

# PLUMBING CONNECTION

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SUMMER 2017



## INSIDE

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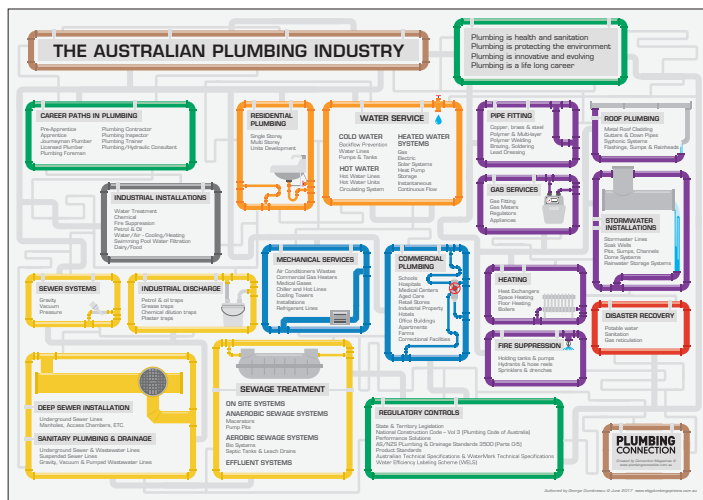
### Bosch Water App

The App for consumers lets the user adjust the temperature, track energy and water usage, and keep an eye on costs.



### Bosch ProWater App

The Installer and Service App allows plumbers to view diagnostics and receive trouble-shooting solutions.



\*Image subject to change

# RAISING THE PROFILE OF BEING A PLUMBER

In our Summer 2016 edition we opened the discussion of how the plumbing industry promoted itself as a profession of choice.

A quick survey of secondary school kids clearly pointed out they knew little about the sector and it was low on their career preferences. Scoping out just what this broad-based sector represents and the exciting flow-on job roles it offers, has been a well kept secret!

Everybody talks about a lack of skills but it appears there is little done to lift the overall competency of the industry or to change public perception.

While few will admit it, I'll say it: the industry comes up short on attracting new talent. The industry has always been strong in utilising the family and friends network, but with changing skill requirements it is important to look at the potential of school leavers and perhaps even mature-age student looking for a career-change.

One of the positive feedbacks from that article came from *Plumbing Connection* reader and contractor, George Dumitrescu of Perth who has made a terrific suggestion on how to raise awareness of the possibilities

as a career plumber through a readily accessible infographic.

Our story on page 46 will tell you more about how this Plumbing Industry Infographic came about and I encourage you to get your hands on a copy. They are available now for purchase at our Trade Store on page 113.

The other bright note is a plumber profile that does see the industry as a positive one – you can read Nick's story on page 42.

## ONLY IN PLUMBING CONNECTION

As usual, there are some great technical stories in this issue from our contributors and writers. While the Flexible Connector piece is long, you really need to understand the situation – hopefully we'll save someone's home from a legal case!

And good old ingenuity by way of clever design appears to have solved that problem of roof overflow – see page 52 for the story on the Dam Buster.

Enjoy the read

*Jeff Patchell*

Jeff Patchell

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**JOHN FENNEL****Priceless Copper**

John Fennell has been the CEO of International Copper Association Australia since 1998 and oversees Oceania and approximately 12 ICA Building Construction Programs across Asia.

**See page 50****DR TERRY LUCKE****Roof Drainage**

Dr Terry Lucke is an Associate Professor in Hydraulic and Civil Engineering at the University of the Sunshine Coast's School of Science and Engineering. He can be contacted at [tlucke@usc.edu.au](mailto:tlucke@usc.edu.au).

**See page 56****PETER MCLENNAN****Backflow Prevention**

Peter McLennan has been involved with Backflow Prevention in Australia since the late 1980s. He is the President of the Backflow Prevention Association of Australia Inc., and Secretary of the Backflow Prevention Association of Australia Inc. Queensland Chapter.

**See page 68****JON PALFREY****In Hot Water**

Jon Palfrey is Rheem Australia's Training Manager and also a qualified plumber. He conducts training to plumbers and specifiers across the southern states, covering the latest water heater technology and key water heating issues facing plumbers.

**See page 72****ENZO ALFONSETTI****Future Energy**

Enzo Alfonsetti is the Manager of Type A Gas Appliance and Component Safety with Energy Safe Victoria. He has a background in certification and testing and extensive technical knowledge of gas appliances. Enzo is the Chair of the Gas Technical Regulators Committee for ANZ and Chair of Standards Australia AG006 committee.

**See page 76****PAUL COTT****Legal Eagle**

Paul Cott LLB (Hons), Grad Dip Legal Practice, LLM is a commercial litigation solicitor specialising in building and construction, primarily domestic projects. He has more than 10 years experience in the industry and has written many articles on various aspects of the field.

**See page 84**

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### MILWAUKEE GETS SERIOUS ABOUT DRAIN CLEANING

The traditional suppliers in the drain cleaning segment are about to face some stiff new competition from Milwaukee plumbing tools.

The brand has been on a strong growth curve with its traditional contractor power and hand tools but is now taking a particular focus on the plumbing and electrical segments.

Milwaukee have redesigned the lighter end of the drain cleaner market with innovative products that feature improved user safety, ergonomics and performance. All the products are powered by Milwaukee's lithium ion cordless battery platform.

Rather than running a cable down a clogged sink to Air Snake is a power gun that releases a shot of compressed air, to blow-out the obstruction, without having to disassemble traps. Set the pressure, seal the tip against the drain and pull the trigger. It then shoots an air charge of up to 50psi through the pipe - effective to 10m.

The M12 Drain Snake is a hand-held pistol grip tool, cable fed with a fixed drum and shield casing that protects both users and fixtures. Weighing less than 5 kgs, this model is for tougher tasks but set-up time is virtually eliminated.



Topping out the range is Milwaukee's take on a sectional drum machine, the Switch Pack TM. This exceptionally mobile unit features a tool-free drum connection with the power pack unit, that comes in the form of a back pack. The drums are fully enclosed and provide protection against mess, particularly useful when walking around a home. Cable sizes can be quickly interchanged or a second drum added for longer reach. An integrated drum brake is claimed to slow the machine up to 5x faster than current drums.

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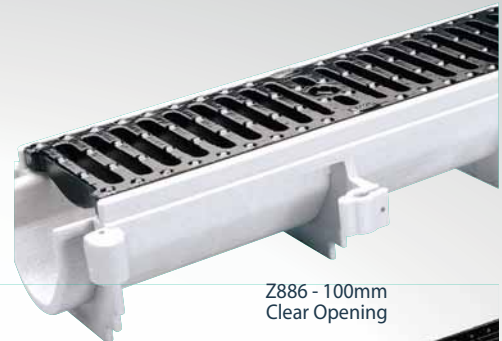


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## CUSTOM PLASTIC FABRICATION

Viking Plastics is an industry leader in fabricating custom plastic tanks, providing world class customised products for specialised applications.

A large number of the products are specially designed or adapted to customers' individual needs. With more than 50 years of experience in the plastic fabrication industry Viking Plastics has the expertise to assist with any specialised design.

"There may be occasions that non-standard products are required. When shape and dimensions are critical, we will attend the site to precisely measure the available space to ensure the manufactured tank is tailored to the precise specifications," says managing director, Malcom Ling.

In addition to prime quality PVC, polypropylene (PP) and polyethylene (PE) plastic, Viking Plastics utilise Paneltim®, an innovative 50mm thick, dual skin sandwich panel that is suitable for welding construction. Featuring an internal cross-rib cell structure, it has superior strength and rigidity in both length and width. Paneltim® is made from Polypropylene Copolymer (PPCO) or High Density Polyethylene (HDPE). The result is a product that is chemical resistant, requires less reinforcement, is shockproof and ensures static and dynamic stability.

Viking Plastics recently received a request for a 3000 litre above ground custom sized grease trap. The trap needed to be installed in a very difficult location within a new restaurant in Duckboard Place, just off Flinders Lane in Melbourne's CBD.

"The only available location to install the grease trap was at ground level, at the bottom of a seven story light shaft in between four buildings. Access was difficult, through a narrow passage way, down a stair well and through a small doorway," says Malcom.



Image above: Duckboard Place grease trap. Image below: Paneltim® internal cross-rib cell structure



Due to the difficult location and complexities on site, the custom size grease trap was manufactured from Paneltim®. Individual panels and components of the grease trap were lowered over the side of a two level balcony and constructed on scaffold before finally being winched into position.

"Every aspect of the grease trap was customised. Most noteworthy, all pipe-work had to be located at one end and an internal pump out port had to be fitted. The use of Paneltim® construction panels, combined with Viking's experience in customised tank fabrication, provided the solution for this very challenging installation."

Manufacturing over-sized mega plastic tanks is all in a day's work

at Viking Plastics. They have the technology and expertise to fabricate tanks to almost any specification, including a 8,000 litre chiller tank for a process plant in Warrnambool.

The chiller tank was built with two chambers – one holding hot water at 50°C, the other chilled water. At 8m x 2m wide, the tank fitted nicely onto a semitrailer for transport to site.

All Viking Plastics' customised products are fabricated in their modern, well equipped facility located in Melbourne, supplying Australia wide. In addition to bespoke products, Viking Plastics also supply a full range of standard grease traps, trade waste tanks, fume cupboards, chemical resistant fume exhaust fans and, ventilation ducting and fittings for fume extraction.

For more information contact Viking Plastics on +61 3 9587 2297 or [www.vikingplastics.com.au](http://www.vikingplastics.com.au)





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**For Approved Certifiers and Users**

The changes will be implemented over a period of time to allow industry to adjust.

The changes include:

- adoption of a sustainable funding model with a simplified annual flat fee per licence;
- establishment of the WaterMark Technical Advisory Committee [WMTAC] to provide technical advice to the ABCB;
- greater alignment of WaterMark product specification development procedures, through the Protocol for Developing Product Specifications, with the Protocol for Developing NCC Referenced Documents;
- commitment for the adoption of the most recent edition of referenced standards, provided they comply with the Protocol, to ensure product specifications keep pace with product evolution and innovation; and

- all existing Australian Technical Specifications [ATS] have been rebranded as WaterMark Technical Specifications [WMTS] – i.e. product specifications published by the ABCB; future new or amended WMTS will require a Deed of Assignment and Licence of Intellectual Property signed by contributors prior to publication.

**For Plumbers, Builders, Architects and Regulators**

The key change that will benefit all plumbers, builders, architects and regulators and onsite trades is the improved WaterMark Product Database with enhanced user interface and search functionality.

WaterMark certificates and/or products can be searched for by WaterMark licence number, licensee name, product specification, product type, brand name, model name or model identification, with additional filters to enable refined searching. From the search results a specific certificate/product may be selected to view more detailed information. This provides a simple means of verifying that plumbing and drainage products have WaterMark certification.

Further information visit <http://abcb.gov.au/Product-Certification/WaterMark-Certification-Scheme>



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# STIEBEL ELTRON



# BURSTING THE FLEXI HOSE BUBBLE

Following on from the previous edition, *Plumbing Connection* organised a workshop with a range of industry stakeholders to discuss the issue of bursting flexible connectors. Adelle King reports.

Last edition, *Plumbing Connection* introduced readers to the issue of bursting flexible braided hoses, which are costing home owners thousands of dollars a year in water damage.

According to research conducted by general insurer IAG, flexible braided hoses accounted for 22% of water damage claims in Australian households in 2016, with the claims most likely to be for kitchen and bathroom damage. IAG has even labelled flexible connectors a “ticking time bomb” and put notices on its website advising home owners that flexible hoses have a lifespan of between five and ten years, and should be checked by a licensed plumber every two years.

However, it’s unlikely consumers will heed this warning and it seems the onus is on the plumbing industry to collectively work together to do something about this issue.

In late July *Plumbing Connection* organised a Flexible Connector Workshop in Melbourne with a range of industry stakeholders to discuss what product types are failing and in what applications, the influences that lead to product failure and how to ultimately reduce the incidence of failures.

The aim of this workshop was to start the discussion process about ways the plumbing industry can take the issue forward.

#### The following people attended:

- Abey Australia general manager Geoff Anderson
- PROVE Standards and Engineering plumbing test consultant Terry Nguyen
- Metropolis Solutions chartered loss adjuster David Pockett
- Metropolis Solutions forensic plumber Russell Kirkwood
- IAPMO Oceania technical manager Glenn Tate

- Shinnors Plumbing owner and Master Plumbers Association [MPA] Victoria vice president Kevin Shinnors.
- Aquaknect Flexibles general manager Tom Davies

Our thanks go to the attendees for their time.

#### THE EMERGENCE OF FLEXIBLE CONNECTORS

The first braided stainless steel flexible hoses came onto the Australian market as far back as 25 years ago and quickly became popular with the plumbing industry. Made from ethylene propylene diene monomer [EPDM] rubber or PEX and armoured in braided layers of stainless steel, these hoses replaced standard copper pipe installations from wall outlets to taps in kitchens, bathrooms, hot water services and laundries. This article primarily focuses on the performance of the EPDM tube version. ➤



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In July Plumbing Connection hosted a workshop with industry stakeholders to discuss the issue of bursting flexible braided hoses.

Flexible hoses are very versatile and significantly reduce the time it takes to hook-up hot and cold water pipe appliances, such as taps, dishwashers and water heaters. They also overcome alignment problems and significantly reduce labour costs and noise in pipe work, as well as eliminate brazing, welding, cutting, re-shaping and waste.

Over time, the popularity of these connectors has led to them being included with the supply of many tapware ranges, whether mixer or hob mounted, and other fixtures. There are now approximately seven million flexible connectors sold annually in Australia and some of these are low-cost products from as little as \$3-\$5 from hardware stores.

Recent data released by insurance companies, including NRMA Home Insurance and general insurers IAG, QBE and Budget Direct, shows flexible braided hoses that have leaked or split are the number one cause of internal flooding in Australian homes.

NRMA Home Insurance says the average claim for escape of water in 2016/2017 was \$4,818 [excluding excess and GST] but there have been reports of some claims costing tens or hundreds of thousands of dollars.

IAG executive manager for short tail

claims Cheryl Chantry says properties between 11 and 30 years old are most likely to suffer an escape of water claim as flexible hoses generally only last 10 years. Yet the experiences of attendees at the workshop suggest some flexible hoses are bursting within a couple of months of installation.

Working out why this is happening and how it can be prevented isn't as simple as pinpointing one cause and one solution.

It's important for the plumbing industry to start a discussion and begin educating plumbers, manufacturers,

TAFEs, insurers, regulators, government and consumers about the risk of flexible hose burst failure.

### BURSTING AT THE SEAMS

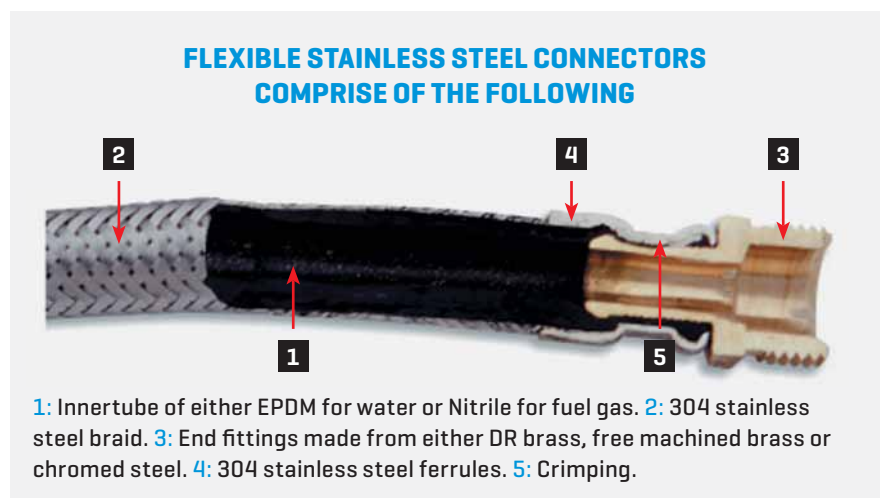
Based on analysis of burst flexible connectors, it seems to be the braided stainless steel component of the product that is failing.

The rubber tube lining in flexible connectors expands when pressurised and the braided layers of stainless steel are designed to prevent this tube from further expansion. If the stainless steel fails, the rubber inner core will expand to a point where it bursts.

"This is primarily caused by a slow leak at the connection point, which runs down the hose into the braided stainless steel and leaves a deposit of chloride. Over time these chloride levels increase in the deposit creating pitting corrosion. The pitting locally reduces the cross-section of the wires to a point where overload failure occurs [due mostly to the hydrostatic water pressure]," says Metropolis Solutions forensic plumber Russell Kirkwood.

Chloride is present in natural waters from the dissolution of salt deposits and as a result, Australian drinking water has low chloride levels of up to 350mg/L.

Abey Australia general manager Geoff Anderson says that generally the 60/60/60 rule will enable stress corrosion cracking to occur. This is where water temperature is 60° with 60ppm of chloride and 60% of yield stress.



"Once the water reaches 60°, the evaporation process leaves behind a deposit of chloride. Over time the process continues and the chloride level increases in the deposit until it reaches a level that enables localised corrosion of the stainless steel to occur. Since the cracks caused by stress corrosion cracking are so fine, they are difficult to detect," says Geoff.

This corrosion eats away at the individual metal strands of the steel sleeve, which eventually fail and break. When enough of these strands fail, the steel sleeve is no longer able to support the inner lining and water pressure causes the lining to bulge out of the sleeve. This leads to the lining rupturing and water escaping.

The presence of water exterior to the hose is required for corrosion, which is why most failures are seen under kitchen, laundry and bathroom sinks, toilets and dishwashers, rather than on connectors to gas stove cook-tops.



The stainless steel braided sleeve corrodes, causing the rubber inner tube to expand and burst. Image supplied by Neil & Craig Baker Plumbing - NSW.

Materials Solutions Australia [MSA] engineering director Trevor Rowlands says pulling apart burst flexible connectors clearly shows the moisture path and evidence of corrosion.

"Stainless steel isn't impervious to corrosion and can become vulnerable when put through certain conditions. However, the stainless steel braiding is appropriate for its function and it's the leakage at the connection that is the issue. You can always trace a leak path in these hoses and all the ones I've seen have had a leak path at the connector."

#### WHY IS THIS HAPPENING?

There are various reasons why this leakage occurs but four main issues arise based on experience in the field. These are installation, the effects of water hammer, the quality of materials in the manufacturing process and household cleaning products being stored within the vicinity of flexible braided hoses in homes. ➤

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Other than poor quality, the majority of these reasons are not due to the connector itself, which suggests the issue of bursting flexible hoses is largely preventable.

## INSTALLATION

Russell and Trevor both suggested installation issues are playing a big role in bursting flexible braided hoses, particularly in regards to the tightening of the nuts at either end of the connectors.

"Where the nut is connected at one end under the sink or to the mains water its fine but when it comes to tightening up the second nut, which connects to the tap assembly, the design is such that the first nut can become loose," says Trevor.

"When you tighten the first nut, the second nut can actually partially loosen off again if the ferrule isn't gripped or held at the first end."

This slight loosening leads to a slow leak that allows water to migrate across the rubber seal face down to the back face of the nut and eventually onto the braiding.

Tightening the nuts is also an issue where the installing plumber hasn't torqued one or both of the nuts sufficiently. If it's too loose it creates a leak path and if it's too tight the seal will rupture.

## CONSIDERATIONS FOR PLUMBERS

Below are five key considerations for plumbers when specifying and installing flexible hoses from attendees at the *Plumbing Connection* flexible hose workshop.

1. Ensure you purchase the correct length of hose for the installation. It's better for the hose to be too long rather than too short as this allows the hose more space and reduces stress on the connections.
2. Ensure the connections are firm and leak free.
3. Offer to routinely inspect flexible connectors as part of a regular maintenance in all premises that you visit.
4. Be prepared to pay slightly extra for a quality connector from a reputable supplier that offers a credible warranty.
5. If you become involved in a flexible hose failure, photograph the hose in detail and in situ with context photos. Retain the photos securely and the hose in a sealed bag as evidence with clear labeling. Only release this item directly to an independent material testing expert who signs for it.

"These end in the same result, which is corrosion of the stainless steel braiding, leading to wire breakage and then the rubber tube expanding and bursting," says Trevor.

The rise of the DIY culture in Australia and the low cost of these connectors are also increasing the likelihood of flexible hose failures, as they encourage handymen to attempt installations themselves.

General insurer Budget Direct says on its website that this is compromising the integrity of flexi hoses in homes as DIY is more likely to result in flexible hoses being damaged at the time of installation, which then increases the chance of bursting.

There are fears that eventually insurance companies will begin disallowing claims if customers can't prove installation by a licensed plumber as well as regular maintenance.

"There's a significant risk here for the home owner and it's likely to get far worse given the high rate of losses insurers are currently reporting due to these flexible connectors," says Metropolis chartered loss adjuster director David Pockett.

## EFFECTS OF WATER HAMMER

Although by itself water hammer will not cause failure, it is a contributing factor that can play a role in the final catastrophic failure of a flexible braided hose once it has been brought to a vulnerable point.

Phillip Woolhouse has more than 30 years experience in the plumbing sector and is the principal consultant at Phil Woolhouse Hydraulics in Perth. He says the speed at which modern tapware can be isolated puts the rubber seal under constant force.

"Mixer taps can be closed in a fraction of a second and the faster the tap is isolated, the higher the pressure shock. Pressure well above 500kpa can be experienced by modern fast-closing tapware and this generates massive shock pressures within the piping system."

According to Trevor, this can cause the rubber seal to react by compressing over time and forming a permanent stress.



Common household cleaners stored under kitchen or bathroom sinks where flexible braided hoses are installed can create fume cupboard environments that corrode the braided stainless steel sleeve, leading to bursting hoses.

"Some rubber does have a memory effect and will shrink. Over time this loosens the nut and there's less contact pressure on the seal face, allowing water to leak."

## QUALITY OF MATERIALS

With the price of flexible braided hoses continuing to drop and a number of new products entering the market, there are concerns that the quality of steel and brass components being used in some hoses are contributing to the early failures being seen in the field.

Trevor says he has come across flexible braided hoses where the brass barb fittings were not properly manufactured or heat treated.

"Alpha-beta brass had been used, which is cheaper but more susceptible to de-zincification corrosion, and had not been carefully controlled during the manufacturing and thermal cycling process. The aim is to produce a microstructure with 'islands' of beta phase but when they interconnect, forming a continuous network, once corrosion occurs it creates a continuous pathway allowing water to pass through the cross-section of the barb fitting from the inside to the outside surface. The water is then in direct contact with the area where the rubber tube of the hose and the stainless steel braiding are crimped."

# ARE YOUR STANDARDS



If you're penny pinching by using non-conforming AAV plumbing products... think again.

Australian Standards are there to provide baseline safety and performance standards that products have to meet. Without certification, products are not fit for use. If you are using dodgy products that don't conform, it could cost you in the long run, as authorities take a closer look at non-conforming building products (NCBP's).

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Aquaknect Flexibles general manager Tom Davies says he also has concerns about the wire size being used on the braiding as a weaker braid is more likely to fail. The company, which is an Australian manufacturer of flexible braided connectors, uses a minimum wire size for braiding of 0.23mm.

"This is the minimum for us but there are some manufacturers where the largest wire is 0.15mm, which is 33% thinner, and you can see through the gaps to the rubber underneath. With the tap being turned on a few thousand times, the hose flexes back and forth, causing a weaker braid to fail regardless of whether the braid has broken," says Tom.

"Additionally, less mass means quicker corrosion."

There are suggestions that these low-quality products are able to make it to market by unscrupulous suppliers that are defrauding the WaterMark product certification system with what's known as the 'golden sample'.

The 'golden sample' is when a product supplied for third-party testing is of a high enough quality to pass requirements but the product supplied when large orders are placed is substituted with a low-cost alternative.

## FUME CUPBOARDS

Common household cleaners kept under sinks and cupboards create

a 'fume cupboard' environment in areas where flexible braided hoses are installed and is a potential second source of corrosion causing flexible connectors to burst.

The presence of stored household cleaners in closed environments causes the level of chlorine in the air to rise to measurable levels because many common cleaners contain chlorinated chemical solvents, liquid chlorine or crystallised chlorine chemicals. These remain in the air long after the product has finished being used.

"In most cases cleaning products are stored in bathroom, kitchen or laundry sink cabinets where there is high humidity caused by condensation from hot water being run through the taps and bowls above the cabinet," says Tom.

"Chlorine dissolves in humidity and forms hydrochloric acid, which is highly corrosive. Therefore the number of failures in this environment caused by corrosion is high."

Cheryl from IAG says that the company's research backs up this claim, with IAG data suggesting flexible braided hoses eroded faster if household cleaners are stored under the sink.

## PLUMBING INDUSTRY RESPONSE

Starting a discussion about the issue of bursting flexible braided hoses is an important first step but action needs

to be taken to bring the problem to the attention of regulators, government, TAFE's, manufacturers and consumers.

"It's still only a small percentage of the industry that realises this issue is happening," says Trevor.

At the workshop hosted by *Plumbing Connection*, there was consensus that the current AS/NZS3499:2006 *Water supply – Flexible hose assemblies* needs to be updated.

"Changes to the Standard need to reflect technology and practicality. The current version was last reviewed in 2006, with a small amendment in 2009, and since then there have been many regulatory and technological changes," says Tom.

There are also concerns that manufacturers are actually writing their own interpretation of the Standard, with one supplier on the shelves of a prominent Australian outlet providing a selective product warranty that "covers domestic use only and not for commercial applications".

Representatives at the workshop discussed the possibility of proposed changes to the Standard, including introducing a minimum wire diameter for the stainless steel braid, future testing for things like corrosion, markings on the inner liner of hoses to identify manufacturer and changes to the classification of hoses.

Trevor agrees that there are things within the current Standard that are not ideal but says because many of the issues causing burst flexible connectors may be the result of incorrect installation, a change to the Standard will not have much of an impact.

"The manufacturers and suppliers of these hoses need to implement specific requirements about how flexible hoses are installed and maintained. I think that's probably going to solve a lot more problems compared to the Standard."

Regardless of how the industry decides to take this issue forward, it's important that action is taken soon.

"Unless the whole industry gets together and does something, we will still be talking about this in a few years," says Shinn's Plumbing owner Kevin Shinn's. ■

FLEXIBLE CONNECTORS	
THE QUESTION IS	RECOMMENDATION
How do I tell good from bad, when installing flexible connectors?	Approved product will carry WaterMark identification and its certifier number.
What does the brand warranty tell me?	Use one that has clauses that don't get you into hot water.
How old is it and how long ago was it installed?	More than 10 years and any flexi should probably be replaced.
Is it good quality – thick braiding, good fittings?	Cheap and cheerful – if it is too good to be true, then look for alternatives.
Is there high water pressure on site?	Consider a pressure reduction valve to limit pressure shock through the flexi hose
Are there cleaning products in the same cupboard?	Suggest a vent hole to allow regular airflow in and out to reduce chloride levels.
Are there signs of water drips or rust on the flexi hose?	Could be a ticking time bomb, replace before failure.
Does the flexi suit the temperature and pressure of the site?	Replace it with a more appropriate flexi hose that's up to the task.
Does the homeowner's insurance policy restrict or exclude cover for losses arising from flexi hose failures?	Suggest a regular maintenance regime, copper or change insurer.



## NEW TO MARKET

There are some companies within the plumbing industry that are taking a proactive approach to preventing and reducing the incidence of bursting flexible connectors. Below are some products that can help protect customers against water damage caused by failing flexi hoses.

### AQUASHIELD

The Aquashield range of flexible connectors from Aquaknect Flexibles, feature a specially designed plastic protective coating. The coating is applied over the stainless steel braiding, making it more resistant to corrosion. Aquashield can be used in hot and cold water applications, operates to 3,450kpa and helps to prevent kinking.



[www.aquaknect.com.au](http://www.aquaknect.com.au)

### WHISPER FLOOD STOP ISOLATING VALVE

Developed by Con-Serv, the Whisper Flood Stop Isolating Valve offers a low-cost safeguard to ensure property damage is minimal if a flexible connector does burst. This Watermark approved  $\frac{1}{2}$ " F&M brass device limits water leakage to less than half a cup of water thanks to an integrated ball valve that isolates the damaged hose should a failure occur. It also comes with a \$10m product assurance warranty from Con-Serv.



[www.con-serv.com.au](http://www.con-serv.com.au)

### SOFTPEX®

SOFTPEX® flexible connectors from Neoperl can get all relevant approvals including Watermark [depending on the exact hose configuration]. Their Softpex inner tube has a proven 0% failure rate since its market launch 14 years ago and offers strong resistance against additives in drinking water such as chloramines and chlorides, which helps to prevent corrosion.



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# BRASSED OFF IN PERTH

It's official, the cause of lead in water systems at Perth Children's Hospital is the result of dezincification in brass fittings, according to the Chief Health Officer Review of July 2017.

In what is hoped will be the last word on the problem-plagued construction of Perth Children's Hospital, a review by the Chief Health Officer (CHO) has deduced the cause of lead in the drinking water supply.

The results of the data analysis and investigation, published in *Report on Perth Children's Hospital Potable Water, Chief Health Officer Review, July 2017*, indicated:

1. "the source of the lead in the water is from brass fittings that have undergone a process of dezincification;
2. many of these brass fittings are located within approximately 1200 Thermostatic Mixing Valve (TMV) Assembly Boxes, located within a metre or two of drinking water outlets; and
3. phosphate treatment has been partially but not sufficiently effective in reducing lead levels."

The summary of the findings included observation of surface deterioration on the brass fittings of some TMV assembly boxes which was identified as dezincification. What is also of concern is that "some components of the TMV assembly boxes lack Australian Standard identifying markings and appear to be deviations from specified and approved materials".

The report goes on to point out that: "The findings around lack of important documentation,... may in part explain why the problem with the TMV Assembly Boxes was not identified earlier. For example, the chlorination process was poorly overseen, poorly documented, and then was not examined strenuously nor as a matter of urgency in the period following identification of the lead in water issue, despite its clear link to dezincification. Put another way, failures of the contract management and assurance function

## A HISTORY OF PROBLEMS:

<b>FEB 2010</b>	Western Australian government announces the Perth Children's Hospital project will go ahead
<b>JULY 2011</b>	John Holland is awarded the construction tender
<b>JANUARY 2012</b>	The first sods of dirt are turned to commence construction
<b>SEPTEMBER 2013</b>	Pressure mounts to add more floors and wards to the original design
<b>JUNE 2015</b>	Rumblings are heard that many contractors haven't been paid and owed significant amounts of money
<b>MARCH 2016</b>	A complete section of water pipes fail, requiring full replacement
<b>APRIL 2016</b>	900 fire door frames are found to be non-compliant. The CEO of the hospital resigns
<b>MAY 2016</b>	The first traces of lead are found, but nothing is said publicly. Replacement of the iconic green interior panels is required after many are damaged in-transit.
<b>MAY 2016</b>	A section of the basement is flooded when pipes fail
<b>JULY 2016</b>	Concerns for worker safety are raised when traces of asbestos are found in non-compliant roof panels
<b>AUGUST 2016</b>	An official opening date is yet to be determined
<b>SEPTEMBER 2016</b>	Official recognition of the presence of lead in the potable water, but no reasons are given
<b>DECEMBER 2016</b>	The whole plumbing system is given a flush-out to see if fixes the lead problem. It didn't.
<b>APRIL 2017</b>	John Holland is given the bill for the lead issue. Phosphate is given a go to flush out the problem. Worked a little.
<b>APRIL 2017</b>	Blame for the lead is put on the water supply in the medical precinct and brass fittings
<b>MAY 2017</b>	First indications from a government report suggest that dezincification in brass fittings may be the root cause in the Jacobs Report
<b>JUNE 2017</b>	Another CEO resigns
<b>JUNE 2017</b>	An official inquiry is launched to be conducted by the CHO. There is growing evidence that some stainless steel is corroding rapidly
<b>JULY 2017</b>	It's official. The Chief Health Officer report conducts thorough testing to show that the brass fittings in thermostatic mixing valve assembly boxes are suffering dezincification, elevating the levels of lead in some 1200 units and will need to be fully replaced.
<b>SEPTEMBER 2017</b>	Legal advisors to WA government suggest that John Holland may be liable to pay \$42.5m for delay penalties in completing the build

during the construction phase may underpin both the emergence of the problem and the failure to identify and address it in a timely fashion."

The full report can be found here: [http://ww2.health.wa.gov.au/~/\\_/media/Files/Corporate/Reports%20and%20publications/Perth-Childrens-Hospital/CHO-PCH-Report.ashx](http://ww2.health.wa.gov.au/~/_/media/Files/Corporate/Reports%20and%20publications/Perth-Childrens-Hospital/CHO-PCH-Report.ashx)

Since the report's release, official word from Perth Children's Hospital (PCH) still has no clear indication when

the facility will be officially opened - it is unlikely to be in 2017 - but 'work is continuing at PCH to complete the water remediation activity as soon as possible' [as at September 14, 2017].

A Potable Water Remediation (PWR) Working Group has been established for daily monitoring of the progress. The Western Australian Health Minister has advised that by November a timetable will be established for the opening of the hospital. ■

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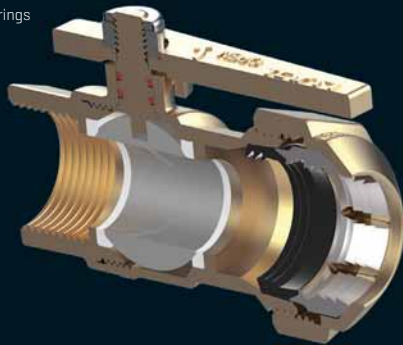
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# BUILDING EQUINE EXCELLENCE

Willinga Park Equestrian Centre is the realisation of a dream to produce a world-class facility. To make it happen required extensive planning and design from a suite of building, plumbing and electrical specialists. **Deborah Andrich** reports.

Philanthropist Terry Snow, is no stranger to big build concepts and outcomes. As the owner of Canberra Airport and its current re-development, he commissions experts to design and build the best possible buildings and surrounds to create exceptional results.

Such is the case for Willinga Park Equestrian Centre at Bawley Point, NSW.

Discovering a love of horses later in life, Terry decided to build a state-of-the-art horse breeding facility for Australian Stock Horses and an international-level equestrian centre for performance horses. In an interview with *Australian Financial Review*, Terry said that his vision was 'to create a place of paramount excellence in terms of breeding, showing horses and

hosting equestrian events, including dressage, showjumping, campdrafting, and vaulting. Most horse people are interested in a range of events – so that's what we'll give them...everything'.

The facility has been built on Terry's 100 ha property north of Batemans Bay. In line with his philosophy of 'the pursuit of excellence', Willinga Park provides a 100m campdrafting arena and judges box; two round yards; two open dressage arenas; a grand prix arena; covered arena with seating for 500 spectators; polocrosse field and pavilion; 32 stables [primarily for Terry's breeding program and horse auctions] and a veterinary room, reception building and an administration area. Building is underway to provide another 160 stockyards for visiting equestrians.

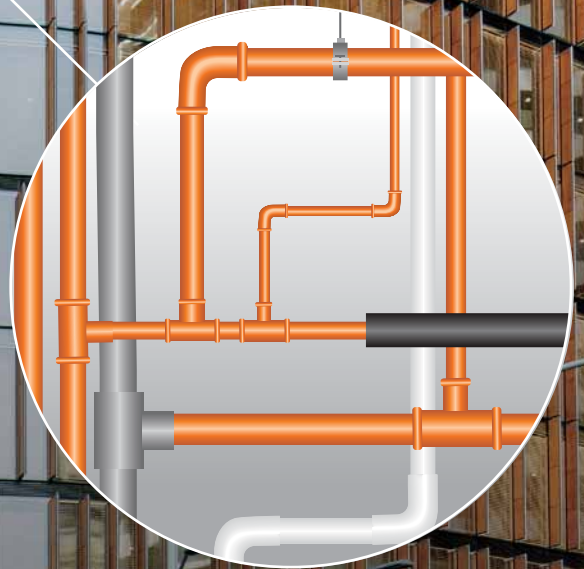
Project management team,

Construction Control have been involved since conception in 2014, in conjunction with well-respected Canberra design firms, Cox Architecture, Norman Disney & Young, Vital Design Solutions [hydraulics and plumbing], Shepherd Electrical, DZ Designs [landscaping] and Sydney-based Lighting Design Partners.

"The original scope of works was to build the main stables, the grand prix arena and the reception building, but then we added the polocrosse field and pavilion, campdraft building and assembly area," says project manager, Andrew Sharpe of Construction Control.

"Then the covered and open arenas, 4.5km of sealed road, the heated equestrian hydrotherapy pool, horse walker and administration building. And now the 160-capacity stockyards. The project has evolved over time but in ➤





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**Top:** Lighting is designed to factor in equine vision tolerances and to minimise night light spill. **Bottom:** The soffit of the polocrosse pavilion.

everything we aimed for best value and quality.”

The wait has been worth the effort, as Willinga Park has picked up two awards from the Australian Institute of Architects’ 2017 Architecture Awards held in June – one for interior design, the other for public architecture. Construction Control has also received accolades at the 2017 ACT Master Builders Awards.

The site presents three key challenges – locality, water and power.

At 38 km from Bateman’s Bay, trucking

the necessary materials required its own logistics program. Using upwards of 9000m<sup>3</sup> of concrete at a maximum of 100m<sup>3</sup> per day, the roads into Willinga Park were a constant flow of concrete trucks. Project sequencing had to be precise to cope with the lack of access options and resource availability from surrounding areas, Canberra or Sydney.

All water onsite is rainwater only. A massive array of water storage tanks and dams are the only option – the mean annual rainfall for Bawley Point is in the order of 1200mm per year (compared

with Sydney at 1085mm). So while water is not usually a problem, it still needs to be used wisely.

Power presents its own challenges.

“Terry’s property is at the end of a spur line – one power line comes in – there is no return loop,” says Andrew. “We can only draw as much power as the line can provide and it is prone to blackouts from weather events. As a result, solar panels and diesel generators are the back up.”

### BUILDING BY DESIGN

The overall design of the complex is a far cry from traditional horse properties – there are no barns, western themes or horseshoes for good luck, but rather it reflects Terry’s admiration for Canberra’s modern architecture.

A prominent feature of the complex is the roof line over the Main Round Yard shaped to resemble a saddle. The Covered Arena uses a sawtooth roof construction, with cutouts made from a Danpalon product which is angled toward the south east to reduce direct midday sunlight, which also makes the orientation perfect for solar panels which are on the north facing roof of the saw tooth. The roofs on the Reception building, Main Stables and other non-training facilities are clad in copper, as much for its aesthetics and patina as its longevity.

### LIGHTS, CAMERA, ACTION

In line with Terry’s love of architecture and sculptor, Lighting Design Partners was instructed to enhance the visual appearance of the facility, while maintaining the light levels needed for the horses – in the training facilities and for television broadcasts.

“The brief for the lighting was done in conjunction with the architect and interior designer to deliver a contemporary visual language representing a ‘Modern Rural Australia’,” says DJ of Lighting Design Partners [LDP]. “The buildings have strong, bold forms with copper and timber surfaces from which the light reflects from. The reception building, an architectural masterpiece, is lit from invisible sources [nearly entirely]. At night, the building radiates light. Special housing details



were created to install the fixtures. One of the design criteria was to have no upward light spill at night to prevent disturbance to the surrounding fauna."

In researching the lighting needed for horses, LDP discovered that equine vision is sensitive to shorter wavelengths and moving shadows. The stables are lit via indirect illumination and from glare-free linear sources which ensure good vertical illumination on the faces of the horses.

"The covered arena, though simpler in some aspects proved a different challenge, it is a full-fledged Olympic grade show-jumping and dressage venue, complete with broadcast quality lighting," says DJ.

#### KEEPING THE SPARK

"Power supply is one of the biggest challenges with the Willinga project," says Neil Shepherd of Shepherd Electrical. "Bawley Point is a small coastal town that is simply not used to

having such a huge point of load from one customer. As a result, solar PV and generators have to be used to provide what we need."

Power generation is currently supplied by two utility pad-mount sub-stations distributed strategically around the property, supported with stand-by diesel generators should power go down. Solar panels provide approximately 100kW. The sawtooth roof on the Covered Arena provides 75kW while another 25kW is from the workshop roof. The diesel generators are designed to provide 72 hours power capacity at full load across the whole facility.

The primary source of power is solar, but should the day be cloudy or the battery storage is low, the grid is utilised to re-charge the batteries using the off-peak tariff. The majority of the power drain is through lighting – particularly for night events when the arenas, pedestrian areas and roadways

need illumination.

Other power users onsite are the heated horse hydrotherapy pool which requires an electric heat pump; water distribution pumps using VSDs for pressure on demand, plus three Stiebel Eltron instantaneous hot water systems. In addition, the hydronic heating system pipe work incorporated into the reception building slab for future use, has now been connected. Cold winter days are not uncommon in the region says Neil.

Neil and his team are also in the process of installing a BMS Scada monitoring system that is able to identify any alarm or alerts from pumps, solar PV, batteries – wherever there is a requirement for notification to tradesmen.

#### WATER, WATER, EVERYWHERE

In the days when the site was Terry's holiday home, a storage water tank of 1.6 million litres was used. With the

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The sawtooth roof design reduces shadows on the horses while providing an optimal orientation for solar panels.

development of the equestrian facility further storage tanks were installed, including 1.8 million litres of in-ground tanks under the grand prix arena. Further water storage is provided at individual buildings typically of 100,000 – 200,000 litre capacities, plus a number of dams around the paddocks to supply the water troughs.

“Rainwater is collected from the Colorbond roof on the covered arena – a catchment area of 6,200m<sup>2</sup>, which is potable. It is UV filtered and sterilised for human consumption. Once full, those tanks overflow into the non-potable tanks which are used for stock drinking, washing down the horses, cleaning the stables and irrigation. Water from the copper roofs is re-directed away from potable sources.”

“The water collected from the copper roofs is still compliant as potable drinking water,” says Josh Pirotta, services manager with Vital Design Solutions. “As the roof ages, the salty sea air will increase the level of copper ions that are generated, to a point that is no longer acceptable for human consumption. So rather than face that complication in five years, the decision was made to re-direct that water to non-potable storage.”

The whole system is pumped from three main pumping stations, capable of

up to 1000 litres per minute, contained within the basement as much for aesthetics as for maintenance. In essence, Vital Design Solutions opted to run two independent pipe works for potable and non-potable water. As a consequence the biggest challenge was to prevent cross-contamination between the two streams.

To manage stormwater, there are three systems in place. The first is essentially the potable water from the Colorbond roof, the second handles the non-potable water from the copper roofs, and the third is the civil stormwater. The civil stormwater collects water from surfaces such as the roads, pathways and horse washdown. It is then directed into a bio-retention basin to improve the water quality using vegetation before it reaches the downstream water systems at the bottom of the property. Horse waste solids are recovered and composted, broken down and macerated for use as fertiliser. The septic system for human waste is based on an envirocycle system which aerates waste in a similar concept to a small tank system.

“Of the water used, about three-quarters is non-potable for applications such as garden irrigation and keeping the grass in the holding yards green for

horse grazing,” says Josh. “We have created an overflow daisy chain system that means that tanks overflow into the next. Pumps can then redirect that water to wherever we need it around the property. The addition of a bore means we have another option to fill tanks should we need it.”

Other water uses on site include an evaporative misting system in the stables to cool the horses in hot weather, the training pool and hot water systems. The forthcoming 160 stockyards will have their own standalone water supply pipe work.

“We have designed the system to be as low maintenance as possible, including automatic backwashing filtration if there is too much friction across the filter, which reverses the flow of water and discharges all the wastewater out to a drain,” says Josh. “With alarms, we can monitor what is happening anywhere on site.”

## THE NEXT PROJECT..

Since the facility opened, a further 160 stockyards are under construction for eventers to house their horses for equestrian events. The scale of this is particularly challenging.

For the contractors, it requires a new level of thinking. For Neil, he will need to develop a cutting-edge method of power supply – the grid simply won’t cope. He estimates he will need about 500kW of solar, 2MW of stored energy (Lithium ion battery is the current leader with conversations underway with Magellan, Tesla and Flow Technology) and 3MW of stand-by diesel generation systems.

Josh needs to re-think how much water will be needed for washdown, drinking, cleaning and misting, and what capacity hot water services. For DJ, the lighting will still need to be in keeping with architectural design but particularly mindful of equine light tolerances.

The project while challenging has been rewarding for all the contractors involved. For those in the equestrian industry, the development of Willinga Park as a world-class facility has been a welcome addition to the international circuit of eventing. ■

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**A**s every plumber knows water pipes in many cases can be up to or more than 70 years old. So, it is no surprise that researchers from Macquarie University have detected traces of copper and lead contaminants in domestic water samples from kitchen taps across New South Wales.

Many consumers don't understand the importance of water filtration in their homes. It is therefore up to professionals in the industry to educate consumers about the risks associated with prolonged consumption of these contaminants and the long term effects they have on brain development and liver function.

"My results show that there is quite a significant concentration of lead and copper in the drinking water that is coming out of people's kitchen taps into their morning cup of tea, or baby formula," says lead author of the study PhD researcher Paul Harvey.

The team tested 212 'first drawn' samples from kitchen taps following having the water sitting in a tap for a 9 hour stagnation period – similar to what happens when you run the tap in the morning to make your morning cuppa. All samples contained copper, while lead was present in 56% of the households tested.

Notably, 8% of the lead samples contained higher than 10 micrograms of lead per litre, where Australian guidelines stipulate that drinking water should not contain any more than that.

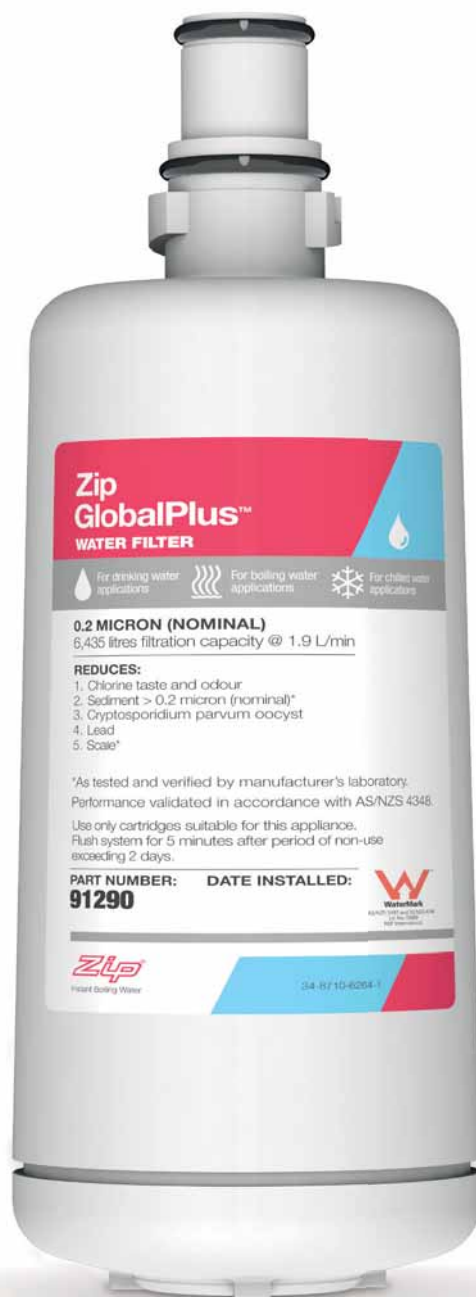
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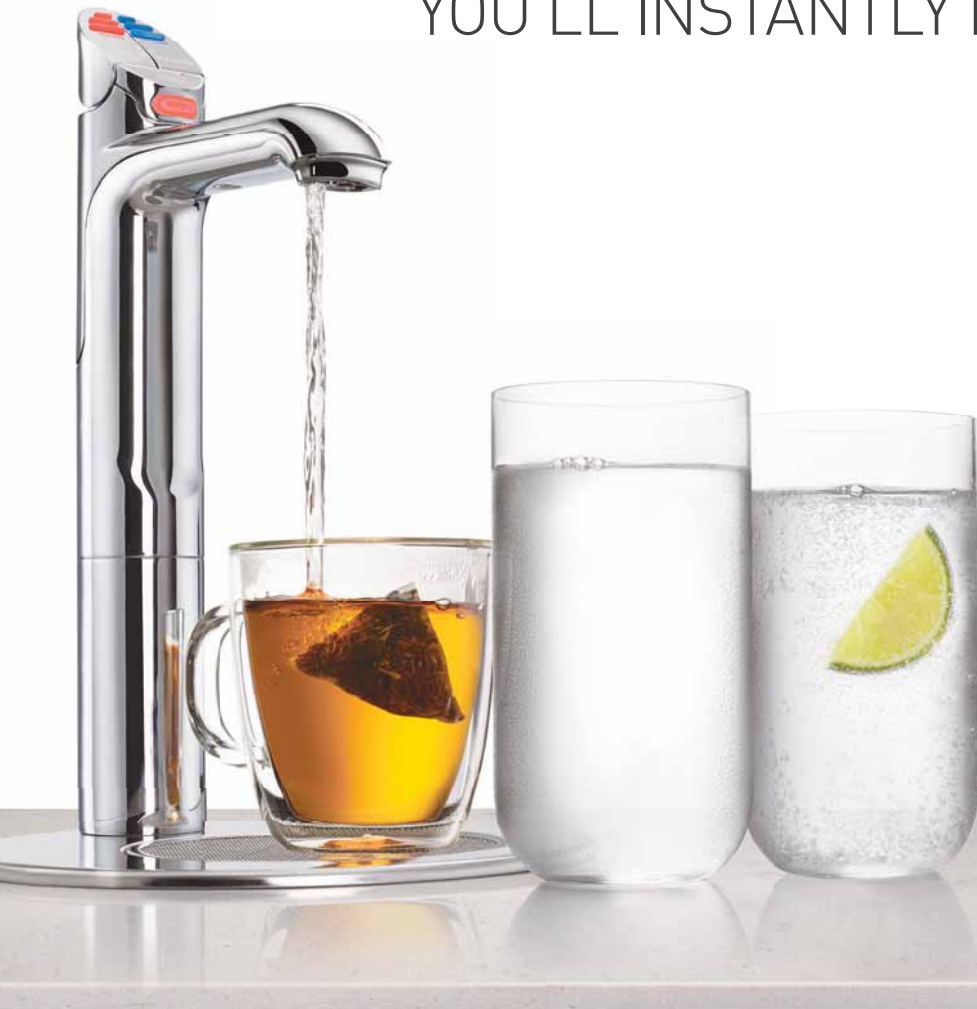
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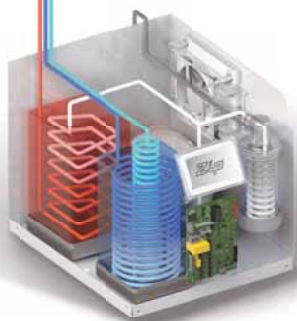
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# FOUR PILLARS OF PLUMBING FRAMEWORK

The World Plumbing Council wants strong industry frameworks for plumbing industries, and believe it can be achieved from plumbing industries learning from each other. The president, **Shayne La Combre** asks for your help.

The World Plumbing Council (WPC) describes the *Four Pillars of Plumbing* as the frameworks of plumbing industries in four dimensions:

- **Participation:** primarily the training requirements to work in the industry
- **Practices:** standards and accountability in day-to-day work in the industry
- **Products:** features and quality of the materials, fittings and appliances used in plumbing work
- **Protection:** measures to minimise risks and provide redress when failures occur.

The first step for this initiative is simple. The WPC is asking for a clear description of the training requirements to participate in the plumbing industry in your country or jurisdiction. The WPC has a guideline for producing the descriptions but will be happy to receive a description in any form.

The second step is optional but should also be simple for many stakeholders in plumbing industries. The WPC asks you to state any changes you want regarding training requirements for your plumbing industry and to note any evidence or arguments supporting your wanted changes.

In other words, the first step asks you to give a straight factual picture of the current training requirements for your plumbing industry, the second step asks you to state what you think the training

requirements should be and why.

Through these two steps, the aim is to create a storehouse of per-country or per-jurisdiction case studies concerning training requirements to participate in plumbing industries.

After we have gained a collection of case studies for the Participation [training-requirements] 'Pillar', we will repeat the process to obtain case studies for the other three Pillars.

The WPC held its first *Four Pillars of Plumbing Forum*, focused on training requirements, on 19 October 2017 in Abu Dhabi, in conjunction with the 2017 WorldSkills Competition. The initial phase of the *Four Pillars* program will culminate in the next World Plumbing Conference in September 2019, in Melbourne Australia. The theme for the Conference is: *What's the best way to build a plumbing industry?*

Plumbing industries can get ideas for improving their industry frameworks by learning about the features

of frameworks in other jurisdictions. We can jointly gather evidence and arguments that support establishing – and in some cases defending – strong frameworks for plumbing industries. WPC Members, and other organisations that contribute case

studies, will be able to draw on this unique storehouse of knowledge. WPC Members will also be able to obtain tailored information from the WPC Secretariat drawn from analysis of the case studies.



Shayne La Combre asks for the plumbing industry to contribute to the Four Pillars of Plumbing

The WPC does not think there is a one-size-fits-all 'best' plumbing industry framework. The economic, institutional and cultural environments of plumbing industries, and the scopes of plumbing industries, are too varied globally for there to be one ideal framework. But we do think better frameworks bring better outcomes, with the outcomes ranging from better availability of clean water and efficient sanitation services to better prosperity of plumbing businesses and better growth of strong plumbing industries.

If you are willing to help this initiative, whether by contributing a case study for one or more of the Pillars or some other means, please contact the World Plumbing Council on [secretariat@worldplumbing.org](mailto:secretariat@worldplumbing.org). ■





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# WELS CONTINUES TO RAISE THE BAR ON WATER SAVINGS

Water efficiency is again at the forefront of public and industry awareness as changes to the WELS scheme take effect.

**T**his year, the Water Efficiency Labelling and Standards (WELS) scheme is looking harder at the building industry and has been addressing non-compliance by giving infringement notices to businesses that don't respond to educational approaches.

A legislated program, WELS is designed to help businesses and consumers make decisions about choosing products that reduce household water usage.

Developed in 2005, the scheme specifies and enforces efficiency standards and labels on toilets, urinals, tapware, showers, flow controllers, clothes washers and dishwashers.

Under the regulations, these products are required to be registered on the WELS database and labelled with their water consumption and star rating as specified by AS/NZS 6400:2016.

Products regulated by WELS are also required to have WaterMark certification, but the onus on who must make sure the product meets requirements is different for each program.

In general, WaterMark certification is required before a product can be legally installed by a licensed plumber. With the WELS program, the responsibility to make sure the product is registered and labelled rests with the supplier – which can be a builder or developer selling a new unit or building with WELS products in it, a wholesaler or retail outlet, or a plumber who provides and installs the product.

"The WELS legislation applies when someone supplies or offers to supply a new WELS product," says Dr Carol Grossman, director of the WELS Section within the Department of Agriculture and Water Resources. "Any time a product on that list is offered for sale in Australia, the legislation will apply and the product should be registered and labelled. Initially it needs to be tested for its water efficiency, registered with WELS and then the label or text-based

WELS information must be provided to purchasers.

"It is not about who installs the product, but if the plumber supplied it, then that information needs to be provided. It only applies to new products, but it also applies in new homes when offered for sale for the first time. If the WELS product is sold as part of that home, the legislation is crafted to include new buildings. So when you look at a display home, with new taps and toilets, then



**Selling a plumbing product without a WELS label makes you liable for any problems that may occur.**

the WELS information should be part of the display and the inclusions list. Water efficiency can be a useful selling point for the home."

The WELS label is the recognisable blue and white arch with stars which indicates its' water efficiency rating and water consumption figures, making it easy for consumers to compare products.

Under the *Water Efficiency Labelling and Standards Act 2005*, civil penalties can be imposed of up to \$12,600 for individuals or up to \$63,000 for corporations that do not register or label a product that are supplied or offered for supply. The WELS Regulator can also issue infringement



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### WELS

notices for up to \$1260 for individuals or \$6300 for corporations.

"Ultimately we want to be able to provide a level playing field for businesses that do register and label their products and the majority of them do," says Carol. "The challenge is those products that are brought in from overseas that are often purchased online. For those that do register and display the WELS label it is easy to identify the compliant product compared to those which are not.

"When we find instances of unregistered or unlabelled product, we work with the supplier to rectify the problem first rather than hand out an infringement notice. Most of them once they realise that it is a legal requirement and that penalties can be enforced, will rectify the situation. Some even become advocates for WELS because they recognise its value to the community and its usefulness as a selling point."

Since introducing WELS, the scheme has seen marked improvements in water savings in urban environments. A study published by University of Technology, Sydney in 2015 estimated that WELS saved 70 billion litres per year in 2013. Projections on those figures to 2030 give water savings of around 200 billion litres per year – one billion litres is enough to fill 400 Olympic-size swimming pools.

"Those figures equate to about \$2bn savings per year on utility bills for the homeowner. That is from both water savings and reduced energy bills for water heating. The reduced energy use means greenhouse gas emissions are also reduced.

"When consumers are shopping for a new showerhead, toilet or tap, the star rating will let them know which one is more water efficient. Choosing between one that is three star rated at \$30 compared to a four star showerhead at \$40 should be a simple decision, given the long term savings on water and energy bills."

Product testing for the WELS rating is rigorous and is conducted as part of the WaterMark tests. Products must be fit for purpose, deliver the water savings promised and meet performance requirements. For example, toilets must remove waste and washing machines must clean the clothes and rinse away detergent.

Showerheads can now achieve a four star rating but they must meet the requirements of a spray force and coverage test. Essentially it is designed to test that the showerhead still delivers a satisfactory and comfortable shower experience, and that the spray of water doesn't feel like being struck with pins and needles, and the consumer can, for example, rinse their hair. Toilets can now be tested to a six star rating.

The WELS group are working with government and industry bodies to ensure that all stakeholders are aware of their obligations. Consumers and industry can use the WELS database to find WELS information, check that products are registered or register new products. ■

*More information is available on the WELS website ([www.waterrating.gov.au](http://www.waterrating.gov.au)) and WELS personnel can be contacted at [WELS@agriculture.gov.au](mailto:WELS@agriculture.gov.au) or on 1800 372 746 (compliance enquiries) or 1800 218 478 (registration enquiries).*



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# HIGH RISE - LOW PRESSURE

For plumbers fitting out high rise buildings, the battle of increasing pressure has been handled with plant rooms, but premium floor space warrants a new approach. **Deborah Andrich** investigates.

**A**s high rise buildings become more prevalent and with ever increasing heights, the push by developers is to maximise floor space for tenants. For services this results in designs that call for smaller footprints or better still, no plant rooms.

Conventionally, water is brought in from mains to a basement plant room, where pumping systems are installed to adjust the pressures appropriately to reach storage tanks at the top levels of the building. As water is directed down through the building to each storey, pressure reduction valves would be incorporated in a single stage process.

In the past, this was sufficient for buildings that were in the order of 20 – 25 storeys.

A 36 storey building currently under construction in Sydney is pushing conventional methodologies to its limits, potentially creating noisy pipes, cavitation and reduced lifespan of the hydraulic infrastructure.

The company contracted to design the hydraulic system for the building, Wood & Grieve Engineers, had concerns about the suitability of a traditional single-stage pressure reduction system for 36 storeys.

Hydraulics principal with Wood & Grieve, David Steblina says that at 36 floors, the dynamic pressure

increase on valves to perform correctly needed to be considered. As a result, the company performed a number of tests in a simulation to verify product suitability and other options to meet the requirements of the building.

"We had to find the balance between cost and performance," says David.

subjected to these conditions. This resulted in finding a different method for regulating the pressure."

The investigation, initiated and led by Dr Houman Tamaddon, tested pressure reduction valves in a dual-stage configuration. A test rig was set up to replicate the pressures likely to be experienced in the building which can potentially reach 1,800kPa.

In Houman's report on the test results, he says that a "dual-stage reduction concept was developed for the high pressure PRV [pressure reduction valve] station based on a simple concept: if the required pressure reduction ratio from the main riser pressure to the point of use is more than the optimal zone of the pressure reduction valves, implement a two-stage, serial reduction configuration."

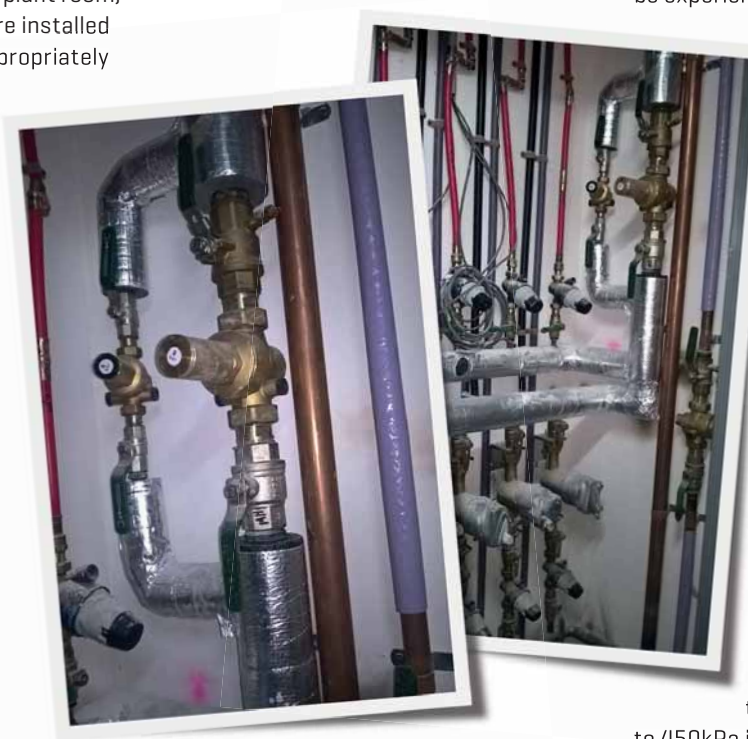
"To distribute the pressure reduction evenly we tested from 1800kPa down

to 450kPa in a two to one ratio," says Houman. "So it stepped down 1,800kPa to 900kPa to 450kPa.

"The first step down is still too high for most valves operating range, so a modification was needed on the valve. The second stage reduction would be suitable for standard products."

"Operating outside normal valve range can lead to knock-on effects," says David. "Excessive pressure can put the valves under serious stress which can create whistling, cavitation and reduced life spans."

To develop a prototype to perform at the necessary pressure ratings, Wood & Grieve worked with Caleffi in Italy and All Valve Industries to modify the design of



**Left:** The hot water service is held in a separate access cabinet – first stage pressure reducing valve set in a bypass arrangement. **Right:** On Level 1, a dual-stage pressure reduction system meter cupboard arrangement for even levels incorporating first and second stage pressure reduction.

"The idea had to be cost effective, but still reliable and robust enough to deliver the performance needed. The available products that we reviewed were reported to perform, however we weren't convinced they would not deteriorate and create noise when



**Dr Houman Tamaddon, Hydraulic Project Engineer, Wood & Grieve**



a direct acting pressure reduction valve that would have the capacity to be an off-the-shelf-product in the future.

The test rig used by Houman and his team allowed for individual isolation of the valves to create parallel and serial configurations. Noise levels were also recorded as part of the testing. All Pumps Sales & Service developed a pumping system to deliver a flow rate of up to 5L/s at 1,800kPa.

Using a range of flow rates and pressures, the test rig showed that a single stage setup created significantly higher noise levels than a double stage arrangement. The report concludes that "the dual stage pressure reduction valve setup can perform at considerably higher pressure ranges where the conventional single stage designs fail to deliver the required performance."

For the high rise building in Sydney, this means that a solution has been found to manage pressure reduction throughout the building without the

need for staged storage tanks. The knock-on effects that David eluded to can be minimised and noise levels within the building would be maintained to comply with the acoustic requirements for the project.

"If we didn't use this system," says David, "we would have to work out other ways and means to reduce the pressure. There are other design philosophies that could have been adopted, but I think we would have experienced more pipe work that would not necessarily be cost-effective."

The system has been designed to give a pressure reduction breakout on alternate floors, with smaller systems to cater for the next floor above.

"Using this configuration actually makes it easier for the facilities manager to maintain the system as any pressure drops can be quickly identified within a two floor location," says David. "We no longer need plant rooms at regular intervals, and access

to the valves can be achieved through a services cabinet. Ultimately it could be wired up to a BMS system for monitoring and alarm notifications."

Plumbing contractor for the Sydney apartment building, Andrew Khadi owner of AK Plumbing, is confident that Houman's design will be successful.

"It is a new way of approaching pressure reduction and it takes a bit to follow the concept, but once you understand it, it makes a lot of sense," says Andrew.

"On the odd floors, we have the pressure reduction system Houman has designed with low flow diversions to the even floors. The system will be used for the first 18 floors, after that, the pressures aren't such a problem."

The building, due to be completed by year's end is well under way and the building and plumbing contractors are confident that the solution Houman and his team found will be more than satisfactory. ■

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# TAKING PRIDE IN MY WORK

A post on social media from a plumber showing his work, begs the question – what makes for good workmanship? **Deborah Andrich** spoke with the plumber to find out.



**P**roof that social media does have its benefits, a recent post on LinkedIn by a plumber suggests that pride in workmanship is still healthy in the industry.

It was simple enough, a corner of a basement with a hot water system, some valves, some taps and copper pipework linking it altogether. It's clean – no sign of rubble or plaster and there is no sign of pipes going at weird angles and everything is accessible.

The work was completed by Nick Rizk of JDR Plumbing in Sydney, who posted the photo up on the company's LinkedIn page, mostly because he was happy with the result. The post received its fair share of negative responses, – the downside of social media – but in amongst those were congratulatory comments acknowledging that it was a job well done.

Here at *Plumbing Connection* we hear a lot of grumbling about dodgy work practices, non-conforming product and regulation. To see Nick's post was a breath of fresh air.

So who is Nick and why such pride in his work?

Nick and his business partner, Leithen formed a company JDR Plumbing in the past year after contracting since 2016. The company's philosophy is to provide high levels of workmanship, attention to detail, use quality products and above all, develop lasting relationships with clients. Nick

credits this attitude in part to his training as an apprentice, plus his own desire to do the very best he could.

"When I first started to consider doing an apprenticeship, it was always going to be in the construction game and I knew that plumbing would always be in demand," says Nick.

"The guy who took me on to do the apprenticeship for the first three years had a huge impact on me, he was still pretty young himself, but was very much hands-on, in the office and onsite. He was a terrific mentor on how a business should be run."

Broadening his horizons, Nick completed his apprenticeship with another company before moving on to other facets of the plumbing industry to gain a greater depth of understanding about the industry. Amongst that experience was as a plumber on some of Sydney's notable Tier 1 projects.

"Doing the Tier 1 projects gave me exposure to the higher end of construction," says Nick. "At that level, you don't see cut corners and poor quality product. If it costs a little bit more money, so be it. The client will appreciate it in the long run."

"Ultimately, we want to be able to set up different divisions with the company so that we can be involved in landmark construction projects in Sydney, but develop at a slow and



steady pace. We are not here to make a quick buck. By developing quality relationships with our clients and providing high standards of workmanship and sticking to our guns, the money will come with it."

JRD Plumbing employs two tradies and two apprentices and brings in sub-contractors as needed. Current projects include two townhouse developments in Toongabbie and Carlingford and another slated to start in Balmain at the end of the year.

"With our apprentices, we try and instil the same skills and work ethic that I was given all those years ago. It's tricky with apprentices – so many of them want the rewards now, when really it is about hard work and having the grit to see it through for the long term. Our apprentices seem to have that dedication, so Leithen and I want to teach them what we know and show that plumbing is a good trade and career."

With good workmanship comes quality product and Nick's philosophy is to stick with products and brands that have stood the test of time, but also know when the project warrants trying something new.



**Left:** Nick Rizk posted this photo on LinkedIn to show that he was proud of the end result. A win-win for plumbing. **Above:** Nick Rizk and his business partner Leithen, own JDR Plumbing and believe that good relationships, workmanship and product make the difference to business success.

"On social media, we constantly get approached by sales reps to try a new product, but so many of them have not been tested on a jobsite so you tend not to trust it fully even with the warranties and compliance certificates.

"If the job has opportunities to try a new product, then we will assess the risk, see what others have said about the product that have used it and give it a go.

"There are so many factors that are unknown about a product – the types of plastic used, the acoustic properties, the rubber rings. There is a lot of work on in Sydney at the moment, so there is always someone who has used it [new product] and happy to discuss how it went, so you can always get an honest opinion."

Ultimately, Nick says that what you learn at TAFE only goes so far, the rest you learn from your boss. He advises to surround yourself with people you admire and respect and understand that you only get out of plumbing what you put in. Good workmanship only comes from hard work and attention to detail – and don't be afraid to take pride in your work. ■

# Vacuum Plumbing Solutions for...



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# RHEEM 2017 APPRENTICE PLUMBER GRANTS WINNERS ANNOUNCED

Rheem Australia has announced the winners of the enhanced Rheem Apprentice Plumber Grants for 2017. While in previous years \$1,000 grants were awarded to successful recipients, this year there were 10 grants worth more than \$3,000 each. **Adelle King** reports.

**T**his year Rheem is celebrating its 80th anniversary since it began manufacturing in Australia and five years since it kicked off the Rheem Apprentice Plumber Grants.

These grants lend a helping hand to plumbing apprentices and form part of Rheem's aim to invest in the plumbing industry's skills future and provide training support.

For 2017 there were 10 grant winners from around Australia who each received \$2,000 to go towards their TAFE/RTO fees and/or text books, a \$1,000 voucher from the merchant of their choice and tool bag.

The applications were reviewed by three judges, Kevin Shinnars who is a long-standing plumber and Master Plumbers and Mechanical Services Association Australia board member, Paul Carey who is a National Plumbing and Services Training Advisory Group deputy chair and a teacher at Gordon TAFE in Victoria, and Jon Palfrey, Rheem training manager and a former plumber.

"The plumbing industry has provided immense support to Rheem over the past 80 years and these grants are designed as a thank you and to help foster the future generation of plumbers. With data showing apprenticeships have declined in Australia, we are happy to play a small role in helping encourage those who might be struggling financially or need a morale boost to continue with their studies," says Rheem chief operating officer Chris Taylor.

## Some of the winning applicants include:

- Adam Nebelung: A sixth generation plumber who works as a chef on weekends to provide for his young family.
- Sarah Condie: An independent young woman who moved out of home at a young age and now works for the all-female Tradettes Plumbing group in Brisbane.
- Patrick Andrews: The eldest of six children, Patrick is the main breadwinner of his family and a vital support for his single mum, who requires a liver transplant.
- Mohammed Osman: After living as a refugee for 12 years,

Mohammed, a father of two young children, finished high school at 27 and is now a first-year apprentice with a dream to one day go back to his birth country in East Africa and help them with safe drinking water.

Since the Rheem Apprentice Plumber Grant program was launched in 2012, \$180,000 in grants has been awarded to 160 apprentices. ■

*The full list of this year's winners can be found on the Rheem website - [www.rheem.com.au/apprentice](http://www.rheem.com.au/apprentice).*

**Left:** Victorian winner Mohamed Osman. **Bottom left:** North Territory winner Josh Newnham following a presentation by Rheem's Wayne Margetich. **Bottom right:** New South Wales winner Adam Nebelung with his employer Darren Clancy.





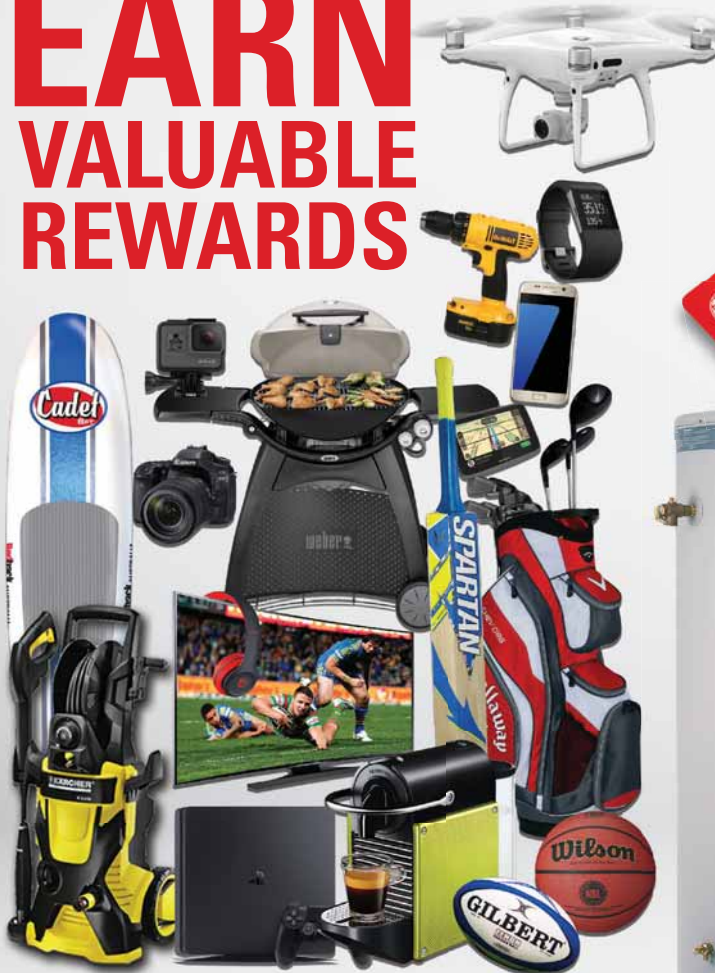
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# PROMOTING PLUMBING AS A PROFESSION OF CHOICE

In the Summer 2016 edition of *Plumbing Connection* we challenged the industry to take a serious look at how it promotes itself, in order to attract the best people Australia has to offer for apprenticeship positions.

We still feel today that there is a lack of coordinated effort to provide reference tools to schools and online resources to give the public a far better appreciation of the opportunities across the plumbing industry.

The article created some very positive feedback from industry members thoroughly agreeing with our message, as well as examples or two of local initiatives.

But really, when you add it all up, it's fair to say the industry is still struggling with finding ways to improve how it promotes itself to the next generation of plumbing (and their parents).

However, there was one ray of light that came out of Western Australia, a plumbing contractor by the name of George Dumitrescu, who owns EKG Plumbing Opinions in suburban Perth.

George wrote to us:

Jeff,

"I just finished reading your 'Who wants to be a plumber' report in *Plumbing Connection* and I am impressed.

"I have been doing plumbing in Western Australia for about 30 years and with my European years as well, I've got more than 40 years' experience in the industry.

"Mid last year I started an offshoot business with the idea of forming a team of 'old plumbers', with years and years of experience to share their knowledge, their experience and expertise with the younger generations coming through.

"Probably due to the novelty of this concept, it has been fairly slow to take-off: the younger plumbers don't readily understand the advantages of experienced advice [before starting out on their own] and getting experienced plumbers to share their time is proving more difficult than I thought.

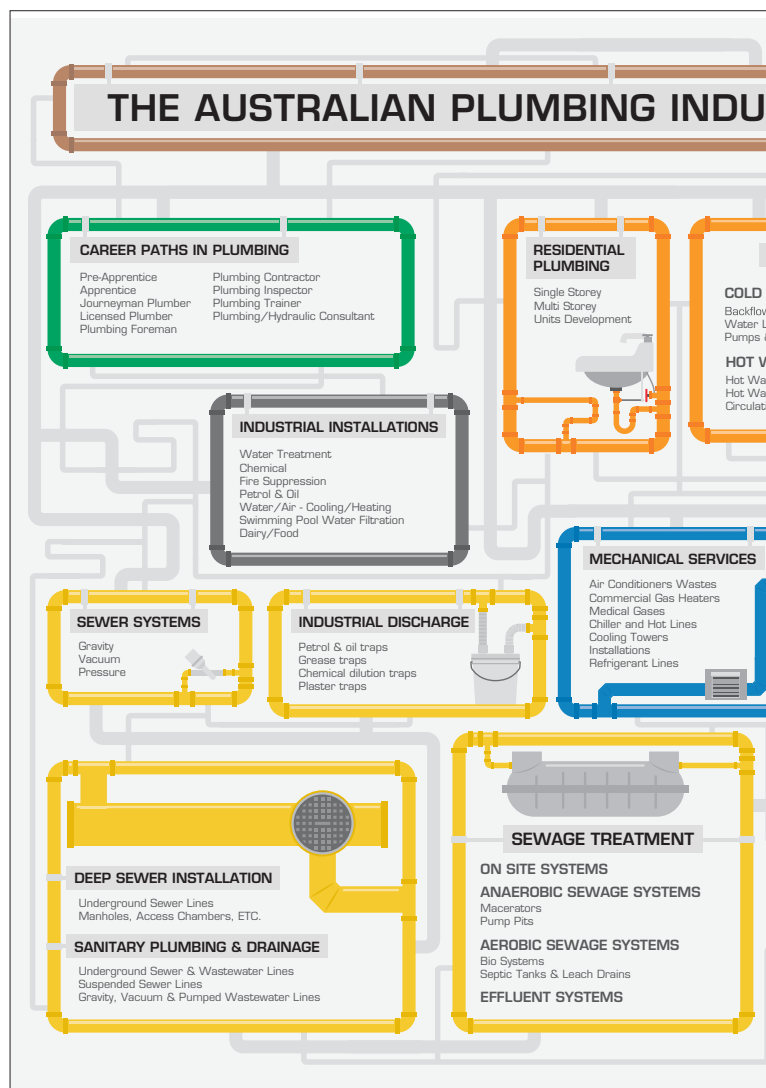
"Right now I am part way through the development of a *Plumbing Business Guide* pertinent to Western Australia, which is intended to be a business training manual for plumbers,

Left: George Dumitrescu has been instrumental in designing the infographic.

taking on a licence and going out on their own.

"As part of that process, I decided to list all the sectors of industry a plumber might be involved in. This is represented in the form of a mosaic, to make it more readable.

"I am convinced that if the young people see the opportunities and the challenges this trade offers them – not just unblocking toilets – maybe they can picture a more realistic image of plumbing and get excited about those opportunities," George.





The idea of the mosaic from George is a wonderful contribution to the industry – so much so that in conjunction with George's initial concept as a baseline, we did more work, added some ideas and then converted that into a Infographic.

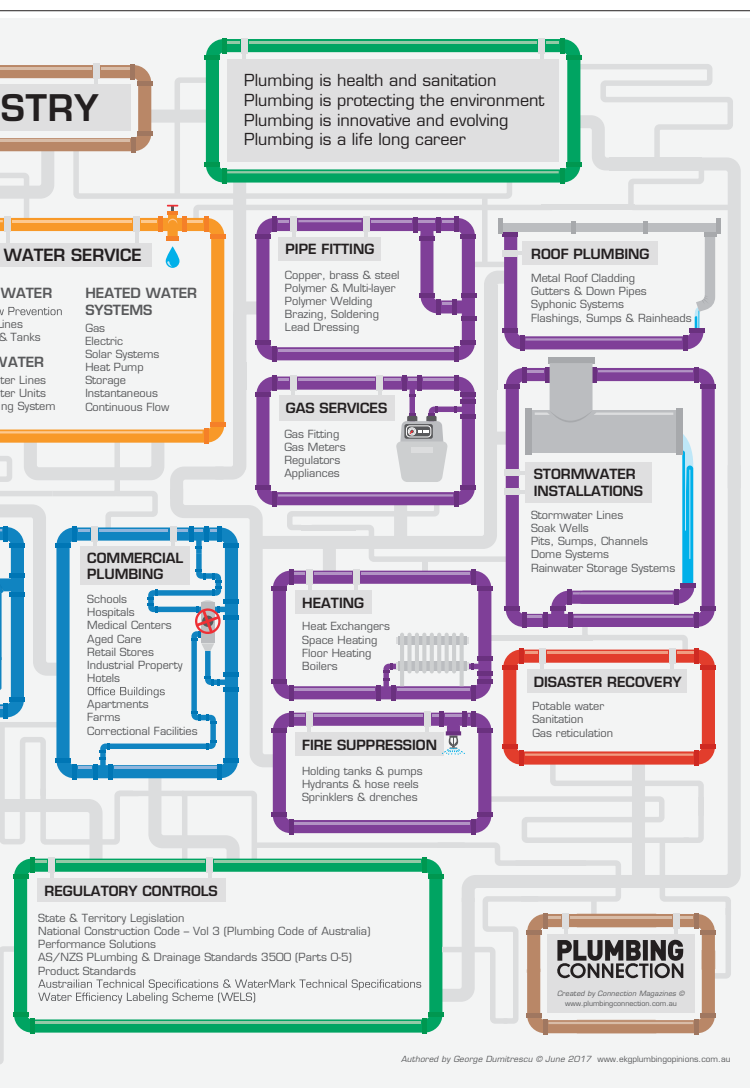
The Infographic is a great way to communicate with people, as well as the existing industry, the opportunities plumbing can provide.

#### A GREAT INDUSTRY ASSET

Printed copies of the Plumbing Sector Infographic in large format A1 size [594 x 841mm size] are available to proudly display at your business office – or better still, how about buying a copy or two and giving them to the careers teachers at your local secondary schools and TAFE.

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\*Image subject to change

# WATERLESS TOILET [NOT] MAKING A SPLASH

Alarming statistics for sanitation accessibility around the world have prompted the development of the 'waterless toilet'. **Simeon Barut** explains the ins and outs of the innovation.

**T**oday, under half the world's population are without access to sanitation. For this very reason, Cranfield University is developing the Nano Membrane Toilet which processes human waste without the need of energy or water – basically, the waterless toilet.

The prototype works just like a normal toilet where it accepts urine and faeces as a mixture but has added mechanisms to treat the waste onsite instead of carrying the waste to a sewage treatment plant. The ingenious creation has slowly made waves across the plumbing industry, especially with funding from the Bill and Melinda Gates Foundation.

The toilet and its clever design speak for itself. Cranfield University lecturer Dr. Alison Parker says that on the surface it looks like a normal toilet, but a plethora of features enable the Nano Membrane to stand out and be the innovation the world needs.

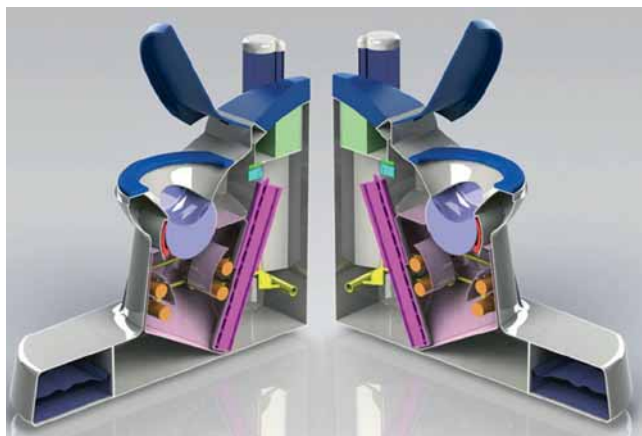
"For the user, it's just like a normal toilet – it accepts urine and faeces as a mixture then you just flush it and off you go. Then clever stuff happens," says Alison.

"A rotating mechanism drops the waste into a holding tank while simultaneously blocking odour and the user's view of the waste. The solids settle to the bottom of the tank, while the liquids float on the top. The solids are then transported out of the tank by a mechanical screw into a combustor where they are burnt and transformed into ash.

"Later, the heat generated can be converted into electricity which is used to power toilet operations and any residual energy is used for charging low voltage items. The liquids pass over a weir in the holding chamber and into the membrane bundle. The unique nanostructure membrane allows clean water to be extracted from the waste which can be used in the household for whatever the user pleases."

The first thing that runs through the minds of many people who hear this being explained is 'what about the smell?' Luckily this was thought about in depth by the Cranfield University creators and is solved by the toilet's rotating mechanism which blocks odours once the toilet is flushed. In conjunction with Cranfield's Centre for Competitive Creative Design, the rotating mechanism was designed to wipe clean the surface and trap odours by maintaining a constant barrier to the waste.

Alison notes the simplicity of the installation process and the minimal maintenance required, are two of the many advantages that the waterless toilet brings to the industry.



"As no plumbing is required, the installation process is simple – the toilet just needs to be transported to the home. Some maintenance is required every three months to clean the membranes," says Alison.

"Other major advantages include the fact that the toilet requires no water or external power to operate which removes the entire need for plumbing, a sewage system or an electrical power supply. This will prove to be even more valuable with water scarcity rising and will also reduce water bills. Additionally, it actually produces fresh water and a small amount of power and while this may seem small to most, in the poorest areas of the world it can make a huge difference."

Around 2.5 billion people around the world are without access to sanitation today. Ultimately, this was the inspiration behind the Nano Membrane

Toilet, especially with millions of girls and women being forced outside – often risking their lives and health – in unsanitary conditions. Moreover, approximately 494 million people use shared external toilets and every day two million tonnes of human waste is disposed in water courses.

The combination of knowledge and expertise in water, membrane technology, design and energy were used to produce a household toilet that can transform human waste into useful resources.

"At the end of the day, a household toilet offers convenience, dignity and security, especially for vulnerable groups like women, the disabled and the elderly." ■



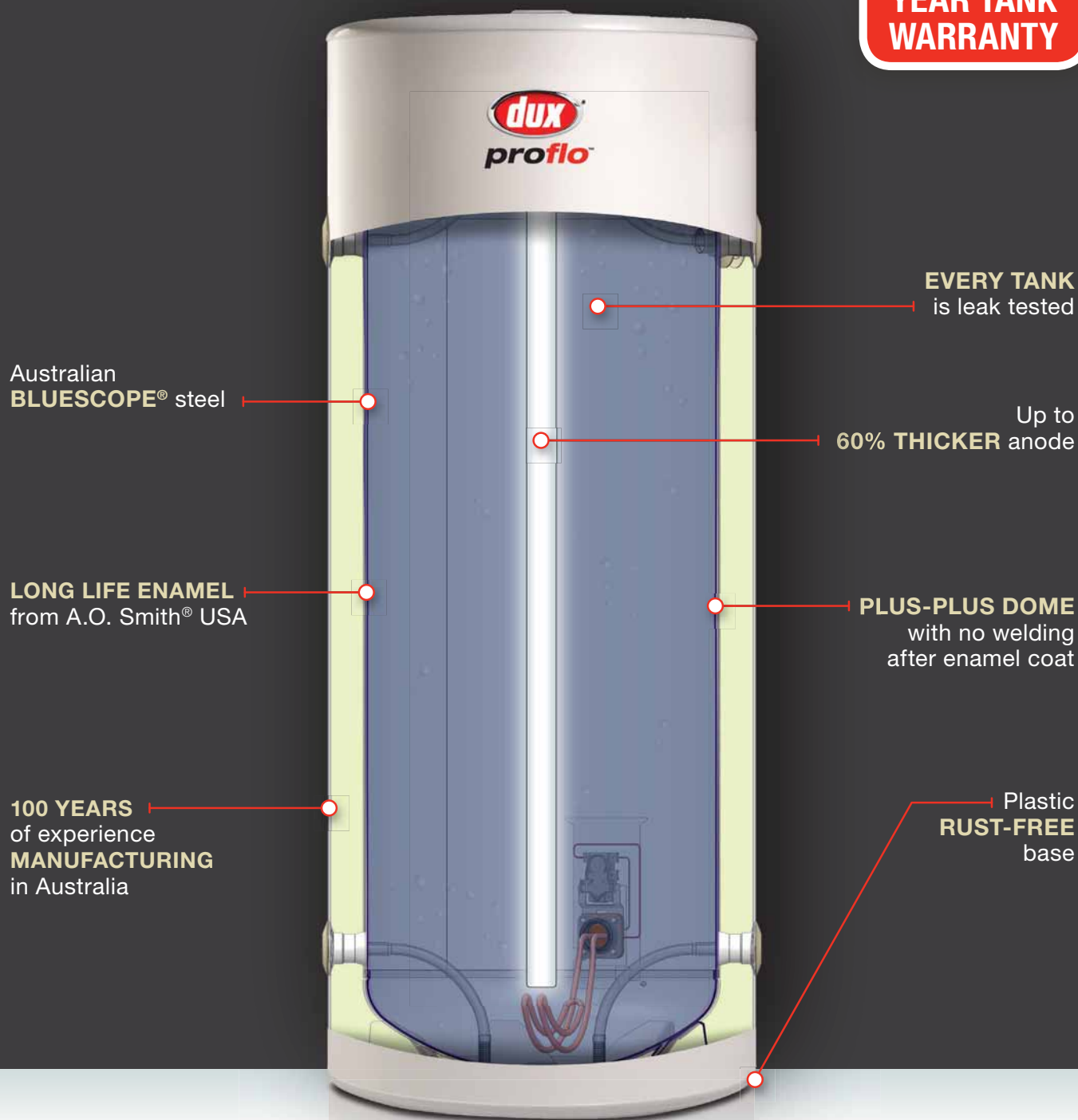
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# BEHIND THE WALL - REDUCE YOUR RISK AND PLAY TO YOUR STRENGTH

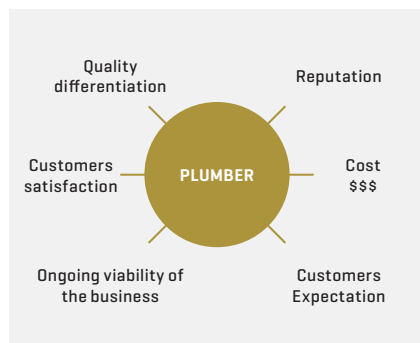
Plumbing errors or failures can be costly to both you and your customer, but there's ways to make sure they rarely happen says **John Fennell**.

A simple plumbing leak can be a major headache for a customer particularly if it means ripping down those expensive Italian tiles in the bathroom to find the source. As a plumber you have the responsibility to use the most reliable products you can, as well as your experience and skill, to create a great installation so that the chances of problems occurring are minimised.

Sure, there'll always be those jobs that come back to bite you and when the failure is in a product that lies behind the wall, the risk and cost to your business and reputation can increase significantly.

However, you can minimise the risk of them occurring by discussing the options available with your customer, providing your expert advice to assist with your customers decision, using those products that you know have a proven track record, and, most importantly, not taking short cuts just to save a few dollars.

The business of a plumber has many competing responsibilities that have to be considered and evaluated. The graphic below shows some of these responsibilities. Ultimately, how well you manage these responsibilities can determine the ongoing success of your business.



Behind the wall does not mean it should be out of sight and out of mind.

A simple way to ensure this success is to minimise your risk and capitalise on your competitive advantage by using quality products, employing best practice installation methods and leaving very little to chance.

Employing the best installation methods and understanding and complying with the relevant installation standards is the starting point. The Australian plumbing Standard AS/NZS 3500 has many installation methods that must be followed and have been designed to assist plumbers and prevent or alleviate any problems that can occur during installation. These include such things as fixing distances, allowance for expansion of heated water lines, concealment of pipes in or under concrete are all dealt with in the

Standard and help ensure a trouble free installation.

## KNOW YOUR PRODUCT

The products you use are just as crucial. Not only must they be agreeable to the customer, but they must meet regulations such as WaterMark.

It is the plumber's responsibility to install only WaterMark approved products. Even though you might see non WaterMarked products marketed cheaply for sale at a store or online, the responsibility lies with the plumber not to use them. If you are in doubt of a product it is also possible to check the validity of the item on the WaterMark database at <http://www.abcb.gov.au/Product-Certification/WaterMark-Certification-Scheme/WMPD-Search>.

There have also been cases where non-compliant products displaying the WaterMark symbol have been sold, making it very difficult for the plumber to determine if these products are genuine and fit for the purpose they were intended. The safest way to minimise the risk of non-compliant products is to use a reputable plumbing distributor and use well known and trusted brands of products which have good local technical support or representation should you find yourself with an issue or if you simply need some advice.

Plumbers and homeowners need to be aware that not all products and systems are equal and that some products or components have a limited life. Just like a tap washer, some other components may need replacing earlier than may be expected.

A recent issue concerning flexible braided steel hoses has highlighted that some of these have a life of 10 - 15 years, but if they fail they may

cause considerable water damage that hopefully the plumber will not be blamed for. There are longer lasting alternatives to these hoses in most cases, such as solid copper pipes, but there are also some products where there is no alternative. The modern sink flick mixer tap assembly comes with flexible braided steel hoses and due to the connections and limited space there are limited alternatives.

#### RELIABILITY IS EVERYTHING

Copper has a long and proven track record of use in plumbing installations globally and its advantages are well known. All plumbers are trained in its installation methods, plumbing techniques and standards are based on the use of copper and when installed correctly provides a reliable and high quality installation. Copper can be used for cold water and heated water at all temperatures whereas other products have limitations.

Copper, and other metallic pipes, are the only pipes that can be directly connected to any water heater as well as all pipes used to connect solar hot water collectors to the heated water tank. The choice of copper for your installation means you are further minimising the risk of failure, especially when you know how well a job you have done during installation.

Choosing quality copper products ensures you not only minimise the risk of any plumbing system failure, but you are also enhancing your business' reputation and competitive advantage by using a trusted, high quality and proven material in your installation. Letting your customer know that the use of copper in their installation means they have a high quality plumbing system behind the wall is a reflection of the quality of your business.

Just because your best work is often hidden behind the wall, it doesn't mean your customer shouldn't know about it. ■

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# DAM BUSTER SOLVES THE BOX GUTTER RAINHEAD

Non-compliant, poorly fitted or 'retro-fixed' box gutter rainheads are the bane of roofs, often causing catastrophic and nuisance flooding, **Deborah Andrich** investigates.

**T**ired of seeing box gutter rainheads across Australia that just didn't comply with AS/NZ3500.3, a team of plumbing industry experts came together to resolve the issue.

Too often in the roofing industry, plumbers are installing rainheads that simply don't perform, requiring 'solutions' to make them work, such as tin snipping in overflow holes, removing components or altering the overall product. In many cases, the end result is still non-compliant but also an ugly fixture that can cause overflow flooding inside the building, creating insurance headaches for the owner and occupants.

The launch of the Dam Buster box gutter Rainhead means Australian roofing plumbers can now install an 'off the shelf', fully AS/NZS3500.3 compliant, simple to fit rainhead that meets the 'deemed-to-satisfy' requirements of the Plumbing Regulations.

Designed to perform under the most extreme conditions, including one-in-one-hundred year rain events mandated under the Standards, the Dam Buster Rainhead features an inbuilt overflow weir and overflow chute to allow a free flow of water away from the box gutter and roof installation even with the downpipe obstructed.

"It shouldn't be a surprise to the industry, but 95% of all rainheads installed on buildings in Australia are non-compliant," says Peter Coll, general manager of Johnson Roofing, and PC's roofing expert.

"The reasons can vary from the position it is installed in to the lack of provision for overflow."

"Most rainheads don't look like the one in the Standards,



Many housing estates have upwards of five rainheads - most of which are not compliant

because from a cosmetic point of view, customers don't accept it because you see too much of the box gutter behind it.

"The aesthetics issue has been resolved with the Dam Buster design - I'm kicking myself for not having seen the simplicity of the design."

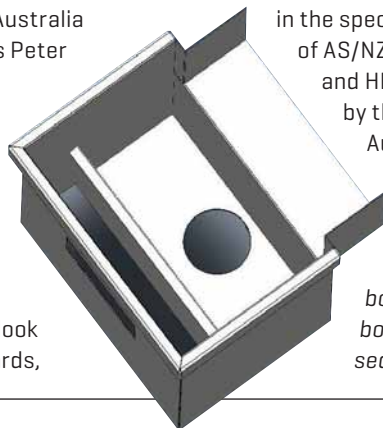
Currently the Standards require a rainhead to be similar to the one in the specification diagrams of AS/NZS3500.3: HB-114, and HB-39. The description by the Victorian Building Authority states:

*"The width of the rainhead is to be at least equal to the width of the box gutter and the box gutter needs to be sealed to the rainhead."*

*The hydraulic capacity of the overflow device must be no less than the design flow for the associated box gutter outlet. Overflow devices need to discharge to the atmosphere in such a way as to prevent damage to buildings and property."*

The design developed by Dam Buster features an overflow weir toward the forward face of the rainhead, beyond the downpipe outlet in alignment with the box gutter outlet. Across the front of the rainhead is a fascia that has a pre-cut egress point [circular or rectangular] for unusually high water flow. Between the weir and the front face of the downpipe is an overflow chute sufficient to provide the overflow provision required in AS/NZS3500.3.

This fascia gives a more attractive appearance to the overall rainhead. ➤







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## THE STANDARDS DESIGN OF A BOX GUTTER RAINHEAD

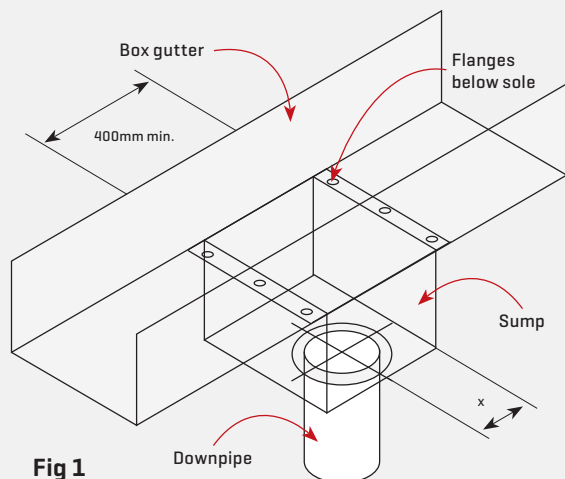


Fig 1

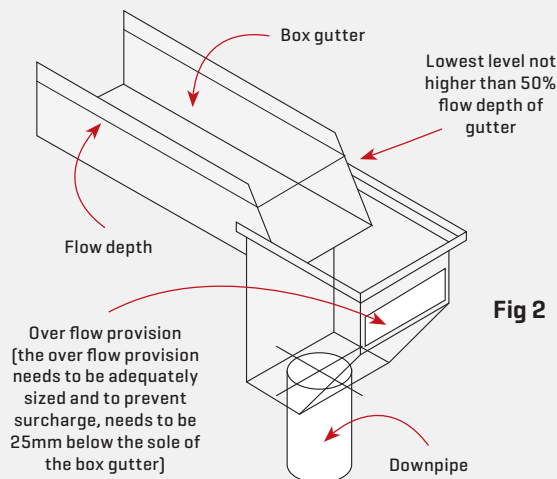


Fig 2

SOURCE: VICTORIAN BUILDING AUTHORITY OVERFLOW PROVISION FOR BOX GUTTERS, OCTOBER 2014  
[http://www.vba.vic.gov.au/\\_data/assets/pdf\\_file/0012/24510/Overflow-provisions-for-box-gutters.pdf](http://www.vba.vic.gov.au/_data/assets/pdf_file/0012/24510/Overflow-provisions-for-box-gutters.pdf)

More importantly, without a solid base in the main overflow chute, there is reduced risk of debris such as leaf matter, blocking the blocking the overflow provision of the rainhead.

With a range of features for installation including inbuilt attachment points and a box gutter seal, plumbers can quickly and easily fit a Dam Buster to a new build or retrofit one to any box gutter application. It can be converted for use on eaves guttering using the supplied converter plate.

### THE INSURANCE PERSPECTIVE

Decades of experience tells Chartered Loss Adjuster David Pockett, director of Metropolis Solutions that the 'overflowing gutters' are responsible for significant numbers of insurance claims, particularly in storm events. It is quite common for there to be no actual 'storm' damage to a house or building and for the only damage to be caused by the gutters failing to cope with the volume of rain and flooding the property via the ceilings.

"Many people put these events down to that good old '1 in 100 year storm'," says David, "but these supposed events have become so common it's obvious people are not talking about 1:100 year events, but maybe 1:10 or 1:20 type events.

With the massive rise in modern construction has come an equally massive rise in the use of box gutters and rainheads [Fig1 & 2]. In years gone by these were almost never found on domestic homes – only on commercial buildings and in the 'old days' they commonly had a different installation method that mirrored the original English design which was also the basis of one of the [compliant] rainhead options set out in AS/NZS3500, which rarely caused a problem.

"Currently the Australian Bureau of Statistics shows that between 15,000 and 20,000 new homes are being constructed in Australia every month," says David.

"If we assume only 50% have rainheads that equates to 9,000 to 10,000 new homes a month with rainheads. A typical house would have four to five rainheads. So we are looking at nearly 50,000 non-compliant rainheads a month going into residential housing."

The major problem with modern rainhead installations says David, is that they choke the box gutter, even if they are well installed and there is also no restriction through the parapet. Modern rainheads are little more than decorative trim boxes. Small holes and slots hacked in to the front face of the

rainhead with tin snips are inadequate to cope with the potential volume of water generated by a 1:100 year rain event when the rainhead will need significant overflow provision to meet AS/NZS3500.3 and simultaneously ensure the property will not be flooded internally.

The end result is likely to be an epidemic known as 'leaky building syndrome' occurring mostly in multi-unit residential developments. In David's experience, water damage from defective roof plumbing in domestic homes and multi-unit residential developments is common. Entire properties can be flooded out, ceilings collapse, carpets are saturated and floating timber floors destroyed and mould takes hold, forcing people out of their homes.

In the insurance industry, most assessors do not recognise that common practice is [for rainheads] non-compliant and do not investigate the root cause of any claim. This means that claims are paid on face value, especially if there has been a rain event of some significance. Many insurers also use what is called "The Builders Model" where panel builders will assess causation of any claims, however they also often lack the experience to identify the problem which has actually

caused the loss and claims are paid.

“More and more insurers are using specialist assessors who will recognise non-compliant installations and defects and deny the claims,” says David. “The hapless consumer who has recently purchased their dream home has no idea about rainheads or non-compliance. Their property floods and suddenly the insurance company tells them the roof plumbing installation was not compliant and their claim will be denied. As insurers tighten the screws, this is potentially the next ‘flood’ to appear in this area of denied claims and unhappy home owners.”

“The Dam Buster Rainhead patented design has put together years of hydraulic experience and mixed it with some truly amazing manufacturing techniques to make the seemingly problematic rainhead and wrap it in the skin of another rainhead to deliver the “box in a box” Dam Buster Rainhead that is fully compliant,” says Peter. ■

#### CALCULATING RAINHEAD SIZING

The team at Dam Buster have simplified the zoning of rainfall intensity listed in AS/ NZS 3500.3, Appendix E, into five categories (listed as Average Recurrence Interval – ARI). For regional areas, consult the charts in the Standard.

MAX RAINFALL INTENSITY (MM)	LOCATION
190	Melbourne, Adelaide, Hobart
220	Canberra, Perth
270	Sydney
330	Brisbane
390	Darwin, Cairns

For example, in Sydney, the rainfall intensity is up to 270mm for a 1:100 year ARI. It is necessary to size the roof stormwater catchment area (which should include exposed sections of walls that may drain into the catchment area). This must be done to size the box gutter in accordance with Australian Standards (as per HB 114 1998) to give the minimum width and depth of the box gutter required.

The Dam Buster Design Guide will give

the appropriate size rainhead to suit the width and depth of the box gutter and the catchment area (in sqm) based on the rainfall intensity for the location.

With these numbers established, the ‘Design Guide for Dam Buster Rainheads’ will also specify the acceptable range of downpipe sizes (and shapes) that can then be cut into the base of the Dam Buster rainhead.

A correctly sized and fitted Dam Buster rainhead has been certified (Dr R J Keller & Associates, Civil Engineering Hydraulics) to meet the primary hydraulic requirement of AS3500.3 “Plumbing and drainage Part 3: Stormwater drainage” for rainhead performance:

*“3.7.5.1 Hydraulic capacity - The hydraulic capacity of an overflow device shall be not less than the design flow for the associated gutter outlet. Overflow devices shall discharge to the atmosphere.”*

The Dam Buster rainhead is therefore not only compliant with AS/NZS 3500.3 but also compliant with the NCC as it meets or exceeds the Deemed-to-Satisfy requirements and meets the overall performance requirement of the NCC Volume 3 2015 Plumbing Code of Australia Section D 1 Clause DP1.1, DP1.2 and DP1.4.

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# TEST YOUR PRODUCT ON THE RIG

Hydraulic performance for eaves and gutters allows manufacturers and suppliers to test product, Dr Terry Lucke explains.

Since 2015 we have been following the progress of the National Drainage Research Facility (NDRF), a development resulting from the collaboration between the Association of Hydraulics Services Consultants (AHSCA) and the Stormwater Research Group (SWRG) at the University of the Sunshine Coast (USC).

Earlier this year we reported on the development of a national testing protocol for grated balcony and roof drainage outlets as well as the first research project to put this testing protocol into use – the quantification of more than 20 Specialised Plumbing Supplies (SPS) proprietary grated roof and balcony drainage outlets under typical Australian rainfall conditions.

Research at the NDRF continues strongly and 2017 has seen the formation of the AHSCA Research Foundation – an initiative created to manage all current and future research projects and to develop national education programs for all AHSCA members. Mark Alexander accepted

the role of Chairman of the Foundation and will be supported by Directors Ben Rimmington and Chris Tritton. The Foundation aims to bring continued innovation and technical know-how to AHSCA members as well as the broader construction industry.

In July 2017, a new addition to the NDRF at USC, the Residential Roof Drainage test rig, was opened and showcased to the Australian Building Codes Board (ABCB) and the Australian Plumbing Codes Committee (APCC).

The Residential Drainage test rig was constructed as a result of an initial research study by the SWRG and the AHSCA into the hydraulic performance of the “Acceptable Overflow Measures” for eaves and gutters, as detailed in the 2016 National Construction Code (NCC).

The study assessed the suitability of the Acceptable Overflow Measures in real flow situations and found that there were limitations in the recommendations of the NCC that could have serious consequences for building flooding. The main outcome from the research study

was the recommendation for further comprehensive research to fully investigate the applicability and suitability of the Acceptable Overflow Measures recommended in the 2016 NCC of the Building Code of Australia.

Consequently, the Residential Roof Drainage test rig was constructed and a more comprehensive study is scheduled for 2018. Some initial testing of standard eaves gutter profiles identified that the minimum recommended fixing and bracketing is insufficient and could result in failure of the support system when subjected to the weight of the accumulated water in overflow [blocked] conditions.

The Residential Roof Drainage test rig will allow manufacturers and suppliers to test and certify the primary flow capacity and overflow capacities of their products. The rig incorporates two valley gutters and also a number of internal and external changes of direction that replicates an installed environment. Testing undertaken in other facilities has only dealt with straight sections of eaves gutter and



Residential Roof Drainage Test Rig developed by AHSCA and SWRG, University of the Sunshine Coast



Members of ABCB and APCC assess the outcomes of the test rig

therefore the hydraulic restrictions caused by corners and the incoming flow of valley gutters has not been observed and documented.

The Residential Roof Drainage Test Rig is fitted with roof sheets that can slide above the gutter and fascia

allowing for change over of gutter profiles without removal of the sheets.

Further to research and innovation, the AHSCA Research Foundation will provide a National Education Program for its members with the first training modules held in October 2017. Dr

Terry Lucke from the SWRG at USC will educate members on how to use the performance based design methods in the NCC and upon demonstrating proficiency members will achieve formal AHSCA Research Foundation Accreditation. Members will then have access to various design programs that are currently being developed by the AHSCA Research Foundation, enabling them to design quickly and efficiently. Results from the research undertaken at the NDRF will guide the direction of future courses offered by the Foundation.

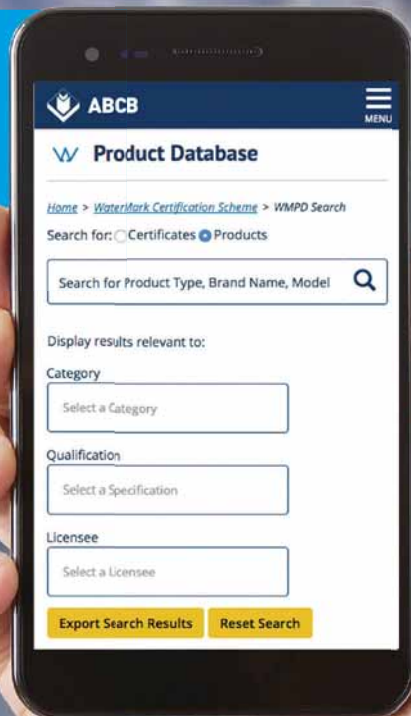
The Foundation is currently working in collaboration with a number of national and international product suppliers to test their products which will provide assurance that quoted flow rates and duties can be relied upon. ■

For more information visit the AHSCA Research Foundation website [www.ahscaresearch.com.au](http://www.ahscaresearch.com.au)

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# HEATING UP A 6-STAR

Hydronic heating using a heat pump need not be a mystery to install, but for the 6-star homeowner, it is a must-have, writes **Deborah Andrich**

**H**eat pumps for use in hot water systems and hydronic heating still remain a mystery for many plumbers who are more familiar with installing and servicing gas-based or reverse-cycle systems.

Heat pumps have been used extensively overseas as a cost effective method of providing domestic hot water and home heating, particularly in the colder climates of Europe.

In order to help the Australian market come to terms with specifying, installing and commissioning heat pumps for hot water and hydronic heating systems, Stiebel Eltron have brought specialist Oliver Joss from the company's Switzerland office to Australia.

As head of technology and product management, Oliver was leading the in-house training facility for in-depth industry knowledge on energy, heating and ventilation. With Australia becoming increasingly more aware of renewable solutions, he has recently joined the local team to offer his expertise in heat pump technology and ventilation systems to Australian customers.

According to figures from the World Energy Council, Australia's average electricity consumption per household per year is the third highest in the world. With more than 7,000 kWh per year, Australian households use more than double the electricity compared to the global average: 62% of this energy is used for heating, cooling and hot water – it makes sense to start reducing this figure.

There is a groundswell to move toward more electricity usage instead of gas, particularly as renewables such as solar PV are becoming more cost effective (even with poor feed-in tariffs). As a consequence Stiebel Eltron has recognised that products that are smart-grid ready – including heat pumps are a viable option for Australian households.



Oliver Joss (right) is an expert on HVAC and heating systems and is here from Stiebel Eltron, Switzerland, to help the Australian office educate plumbers and suppliers on the installation and specification of heat pump hydronic heating systems.

"In Australia, we have seen consumers wanting more autonomy in what energy source they can use," says Darren Fletcher, national product manager, Stiebel Eltron. "For example, in Victoria, gas was traditionally seen as a cheap, convenient energy source and taken for granted. With energy prices rising, the whole energy sector is becoming a hot topic once more."

Hydronic heating can be installed in two formats: in-slab or as a radiator.

Darren recommends in-slab as the more efficient method as the heat can be retained in the concrete's thermal mass. The flow temperature of the water coursing through the pipework can be at, 43–45°C, compared to a radiator at 50°C plus. This demands the

surface area of the radiator needs to be larger to heat the room – and many homes simply don't have the wall space for large hydronic radiators.

The use of hydronic heating tends to be taken up by homeowners who are looking to have a more energy efficient and liveable home where 6-star rating is a minimum.

"Typically, home owners who are building their own home who are looking at this type of heating are well versed on what they want," says Darren. "They are often on the third or fourth home, and possibly downsizing. The types of specifications will include double glazing, high level insulation and to their own design – not a cookie-cutter home. Hydronic heating with a heat pump is a ➤





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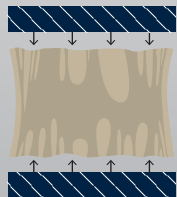
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natural fit for them.”

In the early days of heat pumps being introduced to the Australian market, it was seen more as a niche product, but it is becoming a mainstream option. As a result, Stiebel Eltron wants to educate the installers on correct system specifications, installation and commissioning, hence Oliver’s presence in Australia.

“It is important that specifiers and installers understand the size of the heat pump that will be needed and that the heat load required is calculated correctly,” says Oliver. “It is not like a gas system where you can simply put in a bigger gas unit. If it is wrong, and it’s in-slab, it is an expensive problem to fix and can cause a lot of reputation loss for the installer, specifier and Stiebel Eltron.”

As an example, Darren and Oliver have taken an approximation of systems installed thus far in the Australian market to highlight what a ‘typical’ 6-star rated home would require.

#### House Specifications:

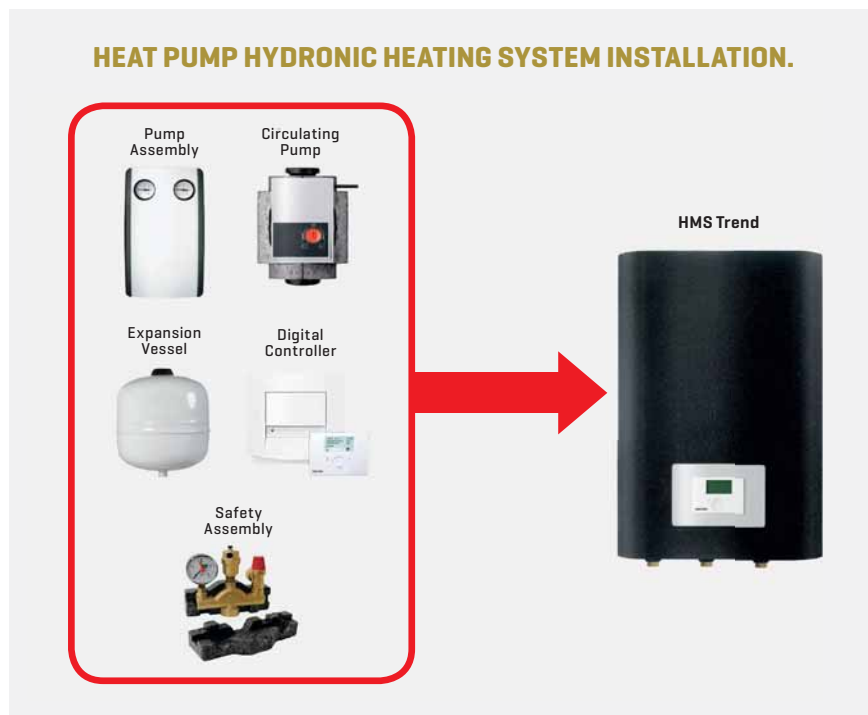
Star rating:	6
Area (sqm):	250
Residents:	4
Water usage (l/person):	200
Energy per sqm:	15kW

#### PRODUCT SPECIFICATIONS:

- Hot water heat pump and HSM Trend connection system
- 200 litre buffer tank
- Internet interface
- Installation footprint of heatpump: 0.88 m<sup>2</sup>, buffertank: 0.3 m<sup>2</sup> and HSM Trend connection: 0.47 m<sup>2</sup>
- Operating at an outside temperature range above +2°C for an internal temperature of around 20°C

#### OUTCOMES

- Cost of kit including hot water system: ~\$15,000
- Annual coefficient of performance: 4.7 [20% electricity and 80% environmental energy]
- Annual energy consumption for heating and hot water: 4500 kWh
- Estimated annual cost for heating and hot water [\$0.30/kWh]: \$1,350 per year



The heat pump system comprises a pump assembly, circulating pump, expansion vessel and controller

- A 4 kW PV Installation could cover 100% of this energy
- CO<sub>2</sub> emissions: 2900 kg/year
- Using PV and a smart grid heat pump, CO<sub>2</sub> can be 0 kg/year

An analysis by Sustainability Victoria [2013] estimated that a large house [220m<sup>2</sup> built prior to 2005 and 2-star] with a high standard gas hydronic, zoned system would typically cost a Melburnian \$4610 per year to operate. For a 6-star home of the same size it is nearer to \$1400, however it *does not* include costs for hot water. The CO<sub>2</sub> emissions with a gas-based system would also be higher at around 4900kg/year.

Oliver’s calculations provide an interesting figure in the coefficient of performance – namely environmental energy.

In simple terms, air-sourced heat pumps absorb energy from the environment and transfer this energy into the hydronic or domestic hot water systems. Operating in a similar fashion to a refrigeration system, the heat is not rejected, but collected. Power is therefore needed to operate the

compressor to move the refrigerant around the system. Buffer tanks and domestic hot water heat pumps have the ability to store thermal energy, acting as batteries when solar PV is creating excess energy through the day.

Linking it to a renewable electrical source such as PV, therefore, enables the system to virtually require zero energy supply from the grid.

A smart grid ready heat pump, Oliver says, can be managed by an energy management system. In this way, all appliances, including the hot water and hydronic heating can be staggered to operate throughout the day at a time when solar energy generation is at its greatest, storing the energy for times of low sun.

“We need to help plumbers make the right choices-with the equipment that is needed to do a heat pump-based hot water service and hydronic heating system,” says Darren. “It is not as simple as buying a bigger gas unit and an extra couple of metres of pipe. With Oliver here, we can now help plumbers do it right the first time, to give the homeowner the best possible solution for their 6-star home.” ■

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- ▶ Alarm system



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- ▶ **Vortex technology** - 65mm free space (blockage free)
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# CAROMA INTRODUCE NURSE CALL BUTTONS TO TOILET SUITES

Nurse call systems are commonly used throughout hospitals and aged care facilities, allowing the patient to activate an alert to the healthcare staff when help is required. Caroma have introduced a clever design to integrate the alert system into their range of care toilet suites – so what do you need to know about this new product?

## SAFETY ASSISTANCE

Often nurse call devices in the bathroom look out of place and can be hard to keep clean. Caroma provides an advantage to help the patient easily access nurse assistance without having to reach around to the wall, all within a simple design that is easy to clean.

The new Caroma Advantage nurse call button integrates the toilet suite with new and existing nurse call system installations to ensure quality and reliability.

## DESIGN

The design provides connectivity directly from the toilet suite and minimises the institutional look that traditional solutions provide.

The nurse call button is available as a left or right hand option and comes with the toilet roll holder included.

The button is located to the side of the armrest to avoid any accidental triggers. However, when activated, the LED light will appear for reassurance to the patient.

The Nurse Call button is available in three of Caroma's most popular care suites, the Opal II Easy Height, Caravelle Easy Height and Caravelle Support suite.

## INSTALLATION

The toilet suite installation requires no change for the plumber. The integrated nurse call button allows for fast and easy installation by the nurse call installer. A durable cable is hard wired into nurse call system, Caroma will include a wall plate and cable gland in the same box as the arm rests for that professional finish.

## IP56 RATING

Suited for use in damp environments, the nurse call button is rated to IP56 to ensure lasting reliability in bathroom applications. IP56 rating means the wiring is protected against jet sprays of water and dust – making the Caroma Advantage nurse call button perfect for your next hospital or aged care installation.

Now available for specification on [specify.caroma.com.au](http://specify.caroma.com.au), the Caroma Advantage Nurse Call products will release in July, 2017.





## THREE'S COMPANY FOR HOT WATER

At a time when climate change and population growth are placing increased pressure on water resources, South East Water has developed a new rain-to-hot water system that will reduce reliance on potable water and allow homes to be plumbed with three types of water. **Adelle King** explains.

A new housing development in Melbourne's south east will incorporate a range of unprecedented water saving features as part of a collaboration between South East Water and residential land developer Villawood Properties.

Known as Aquarevo, the 460-home development is being built at the site of a decommissioned water purification plant owned by South East Water and will have built-in energy efficiency and water saving features in each property.

It's on track to become what has been described as Australia's most sustainable urban residential development that will push the boundaries in eco-friendly living.

"We wanted to reduce the reliance on drinking water without losing the liveability we enjoy today, which is why Aquarevo homes will be plumbed with three types of water – rainwater, drinking and recycled," says South East Water Aquarevo group manager Terry Dalglish.

The main water-efficient feature is a rain to hot water system that will directly supply hot water services in the bathroom and laundry.

Terry says South East Water designed this rain to hot water system as a way to focus on using sources of water for their most appropriate purpose.

"At the moment, in most towns and cities, reticulated mains drinking water is used for a variety of purposes – drinking,

cleaning, flushing toilets, watering gardens and washing clothes. In rural communities, the opposite is often the case, with rainwater usually the sole source for the household and often untreated and unmonitored for quality."

### STORING WATER

This is the first rain to hot water system to be developed to deliver water of this quality and on this scale. Terry says designing the system into a new home rather than an existing one is not only much easier but also more practical.

"Considerations such as ongoing ownership, maintenance and monitoring of the equipment make precinct-scale implementation much more viable."

South East Water has designed and developed a system that will treat rainwater for safe supply as hot water for the shower, bath, laundry trough and washing machine. In addition, heated drinking water for food preparation or other human consumption will be supplied to all sinks, basins, fridges and dishwasher appliances via a normal water system.

Every home will have a 2,400L rainwater tank to feed the heat-pump hot water system, which will draw its energy from the warmth in the air.

"We all need to reduce our reliance on drinking water as we deal with the challenges of population growth and climate





change. That's why innovative projects like the Aquarevo development are key to putting people first by making our communities more liveable and sustainable for the future," said Victorian Minister for Water Lisa Neville in a 2016 press release.

Rainwater is collected on the roof of each home within the Aquarevo development and screened through a gutter guard to remove debris that might be on the roof or in the gutters. The water then passes into the downpipe where it is screened a second time through a leaf diverter. A third screening is done via the initial flow of 17L of rainwater being diverted away from the rainwater tank by a first flush device.

The screened water flowing into the tank is filtered through a five micron filter and exposed to UV light before being heated to 60°C to remove bugs or pathogens to be safe for non-drinking purposes.

An air source heat pump fitted on the tank uses a refrigerant fluid to absorb warmth from the outside air and transfer it to the water stored inside, using up to 60% less electricity than a conventional electric storage hot water system.

Drinking water will be automatically supplied to the hot water system as a back-up if no rain water is available or if the system detects any variations in quality.

"South East Water will monitor individual systems throughout the estate to ensure all components are maintained and in good working order. We will also supply, install and maintain all components of the system installed on individual homes for 10 years at no cost to the property owner," says Terry.

South East Water has a patent pending on this technology, which has undergone extensive testing and monitoring.

"Several test sites have been established with full monitoring and South East Water has established a formal test environment at Holmesglen Institute to create scenarios and drive the system beyond expected real-life situations. The facility is also being used in the curriculum for the education of future plumbers," says Terry.

As part of this collaboration between South East Water and Holmesglen Institute, a test rig has been constructed within the Chadstone campus workshop with an assembly of water tanks, pumps, filtration systems and fixtures attached to a two-storey simulated domestic home. This simulated home can be monitored remotely from a South East Water facility to test the performance and viability of the heating of rainwater.

Terry says independent testing is also being undertaken by Monash University to further push the system's performance.

#### **BACKED BY TECHNOLOGY**

Each property will have South East Water's OneBox technology installed to intelligently manage water use and monitor energy consumption within the home.

OneBox is a small, wall-mounted, remote controlled telemetry system that can control and monitor the hot water system at a property, as well as the temperature of hot water leaving the hot water unit. It allows South East Water to remotely monitor and control the Aquarevo estate's



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Each rainwater tank has a transducer device to measure water levels and a motorised valve, which are both connected to South East Water's OneBox device. This receives weather forecasts so the tanks can release water before heavy rainfall, minimising stormwater run-off. Advanced screening, filtering and treatment systems ensure rainwater is safe for non-drinking purposes.

pressure sewer network, regulate sewer flow and enable Tank Talk.

Tank Talk is a system that enables the rainwater tank on each home to serve as a retention system through which South East Water can control stormwater discharge.

"Each tank has a transducer device installed within it that measures the water level and a motorised valve on the outlet of the tank. Both are connected to South East Water's OneBox device, which integrates data from the Bureau of Meteorology with a predetermined formula and discharges water to stormwater prior to a significant rain event," explains Terry.

"The benefit is that flows to our waterways can be better controlled and water quality within the tank improved."

Additionally, South East Water has developed an app that aggregates data from the technologies in the system to provide customers with near real-time data on their water and energy use.

### WASTE WATER TREATMENT

As part of the three plumbed system, waste water will be recycled to a Class A standard at an on-site treatment plant.

A pressure sewer is being used throughout the development instead of the traditional gravity system. This allows flows to the onsite water recycling plant to be controlled without diurnal peaks, resulting in a smaller treatment plant footprint. The plant will then return Class A recycled water to homes for use in toilets, gardens and optionally for washing machines.

Terry says these systems and technology, making use of rainwater and recycled water, will enable Aquarevo residents to cut drinking water demand by up to 70%, which is the equivalent of 1.2 million showers. They will also reduce stormwater run-off by 25%.

"These outcomes are unprecedented in a greenfields residential development," says Terry.

### AN INNOVATIVE SOLUTION

South East Water's use of innovation was recognised in 2017 when South East Water was inaugurated as a member of the Leading Utilities of the World (LUOW), an organisation that aims to promote innovation within utilities and communication between utilities.

It seems home owners are also impressed by the range of advanced environmental initiatives on offer at Aquarevo, with some lots selling out within hours of their release.

Land sales at Aquarevo commenced in November 2016 and all 167 lots released as of August 2017 have been sold. House construction will begin in 2018 and the development is expected to be completed by 2022.

Once completed, South East Water hopes Aquarevo will demonstrate there is a better way to use water at home that doesn't compromise quality or liveability. If successful this could then result in more residential developments plumbed with three types of water to deliver sustainable, water-efficient homes.

"We're excited about the opportunities this rain to hot water system presents for developments in urban and rural environments, and in Australia and beyond," says Terry. ■





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# COMMITMENT TO UNDERSTANDING THE BASICS OF BACKFLOW

Backflow is one of those things that you generally cannot see hence we go blindly through life blissfully unaware of the dangers lurking in the drinking water system, writes **Peter McLennan**

**B**ackflow prevention devices are everywhere but we may not be aware of them. For example most homes in Australia will have a dual check valve backflow prevention device installed in the residential water meter assembly. Many homes have hose connection vacuum breakers attached to garden taps and every toilet cistern has in-built air gap backflow protection to ensure the drinking water does not come in contact with non-drinking water. Backflow prevention devices protect against contamination of the drinking water caused by illegal or inadvertent cross connections between drinking water and sources of non-drinking water.

The level of protection necessary to all drinking water connections is laid out

in the Plumbing Code of Australia which is part of the National Construction Code.

When a State or Territory calls up the National Construction Code in their plumbing regulations, unless otherwise stipulated, it makes the use of backflow preventers mandatory.

Making it mandatory through legislation is one thing but while there is no requirement for additional skills development for the plumbing industry we risk the fact that the public will be exposed to potential danger.

The Backflow Prevention Association of Australia Inc. (BPAA) is committed to improving the knowledge and understanding of backflow through seminars, events, conferences and

workshops around Australia and resources on our website, [www.bpaa.org.au](http://www.bpaa.org.au).

Our national conference held in August, on the Sunshine Coast in Queensland saw around 100 industry professionals attend the 2 ½ day event which included a half day workshop for backflow contractors that focussed on building a better business plus refreshing their skills on testing and new standards.

## **Presentations were given by a range of industry speakers and included:**

Shayne La Combre - chief executive officer, Plumbing Industry Climate Action Centre (PICAC) and Chair, World Plumbing Council (WPC). Shayne officially opened the conference and his presentation provided many with a thought provoking message of where drinking water sat on a world scale and how the World Plumbing Council had developed the 4 Pillars Programme to improve education and understanding of plumbing internationally.

Bruce Hutton principal asset planning manager at SEQ Water gave an excellent overview of how they supply bulk water and the challenges they face with droughts, floods, aging technology and environmental implications that they encounter in getting the bulk water to the water supplier.

Ester Blest from the Service Trades Council Queensland and Assistant Commissioner for the Queensland Building & Construction Commission gave an insightful presentation on how the Services Trades Council in Queensland are implementing a raft of strategies for the Protection of the Service Trades.

Robert Dwyer, technical advisor backflow prevention, Central Highlands Water presented a valuable case



Backflow prevention devices are an integral part of the plumbing infrastructure

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study on the challenges faced by a regional water supplier. His presentation 'Backflow in a Regional City', took us through the steps required to set up and manage a successful backflow management programme and showed that it required a strategy that is supported from the managing director right through the organisation to the administration team.

Then on Saturday, Robert King from McKays Solicitors, covered an important aspect of any business with his presentation 'Are you Kicking your Health and Safety Goals'. It highlighted the importance of managing your health and safety risks in a small business and what your responsibilities are under the current legislation. This paper had people's eyes wide open as Robert's delivery was built from real life experiences and pointed out how ignorance is not bliss if a safety infringement gets to the Magistrates or worse still, the Coroners Court.



**Winners ... Marc Wilson from Victoria and Grant Carr from Queensland.**

The feedback from delegates indicated that the mix of topics and speakers provided real value to the conference and that the investment in time and money was worth every cent. The conference was well supported

by industry suppliers and a number of prizes were available for contractors on the day. Backflow test kits were donated by Emerson ValvCheq and Hydroflow Distributors Australia and these were won by Marc Wilson from Victoria and Grant Carr from Queensland. Congratulations to the winners.

Many thanks to all the sponsors and supporters involved in making the event a success.

They say knowledge is power, so whilst the understanding of backflow and backflow prevention is limited, the BPAA will continue to provide events and resources to raise the awareness and work toward safe drinking water for all. ■

*Visit [www.bpaa.org.au](http://www.bpaa.org.au) to find out more about how the Backflow Prevention Association of Australia Inc. can help you understand Cross Connection Control and Backflow Prevention.]*



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# CLASS IS IN - HOT WATER 101

Since the mid-1940s Australia has utilised mains pressure electric storage water heaters for use in domestic and commercial applications, **Jon Palfrey** explains the best practices of installation and commissioning.

**T**his article explores the electric water heater - its operation, function, installation, and commissioning, to a system that has been an industry mainstay for many years particularly in non-reticulated natural gas areas.

## OPERATION

### MAINS PRESSURE

Electric water heaters are designed to operate at mains pressure by connecting directly to the mains water supply. If the mains supply pressure in the area exceeds the unit's cold water supply parameters, a pressure limiting valve must be fitted. The supply pressure should be greater than 350 kPa for true mains pressure performance to be achieved.

### ELEMENTS

Each electric storage water heater is fitted with at least one tubular single phase immersion element located near the bottom of the tank, controlled by a contact thermostat and over-temperature energy cut out mechanism.

The elements are attached to the cylinder by a mounting plate and sealed with a rubber gasket and four screws.

The tube of the element sheath is made from copper. A resistor is connected between the sheath and the mounting plate to produce a resistance earthed element, reducing unwanted dissipation of the protective anode.

#### • Single Element Models

This type of water heater has one element with its own thermostat, located at the base of the water heater. It can be connected to an Off-Peak (overnight) or time controlled supply, Extended Off-Peak (overnight and day) or Extended Time controlled supply, or a Continuous/Domestic electricity supply.

#### • Twin Element Models

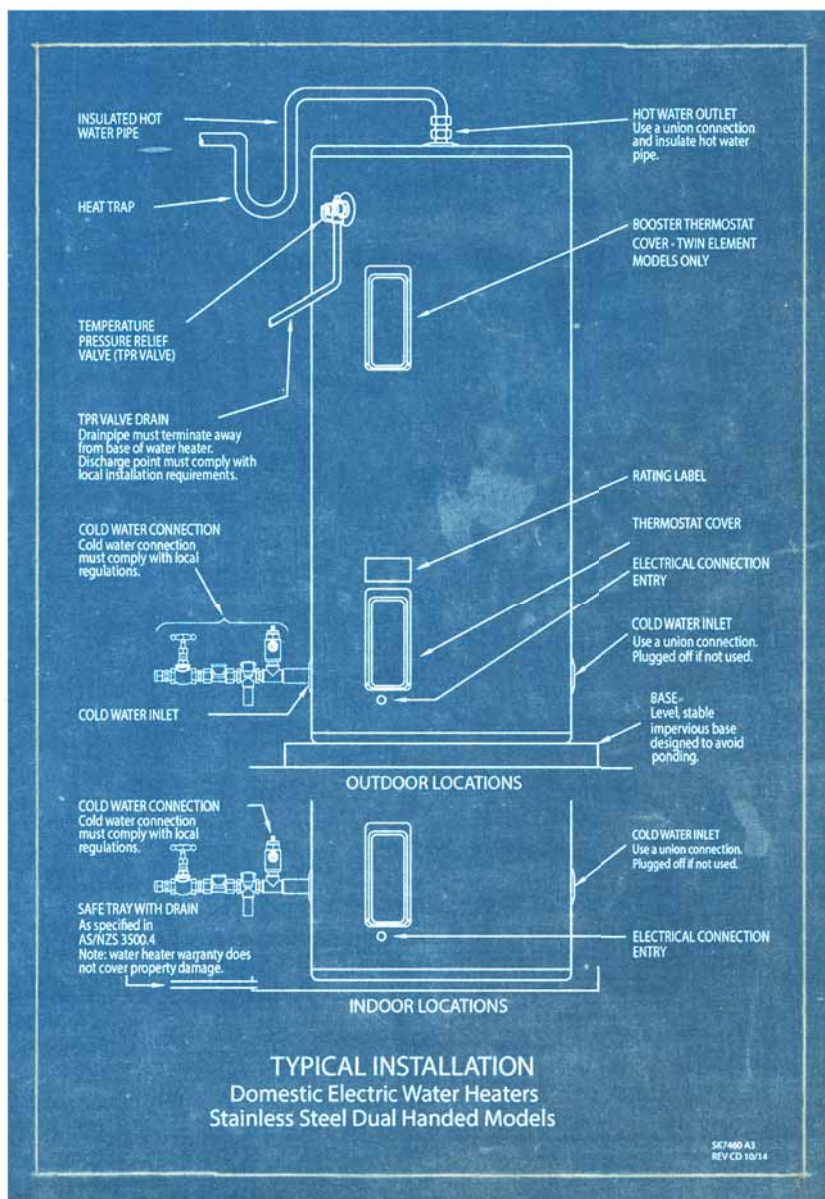
These have two separate elements,

each with its own thermostat and over-temperature energy cut out mechanism. One is located near the base of the cylinder and designed to heat the whole cylinder.

The other element is located part way up the tank to serve as a "booster" to heat only the upper portion of the contents of the cylinder in conjunction with the main element circuit.

During normal operation only the bottom element supplies all the hot water. During periods of high demand the top (booster) element operates, to provide an additional supply of heated water.

**NOTE:** Power must be available to the top element circuit at all times for this water heater to operate as designed.





## INSTALLATION

### TEMPERATURE ADJUSTMENT

For many electric hot water heaters, the temperature can only be adjusted by a licensed tradesperson via an adjustable thermostat.

The thermostat [bottom thermostat on twin element models] has a maximum temperature setting of 75°C (80°C for 50 litre stainless steel models) and a minimum temperature setting of 60°C. The top thermostat on a twin element model has a fixed setting of 60°C and cannot be adjusted. Only adjust the bottom thermostat setting when the isolating switch is switched off at the switchboard.

### WATER HEATER LOCATION

Electric mains pressure storage water heaters are suitable for either indoor or outdoor installation [power cord and plug models are suitable for indoor installation only]. Key considerations for choosing the location for the heater are:



Electric hot water systems have been an industry mainstay

- Install as close as possible to the most frequently used outlet [with safety and service in mind]
- The water heater is accessible without the use of a ladder or scaffold.
- The temperature pressure relief valve lever is accessible and the front cover, thermostat and element can be removed for service.
- You must be able to read the rating plate.
- Remember you may have to take the entire water heater out later for servicing.
- The water heater must stand vertically upright on a stable base
- The base is made of corrosion resistant steel, so can be placed on the surface. It is not necessary to allow for free air circulation under the base of the water heater.
- For internal installations, the unit must be placed on a safe tray and drainage available.

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**NOTE:** The water heater should not be placed in direct contact with a concrete surface less than two months old and not fully cured as this may attack the metal coating. A moisture barrier should be used between the two surfaces in this instance.

### HOT WATER DELIVERY

The water heater can deliver water at temperatures which can cause scalding.

It may be required by regulations [and where recommended] that a temperature limiting device be fitted before the hot water outlets in any ablution area such as a bathroom or ensuite to reduce the risk of scalding.

Where a temperature limiting device is installed adjacent to the water heater, the cold water line to the temperature limiting device can be branched off the cold water line either before or after the isolation valve, pressure limiting valve and non-return valve to the water heater. If an expansion control valve is required, it must always be installed after the non-return valve and be the last valve prior to the water heater.

If a pressure limiting valve is installed on the cold water line to the water heater and the cold water line to a temperature limiting device branches off before this valve or from another cold water line in the premises, then a pressure limiting valve of an equal pressure setting may be required prior to the temperature limiting device.

### HEAT TRAPS

If the hot water outlet is located on top of the water heater an external heat

trap may need to be installed to ensure against convection and heat losses. It must be within 1m of the hot water outlet, before the first hot water branch and have a vertical drop of 250 mm from the outlet.

Therefore if the outlet connection is located at the top of the unit and the direction of supply to fixtures is vertical, a heat trap extending 250mm must be plumbed.

### PIPE SIZES

To achieve true mains pressure operation, the cold water line to the water heater should be the same size or bigger than the hot water line from the water heater.

Pipe sizing should be carried out by persons competent to do so, with reference to the technical specifications of the water heater and local regulatory authority requirements.

### RECOVERY RATING

When hot water is released from a water heater, cold water comes in to replace it. The amount of cold water that can be brought up to temperature per hour is the heater's *recovery rating*. The recovery rating is calculated based on the known properties of water and assumes no heat loss during recovery – that it is 100% efficient.

### COMMISSIONING

Once installed, the power supply must not be switched on until the water heat is filled with water and a satisfactory megger reading is available.

To do that,

- ensure all the hot water taps in the house are open;
- Open the cold water isolation valve fully on the cold water line to the water heater. Air will be forced out of the taps.
- Close each tap as water flows freely from it
- Check the pipe work for leaks
- Switch on the electrical supply at the isolating switch to the water heater.

Explain to the householder the functions and operation of the water heater. Upon completion of the installation and commissioning, leave the installation instructions/owners guide with the householder.

### MAJOR SERVICE EVERY FIVE YEARS

It is recommended a major service be conducted on an electric water heater every five years. Only genuine replacement parts should be used on the water heater.

The major service includes the following actions:

- Replace the temperature pressure relief valve.
- Inspect and flush the expansion control valve [if fitted]. If required, replace the valve.
- Check the element for excessive calcium build up or corrosion and replace if necessary.
- Visually check the unit for any potential problems.
- Inspect all connections.
- Check the drain line from the safe tray [if one is installed] is not blocked. ■

**TABLE 1: CALCULATING THE RECOVERY RATING**

ELEMENT RATING [W]	40°C RISE	50°C RISE	60°C RISE	70°C RISE
1200	26	21	17	15
1500	32	26	22	18
1800	39	31	26	22
2000	43	34	29	25
2400	52	41	34	29
3000	65	52	43	37
3600	77	62	52	44
4800	103	83	69	59
6000	129	103	86	74

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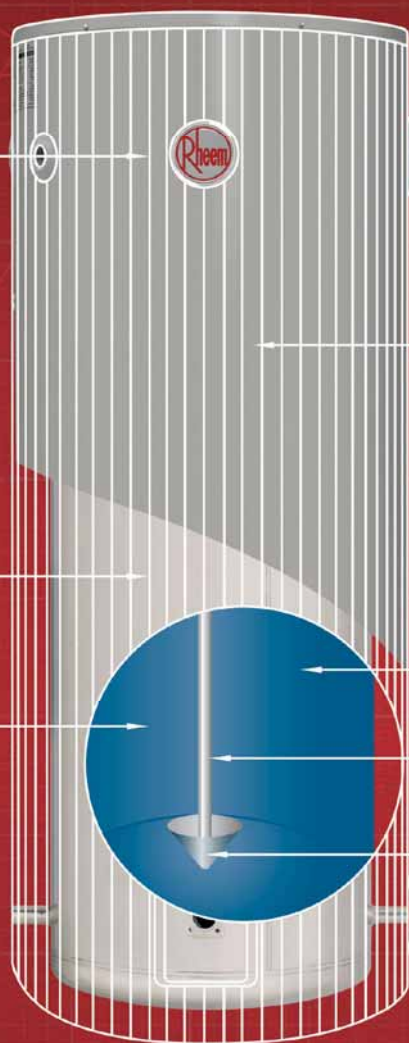
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# HYDROGEN PILOT PROJECT FOR SOUTH AUSTRALIA

Is hydrogen gas the solution to fossil fuel emissions? The City of Leeds thinks so, and potentially so does the South Australian government, but what are the realities for the industry? **Enzo Alfonsetti**, Energy Services Victoria explains.

**T**he UK Government has committed to reducing carbon emissions by 80% of 1990 levels by the year 2050.

Natural gas [mainly methane] is a much cleaner fossil fuel relative to coal however it still contributes to greenhouse gas emissions through the production of CO<sub>2</sub>. Hydrogen gas on the other hand emits zero CO<sub>2</sub> when it is burnt. As a result the UK Government has committed to converting the City of Leeds to hydrogen in a project referred to as the H21 Leeds City Gate project.

The aim of the project is to determine the technical and economic feasibility of converting the existing natural gas network in Leeds to 100% hydrogen. In the H21 project hydrogen is produced through the steam reforming of natural gas where the carbon is captured during this process and then stored underground using Carbon Capture and Storage Technologies.

Now a "Power to gas" trial has been announced for South Australia where small quantities of hydrogen will be injected into Adelaide's grid. Wollongong based company Aquahydrex is developing a prototype electrolyser to produce hydrogen from water. The development of the electrolyser

is being funded through a \$5 million grant from the Federal Government's Australian Renewable Energy Agency [ARENA]. South Australian gas company, Australian Gas Networks, is partnering with Aquahydrex to run this trial.

## **There are two main differences between the H21 project in Leeds and the South Australian project.**

1. Firstly the method by which the hydrogen gas will be produced. The South Australian project will produce hydrogen gas through electrolysis where electricity will be used to split the water molecule H<sub>2</sub>O into hydrogen and oxygen. Hydrogen production within the H21 Project on the other hand will be by the steam reforming of Natural gas.
2. The South Australian pilot project will focus on blending hydrogen with Natural gas whilst the H21 project involves converting sections of the city at a time to 100% hydrogen. The level of hydrogen injected and blended with Natural gas into the South Australian gas network during the trial will be limited by the ability of currently installed gas appliances to safely burn hydrogen. ➤



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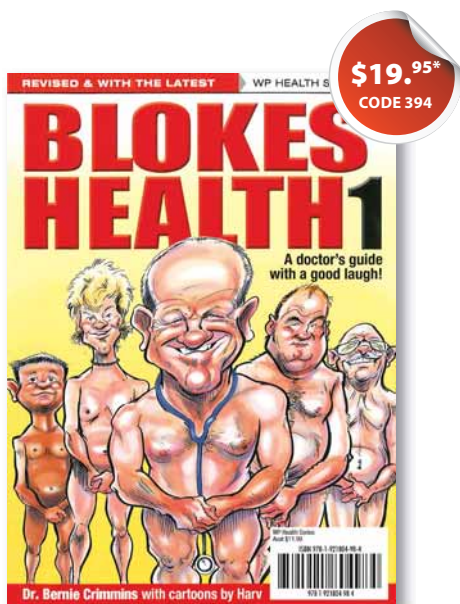
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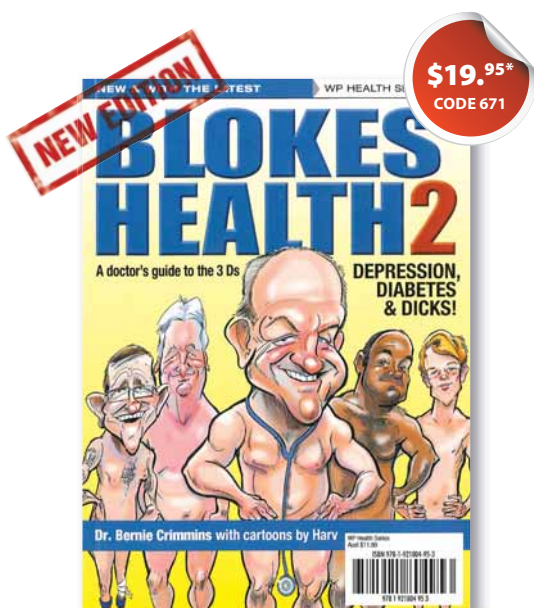


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## FUTURE GAS

Some of the technical challenges that need to be considered include the impact on infrastructure including distribution pipelines. Old steel mains at high pressure are incompatible for transporting hydrogen as embrittlement of the steel can occur. In addition the smaller hydrogen [H<sub>2</sub>] molecule relative to the methane [CH<sub>4</sub>] in natural gas increases the probability of gas leaks occurring. The use of polyethylene pipelines addresses these problems.

The impact on infrastructure downstream of household billing meters also needs to be considered. Copper and its alloys such as brass are believed not to be impacted upon. However the effect on older downstream infrastructure made of steel may need to be considered.

Hydrogen has a significantly larger [4-75%] flammability range than natural gas [5-15%] and as mentioned earlier is more prone to leakage given its smaller molecule relative to natural gas. Hydrogen also has a higher flame speed which means it is more likely to ignite back at the injector of a burner [commonly referred to as lightback] if the appliance is not designed correctly or if the appliance is not converted to suit.

Type A gas appliances designed for use with natural gas are laboratory tested using a range of natural gas limit gases prior to certification. "Nb" gas is a natural gas limit gas which contains approximately 13% hydrogen. Hence this limitation will have to be taken into consideration when considering the concentration of hydrogen to include in the blend. It is expected that a safety margin would be considered and so therefore the concentration of hydrogen within the natural gas would be considerably less than 13% to ensure satisfactory performance of installed Type A gas appliances. Hence theoretically there should be no need to make any adjustments to the appliances provided the concentration of hydrogen in the natural gas is less than 13%.

Injecting higher concentrations of hydrogen beyond 13% would require for gas appliances to be modified or converted in order to cope with the characteristics of hydrogen. This would typically include a change in the burner head design where burner ports are reduced in size to prevent lightback and also a reduction in primary burner aeration and reduction in operating pressure. An increase in the size of burner injector orifices would also need to be considered to account for the lower heating [calorific] value of hydrogen relative to natural gas.

The success of a project such as this could pave the way one day for a complete conversion of Australia's gas network to 100% hydrogen and a carbon free gas industry. The other challenge will be to one day produce sufficient quantities of hydrogen to meet demand using renewable energy sources such as solar and wind power. ■

**For more information refer to the following links:**

<https://www.australiangasnetworks.com.au/our-business/about-us/media-releases/agn-to-play-leading-role-in-australian-renewable-energy-pilot-plant>

<https://arena.gov.au/news/power-gas-trial-to-inject-hydrogen-australias-gas-grid/>



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# HOLMAN INDUSTRIES, THE NEW LEADING SUPPLIER IN PLUMBING FITTINGS

Already seeing success as a national industry leader in gardening and irrigation, Holman is now a leading supplier in plumbing fittings.

**H**OLMAN Industries recently celebrated 50 years of operation and success as a family owned Australian company. HOLMAN started manufacturing electronics in 1966 but 25 years ago turned its focus to the irrigation, landscape and plumbing industries under the guidance of new managing director Wally Edwards.

The family owned company is now a proud leading supplier of watering products and plumbing fittings in Australia. The key product groups of the company are PVC pipe, DWV, stormwater and pressure fittings, Bluetooth irrigation and garden lighting products. The HOLMAN product range will be expanding even further in the next few years and the company has already seen an impressive 40% growth during the past two years.

With an established market share in Australia, HOLMAN is expanding its international distribution network, already heavily exporting to the USA and Europe. With large distribution warehouses in Brisbane and Melbourne, alongside an exclusive plumbing warehouse in Sydney, HOLMAN has the capacity to supply national and international customers and allow for continual annual growth of its customer base in Australia and overseas.

Growth and innovation have always been a focal point of the company. In 2016 Holman took the opportunity to acquire Fabfit, an already successful Australian plumbing and electrical moulded and fabricated fittings manufacturer. The acquisition saw an expansion of the available HOLMAN plumbing fitting range. HOLMAN now offers DWV fittings, stormwater fittings, PVC pressure fittings, poly compression fittings and poly threaded fittings to its national and international customers.



With a high industry standard for residential and commercially available plumbing fitting products, HOLMAN continues to grow its large plumbing fittings range by investing in tooling, research and product development, and innovation into its Australian business. A dedicated research and development department, and a design team are located in Perth and all fabricated fittings are manufactured locally in Queensland, Australia.

All HOLMAN products are certified by ApprovalMark International, an Australian based Certification Body accredited by JAS-ANZ, who provide certification to all HOLMAN plumbing products in accordance with Watermark Level 2 [High Risk] and Watermark Level 2 [Low Risk]. This provides assurance and confidence that HOLMAN only supplies products which comply with Australian Standards, and are manufactured to the highest quality. All Holman PVC fittings comply with Best Environmental Practice [BEP] requirements.

HOLMAN currently employs more than 200 employees around Australia, and has recently moved into a new purpose built Head Office in Perth. This is also the location of four new warehouses that supply the national leg of the HOLMAN distribution network and a heavily involved customer service department. The HOLMAN customer service team offer the highest level of product knowledge and additional dedicated back office support and analytics to customers all year round. Ensuring positive experiences with the HOLMAN brand and product range is paramount to the company and employees work closely with their customers to understand their customers' market demands and requirements. Product development and innovation are constantly evolving to meet changing market expectations and ensure success and growth for HOLMAN customers. ■

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The R&D and design teams at Holman Industries are passionate about providing clever solutions that enhance the plumbing range.



# THE BATHROOM IN A BOX

An Australian-designed compact bathroom appliance enables the toilet and all sanitary fixtures to disappear from the bathroom, revolutionising bathroom design. **Adelle King** reports.

Growing populations, energy resource issues and rises in house prices are affecting how homes are being designed and built. According to *The Australian*, unpublished Australian Bureau of Statistics [ABS] data shows the average new home in Australia in 2016 was 192m<sup>2</sup> compared to 222m<sup>2</sup> in 2009.

As the size of homes decrease and more people move into small apartments, terraces and townhouses, there is a need for space efficient bathroom appliances that will revolutionise bathrooms the same way washer/dryer combinations did for laundries., particularly in high population density cities.

This is the idea behind the Australian-designed UB1 product from Sydney-based UNIQ Bathrooms. UB1 is a bathroom appliance that provides up to three fixtures in one, concealing a retractable toilet and basin with no taps or accessories, as well as an optional shower.

"We saw the need to rationalise the design of bathroom components and find ways to prefabricate, optimise space and reduce the costs of the most expensive part of the house," says UNIQ Bathrooms director Malcolm Carver.

"In a traditional bathroom, each fixture takes up dedicated space with little duplication and we saw that bathrooms needed an appliance to become more affordable and space efficient."

UNIQ Bathrooms has designed a toilet and basin that can be folded away so all sanitary fixtures, including the taps and accessories, are concealed flush within the bathroom wall or under a vanity bench. Malcolm says this means each function of the bathroom can be carried out using the same 1m<sup>2</sup> space.

"We tried to change the whole concept of what a bathroom is by de-cluttering the space so that the room enables multi-functional uses."



The UB1 allows each function of the bathroom to be carried out using the same 1m<sup>2</sup> space. UNIQ Bathroom's retractable toilet and basin can be folded out and away.

There are three appliance models available, the UB1, which is a combined basin and toilet, the UB2, which is the toilet alone, and the UB1+S, which is the combined basin and toilet with plumbing for a remote shower head.

All three units discharge waste into an existing 100mm sewer pipe connection in the wall or the floor, with hot and cold water inlets similar to those required for a dishwasher installation. The remaining

plumbing is all contained within the appliance, with the exception of the optional flexible pipe to the shower head mode.

The sewer trap to the toilet is a patented rotating 'R' trap that Malcolm says is similar to an S trap but with a hinged joint, sealed with 'O' rings that close in a V shape to provide the required water seal.

There are hand sensors in lieu of taps,



with built-in overflows to the basin and cistern, while the water flush system is similar to a traditional 6/3L dual-flush cistern. However, because the toilet system moves and returns back into the unit at an angle, there is a water sealed gasket lid to ensure water doesn't get out.

"The sealed gasket lid and the V trap water seal eliminate any chance of smell from sewer pipes," says Malcolm.

A thermostatic valve controls water temperature and the shower model has a sensor on/off operation with temperature adjustment and timer control. The basin is activated by hand and the toilet is opened and closed by a remote controlled unit with a 12V motor.

The UB1 and UB1+S are the same size as a standard dishwasher (the UB2 is smaller), making handling, transport to site, servicing and replacement easy. It also means the units are able to sit flush with walls or cabinets.

"Kitchens and laundries are far more

advanced than bathrooms and benefit from having appliances and modular construction with services contained in cupboards for easy access. We wanted to create something similar for bathrooms and came up with the UB1, which is effectively a 'bathroom in a box'," says Malcolm.

As space in cities becomes increasingly limited, UNIQ Bathroom's UB1 provides a new option for bathrooms that is space efficient and adaptable to future upgrades.

"Bathrooms today are the most expensive component of a house and normally configured in an ad hoc arrangement of individual fixtures. These each require dedicated space to function. They also need expensive, labour intensive water proofing and tiling, with fixed concealed services in walls and floors," says Malcolm.

"While prefabricated bathrooms are becoming more common and favoured by builders, they still waste space. We've

developed an appliance that will enable more space efficiency in the most expensive part of the house, which leads to less tiling, waterproofing, lighting and ventilation, and therefore major cost savings."

According to a report by international cost consultants Rider Levett Bucknall [RLB], the UB1 can achieve cost savings of up to 40%, as well as reduce bathroom space by up to 66%.

These savings have been recognised internationally and the UB1 has received seven international design awards, including the ISH 2017 Design Plus Award at the ISH International Fair in Frankfurt, Germany.

"We think the UB1 solution is the beginning of a real change in bathrooms and an exciting new paradigm in contemporary bathroom design innovation," says Malcolm. ■

**Contact:**

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# STANDARDS AND QUALITY OF WORKMANSHIP AND CERTIFICATION

As a builder or contractor, providing quality workmanship and products fit for purpose are backed by laws and standards across the country. **Paul Cott** outlines the laws involved.

All states in Australia have to some extent standardised laws in respect to the standard that contractors [and builders] are required to uphold for their work. Victoria, New South Wales and Queensland law is similar whereas the other states and territories have laws that are broadly the same in effect and ideas.

Building standards apply whether or not they are written specifically or are even referred to in the contract. The important thing to remember is that there are time limits beyond which, if defects begin to be revealed, the builder or tradesman is 'off the hook' as far as potential legal liability is concerned. That time period is often ten years from the date the Occupancy Certificate is issued. This time period also applies when the legal liability risk 'transfers over' to subsequent purchasers of the property.

These laws and standards are designed to protect consumers in relation to all types of products and services and provide some protection to ensure that the consumer gets what they pay for.

Warranty insurance is applicable to building projects more than \$16,000 in Victoria and only applies to protect an owner in certain specified circumstances.

Those circumstances are where the builder dies, the building company becomes externally administered by a liquidator, or where the builder goes missing and cannot be found. It is a common error to think that this 'warranty insurance' applies generally and gives protection to the owner whenever there are defects and/or incomplete works.

The first implied warranty is that the works are performed with reasonable care and skill. That is not a duty to



guarantee that the works are done or the goods which are provided will be completely defect-free but that they are performed [or provided] with reasonable care and skill, appropriate to the contractor's skills, qualifications and experience. The standard required is adaptable to all the circumstances. Often, however, the law makes a distinction as to the possibility of a remedy [such as the right to a refund of money paid, compensation or rectification of the defects] for the consumer or home owner, on the basis of whether the defect[s] are major or minor. This standard is often called the duty to do work in a 'proper and workmanlike manner.'

The second implied warranty

which will apply irrespective of the intentions of the contractor and the owner is the duty to follow the plans and specifications of the contract. Not much needs to be said about this one except to say that it is a reflection of the concept that a consumer is entitled to receive what they paid for.

The next aim for a contractor is to provide materials or products which are of an acceptable quality. As with the standard of due care and skill, whether you have reached the level of 'due' care or skill or 'acceptable quality' varies with circumstances, but the products or materials actually have to be fit for purpose. In some instances, the law will require that the materials provided be new.

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The arguably most critical requirement is that the contractor's or builder's work complies with the law.

Finally, the work should be carried out by the promised due date. Though this duty is not often explicitly stated in the law (although it is in Victoria in the Domestic Building Contracts Act) it is related to the critical element of time. It is also usually the subject of a clause in the contract where there are a specified number of days by which the works must reach practical completion or substantial completion.

It is specified in the contract what the consequences are if this date is not achieved. Liquidated damages may be payable, based on the number of days past the due date the works are complete is an example. A set rate is usually set, such as \$250 per week. There are exceptions to this requirement for the builder to pay such damages, broadly based on factors outside the builder's control.

Mention should be made of the important topic of certification of works. Certification of works can be implied or actual - usually written, but it can be verbal. The builder can be entitled to final payment claims based on an implied written statement from the architect or inspector.

The most common examples of documentation are final and practical completion certificates. Often, a building contract says that a certificate from an architect is required to indicate that the architect is satisfied that the works carried out are satisfactory in relation to the contract. In general, the certificates referred to in this article are conclusive

with respect to compliance of the duties or standards but this can depend on what the contract stipulates.

Final certificates are usually issued at the end of the defects period. However if there are defective works, an owner can still usually, despite the certificate, claim damages. As in all cases, it is the contract and its wording which governs the conclusiveness or otherwise of a final certificate.

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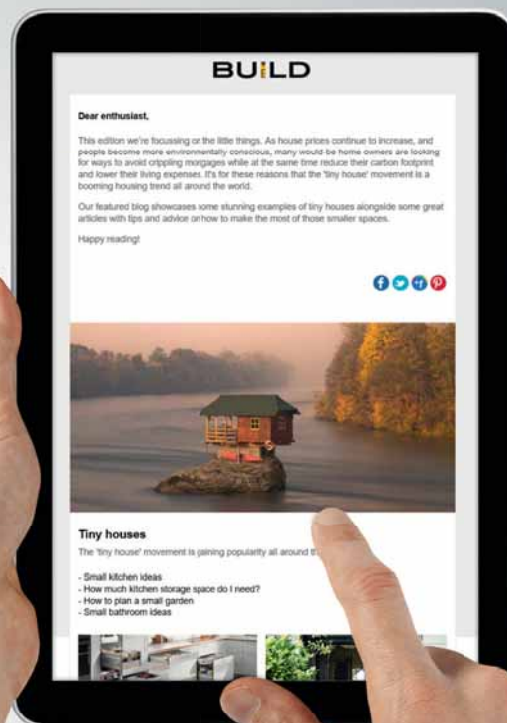
### **Building standards apply whether or not they are written specifically or are even referred to in the contract**

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Due to the often discrete and technical aspects of this area, it is strongly recommended that if you are faced with allegations that you have done work of sub-standard quality, you seek professional advice. ■

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Another great innovation from the team at Plastec Australia is a new range of compact Floor Waste Gullies.

These gully kits have been designed to require significantly less ceiling space for installation than most regular gullies in the marketplace today.

They will be available for purchase as a complete installation package including gully, grate and puddle flange. There will be numerous grate options to choose from including regular round and square grates, plus tile insert options.

Even with their reduced height, these gullies will be very easy to maintain with a removable internal trap.

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ACROSS THE TRADES



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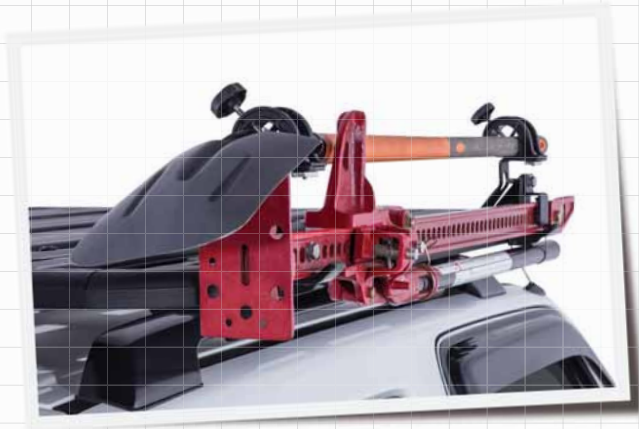
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## Pioneer Shovel Mounting Bracket

The Rhino-Rack Shovel Mounting Bracket is the perfect accessory to keep your shovel at the ready when you need to dig yourself out of snow, sand, mud or any other type of terrain.

With easy installation and removal, you will be able to mount a shovel onto your vehicle with multiple configuration options. The brackets can be inverted to position the shovel above or below the tray and the hinged design allows mounting of a wide variety of handles as well. The secure roof system holds your tools to prevent any cabin damage from occurring.

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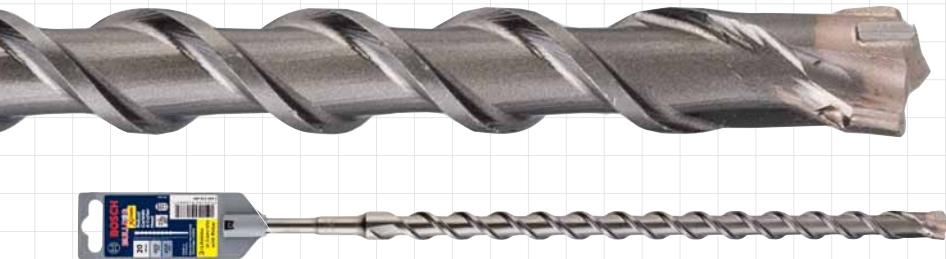
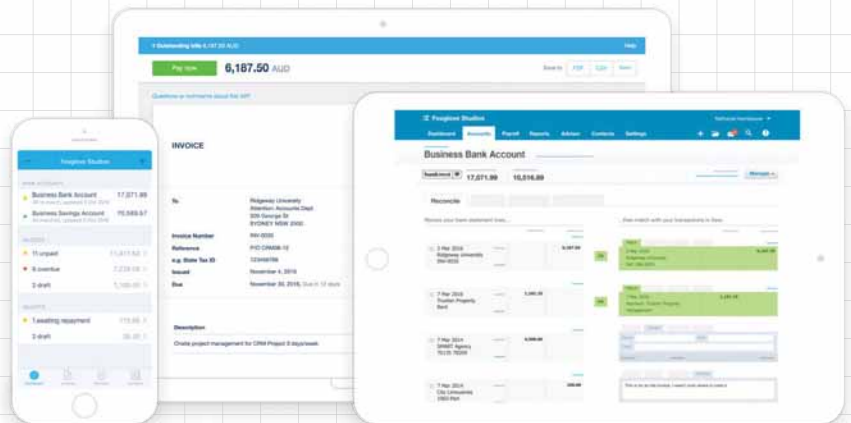
## Xero Connect

Xero has launched Xero Connect, the newest step in e-invoicing that lightens administrative burdens on small businesses and has the potential to slash overdue payments.

Xero Connect allows large suppliers to send invoices directly into small businesses' Xero accounting software via a secure integration with the supplier's billing system. After a small business approves a draft invoice, the bill will automatically be matched in Xero to a corresponding payment made later.

**Xero**

[www.xero.com/au](http://www.xero.com/au)



## Bosch Bulldog Xtreme

Bosch has announced the release of its new Bulldog Xtreme drill bits.

These new bits feature a sharp, 90° 'centring' tip for a deep and stable centring as well as large dust removal channels and a four-flute design, which continues the geometry of the drill bit head.

A four-cutter full tungsten carbide head offers resistance in reinforced concrete applications while a unique 180° cutting edge enables 100% power transfer during drilling.

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**AMAROK** **V6**  
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## Safety Boot

Blundstone has released a new style in its premium XFoot TPU range - the #144. With a wheat nubuck water resistant upper, the #144 offers a range of outstanding features for the discerning wearer who is looking for optimum comfort in their safety footwear.

The #144 is a general-purpose safety boot, ideal for a range of occupations and conditions. It is packed with features including Blundstone's exclusive SPS Max Comfort system with XRD Extreme Impact Protection providing outstanding cushioning if you are on your feet all day. The luxury Comfort Arch footbed further enhances the comfort experience.

Featuring a steel toe cap, the #144 would be an ideal choice for tradies.

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## Energizer Vision LED headlight

Energizer Vision LED headlights offer a perfect solution to any jobs and activities that demand the use of both hands. Designed with leading-edge LED, optics and focusing technology, the head torches are designed for an exceptional user experience at every level.

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## LEGAL MATTERS



# CARRY ON THE GOOD WORK

WHAT HAPPENS WHEN YOU RETIRE? **MARTIN CHECKETTS** THRUSTS BUSINESS SUCCESSION INTO THE SPOTLIGHT AND ASKS THE SOMETIMES TRICKY QUESTION OF SUCCESSION IN A FAMILY BUSINESS



**H**ere's a tricky question to ponder while you're driving to the next job, or when you've got a quiet moment on site: what will happen to your tradie business when you retire?

If you're like most tradies, your business is probably individually or family owned. And if you've never considered who will run your business when you're gone, you're certainly not Robinson Crusoe: studies have shown that only about 25% of family businesses have a formal succession plan.

Will your kids take over when you're gone? And if so, what's the best way to go about it?

### **In all honesty...**

The thought of passing on the family business to your kids is enough to make any parent feel warm and fuzzy. But as with many things warm and fuzzy, cold reality may intrude. You need to start with

a dose of brutal honesty: is this what you really want? Is this what your kids really want?

If you have ever attempted to sit down and have a conversation with your child or children about their plans for the future, you will know just how fraught this subject can be. They may be candid with you. They may not. If they are still young, their main priority will probably be just to get you off their back!

That's the reason why you should never make assumptions about transitioning the business to your children without having an explicit understanding about what they want. If this is an uncomfortable conversation (and it often is), it may be preferable to ask an independent person, such as a trusted friend, to have this conversation and find out what your children really want.

The other side of the equation is that you need to be sure of what you want too. We see many cases of parents handing over the business to their kids and then trying to wriggle their

way back in because they haven't prepared emotionally for retirement – or financially either. So think it through and consult a financial planner. Find out how much you need to retire and plan the transition around that. Never forget the emotional investment you've made in your business. This has been your labour of love – are you ready to step aside and find something new to fulfil your days?

### **Eggs in a basket**

I have heard many business owners say things like 'we will never sell; this business is our children's inheritance.'

However, there are many ways to ensure that future generations are financially secure that don't necessarily involve giving them your business.

This is particularly the case if the children are not ready to take on running the business or have other plans or aspirations.

By passing the business on to your children, you may be putting all of their financial eggs in one basket. In contrast, selling the business and then setting them up with the sale proceeds would allow them to spread their risk by investing in a broader and more diverse portfolio of assets.

### **Show me the money**

Once you have decided to proceed with the transition, the next question that arises is how you conduct the transaction. Do you give your child the business? Do they buy it at a fair commercial price? Or perhaps at a discount?

While there are many valid exceptions to this 'rule', we generally recommend selling the business to your child or children at a fair commercial price, and supported by an independent valuation report. This is for a few reasons. First, if you have multiple children but only one child is taking over the business, you're opening up a real can of worms by

giving that child the business or giving them a discount. To put it mildly, it is going to put a strain on any perception that you're dealing the other kids a fair hand – especially if your business is the main asset in the family. Secondly, even though you didn't make any personal profit on the transaction, depending how you structure the deal this may not stop the ATO or State Revenue Office coming around to take its cut.

For these reasons, it's preferable to keep your business dealings with your children at arm's length. This means treating them just like you would treat any other business associate. Preferably they should have separate legal and accounting/financial advisors.

If they are already working in the business, pay them a fair market wage. No more, no less. It may sound old-fashioned, but taking the place of a normal employee and paying fair price for the business will give your kids a far greater sense of achievement and appreciation of the business than preferential treatment or a gift.

For similar reasons, we generally don't recommend so-called 'sweat equity' – paying a child less than the market rate on the understanding that the business will one day be theirs. If you do this, you are locking in a whole series of assumptions about what will happen in the future and, from the point of view of any other children you might have, creating a less transparent state of affairs.

### **Slowly but surely...**

The key to successfully transitioning a business to your children is to allow adequate time. Experts recommend allowing two to three years as an absolute minimum period to transition your children into the business and getting them to the level of competence necessary to run it.

You may wish to transition the equity or ownership structure of the business in line with this process. This is called a 'staged succession' and it occurs when you sell your interest in a business over time. So you would commence with 100% ownership of your business and sell it down gradually to your children over a number of years, transitioning ►



If you've ever tried to sit down and have a conversation with your child about their plans for the future, you'll know just how fraught this subject can be. They may be candid with you. They may not.

ownership in more manageable 'chunks'.

The upside of such an arrangement is clear. It will be easier for your kids to fund the purchase of your company in instalments and you are also giving your kids the opportunity to get to know the business, the customers and the suppliers and also reducing the risk that they will leave to pursue other career opportunities. It also allows your child to become steeped in the culture of the business and how things are done, while allowing you to slow down over time and gradually withdraw.

### Hope for the best, prepare for the worst

You may enter a transition plan with the best of intentions, but let's be honest. Expecting the lifetime owner of a business to gradually fade into the background over a few years and then gracefully bow out is not exactly realistic. Tradies are known for brutal honesty and for wearing their hearts on their sleeves. Transitioning out of a business is going to be emotional and at times there are going to be disagreements about how the business should be conducted.

So, we recommend starting the process by covering all of the possible scenarios where disagreement could occur and agreeing on a process to resolve these, documented in a Shareholders' Agreement.

### Common situations you should anticipate include the following:

- What happens to remuneration, as your role diminishes and your kids' role increases?
- What happens if the transition doesn't work and your child pulls out? If they've already purchased a stake in the business, at what price should it be bought back?
- What happens if your kids propose something that is absolutely unacceptable to you - for example, radically changing the business, bringing in a new partner of whom you don't approve, or even winding up the business. Should you keep a right of veto in these situations?
- What if someone storms out of the business - should they be restrained from starting up a competing business and then poaching customers?

These are all common business scenarios which a qualified lawyer can assist you to anticipate and defray - before the blow up occurs.

### Conclusion

When you're preparing to transition your business, it pays to keep a few key principles in mind. First, deal with your children on commercial terms. Secondly, transition the succession over at least two to three years. Third, keep a written agreement on what happens if you have a disagreement during this transition period. And finally and most importantly, make sure this is what you and your kids genuinely want. "Dad, I don't want to take over the business" is a hard enough conversation to have at the best of times. Just make sure it doesn't happen three years into an expensive ownership transition. ▲

#### Martin Checketts

heads up the Private Advisory Team at national law firm Mills Oakley. He specialises in advising the owners of private and family businesses and high net wealth individuals on issues such as business succession and asset protection.



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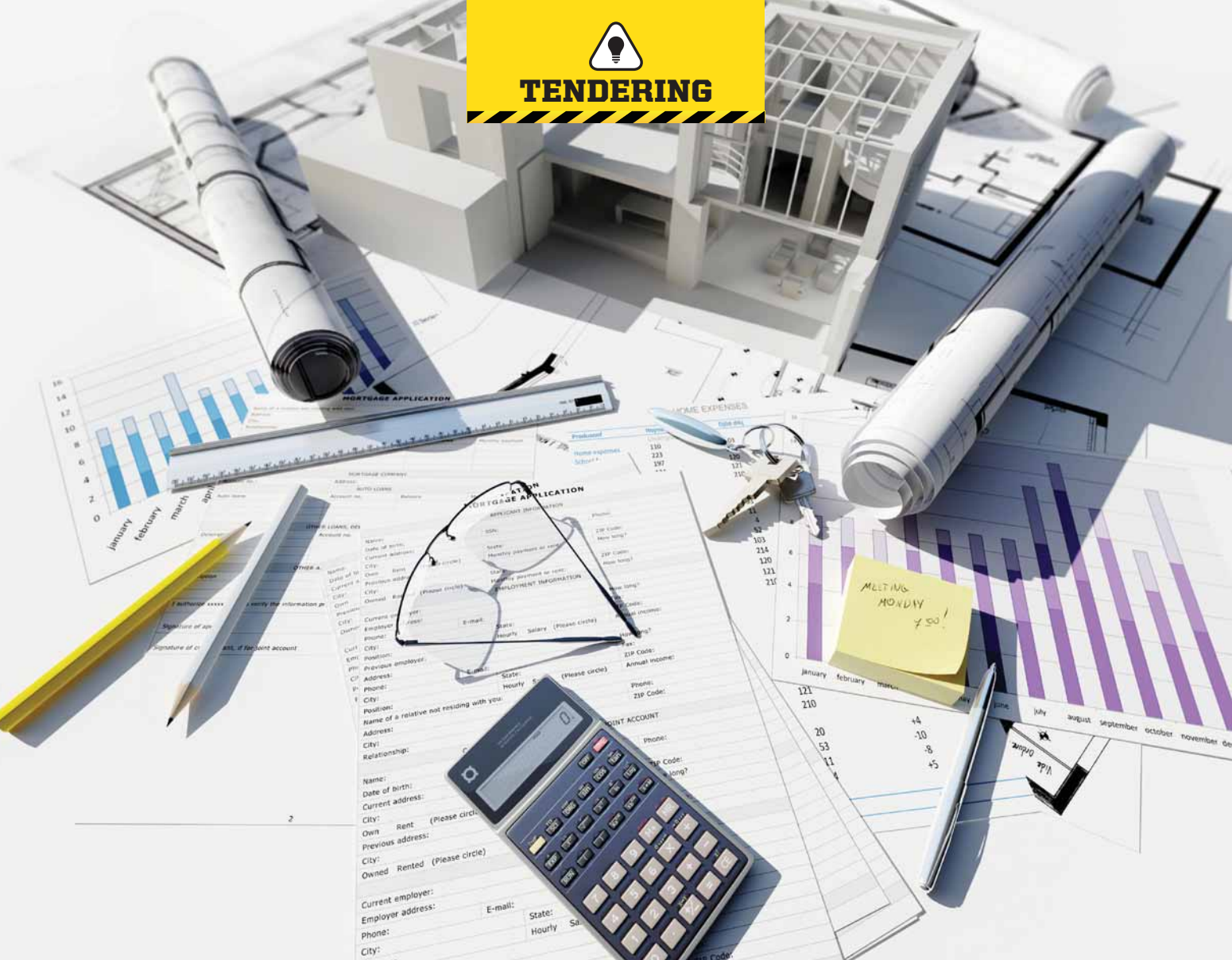
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# LOVE ME TENDERING

WINNING A TENDER CAN BRING IN THOUSANDS OR EVEN MILLIONS OF DOLLARS IN NEW AND REPEAT BUSINESS BUT THE PROCESS CAN BE OVERWHELMING AND COMPLEX. **ADELLE KING** ASKED KEITH WHELAN, WHO SPECIALISES IN GRANTS, TENDERS AND FUNDING CONSULTANCY, TO BREAK DOWN THE PROCESS AND OFFER HIS TIPS FOR SUCCESS.

**T**enders can be a rich source of work for tradies and are crucial in building a business and gaining contract work in both the public and private sectors. However, submitting a tender can be a difficult and daunting process for any contractor, particularly if they haven't submitted one before or aren't confident in their writing ability.

"The public sector in Australia is a multi-billion dollar tender market, which is huge and financially lucrative, so more building contractors,

electricians and plumbers need to be looking at submitting tenders for projects to access this market," says The Grants Guy owner Keith Whelan.

Keith has worked across the local government, university, sporting and disability sectors in Australia and has taught tender writing workshops for ACT Tourism, NSW Business Chamber, Newcastle City Council, Canberra Business Council, University of Adelaide and the University of Sydney.

He says that for builders, electricians and plumbers looking at submitting a

tender, the first thing they need to do is work out what their business can offer.

"This means having a business plan, capital expenditure in order, a budget and a project plan," says Keith.

"Tradies know their own product, their strengths and how to be cost competitive because they're already out in the market competing. From there it's basically assessing what you want to achieve with the tender, the outputs and outcomes, and then take it step by step."

There are a number of websites, such as AusTender, which list tender

opportunities on a daily basis, and industry bodies and associations, local, state and federal government websites, newspapers and business group networks will also publicise contracts for tender in the public and private sectors.

After finding a contract to submit a tender for, the next step is to carefully read through the response documentation to understand exactly what is required and ensure completion of the job is achievable. The tender proposal process will include planning, drafting and refining the response.

"It's a baby steps process and it's really about going through the questions in an analytical order to make sure you address all the criteria, including time, scope, price and quality parameters," says Keith.

Before submitting a tender, gather all the information required for the response, including material that demonstrates how OH&S, quality control, environmental management and staff training are managed. Assessors will usually ask for a copy of plans for these and other operational procedures so there should be contributions from people across the business, including finance managers and project managers.

Make sure the submission is concise, compelling and clear, and stick to word or page limits.

Experience in the market should be highlighted and how well this experience meets the tender scope of works must be explained. Keith says similar work

the business has completed should be outlined and information about the scope of work, value, timeframe and results should also be included.

"You should model your tender around feature, benefit and interests (FBI) - what you do/offer, what you can bring to the project and why you're applying for the tender - and claim benefit evidence (CBE) - making a statement and backing it up with evidence," says Keith.

"This means proving you know the market, even if you're breaking fresh into it, understanding your point of difference compared to competitors and your unique selling point."

Being cost competitive is also crucial as many tenders still use price as the sole award criteria.

"For most tenders, 60% of the value is all about tender price so it's really important that you understand what your competitors are offering and how you can be competitive in price compared to them," says Keith.

Contractors should be doing at least three or four drafts of their proposal to ensure their budgets and value offering are clear. Although there is no one-size-fits-all answer to how long you should spend drafting a tender proposal, how much the tender is worth will give some indication of how long to spend preparing the response.

"If it's a multi-million dollar tender then you should be spending 16 weeks on your proposal. If it's worth less than that then the minimum should always be one month and if it's a repeat tender you should still spend three weeks rejuvenating and reinvigorating your proposal."

The biggest mistakes businesses

make when submitting a tender is leaving the process to the last minute and not taking the time to proof-read, review and correct mistakes.

"The other big thing is not answering the question and talking around the

subject rather than at it. Give case studies or examples of how you've done similar work in the past and don't leave any statement unqualified. A lot of tradies make a statement, such as they're the best plumber in a particular part of Melbourne, and don't provide industry recognition, awards or client numbers as evidence of this," says Keith.

It can therefore help to bring a tender



**The Grants Guy owner Keith Whelan reviews and makes recommendations on tender applications.**

response writing expert in at the later stages of the process to assess, review and appraise the application, edit it, proof-read it and offer an objective third-party view-point that understands what the assessor is looking for.

"Business owners can undertake the tender writing process to about 80% value and then I think you need a person who understands the tendering market to complete the last 20%," says Keith.

Tendered projects also won't usually provide feedback on unsuccessful tenders so it can be difficult to know where improvements are needed without engaging the services of an expert.

"Most tendering bodies are going to be looking at 'value for money' so that is obviously something you should consider. I think the main things to remember though, are be professional, don't do a last-minute application and really look at your businesses own values as well as adding value," says Keith. ▲

*Keith will be teaching Tender Writing at the Centre for Continuing Education at the University of Sydney on Tuesday 21 November from 9am-3pm. To register go to <https://cce.sydney.edu.au/courses?s=tender+writing>.*

**The Grants Guy**  
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*For builders, electricians and plumbers looking at submitting a tender, the first thing you need to do is work out what your business can offer.*

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# THERE'S NOT ALWAYS SAFETY IN SUNSCREEN

EARLIER THIS YEAR, REPORTS OF SUNSCREENS 'FAILING' TO PROTECT USERS SPARKED FEARS THAT TRADIES WORKING OUTDOORS WERE BEING PUT AT RISK AND DREW ATTENTION TO EMPLOYER RESPONSIBILITIES IN REGARDS TO SUN PROTECTION. **ADELLE KING** REPORTS.

**L**ast summer a number of popular sunscreen brands, including Banana Boat and Cancer Council, were linked to serious burns in children and adults in Australia. Dozens of people were treated for first and second degree burns after using sunscreen products, with one three-month old baby requiring hospitalisation.

Despite fears that dodgy sunscreen products were making their way onto shelves, the Therapeutic Goods Administration (TGA) found the products performed consistently according to labelled claims. The TGA tested a range of sunscreen products after the burn allegations and found all products tested contained the correct levels of ingredients and complied with the Australian regulatory guidelines.

The TGA says the issue is therefore not with a product's failure to protect but with allergic reactions and consumers' failure to apply and re-apply sunscreen correctly as per

labelling instructions.

Despite these assurances, the organisation has proposed an ongoing review and will check the compliance of all sunscreens listed on the Australian Register of Therapeutic Goods to ensure products are of a good quality, safe and meet regulatory requirements. The summary of the review will be published at the end of the year but the TGA does not expect it to find that sunscreen products are failing to protect consumers.

"With more than 24 million people in Australia, there are many millions of applications of sunscreen each year and - given the widespread use - the rate of reported problems is low," says a TGA spokesperson in a press release.

Generally, reports of a product not being effective are allergic reactions that have been mistaken for sunscreen product failures. For instance, the three-month old baby who required hospitalisation for burns the mother

alleged were caused by defective Cancer Council Peppa Pig sunscreen, actually had an allergic reaction to ingredients in the product.

St Vincent Hospital director of dermatology and Australian College of Dermatologists president Associate Professor Chris Baker says this mix-up occurs because some of the symptoms associated with allergic reactions, such as red rashes, are similar to the symptoms of sun burn.

"The reaction to sunscreen chemicals can cause contact dermatitis, which results in a rash, itchy skin, blisters and/or swelling where the sunscreen was applied. There are several ingredients in sunscreen products that can cause these reactions, including preservatives, the actual sunscreen chemical, fragrances and perfumes," says Chris.

"Allergic reactions to sunscreen can also in some cases be paradoxically made worse with sun exposure."



For tradies who are working outdoors for extended periods of time or near reflective surfaces, such as plumbers, electricians and builders, this could potentially have big implications on their health and safety.

Outdoor workers already have a higher than average risk of the two most common types of skin cancer, basal cell carcinoma and squamous cell carcinoma, which resulted in \$63 million worth of workers' compensation claims being made for sun-related injury or disease between 2000 and 2012, according to Safe Work Australia.

Chris says it's important to remember though that sun protection does not just involve sunscreen.

"Clothing, hats, sunglasses, providing shade, the timing of outside work and avoiding the middle of the day are critically important in sun protection but these are the things people often overlook. People think sunscreen is all they need but these other things are equally, if not more, important."

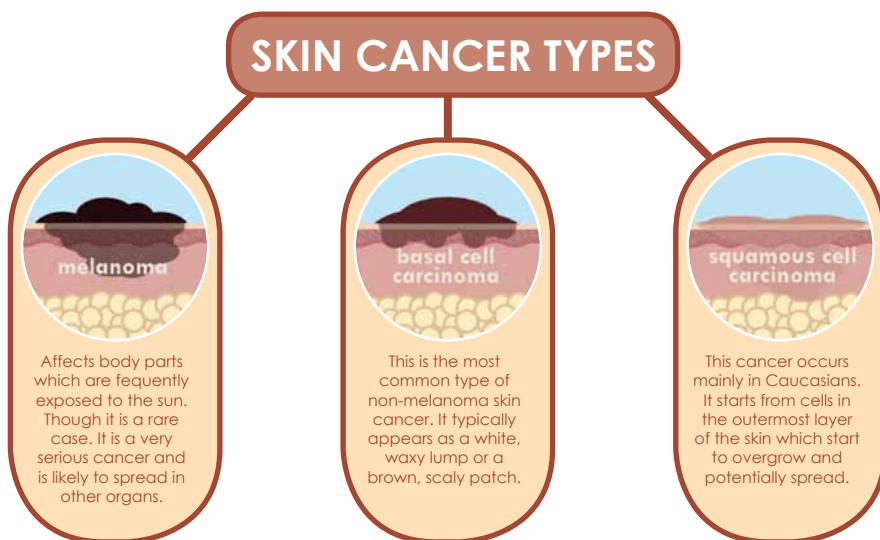
While employees do have a responsibility to take care of their own health and safety, state and territory Workplace Health and Safety (WHS) legislation requires employers to take steps to reduce workplace hazards, including ultraviolet (UV) exposure.

A Work Safe Australia spokesperson says the organisation has developed model WHA laws, which have been adopted in all jurisdictions except Western Australia and Victoria.

Under this model WHS Act, employers are required to provide and maintain, as far as reasonably practical, safe working environments that do not pose a risk to employee health.

"This duty requires business owners to manage health and safety risks by eliminating them as far as reasonably practical and, if not reasonably practical, by minimising those risks so far as is reasonably practical," says the Work Safe Australia spokesperson.

Work Safe Australia says managing the risks of exposure to UV radiation (UVR) for outdoor workers should be done as part of a risk assessment and management process. This includes identifying hazards, assessing risks if necessary, controlling risks and



reviewing control measures to ensure they are working as planned.

"Duty holders should keep in mind that some control measures are more effective than others. The most effective control measure is eliminating the risk, then substitution and finally minimising the remaining risk," says the Work Safe Australia spokesperson.

For employers of outdoor workers the most effective control measures are therefore timing outdoor work when the risk of UVR exposure is lowest, such as early morning or late afternoon, installing sun shades and rotating jobs and various tasks.

"Personal Protective Equipment (PPE), such as sun protective work clothing, sun protective hats, sunglasses and sunscreen, are the least effective way of controlling and reducing the risk of solar UVR," says the Work Safe Australia spokesperson.

"They should only be considered when other, higher order control measures are not reasonably practicable or to increase protection from the hazard. PPE should then be chosen carefully, with consideration to when it is used and the type of work being performed."

Sun protection policies implemented within the framework of WHS

legislation should take a proactive, risk management approach to protecting employees from UVR exposure and include education and training on sun protection.

Failure to do so leaves employers open to legal action if skin cancer can be attributed to the workplace and also affects worker productivity.

According to the 2016 Skin Health

Australia Report Card (SHARC) by the Skin and Cancer Foundation, 4% of respondents said skin health has prevented them from working or studying in the previous week to the survey. The report also found

that 11% of Australians, or two million people, missed work in the past 12 months due to a skin condition.

Sun protection is therefore an important occupational health and safety (OHS) issue that employers can't afford to ignore, either from a safety or profitability perspective. ▲

*Outdoor workers already have a higher than average risk of the two most common types of skin cancer.*

**The Australasian College of Dermatologists**

[www.dermcoll.edu.au](http://www.dermcoll.edu.au)

**Work Safe Australia**

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





## MARKETING



# GIVE YOUR QUOTES THE EDGE

THE QUOTE YOU LEAVE WITH A POTENTIAL CLIENT OFTEN DICTATES WHETHER YOU GET A JOB. MAYBE IT'S WORTH A LITTLE EFFORT? **CECELIA HADDAD** EXPLAINS.

**I**t's rare that someone accepts the first quote that comes along. Unless it's repeat business, then in most business transactions people seek at least two quotes.

A client of mine recently asked me to source two photography quotes. The first quote was from a highly experienced photographer who had been in the industry for over 30 years and the quote was presented in a one-page word document containing a description of the job and cost estimate. The second quote came from a new start-up in the industry and consisted of an eight-

page professionally designed PDF with photos, timeline, terms and conditions and of course, the cost estimate. The PDF quote was at least \$1,000 more expensive than the other quote.

I was confident my client would pick the cheaper quote. He didn't. When I asked him why he chose the more expensive quote, he said this particular photographer presented professionally and if he went to the effort of presenting his quote in that way, then he was confident he would get a professional result.

Presentation is everything. You only need look at the real estate industry as

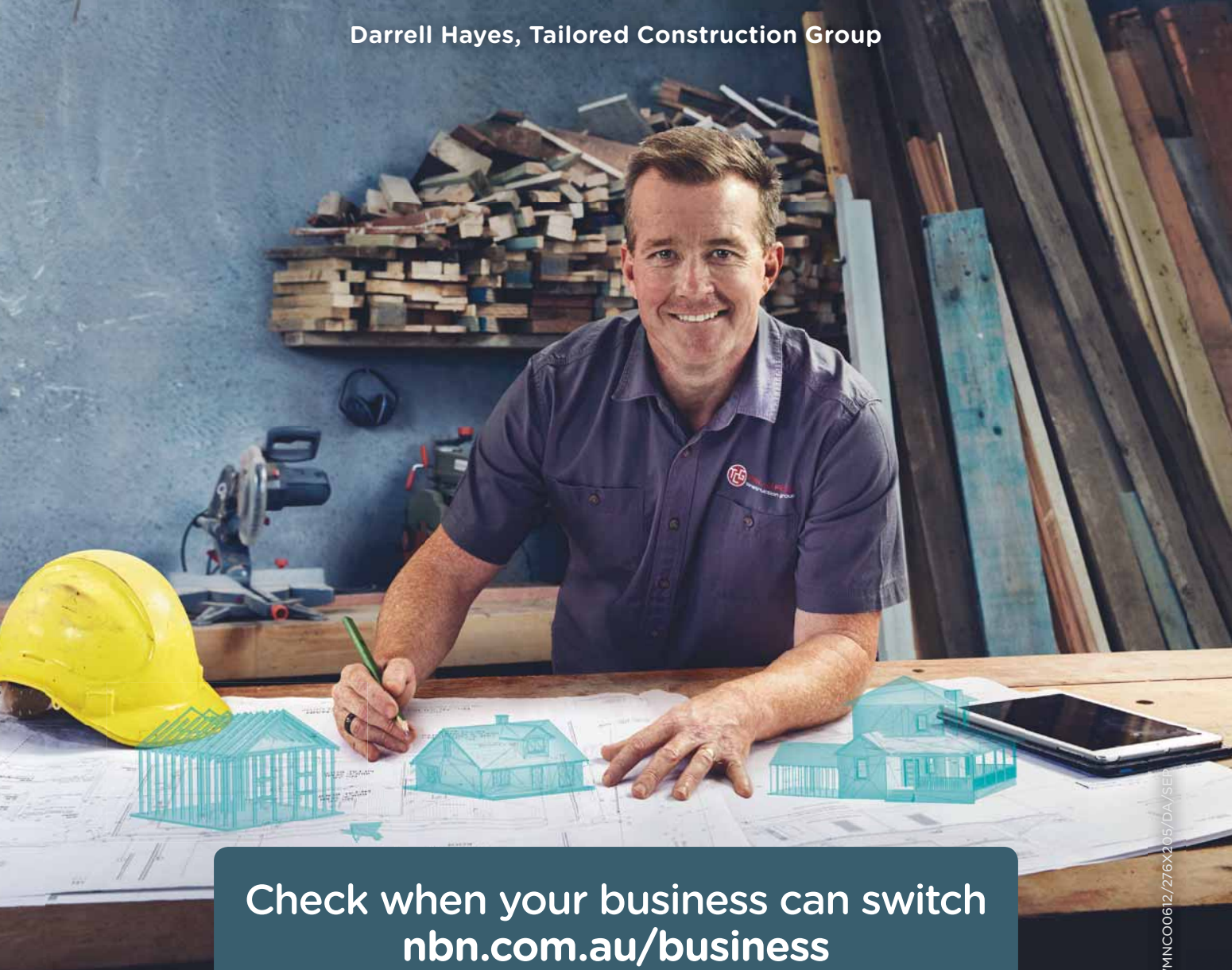
a perfect example. Home owners are putting their furniture in storage and hiring professionals to style their home for sale to help buyers fall in love with the property and dig deep.

There is definitely a lesson in all this. Taking a little more time to present well can be the difference in landing a job (or not). Not everyone has great graphic design skills (least of all me), however with a little help you could transform the way you quote your next job, giving your prospective client confidence in your ability to meet the brief and give you the edge on your competitors. ➤



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Darrell Hayes, Tailored Construction Group



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Here are some tips on how you can spruce up that quote.

## 1 First Impressions Count

Even if you are using a word document, you can design a striking cover page that will give the right first impression. Starting with a heading - Project Proposal/Quote, followed by one large photo of one of your most appealing projects. Then underneath put your company's contact details including a website address and any social media contacts. Even if you stopped at this particular point, you have already made a vast improvement on what has previously been just a one-page word document.

## 2 Use a template

If you are using Word or Google docs for example, you can find some great templates, backgrounds and borders that can be easily adapted to feature your quote. They will not only stand out more but give you a professional finish that requires absolutely no design skills on your part. If you have a designer or want to personalise the style of your document, then ask the designer to develop a template which you can simply insert the actual estimate into each time you need to create a new quote.

## 3 Incorporate testimonials

Nothing incites confidence like a third-party endorsement and this should be easily obtained if you don't have them on hand. The best time to ask for a testimonial is at the end of a project when the client is happy with the completed job. You need to seek permission to use that client's testimonial in promotional materials and you can simply use their first name and suburb as a reference. If you want to get a little more creative, take a head and shoulders photo of the person giving the testimony and use this to accompany the testimonial in your document. Photos make a more powerful statement and bring that testimonial to life.



Taking a little more time to present well can be the difference in landing a job... or not.

## 4 Case Studies

Do you have a knock-down, rebuild with before and after photos? Or how about an upper-storey extension? Even though the potential client may have already seen some of your work, it's a bonus to enhance your quote with a case study relevant to what you are quoting on.

## 5 People relate to people

Human faces behind an organisation not only add appeal but they provide a connection that you cannot get through text so include a profile on yourself and the team that will be working on the project. Real estate agents are notorious for using photos of themselves on everything - from postcards to large glossy reports, you will always find a photograph of the agents included in all promotional materials. It's a concept that works.

## 6 Timeline

A timeline of expected delivery of a job from quoting and sign off through to the end result should be included to manage expectations but more importantly to show the next steps and help lead the client to the next stage. If you really want to improve

the odds for a call to action, provide an area for the client to sign and return the approved quote.

## 7 Inclusions

Be transparent. Spell out the inclusions as well as any additional considerations the client may need to think about when considering your quote. The client will appreciate the transparency and allow them to accurately compare quotes.

## 8 That added touch

Are you emailing, posting or presenting the quote? Ideally you would meet with the client and go through the quote over a coffee. If time is an issue, then send the quote with a promotional item or something for the client to remember you and hold onto in terms of branding. It could be as simple as a fridge magnet, coasters, bottle opener or other merchandise but try to find something useful that people will hang onto and interact with. A client will always appreciate someone who goes the extra mile.

So unless you really don't need the work, now is the time to start sprucing up that quote. It won't cost a bomb but it might just be the one thing that lands you the business over a competitor. ▲



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## MERCEDES-BENZ LAUNCHES FIRST X-CLASS UTE

**M**ercedes-Benz has unveiled the production version of its first-ever ute, the X-Class, ahead of its arrival in Australian showrooms early next year.

Available as a dual cab only for the time being, the X-Class - which is based on the Nissan Navara - will launch with a 2.3L four-cylinder turbo-diesel engine in two states of tune, and will follow up with a flagship V6 diesel around the middle of the year.

The vehicle will be offered in three model variants - Pure, at the entry level, which will be aimed specifically at tradespeople looking for a more functional ute without loading up too heavily on equipment; Progressive, which will have extra styling flourishes and 'comfort' features; and Power, which will come with all the bells and whistles.

There are no plans for a single or extra cab body style, but the rear end of the dual cab will at least have the option of cab chassis or the tub you see in the picture.

At the entry level, the X220d 2.3L

single-turbo diesel produces 120kW of power and 403Nm of torque while the higher-output twin-turbocharged X250d delivers 140kW/450Nm. Both of these engine outputs are identical to Navara, although only a six-speed manual gearbox will be available on the X220d.

Both four-cylinder variants will be available with a 4x2 or conventional part-time 4x4 driveline, along with a diff lock, hill-descent control and low-range gearing.

Standing the X-Class apart from Navara, the X350d V6 diesel is a 190kW/550Nm 3L unit that takes the Benz ute to the top of the market in terms of power - its closest rival is the

165kW/550Nm Volkswagen Amarok V6 - and combines with a 7G-Tronic Plus seven-speed automatic gearbox and Mercedes' 4Matic permanent four-wheel drive system.

The transmission has steering-mounted shift paddles, a fuel-saving 'Eco' start/stop function and a 'Dynamic Select' system that allows the driver to shift between various modes that modify the engine characteristics and transmission shift points (Comfort, Eco, Sport, Manual and Offroad).

Mercedes will also offer a 122kW 4x2 petrol model - dubbed X200 - for select left-hand-drive markets.

Payload is around the one-tonne mark for all variants, while maximum braked towing capacity is 3,200kg for the 4x2 variants and 3,500kg for the 4x4s, including the V6.

The tray can hold a Euro-spec pallet between the wheel arches, while this area also contains a 12V socket and an LED light that illuminates the entire load bed (operated by a switch in the centre console). ▲





## VOLKSWAGEN AMAROK SPORTLINE V6 ANNOUNCED

**V**olkswagen has introduced a more affordable 'Sportline' version of its top-performing V6 diesel-powered Amarok one-tonne utility, bringing the entry price point down to \$55,490 plus on-road costs - \$4,500 below the Highline version and a hefty \$12,500 under the Ultimate flagship.

The Sportline has fewer features but remains a highly specified 4x4 dual cab ute with no mechanical changes to the headline act: a 3L V6 turbo-diesel that produces 165kW of power from 2,500-4,500rpm and 550Nm of torque from 1,500-2,500rpm.

An overboost function also pushes up the engine's output to 180kW/580Nm for short periods.

The V6 drives all four wheels on a permanent basis via an eight-speed automatic transmission, enabling the German brand's workhorse ute to reach 100km/h from standstill in a claimed 7.9 seconds. Combined-cycle fuel economy is listed at 9L per 100km.

For those who prefer to do the shifting themselves, Volkswagen Group Australia is planning to launch a six-speed manual gearbox option for the Sportline V6 in 2018, most likely with a selectable 4WD system.

Four-wheel disc brakes are on board the Sportline, along with plenty of other handy bits of hardware including a mechanical diff lock, electronic stability and traction control, ABS brakes (with electronic brake-force distribution and brake assist), an active rollover prevention system, hill-hold function, trailer sway stability control (when a towbar wiring kit is installed), front and rear parking sensors, a rear-view camera, and front and side airbag protection for the driver and front passenger.

Other notable features on the new variant include 18" alloy wheels, dual-zone climate control air-conditioning, a 6.33" 'Composition' multimedia unit with app-connect and Apple CarPlay compatibility, tinted rear windows and four 12V USB sockets (including in the tray). ▲



## FORD RANGER UPDATED

**F**ord Australia has made a series of running changes to its Ranger utility in a bid to keep its top-selling model front of mind for customers as it continues to close in on the market-leading Toyota HiLux.

The Blue Oval brand says that customer and dealer feedback have led to several new features and upgrades for the Australian-developed MY2017 PX Mark II Ranger, including fully reworked front and rear seats on top-spec Wildtrak variants that aim to better resist staining and soiling and improve comfort.

There is no change to pricing with the new seats, which now carry less piping and have a shorter front cushion overhang.

Among other minor changes, an external temperature display (and outside temperature monitor) with frost/ice warning is now fitted standard on all models bar the XL Plus - it was previously only available on XLT and Wildtrak - and redesigned cup holders that better hold drink containers of various sizes in place are now fitted across the range.

XLS models have also had the outer tie-down hooks removed for a 'sleeker' appearance.

The current series is due to be replaced in 2019 by a fully redesigned model currently in development at Ford's Australian-based Asia-Pacific Product Development Centre.

A variety of test mules have been spotted on Victorian roads in recent months that indicate substantial improvements with the new generation such as a sophisticated new multi-link rear suspension on top-end versions - the latter set to include a high-riding, wide-track, muscular F150-style 'Raptor' flagship - along with a front suspension overhaul and disc brakes at all four corners of the vehicle.

Also count on major changes to the exterior design and more sophisticated driver-assist safety technology aided by 360-degree cameras that will help with low-speed manoeuvring. ▲





**TRANSPORT**



## HINO 300 SERIES 817 4X4

**H**ino is preparing to launch a 4x4 version of its 300 Series light truck.

The Japanese manufacturer says the 4x4 version was specifically developed for the Australian market, with several engineering prototypes undergoing testing here over the past three years to ensure it meets customer expectations in tough operating conditions – not least of which is the ability for tradies to access difficult jobsites.

Initial Australian specifications were subsequently released just in time for our publication, with Hino confirming the 4x4 will be available in both single and (seven-seat) crew cab configuration.

Power comes from the familiar Euro 5-compliant 'N04C' 4L four-cylinder common-rail turbo-diesel engine (with particulate filter) that produces 121kW of power (or 165hp) and 464Nm of torque from just 1,400rpm, driving through a six-speed manual overdrive transmission and selectable 4x4 system with dual range transfer case.

Hino says the 300 Series 4x4 has the widest spread of ratios and the lowest crawl speed in its class – pointing to low-range gearing of 2.2:1 – and that the driveline combination improves fuel economy and refinement over long distances by lowering the engine revs at highway speeds.

Drive is delivered 50:50 front/rear when 4x4 is engaged via the transfer case. The standard free-wheeling hubs are manually locked; once engaged, 4x4 can be selected on the fly by the driver via a button on the dashboard. Moving between high and low range is also made via a dash switch (when the vehicle is stationary).

Based on a new 817 model designation, the 300 Series 4x4 is fitted standard with vehicle stability control – billed as a first for a Japanese-built truck in this (7,500kg GVM) category – as well as four-wheel disc brakes, a reversing camera and dual front airbags, among other safety features. ▲

## LDV G10 ANCAP RESULT

**T**he Australasian New Car Assessment Program (ANCAP) has handed down a three-star safety rating – described as 'a disappointing result' – for the LDV G10 light-commercial van.

Applying to all petrol and diesel variants sold in both Australia and New Zealand from mid-2015, the three-star rating for the Chinese-built van is the same 'below-par' level, as ANCAP describes it, reached by LDV's larger V80 van (that is, short-wheelbase low-roof models built from September 2015), which have electronic stability control fitted standard.

A separate two-star rating applies to earlier V80 models that do not come with ESC.

ANCAP chief executive James Goodwin says commercial buyers such as tradespeople – who are a key target audience for the G10 – were being "let down" by LDV's vans in terms of both structural integrity and safety equipment specification.

"There were a number of serious concerns with the G10's structural performance, with the driver footwell rupturing and excessive pedal movement," he says.

"Steering column and dash components were also a potential source of knee injury for the driver and passenger.

"The G10 also lacks important safety features such as head- and chest-protecting side airbags and seatbelt pre-tensioners which consumers today expect to be provided as standard."

Safety equipment fitted standard to the G10 includes dual front airbags, ABS brakes (with electronic brake-force distribution and emergency brake assist), ESC, a 'roll movement intervention' system, a tyre pressure monitoring system, rear camera with park assist feature, and separate parking sensors.

A rival for the Toyota HiAce, Hyundai iLoad and other mid-size vans, the G10 is pitched as a value-oriented package priced from \$25,990 drive-away for ABN holders. ▲



# ISUZU EXPANDS RANGE



**I**suza Australia has expanded its range of fully fitted-out 'ready to work' trucks that are pre-bodied to cater for various trade applications, with key NLS and NPS variants now available with the practical 'Servicepack'.

The market-leading Japanese truck brand has also added a factory-built three-way 'Tri-Tipper' body to its NLR 55/45-150 model, which can tilt to the left side, right or rear to make easy work of tipping loads onto jobsites.

The new Servicepack variants include the NPR 45/55-155 model, the NLS 45-150 crew cab 4x4 and the NPS 75-155 4x4 in single and crew cab configuration.

These four-wheel drive variants are described as being ideal for reaching worksites, no matter how difficult access may be, while the NPR Servicepack was specifically developed, Isuzu says, "to out-carry, outperform and outclass the average Australian work ute" – a comment designed to get tradies thinking about the benefits of moving from a traditional one-tonner to a light truck.

As the '45/55' in the NPR's model designation indicates, the 45/55-155

has a GVM of 5,500kg but can be derated to 4,500kg which allows it to be driven on a car licence.

The engine is a 5.2L '4HK1-TCN' four-cylinder diesel that produces 114kW of power at 2,600rpm and 419Nm of torque from 1,600-2,600rpm, and combines with a six-speed automated manual transmission (AMT).

The Servicepack comes with a fully powder-coated steel service body featuring seven lockable storage compartments with a total volume of 3.7m<sup>3</sup> – a useful amount of room for carting tools and equipment – as well as a central storage area (measuring 2.28m long x 1.17m wide) with chequer-plate floor and six tie-down points.

The rear towbar has an integrated rear step with non-slip surface, rear grab-handles are provided and access to the central area is made via a rear barn door. The locks on the storage containers are fully integrated with the vehicle's remote central locking system and there is LED lighting in each individual compartment.

Maximum braked towing capacity is 3,500kg, allowing for a trailer to be hitched as required, while a reversing camera is added to the list of standard

safety features on the vehicle, which already include such items as four-wheel disc brakes with ABS and electronic brake-force distribution, electronic traction and stability control, and dual front airbags.

The crew cab on the NLS and NPS Servicepack models adds a three-person rear bench seat (adding to the driver's bucket seat and front passenger bench that fits two people), while the heavier-duty NPS 75-155 4x4, with its 7,500kg GVM, comes fitted (in single cab guise) with a Palfinger PC1500 crane with a maximum hydraulic outreach of 3.1m, manual outreach of 4.2m and a lifting capacity of 990kg.

The NLR 55/45-150 Tri-Tipper, meanwhile, has a heavy-duty steel tipper body with drop sides and auto-release two-way tailgate. It also features an auto-release body lockdown hook, shovel rack, non-slip side steps and rope rails on both the left- and right-hand sides, while Isuzu says the tipper can be fully raised or lowered in just 20 seconds. The load area can hold 2m<sup>3</sup>.

Power comes from a 110kW/375Nm 3.0L '4JJ1-TCS' engine, paired with a five-speed manual gearbox. ▲

# RAM CODE BLACK, 2017 MODEL YEAR UPDATE

**T**he factory-supported Australian vehicle conversion outfit behind the right-hand-drive Ram pick-up truck - American Special Vehicles (ASV) - is working overtime to pump up the presence of Fiat Chrysler Automobile's big ute on our roads, introducing a model year update and its first-ever limited edition in the form of a menacing 2500 'Code Black'.

As the name suggests, the Code Black edition adds a variety of dark-themed styling changes that provide an even more aggressive look to the hulking Ram 2500.

The broader model year update includes a variety of minor tweaks, among them a new tyre spec for improved refinement (Nexan Roadian AT Pro RA8 LT275/70 R18) and a second microphone that sharpens up the voice clarity for the Bluetooth hands-free system.

However, the headline feature is the new option of a fully integrated 'RamBox' storage system on the 2500 model that turns the often-wasted space along the side of a

boxed tub into a useful storage area and/or toolbox.

Running the length of the load area, the boxes are easily accessible no matter what load is being carried in the main tray, they're weatherproof, come with their own lighting, have drain holes, lids that open to 90°, and locks that are linked to the vehicle's remote central locking. They can also be locked separately.

The boxes create a space that is 152cm long and offers 243L of storage space on either side of the vehicle. The system includes an adjustable and lockable bed divider which creates individual compartments in the pick-up bed to separate payload equipment such as tools or equipment, while a cargo rail system with sliding cleats brings extra versatility when tying down.

ASV says the tray will still take a standard pallet with the RamBox system in place.

The other main model change is the re-rating of the Ram 3500 that sends its GVM down below 4.5t (to 4,490kg) and therefore allows it to be driven



on a regular passenger car licence. The regular 3500 has a 5,309kg GVM, which requires the driver to have a light rigid truck licence.

Payload in the tray drops from 1,713kg to 894kg with the re-rating but, importantly, the maximum brake towing capacity of 6,171kg remains. The 2500 continues to offer a 913kg payload and 6,942kg load-hauling limit.

All Rams use a Cummins-sourced 6.7L six-cylinder turbo-diesel engine that churns out 276kW of power at 2,800rpm and a phenomenal 1,084Nm of torque at just 1,600rpm. The big oil-burner is paired with a six-speed automatic transmission and BorgWarner part-time 4x4 driveline, with high and low range. ▲







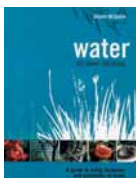
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## Water: not down the drain

### A guide to using rainwater and greywater at home

Water Not Down the Drain is a comprehensive guide to sustainable water use around the home. With Australia experiencing one of its driest phases in history, everyone has to think about how they use the water available to them and find ways to reduce their day to day water use.



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## HB 233-2008 Fire Protection Systems Testing Water Conservation Handbook

A Handbook to assist in minimizing wastage of water during fire tests and a companion guide to AS 1851-2005 Maintenance of fire protection systems and equipment. This Handbook considers the systems listed which require flowing water as part of the testing and maintenance, and makes recommendations as to how that water usage can be minimized, reduced and/or recycled.



**\$95.55** .....CODE 763

## Plumbing & Drainage Guide

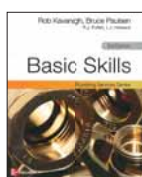
This guide explains in simple terms the general principles of the building codes and Standards for sanitary plumbing and drainage in Australia and New Zealand. It is intended as an aid for designers, builders, students and owner/builders. It also serves as a useful reference guide for plumbers, drainers and building officials. This book covers most common plumbing and drainage solutions.



**\$71.90** .....CODE 424

## Basic Skills

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.



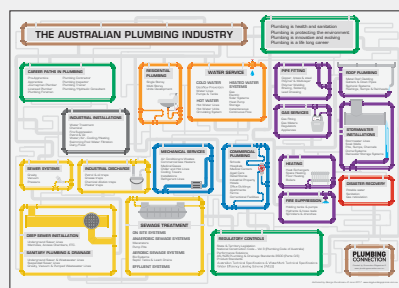
**\$59.00** .....CODE 604

## Plumbing Industry Wall Poster Infographic

Get behind your industry and promote greater understanding of its broad nature to your staff, community and most importantly schools in your region. Assist the plumbing industry to be the trade of choice for today's career seekers.

This giant (A1) 594 x 841mm wall poster is printed on 200gsm Satin Art Paper.

Price includes postage and secure packing tube for safe delivery.



\*Image subject to change

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## Domestic Plumbing & Drainage Standard

AS/NZS 3500.5:2012 Prepared to provide a suitable Standard for domestic plumbing work associated with buildings not exceeding three floors in height. The objective is to describe in a simplified way the installation requirements for hot and cold water services, sanitary plumbing and drainage and stormwater drainage. This standard is a MUST HAVE if you are involved with any domestic plumbing.

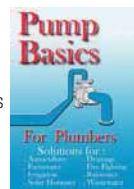


**\$325.00** .....CODE 521

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## A quick reference and solution handbook

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. There is a useful trouble-shooting chart and has installation hints.



**\$25.95** .....CODE 362

## Solar Hot Water

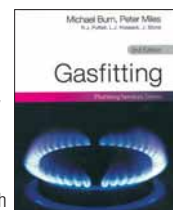
This is a very small book with a lot of big information and will help you with many applications. Plan your own solar hot water system. It gives you an understanding of solar water heaters and the most common models and their features. It also covers retrofits, size and site locations, including mains pressure versus low pressure, collectors, tanks, boosting and freeze protection, warranties, rebates and Standards. A very helpful booklet.



**\$16.95** .....CODE 589

## Gasfitting: Plumbing Services Series

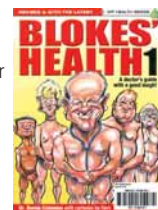
This text assists the licenced gasfitter to understand and correctly interpret the Standards laid down in the current code for the installation of gas burning appliances. This new second edition incorporates thorough and wide ranging revisions to bring it up to date with the requirements of the Plumbing and Services Training Package.



**\$69.95** .....CODE 165

## Blokes Health

This is an absolute gem of a publication and a valuable resource for men of all ages. Written by Dr Bernie Crimmins, Blokes Health provides extremely useful health advice in a simple manner. There aren't many books you can buy that could actually SAVE YOUR LIFE!



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## Good Tiling Practice

This guide to successful ceramic tiling contains 120 pages of practical, fully illustrated advice on how to avoid tiling failures. Aimed at designers, tilers, inspectors and builders, its 15 chapters cover everything from selecting the right tiles for specific purposes, choosing substrates, adhesives and grouts, wet-area requirements, maintenance, swimming pool tiling and 'troubleshooting'.



**\$52.50** .....CODE 320

## Little Red Roofing Book

Roof cuts and rafter lengths – Hancock's 10th edition is a very popular, best selling book. With calculations, diagrams and tables it will help you with plumb and side cuts for hip and rafter, down and side purlin frames and more. Calculations for roof cuts and rafter lengths. This 88-page pocket size edition is in metric, updating all the old calculations, and it is a very easy-to-use roofing guide which you can use with complete confidence. This book will earn its keep.

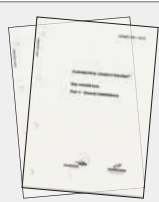


**\$25.95** .....CODE 129

## New Gas Installation Standard plus Amdts

Part 1: General installations (A)  
Part 2: LP Gas installations (B)

After six years, the building industry can breathe a little easier with the release of the updated AS/NZS 5601. It highlights minimum requirements for the design, installation and commissioning of gas installations and provides 'deemed to comply' solutions to promote uniform Standards. If you work with gas, this revised Standard is vital.

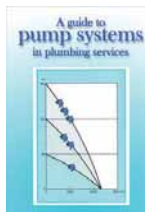


**\$305.00** .....CODE 489A

**\$205.00** .....CODE 489B

## A Guide to Pump Systems

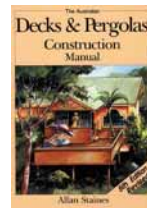
A guide to Pump Systems in Plumbing Services is an Australian first publication specifically written for plumbing designers, practitioners, consultants and specifiers of plumbing installations and equipment involving the use of pumps for all classes of buildings and construction. The content of the handbook includes information on pump systems associated with water supply, rainwater, harvesting, bush fire protection, sewage, disposal by pumping, special purpose installations and dewatering systems.



**\$29.95** .....CODE 669

## Decks and Pergolas Construction Manual

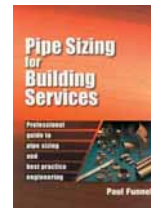
One of our most sought-after construction manuals, this is an invaluable reference covering every aspect of decks and pergola construction. Includes designing, estimating, building, timber selection charts, fastening & anchoring recommendations, terminology, painting & finishing, and preparation of plans for councils.



**\$28.95** .....CODE 49

## Pipe Sizing for Building Services

This is the key that unlocks the secrets to pipe sizing! Tables provided in Australian Standards are based on minimum requirements for sizing, but this book has tables and charts that will provide an optimal design solution for specifier, installer and customer. The result will be more efficient and cost-effective use of materials, faster installation and commissioning, and problem-free solutions for the customer.



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The magazine cover for 'connected' has a bright yellow background. At the top, the word 'connected' is written in large, bold, white lowercase letters. Above it, in smaller white text, is 'THE MAGAZINE FOR PEOPLE WHO LOVE THEIR DOGS'. To the right of the title, the words 'HOME &amp; GARDEN' are written in a smaller, white, sans-serif font. On the left side, a pink rectangular box contains the word 'INSIDE:' in white, followed by a list of topics: 'HIGH-TECH SENIORS', 'GOING INTO LOCKDOWN', and 'SEEKING CLARITY'. The central image features a blue dog with large, expressive yellow eyes and a pink pig. The dog is wearing a blue ribbon award that says 'BEST IN SHOW' and '2020'. Below the dog, the text 'BEST IN SHOW!' is written in large, bold, red letters. At the bottom, a yellow banner contains the text 'WHO'LL BE TOP DOG?' in bold, black, uppercase letters. In the bottom left corner, the 'CEDIA' logo is visible.

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