# ELECTRICAL CONNECTION

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SPRING 2015

INSIDE:

PICKING CABLES

DEBUNKING SOLAR MYTHS

HOW TO GET PAID AND TURN A PROFIT

## STORE THE SUN

neca national electrical and communications association
COMMUNICATION PARTNER

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As Australia's leader in residential circuit protection equipment for over 30 years, you can be confident that Clipsal Resi MAX™ sets the standard for performance and durability in residential circuit protection.

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*The new dual USB charger (2x 2.4A) will be delivered from October 2015

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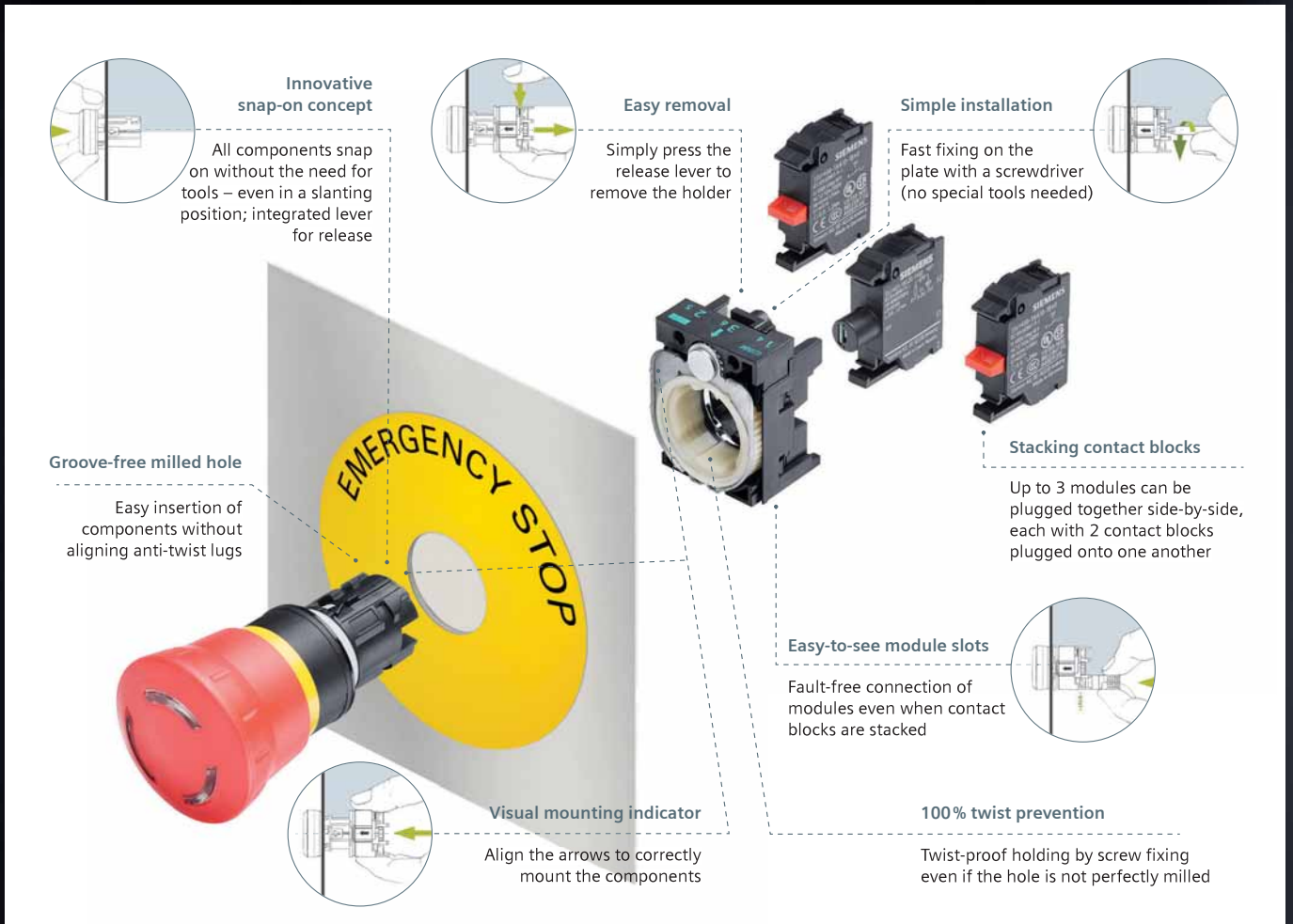


Installation has never been easier. With 100% twist prevention integrated into the holders, SIRIUS ACT can be installed in groove-free milled holes, saving you significant installation time.

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# SIRIUS ACT – Performance in Action

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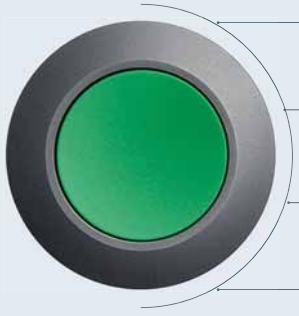
**siemens.com/sirius-act**



**Modern design**
Elegant product design and high-quality material – as a distinguishing system design feature.

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From configuration to installation, SIRIUS ACT takes the concept of sophistication in simplicity to the next level.

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**Flexible communication**
Whether standard wiring or direct connection to the controller – SIRIUS ACT offers flexibility via AS-i, IO-Link and Profinet.

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**The way we provide and consume energy is destined to undergo a paradigm shift – and maybe much sooner than we think.**

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# ELECTRICAL CONNECTION



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ATT ACROSS THE TRADES

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# ChAFTA away...


The recent signing of a landmark Fair Trade Agreement with China (awesomely known as ChAFTA) has received a lot of press lately – and not all about the potentially-cheaper Chinese-made products and boosts to tourism that the Government is trying desperately to sell to the Australian public.

Given that the cost of living is skyrocketing, who wouldn't want to pay less for consumer goods? And, with the downturn in the resources sector, increased tourism will be a good thing for the economy, right?

But, perhaps thanks to poor wording on the Government's behalf, initial reading of ChAFTA led many to believe that we would soon be overrun by Chinese electricians who are exempt from meeting Australian licensing standards.

At the time, the National Electrical and Communications Association (NECA) – which had not been consulted in the lead-up to the announcement – issued a press release cautiously welcoming the news, but with the caveat that there be no dilution of licensing or safety standards.

And rightly so – the electrical industry has had a rough trot lately with inferior product and unqualified workers.

Thanks to the noise created by NECA and other groups, we now have some clarification to offer readers of *Electrical Connection*.

After the news of ChAFTA broke, NECA representatives had numerous discussions with both Federal Minister of Trade Andrew Robb's office and the Department of Foreign Affairs and Trade. As a result of these discussions and enquiries, assurances were made that the proposed changes under ChAFTA will not dilute licensing or safety standards.

The changes that have been announced go to the manner in which the Government internally processes skilled migration applications. An applicant will still be required to apply via a skilled migration pathway – as any other applicant from any other country. Once a 457 application is granted, the applicant will still be required to apply to which ever State/Territory and satisfy that individual State/Territory's licensing requirements.

As is currently the case, it is the ultimate responsibility for the State/Territory to set its own licensing standards – in this regard there is no change.

I hope you find this edition information and entertaining.

**Paul Skelton**


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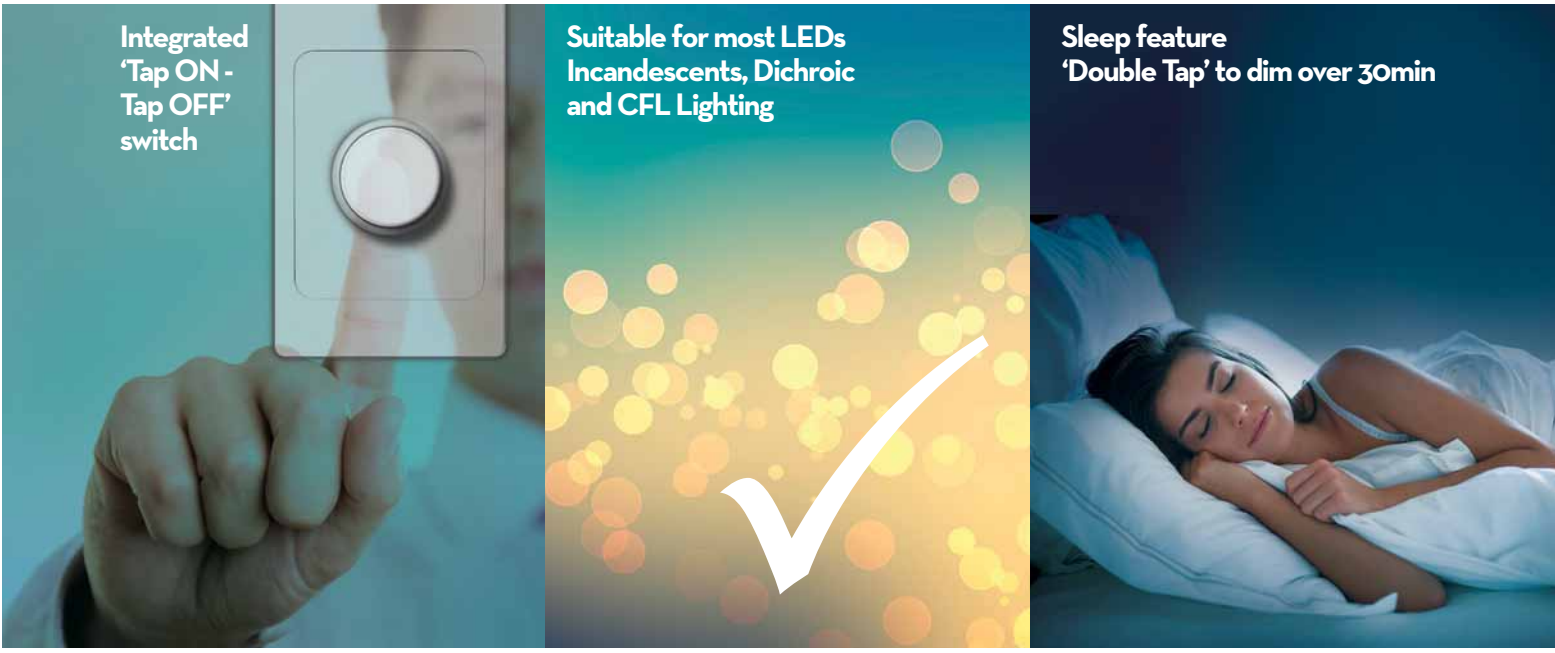
**PUBLISHED BY:**
Connection Magazines Pty Ltd
Unit 2/18-22 Lexia Place,
Mulgrave, Victoria 3170
AUSTRALIA
ISSN 1839-2288

cm connection magazines

GERARD LIGHTING

DIGINET CONTROL SYSTEMS




# LEDSMART XPERT™

## ROTARY DIMMER / SWITCH

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Fully programmable via a simple process, it fits into most Australian switch plates and comes with an integrated "Tap ON - Tap OFF" switch.

LED indicator inside the dial can be programmed to stay on at night as a night light in the kid's bedrooms.

Product code: MEDM/DGRT

LEDSMART Xpert

www.diginet.net.au

**Sales 1300 799 300 Technical 1300 953 254**

# CONTRIBUTORS

**BRIAN SEYMOUR**

***Business Basics***

Brian Seymour MBE, author of *Electrical Estimator's Labour Unit Manual* and *Starting Out*, conducts regular industry training programs throughout Australia on behalf of the electrical and air conditioning industries.

**> See page 30**

**GARY BUSBRIDGE**

***The Buzz***

Gary Busbridge has been with Clipsal for more than 33 years. Since 1997 he had been involved with Standards Australia and has held memberships in several Standards committees.

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**CHRIS HALLIDAY**

***Method in the Madness***

Chris Halliday has been running his own consultancy business since 2005. He has almost 40 years' experience in the electrical industry having started as an apprentice electrical fitter at the age of 16.

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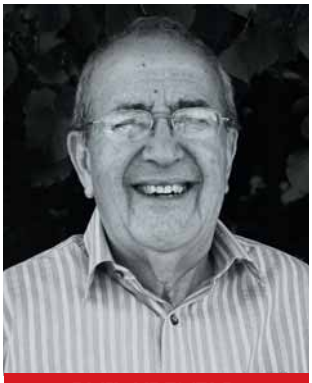

**PHIL KREVELD**

***Let's Get Technical***

Phil Kreveld is an electrical engineer with broad experience in electrical and electronic instrumentation, including relay testing power and power quality analysis.

**> See page 36 and 42**

**STEVE ARTHUR**

***Guiding Light***

Steve Arthur has been involved in the electronic component and lighting industry for more than 15 years in Australia and internationally. Steve has previously led the OEM business for Philips Lighting in Australia and is now its trade channel manager.

**> See page 62**

**IAN MILLNER**

***Networking***

Ian Millner has over 30 years' experience in business, telecommunications and vocational training. He established (and later sold) Milcom Communications, a Registered Training Organisation, and is now a consultant.

**> See page 58**

**JACOB HARRIS**

***Cover Story***

Jacob Harris is a staff writer at *Electrical Connection*. When he's not at work or at home with his family, he can usually be found fly-fishing for trout in local backwaters.

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**PAUL SKELTON**

***Editorial***

*Electrical Connection* editor Paul Skelton has spent the past nine years working closely with all levels of the Australian electrical sector, helping sparkies, contractors and suppliers alike to grow their businesses.

**> See page 10**

## WHAT IS DC?

Combining the latest in energy efficiency and stylish design, Mercator DC ceiling fans feature a unique motor that converts AC (Alternating Current) to DC (Direct Current) to reduce both energy consumption (up to 81%) and operating costs.

Mercator DC Ceiling Fans also include high airflow, quiet operation, reversing function on remote and up to 6 speed settings.

**Eagle DC LED**
Also available in White, LED and Without Light.

# A BREATH OF FRESH AIR

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## CONCERNS RAISED SURROUNDING SECURITY OF PAYMENT

With recent news of yet another construction firm going into liquidation owing millions to contractors and sub-contractors, concerns continue to be raised about the stability of payment for electrical contractors.

"It is usually the case that electrical contractors are involved in the latter stages of the building and construction cycle and are often the last in the credit line for payment. This becomes particularly difficult in the event of the construction firm falling into receivership as electrical contractors are treated differently across each state's fair trading departments," National Electrical and Communications Association (NECA) chief executive Suresh Manickam says.

"Electrical contractors enter into building works in good faith through the installation of substantial, highly complex and expensive electrical equipment. The inequity of market failure for electrical contractors means that given they are often one of the last trades on site, they are last in line to receive payments, despite the substantial financial value of their work toward the completion of the construction project."

NECA's Policy Statement 2015 highlights these concerns and calls for the harmonisation of the creditor line process across Australia so that electrical contractors are not disadvantaged by the collapse of a construction company.

"Once again, we call on governments across Australia to ensure that electrical contractors are not left in the lurch and that credit line payment processes are fair and equitable right across Australia."

## APPRENTICESHIP COMMENCEMENT FIGURES FALL

The number of people starting apprenticeships and traineeships declined by 21.9% to 192,000 in 2014 compared with 2013, according to the latest release of apprentice and trainee data.

Published by the National Centre for Vocational Education Research (NCVER), *Apprentices and trainees 2014 - December quarter* shows that there were 316,400 apprentices and trainees in training on 31 December 2014, a decrease of 18.3% compared with 31 December 2013.

Comparing data from 2014 with 2013, the number of apprenticeship and traineeship:

> commencements in trade occupations decreased 16.9%;
> commencements in non-trade occupations decreased 25.3%;
> completions decreased 17.8%; and,
> cancellations and withdrawals decreased by 7.6%.

According to the National Electrical and Communications Association (NECA), the numbers are "a cause for concern and action".

"While electrotechnology apprenticeship commencements continue to strongly contribute to the overall take-up of technical and trade workers apprenticeships, NECA notes the drop off in numbers over the past year which reinforce our concerns about the looming skills shortage," NECA chief executive Suresh Manickam says.

## SENATE ANNOUNCES INQUIRY INTO NON-COMFORMING BUILDING PRODUCTS

**Precipitated by the Victorian Metropolitan Fire Brigade (MFB) report on the 2014 Docklands Lacrosse Fire, the Senate will hold an inquiry into non-conforming building products.**

**The installation of unsafe, non-compliant electrical equipment can be costly for business and consumers and presents the risk of electrical fire and shocks, property damage and increases the potential legal liabilities for electrical contractors. This ultimately leads to a devaluing of industry standards and a loss of professional reputation.**

**A key concern for the industry is the lack of enforcement of those distributing non-compliant products and the lack of product batch testing of products to ensure quality and measurement of the performance to Australian standards.**

**While examples of prosecution exist, such as those involved with the sale and distribution of counterfeit HPM products in New South Wales, concerns remain within the industry that more should be done to protect the industry's professional reputation.**

## GENERAL CABLE SELLS APAC OPERATIONS

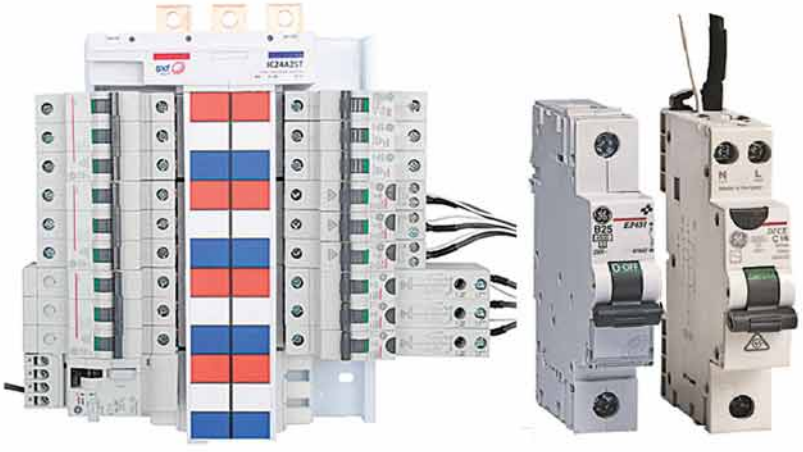
**General Cable Corporation has reached a definitive agreement to sell its Asia Pacific operations to MM Logistics Co., Ltd. for cash consideration of approximately $205 million, which includes preliminary estimated net cash of $30 million.**

**The company's Asia Pacific operations consist of businesses in Thailand, China, New Zealand and Australia.**

**The company expects to close the sale of the operations in the third quarter, subject to customary closing conditions. Proceeds are expected to be used to reduce outstanding borrowings and pay related fees and expenses.**

GE
Industrial Solutions

# Encapsulated Chassis for GE DIN breaker range now released



GE DIN MCB

The IC range of chassis has been specifically designed to enable the GE DIN range of breakers to be mounted in switchboards requiring Form 2a/2b of higher.

When the IC chassis is fitted with GE **MCB RCBO** or Tee Off Covers to every pole it achieves an IP2x rating.

**Tested to the new IEC61439.1 std**
**Ratings 10kA/1s – 25kA/0.1s**
**250A Rated Main Busbar.**

## Family of products available to mount GE Breakers

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## ACCC "EXTREMELY CONCERNED" ABOUT INFINITY CABLE RECALL PROGRESS

**Time is running out for thousands of Australian homes and businesses to find out if they have faulty electrical cabling before it poses a serious danger, the Australian Competition and Consumer Commission has warned.**

**The degrading cable could cause fires or electric shocks from as early as 2016. An estimated 3,900km of unsafe cable was supplied and approximately 2,800km is yet to be remediated, recovered or scheduled for remediation under the recall. Approximately 28% of the cable has been accounted for.**

**"The ACCC is extremely concerned that over 70% of the cable supplied has not been accounted for under the recall," ACCC deputy chair Delia Rickard says.**

**In August, the ACCC held an Infinity Regulatory Taskforce meeting with electrical, building and Australian Consumer Law regulators to discuss and agree what more is needed from businesses on this front.**

**"It is clear that all businesses in the supply chain need to be doing more to alert consumers to the recall and remediation options."**

**"The ACCC is urging electricians, builders and contractors to notify their customers and cable suppliers if they installed Infinity cables between 2010 and 2013," Delia says.**

**The ACCC recently undertook an advertising campaign to warn consumers about the risks of Infinity cables.**

**"Consumers that purchased new properties, undertook renovations, had appliances installed or had electrical work carried out in the past few years should contact a licensed electrician for a safety inspection to determine if Infinity cables were installed.**

**"Consumers should not attempt to inspect cables themselves. Any affected cable installed in accessible areas or near heat sources must be removed and replaced under the safety recall."**

**Infinity cables were recalled last year after they failed electrical safety standards due to poor quality plastic insulation coating, which will become brittle prematurely. Once the insulation is brittle, physical contact with the cables could dislodge the insulation and lead to electric shock or possibly fires.**

**The risk of physical contact is highest in roof spaces and under raised floors. Cables exposed to prolonged high temperatures will degrade at a faster rate.**

## GOVERNMENT ACTS ON MR FLUFFY

The ACT Government has decided to release the address list of 1,021 homes confirmed to contain asbestos-affected home insulation, installed by Mr Fluffy.

It's estimated that up to 30,000 residents may be affected by the release of the database.

Last year, the ACT Government announced that the affected homes would be bought back from present owners and demolished, following a $1 billion loan from the Commonwealth.

In 2014 the NSW Government offered a free sample home testing program across 26 local government areas where it was known that Mr Fluffy provided home insulation. This program has been extended until August 2016. To date, 66 properties in New South Wales have been positively identified (57 from historical records and 9 from sampling), with the bulk of those located in Queanbeyan.

## GE AND BEACON LIGHTING PARTNER ON LEDS

GE Lighting has announced a strategic partnership with Beacon Lighting to expand the reach of its LED business in A/NZ.

Beacon, operating under Light Source Solutions, will be the sole distributor for GE's commercial and residential lighting business, leaving GE to focus on the development of smart industrial internet applications for industry and municipalities.

"Beacon is a long-term customer of GE Lighting and we are proud to be further investing in that relationship today," GE Lighting Australia & NZ country leader Ian Killick says.

"Beacon has the reach and expertise to facilitate a rapid transition to LEDs and will be able to offer our customers localised service. They are a fantastic team and I look forward to working with them."

GE's LED and conventional lighting products will be sold through Beacon's 90+ retail stores and online, as well as be sold to other retailers and wholesalers.

"GE has an impressive heritage in the lighting business, reaching back to its founder Thomas Edison and the invention of the light bulb," Beacon Lighting chief executive Glen Robinson says.

"Today, GE LED technology is transforming lighting, using up to 80% less energy and lasting up to five times longer than traditional lighting. The technology is continuing to advance, and we are excited to partner with GE to bring it to more customers in Australia and New Zealand."

At the same time, the GE Lighting business will increase its focus on the development of smart lighting applications and services for roadways, retail environments, commercial buildings and industrial facilities. GE Lighting will further invest in building its industrial internet capability, using data and analytics to run lighting systems more efficiently and layer additional capabilities.

## NBN CONSTRUCTION WORKFORCE TO DOUBLE AS ROLLOUT ACCELERATES

The nbn (formerly NBN Co.) will embark on one of Australia's largest workforce training initiatives, to ensure the network can be rolled out sooner.

Under the workforce training scheme, nbn will work with delivery partners to recruit and train around 4,500 workers. This will see the current project construction workforce doubled, with around 9,000 workers employed at the peak of the rollout.

The scheme will target both school leavers and people who have worked in the industry who require retraining.

Under the scheme, nbn will work with training organisations including TAFEs and private providers, to deliver relevant training programs, while delivery partners will be responsible for providing on-the-job training. To regitser your interest, visit www.nbnco.com.au.

## INDUSTRY CALLING FOR DALI-CENTRIC TRAINING

A recent survey of 120 electricians conducted by NECA reveals that while 46% are familiar with Digital Addressable Lighting Interface (DALI) – the global standard for lighting control communications, as specified by the International Electrotechnical Commission (IEC 62386) – only 19% have completed any formal training on the subject.

Further, 83% of respondents said they would attend industry training on DALI and its implementation if it was made available and 89% recorded interest in receiving a fact sheet and/or training.

The survey also reveals that in contrast to the low numbers of respondents who have completed formal training, 57% report to have experience with the devices, installation, programming and design of DALI lighting solutions.

## SPARC 2015 WRAPS UP

In excess of 2,000 industry members attended SPARC International Lighting Event 2015 from 27-29 May in Sydney.

Held at Sydney Exhibition Centre at Glebe Island, SPARC 2015 featured an exhibition of around 80 lighting companies, a speaker program of renowned international and Australian experts and a concluding gala dinner.

"This is the third SPARC International Lighting Event to be held and SPARC has truly secured its place as the Southern Hemisphere's leading event for lighting professionals and stakeholders in the built environment," SPARC chief executive Bryan Douglas says.

The exhibition showcased leading edge innovations, products and technology — reflecting developments in interior, exterior, retail and commercial lighting and lighting controls. Exhibiting companies ranged from large multi-nationals to smaller niche businesses from across Australia and overseas.

Solid state lighting and lighting controls technology featured prominently.

## LASER TRADIES GIVE BACK IN FIJI

**In September, around 400 plumbers and electricians from A/NZ will descend on Fiji for the annual Laser Group conference. In line with the company's commitment to being socially responsible, many of the men and women of Laser will arrive a day early to take part in the Laser Group Charity Taskforce project.**

**The Taskforce sees members of Laser Group take on a local project, using their skills to give back to the community hosting the conference. With the conference being held in a different place each year, charities that have received assistance from the Group include Habitat for Humanity in New Zealand as well as the Gold Coast Youth Services and Variety in Australia.**

**This year's chosen project will focus on children, with the Group working with the Fijian Ministry of Education to help improve two local schools with combined enrollments of almost 2,000 students.**

**The Votualevu Public School currently has 923 students enrolled up to year 7 as well as 115 enrolled at preschool level. Established in 1926, the school is one of Nadi's pioneer schools and has been affected by fire and floods in recent years.**

**The Laser Group Taskforce will install new roofing on one of the buildings as well as install drainage, a new water pump and trough for the children to drink at. While to most these are basic requirements, the children currently have to move rooms when it rains and straddle a crude drain to access water to drink. At the same time, the Group will be working on the library, painting the walls and installing bookcases for the books which have been donated by Laser Group Members.**

**In addition to the primary school, the Laser Electricians will also work on Nadi Technical School. Opened earlier this year, the technical school oversees the training of some 400 students in a number of trade areas. The school also runs short courses with 200 students currently enrolled.**

**Over the past 12 months, the Laser Group has also raised over $150,000 for charity group beyondblue, to raise awareness about depression in the trade sector.**

## SWITCHBOARDS AND CIRCUIT PROTECTION DEVICES

**Clipsal by Schneider Electric**

**www.clipsal.com**

One of the most important electrical components for a contractor to install in any home is circuit protection.

Clipsal by Schneider Electric's Resi MAX solution includes everything you need for residential circuit protection. The range has recently been expanded so that installation time is dramatically reduced, saving you time and money. The key to the new method is the use of a comb busbar. Optimised for SLIM RCBO, the SLIM comb busbar ensures that wiring effort is reduced, making your installation tidy and time/cost effective.

All Resi MAX products fit easily into Clipsal's consumer switchboards and meter boxes. Available in flush- and surface-mounted versions, the switchboards are easy to install and offer generous wiring room, making connecting and running cables a breeze. For added protection, the housing for all devices is made of sturdy, self-extinguishing material.

Each product in the Resi MAX range is identified by the Resi MAX house symbol.

## LIGHT SENSITIVE SWITCH

**HPM Legrand**

**www.hpm.com.au**

HPM has launched the new programmable weatherproof light sensitive switch, PE170R2.

Unlike conventional light sensitive switches, which work on a time delay from sunset, the new programmable model allows an 'off' time to be defined, which will remain consistent all year – regardless of seasonal changes in sunrise/sunset times.

Engineered with a built-in algorithm that controls and maintains the nominated off time, adjustments can be easily made using a dial system in 30 minute increments, or for dawn (which is natural light dependent).

The new PE170R2 model is compatible with the existing HPM weatherproof light sensitive switch (PE170/10) mounting base for easy retrofitting.

## LED PENDANTS

**Beacon Lighting Commercial**

**www.beaconlightingcommercial.com.au**

The LEDlux range of pendants from Beacon consists of the Canteen, Piper and Tapas models. Each pendant is 650lm, with a beam and field angle of 30º and 50º respectively, and has been tested on the following dimmers: Clipsal 32E450UM, 32E450TM and Lucci 290998 dimmers. (For the best dimming range, the Lucci 290998 trailing edge dimmer is recommended.)

The LEDlux Canteen and Tapas pendants are available in matte black, copper, brushed chrome and matte white.

The LEDlux Piper pendants are available in two sizes – large and small. Each pendant features ash wood detailing, and is available in matte black, matte white, copper or brushed chrome.

## OTDC SWITCH

**ABB Australia**

**www.abbaustralia.com.au**

ABB has introduced a range of OTDC switch disconnectors for DC applications up to 1,500A. With a bespoke two-pole configuration for 1,000V DC, the OTDC is currently the only true 1,000V DC per polarity switch on the market.

The OTDC portfolio now includes solutions for installations with the most special requirements such as 1,500V DC voltages, multi-circuit switching and combined load outputs above 800A.

## PLIERS, CUTTERS AND STRIPPERS

**element14**

**www.element14.com**

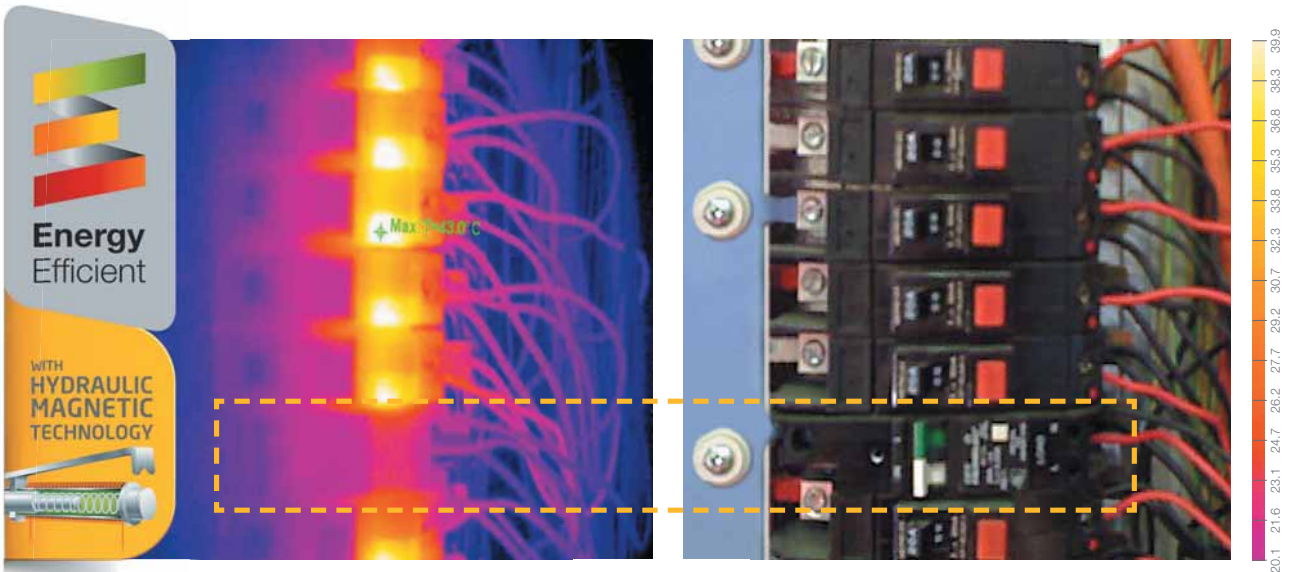
element14 has introduced the CK Ecotronic range of stamped steel pliers, cutters and strippers.

Each product's blades feature special tool steel that is hardened for long-term cutting performance, while the handles are designed to dissipate ESD in order to protect components against failure.

Other innovations for the Ecotronic series include contoured, dual component handles for comfortable working, a return spring with smooth action for convenience during repetitive work.

The joint is made of a durable stainless steel rivet and the tools come with a black oxidised finish for corrosion resistance and reduced glare.

# Save power. Save money.




*(Shown above)* CBI's SF1EL breaker proves a 'no load' reading in Themoscan tests whilst other RCBO'S still use power even with the load turned off.


With Hydraulic Magnetic Technology CBI's breakers and RCBO's are the only range that don't consume power under no load conditions.

---

CBI offer a range of Enclosures, Load Centres and Switchboards for Mining, Commercial and Residental.

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HEINELEC® CIRCUIT PROTECTION

SLEGERS GET CONNECTED

## CLAMP METER

**FLIR**

**www.flir.com.au**

FLIR Systems has announced the new CM55/57 flexible clamp meter and the TA72/74 universal flex current probe accessories designed for electrical applications. Made with narrow, flexible coil clamps, these new tools allow electricians to take accurate measurements in tight, awkward spots that are difficult to access with a traditional hard-jaw clamp meter.

The new meter can easily snake around obstacles to achieve the most accurate measurements and readings, adding up to 3,000A AC current for multiple conductor measurements. Both products are available in 10" flexible coil lengths for compact convenience, or 18" for larger and multiple conductor measurements.

## INDUSTRIAL MONITOR

**Siemens**

**www.siemens.com**

Siemens is extending the possibilities for its industrial flat panel products through the integration of an Ethernet interface. The new Ethernet interface now enables the use of monitor screens as far away from the server as desired.

The 19" and 22" glass-front monitors support intuitive operation with gestures and multi-touch operation even if the operator is wearing work gloves.

A standard Cat cable transmits video and USB signals. On the PC side, only a standard Ethernet interface is required.

## ENCLOSURES

**NHP**

**www.nhp.com.au**

NHP's new Fibox ARCA polycarbonate enclosures are designed especially for use in harsh and demanding environments.

Manufactured from glass reinforced polycarbonate, this new combination is as strong as steel without any risk of corrosion. This means extended lifetime and excellent security. The rugged ARCA range is also high-impact and UV resistant, aesthetically pleasing and provides excellent protection against vandalism.

With no requirement for complicated tools courtesy of patent pending, easy-to-use DIN-rail frame set design and lockable inner door, customisation is easily achieved either on site or in the factory.

## NETWORK SWITCH

**Ethernet Australia**

**www.ethernetaustralia.com.au**

Oring has launched a new layer 3, high bandwidth, rack mounted switch for use in network backbones and high data flow applications.

Distributed in Australia by Ethernet Australia, the 9000 Series incorporates the latest network standards and security measures along with Oring's redundancy protocol and industrial wide temperature operation. The RGPS-R9244GP+-P offers four full 1/10 Gigabit SFP Ports and 20 4Gbps RJ45 ports, each offering full 30W PoE. With its features set the RGPS-R9244GP+-P fulfils the stringent requirements for a core network switch.

## PROVING UNIT

**Fluke**

**www.fluke.com.au**


**Three-point 'test before touch' (TBT) verification of electrical test tools (i.e. verify the test tool is working properly before conducting a test, take the test, verify after the test) is a new, important safety development now required by work practices. The new Fluke PRV240 proving unit provides a safe and convenient method for TBT verification of electrical test tools without placing the electrician or technician in potentially hazardous electrical environments, which would generally involve using known live voltage sources.**

**In contrast to using a known live source, using the PRV240 does not require personal protective equipment (PPE) for tester verification. Use of the PRV240 reduces the risk of shock and arc flash compared to verification of test instruments on high-energy sources in potentially hazardous electrical environments because the PRV240 provides a known voltage in a controlled, low-current state in accordance with safe work practices.**

# Sophisticated style meets ENERGY EFFICIENCY

Crafted from contemporary materials such as metal, timber and copper, the **LED pendant range** from Beacon Lighting Commercial combines designer style with energy efficiency.

**LEDlux Tapas**
in copper.
Available in matte black, matte white and brushed chrome.

DIMMABLE

**LEDlux Canteen**
in brushed chrome.
Available in matte white, matte black and copper.

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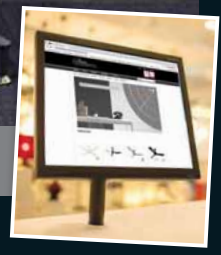
**LEDlux Piper**
in matte black and copper.
Available in matte white, brushed chrome and small.

DIMMABLE

**LEDlux**
Super efficient lighting

View the range and get a quote at **www.beaconlightingcommercial.com.au**



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Beacon LIGHTING COMMERCIAL

# Assault of the battery

**The way we provide and consume energy is destined to undergo a paradigm shift – and maybe much sooner than we think. Jacob Harris explains.**


Energy storage has been hailed by many as a game-changer for the power industry – touted to do to the energy market what Web 2.0 did to media consumption. And while the technologies on the market today aren't sufficiently advanced to make it an economically viable option for most, it may only a matter of time before the energy market landscape changes forever.

John Grimes is chief executive of the Energy Storage Council (ESC) and the Australian Solar Council (ASC) and has seen a dramatic increase in focus on the energy storage issue over the past three years. While the market in Australia remains embryonic, John has seen a particularly strong pull towards on-grid energy storage in conjunction with solar, and a steep overall rise in market awareness and consumer interest in the emergent technologies.

"One of the big spin-offs of the billions of dollars that has been ploughed into electric vehicle research in places like China and the US has been energy dense, compact and relatively inexpensive batteries. Most developers are using lithium-ion technology – the same as in mobile phones, laptops and many power tools – so people are pretty familiar with that kind of battery. These have been scaled up to be used in domestic or small business applications.

"There are a range of products available now that look like anything from a mini bar fridge through to a full height fridge that will store anywhere between 1kWh to 10kWh of electricity," John says.

This gives solar customers the ability to store energy acquired in peak generation times that would otherwise be exported, for little or no return, back to the grid. They can then use this energy when it is needed and reduce tariffs paid to utilities, or avoid them altogether.

"People are increasingly looking for energy storage sufficient to capture energy production mid-afternoon and use it when they get home in the evening. So it's about time shifting from when the energy is produced to when the customer actually needs the energy in their house."

The problem with the storage solutions currently on the market is that prices are prohibitively high if any economic gains are to be made by the process.

"Today there are solutions available to buy that will cost you the equivalent of about 30c/kWh. That's still a bit high for most of us because grid electricity sells for around 25-28c/kWh on average. But in some parts of regional Australia people are paying energy rates upwards of 42c/kWh so in those cases it's already a viable money saving solution," John says.

However, technologies are evolving rapidly and several new products that could significantly reduce storage costs are poised for imminent release.

"I'm aware of three companies that are coming to market this year with solutions that will be significantly cheaper. Once you have a battery storage solution that delivers you energy at a cost less than you can buy it from the grid it starts to get really interesting and will open up a lot of market applications."

Tesla's Powerwall unit, due to hit the market towards the end of the year, is already available for pre-order and is reportedly experiencing overwhelming demand. The sleek, wall-mounted Powerwall units will be available in 7kWh and 10kWh sizes with the ability to 'stack' up to nine units to fulfil a range of energy requirements.

German company Daimler AG is also primed to enter the market with Mercedes-Benz branded, scalable lithium-ion batteries. And Panasonic is currently conducting Australian tests on an 8kWh unit the company estimates will double a household's self-consumption.

"According to research done by the Rocky Mountain Institute, places like

Hawaii will see mainstream adoption of the technology as early as 2018. Australian conditions are actually very similar – our energy prices are some of the highest in the world – so it's not unreasonable to assume Australia will be operating on a similar time frame," John says.

"That will shock many people because there seems to be a pervading view that energy storage is still five to 10 years away, but that's just not the case. I joined the solar industry in 2008 when there were 22MW of installed solar in Australia now there's 4GW. So rapid change is something we've seen before in the industry and I think the conditions are similar for energy storage as they were for solar."

As is often the case with rapidly developing technologies, Australian standards – that were written around lead acid batteries – are going to have to play some pretty serious catch up. To this end, Standards Australia recently announced that it is forming a working group to update the standards in relation to energy storage. The ESC will be part of that process and sit on the committee.

"We want long term, safe, reliable, high quality energy storage solutions for Australia. We don't want to see systems that are half baked come into the market and cause injury or damage. It would be really bad for an industry like energy storage so making sure that what we do at this early stage is world's best practice is what we should be aspiring to.

"We also need to engage in a positive way with utilities. We need to understand the technical issues that they face and how the application of energy storage can help them deliver against their mandate. We don't want to set up a situation where it's us or them, where the utilities block out energy storage because they're fearful that it's actually taking market share away from them. So engaging in a positive way with the utilities and the regulators is really important for our industry and that's the other primary focus of our work at the moment."

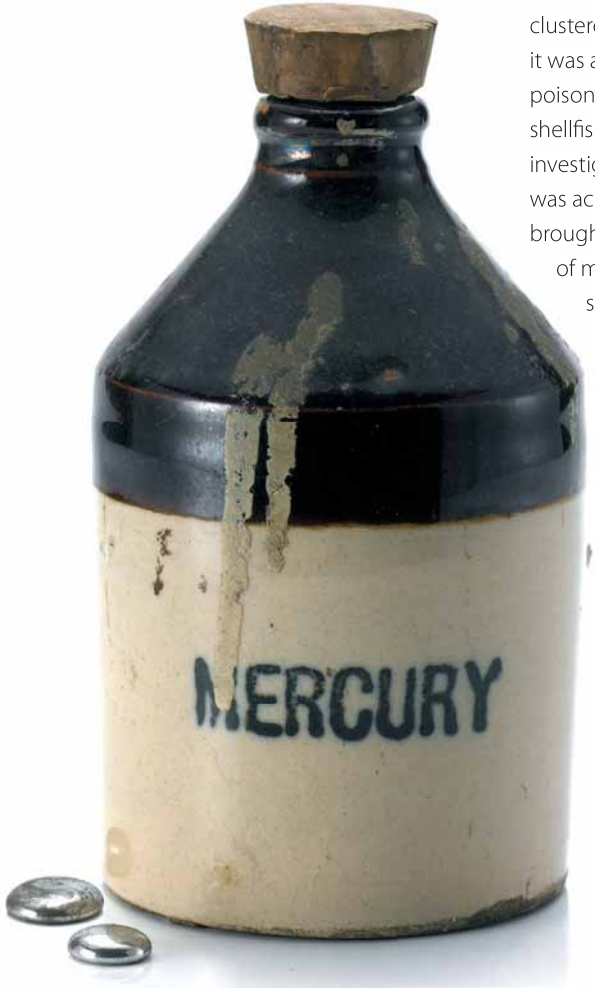
Such is the opportunity presented by power storage technology, *Electrical Connection* will continue to investigate the storage sector and profile any advances to the technology on offer. ■

> **Energy Storage Council**
> **www.energystorage.org.au**

# Name your poison

**Events that took place in a sleepy Japanese town in the 1950s provide a stark reminder of the consequences of ignorance when it comes to the safe disposal of mercury. Jacob Harris explains.**

When the cats in Minamata Bay, Japan started behaving strangely in the early '50s, no-one could explain why. The peculiar way they staggered, writhed and screeched as if demonically possessed was dubbed Dancing Cat Fever. Then, in 1956, the human population of the quiet sea-side town began presenting with symptoms of the mysterious condition. Those afflicted would suffer a narrowed field of vision, muscle weakness, a loss fine motor skills and their voice would change pitch. More often than not this would be followed by violent convulsions, insanity and ultimately death.




Because cases were confined to Minamata, the affliction was at first thought to be highly contagious. It wasn't until researchers from a neighbouring university discovered that cases were clustered around fishing hamlets that it was attributed to a kind of food poisoning caused from eating fish and shellfish caught in the bay. Upon further investigation it was found that the disease was actually heavy metal poisoning brought about by the gradual build-up of mercury in the bay's sea life and its subsequent ingestion by the local population.

The build-up was directly attributed to the actions of the Chisso Corporation. It had been operating a chemical plant in Minamata since the 1930s and dumped its wastewater (containing methyl mercury) straight into the bay.

According to *Toxic Effects of Mercury* by Shabnum Nabi, by March 2001 2,265 people had been recognised as suffering Minamata Disease, (1,784 of which had died). By 2004, the Chisso Corporation had paid $86 million in compensation and was ordered to clean up the contamination.

On 19 January 2013, a global treaty, aptly named the Minamata Convention on Mercury, was agreed upon in Geneva and to date 128 countries (including Australia) have signed it. The convention draws attention to mercury and its still prevalent use in many common products and processes including compact fluorescent lamps (CFLs), fluorescent tubes and high intensity discharge (HID) lamps.

Although these lamps only contain small amounts of mercury, problems arise when they are disposed of in landfill. Over time the mercury leaches out of the lamps, through the landfill and into the water table, eventually entering rivers, lakes and waterways.

The Convention includes provisions regarding the management of waste containing mercury, which will include disposal of lamps containing mercury in landfill. These provisions are aligned with work that has been undertaken by the Basel Convention which addresses the treatment and movement of hazardous wastes. Australia has been a ratified Party to the Basel Convention for over 15 years. The introduction of the Minamata Convention could result in additional domestic regulatory action on the management of mercury waste, and with this in mind changes in the electrical contracting sector could be made.

For about the last 10 years there have been several voluntary lamp recycling programs in operation, and for the past five years these have been supported by the Federal Government's FlouroCycle scheme. The scheme encourages businesses, agencies and organisations to join the program and recycle their used lamps and receive public recognition for doing so.

Energy saving initiatives such as the Victorian Energy Efficiency Target (VEET)

and NSW's Energy Saving Scheme (ESS) also have lamp recycling requirements as part of their programs, and in 2013 South Australia put an (albeit poorly policed) ban on fluorescent lighting in landfill.

For companies operating under the ISO 14001 Environmental Management System, reporting of lighting waste can be a key ingredient.

But with an estimated 95% of lamps still ending up in landfill, take up has been slow to say the least. This is disappointing when you consider that mercury containing lamps are the largest single category of consumer products that contain mercury.

It is also indicative of the level of change the sector will need to undergo when recycling ultimately becomes mandatory nation-wide. Indeed, perspectives will need to be altered, but this is nothing new. The automotive industry underwent a similar change when mandatory tyre recycling was introduced, and now little thought is given to the added cost of recycling old tyres when new ones are bought – it's just an accepted part of the process.

Similarly, the key to making lamp recycling work for you as an electrical contractor is to charge for the service. Due to rising levels of environmental awareness and education, perspectives are changing. While in the past customers may have balked at an extra charge, many now view recycling programs in a favourable light and are accepting of the fact that there are costs involved.

Although Australia signed up to the Minamata Convention in 2013, it is still going to take some time to work through the various layers of Federal Government review. While it is difficult to put an exact date on implementation, 2017 is thought to be likely. In the meantime, wise contractors should start to educate clients about recycling their lamp waste and for that matter, end-of-life luminaires too. No longer can the outer-suburbs be the dumping grounds for electrical industry waste.

The dancing cats of Minamata Bay were not possessed by demons or infected with some exotic contagion, they were poisoned by mercury. Greater understanding of our actions and their consequences shouldn't be seen as a negative but it does mean we are responsible for affecting positive change. ■

# Careful cabling

**Selecting the right cable is a tricky business. Chris Halliday offers guidance on the conductive material, insulation type and cable size for a range of requirements and conditions.**

Once a cable is properly selected and installed an electrician generally won't think of it again, and the installation owner or system users will certainly never consider it.

But if you select the wrong cable, the end users will have problems and safety may be compromised.

Retrofitting can be an expensive and annoying business if you do get it wrong. Take those that installed the Infinity or Olsent brand cables – what a nightmare, particularly if cables were installed horizontally through walls.

So how do we get it right?

## STANDARDS

We need to comply with all the requirements of the Wiring Rules and AS/NZS 3008.1.1 *Electrical installations – Selection of cables*.

First there is the general and overarching guidance provided by Part 1 of the Wiring Rules. This includes protection against danger and damage, protection against electric shock, basic protection, fault protection, residual current protection, etc.

Then we get into the specific guidance of Part 2, Section 3, for selecting wiring systems. You will also need to understand the detailed requirements of AS/NZS 3008.1.1.

## CONDUCTORS

Generally we have a choice of copper or aluminium.

Copper is a 'noble' metal, so it corrodes slowly and has good conductivity.

Copper is the preferred choice for cables in an installation, even though it is more expensive than aluminium. Most fittings and accessories are fitted with copper or brass connections, so there is no galvanic reaction (that is, corrosion – any two dissimilar metals touching each other are likely to corrode unless adequate measures are taken).

However, aluminium may be selected for longer lengths of consumer mains or sub-mains, as overall it may be cheaper and is quite suitable. But you will need to use some form of bi-metallic connectors, generally somewhat expensive, to connect at one or both ends of the cable. Also, a larger conduit may be required to fit the larger sized aluminium cable.

The economics may not be there for shorter lengths.

Certainly you should consider aluminium when quoting for longer lengths of consumer mains and sub-mains, but don't forget to include the cost of bi-metallic connectors, heatshrink or links, and larger conduit, if applicable. You will also need crimpers, which can be quite expensive.

My son was asked to quote on a proposed installation where the conduit had been installed for the consumer mains. The conduit, if compliant, is a little small and he may not be able to use aluminium cable. Copper mains are a possibility, but we have to check voltage drop and maximum demand before making a decision.

## ENVIRONMENTS

If high temperatures are a factor, then a mineral insulated metal sheathed (MIMS) cable is likely to be needed.

If moisture is a particular problem, then water-blocking (insulation between the strands) or water-jacketed (includes a metal foil layer in the insulation) cables may be required.

Ultraviolet stabilisation or protection will be required if the cable is exposed to the sun during the day.

Mechanical protection may be required if there is a possibility of damage from some mechanical force.

See Clause 3.3.2 of the Wiring Rules for other types of environmental conditions that might be encountered, and the management options.

## CONDUCTOR STRANDS

The number and shape of conductor strands will depend on the degree of flexibility required.

A single-strand cable is fairly rigid, and a cable with many strands is quite flexible.

A single strand might be suitable if it is not moved again after installation, but a cable that is regularly moved will need to be flexible.

Seven-stranded cables are mostly used in installation wiring.

## CURRENT CARRYING

The current-carrying capacity of a cable is affected by the method of installation and external influences that might restrict its operating temperature.

Some of the first steps in selecting a cable are to determine the:

- maximum demand of the circuit (Clauses 1.6.3 and 2.2.2);
- route of the cable (this will determine the installation method);
- number of conductors (two, three or four cores); and,
- normal operating temperature of the cable (Table 1 of AS/NZS 3008.1.1).

The current-carrying capacity of cables is detailed in Tables 4 to 21 of AS/NZS 3008.1.1, but derating or rating factors may also apply.

Derating factors are detailed in Tables 22 to 26 for such things as bunched circuits, circuits on trays, racks, cleats in air, or groups

of circuits. Rating factors are shown in Tables 27 to 29 for such factors as cables in heated concrete, soil temperature, burial depth and soil thermal resistivity.

In using Tables 4 to 21, circuit designers or electricians should consider the following cable situations:

- Vertically or horizontally spaced;
- touching the surface of, say, wall lining material;
- exposure to the sun;
- enclosed or not;
- partly or completely surrounded by thermal insulation; and,
- buried directly or in an enclosure such as conduit.

They should then go to the correct column of the table.

## VOLTAGE DROP

Too long a cable run with too much load will cause excessive voltage drop, which may result in unsafe or non-operation of the equipment on that circuit.

This will breach the Wiring Rules, so we must consider voltage drop when selecting a cable (see *Electrical Connection* Autumn 2015, page 44).

## FAULT LOOP IMPEDANCE

The loop impedance of circuits must be considered for all circuits and should comply with Tables 8.1 and/or 8.2 of the Wiring Rules.

Table B1 provides guidance on circuit lengths. Voltage drop requirements will generally, but not always, be more stringent than loop impedance requirements. Further detail is provided in the aforementioned article.

## SHORT-CIRCUIT TEMPERATURE

Cables may have to endure the thermal effect and mechanical forces caused by fault currents for up to five seconds.

Therefore we must check the minimum cable size that can withstand these effects by applying the following formula:

$$S = \frac{\sqrt{I^2t}}{K^2}$$

where

S = size of the current-carrying component ($mm^2$).

I = short-circuit current (amps).

t = duration of the short circuit current (seconds) – check protective device information for the fault level.

K = temperature constant depending on the material of the current-carrying component.

Some examples are provided in AS/NZS 3008.1.1 for reference.

## REPUTABLE SUPPLY

If the Infinity and Olsent debacle has taught us anything, it is that we should buy only reputable brand cables from reputable suppliers.

This goes for all other electrical equipment and components. The message from government fair trade departments is: "If it sounds too good to be true – then it probably is".

## CONCLUSION

Selecting a particular type and size of cable is not easy, and there will be other factors not included here.

Failure to consider all requirements may mean that people are put at risk, or the electrician must bear the cost of returning to remedy the installation. ■

> **Power Logic**
> **www.powerlogic.com.au**

# How to make a profit and get paid

***Electrical Connection* is on a mission to help contractors ensure the longevity of their businesses, by looking at the crucial topics of estimating and debt recovery.**

When I'm out and about talking to members of the electrical industry, I'm often asked what I perceive to be the major challenges facing electrical contractors.

Yes, there are non-conforming products, OHS compliance issues, too much unenforced regulation and too few tradesmen fully embracing smart new technologies – but let's hold it there.

None of those things are responsible for the far too many jobs not returning a profit, or that sizeable industry creditor trail that starts at the contracting level and has a nasty knock-on effect up the supply chain to the merchants and suppliers, who are ultimately left holding the materials bill.

Quite clearly, the two issues this industry lacks focus on are accurate estimating and debt collection.

The effect of these two factors can result in families losing homes, contractors working ridiculous hours to pay off debts and, of course, the associated mental health issues caused by the pressure of deemed personal failure.

Thus, for good reason, this section of the magazine revolves around these two major issues.

Further, it's the basis of an ongoing commitment by *Electrical Connection* to provide comprehensive, ongoing guidance on these two critically important subjects.

We can't hope to fully cover these issues in one edition but we can commence a process that encourages contractors to put aside time for something that will likely provide them with the greatest upside to their business.


**Be sure to keep an eye out for the Business Basics logo in future editions of *Electrical Connection*.**

Of course, these subjects are not solely the domain of the electrical sector, the same can be said for plumbers and other sub-trades, as well as the builders who ultimately screw down the trades (due in part to their own poor management - either by way of incompetence or intention).

When we started to ask some questions around Australia about what there is in the way of estimating training (at an apprentice and continuing professional development level) as well as debt collection, there was a fairly shallow response.

The industry seems to acknowledge there is a problem but too many pass it off as industry culture and the fact that it's always been that way.

Some want to say it's a TAFE issue – how what is taught is out of a textbook and how lecturers, in some cases, have no practical experience. But what has the industry really done to solve those problems? Finding anyone with experience to teach others is as rare as hen's teeth.

Due to ignorance, the industry continually pumps out new contractors whose first aim is to take on their old boss and commence undercutting their old firm. And few of them have any grasp of what it really costs to run a profitable business these days.

So, this is the start of a journey and we want you (the industry) to get involved. I know it's not in the nature of contractors to spend money on education but this issue really needs some serious consideration.

Having a start in the electrical industry is quite a leg up in this day and age. You get paid well to learn on the job in an age when most ~22 year olds coming out of uni have gotten by on slim pickings from after-hours retail jobs. They also have a HECS/HELP burden to shoulder for many years afterwards and, generally, pay packets on entering their chosen career (let's put aside law, investment banking and specialist medicine) are fairly mediocre.

In putting this first edition together, we spoke with long-time *Electrical Connection* contributor, author, trainer and electrical estimator Brian Seymour to get a few tips that contractors can use wo ensure they are making the most out of every possible job.

We're also pleased to support the online debt recovery training services from Anthony Igra, which you can access anytime over the web.

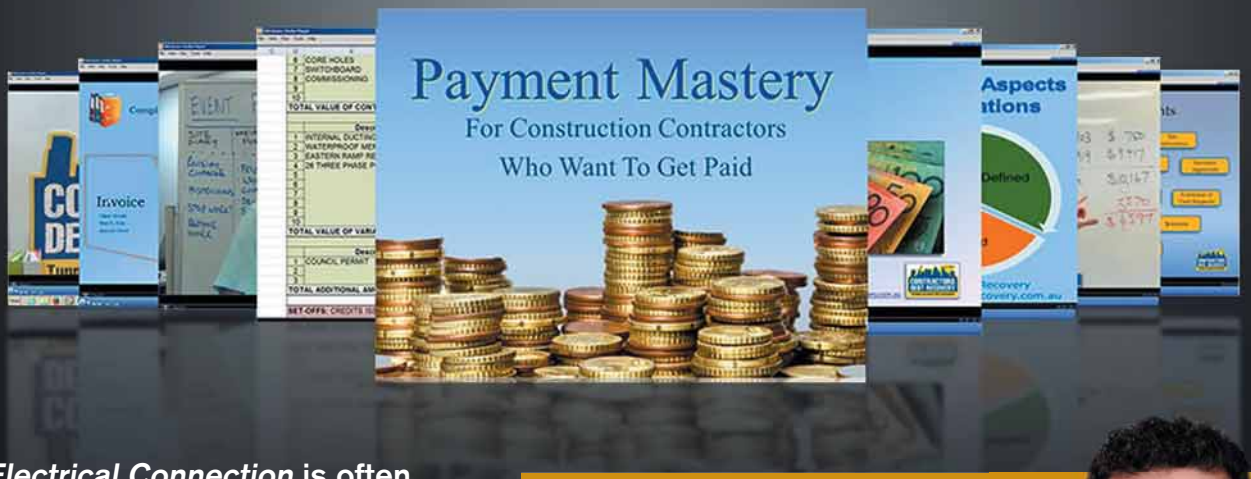
I'm sure there are lots of ideas and tips about these two issues hidden away in electrical offices around the nation – it's time you shared a few with us and others. ■

*Jeff Patchell*

DEBT COLLECTION GUIDE

# RECOVER WHAT'S RIGHTFULLY YOURS

## Are you fed up with chasing your payments every month?




***Electrical Connection*** **is often approached by service providers to promote or sell their offerings to contractors and more often than not, we turn them away.**

But, the debt collection advice that Anthony Igra puts out to this industry is in a league of its own.

As a result, the online video training series he has produced is a great investment for you and your staff.

This three-hour, four-part series of online training videos shows you how to handle your debt collections and empowers you to confidently approach your debtors and recover what's rightfully yours.

Upon completion of the course, you will also get access to downloadable forms and templates that you can quickly convert into your own formal documents.

It's the best $397 in training you'll ever spend!

Over these three hours I guarantee I will dramatically improve your ability to 'get paid'...forever

**ANTHONY IGRA**
Founder, Contractors Debt Recovery

| ONLINE TRAINING VIDEOS | |
|---|---|
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| **TRAINING SESSION 2 Structuring Payment Claims** | How to make them bulletproof |
| **TRAINING SESSION 3 Variations & Change Order** | How to make them undeniable |
| **TRAINING SESSION 4 Reconciliations** | How to account for every cent you are owed – on a single page! |

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# Am I ready to go it alone?

**There's a lot more to running a successful electrical contracting business than being a good electrician. Brian Seymour outlines other crucial skills.**

Just because you are a top electrician doesn't necessarily mean you have great business skills.

Business requires additional skills and attitudes. Before embarking on a business venture, ask yourself these questions:

- Am I a decision-maker?
- Am I competitive?
- Am I self-disciplined?
- Am I a planner?
- Do I have leadership qualities?
- Am I prepared to work long hours?
- Do I have the ambition to succeed?
- Is my family or others close to me willing and able to go along with the inevitable struggle for business success?
- How much money am I willing to gamble on this venture, knowing that I might be risking all of it?
- Do I have sufficient experience in this field?
- Have I had any training in the basics of business?

The prime reason for going into business is to make a profit. So how much money should you expect to make as a successful electrical contractor?

Much depends on your local market, your specialty, your capital, your time in business, your management skills, and many other factors.

Your goal should not be how many jobs you can tender for, but how many customers you can develop for long-term growth. Any dumbkopf can win a job 'at any cost', the skill is to win the job and make a profit.

A large turnover is not necessarily the measure of a successful business – only net profit.

The electrical contractor must be many things: a qualified and experienced electrician, employer, estimator, buyer, credit manager, bookkeeper, tax collector, customer relations representative, problem-solver, communicator and – to survive – successful business proprietor.

Apart from electrical trade skills, estimating is the most important. There's a legion of accountants, bookkeepers or lawyers who offer services to new businesses, but it is rare to find anyone offering estimating services.

The contractor is responsible for calculating all the costs of completing the job, with an acceptable profit margin in the final price.

This cannot be achieved by what is commonly known as 'price per point', which in many instances doesn't remotely resemble real costs. You must count and measure all the materials expected to be consumed. It is a relatively straightforward job to get accurate prices from the wholesaler or industry catalogues.

Calculating the labour takes a lot more skill, using personally calculated labour units or a professional labour unit manual. (A labour unit is the time it takes to install an aspect of an installation.)

However, time and materials constitute only about 70% of the job. There are many more factors that can affect the labour units, including abnormal conditions, weather and work environment. These can be managed, but only if they are factored into the final pricing structure.

Whether it is a multi-million dollar industrial project or wiring a sunroom in someone's home, the process is the same. The accurate counting of all materials and accessories and the measurement of all cables, conduits, bus-bars, etc, is a relatively simple exercise if carried out by a competent tradesperson.

However, the application of labour units needs skilful assessment and is probably the most important of the estimator's responsibilities. Labour is potentially the most highly variable factor of project costs.

Even with today's tested and proven estimating procedures, estimators can't just sit back and reflect how many days, weeks or months it should take a certain number of electricians to complete a job. They have to tailor the labour estimate to more closely fit the job.

Under highly competitive tendering situations they have little leeway and the target area is extremely small. They must visualise all the problems that are likely to cause labour expenditure over

**BRIAN'S TOP 6 TIPS**

1. **Figure out your profit margin. Know your current gross profit margin from your last month end accounts. Get some benchmarking figures from your accountant – how do you compare with the industry average?**
2. **It's about profit, not turnover. It's irrelevant how many thousands of dollars of sales each month you make if your overheads are as high or higher.**
3. **The only accurate method to achieving a profitable tender/quotation is count and measure.**
4. **The job can only be profitable if all materials and associated labour is accounted for.**
5. **Analyse your competitors. They may be run a more efficient operation.**
6. **Understand the risks and rewards. Take calculated risks to help the business grow and determine the worst case scenario.**

and above the physical installation of materials.

There are several items that contribute to 'running the labour up'. If you want the expended hours to be somewhere near the estimated hours, all these additional factors need to be taken into consideration when making a final assessment of the tender.

This area marks the difference between a competent estimator and a count-and-measure clerk.

The labour unit, from a labour unit manual or calculated by the estimator, is a cost data figure, indicating the cost (in hours) for installing a given item of material or performing a given labour operation. The distribution of time on any particular job may be divided into two general categories:

> productive labour used in the actual installation or fabrication of material or equipment, or in performing a labour operation not associated with materials, eg: cutting holes, trenching, marking up drawings, etc; and
> non-productive labour, such as supervision, handling and ordering materials, making out time sheets, relocation of work, walking to the workface, material storage, lifting and access times.

Some non-productive labour is inherent in most jobs, but more will be evident in certain job conditions. The extent of it will vary, and this has been historically termed the 'job factor'. In the next issue we will examine the job factor and techniques for improving profitability. ■

**Any dumbkopf can win a job 'at any cost', the skill is to win the job and make a profit.**

# Getting paid without the hassle

**It's not that hard to cut out 80% of your bad payers, writes Anthony Igra. Here's how.**

I know a contractor who was asked to do so much additional work that the value of the variations exceeded the original contract price. When it came to payment time the client flat-out refused to pay any of the variations at all. It was then that the contractor produced every single variation request, where the work was detailed, numbered and signed off by the client's foreman. The client was furious and grudgingly paid the whole amount, clearly realising that the weight of evidence was on the contractor's side: it would be pointless to dispute it.

Another contractor had his client claim that he never gave any instructions to carry out some part of the work. The contractor produced emails showing where the direction was given.

I know another who was accused of providing damaged product. But this contractor was able to produce photos of the product when it was delivered and the signed receipt from the site representative. It was in perfect condition, clearly proving that the damage occurred after delivery. The matter went to adjudication and the contractor's evidence was so conclusive that the client realised that payment was the only option. A cheque for $60,000 came the next week.

These are just a few of examples of how paperwork gets you paid. Some people only associate paperwork with delays, red tape and wasted time. Chances are those same people are locked in payment disputes over what was promised, agreed or quoted and are unable to prove their case.

The fact is that solid paperwork is probably the most effective weapon in defending a payment claim. Good paperwork means that there isn't this great void where neither you nor your client can prove what was promised, agreed or quoted.

But most contractors struggle to get themselves and their businesses organised around simple and solid processes to tighten up on payment. The most common question I get asked after a claim is 'How to I stop this from happening again?'

So I put together everything I had learned from a decade of payment disputes and created Payment Mastery. It provides three-and-a-half hours of content to answer that very question: How can a contractor tighten up on payment practices and avoid 80% of payment problems?

Let's look at what this is in more detail.

## PAPERWORK IS CONTEMPORANEOUS EVIDENCE

The important feature about paperwork that is created or completed around a dispute is that it becomes 'contemporaneous' evidence; coming from the word 'contemporary'. Good contemporaneous evidence will carry significant weight in proving what happened, what was promised, agreed or quoted. In adjudication, the adjudicator will place weight on this kind of evidence in making a decision if he/she is satisfied as to its quality and credibility.

Far too many disputes come down to the contractor's word against the client's. The easy way to tip the balance in your favour is by including simple record-keeping habits into your work.

In the Documentation Video in Payment Mastery, we go into detail about how you can not only create this kind of evidence but also how you create 'corroborating evidence'; documentation that backs up other documents. For example a Site Diary Note might back up an email sent that day on the same issue. Payment mastery also provides 12 complete document template downloads for you to use straight away in your business.

## VARIATION MANAGEMENT

**> Variations/Site instructions (Time required: 30-60 seconds)**

If you are given a verbal direction to carry out additional work make sure it ends up in written form. If the client refuses to document the direction, then the contractor should document it in his own 'site instruction' form and issue it to the client.

I recently prepared an adjudication application where there were nearly 60 directions for additional work. Even though the client's foreman failed to complete a variation advice as required by the contract, the contractor documented each one himself on his own paperwork: The details of the work done, who requested it and dates and times were all recorded. The result was that he was awarded all these variations because the adjudicator was satisfied that these site instructions were valid contemporaneous evidence that work was requested and done.

The hot issue of variations actually has its own dedicated video in Payment Mastery. In that we go into variation registers, how to complete them and how to incorporate the register into your payment claims. More importantly though, it covers the three crucial aspects of variations that need to be recorded on any variation approval: scope, price and authorisation.

**> Photos/reports (Time required: 30-60 seconds)**

Stop talking on your mobile! Take

pictures with it! In disputes around defective work or damage, take a pile of photos right there and then. If possible have the work inspected by an expert who can prepare a report shortly after.

Often disputes around defective work occur months before a payment dispute. Only then does the client raise the defect as a reason for non payment. If the contractor can produce photos and reports about the work from the actual time, this is excellent evidence as to what was or was not defective.

I recently prepared an application where the respondent refused to pay by alleging that much of the fitted equipment was damaged by the contractor; however, the contractor had taken so many photos at the time, together with a detailed report, that clearly showed that the damage was caused by another trade. This type of evidence was impossible to argue with and the contractor got paid.

**> Site Diary (Time required: 60 - 90 seconds)**

A site diary is useful because it typically captures a whole raft of information. Beside details of work done or directed, it also records weather, any delay details, conversations, staff onsite/offsite and more. This is a single record of each day that can take as much information as you want to include. If you can make completing a site diary page a daily habit then you will be able to produce evidence regarding the dispute, and if you can show that this has been a daily habit for a long time then the weight given to your site diary will drastically increase.

**> Emails/Faxes (Time required: up to 20 minutes)**

Any project will leave behind it a paper-trail of faxes, letters and emails. Keep all of these in a file in chronological order. They can show what happened and when. Further, if a dispute comes up onsite make sure you confirm the details in a fax to your client that day. Remember, verbal recollections of events aren't worth the paper they're written on!

**Paperwork is probably the most effective weapon in defending a payment claim.**

### MINUTES OF MEETINGS (TIME REQUIRED: UP TO 30 MINUTES)

Site meetings occur regularly on most projects, especially meetings that are supposed to resolve disputes. Most times the client will not provide any record of the meeting, what was promised or agreed. So this is the contractor's chance to step into that void. There is nothing stopping you from writing up your own record/minutes of the meeting and sending them to the client. Again you are creating a record of events and undertakings that can be useful evidence in the future.

### RECONCILIATIONS RULE

This is the most common weakness in contracting payment practices; very few of you prepare a proper reconciliation of what you are owed each month. That is nuts. Amazing as it may seem, many contractors don't actually know what they are owed. Every month your claims must show the breakdown of full work value, variation value, other amendments and the paid-to-date. Again, too many contractors are concerned with the 'certified-to-date' instead! You can't pay your bills with 'certified payments'! A good reconciliation will show you your paid amount so you know exactly what remains 'unpaid'.

Payment Mastery has a complete video taking you through the reconciliation process making it easy to follow. It also provides a completed reconciliation spreadsheet template to use each month. That way every outstanding dollar can be identified.

### THE POWER OF PAPERWORK

The power of good paperwork lies in its credibility and the weight that a court or adjudicator will place on it. Good paperwork will very often beat hearsay, statutory declarations, someone's recollections and will often catch out 'invented' evidence. Good paperwork is very hard to argue with and provides adjudicators with sound material upon which to make their decisions about what actually happened in the dispute. Good paperwork helps you prove and support your case for payment.

### SO WHAT DOES ALL THIS MEAN FOR ME?

It means you should start to get very excited about keeping great paperwork! Take a look at the estimated time you need to invest. Most of the time it would not reach 10 minutes a day. Now is 10 minutes a day worth it to protect your ability to recover payment and settle payment disputes? Of course it is!

Never again will you rely on your word against the client's. There will be overwhelming evidence on your side.

Make paperwork a daily habit right now and rejoice while you're doing it. Don't see it as red tape; see it as money in the bank.

Because that's exactly what it is. ■

**> Payment Mastery**
**www.electricalconnection.com.au/paymentmastery**


Dave


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# Right on the roof

**Panel installers must study location and roof type before quoting, writes Phil Kreveld. Mounting materials are costly, labour time may increase, and an unhappy customer is bad for business.**

One of the major risks when you install a photovoltaic system – besides falling off the roof – is an installation malfunction.

Your reputation as an installer is also in jeopardy.

Immediate thoughts go to the electrical side of such a project, but the longevity of an installation also relies on the mechanical workmanship in putting the system together.

A rooftop photovoltaic (PV) system is subject to weather that can severely restrict its useful life. Installation costs are considerable in a typical domestic system, and competition means there's a temptation to cut corners in areas that don't relate directly to electrical performance.

However, compromising the structural integrity of a rooftop installation is a bad idea – even a dangerous one.

PV panels are not something to just 'stick' on the roof. They are part of the structure, and the expertise usually associated with construction comes into play.

In addition to the mounting system there are other crucial aspects:

- Resistance to weathering (particularly corrosion).
- Secure fixing to the roof structure.
- The condition of rafters and lintels in older homes, especially in relation to wind, which sets up conical vortices at the edges and corners of roofs. Under wind velocity of more than 60m/s, vortices can exert great forces on panels.

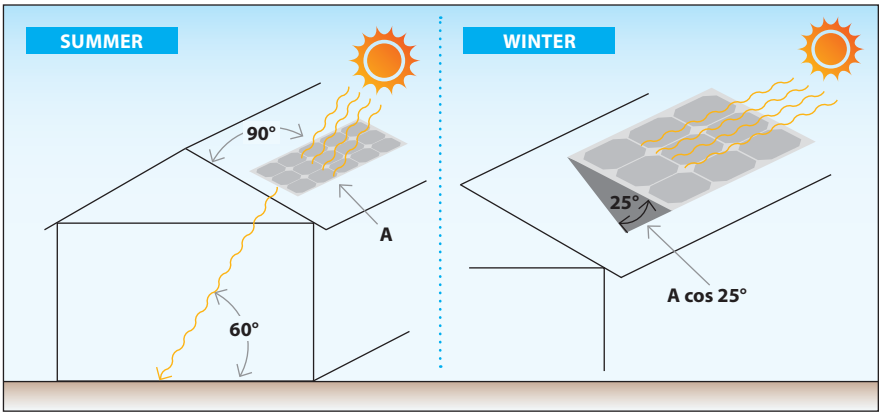



**Figure 1.**

So installers should at least be aware of the Australian Standards applying to rooftop installations. They should also carefully scour the technical literature from reputable suppliers of rooftop installation equipment.

Working at height among potentials of hundreds of volts is dangerous. A single panel typically has open circuit voltage of 30V DC or more, and the string voltage of 12 panels will be about 400V.

To avoid any chance of electric shock when panels are being installed, no electrical connections should be made. Once the panels are in place, and before wiring is commenced, it's a good additional precaution to cover them with blankets, etc, until wiring is complete.

Malfunctioning of the PV panels at installation time is unlikely other than through obvious damage sustained in transport. However, performance degradation takes place over time. It's a matter of degree, but bear in mind that the householder pays for this.

Rooftop panels should be facing as close to due north as possible. Otherwise, they should face north-east. If sufficient power is not available on one side of the roof, another set of panels (e.g. west facing) can be installed.

The inverter for this arrangement requires two maximum power point trackers (MPPTs). Panels that are unequally illuminated should not be paralleled other than via two MPPTs. If connected in series their efficiency will be badly affected.

Orientation can be a problem. A 30° roof slope is generally adequate, but roof mounting hardware to elevate the angle of the panels is available.

Without going into theory, the orientation is best explained with a panel facing due north (Figure 1). A 30° roof facing the midday sun at an elevation of 60° gets the sun's rays at 90° to its surface. This is ideal.

In winter, the sun might be at 35° elevation. The effective illumination of the panel is equal to the cosine function of 25° (check the diagram for the definition of angles) or 90.6% of the maximum value.

If the roof is flat the illumination will be 57%, which is well down. A minimum tilt of 10° allows for self-cleaning.

If the panels are tilted on the roof, ensure that they don't cast shadows on each other (the standard tilt angles available are 5 and 15°).

Slate, tile and steel roofs require different mounting methods. In all cases the panel-securing hardware will be attached to

battens or purlins, but the leak-proofing methods will vary.

Fixing to purlins is generally preferred, but the installer needs to check the location carefully before the installation date. Steel roofs require fixing of panel hardware by means of rubber pads, which provide leak proofing and isolation.

The isolation aspect is important, as nearly all solar systems have only a safety ground. The functional ground is absent in a transformer-less inverter installation, but earth leakage current flows via the capacitance panels have to ground nevertheless. For a steel roof this can be considerable.

Apart from the power considerations that determine the number of panels, wind conditions have to be taken into account. As a rule of thumb, mounting panels close to the edges of roofs should be avoided.

The Northern Territory, northern Queensland and Western Australia are subject to cyclonic conditions, so installations must adhere to Australian Standard (AS) 1170.2.

Although panels look like part of the roof, they are separated from the roof surface by an appreciable distance. Wind exposure causes lift and drag forces on the panels that increase as the square of wind velocity. The higher the roof pitch and panel location the more pronounced the effects. Sufficient anchoring to the roof structure is crucial.

In planning roof fixtures, first look at the location. (For simplicity's sake a conventional pitched roof is assumed.)

If the installation is in Brisbane (region B of the Australian Standard) the anchoring points for the solar panel fixtures will increase. Brisbane is subject to higher wind speeds than Melbourne and most of the south coast (region A).

Next, the roof is divided into three equal zones: a central zone and two end zones. The end zones bordering the roof edge are subject to higher wind speeds than the centre, so the anchoring points and number of rails will increase.

There must also be an exclusion zone so that panels are not mounted right on the roof edges.

The terrain categories must now be considered. Open country without windbreaks is the worst situation, compared with built-up areas.

A combination of open or built-up terrain and wind speed region determines the number of anchoring points per rail. Installers should consult their supplier for appropriate engineering detail.

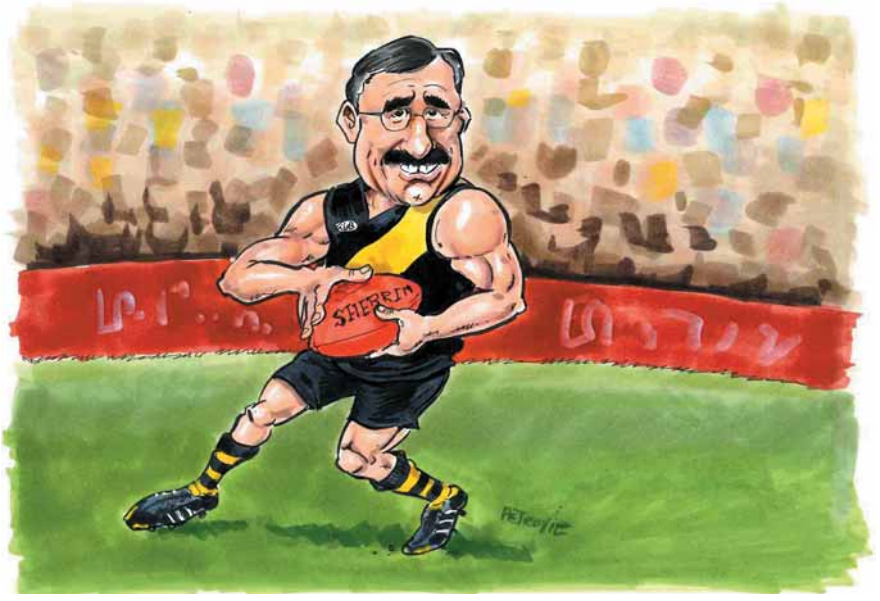
The 'install and forget' mentality that marks much of the industry is not helpful, because installations degrade over time.

The quality of roof-mounting materials has quite a bearing on the effective lifespan of the installation. The weather can promote galvanic corrosion; dissimilar metals and water being the ingredients. Oxidation can halt corrosion – but don't count on it.

Marine and industrial environments can speed up corrosion. Sulphur dioxide and nitrous oxides in industrial and heavy traffic areas, and chlorides in seaside locations, require precautions to be taken.

When in doubt, seek ways of physically and electrically separating potentially problematic metal combinations. Using rubber washers to isolate galvanised screws from painted steel sheet is common practice in the roofing industry. Stainless steel washers with an ethylene propylene diene monomer (EPDM) gasket adhered are commonly available from hardware suppliers. ■

# "G'day, Robin Norris here..."



**For the past 50 years, Robin Norris has been a dedicated member of the Australian electrical sector. Now he's decided it's time to pull up stumps.**

It's an impressive feat for electrical contractors to rack up 50 years on the tools. It's a rare milestone well worth celebrating and a sign of someone doing something right. But, what is an even rarer occurrence is reaching 50 years working in the wholesale sector.

In 2015, Sonepar Pacific chief executive Robin Norris will join the illustrious '50 Club' by observing his 50th (and final) year in the industry.

Sonepar Pacific is the parent company of electrical wholesaler Lawrence and Hanson.

A born and bred Taswegian, football-mad Robin knew from a young age that he wanted to work in the electrical industry. At the age of 15, he started his apprenticeship with local contractor Phil Lovett, with whom he worked for seven years before moving into the wholesale sector.

"Back then, to get an apprenticeship was a prestigious thing," he says.

"They were pretty sought after positions.

"When I decided to leave school, my mother was keen for me to get an apprenticeship with the Hydroelectric Commission, as it was known back then, or with Electrolytic Zinc Company because she said if you got a job there you'd have a job for life.

"I didn't want that. Instead, I applied for a job in the paper."

Robin explains that in those days, it took a month between applying for the job and getting an interview because everything was done through the post. ("Today, if you don't reply within an hour the applicant is no longer interested.")

He remembers the interview process was far more gruelling than today, too.

"The world has definitely changed in this respect," he says.

"The final thing that Phil did before he gave me the job was meet my parents. Could you imagine today if that was a requirement? It would never happen."

This isn't to say that Robin believes young workers aren't as capable as those from his generation.

"When people talk about 'young people' today, I don't actually see a huge difference... except their perception of time. They want the same things that I wanted, it's just a different process – smart phones compress time," he says.

Modern times have also seen the rise of the 'specialist'.

"I don't want to sound cliché, but so much has changed in the past 50 years and so much hasn't.

"As a kid you did your apprenticeship and everyone got the same qualifications. We were all called electrical mechanics and there was no such thing as a specialisation.

"You didn't have people who were specialists in industrial control or automation.

"We were all trained to be generalists and that was possible because the product range was so small. The Clipsal catalogue would have been 30 pages. Now, the Clipsal by Schneider Electric catalogue needs to be downloaded because it's so large."

Perhaps most impressively, throughout Robin's 50-year career, he has only ever worked for three different companies – an idea that would send shivers up the spine of many a millennial.

"I worked with Phil Lovett for seven years after which I moved into wholesale with the old GEC, and then spent the next 37 years with L&H, come ALH, come Pacific Distribution, come Hagemeyer, come Sonepar."

But, Robin says, the past 50 years in the electrical sector almost never happened.

In his early twenties, Robin was a star fullback for the Clarence Aussie Rules team. He was so good that he was signed on

several Form 4s, which the then-Victorian Football League (VFL) used to allow interstate players to try out for VFL teams. He was invited several times to pre-season training at Richmond but was never signed up.

He then moved back to Clarence, where he took the role of captain-coach.

"When I realised that the VFL wasn't going to happen, I entered the electrical wholesale sector," he says.

"I started in Tassie and then went to Brisbane for two-and-a-bit years. I went back to Tassie and I then moved to Melbourne to be state manager for L&H in 1988.

"I was here for two years and then went to NSW in 1990 for three-and-a-half years as its state manager. In 1994 I moved back to Melbourne as the operations manager and in 1999 I was made CEO."

Robin says electrical wholesaling has changed a lot in that time, but a few things remain the same.

"Back when I started, the wholesaler's rep was a contractor's sole point of contact with a shop. Nowadays, contractors have so many ways to connect with a wholesaler, but they still want that personal connection," he says.

"But the time has come for the wholesale sector to improve its image or we will face competition from someone we don't currently see as a competitor.

"A potential threat to any business is the internet. Look at Amazon.com – it has the potential to be a major player in this space. And the reason why it's so successful is that it has an amazing supply chain.

"To succeed into the future, improving our supply chain is critical.

"I said earlier that the Clipsal catalogue is a lot thicker than it was, but so is everybody else's.

"The requirement for wholesaler staff to be knowledgeable on product back when I started compared to today is unbelievable. It's incredibly demanding. And if we don't have good technology to support it, if we don't have the ability for people to find info, we will never get new product to market as quick as we need to."

Robin is now preparing to enter the next phase of his life – the first in a long time that won't involve the electrical industry 24/7.

Though his retirement might mean the end of hearing Robin plugging L&H's Traders electrical industry trade shows on early morning radio with his well known "G'day, Robin Norris here...", don't be surprised if you hear his voice around the industry he has spent so much time helping to build.

"Weaning myself off the industry is going to be hard to do. I have so many friends spread across the country, so I'd like to think I can give back in some way."

On behalf of the thousands of electrical industry members that Robin inspired and befriended over the years, *Electrical Connection* wishes him all the best for the future and acknowledges his contribution to the industry over the past five decades. ■

ADVERTORIAL

**There are less than a handful of companies manufacturing electrical accessories in Australia.**

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Even less again with a family of over 100 year tradition of manufacturing.

In fact there may be only one - AMPERE Electrical Manufacturing Company P/L.

AMPERE Electrical is an iconic Australian company which is proud of its tradition of manufacturing.

Oswald Mense, a Toolmaker, manufactured Electrical Accessories in Vienna at the turn of the 19th to 20th century. Oswald's son, John,worked with his father from 1926 to their departure from Europe, fleeing World War II. The Viennese company, OSWALD MENSE METALLWARENFABRIK, manufactured switches, power points, lighting and other goods.

When John came to Australia he was interned as an 'enemy alien' because his native Austria was occupied by Germany. After a while, John enlisted and worked for the war effort as a Toolmaker.AMPERE was established in 1947 by John, in Melbourne.

Robert, John's son, also a Toolmaker, joined the company in 1973. When John died in 1983, Robert assumed control of the business.

Under Robert's control, the business expanded enough to afford purchasing two additional buildings which then doubled the company's footprint in the inner Melbourne suburb of Prahran. The Company's catalogue of products expanded from a six page single sided list to the 80 plus page catalogue of today.


AMPERE has brought to the market leading 'firsts' in either product or design or packaging.

- AMPERE in 1965 were the first company manufacturing Plastic Cable Clips in Australia – the QUIKLIP® Cable Clips
- The Australian made ANKA® Wall Plugs were the first plastic cavity wall plugs with threads to suit 6 and 8 gauge wood screws (product is coloured orange).
- The ANKA® Wall Plugs were further improved to accommodate 7 gauge (red) and 8 gauge (green) self drilling screws
- QUIKLIP®s were then packed In buckets of 500.
- Further improvement for QUIKLIP®s was packing in Bulk Bins
- Introduction of Australian made 'Yellow Tongue' Cavity Wall Rods 4 metre long in a handy plastic bag designed for easy sale to electricians
- Innovative Australian made Mounting Blocks for Top Hat Girders (PURLMATE®) and 'C' and 'Z' Girders (CnZ MATE®).
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AMPERE carries everything from Cable Handling to Fasteners to Toolbags to Cutting Tools to Electrical Accessories. AMPERE has it all.

AMPERE is very lucky and proud to have long term employees now and in the past. Many have clocked up more than 25 years. That gives the company stability and ensures the high standard is maintained. Talking of standards, AMPERE is ISO9001 accredited and zealously and jealously maintains it at every Accreditation Assessment.

With warehouses in Queensland, Melbourne and Perth, AMPERE is able to supply overnight to all Capital Cities (except Darwin – that takes longer).

Robert Mense is proud of his heritage of over 100 years of manufacturing and distributing electrical products, but the future is where AMPERE is looking.

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# No shortcuts for solar

**Electricity from the sun is cheap, but don't think that way about PV installation gear. Phil Kreveld tells how to get the best out of those essential bits and pieces.**

Using the right installation equipment for a photovoltaic rooftop system ensures maximum operating life – and customer satisfaction.

When the solar installation industry was in its infancy there was some excuse, or at least an understanding, for very poor choices of cabling, switchgear, junction boxes and conduit.

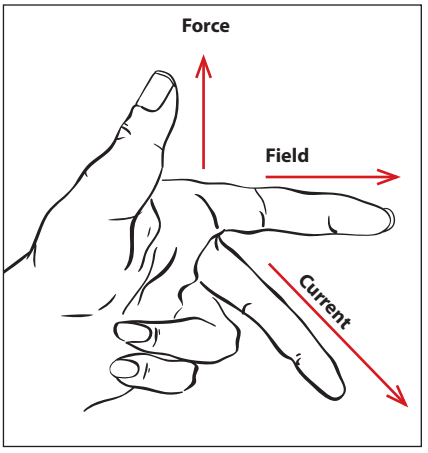
There were even instances of AC-designed switchgear being used for DC carrying circuits. We hope that doesn't happen these days, but there is still much room for improvement in durability and safety.

If there's any unfamiliarity on the part of the installer it is likely to be on the DC circuit side. The difference is not so much in current ratings for cables (we are always dealing with rms AC current as equivalent to the same value DC current) but in the switchgear.

DC current is difficult to interrupt. There are no 'swing through zero points' for the arc, which can be drawn on opening a switch, to be extinguished.

For AC, load-make and load-break are about the same challenge, whereas for DC load-make is not a problem but load-break is. In practice the DC interrupters (load-break, since there is no way we can stop the sun from shining on the PV panels) are bulky compared with their AC current rating equivalents.

In AC switching, the interruption can occur anywhere in a 10 millisecond period. Even the possibility of drawing an arc on opening the circuit is minimised if that happens to be near a crossover point. The speed of opening contacts is therefore less critical in AC than in DC circuits.




**The left hand rule.**

In DC switching, the idea is to build up voltage across the switch rapidly. If this doesn't happen an arc will strike and, because of its low impedance, current will continue to flow.

A well-established technique of dealing with the interruption problem is to use an arc-extinguishing method. To handle this in a compact device, rather than an air blast to lengthen the arc, a permanent magnet is used.

The left-hand rule (Figure 1) shows how it works. We are relying on the force F to blow the arc (current-carrying conductor) away from the contact points.

It's a neat way of solving a problem, but the use of such 'polarised' devices can be problematic. If not connected properly (ie: current polarities not observed), or if current direction can reverse, the arc will be sucked in instead of being blown out.

In the case of compact switches, the heat generated as a result can provide all the conditions for a fire to start. For this reason, Australian Standards stipulate that polarised devices can no longer be used.

The multiple-contact ganged switch, although bulkier by virtue of three or four contact sets, is superior. Furthermore, both conductors in a DC circuit can be interrupted (this cannot be done conveniently in the permanent magnet device).

In most installations two isolators are required: on the roof and at the input to the inverter. For transformer isolating inverters you will need a DC breaker or isolator that is double pole (breaks negative and positive simultaneously).

Switches should be rated to break 1.25 times the short circuit current (Isc) rating of the solar PV array and 1.2 times the open circuit voltage (Voc) of the array. Look carefully at suppliers and the specs because this is a critical area of an installation.

If you are aware of polarised switches or breakers in existing installations, you must replace them. They are not allowed under AS/NZ 5033. Ganged switches suitable for solar installations come in current ratings of 8, 10, 16, 20, 25, and 32 amps, and voltages of 250, 440, 500, 800 and 1,000V.

The rooftop installation is an example of unprotected consumer mains, though DC rather than AC. The regulations require DC conductors, where otherwise exposed, to be housed in heavy-duty conduit, obviously resistant to UV degradation and vermin.

Note that in some panel mounting rails, provision is made for routing cables. However, the installer needs to ensure that entry slits are too small for any creatures to enter. In general, it is better to err on the side of safety and enclose all conductors in conduit without over bunching, as this will lead to heat problems.

In terms of total system cost, DC conductors account for a small proportion (2-5%), but bad cabling is responsible for 7-10% of installation problems. In many instance this has caused a fire.

with **Phil Kreveld**

Cable ties, clips and other attachments should be properly used so that cable electrical properties are not compromised. A PV installation is in the open, and movement is something that installers have to factor into cable management.

Installers use different ties to attach cables to frames or other supporting features. Cable ties are usually UV-stabilised and available in a wide range of tensile strengths, bundle diameters and styles. However, if they are not UV-rated they will fall apart in due course, as they can't withstand 20-25 years of sun (plus rain and curious animals with a penchant for plastic).

Note that the use of metal wire ties is discouraged, as they can cut into cables. In addition, AS/NZS 5033:2012 explicitly states that plastic cable ties are not to be used as a primary means of support.

Where landscape orientation of PV panels is called for because of roof topography, installers should look very carefully at the lead lengths, as these are often relatively short and designed for the usual portrait orientation.

This can lead to excessive time, as well as materials, to splice in extra conductors. To prevent kinking and compromising conductor life, the minimum bend radius of solar cables should be observed. Over-bending of a conductor can cause excessive heat at the bend and stress on the connection. This also increases conductor resistance.

The importance of good quality connectors cannot be overstated, particularly because cheap counterfeit versions of the well-known MC4 connection system are available. You indeed get what you pay for.

MC4 connectors (named for the original manufacturer, Multi-Contact USA) are single-contact items designed for DC connections. The MC4 system allows strings of panels to be easily constructed by pushing the connectors from adjacent panels together by hand. However, a tool is required to disconnect them to ensure they are not accidentally disconnected when the cables are pulled.

The MC4 system and compatible products are common in the solar market today, equipping almost all solar panels produced since about 2011.

In short, the use of the correct protection gear, conductors and conduit is essential for solar PV rooftop installations capable of withstanding the rigours of weather, sun, vermin, dirt, etc.

Complete installation kits are available, but installers are well advised to study the requirements of intended installations. Sketch plans should be done, with indications for conductor length, connector location and, where appropriate, junction boxes and isolator switches. ■

**The speed of opening contacts is less critical in AC than in DC circuits.**

# 10 dumb myths of solar installers

**The solar installation industry is rife with legends and stories, many of which are unfounded. Matthew Wright of Zero Emissions dispels 10 of the most common myths surrounding the industry.**

I've been arranging the installation of a number of solar systems lately. And I like to do them big (the efficient option); I like to get them for the lowest price (within reason, because I want a good job with reasonable quality components); and, I like to make sure the economics are understood and that customers are maximising self-consumption while recognising economic value for their exports.

But most importantly to me, I really want the environmental outcomes that come with installing as much solar as possible, displacing both fossil gas burnt on-site and coal and gas-fired power generation from the grid.

In pursuing those aims, I've run up against a few myths I get from solar installers that, frankly, have me flummoxed.

I want to buy product off them. I've worked out the solution and then I'm told, 'no you can't'. In almost every instance – with much hard work – I've managed to convince them it's just not true, got the system I wanted installed and, ultimately, proved the myth wrong.

Here's my list of the top 10 solar installer myths. It's not complete but it covers the main myths.

### 1) THE 'SOLARGEDDEN' IS COMING BECAUSE THERE ARE ALL THESE DODGY INSTALLATIONS OUT THERE FROM FLY-BY-NIGHTERS

Now, I've heard of all these dodgy installs but haven't really come across too many. I know that in my case I haven't had anyone try to sell me a stupidly built solar system. My problem is the opposite: installers are foregoing revenue and profits because they won't sell me a perfectly good solar system even though I've modelled it up using the same software they use and I understand exactly how the production will pan out and can relate that to the demand profile of the customer (which I also know).

### 2) YOU CAN'T INSTALL PANELS FACING EAST AND WEST

This one's a goody, installers vying to sell north-facing panels only. Fortunately, it's mostly been solved. With the self-consumption of solar generation paying three times more than exports, the light bulb has switched on that losing 10-15% of annual production to gain even more in self-consumption is worthwhile.

### 3) THERE MUST NOT BE SHADING OF THE SOLAR PANELS

OK, say a system might experience some shading for some section of the day, say the afternoon – what's the consequence? Some derating with reduced power output, but the system doesn't blow up and isn't damaged. If the shaded panels are facing north the derating could be as high as 15% and the amount of power output would still be as good as an unshaded west or east facing system which installers, for the most part, now thankfully happily sell.

Obviously, if you can give a customer a good sized system while eliminating shading or minimising it, that is a first preference. But then again you don't want to plunk the panels lazily in the middle of the roof, which might crowd out the roof space so the customer can't add more panels in the future.

### 4) PANELS SHOULD FACE WEST

This one comes from our friends in the incumbent power business establishment and is rubbish. Systems should face any way that maximises production and benefits the customer. So if a customer isn't home in the evening, then western facing panels may not be of that much benefit in lowering their personal power bill via maximising self-consumption. Although I think west-facing panels are perfectly fine for most people, it's not a law that anyone should be following religiously.

If power distributors want to run around pushing this myth on the solar industry and customers alike they could offer additional feed-in-tariffs to encourage it. But they don't.

The power companies are just spreading FUD – fear, uncertainty and doubt – to make people feel like they're doing something wrong or unfair as a result of their north or east facing systems. Yet these people have invested their own money to help fight climate change and contribute to reducing wholesale power prices to the benefit of other customers and to the detriment of polluting fossil fuel power stations. This is something to feel good about.

### 5) YOU CAN'T PUT PANELS FACING SOUTH

This one's a biggy. I was previously in the trap also of criticising systems that were oriented south, south-west or south-east.

Actually they're great. They're great if the north, east and west already have panels, as they help enhance self-consumption of solar output. They're also great if installing on the northern roof is complicated and would necessitate a very expensive install. If you were comparing, say, a system on the north costing $1.30 or more per Watt due to complications (split arrays, need for DC optimisers/micro-inverters), but could get a system in for $1 per Watt on the south, then the financials end up about the same and you could conceivably afford to install 30% more panels on the south that would make up for the loss of power output.

The south facing system is also a good match for self-consumption in summer. And in diffuse light (when it's cloudy) it should contribute as much as a north facing panel. That's assuming 5-30° incline on the south facing roof in Melbourne. As you go further north from Melbourne, the option of installing on the south gives better and better results. >

### 6) CHINESE PRODUCT IS RUBBISH

The myth here is that apart from Trina, Yingli and Suntech, everything out of China is cumbersome, performs badly and will be up for warranty claims within a few years of being installed.

Let's remember that Chinese inverter manufacturer Growatt is the company that has the largest share of the Australian market when it comes to inverters. They had some issues in a prior run of inverters that got swapped out under warranty, as you should expect, yet everyone in the industry seems to be using that done and dusted story from the past as a model (but poor) case study of why Chinese inverters and other products are no good.

There's also a bit of irony in the rubbishing of all Chinese inverters because, as I've discovered, Growatt inverters for instance have better power monitoring than some of the leading brands, with five minute interval data available showing the performance of the array or arrays attached to each individual MPPT (this stands for maximum power point tracking – it is essentially the computer smarts of the inverter which optimises the power output from a group of panels given varying sun conditions). Some well-known German brand inverters can't give you monitoring of each of your arrays though their manufacturers have promised it's coming .... so is Christmas.

### 7) YOU SHOULDN'T PUT ON MORE PANEL CAPACITY THAN THE OUTPUT OF YOUR INVERTER (OVERSIZING IS BAD)

Let's be straight – it's better economics to oversize the amount of panel capacity relative to the inverter. All systems should be oversizing 150% panel capacity to inverter output. Unfortunately, the Clean Energy Council (CEC) guidelines undermine good solar system economics. They currently only allow 133% oversizing of arrays, after which you forgo eligibility for the government STC rebate.

However, provided you are prepared to do the project in two passes, claiming the STC rebate only for that capacity up to 133% of the inverter capacity, this is entirely legitimate. Most importantly it can be done safely and within electrical codes and regulations.

Yet, what's even more ridiculous is that many installers come up with arbitrary constraints that they'll only do 15% oversizing on the north. Others even incorrectly claim that you're not allowed to oversize and it wouldn't get past the electrical inspector/authorities.

Oversizing changes production over the day from a bell curve to a table top (much like an intermediate power station) which is better for solar owners by maximising self-consumption, but also customers without panels and the network operators.

### 8) THE ELECTRICITY NETWORK DISTRIBUTOR WON'T ALLOW OVERSIZING BEYOND THEIR INVERTER SIZE LIMIT

Wrong again for most network distributors. Yes, Ausnet in Victoria has this stupid rule and they should hire some electrical engineers with competence to help them out. But Citipower/Powercor, Jemena and United Energy in Victoria all allow oversizing, as do network operators in WA, SA, Queensland as well as some distributors in NSW.

So if distributor Jemena says you can have a 10kW capacity inverter installed on a single-phase then as long as it's compliant with Australian Standard 4777 you can attach panels with capacity of 13kW, 15kW or even more. Also by not going beyond a 10kW inverter you slip in under their rule of automatic pre-approval

### 9) FRAMES SHOULD BE USED TO ENSURE PANELS ARE OPTIMALLY TILTED TO THE NORTH

No, this is old thinking. Adding the cost of 20 or 30 cents per Watt to a system that costs $1.00 per Watt so the the panels are ideally tilted to eek out every bit of output from a panel is a complete waste of money. With the exception of completely flat roofs where build-up of dirt and grime will be a real problem, flat racking is the go. If space permits, you could instead install 30% more panels for the same price as using tilt framing. Better to install more panels than frame – because that creates economies of scale and brings the cost of panels down in the future!

### 10) YOU CAN'T SPLIT ARRAYS ON DIFFERENT INCLINATIONS

Yes, it can be done. Sure there is a loss of output (in technical speech, a cosine loss leading to voltage mismatch dynamics because of different MPPTs within the series strings) but this must be balanced against other benefits in, say, reduced installation cost and the ability to fit more panels on a roof. The CEC guidelines say a maximum of a 5% difference in inclination, yet most installers won't even do that. In reality the guideline should be scrapped or increased to a higher figure more like 15%, as long as the consequences are understood and explained to the customer and the economics of a larger system outweigh any losses per capacity invested.

### PLEASE BURY THESE MYTHS FOR EVERYONE'S BENEFIT

By burying these myths, Australians will be able to buy a lot more solar panels, benefiting from economies of scale and availability of roof space. Electricians on the other hand who get on board can make a healthy living helping Australians realise their dream of more solar panels; the environment benefits, the nation's grids don't have to max out close to their peaks anymore and customers will be ready for their next purchase of energy efficiency, more solar and batteries.

Myths aren't good for solar, good for customers or good for installers – so let's bust and bury them. ■

*Matthew Wright is executive director of Zero Emissions Australia, technical director at Efficiency Matrix.*

# Lighting Recycling

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with **Chris Halliday**

# Protection convention


**In the first part of this two-part series, Chris Halliday looked at the more obscure but nevertheless important types of protection. He now examines the conventional forms.**

A safe and reliable electrical installation depends on overcurrent, short-circuit and earth leakage protection as required by the Wiring Rules.

This comes at a cost to the customer, but inadequate protection will have serious implications for those using the installation if something goes wrong – and for the electrician responsible.

Let us look at Wiring Rules requirements for the three types of protection mentioned.

## OVERCURRENT PROTECTION

This seeks to automatically disconnect the supply if an overload or short circuit occurs (Clause 2.5.1).

Either situation could cause injury or damage due to excessive temperatures or electromechanical stresses in the installation.

Protection these days is more commonly provided by circuit breakers, and with some use of high rupturing capacity (HRC) fuses.

However, the days of the rewireable fuse are long gone. Electricians should always seek to replace rewireable fuses, using a residual current breaker with overcurrent protection (RCBO). This will help to ensure safety and perhaps save a life.

Electricians can never know how many lives are saved by their work, but those they fail to save can be easily tallied.

## OVERLOAD PROTECTION

This must be sized so that it is no larger than the maximum demand of the circuit or the continuous current rating of the conductor (Clause 2.5.3.1).

It doesn't necessarily have to be at the start of the circuit (Clauses 2.5.3.3). It can even be omitted in certain circumstances, such as where there is a fixed load not capable of causing an overload, eg: a heating appliance (Clause 2.5.3.4).

That also means the load must be suitably matched with the cable and does not negate the need for short-circuit protection.

## SHORT-CIRCUIT PROTECTION

A short-circuit current must be interrupted to prevent the conductors becoming too hot, and to limit electromechanical forces.

The designer or electrician must know the prospective short-circuit current at the protection location (Clause 2.5.4.1). This can be determined by calculation. However, the easiest way for an electrician to obtain a value is to measure the level using a loop impedance tester (most loop testers are capable of measuring the prospective short-circuit current).

The circuit breaker or fuse used must have a kA rating greater than the calculated or measured prospective short-circuit current at that location (Clause 2.5.4.5).

The Wiring Rules allow for two situations in which short-circuit protection doesn't have to be at the start of the circuit or a reduction in size of the current-carrying capacity of a cable (Clause 2.5.4.3).

The first is where the length of the circuit is less than 3m, it is mechanically protected, the risk of short-circuit is reduced to a minimum, and it is installed in a way that minimises the risk of fire or other danger.

The second is where the short-circuit device is upstream of a reduction in cross-sectional area or other change, but the protective device must protect the smaller conductor.

Short-circuit protection can even be omitted in certain circumstance (Clause 2.5.4.4) such as: >

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- when isolating the supply is more dangerous than the short-circuit;
- where consumer mains are installed in accordance with Clause 3.9.7.1; and,
- between generators, transformers, rectifiers or batteries and their associated switchboard.

However, strict conditions are detailed.

The installation of current-limiting fuses is one way of controlling the available fault energy at a particular location. Downstream protection may then be rated lower than normally allowed (Clause 2.5.4.5 [a]).

## CO-ORDINATION

Co-ordination of protective devices is important to ensure safety and minimise the extent of the outage.

We don't want to isolate parts of the installation that are not involved in the fault (see Clause 2.5.7.1 on the reliability of supply). To this end, the Wiring Rules provides guidance on co-ordination (Clause 2.5.7.2).

**Inadequate protection will have serious implications if something goes wrong.**

## RESIDUAL CURRENT PROTECTION

Residual current device (RCD) protection seeks to prevent earth leakages posing a substantial risk of electric shock.

Such protection came to prominence in NSW in the 1970s with earth leakage circuit breakers (ELCBs) being installed on an installation-wide basis. This was problematic and we have seen RCDs become cheaper, more reliable, generally installed on separate circuits, and with increased focus and usage as specified by the Wiring Rules.

I have written extensively on RCDs previously and will briefly sum up the requirements of the Wiring Rules.

The Wiring Rules have been adapted to prevent nuisance tripping by including Clause 2.6.2.1 and 2.6.2.4, which state:

- leakage currents are recommended to be less than one-third the RCD tripping current;
- the number of socket outlets and the nature of the equipment likely to be connected to the RCD is to be considered;
- there will be no more than three final sub-circuits per RCD; and
- if there are more than one final sub-circuit, a minimum of two RCDs must be installed.

Lighting circuits are to be distributed across circuits where there are more than one RCD and more than one lighting circuit.

A Type S, 100-300mA RCD is recommended as a main switch in domestic installations to help prevent electrical fires caused by current leakage across insulation (Clause 2.6.2.3). If it is good enough for the Wiring Rules to recommend this, then it is good enough for you to recommend as well.

Clause 2.6.3.1 specifies that in residential installations RCDs be fitted to final sub-circuits supplying one or more socket outlets, lighting points and directly connected hand-held equipment.

Clause 2.6.3.2 specifies RCDs in "other installations" for final sub-circuits supplying socket outlets not exceeding 20A, lighting not exceeding 20A and directly connected hand-held equipment.

Workplace health and safety legislation may override the Wiring Rules requirements for "other installations" in which an RCD is not required for socket outlets rated at 20A amps or greater, but they are used in hostile environments.

To ensure the safety of workers, an RCD seems to be a minimum requirement for any electrical equipment or situation.

For patient areas in hospitals, medical and dental practices, and dialysis areas – plus home care and 'self-harm' areas – the Wiring Rules refer the reader to AS/NZS 3003. This Standard has special installation requirements, including RCD protection, above and beyond the Wiring Rules. You will need a copy to ensure all additional requirements are fulfilled.

Gary Busbridge suggested in the Autumn issue of *Electrical Connection* that we will again see increased requirements for RCDs in the next revision of the Wiring Rules, with the installation of RCDs being required on all final sub-circuits.

## CONCLUSIONS

Overload, short-circuit and RCD protection that operates automatically is a must to ensure safety and prevent damage. Failure to adequately protect an electrical installation will place people within the installation at risk and the electrician will breach the Wiring Rules requirements and the law as Wiring Rules are called up in State-based Regulations.

RCBOs is the most common form of protection to cover overloads, short-circuit and residual current faults. RCBOs are recommended for all final sub-circuits and electricians should take every opportunity to replace rewireable fuses and circuit breakers with them.

Finally, protection options require a little thought and planning by the designer and/or electrician to ensure safety and to minimise the extent of the loss of supply if a protective device was to operate. ■

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# Producing safety

**Component safety is as big an issue as electrical system safety. Gary Busbridge asks whether we are as diligent as we should be.**

These articles usually deal with the safety of electrical systems; however, here's one about the safety of products.

It will all come back to electrical safety, but it's time to remind everyone in the electrical game just what to look out for regarding the products in our market.

We have heard a lot about non-compliant and counterfeit products, and they are certainly causing issues for all of us. Yet there are many other things to focus on in relation to safe handling or use of products.

Whether you are installing or using electrical items, it is important to understand the basics of product safety.

It starts with the electrician and the choice of product. I urge you to check the AS/NZS 3000 Wiring Rules, in which there's a clause aimed directly at product choice – and this is your responsibility:

### CLAUSE 1.7.1 ESSENTIAL REQUIREMENT

Electrical equipment, forming part of an electrical installation, shall be selected and installed to:

a) operate in a safe and reliable manner in the course of normal operating conditions;
b) not cause a danger from electric shock, fire, high temperature or physical injury in the event of reasonably expected conditions of abnormal operation, overload, fault or external influences that may apply in the electrical installation; and,
c) be installed in accordance with the manufacturer's instructions.

It can be argued that what you buy and where you buy can provide a safety net as to products and compliance. But are you being as diligent or vigilant as you need to be?

There are Standards for most electrical accessories in the market, and the manufacturer or supplier should be able to provide documentation to prove that the product has been designed, manufactured and tested to its specific Standard.

More than 50 'prescribed' articles (usually referred to as 'declared articles') need to have an approval certificate and number – meaning an approved test laboratory has verified that a product is compliant. This must be done before the articles can be marketed in Australia.

Prescribed or declared means each state has gazetted that such products gain approval as a matter of law. The most common examples are socket outlets, switches, residual current devices and miniature circuit breakers, but there are many others.

All other accessories or appliances may be covered by specific Standards. If they are not, then AS/NZS 3820 *Essential Safety Requirements* has to apply.

If you have doubts, then protect yourself by asking the supplier for documentation on your purchase to verify that it meets Australian Standards. This is called a 'declaration of conformity'. If the supplier can't provide it, then the product has not been tested for compliance.

From a liability perspective, choosing and installing safe and approved equipment is another form of protection for you. Look on the product for the Regulatory Compliance Mark, which indicates compliance.

Sometimes what seems to be safe is less than perfect and can catch you unawares – for example, the floor boxes used in many commercial installations.

For a long time we have accepted the method for bringing flexible cables and data cables out of the box into the room space. Of course we all expect that the user will bring those cables through the little hatch in the lid, as designed, thereby providing a safe product.

But you've probably seen what actually happens: the cables come out at all points of the box, and not where intended. Those that don't come out of the hatch are prone to slicing and damage when the lid is closed or when a heavy weight descends on it.

Given the combination of electrical cables and metal floor boxes you can appreciate the risk of electric shock if the cable is sliced open. Our trade unions issued a warning on this very problem some time ago, as it is a workplace health and safety matter that concerns us all.

When buying floor boxes for an installation look for the product that has a way of protecting the cables no matter how the cable comes out of the box. The closing of the lid in itself should guide the cables into safe egress positions without any damage.

Safe, clean switches and socket outlets – that's what installers and users want. Well, have you ever seen the effects of detergents and cleaners on the plastic mouldings? These materials can cause cracking of the wall plates and switch actuators. This can lead to a severe breakdown of the plastic and may expose live components usually hidden well away from prying fingers.

Fortunately, the initial cracking is highly visible, which means the item can be replaced before any harm arises. For that reason, all reputable manufacturers recommend that the plastic be cleaned with a 'soft damp cloth' – and no detergents or cleaners.

Speaking of chemical attack, many of you would know the effects of certain chemicals on industrial switchgear and control gear. This is especially important in the food industry where detergents and cleaners are used with

very hot water at very high pressures. These are some of the most severe conditions that a simple switch and socket outlet will be exposed to.

It is crucial to choose appropriate industrial switchgear made from materials specific to the application. There is no single plastic moulding material that can withstand myriad attacks from chemicals such as caustic and petroleum products. Speak with your supplier and get the product in the correct moulding material for your installation.

On the same theme but a different product, antiseptic hand gel as used in hospitals and clinics may be a problem for moulding material. One report concerns a hand gel dispenser next to a light switch, and allegedly a couple of shocks have been received from the switch. Initial investigation by the contractor showed that residue from the gel on the wall plate and switch actuator was conductive.

Further investigation is needed, but this is a word of warning. Hand gels have become popular for everyday use at work or play, and this may just be a problem in the making for manufacturers, installers and users.

I will finish off with a non-compliance issue that rattles my cage.

Many of the new entrants in the market have moulded items that are copies of a reputable manufacturer's grid and removable cover design.

My concern is that the mounting screws of some newer products are accessible to prying fingers if the cover is removed. These covers are intended to be removed for decoration or colour replacement. If the cover is not reattached to the grid, the situation is potentially unsafe.

The mounting screws protrude directly into a space behind the walls that can be occupied by single-insulated cables … live cables. If a screw penetrates the insulation, it becomes live and can be touched inadvertently when the cover is off.

Check out the reputable manufacturer's products. There are deep recesses or caps over the heads of the screws to protect against inadvertent contact.

State regulators are now investigating the newer products because of the mounting screw problem.

So be diligent in relation to safe products and installations, and promote similar diligence among your customers. As we know, there are no short-cuts to safety. ■

# The bright lights of Korumburra

**Walker Electrical Contracting has completed its largest ever job by upgrading the lighting system at the local footy club.**

**When his local footy club needed a lighting overhaul, Mat Walker made sure he got the job done right. Jacob Harris shines a light on the situation.**

When the Korumburra Bena Football Netball Club needed a $300,000 lighting upgrade, the club committee decided the best bet was to hire one of their own. Mat Walker of Walker Electrical Contracting is a life member, sponsor, senior player and junior coach at the club and as such was well placed to achieve a great outcome for everyone involved.

"The concept for the lighting project actually started about five years earlier. One of the existing underground cables to a light tower had shorted out and, being a mineral insulated metal sheathed (MIMS) cable that was buried under concrete and asphalt, repairing it was going to be extremely costly.

"Instead, we made a three phase lead and plugged the tower into an outlet 40m away. This was meant to be a temporary fix but we ended up using it for about four years," says Mat.

This setup provided the football oval with a dim 20lux at the brightest point. Add the fact the netballers had no outdoor lights whatsoever, and there was a compelling argument for a complete overhaul of the club's lighting.

Unfortunately, the club committee didn't think they could find the resources to fund the whole project, so Mat advised them that the best way forward was to install new infrastructure to the damaged pole and then have further lights added to it when funds became available down the track.

But when the committee began looking into avenues for funding, they met South Gippsland Shire's grants officer Penni Ellicott, who suggested the club had a reasonable chance of getting the whole project done at once.

Walker Electrical sought the advice of Pierlite and a lighting layout was put together. Then, after securing funding from the state government, the local shire and the club itself, the project was put out to tender.

"We had already invested a lot of time and effort in the project, so we were really keen to gain the successful tender," says Mat.

They got it alright but that was just the beginning: this was going to be a big job for a small team.

"Because this was the first project of its kind that we had undertaken, the prospect was undeniably daunting. This was compounded by the fact that when you're working in a small town everybody is watching your every move," says Mat.

"I was confident I had the electrical knowledge and the team to get the job done. The biggest challenge was going to be managing the project while running our day-to-day business."

The project included: two hinged 12m netball towers; two 25m and two 30m football towers (there was an embankment on one side of the grounds so two different sized poles were used to achieve a uniform height of 30m); four 1kW Pierlite Optivision floodlights; 40 2kW Pierlite Optivision floodlights; a mains upgrade of 250A three phase; a new group metering and a CT chamber; and a new three phase netball court supply.

Mat's team ran a 10-pair control cable to each tower to enable individual control of light tower switching, and installed control cabinets at the base of each tower for the lighting control gear. This greatly improved accessibility for future maintenance tasks, as well as providing access to mount general use power outlets.

A programmable logic controller (PLC) was installed to achieve greater switching control, and to achieve the three stages of lumen control (50lux, 100lux and 200lux) the project required. Walker Electrical also had the lights run through PLC timers to avoid massive inrush currents. Now, if all the switches are turned on at once the lights will progressively run through their sequence and turn on systematically.

**The new lighting system increased light output tenfold, from 20lux to a possible 200lux.**

"We encountered some unique challenges on the job," says Mat.

"The heights you have to climb to when aiming the lights take a bit of getting used to. Also, because the ground is a public venue, we had to allow for public access throughout the job. This meant barricading the areas we were working on, and closing all the gates during the erection of the towers."

The job was the biggest ever undertaken by Walker Electrical Contracting and got Mat and his team listed as finalists in NECA's 2014 Victorian Excellence Awards. But the bright lights of Korumburra haven't changed things too much down at Walker Electrical, Matt's just glad they could help their local club and add another satisfied customer to their list in the process.

"Our company has changed only in the valuable experience and confidence gained from the project. We are still just a small firm of six trying to the best job we can - no matter what size the job." ■

# AFL acquires AFC

**AFL's global presence grows with the acquisition of AFC Group, one of Australia's largest fibre optic manufacturers.**

In 1984, AFL started off with just one product: optical ground wire. Over the past 30+ years, it has expanded that range significantly and now offers almost everything anyone could need to connect up telecommunication or infrastructure cabling. Products include transmission and substation accessories, outside plant equipment, connectors, fusion splicers and test equipment, among many others.

AFL currently works with market-leading communications companies providing support for inside plant central office, EF&I, outside plant, enterprise and wireless areas. It caters to diverse markets including mining, nuclear, oil and gas, avionics, renewable and transportation. In addition to developing its products and markets, AFL has also spread globally, recently cementing its position in the Asia Pacific market with the acquisition of Melbourne-based AFC Group.

AFC has a complementary history. Founded in 1992, the company was built to provide more than just fibre optics; it wanted to provide a service that made connecting Australians with the world both efficient and easy. Two decades later, the company possesses a wealth of specialist experience and extensive technical knowledge. It designs, manufactures and integrates fibre optic communication solutions right here in Australia.

In May, AFL announced it had acquired AFC.

"AFL is truly excited to have AFC as part of AFL. During our initial discussions, it was clear very quickly that AFC was a special company. AFC's impressive team of professionals has consistently delivered exceptional quality and innovative solutions to their customers," says AFL cable and connectivity EVP Kurt Dallas.

"From a cultural perspective, AFC and AFL are a terrific match. This acquisition better positions us to expand our customer reach and capabilities. We have delighted to join the AFL," says AFC founder and CEO Tony Macleod.

It does appear that the two companies have a lot in common and their goals are closely aligned. Both place a lot of value on serving their customers' needs and using innovation to meet these.

Prior to acquiring AFC earlier this year, AFL already had a presence in Australia, having provided products to the power utility market for the past 20 years. In 2013, AFL strengthened this position with acquisition of Optimal Cable Services, a local fibre optic cable manufacturer. The addition of AFC rounds out the offerings from AFL, which now includes fibre optic cable, fibre management systems, fibre assemblies and fibre enclosures, as well as splicers, test equipment, and communication network products.

AFL will continue operations in AFC's existing facilities, including Melbourne, Sydney, Perth, Brisbane, Canberra, Adelaide, Auckland and Hong Kong, as part of its plan to provide differentiating and innovative solutions throughout the Asia Pacific region. ■

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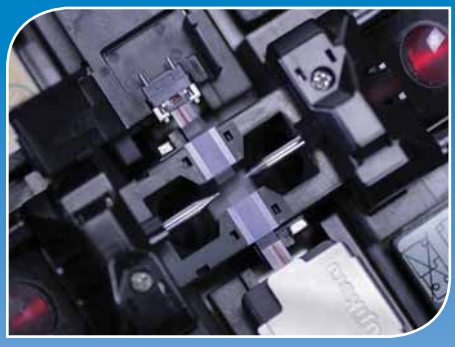

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# Fibre – with a twist

**Network providers bringing high-speed communications to multi-dwelling units have a noise issue to resolve. Ian Millner explains.**

The talk goes on and on – FTTN, FTTB, FTTxxx – and we wonder whether we should care, what we need to know and what we can do.

This is probably in the minds of many cablers when they hear or see information flying backwards and forwards about the National Broadband Network (NBN).

The NBN is rolling out more slowly than most of us would like, and most of us are keen to get it. We know it will be rolled out using a range of technologies.

With the technologies being deployed you will get much higher speeds than at present, so the technology is not so important.

The problem lies in apartment buildings and townhouse complexes – or as the industry calls them, multi-dwelling units (MDUs). An MDU may have two or more network service providers operating from different locations.

To start, it is important to understand how telecommunications services are currently delivered to an MDU using the existing copper network.

Figure 1 shows the copper cable from the telephone exchange to a pillar on the street, and from the pillar to the main distribution frame (MDF) in the building. This copper is owned, operated and maintained by the carrier.

Copper cable then runs from the MDF to telephone outlets in each apartment. This customer cabling belongs to the owners corporation (body corporate), which operates and manages the common property. Fibre to the node (FTTN) and fibre to the building (FTTB) will connect to this existing copper cabling (Figure 2).

FTTN will most commonly be connected to existing pillars in the street, and FTTB is connected to the MDF in the building. If Provider A wants to connect to the pillar it must have an agreement with the owner of the copper network in the street (Telstra in Australia) in addition to other approvals and authorities.

If Provider B wants to connect to the MDF it will need permission from the owners corporation to install equipment in the building and add a cabling termination module to the MDF.

From a purely mechanical perspective these solutions seem to be able to coexist. Unfortunately, from a technical transmission perspective, there are issues involving the vectored VDSL (very high bit rate digital subscriber line) technology used for FTTN and in some cases FTTB.

The biggest challenge in transmitting high-speed data on the existing copper cable is the noise generated by the signal. The twisted copper cable used for telephony behaves more like an antenna as the signal frequency increases.

When all that was transmitted on a telephone cable was the plain old telephone service, then the highest frequency was 4,000Hz. With Vectored VDSL the highest frequencies being pushed along a twisted pair can be as high as 30MHz. At such high frequencies the twisted pair cable is a very good antenna and radiates these signals.

Figure 3 is a closer view of the twisted pair that runs from the node to the modem in the customer's dwelling. It shows the noise from one pair, but all pairs will be emanating noise. Because this twisted pair is such a good antenna, it radiates the signal it is

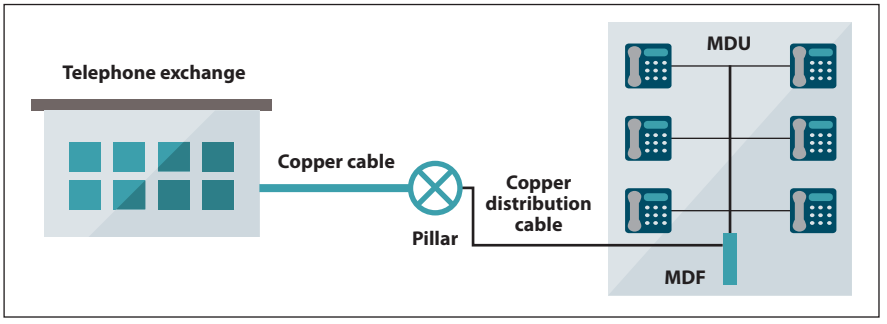



**Figure 1.**

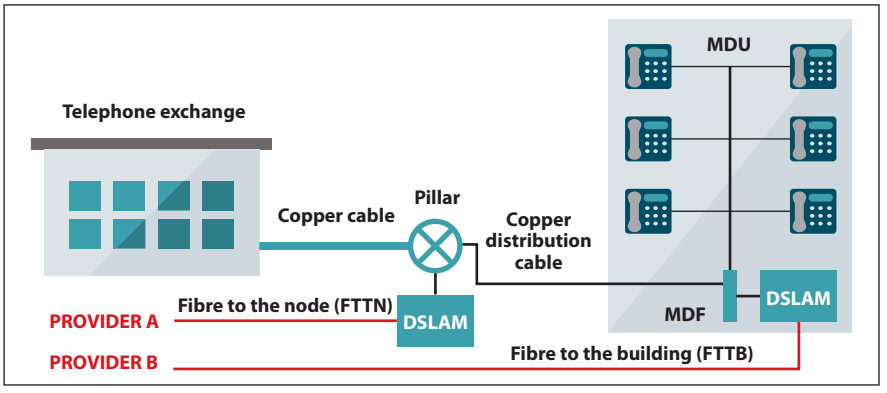



**Figure 2.**

transmitting and receives the signal from adjacent pairs as noise.

So here's the clever thing with vectored VDSL. Engineers know how much noise is being broadcast by adjacent pairs, so they can cancel it at the receiving end. This works because most of the noise when transmitting vectored VDSL comes from adjacent pairs that are also carrying vectored VDSL signals.

The problem is when noise received by the modem comes from an external unknown source. Figure 3 shows noise from an external source being induced into one pair. This type of noise will have an adverse effect on the speed of the broadband service.

This is the challenge in a building with two sources of broadband – FTTN and FTTB. Figure 5 shows two digital subscriber line access multiplexers (DSLAMs). One is installed as a node connected to a pillar, and one is in the building connected directly to the MDF.

The building has a DSLAM, which is shown as supplying three broadband services to different apartments. The noise generated by Provider A's services cannot be cancelled by Provider B's equipment, as it is 'external noise', and vice versa.

Consequently the services can be substantially degraded, leading to loss of the vectored technology's benefits.

Communications Alliance is working on this to minimise the degradation, but it is generally accepted that two providers sharing a cable binder will result in lower data rates.

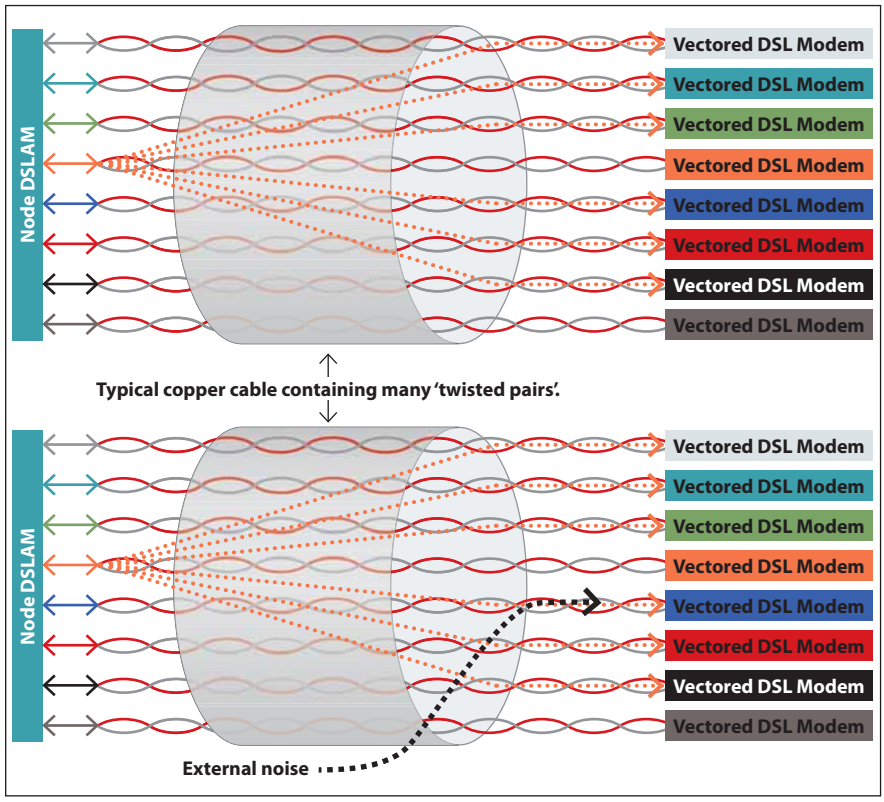
Should the owners corporation give a provider permission to install FTTB, as this may affect overall performance? It's a tough one. Getting high-speed FTTB now rather than FTTN at some future stage could seem very attractive.

The questions to the FTTB service provider are:

> What range of retail service providers (RSPs) will be available to occupants via your network?

> What guarantee can they give the owners corporation as to service levels when FTTN is rolled out?

Note that FTTN and FTTB network providers are limited to providing the infrastructure. Occupants then need to contact the RSP to get broadband or other services installed. ■




**Top: Figure 3. Bottom: Figure 4.**

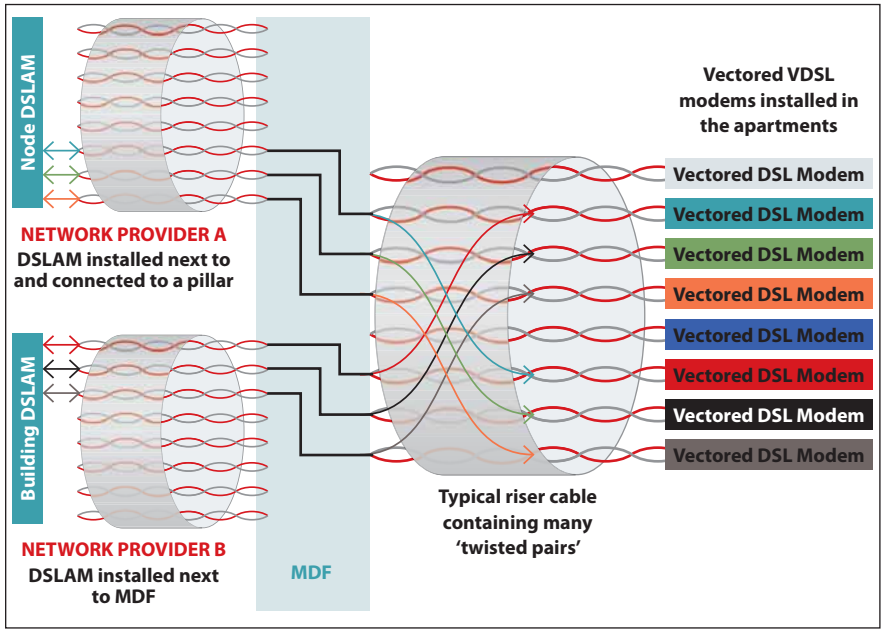



**Figure 5.**

with ???

# The panel game

**Maintaining solar systems can be a good source of business and customer peace of mind, writes The Shadow.**

The maintenance of domestic solar photovoltaic systems is a neglected area.

It's an area in which a business-like approach to householders might give a skilled person the chance to render a service and make some money.

On the economics – other than 'grandfathered' feed-in tariffs of about 60c/kWh – a 12-panel installation will potentially earn about $600 a year, or reduce the energy bill by that much.

Battery storage could substantially increase these savings. Based on a period of 20 years, the savings for a non-storage system are about $12,000, but with a drop in installation efficiency this would come down dramatically.

The owners might imagine themselves doing the planet a favour, but they would not be doing that very effectively or see an economic benefit.

A check-up every two years might be annualised at $150 for labour, and installations more than four years in service would be candidates.

PV panel and inverter efficiency is the main aspect to consider. PV panels degrade, and manufacturers' specifications state the fall in efficiency over time. The inverter does not degrade slowly over time, but it can suddenly lose conversion efficiency. Householders wouldn't be aware of this, except maybe when the electricity bill arrived.

Other problems that can occur with grid-tie inverters may require grid voltage monitoring, as inverters are allowed to operate only within a voltage range of 204V to 268V. This is a particularly nasty problem in relation to the upper voltage limit, when inverters cut in and out because of voltage spikes. It is an 'unseen' problem in that the inverter is sound but little or no energy is being fed back to the grid.

This is not directly a service problem. However, by doing a test on an installation – particularly one in a street of PV installations where the problem is likely to be prevalent – a contractor can alert the owners to contact their energy distributor.

Sudden failures are quickly checked by testing the inverter's AC output. Failure or degradation of the DC link is usually because of the electrolytic capacitor. There's not much to be done on the spot, but the inverter can be returned to the authorised service depot.

Panels sometimes degrade faster than expected. Thin panels are more subject to induced degradation than thick panels. Voltage across the cells with respect to the grounded frame causes a drift of sodium ions in the protective glass and affects cell performance.

Testing all this is 'hairy', but doing a rooftop inspection, armed with a DC tongue tester, will allow the DC power to be measured and can put the owners of the PV installation at ease that the panels are doing their job.

On the other hand, the failure of some cells on a panel may be apparent. Timely replacement of a panel or panels is very important and can be subject to renewable energy certificates being available to discount the panel cost.

In summary, the combination of a DC test and AC output test, of themselves not difficult to perform, will indicate the basic health of the PV installation. ■

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KEYSIGHT TECHNOLOGIES

with **Steve Arthur**

# Good for the environment, good for business

**Car park owners and operators can now install energy efficient technologies while helping their bottom line. Steve Arthur from Philips Lighting explains.**

Connected lighting technologies have transformed the way we light spaces and the way we engage with light within spaces. In recent times we have seen how connected wireless lighting has transformed homes and offices, warehouses and even our cities.

One application where new wireless connected lighting technologies is anticipated to make a notable positive impact is in the thousands of car parking garages in cities, shopping centres, apartment buildings, hotels and transport hubs across the country, many of which use conventional fluorescent batten lighting that remains switched on all day, every day.

Until recently for car park owners and operators wanting to reduce energy consumption, retrofit options have come with high installation costs and unavoidable complexities in turn impacting Total Cost of Ownership (TCO) or payback periods. This is in particular due to nature of re-wiring in existing car parks with concrete ceilings.

However, with the introduction of point-to-point, wirelessly-controlled LED lighting solutions from manufacturers including Philips, car park owners, operators and contactors now have a viable solution in comparison to fixed output fluorescent battens, that ticks the boxes – lighting plan flexibility, light source efficiency, switch and light control possibilities, ease of installation and commissioning.

**Car park owners, operators and contactors now have a viable solution in comparison to fixed output fluorescent battens, that ticks all the boxes.**

## DESIGNED FOR EFFICIENCY AND CONTROL

There are two key design aspects that differentiate the latest batten lighting options for car park lighting from common conventional car park lighting; luminaires are designed with inbuilt sensors for occupancy and daylight detection, and wireless capabilities for additional functionality and controllability*.

## OCCUPANCY AND DAYLIGHT DETECTION

There are busy times and quiet times in a car park environment but conventional lighting systems can't tell the difference; they are always 'on'.

With inbuilt occupancy sensors linked to controls, car park owners and operators are now able to, reduce overall car park lighting levels to, for example 30% during quiet times, until the movement of a vehicle or person is detected by a presence sensor. >


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When movement is detected, lighting levels can instantly return to 100% for clearer movement, while other areas with no movement remain dimmed in power saving mode, reducing energy consumption.

Daylight harvesting sensors ensure a constant lux level enhancing the visual experience of visitors while at the same time also reducing energy consumption.

## MESH NETWORK AND WIRELESS ZONING

Switching from conventional fluorescent battens to LED battens with controls in existing car parks has previously presented challenges, particularly as car parks typically have concrete ceilings.

With wireless capabilities built into individual luminaires, car parking spaces can be easily divided into specified 'zones of light' by carefully positioning presence detectors that are wirelessly linked to the luminaires near by so that lighting is effectively 'one step ahead' of pedestrian and vehicle access. This also means more energy conscious use of lighting as light is only switched on when and where it is needed.

As an example, the Philips GreenPerform batten with G2 Actilume Wireless, uses the ZigBee wireless communication protocol, which means up to 50 adjacent luminaires can be wirelessly programmed into one zone. It is important however to remember that the size, shape and location of zones should be designed to match the occupation and routing density of people and cars allowing optimum balancing of comfort and safety with energy savings.

## PLANNING IS KEY

When creating a wireless networked lighting plan there are a number of factors that need to be taken into account at the design stage.

## LUMINAIRE CONNECTIONS

The impact of blocking objects such as lift shafts with metal sidewalls, corridors, concrete beams and differences in ceiling heights that separate luminaires need to be considered when networking each light zone.

## LUMINAIRE POSITIONING

Where luminaires are mounted can impede commissioning so it is essential to allow for recommended distances between wall and luminaire.

## SENSOR POSITIONING

Where sensors are placed also impacts the success of a car park lighting installation. Whether a new build or retrofit, it is essential to analyse the car park area design and anticipated movements through the car park. Consider the direction of both cars and people throughout the area. This will inform how the area is to be lit, how lighting zones are to be created, how each zone is activated and how one zone flows to the next zone, and the next, around a entire car park.

## ZONING CONSIDERATIONS

When it comes to network zoning with wireless lighting there are essentially three layout options contractors need to know about depending on the needs of the application: 'flexible' layout, 'economical' layout or 'combinational' layout.

**> Flexible layout**

For car parks installations where complete flexibility in terms of both lighting and control is required, grouping and connecting only 'master luminaires' offers the best approach.

Installing all 'master luminaires' means that each luminaire can function as an independent connected unit. This also enables simple pairing or re-zoning by application can be done easily by the contractor as a commissioning service or by the end user.

**> Economical layout**

Where less flexibility is required, consider zones that incorporate one 'master luminaire' connected to a group of 'slave' luminaires to form a wireless connected unit.

**> Combinational layout**

A combinational layout incorporates wireless 'master luminaires', standalone sensors, wireless terminals and ZigBee controls woven in a connected lighting network. With this type of layout, grouping and re-zoning can be achieved without changing the physical connection between the units.

## A WIN-WIN LIGHTING SOLUTION FOR CONTRACTORS

Contractors today need to continually be on the look out for new lighting solutions that enable them to deliver greater value to existing customers and also expand their customer base.

With the introduction of wirelessly-controlled LED luminaires that offer a point-to-point retrofit replacement option for car park applications savvy electrical contractors will see this as a new business opportunity not only in replacing conventional luminaires, but also through the commissioning of each project.

To stay abreast of the latest lighting technologies contractors should regularly:

- Consult their local electrical wholesaler to find out about the latest lighting products and solutions; and,
- Visit industry and manufacturer websites, and ask about product training. Most manufacturers will offer training in system design, installation, commissioning (zoning) and ongoing support. ■

** Comparison to fixed output fluorescent battens.*

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# Leading international engagement in electrotechnology standards

**Standards Australia is the nation's peak non-government, not-for-profit developer of internationally-aligned Australian Standards. In his first column, national sector manager for energy and electrotechnology Varant Meguerditchian writes about the people behind electrotechnology standards in Australia.**

When you buy a new kitchen appliance, you are often told to look for a label or mark affixed at the back that says the appliance has been tested and certified to Australian Standards. It is a simple thing that accords peace of mind for many consumers, and many people and organisations have played a part to get that sticker on the back of your appliance. These people and organisations all form Australia's standards and conformance infrastructure, and we all have different roles to play.

## WHAT ARE STANDARDS?

In Australia, Standards are published documents based on consensus, which can take the form of specifications, procedural requirements, or handbooks. They are living documents which are updated to suit the changing needs of the economy and community.

Government regulators and public health authorities often turn to standards in their regulation to provide a baseline level of safety requirements for houses, buildings, machinery and everyday objects. Standards are everywhere in your daily life, from the buildings you live in to street lighting to the way your kitchen appliances work.

## STANDARDS AND CONFORMANCE SYSTEM IN AUSTRALIA

Standards Australia is a non-profit organisation that develops standards; we do not enforce, regulate or certify compliance with these Standards. What we do is to form technical committees on electrical standards by bringing together relevant stakeholders into the same room. Through a process of consensus, these committees develop standards and technical documents for Australia's net benefit.

We work closely with government regulators such as the Electrical Regulatory Authorities Council (ERAC), as well as the electrical regulators in the eight Australian states and territories, to develop electrical and electrotechnology standards.

Technical and safety electrical regulatory functions are largely the responsibility of state and territory governments (a full list of state/territory regulators is at www.erac.gov.au ). The technical regulators set the rules for electrical product safety requirements in each state. For example, if a manufacturer wants their product approved in the state of South Australia, they need to provide detailed test reports and certificates to prove their product has met relevant safety standards from a recognised testing facility. Only after receiving approval from an Australian authority will manufacturers be allowed to display regulatory compliance marks or labels on their products.

**Standards are living documents which are updated to suit the changing needs of the economy and community.**

## AUSTRALIA'S NATIONAL COMMITTEE TO THE IEC: LEADING ENGAGEMENT GLOBALLY

Many of these Australian Standards in electrical product safety, and other aspects of electrotechnology, are aligned with international standards. Recent adoptions of international standards this year include AS IEC 62271.4 *High-voltage switchgear and controlgear - Part 4: Handling procedures for sulphur hexafluoride (SF6)* and its mixtures, which is a modified adoption of the IEC standard to provide procedures for handling of SF6 during installation, commissioning, operations, and disposal at the end-of-life of high-voltage switchgear and controlgear.

The chief international body that sets electrotechnology standards is the International Electrotechnical Commission, or the IEC. Australia is represented through our National Committee to the IEC (AU NC IEC). Standards Australia holds the role of Secretary for the AU NC IEC and administers the activities of the committee.

Made up of key representatives from the government, industries, and testing bodies, this committee shapes Australia's strategic involvement in the development of international standards at the IEC. The AU NC IEC also deliberates on how best Australia can have its say on issues surrounding lighting and electric appliances, especially conformance issues in increasingly globalised manufacturing chains. The AU NC IEC also has the potential to provide strategic direction to Australian stakeholders on emerging key areas of interest, such as smart grids, electric vehicles, photovoltaic technology and the Internet of Things (IoT).

Australia is a participating member on 99 IEC technical committees and subcommittees, and holds observer member status on a further 55 committees, in areas as diverse as smart grids, radiation protection, lighting and solar. Australia is also represented on all major IEC governance bodies including the IEC Council Board (IEC CB), the IEC Strategic Management Board (IEC SMB) and the IEC Conformity Assessment Board (IEC CAB).

The committee has been instrumental in ensuring Australia is adequately represented internationally and the interests of Australian workers, businesses and government are advocated in the international arena. By ensuring Australia's voice is heard in the global conversation, the AU NC IEC forms a vital part of Australia's standards and conformance infrastructure. If you have any standards-related issue that you would like to see addressed globally, reach out to Standards Australia, and keep in mind the AU NC IEC is here to represent your interests. ■

> **Standards Australia**
> **www.standards.org.au**

# Just add water

**Think small-scale hydro generation is just a pipe dream? Think again. Kate Jordan looks at a new product from New Zealand that's making waves.**

From new-age hippies trying to get off the grid to farmers reducing their overheads, customers considering micro hydro power generation are a varied bunch. They all have one thing in common though: they're searching for a cost-effective, reliable and efficient small hydro generator – and a New Zealand company thinks it has the solution.

PowerSpout is a domestic-scale micro hydro generator. It uses a reconfigured Fisher and Paykel Smart Drive, is fully encased with no exposed moving parts and is capable of producing 1.6kW constant output around the clock. All it needs to operate is water running down a natural fall.

"Every site is different. It's all relative as to how much fall and flow you have and how much power we can get," says Australian PowerSpout silver dealer Darren Cooper.

Although this statement may appear incredibly vague, it's still a truism; a small amount of water flowing down a 40m drop can provide as much energy as a larger amount flowing down a 5m drop. That's why PowerSpout offers a custom service: each generator is made to order, in consultation with the property owner.

The first step is to use the calculator on the PowerSpout website.

"You enter the amount of water that you have available, the length and size of the pipe, and the specifications of your electrical cables if your generator is remote from where you're going to use the power. The calculator will then give you power at the turbine and power at your shed," Darren says.

**PowerSpout generators piggy backed to make the most of the available water.**

To ensure the client gets the most power out of their turbine, the purchasing process is quite consultative.

"Usually you have three or four conversations with people, about their site and what they're trying to do. The turbine is then built to suit the specifications entered into the calculator. There's around 300 different windings that can be put into the units, so it's all matched to the site specifications," Darren says.

There are three models available, each with a different rotor type, that are then customised to the clients' needs. The three rotors include the Low Head (made from stainless steel), the Turgo and the Pelton (both injected-moulded with glass-filled nylon).

While there are options for under 120V DC, all models above this require an electrician to connect it up.

The micro hydro generators have been installed all over the world, from New Zealand to Romania, and everywhere in between.

The technology can have multiple applications. As a single generator can produce 1.6kW with enough consistent water flow, it can cater to the average home's consumption. Generators can also be easily 'piggy backed', to produce more electricity from the same stream.

Darren gives the example of a sheep farm in Cressy, Tasmania. The farm already has pipe work in place for irrigation that runs down a 90m fall from the hills to the paddocks; the pressure from the fall ensures they can irrigate the land without the need for pumps. The pipes were only in use for three or four months of the year.

"We put a spur line off their existing infrastructure and got a water licence for 200ML of water over the winter. When they're not irrigating, we now use the hydro turbines," Darren says.

"They're getting around 6.5kW, around 150 to 160 kWh a day, and that goes back into the grid. When their contract runs out, we'll do some rationalisation and change the metering points, so the homestead, office, visitors' house, shearing shed and workshop will be able to consume the power from the turbines. They just sheared around 6,000-8,000 sheep and didn't use any power from the grid."

While Darren is quick to point out the benefits of hydro over solar – namely the ability to generate power 24/7 and the freedom from large batteries – he also acknowledges that hydro marries well with solar.

"Some people will only have sun for six or seven months of the year. They'll be fine in the summer, but in winter they can't get enough power, so they have to run a generator," he says.

The coupling of solar and hydro can reduce or remove the reliance on a generator and allow the owner to go completely off-grid.

Whether solo or in conjunction with solar panels, PowerSpout appears to have a lot to offer those interested in generating their own power. ■

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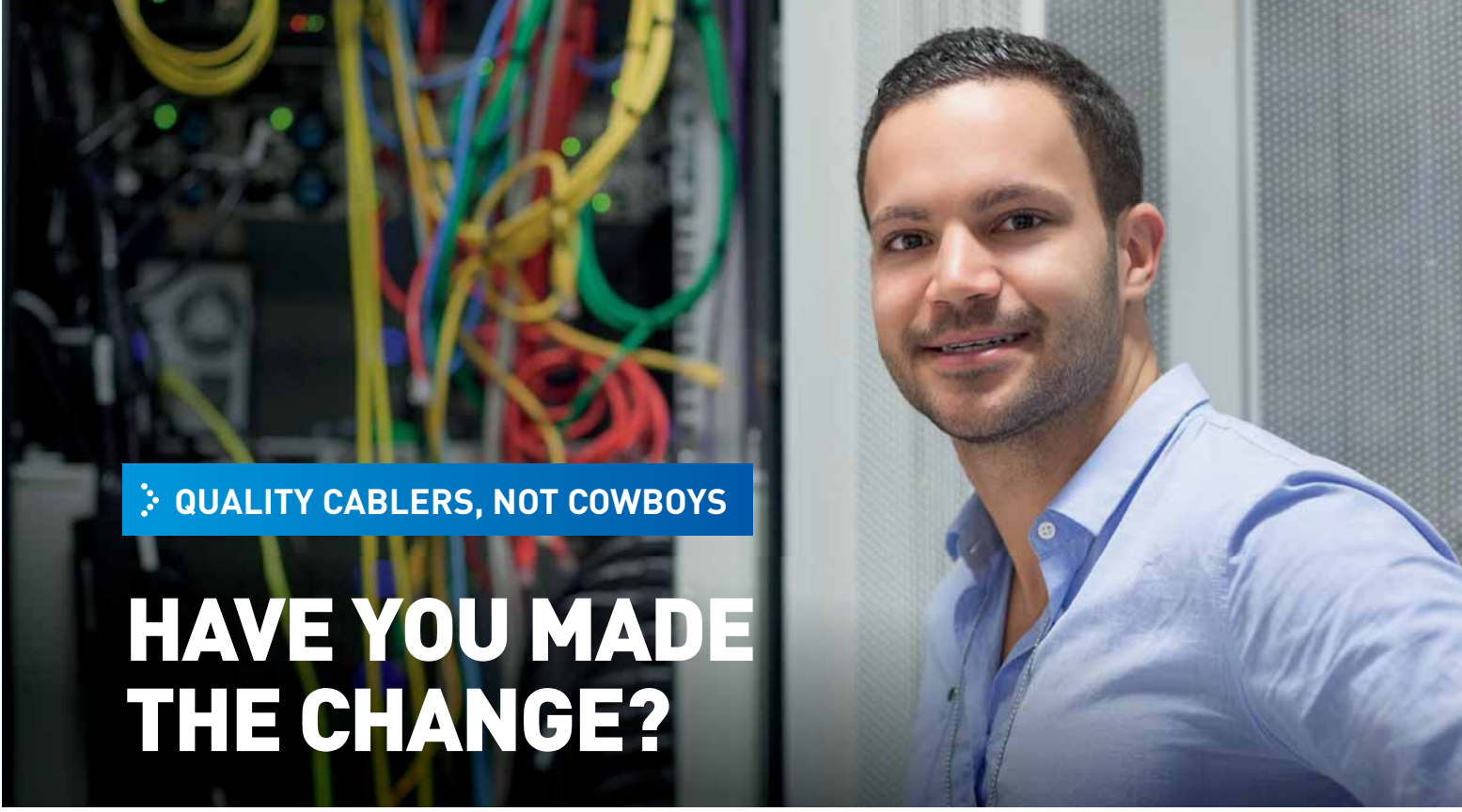

QUALITY CABLERS, NOT COWBOYS

# HAVE YOU MADE THE CHANGE?

The 2014 ACMA competency requirements for broadband were designed so that all cablers comply with the highest industry standards. TITAB, which is Australia's largest cabling registry, can update you on changes and also advise on any training you may need to comply.

## You must be registered

If you install or maintain telecommunications/ data cabling on customer premises, you must be registered – severe penalties apply for illegal work. Working without a registration may also affect your insurance.

Registration could also open up other broadband opportunities for you, as the NBN takes shape.

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# On the mark

**The Solar Gold Certification program is an initiative of the Australian Solar Council that aims to benefit installers, designers and end users alike. Jacob Harris explains.**

For some time, the Australian Solar Council (ASC) has been conducting audits of solar installations on behalf of the Clean Energy Regulator. Throughout this process, the ASC has recognised the need for ongoing professional development and training of solar designers and installers beyond the Council's standard accreditation requirements. To this end, the Solar Gold Certification program was born.

"The ASC launched Solar Gold with multiple objectives: to provide a readily available, online resource to help installers stay on top of compliance issues; to protect the reputation of the industry and ensure all work is of a high quality; and see to it that end users are able to easily access reliable services for their systems," says ASC program manager Laurie Kane.

The Council also sought to make it easy to identify solar installers and designers who are willing go the extra mile to maintain currency with Australia's constantly changing standards and regulatory environment. With new technologies frequently entering the market, and components like micro-inverters and power optimisers being refined and modified, the ASC places no small importance on staying up-to-date with developments in this burgeoning industry.

For installers, the benefits of certification (and displaying the accompanying Solar Gold Trust Mark) are manifold. The program provides leads for installers through their 'Find an Installer' look-up that features both on the ASC website and Solar Gold website. This helps to promote the installers the ASC endorses. In addition to this, the program hones in on a host of industry specific problem areas.

**The ASC has recognised the need for ongoing professional development and training of solar designers and installers.**

"We provide content on areas of the market we've identified as problematic or confusing, such as the different inverters on the market (including how to deal with transformer-less inverters) and the possible fault currents of different situations and different earthing conditions," Laurie says.

"The voltage rating of isolators can also be a cause of confusion because, depending on the inverter, the rating can apply to the isolator as a whole or can be calculated per conductor.

"DC isolators are another important issue as it's probably where most serious errors occur, particularly in terms of water ingress. There's also a lot of information relating to compliance issues."

For installers and designers to secure a Solar Gold Trust Mark, they must first undertake baseline training and then complete a compliance checklist. The initial training is comprised of seven online modules that can be completed at any time.

"Often it's about taking the Australian standards and regulations and demystifying them - giving some practical examples of what's expected and showing installers how to work to maintain those standards. A big part of that is effective communication and team supervision. On any given job, the accredited designer and installer are ultimately responsible for ensuring everything is up to scratch on site, so it's imperative they can clearly communicate those requirements to their counterparts," Laurie says.

Interested parties can register for Solar Gold Certification either as an individual or a company. In the case of company registration, all employees have access to information and training to promote a deeper understanding of issues and industry requirements company-wide. ■

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> **www.solargold.com.au**

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# A word from the CEO

This issue of NECA News focuses on the results of the 2015 Market Monitor – our industry's biennial market research, completed in July. This was the first time we had run the entire survey online and this led to a doubling of respondents over the last study. We also had more sponsors than ever before and we thank them for making this study possible. I will leave you to draw your own conclusions and I thank those of you who participated in the study.

I am also very pleased to be able to confirm dates for our industry conference in South Africa next year. The conference kicks off on Sunday 17 April with an informal braai (a local barbeque) and concludes on the Wednesday night with an open-air gala dinner. We have chosen to run the conference at a boutique winery in Stellenbosch – about 45 minutes from Cape Town.

The Market Monitor results are a great starting point for the conference content, and there will be a mix of presentations, panel discussions and workshops over the three days of the conference. We also have an exciting range of afternoon excursions – as well as pre- and post-conference options, to complete the African experience. See the NECA website for more details.

This is one conference no one should miss!

I hope you enjoy this NECA supplement.

Best regards
Suresh Manickam

# Market Monitor 2015: The results are in

The 2015 Market Monitor survey opened in mid-February to all states and closed on 24 April.

Due to the length of the survey, we gave the respondents the ability to progress through the survey without completing every question. This meant that if they found a question wasn't applicable, or just too difficult for them to answer, they wouldn't be forced to drop out of the survey.

Overall we received a total of 1,532 responses.

In statistical analysis, a recommended cell size is 150-200 people to give robust analysis at the 95% confidence interval and we achieved these numbers for all our key questions.

## So what does this tell us?

- First and foremost, 1,532 is a huge sample for total population analysis!
- When we analyse results by state, we can be very confident in our NSW, Victorian, QLD and WA numbers, as each of those has a cell size of over 200.
- We will also be able to split our results by over 35s versus under 35s, as both these cell sizes were over 200.
- However, if we want to do analysis by state by age (e.g. under 35s in NSW), we need to do some 'grouping'.

## Our sponsors

We would like to thank our 2015 Market Monitor sponsors: Philips, NHP, Clipsal by Schneider Electric, 3M, Rexel, CNW, L&H, MM Electrical, HPM Legrand, Gerard Lighting and Hager.

## Snapshot: Key industry insights

- Competition is on the rise as is anxiety about future work.
- Young people, however, feel confident and feel in control.
- Digital is of growing importance – ordering and content on product info.
- Lower prices are out there – but there are other ways to differentiate.

## Some context: Source of business

- Electrical contracting businesses tend to operate across a variety of industries.
- On average, businesses have gained work from three different industries in the past year.
- However, the drift towards commercial work has continued, with most businesses (85%) sourcing at least some work from commercial projects.
- A greater proportion of businesses (26%) sourced their primary revenue from commercial projects, than from residential (23%).
- There are some differences by states, as would be expected.
- There is a skew in new residential towards younger respondents.
- Maintenance forms the backbone of work conducted, with a greater proportion of businesses having this as their primary work versus 2013. The increase in new premises work in 2015 has drifted back to 2011 levels.

## Cost pressures

- Cost pressures appear to have eased compared to 2013, with over half claiming costs have stayed the same or improved.

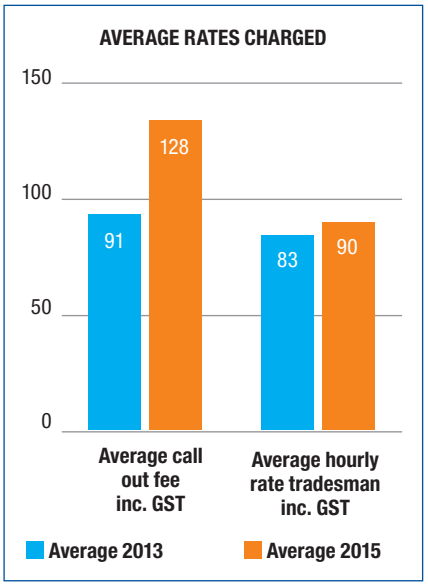
- Where overall costs are perceived to have increased, overhead costs are the biggest contributor.
- However, even here, the impact is less than in previous years.
- An increase in call out rates may be absorbing the perceived impact of cost rises.
- Rates charged by respondents to customers do appear to have increased since the 2013 survey, particularly in terms of call out fees.
- There have been slight increases in the hourly rate of tradesmen in all states, except those who work in the ACT.

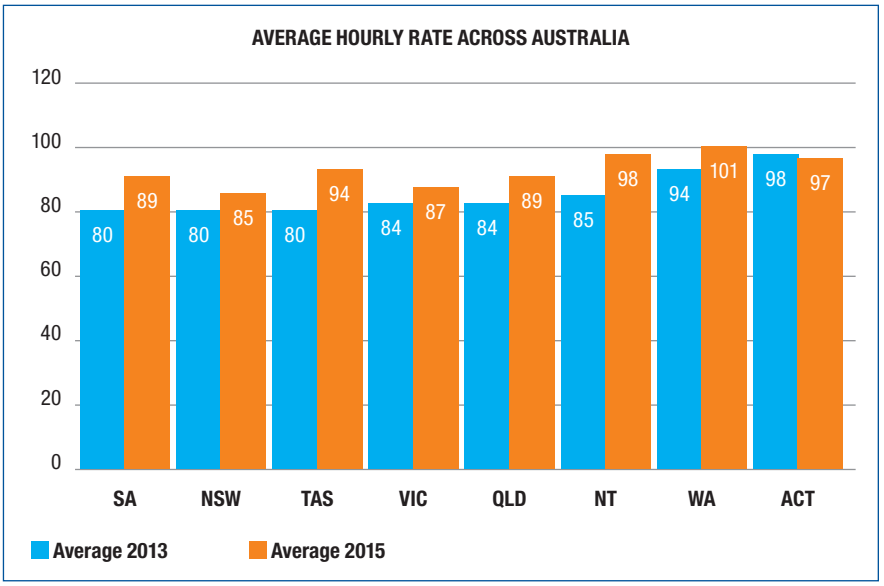
### Business confidence

- Business confidence is down, with more contractors claiming they had less work this past year than the one before.
- Overall, contractors are evenly divided between being optimistic or pessimistic about future opportunities for work, with under 35s significantly more confident about future work than their older colleagues.
- Optimism varies by state – WA is particularly concerned about work opportunities in the next 12 months as the slow down in mining takes hold. This is also reflected in the fact that those sourcing work from resources are also more pessimistic.
- Controlling costs and managing cash flow continue to be seen as the most important areas for business focus.
- However, competition for work has increased and this is more of a concern for future business than in previous studies.
- While the top three concerns are the same regardless of age, wage expectations and reliability of suppliers were more prioritised concerns to under 35s. They are also less concerned with the general economic climate than their older colleagues.

### Future business influences

- As in previous studies, LED technology leads the mentions of emerging technologies.
- However, mentions of renewables, solar and energy efficiencies have increased in this study, reflecting the ongoing broader conversation at a social and political level.
- While not directly comparable, specific communications and networking technologies have rated increased mention this year.




- State and age influences perspective of emerging technologies.
- Less incidence of LED and higher incidence of renewables mentioned in QLD, automation and wireless higher in Victoria.
- While two-thirds of respondents are researching emerging technologies online, some state-based differences emerged.
- Own online research higher incidence in NSW and QLD, manufacturer websites/ materials as important in WA.

## Areas of speciality

- The majority of contractors work across a variety of areas, with maintenance, wiring and testing and domestic lighting likely to make up the bulk of the workload.
- Some increased focus/specialisation in maintenance and domestic lighting, as well as data/networking and green energy management.
- At a total level, more businesses are working in green energy management than in 2013.
- Areas that require particular technical expertise remain limited to specialist firms, as would be expected.

## Skills and training

- Nearly 40% believe there is a lack of skilled labour in maintenance (reflecting increased focus for businesses this year).
- Around 20% see shortages in automation and control, and data, fibre connect and networking.
- There is a desire for training, with nearly half interested in training on emerging technologies. Green/environmental and smart/networking are areas of interest.
- Technical training is desired by nearly four in 10 respondents. On average, people are interested in two to three different areas for training.
- In an ideal world, more training would be preferred – around 2-3 times a year. Finding time, however, seems to be the biggest obstacle for most.
- Face to face training, during the day is preferred.
- Younger contractors are doing less training than 35-54 year old contractors, and their levels of interest in training are lower than their older colleagues.

## Grey market

- As suspected, competitive pricing is the key draw to grey imports.
- Whilst the ability to order online and a good website is interesting, it isn't a key driver.
- And whilst product quality does become a concern, it is clear that there are other ways that local businesses can also differentiate themselves to keep business onshore – key drivers such as quality of sales staff, on time delivery and good communication.
- In general, many categories are vulnerable to leakage but automation and data/ communications are more at risk than others.
- Compliance and warranties are the biggest concerns with overseas imports – a concern shared by those who claim to have purchased overseas.
- It is clear that there is a lot of confusion about where the legal liability for compliance lies.

## The role of digital

- While banking and email dominate, the Internet is being used by many respondents as a place to research products and pricing in particular.
- Finding product and technical information is the key digital opportunity to make work easier.
- Most of this is happening on an office PC although about a third of respondents are doing these more popular activities from a smartphone.
- When looking for the nearest electrical supplier, however, the smartphone is the most commonly used device as it is often done from the job site.
- Clipsal continues to dominate as the key industry app, and 2/3 of users rating it as 'quite useful but could be better'.
- The other top industry apps receive a similar rating.
- There is room for improvement.

national electrical and communications association

# When you talk to a NECA electrical contractor you are getting the benefit of 100 years of industry experience across Australia.

We have members in rural, regional and major capital cities. We understand the issues and the complexities of our industry. NECA electricians value the importance of safety, compliant products, quality training and energy efficiency.

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For more information about NECA, visit our website.

**www.neca.asn.au**

# LAMP RECYCLERS
# NATIONAL NEWSLETTER - SPRING 2015

## ARE YOU AND YOUR CLIENTS MOVING WITH THE TIMES? BLACKMORES IS.

Blackmores is a trusted vitamin and supplement brand, a household name that has an industry-leading approach to reducing impacts on the environment.

In 1967, their founder Maurice Blackmore, boldly stated that "If man persists in ignoring or defying the recycling laws of Nature, he will not avoid pollution, malnutrition or starvation."

Maurice's legacy lives on today through the company's commitment to environmental sustainability as a foundation signatory to the Australian Packaging Covenant, as well as working towards implementing ISO 14001; a globally recognised Environmental Management System across the company's operating facilities internationally.

At an employee level, the company also actively encourages its 300+ staff at its Warriewood, NSW facility to bring to work a growing number of domestic recyclables including household batteries, phones, laptops (for charity) and more recently light globes.

Blackmores was delighted to learn of the availability of Lamp Recyclers Ezy-Return solutions and they now encourage staff to bring-from-home their home globe and lamp waste. The response has been positive and within 24 hours of advising staff of this extended service, the Lamp Recyclers Ezy-Return Recycling Packs were receiving waste globes.

BLACKMORES®

Blackmores Environment and Sustainability Manager Jackie Smiles commented, "It's all about changing people's behaviour and the response from staff to our initiative has been gratifying. Until we did this, few of them knew where or how to recycle globes regardless of the strong underlying intent. We also encourage staff to share their learnings with family and friends; knowing that even small considerations by individuals will benefit the environment".

Blackmores' initiative is an indicator of how forward-thinking companies view their environmental sustainability obligations. If you are doing maintenance work at clients' industrial or commercial premises, check with their environmental manager and ask if they too would like to introduce a bring-from-home lamp collection facility, in addition to recycling their normal facility lamp waste.

The cost is small; but the impact on staff and the environment are significant. If you want to get involved in recycling your companies lighting give Lamp Recyclers a call to discover all of our options - we have solutions for 50 - 5,000 lights!

Jackie Smiles - Environment and Sustainability Manager

FluoroCycle

**FLUOROCYCLE SCHEME UPDATE**
We would like to congratulate all signatories to the Fluorocycle scheme, including the newly joined - Austin Health.

Austin Health

## NEED TO RECYCLE?
## CALL US ON 1300 789 917
## WWW.LAMPRECYCLERS.COM.AU

# LOOKING FOR AN EZY WAY TO RECYCLE YOUR TUBES & GLOBES?


## WE CAN NOW PROVIDE AN EZY SOLUTION - AND IT'S AVAILABLE AUSTRALIA WIDE!

**Purchase of an Ezy-Return Recycling Pack includes:**
- Storage Box & Saftey Bag
- Full Recycling Service
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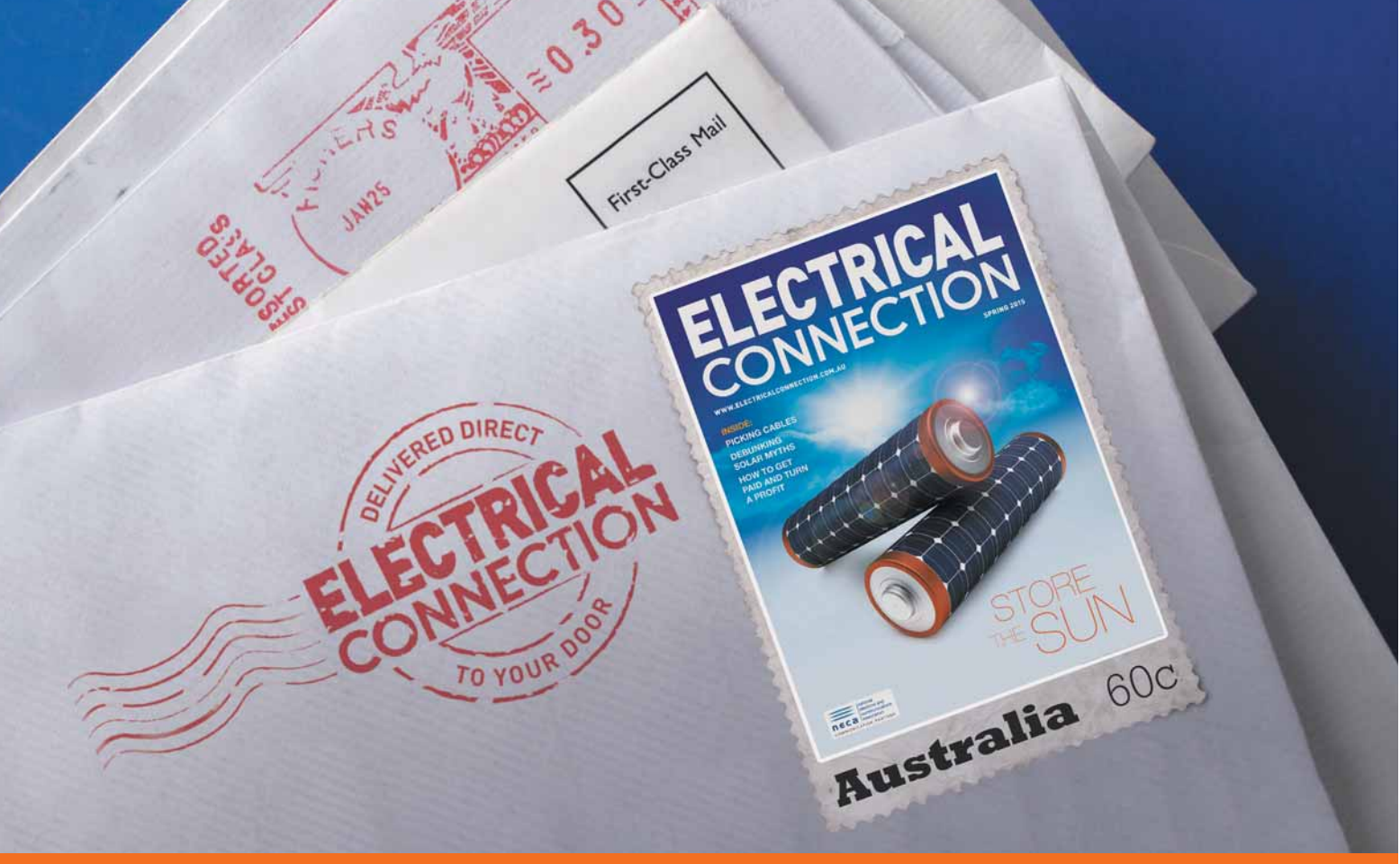


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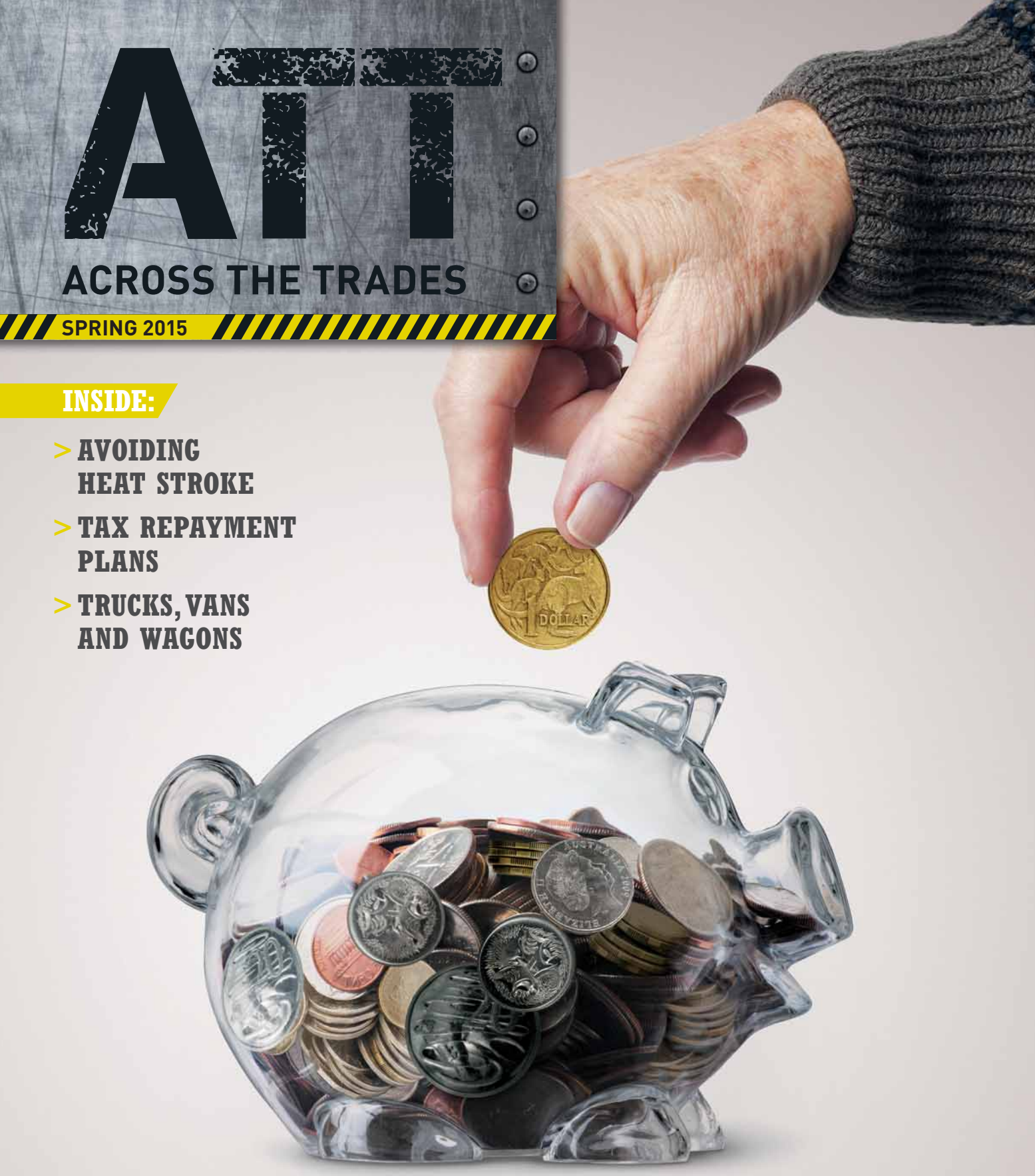
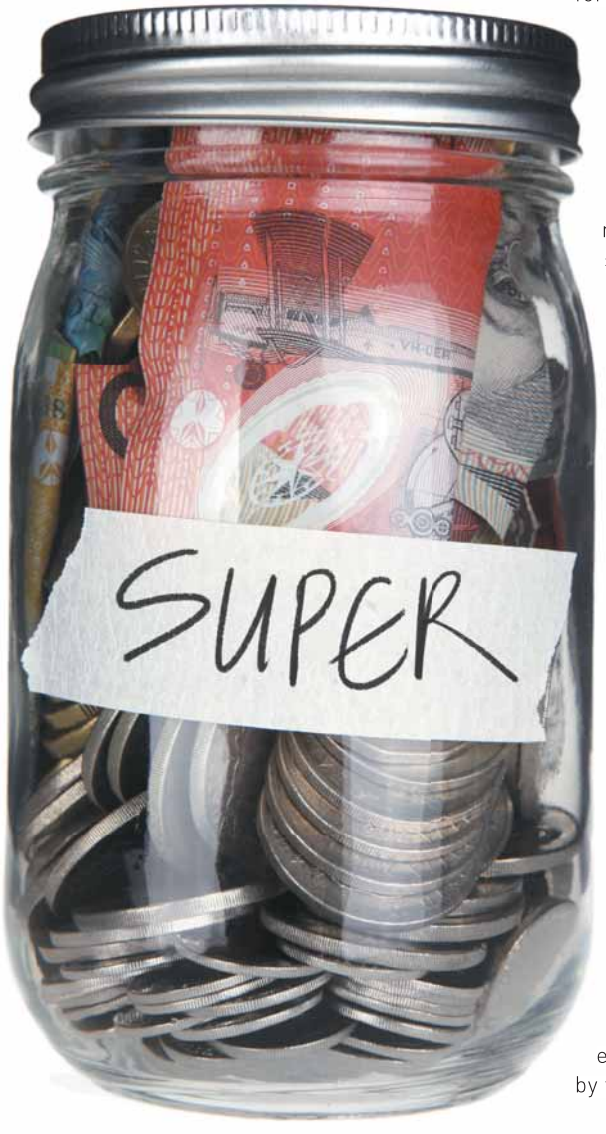


# GOING IT ALONE

## Are self-managed super funds worth it?

# GOING IT ALONE

How does the use of a self-managed superannuation fund assist with wealth planning? Gadens partner **David Coombes** investigates.




Subject to strict, legally enforceable rules and sanctions, a self-managed superannuation fund provides a facility that is assisted by tax concessions to accumulate wealth, which is locked away for retirement or death.

There are tax concessions that apply in three main ways. A complying self-managed superannuation fund will generally pay tax at the special rate of 15%. Secondly, tax concessions are awarded to contributors in that they are entitled to limited tax deductions for their contributions. Thirdly, when the superannuation benefits are paid they are taxed concessionally or may even be exempt from tax.

You are rewarded for the contributions that you make to the self-managed superannuation fund by the provision of a capped tax deduction. The funds may not be accessed so that it is a form of forced saving. Subject to some exceptions, the savings cannot be accessed until after 60 years of age and upon retirement. But from 1 July 2007, under the current superannuation regime, most lump sums and income streams paid from a complying self-managed fund will be tax free if the recipient is 60 years of age or more. The tax concessions enable accumulation at a faster rate than other investment entities because there is a compounding effect that is achieved with the low tax applicable to earnings on investments by the superannuation fund. It is a tax shelter. The tax concessions have been provided as a matter of government policy to individuals so that they will provide for their retirement and so it has the effect of moving a significant part of the population from reliance on the old age pension by self-funding a pension and so relieving the government of that burden.

A self-managed superannuation fund is relatively cheap to establish. It tends to be cost efficient if there is at least $300,000 to $400,000 in the fund. The annual costs of both audit and accounting need to be factored into the cost benefit analysis.

It is because the tax concessions have been so favourable and do tend to favour high income earners that the tax concessions available to self-managed superannuation funds have been the subject of constant annual changes, periodical re-writes of the entire superannuation regime and political debate. More recently, the Australian Labor Party (ALP) has indicated that if it is elected to government it will remove the tax concessions for some parts of the population. It proposes to amend the tax law so that income over $75,000 from a retiree's superannuation fund balance will be taxed at 15% rather than the current zero rating. This would cover approximately 60,000 superannuation accounts with balances over $1.5 million. Secondly, the ALP proposes that the tax on concessional contributions would rise from 15% to 30% for member contributors earning $250,000 or more (which is down from the current $300,000 threshold). So what is all the fuss about, and if it so good, is a self-managed superannuation fund something that you should be using?

## WHAT ARE THE TAXATION BENEFITS?

The current superannuation regime commenced after substantial reform on 1 July 2007. The rules remain complex

and it is important to take advice because the stakes are high if you get it wrong. Let us begin by looking at the taxation of superannuation entities.

### WHAT ARE THE TAX RATES THAT APPLY TO SELF-MANAGED SUPERANNUATION FUNDS?

If the self-managed superannuation fund is a complying fund, then it will pay tax at 15% on the low tax component comprising income, including realised capital gains and assessable contributions. But that rate will increase to 47% in respect of all non-arms length income. On the other hand, if the superannuation fund is a non-complying self-managed superannuation fund, then it will be taxed at 47%.

Where the self-managed superannuation fund is in retirement phase and is paying a current pension or is in the transition to retirement phase, then complying self-managed superannuation funds are exempt from tax on so much of their income as is derived from assets used to pay current pensions. The exemption only applies to income earned once the pension has become payable. The exemption does not apply to assessable contributions or to non-arms length income of the fund.

### CAPITAL GAINS TAX

Special rules govern the way in which the Capital Gains Tax (CGT) rules apply to self-managed superannuation funds. A complying self-managed superannuation fund is entitled to a one third discount on the capital gain if the CGT asset has been held for at least 12 months. If the CGT asset was acquired before 21 September 1999 and held for at least 12 months, then the self-managed superannuation fund can choose to use either the one third discount or the indexation method to calculate the amount of the CGT.

### THE TAXATION OF SUPERANNUATION BENEFITS

The taxation breaks do not end there and in fact you must examine the taxation of superannuation benefits provided by a self-managed superannuation fund. The tax liability will depend upon the age of the recipient and whether the benefit is provided by way of a lump sum or an income stream.

For recipients who are 60 years and over, a lump sum and an income stream from a taxed source within the superannuation fund will be treated as not assessable and not exempt.

If the age of the recipient is between the preservation age and 59 years of

age, and the superannuation benefit is paid from a taxed source in the fund, then there will be no tax on the amount below the sum of $185,000 for the 2014 to 2015 income year but it will be taxed at a maximum rate of 15% on an amount over that threshold where the amount is paid as a lump sum. Where the amount is paid as an income stream, then it will be taxed at marginal rates eligible for a 15% tax offset. The tax offset can eliminate the tax that would otherwise be payable.

If the recipient is under the preservation age, then a lump sum from a taxed source will be taxed at a maximum rate of 20% and the income stream from a taxed source will be taxed at marginal rates with no tax offset applying.

Where the superannuation benefits are paid from an untaxed source within the superannuation fund to a recipient of 60 years and over, then the lump sum is taxed at a maximum rate of 15% on an amount up to the sum of $1.355 million and taxed at 45% on an amount over that threshold sum. Where the benefit is paid as an income stream from an untaxed source to a recipient of 60 years and over, then it will be taxed at marginal rates but eligible for a 10% tax offset.

Where the superannuation benefit is paid from an untaxed source to a recipient who is between the preservation age and 59 years of age, then if paid as a lump sum, it will be taxed at a maximum rate of 15% on an amount up to $1.355 million, taxed at a maximum rate of 30% on an amount above that threshold amount up to the low rate cap amount of $185,000 and taxed at 45% on an amount over the untaxed plan cap amount of $185,000. These figures apply for the 2014-2015 income year. If the superannuation benefit paid from an untaxed source to a recipient between the preservation age and 59 years of age, then the income stream will be taxed at marginal rates with no tax offset.

Where the superannuation benefit paid from an untaxed source is paid to a recipient under the preservation age, then if it is paid as a lump sum, it will be taxed at a maximum rate of 30% on an amount up to the untaxed plan cap of $1.355 million for the 2014-2015 year and taxed at 45% on an amount over the untaxed plan cap of $185,000 for the 2014-2015 year. If the superannuation benefit from an untaxed source is paid to a recipient under the preservation age, by way of an income stream, then it will be taxed at marginal rates with no tax offset.

> What is all the fuss about, and if it so good, is a self-managed superannuation fund something that you should be using?

**EXAMPLE**

By way of simple example, assume that Bob and Barbara have their own self-managed superannuation fund. Bob is aged 64 years of age when he retires and takes a $950,000 superannuation lump sum benefit from the self-managed superannuation fund. Assume that, the lump sum benefit is paid from an element that is taxed in the fund. All of the $950,000 is non-assessable, non-exempt income. Barbara, who is aged 59, receives an income stream benefit of $50,000 from the self-managed superannuation fund which is made up of a $10,000 tax free component and a $40,000 taxable component. On the basis that Barbara has no other income, then the $10,000 tax free component is non-assessable, non-exempt income while the $40,000 taxable component will be included in Barbara's assessable income and taxed at ordinary rates. Assume that for the relevant year, the tax liability on that sum is $5,000, then because Barbara is entitled to a non-refundable tax offset of 15% of the $40,000 taxable component, that is, $6,000, Barbara's tax liability is reduced by the tax offset to nil.

**INSURANCE THROUGH A SELF-MANAGED SUPERANNUATION FUND**

Apart from the somewhat complicated taxation benefits that apply to members, insurance through a self-managed superannuation fund does offer some advantages in that the payment of insurance premiums by a self-managed superannuation for death and disability cover for its members are tax deductible expenses. Those premiums would not be deductible if paid by an individual taxpayer. In that way, a self-managed superannuation fund can be a tax efficient means of providing insurance. However, the fund will be depleted if the fund is used to pay insurance premiums. There will be an advantage where insurance cover or the insured sum is greater than the amount of the superannuation fund held on the premature death or disability of the member especially where the amount that has been accumulated by the member is relatively modest.

**CONCLUSION**

While the area of superannuation is heavily regulated and the taxation rules that apply to superannuation funds are complex, the tax concessions that are provided mean that a complying self-managed superannuation fund is an effective tax shelter that enables the fund invested to compound and increase in value at a much faster rate than other investment entities. Then, when the superannuation benefits are paid from a complying self-managed superannuation fund to a suitably qualified recipient further tax concessions are conferred so that in many cases the receipt may be tax free. ▲

**Gadens**
**www.gadens.com**

# DON'T SUFFER IN SILENCE

For a long time, mental health issues among men has been taboo. Now, beyondblue says enough is enough - men should no longer ignore what's right in front of their faces.

In Australia this week, almost 50 people will die by suicide. Around 36 of these will be men.

The disparity between male and female deaths by suicide is due to men's reluctance to seek support for conditions like depression and anxiety.

They are too proud to ask for help, they do not want to be seen as weak and they don't want to be a burden on others.

The fact that so many men die by suicide, at a rate three times that of women, is unacceptable and must change.

That is why beyondblue launched Davo's Man Therapy in June this year.

It is a campaign starring loveable tradie Davo, who epitomises the typical Aussie bloke with his down-to-earth larrikin attitude.

But it is another one of his classic Aussie traits, a no-nonsense approach, that beyondblue thinks will do the most good.

In television, radio and digital ads, Davo tells men feeling down or stressed out is nothing to be ashamed of and can happen to anyone.

He urges men to visit his website at www.mantherapy.org.au/davo if they're struggling and reminds them that they owe it to themselves and their family to get support.

The website has a Mind Quiz so men can assess their wellbeing, plus more information such as practical advice on how to get support and tales of triumph from men who overcame depression and anxiety.

The website is not just for people who are struggling though. It's also got advice on how to help a mate and tips on how to give yourself the best chance to stay mentally healthy.

The campaign follows the launch two years ago of beyondblue's successful Man Therapy, which used another fictional character, Dr Brian Ironwood, to promote good mental health to men.

Davo's Man Therapy was launched to focus more on men who work in 'blue-collar' jobs and has so far been a success.

In the first month after launching, the website attracted almost 30,000 unique visitors which, given it's targeted at a niche audience, is a huge amount.

There is, however, still a long way to go.

The number of males who die by suicide in Australia each year is almost double the number killed on our roads and suicide is the biggest killer of both males and females aged between 15 and 44.

If you know someone who may be struggling, don't be afraid to have a conversation with them about your concerns. A conversation can make a difference in helping someone feel less alone and more supported, and for more advice on how to broach what is often a difficult topic visit www.beyondblue.org.au/conversations. Alternatively, you can visit the Man Therapy websites for more information or pass them on to the person you're concerned about.

If you are struggling or feeling 'a bit off' for an extended period of time, the most manly thing you can do is to take steps to get better.

Not only do you deserve to feel well, you owe it your family and friends to be as mentally and physically healthy as possible.

Man Therapy can help you learn how to tackle whatever it is that's getting you down and give you advice on how to stay well.

People are often amazed at how much better they feel once they're on the road to recovery, and wonder why they didn't do something about it sooner.

## TAPPER TOOLS

**Fein**
**www.fein.com.au**

Fein's range of high performance tapper tools offer an alternative to working by hand and feature a high torque motor with good speed stability for reliable results. With an integrated reversing gear with rapid return action they significantly reduce the time required to cut threads.

The range is comprised of two models, the ASge 636 will tap threads up to M8 while the larger ASge 648 will tackle anything up to M12. A wide range of accessories are available for both models, making them suitable for a range of applications.

## IMPACT TOOL

**Platypus Outdoor Group**
**www.platatac.com**

As its name suggests, the Ding Dong from Gerber is the perfect, lightweight tool for getting through doors quickly. It's a sledgehammer, ram and pry bar combined into one sturdy, unbreakable piece of equipment.

The Ding Dong's hammerhead features machined cross-hatching that effectively bites into surfaces, minimising slip and maximising impact. The opposite end features a forged pry bar for deconstruction projects and demolition work.

Built in Gerber's homeland of Portland, Oregon, the Ding Dong is fitted with a reinforced fibreglass handle with moulded rings to create a mechanical stop for operator's hands. Measuring 68cm in height and weighing just 5.55kg, the Ding Dong is compact enough to take with you on the move but big enough to produce huge power for effective use.

## DUST EXTRACTOR

**DeWalt**
**www.dewalt.com.au**


Ideal for dust free drilling up to 16mm in diameter, the Dewalt Cordless Dust Extraction System is powered by an independent motor that maintains maximum hammer performance with no decrease in durability. Its high quality, washable HEPA filter is capable of achieving 99.5% efficiency with dust particles as small as 0.3 microns.

Featuring quick release for easy, tool free assembly, the Dewalt system is tough and versatile with a compact design and low weight to offer excellent comfort and near perfect balance. Maximum extraction is maintained at all times regardless of the hammer speed and the extractor continues to operate for two seconds after the hammer trigger is released to ensure any debris in the telescope or hose is completely removed.

## LINE LASERS


**Bosch Blue Power Tools**
**www.bosch-pt.com.au**

Bosch Blue's new GLL 5-40 E and GLL 8-40 E line lasers offer ±0.1mm/m accuracy, delivering accurate lines and on-point horizontal and vertical levelling for high precision jobs. Easy-to-operate and extremely efficient, the Bosch line lasers feature a 360° detachable rotating platform with fine adjustment knob and easy reference bubble vial for precise control of the lasers. For a greater range of measurement, the height adjustable legs ensure tradies can easily manoeuvre the line lasers to suit different working environments, from installation and interior renovation, to laying tiles and flooring.

## BULLSEYE

**PSR Plastics**
**www.psrplastics.com.au**

Bullseye is the latest innovative design by PSR Plastics. The Bullseye system was originally designed to mark out the location of under slab applications in the plumbing industry. Allowing the user to easily and accurately identify the centre point of any application, it can be used for installing anything from electrical fittings to fence posts. Bullseye is a labour saving device designed to create high productivity and safety. Once you have experienced the ease of the Bullseye system there will be no going back.

## HOLE SAWS

**Milwaukee Power Tools**
**www.milwaukeetools.com.au**

Milwaukee Power Tools' new Hole Dozer bi-metal hole saw is built to withstand the toughest jobsite conditions and applications, allowing users to cut through almost anything, bringing increased productivity and efficiency to users on the jobsite.

When cutting through any soft or hard materials the teeth must remain in-tact in order to complete the task in an efficient manner. The Hole Dozer features Rip Guard technology, which comprises teeth that are built with more steel and 8% cobalt behind the cutting edge, increasing life and hole quality for multiple applications.

The Hole Dozer will be available in 51 different diameters in a range of 16mm to 152mm.


## EXTENSION LADDER RACK

**Rhino Rack**
**www.rhinorack.com.au**

No matter what field you're in, very few tradespeople could say that they don't use a ladder almost every day.

Rhino Rack's extension ladder rack is suitable for extension ladders up to 4m and is compatible with Vortex and Heavy Duty roof racks. Constructed from anti-corrosive, high tensile materials, the ladder rack is tough enough to handle any environment; rain, hail or shine.

Including a heavy duty 470mm wide rear roller and multiple slide pads, loading and unloading your ladder is a breeze and helps prevent potential back and shoulder injuries.

## THERMAL IMAGER APP

**FLIR**
**www.flir.com.au**

The FLIR ONE thermal imager has versions for both iOS and Android device platforms and transforms a mobile device into a powerful thermal imager that sees heat and accurately measures temperature. Providing users with the ability to see temperature variations smaller than a tenth of a degree, the technology enables a host of practical applications, from identifying energy inefficiencies and water leaks in a home, to enabling safe and enjoyable outdoor exploration.

TIPS

# HANDLING THE HEAT

Australia is known for its extreme heat in summer months, but there are a few tips to know to avoid becoming a casualty of heat-related illnesses. **Paul Skelton** reports.

The Australian summer - now just months away - takes its toll on both the health and finances of our tradie workforce, with one in 10 struck down by heat stroke during the course of a sticky summer's day on the job, according to KingGee's Workcool survey.

"Tradies are definitely hit the hardest by the Australian summer, having to undertake extreme physical activity under scorching temperatures," KingGee marketing manager Nadia Zaffino says.

"And, while the trademark tradie with his shirt off may be a sight for sore eyes to onlookers, working shirtless is actually extremely dangerous to a tradie's health and safety on the job, and it should be avoided at all costs.

"Combined with the fact that more than half (70%) of tradies find it harder to concentrate on tasks in the heat, and one in 10 saying they've witnessed more accidents on site during hot weather; it is essential for tradies to arm themselves with clothing that both protects them from the heat and helps them perform."

A 2013 Federal Government report – *The State of Australian Cities 2013* – predicts that heat-related deaths in Australian cities are set to quadruple, with Perth and Brisbane particularly affected. Other cities will see more than double the number of heat related deaths.

"Heatwaves are the leading cause of fatalities from natural disasters in major cities," the report says.

In addition to health concerns, KingGee's Workcool survey found a hot day also hits the hip pocket, with just over 40% of tradespeople admitting to taking days off as a result of the heat.

Tradies say they are susceptible to a number of health issues when working in the sun all day. One in 10 have been diagnosed with heat stroke and nearly half have suffered through a sweaty summer day to end up feeling weakened (47%) and/or dizzy (44%). One in three are hit with nausea (29%).

Employers and workers need to take extra care during the summer months to avoid the risk of heat stress or the more serious heat stroke, says WorkSafe WA commissioner Lex McCulloch.

"Workplace safety laws require an employer to provide a working environment in which workers are not exposed to hazards and this includes, as far as is practicable, protecting employees from extremes in temperature," he says.

"The increased sweating caused by heat depletes the body's fluids and can lead to tiredness, irritability, inattention and muscular cramps – these are the symptoms of heat stress.

"Apart from the obvious physical discomfort of these symptoms, they may also increase the risk of workplace injuries by taking a worker's attention away from the task at hand, and this is a major concern."

The acting general manager of WorkCover NSW's Work Health and Safety Division, Peter Dunphy, says, "In the three years to July 2011, there were 497 claims (in NSW) for workplace fatigue and heat stroke at a cost of $4.3 million, so it needs to be taken seriously and managed effectively."

This is just one reason, he says, workers and businesses need to work in partnership to protect themselves from the effects of working in heat.

"If possible, businesses should try to re-schedule work to cooler times of the day such as early morning or late afternoon. If this is not possible, ensure workers have access to plain drinking water, at least 200mL every 15-20 minutes, shaded rest areas and frequent rest breaks.

"Supervision is also important as people can deteriorate quickly if heat affected, so keep an eye out for each other.

"Businesses should set realistic workloads and work schedules and ensure fair distribution of work.

"Further, it is important that workers don't rely on energy or caffeinated drinks which can have a diuretic effect."

WorkSafe WA explains that workers in extremely hot environments can lose up to a litre of fluid every hour, and it is vital that this lost fluid is replaced.

The type of clothing worn is also very important – loose clothing allows air to circulate, improving the evaporation of sweat.

KingGee's Workcool range of workwear, for example, has been purposely built to help tradies beat the heat and keep their cool on the job. The UPF 50+ range is made with lightweight yet strong Ripstop cotton, designed to breathe without sacrificing protection and tear resistance. A collar extension has been added to all shirts for extra sun protection and pants feature 10 multifunctional pockets reinforced with triple stitching.

Heat stroke is a serious condition that must be treated immediately. The signs of heat stroke are cessation in sweating, high body temperature and hot and dry skin. Confusion and loss of consciousness may occur.

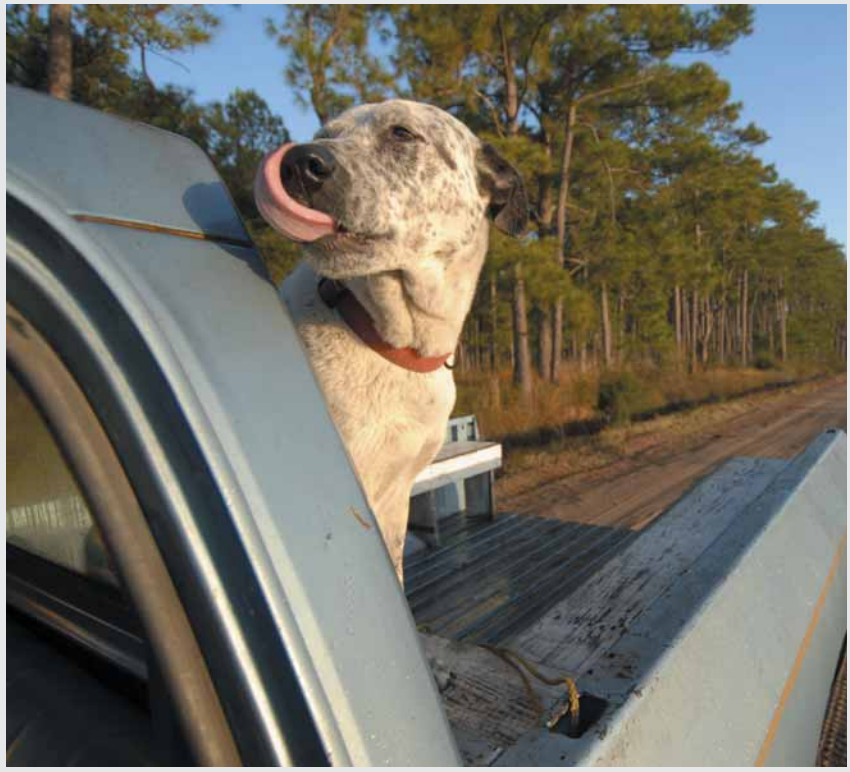
If heat stroke is suspected, the person should be treated by a doctor as soon as possible. Until medical treatment is available, the person should be cooled down as quickly as possible by methods such as soaking clothing in cold water and increasing air movement by fanning.

"The effects of extreme or sustained heat can seriously affect a worker's concentration levels, and the consequences can be very serious," Lex says.

"Guarding against heat stress and heat stroke is part of providing a safe and healthy workplace, and I urge employers to ensure that preventative measures are in place."

**KingGee**
**www.kinggee.com.au**

## IT'S NOT JUST ABOUT YOU...



**While you're taking care of yourself on job sites, keep in mind your mate in the ute.**

**"Dogs are just as susceptible to heat-related illness as humans," says Dr David Neck from the Australian Veterinary Association (AVA).**

**"Vets receive numerous calls from concerned dog owners during heatwaves after seeing worrying signs like lethargy, excessive panting or breathing problems. But there are simple tips that can help to prevent or minimise problems.**

**"Unlike people, who sweat through skin, dogs cool off through the pads of their feet and tongues. They need to pant to regulate their temperature, and dogs with long hair can be more susceptible to the effects of heat."**

**Ten tips to ensuring your best mate makes it through the summer include:**

1. **Making sure there is cool, fresh water available at all times. Leave this in a shady area.**
2. **On really hot days, leaving multiple bowls of cool water in the shade that can't be tipped over.**
3. **Keeping an eye on older pets as they will be more susceptible to the heat, particularly if they have problems with their breathing.**
4. **Dogs love to sit in the sun, but prolonged sun exposure can quickly lead to heat exhaustion and can cause skin cancers, so it's important to provide them with a shaded area.**
5. **Filling a kids' paddling pool with a couple of inches of water and leaving this in a shady spot for your dog to sit in.**
6. **Tossing a few ice cubes in your dog's water bowl can help to keep their temperature down.**
7. **If you don't have air conditioning, leaving a fan on during those really hot days in the height of summer.**
8. **Walking your dog in the early morning or the late evening to avoid the hottest part of the day.**
9. **Putting some treats in the freezer.**
10. **If you own a long haired dog, giving them a trim to help them cope better with the hotter months.**

**"It's important to take your dog to the local vet if they are displaying any symptoms of heat stroke such as heavy panting, fatigue, drooling, vomiting and diarrhoea.**

**"Watch your dogs carefully on hot days and give them extra care to help them safely enjoy summer."**

# METAL PECKER

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TIPS

# THE BENEFITS OF HIRING AN APPRENTICE

Hiring an apprentice offers significant benefits for businesses, including financial incentives and productivity improvements.

"Apprenticeships offer a mix of on-the-job training and theoretical education to give the apprentice a nationally-recognised trade qualification," Northern Sydney Institute construction and engineering faculty manager Pat Vella says.

"Because apprentices are paid while they learn the skills they need for their chosen career, they can avoid having a higher education debt and kick-start their career sooner.

"But the master-apprentice relationship is just as rewarding for the employer. It gives experienced tradespeople a chance to mentor a younger person or help a mature-age apprentice change careers. There are also tangible benefits to hiring an apprentice."

Northern Sydney Institute has identified six key benefits of hiring an apprentice:

**1. Sustainable recruitment:** The cost of recruiting and training staff is high. By recruiting an apprentice, businesses can train a person in specific areas and processes that result in greater productivity for the business. This can result in lower staff turnover and, as a result, reduced recruitment costs.

**2. Financial rewards:** A range of financial incentives may be available to businesses that employ an eligible apprentice. In addition, their pay rate generally reflects the costs to the employer of providing training, which can make apprentices a more cost-effective option, especially considering their ongoing productivity and contribution to the business.

**3. Shared resource:** Companies that do not have enough work for a full-time staff member can bring in apprentices part-time while they are still at school. Companies can also share an apprentice with another business through a Group Training Organisation (GTO), which is ideal when the employer does not have the range of work available to ensure that the apprentice gains all the necessary skills.

**4. Community contribution:** Many business owners are community-minded. Hiring an apprentice gives young people an opportunity to launch their careers and gives them an incentive to work towards a future goal.

**5. Increased productivity:** Hiring an apprentice requires businesses to examine their policies and processes, which can often result in positive changes that increase productivity. Additionally, the apprentice may offer ideas and information that they have gained through their studies, which can help the business in turn.

**6. Skills preservation:** Apprentices are the next generation of skilled workers. By hiring an apprentice, business owners gain the opportunity to pass on valuable skills that may otherwise be lost.

**Northern Sydney Institute**
**www.nsi.tafensw.edu.au**

## HOW TO FIND AN APPRENTICE

**Before deciding to hire an apprentice, business owners must first decide on what the job entails and what skills are needed. The role may be full-time, part-time or school-based.**

**Apprentices can be hired directly by the business or through a GTO. Before selecting a candidate it is important to interview them to make sure they will fit in with the existing team and that they understand the work and attitude that will be required of them.**

**Business owners need to complete a training contract through the Australian Apprenticeships Centre: www.australianapprenticeships.gov.au.**

**Businesses can advertise for an apprentice directly through TAFEs, on employment websites and through GTOs.**


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# THE A-Z OF ATO PAYMENT ARRANGEMENTS

When hit with a tax bill, most small business operators seek out a payment plan. You can do much better than that, writes **John Corias**.

Part of our role as small business accountants is to act as a barrier or intermediary between the tax office and the small businesses of Australia.

It's not that we don't trust the two different interests to get along but it's more about using our experience and knowledge to protect the best interests of the client.

Small business owners will understand the time pressures placed upon them and being caught off-guard by a representative of the tax office can be a genuine issue. Often clients are not able to converse about their business finances in a way that gets the true picture across.

Dealing with payment arrangements for small businesses to pay off overdue debts to the tax office is a daily occurrence in our office. Some of the reasons for these debts occurring can involve:

- Poor cash flow management.
- Using the wrong legal structure.
- Accounting for GST on the wrong basis.
- Not budgeting for cyclical cash flow.
- Business owners spending unassigned cash in the bank.
- Not using accountants or bookkeepers to monitor future tax amounts to be paid.
- Rarely are these issues caused by 'acts of nature', but this can be a factor as well.

So the issue here is how to deal with the tax office and keep your debts under control once they have happened.

Negotiating a payment arrangement with the tax office is normally the first option clients look to. Our advice is always to seek alternative finance to cover ATO debts as they can often be spread over more lenient time frames.

Always to seek alternative finance to cover ATO debts as they can often be spread over more lenient time frames.

Sadly, many small businesses think this is where the process stops but this is not the case. Once a payment arrangement is in place it is your obligation to make your regular payments as well as your current lodgements for both income tax and BAS purposes. Should you stick to your arrangement but not lodge and pay your most recent BAS on time then your arrangement defaults?
Every time you default it becomes increasingly difficult to negotiate a new arrangement. This is how businesses fall further and further behind.

The key piece of advice in this lesson is not to fall behind. The way to keep on top of your obligations is to know what they are and when they are due. You can only do this by taking up the services of a bookkeeper or accountant from the very start of setting up your small business. So many of our new clients have waited a year or two before seeking help and end up paying two years of tax in one year. This is a recipe for disaster and places further cash flow stress on new small businesses that are already running in a very lean state.

**mas accountants**
**www.masaccountants.com.au**

# LIVING IN A POWDER KEG

Unfair dismissal is blamed for one in three disputes with staff, new data reveals. Employment relations specialist **Employsure** provides tips to help employers minimise employee claims.

Unfair dismissal is the main reason employees make a formal claim against their employers, and of these claims, nearly a quarter centre around serious misconduct (12%) or misconduct (12%).

The figures were released by Employsure and were taken from 990 inbound calls to the company, from employers, between February 2014 and May 2015. They reveal that over a third of calls were from employers contacting Employsure for the first time, to seek advice on unfair dismissal.

Employsure managing director Edward Mallet says, "Disputes between employers and their staff occur when an employee's conduct is called into question, but they feel wrongly accused. This is a difficult situation and usually the employer has no official guidelines on conduct in place. They then call a service like ours to explore their rights and obligations."

In 2014, 17,806 unfair dismissal claims were lodged by employees with the Fair Work Commission, the highest number of annual claims ever recorded. The figure amounts to 70 claims a day.

"There is no doubt this is a major issue for employers," Edward says.

"Unfair dismissal was brought about to protect employees from unjust employers; however, the number of claims has blown out. The actual figure is considerably higher as not all claims are taken to the Commission, some are settled internally by the company concerned. Because it is such a prevalent issue, employers need to ensure they have robust policies in place to be clear and equitable in these matters."

"Around two thirds of the companies that contact Employsure in the first instance have employment compliance issues or are involved in a workplace incident and need expert advice and assistance. Around one in five companies in the general business population have workplace issues that result in formal claims being made."

**EDWARD MALLETT'S TOP FIVE TIPS TO AVOID EMPLOYEE DISPUTES**

**1. Have clear descriptions of unacceptable behaviour:** Employers need to train staff on good conduct and include clear descriptions of unacceptable behaviour in employee handbooks. This can cover every aspect of employee functions from absenteeism, sick leave, performance and, most importantly, conduct.

**2. Don't keep policies in a drawer:** When you have gone to the time and trouble to craft workplace policies, make sure your staff know about them. Consider introducing a written or computer test and set the pass mark high to make sure employees have read and understood policies.

**3. Consistency is key:** Ensure all disputes are dealt with consistently. Adhere to your own policies and procedures to the letter, in every case. Don't make allowances for some staff members or come down hard on other employees. Consistently addressing conduct issues will help your employees to perceive what is appropriate workplace behaviour and what is not.

**4. Have meetings before the situation gets out of hand:** If an employee is stepping out of your defined code of conduct, you are within your rights to schedule a disciplinary meeting to clearly outline the employee's unacceptable behaviour. Following this meeting, you may be justified in issuing a formal, written warning. If the misconduct is repeated or it constitutes serious misconduct, this could ultimately justify dismissal.

When you have gone to the time and trouble to craft workplace policies, make sure your staff know about them.

**5. Get the best advice:** Employers often don't know how to manage employees effectively and deal with claims by their employees. Get expert advice to develop solid employee contracts, workplace policies and performance management programs to put you in the best position possible. Use your adviser to gain knowledge of your rights and obligations as an employer.

| RANKING BY REASON FOR TERMINATION | | |
|---|---|---|
| 1 | Unfair Dismissal – Other reasons | 43% |
| 2 | Serious Misconduct | 12% |
| 3 | Misconduct | 12% |
| 4 | Redundancy | 10% |
| 5 | Performance | 7% |

*** Taken from 990 claims from February 2014 to May 2015.**

# TOYOTA HILUX

If there is one utility against which all others are benchmarked in Australia, Toyota's HiLux has to be it. Not only the market-leading commercial vehicle in the land, the Thai-built one-tonner is one of the top three biggest-selling vehicles, month in and month out, alongside the Corolla and Mazda3 small cars.

So an all-new HiLux is big news, and prospective buyers have plenty to look forward to when the eighth generation docks Down Under in October.

Full specifications were still to be revealed at the time of writing, but Toyota Australia has outlined key details such as two newly developed turbo-diesel engines – part of a four-tiered powertrain line-up – new six-speed manual and automatic transmissions, a stronger body, locally developed suspension package, major equipment upgrades and new model variants including 'Hi-Rider' 4x2 versions.

The latter will have the ride height and heavy-duty suspension of an equivalent 4x4 model, and form part of a 31-variant line-up – up from 23 today – that again spans two drivelines, three body styles (single, extra and double cab) and three equipment grades (WorkMate, SR and SR5).

Other new entrants include more double cabs, more 4x4 variants, more diesel options and the reintroduction of the 4x4 WorkMate, with tradespeople a key target audience.

Toyota's newly developed GD-series four-cylinder common-rail turbo-diesel family will be offered in 2.8L and 2.4L guise, replacing the current 3.0L oil-burner and offering more power and up to 10% better fuel economy.

The bigger-displacement engine will develop 130kW and 450Nm with the six-speed automatic (peak torque falls to 420Nm when the six-speed manual is specified), while the smaller engine is good for 110kW/400Nm (five-speed manual: 343Nm). The 2.4L will mainly see duty in 4x2 variants.

The 4.0L petrol V6 will continue, while at the entry level the 2.7L four-cylinder petrol engine has received a major overhaul, this 2TR-series unit now producing 122kW/240Nm.

Other headline items on the new HiLux include an increase in towing capacity up to 3,500kg, payloads of up to 1,240kg, more interior space in the dual cab, expanded cargo volume, a larger fuel tank (now 80L) and improved body rigidity via greater use of high-strength steel and additional spot welds.

Toyota has promised that standard features across the range will include seven airbags, hill-start assist, an emergency stop signal system, electronic stability and traction control and ABS brakes. A reversing camera will also be fitted to all pick-up models, and offered as an option on cab chassis variants.

Every HiLux will also carry a touch screen audio display, air conditioning, cruise control and powered windows, mirrors and door locks. ▲

**Toyota Australia**
**www.toyota.com.au**



# VOLKSWAGEN TRANSPORTER

Volkswagen is preparing to introduce the sixth-generation version of its popular Transporter van in Australia towards the end of the year, following its release in Europe.

Replacing the decade-old T5 and marking 65 years of Volkswagen van production, the new T6 brings sharper looks, a fully redesigned cabin, uprated safety and convenience equipment, more efficient powertrain options and promises of improved vehicle dynamics.

A new family of 'EA288 Nutz' TDI 2.0L turbo-diesel engines makes its debut in the T6, offered in four states of tune in Europe – 62kW, 75kW, 110kW and 150kW – and combining with a five- or six-speed manual gearbox (depending on the variant) or a seven-speed DSG dual-clutch automatic.

A 2.0L 'EA888' petrol engine with either 110kW or 150kW is also available.

VW says the engines will save at least 1L of fuel compared to the previous generation, helped by a standard automatic engine idle-stop system.

The dynamic performance goes up a notch with the development of a new adaptive chassis control system with three selectable driving modes (comfort, normal and sport) for the electronically adjustable shock absorbers.

Driver safety aids such as a radar-based 'front assist' monitoring system, adaptive cruise control, city emergency braking, automatic high/low beam adjustment, reversing camera and driver fatigue monitoring can be specified in Europe, while an automatic post-collision braking system is fitted standard across the range. Electronic trailer stabilisation is also offered.

Infotainment technology moves up a notch with new audio systems, all of which integrate with a Bluetooth hands-free system and most including a touch screen (either 5.0" or 6.3") as standard. Even the most basic audio system in Europe has an SD card reader, USB port and aux-in socket. Digital radio and more sophisticated functionality kick in at higher grades, including advanced voice control and, for the touch screen, a proximity-sensing function and smart phone-like 'swipe and zoom' hand movement control.

The standard panel van's cargo capacity is 5.8m$^3$, accessible from the tailgate (or optional rear wing doors) and a side sliding door, while specifying a medium-high roof (+276mm) increases this to 6.7m$^3$. A long-wheelbase version (3,400mm, +400mm) is also offered in Europe, stretching total vehicle length to 5,292mm and delivering a 6.7m$^3$ load capacity with the normal roof version – or 7.8m$^3$ with the medium-high roof. A LWB high-roof variant takes this even further, to 9.3m$^3$.

Gross vehicle weight ranges from 2,600-3,200kg, depending on version and engine spec, permitting a maximum payload of 502-1,224kg. Maximum braked towing capacity is 2,500kg.

Cab chassis derivatives are due in Australia next year. ▲

**Volkswagen Australia**
**www.volkswagen.com.au**


# NISSAN NAVARA

Nissan has launched its crucial new-generation Thai-built Navara in Australia, kicking off with dual cab variants in a rollout that will see single and king cab models – and a full 27-variant range – on sale by the end of the year.

As well as the three body styles, the new Navara – dubbed NP300 and replacing both the decade-old D40 and 18-year-old D22 series – will cover all bases with four trim levels (DX, RX, ST and ST-X), pick-up and cab chassis back ends, 4x2 and 4x4 drivelines, six-speed manual and seven-speed automatic transmission choices, and three powertrains (two turbo-diesels and a petrol) on offer.

Nissan has a lot riding on the all-new version of its top-selling nameplate, pointing to years of development – including testing in rural and metropolitan Australia – and promising plenty with the launch of the dual cab, such as improved performance, reliability and safety, best-in-class diesel fuel economy and equal-best braked towing capacity for the diesels of 3,500kg.

The diesels in question are two new Renault-sourced 2.3L 'YS23' four-cylinder engines, headlined by a twin-turbo unit that produces 140kW at 3,750rpm and 450Nm from 1,500-2,500rpm.

In ST and ST-X 4x2 dual cab manual grades, this engine can return fuel economy of 6.3L/100km on the official combined cycle – not bad for a vehicle that has a GVM of 2,910kg and tare mass of around 1,800-1,900kg, although for sheer grunt the twin-turbo is unable to match the 550Nm (from a 3.0 V6) that was a feature of the previous model.

A single-turbo version of the YS23 is also available, delivering 120kW/403Nm and similar economy, while at the entry level an upgraded 2.5L 'QR25DE' four-cylinder petrol engine continues, now with 122kW/238Nm and returning 9.7L/100km on the DX 4x2 manual.

Payload ranges from 880-1,112kg, depending on the variant.

Still with a fully boxed ladder frame chassis, the NP300 brings a number of other significant advancements for Nissan, from its "cutting edge" and more aerodynamic design to smart technologies and extra safety features, and claims of improved handling and ride comfort. On the latter, a new coil-sprung five-link rear suspension for dual cab pick-up models is now in service.

In safety terms, seven airbags are fitted standard in the dual cab (including driver's knee airbag), along with electronic stability and traction control, a limited-slip diff and ABS brakes with EBD and brake assist.

Daytime running lights are also fitted, although LED headlights and a rear-view camera are among the equipment reserved for the higher ST and ST-X grades.

There are many other detail points to note throughout the range, so careful study of the specification sheets is recommended. But all dual cabs have air conditioning (with rear air vents), cruise control, a trip computer, electric windows, three 12V power outlets and a six-speaker CD/radio unit with Bluetooth phone and audio streaming and USB/iPod connectivity. ▲

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Reverse parking sensors
Up to 30,000km service intervals^

*Recommended drive away price for the Kangoo Manual Short Wheelbase, Master Manual Short Wheelbase and New Trafic Short Wheelbase Single Turbo each with non-metallic paint. Valid for vehicles ordered between 01/07/2015 & 30/09/2015 while stocks last. Renault reserves the right to vary, extend or withdraw this offer. Offer available to ABN holders only and excludes fleet & government buyers. †3-years/200,000km warranty and 3 year/200,000km Roadside assistance both apply to Master and Trafic III models. Warranty and Roadside Assistance both valid for 3 years or 200,000km (whichever comes first) from new. Demonstrator vehicles receive balance of new vehicle warranty and Roadside Assistance. ^First 3 scheduled maintenance services capped at $349 per service on new and demonstrator Master, Trafic III and Kangoo models, based on standard scheduled servicing from new and on normal operating conditions. Scheduled maintenance services required every twelve (12) months or up to 30,000km (whichever occurs first) on Master and Trafic III, and twelve (12) month or 15,000km (whichever occurs first) on Kangoo. However, Master and Trafic III are subject to adaptive servicing requirements, as determined by the Oil Condition Sensor, and may require servicing prior to the standard twelve (12) months or 30,000km service interval. If Master, Trafic or Kangoo is not presented within three (3) months of when the scheduled service is required, right to that capped-price service under the program is forfeited.

3 YEARS 200,000 KM† WARRANTY
3 YEARS ROADSIDE† ASSIST
3 SERVICES CAPPED^ PRICE

renault.com.au


# IVECO DAILY

Long known as a leading heavy commercial vehicle brand, Iveco has moved to improve its standing in the light commercial sector in Australia with the launch of the new-generation Daily large van and cab chassis range.

The company is claiming four class-leading highlights with the new series: largest volume (at up to 20m$^3$), highest horsepower rating (205hp, equivalent to 150kW) and the "most sophisticated full-automatic transmission" – a new eight-speed unit dubbed 'Hi-Matic'.

Iveco also claims the redesigned Daily is virtually new from the ground up, with 80% new architecture and a host of detail improvements over the previous generation.

The new Daily range spans 18 model variants at launch, with seven different vans, five single and four dual cab chassis options, as well as two 4x4 cab chassis variants at the top of the range.

Gross vehicle mass ranges from 3.8t to 7t across single or dual rear-wheel axles, while towing capacity tops out at 3,500kg.

The vans cover payloads from 1,475kg to 2,767kg, with vehicle lengths stretching across four tiers (5,648mm, 6,048mm, 7,228mm and 7,628mm) and three internal heights (1,545mm, 1,900mm and 2,100mm) for load capacities starting at 9m$^3$ and climbing to 12m$^3$, 16m$^3$, 18m$^3$ and 19.6m$^3$.

Easing the load is a large side sliding door and double-hinged rear doors (opening to 270°), while the rear loading platform has also been lowered by 55mm over the previous model.

The cab chassis range provides the basis for a broad selection of bodies, from basic steel and aluminium trays to tippers, service units, pantechs and more sophisticated bodies needing CAN BUS connections. Three wheelbase lengths are offered: 3,750mm, 4,350mm and 4,750mm, although the latter is not available on the six-seater dual cab. Payloads range from 2,275kg to 4,582kg.

At the heart of the new Daily are three familiar but improved direct-injection diesel powertrain options: a 3.0L unit with either single or twin turbochargers and, at the entry level, a 2.3L single turbo.

The twin-turbo lays claim to the best-in-class power output of 150kW from 3,100-3,500rpm – peak torque is 470Nm from 1,400-3,000rpm – while the single turbo is no slouch either, developing 125kW at 2,900-3,500rpm and 430Nm from 1,500-2,600rpm.

The 2.3L unit produces 93kW from 3,000-3,600rpm and 320Nm between 1,800-2,500rpm, while Iveco cites range-wide fuel efficiency improvements of around four per cent with various mechanical tweaks, reduced internal friction and a more aerodynamic design, particularly with vans.

The ZF-sourced eight-speed automatic is said to have been extensively tested in Australia and was strengthened for use in light commercial applications. It also has 'Eco' and 'Power' modes. The standard manual gearbox varies according to the model selected.

A suspension overhaul has brought improved ride and handling, according to Iveco, while braking performance is attended to with disc brakes at both ends, as well as ABS brakes with EBD.

There is also a hill-holder, electronic stability control with trailer sway mitigation, low-level fog lights (with a cornering function), rear parking sensors on vans, and dual front and side curtain airbags, while a variety of other safety features are optional.

Other key standard items include remote locking, automatic air conditioning, cruise control, electric windows/mirrors, a multi-function steering wheel, various purpose-built storage compartments (including phone and tablet holders) and four-speaker audio with 20W amplifier, radio, CD/MP3 player, USB/aux input and Bluetooth connectivity. ▲

**Iveco Australia**
**www.iveco.com.au**

# RENAULT TRAFIC

Renault's third-generation Trafic delivery van has arrived in Australia, offering a comprehensive redesign inside and out and, not least of all, an all-new 1.6L diesel engine with improved fuel efficiency and performance.

There is no longer an automatic transmission available on Trafic, leaving Renault Australia to soldier on with the new 'R9M' engine family, which is offered in two states of tune but combines only with a six-speed manual gearbox.

Both short and long wheelbase variants remain available – measuring 3,098mm and 3,498mm respectively – with the SWB (dubbed L1H1) offering either engine and the LWB (L2H1) going it alone with the high-output unit.

This top-spec twin-turbocharged 'Energy dCi 140' produces 103kW of power at 3,500rpm and 340Nm of torque from just 1,500rpm (80% of which is available from 1,250rpm). Fuel consumption on the combined cycle comes in at 6.2L/100km, aided by automatic engine idle-stop and regenerative braking systems, among a host of economy-enhancing technical features.

At the entry level, the 'dCi 90' delivers the same economy figures with the lower output, which is 66kW and 260Nm (each produced at the same revs as the dCi 140).

Extended front and rear overhangs have liberated more space throughout the Trafic, with load lengths now stretching to 3,750mm (SWB) or 4,150mm (LWB) via a new bulkhead flap arrangement – establishing "a new benchmark for the market", according to Renault, as longer items extend into the cabin – while the bulkhead itself has been repositioned 30mm further back to liberate more space for passengers.

The cargo area measures 1,387mm high and 1,662mm wide across the range, with access gained through an unglazed left sliding door or, at the back, a conventional glazed tailgate or 180° rear barn doors. Significantly, the cargo area layout remains the same as the previous generation, enabling tradespeople to transfer customised fittings and equipment over to the new model.

Maximum cargo volume is 5.2m$^3$ on the SWB, and 6.0m$^3$ on the longer version, while payload ranges from 1,235kg to 1,274kg, depending on the variant. Maximum towing capacity is 2,000kg.

Standard features include three-abreast seating, full driver's seat and steering wheel position adjustment, air conditioning, electric windows/mirrors, remote central locking, cruise control (with speed limiter) and Bluetooth audio/phone and USB connectivity.

On the safety front there are dual front airbags, rear parking sensors, hill-start assist, electronic stability and traction control (including an advanced Grip Xtend system), and ABS brakes with EBD and brake assist.

Specifying the high-output engine brings extra equipment, including automatic headlights/wipers, front fog lights (with cornering function), a rear-view camera, leather-clad steering wheel, CD/MP3 radio and dual passenger bench with fold-down centre seat workstation that includes a detachable A4 clipboard, laptop storage and under-seat storage compartment. The aforementioned load-through flaps and rear barn doors also kick in here.

Renault Australia is offering three factory-fit option packs on the twin-turbo models, providing scope for buyers to beef up the comfort, convenience and/or technology specification.

Pricing starts from $33,490 plus on-road costs for the L1H1 dC1 90, with the dCi 140 adding $3,500 on the SWB. The LWB L2H1 dCi 140 starts a little further upstream at $38,490. ▲

**Renault Australia**
**www.renault.com.au**

# HOLDEN SANDMAN

Utes and recreational pursuits have become so interwoven today that car-makers promote the lifestyle aspects of their commercial vehicles as much as their work ethic.

This is partly due to the rise of the suburban 'weekend warrior' desperate for out-of-hours adventure, but traditional buyers are also naturally drawn to a vehicle's potential as both a tool of the trade and one that fits the bill away from work.

Holden knew this all too well back in the 1970s when it created the Sandman panel van and ute, tapping into surf culture and an Australian psyche that valued freedom and, ahem, free love.

And now the legendary model is back – in name, at least.

The panel van is long gone, and not coming back as Holden prepares to close its Australian car-making operations in 2017, taking the Commodore-based two-door model with it. But for a limited time, the lion brand is aiming to rekindle the Sandman spirit with a special-edition ute and station wagon.

Adding $2,950 on to the price of SSV and SV6 models, and on sale from June, the Sandman edition comes with some familiar retro decals that contrast with 20" gloss-black wheels and blackened fender vents, grille and sports bars.

Holden's design team has also come up with unique Sandman dashboard stitching, sunshades, floor mats and, for an extra outlay, orange sheepskin seat inserts. An orange shagpile cargo rug was also developed for the wagon (that's Sportwagon these days, not shaggin' wagon) but we see no reason why it couldn't be added to the ute's tray.

Individual build plates are also provided.

The modern-era VF Ute is a far cry from the 1974 HQ Holden, which was the first Sandman series, followed by the HJ (1974-76), HX (1976-77) and HZ (1977). Certainly it is safer, more powerful and far more sophisticated.

But surfboards and larrikins are still a common sight around tradies' utes, and this Sandman-inspired edition could be just the thing to complete the image.

**Holden Australia**
**www.holden.com.au**


# ISUZU N SERIES

Isuzu Australia Limited has introduced a comprehensive upgrade for its all-important N Series, bringing fresh looks, increased performance on NPR variants and a new electric stability control system to the light-duty truck range.

The 2015 update also heralds a change in nomenclature for the massive 50-plus model range, with the familiar three-letter model codes remaining – NLR, NLS, NNR, NPR, NQR and NPS – but then followed by two numbers that reflect GVM rating (from 4.5t to 8.7t, expressed 45, 87, etc) and a separate number indicating power rating in PS (or metric horsepower).

By way of example, and an illustration of the improved performance, the NPR 65-190 and NPR 75-190 – with 6.5t and 7.5t GVM respectively – now benefit from the high-output 190PS (or 140kW) powertrain previously restricted to the higher-series NQR line.

This is the '4HK1' SiTEC Series III 185 engine – a 5.2L turbo-diesel that develops its maximum power at 2,600rpm and carries 510Nm of torque available from 1,600-2,600rpm. This equates to a 23% increase in power and 22% torque boost compared to the previous SiTEC 155.

It combines with a six-speed manual gearbox, complete with full synchromesh on all forward gears, while a six-speed automated manual transmission (AMT) with both fully automatic and clutch-less manual modes is available.

The 190PS engine is also now offered in the driver's licence category NPR 45-190, the strong performance combining with a 2t payload when fitted with an aluminium tray – a package especially designed to appeal to tradespeople who might otherwise be looking for a diesel utility.

The 2015 N Series is identified by fresh new looks, including revised grille design in paint colour for NLR, NLS, NNR and NPS, and chrome on NPR and NQR variants. The latter also benefit from the 'premium' specification level, picking up fog lamps and automatic climate-control air conditioning (except for Tipper variants).

New seat trim and a smaller steering wheel are now included, and the driver's seat comes with a vibration-absorbing support pad, torsion bar and optimised weight ratio for up to 130kg.

Among other changes to the range, all N Series models bar the NQR have a new 90A alternator (up 10A) that broadens its ability to handle aftermarket accessories, while greater data capacity comes with more information from CAN BUS stored onboard. Isuzu says the latter is important in enabling technicians to "readily access more operational data to diagnose and rectify any issues that may occur".

NNR and NPR 45 and 55 models now have the 'MYY6' transmission with revised ratio set. Third and fourth gear ratios have been revised, effectively narrowing the gap from second to third gear.

A new Isuzu Electronic Stability Control (IESC) system applies to all NLR, NNR and NPR models, constantly monitoring data from a range of sensors to detect and, if required, help correct an unexpected loss of vehicle control. It works in conjunction with a raft of other safety equipment including traction control, hill-start assist and ABS brakes with EBD. ▲

**Isuzu Trucks Australia**
**www.isuzu.com.au**

# HOLDEN COLORADO Z71

With the all-new Toyota HiLux, Nissan Navara, Mitsubishi Triton and a heavily upgraded Ford Ranger either on sale or almost on the market, Holden has moved to divert our attention its way with the launch of a new flagship version of its Colorado ute, dubbed the Z71.

Based on the MY16 LTZ 4x4 Crew Cab pick-up, the Z71 is pitched at top-end buyers who are looking for some extra flair – in a darker, more aggressive theme – and cabin comfort.

The key exterior additions include 18" gun-metal 'Arsenal Grey' alloy wheels (with 265/60-section tyres), a body coloured sail plane (with Z71 graphic), stylised nudge bar, revised headlights (with a dark chrome mask) and a host of other black elements including bonnet (also with Z71 graphic), body side door mouldings, door handles, roof rails and rear step trim.

Gloss black detailing is also applied to the exterior mirror caps, B-pillars and tailgate handle, while a black soft tonneau cover is fitted. A hard tonneau is available as an option.

The interior, meanwhile, carries leather-appointed seats (heated up front), adding to the full whack of equipment already fitted to the LTZ such as climate-control air conditioning, 7" colour touch screen with Mylink media system, reversing camera and satellite navigation.

Safety features include six airbags, electronic stability and traction control, trailer sway control, hill descent control, hill-start assist and ABS brakes.

There are no mechanical changes, with a 2.8L four-cylinder turbo-diesel engine delivering 147kW and 440Nm when paired with a six-speed manual gearbox, or 500Nm with the optional six-speed automatic.

Pricing starts from $54,990 plus on-road costs for the manual, or $57,190 for the auto. ▲

**Holden Australia**
**www.holden.com.au**

## AMX
## WWW.AMXAUSTRALIA.COM.AU/TRAINING

### Inspired XPert

This two-day classroom course provides the knowledge to design and configure the IS XPert player, along with hands-on experience with Composer software for creating content from easy-to-use templates to support on-the-spot editing, publishing and delivery of signage content. Students are given an opportunity to use photo albums and RSS feeds.

| Start date | End date | Location |
|---|---|---|
| 24/09/2014 | 25/09/2014 | Gold Coast |

### Inspired XPress

This two-day classroom course covers the design and installation of the Inspired XPress digital signage equipment and software, including the development of custom content, for both static and dynamic signage. Students are given an opportunity to use web photo albums and RSS feeds.

| Start date | End date | Location |
|---|---|---|
| 22/09/2014 | 23/09/2014 | Gold Coast |

### AMX Programming 1

This four-day course for programmers and technical support personnel teaches the basic techniques for programming an AMX control system. A person completing this course will be able to program a basic NetLinx control system.

| Start date | End date | Location |
|---|---|---|
| 10/11/2014 | 13/11/2014 | Melbourne |
| 17/11/2014 | 20/11/2014 | Western Australia |
| 24/11/2014 | 27/11/2014 | New Zealand |

### AMX Installation

In this course you will learn how to take NetLinx and Enova system designs and install, including control, DVX and DGX setup and configuration, DXLink integration, ICSLan, resolution adjustments, DSP and troubleshooting.

| Start date | End date | Location |
|---|---|---|
| 13/10/2014 | 15/10/2014 | Western Australia |
| 27/10/2014 | 29/10/2014 | South Australia |

### AMX Design

This course for designers, sales personnel and consultants focuses on the capabilities of AMX systems and the requirements to design fully functioning room solutions. In this course you will learn how to take a scope of work and design NetLinx and Enova systems, including control, AV switching and distribution.

| Start date | End date | Location |
|---|---|---|
| 16/10/2014 | 16/10/2014 | Western Australia |
| 11/11/2014 | 11/11/2014 | South Australia |

### RMS Administration

This one-day course is designed for the RMS enterprise end-user. After completion, you will be able to navigate the RMS Enterprise work area interface and perform the most common RMS Enterprise Tasks.

| Start date | End date | Location |
|---|---|---|
| 20/10/2014 | 20/10/2014 | Gold Coast |

### RMS Programming

This two-day course helps advanced programmers implement and develop code to work with RMS. Step through instruction for the basic elements as well as working with existing code and how to code more efficiently for RMS.

| Start date | End date | Location |
|---|---|---|
| 21/10/2014 | 22/10/2014 | Gold Coast |

## RAMSDEN TELECOMMUNICATIONS TRAINING
## WWW.RAMSDENTRAINING.EDU.AU

### Structured Cabling Endorsement

A specialist cabling endorsement for planning, installing and certifying data cabling to AS/NZS 3080.

| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 22/09/2015 | Preston |
| 28/09/2015 | 29/09/2015 | St Leonards |
| 9/11/2015 | 10/11/2015 | Lambton |
| 16/11/2015 | 17/11/2015 | Regency Park |
| 30/11/2015 | 1/12/2015 | Murdoch |
| 30/11/2015 | 1/12/2015 | Preston |

### Optical Fibre Cabling Endorsement

This is a specialist cabling endorsement for planning, installing and certifying optical fibre cablng for use in office, MDU and industrial environments, including direct termination and splicing and LSPM and OTDR testing.

| Start date | End date | Location |
|---|---|---|
| 23/09/2015 | 24/09/2015 | Preston |
| 30/09/2015 | 1/10/2015 | St Leonards |
| 11/11/2015 | 12/11/2015 | Lambton |
| 18/11/2015 | 19/11/2015 | Regency Park |

### Coaxial Cabling Endorsement

This is a specialist cabling endorsement for installation and testing of coaxial cable for pay TV and security use in a customer premises environment.

| Start date | End date | Location |
|---|---|---|
| 11/09/2015 | 11/09/2015 | Salisbury |
| 25/09/2015 | 25/09/2015 | Preston |
| 2/10/2015 | 2/10/2015 | St Leonards |
| 13/11/2015 | 13/11/2015 | Lambton |
| 20/11/2015 | 20/11/2015 | Regency Park |

### Open Registration

This registration is a legal requirement for those installing cables in buildings on the customer side of the network boundary for telephone/fax/internet services, data networking, security or fire detection wiring for alarm systems remotely monitored by a security/fire detection company and pay TV distribution.

| Start date | End date | Location |
|---|---|---|
| 10/09/2015 | 11/09/2015 | Murdoch |
| 15/10/2015 | 16/10/2015 | Salisbury |
| 19/11/2015 | 20/11/2015 | Lambton |

### Restricted Registration

Restricted registration is a legal requirement for installing simple cabling and sockets in buildings such as single dwellings and small shops. The theory component of the restricted registration course is delivered online through eLearning, followed by a half-day practical course.

| Start date | End date | Location |
|---|---|---|
| 10/09/2015 | 10/09/2015 | Murdoch |
| 15/10/2015 | 15/10/2015 | Salisbury |
| 19/11/2015 | 19/11/2015 | Lambton |

### Upgrade to Open Registration

This course provides the training required for holders of a restricted registration to upgrade to the open registration competency. The theory component of the 'Upgrade to Open Registration' course is delivered online through eLearning, followed by a one-and-a-half-day practical course.

| Start date | End date | Location |
|---|---|---|
| 10/09/2015 | 11/09/2015 | Murdoch |
| 15/10/2015 | 16/10/2015 | Salisbury |
| 19/11/2015 | 20/11/2015 | Lambton |

### Pit and Pipe and Cable Hauling

This training course is written for students who pit and pipe infrastructure within the carrier environment.

| Start date | End date | Location |
|---|---|---|
| 12/10/2015 | 14/10/2015 | Salisbury |
| 16/11/2015 | 18/11/2015 | Lambton |

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WWW.CLIPSAL.COM

## C-Bus Basic

The C-Bus Basic training course is an entry level training course designed for electrical contractors and apprentices who wish to learn how to install and program C-Bus.

| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 23/09/2015 | Adelaide |
| 21/09/2015 | 23/09/2015 | Rocklea |
| 21/09/2015 | 23/09/2015 | Carlton North |
| 12/10/2015 | 14/10/2015 | Hobart |
| 13/10/2015 | 15/10/2015 | Melbourne |
| 19/10/2015 | 21/10/2015 | Adelaide |
| 26/10/2015 | 28/10/2015 | Rocklea |
| 26/10/2015 | 28/10/2015 | Perth |
| 9/11/2015 | 11/11/2015 | Brisbane |
| 9/11/2015 | 11/11/2015 | Carlton North |
| 23/11/2015 | 25/11/2015 | Rocklea |
| 23/11/2015 | 25/11/2015 | Sydney |

## C-Bus DALI Gateway

The C-Bus DALI Gateway training course is designed for electrical contractors, consultants and apprentices who wish to learn the installation practices of a DALI system with the integration of C-Bus DALI Gateway.

| Start date | End date | Location |
|---|---|---|
| 16/10/2015 | 16/10/2015 | Townsville |
| 30/10/2015 | 30/10/2015 | Brisbane |
| 20/11/2015 | 20/11/2015 | Adelaide |
| 27/11/2015 | 27/11/2015 | Melbourne |

## C-Bus Learning Pathway A (C-Bus Basic + Touch Screen)

The Learning Pathway A is a training course which will provide a entry level for electrical contractors, IT personnel and apprentices who wish to learn how to design, install and program a C-Bus system including C-Bus touch screens.

| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 25/09/2015 | Rocklea |
| 21/09/2015 | 25/09/2015 | Carlton North |
| 12/10/2015 | 16/10/2015 | Hobart |
| 19/10/2015 | 23/10/2015 | Adelaide |
| 26/10/2015 | 30/10/2015 | Rocklea |
| 26/10/2015 | 30/10/2015 | Perth |
| 9/11/2015 | 13/11/2015 | Brisbane |
| 23/11/2015 | 27/11/2015 | Rocklea |
| 23/11/2015 | 27/11/2015 | Sydney |

## C-Bus Logic

The C-Bus Logic training course is designed for electrical contractors, consultants and apprentices who wish to learn how to program the C-Bus logic engine.

| Start date | End date | Location |
|---|---|---|
| 22/09/2015 | 23/09/2015 | Sydney |
| 13/10/2015 | 14/10/2015 | Brisbane |
| 16/11/2015 | 17/11/2015 | Adelaide |

## C-Bus Wiser Home Control

The Wiser Home Control training course is designed for consultants, electrical contractors and system integrators who wish to learn how to program the Wiser Home Controller system.

| Start date | End date | Location |
|---|---|---|
| 24/09/2015 | 24/09/2015 | Sydney |
| 15/10/2015 | 15/10/2015 | Brisbane |
| 18/11/2015 | 18/11/2015 | Adelaide |

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WWW.CLIPSAL.COM

## C-Bus Touch Screen

The C-Bus Touch Screen training course is designed for electrical contractors, consultants and apprentices who wish to learn how to program C-Bus touch screens.

| Start date | End date | Location |
|---|---|---|
| 24/09/2015 | 25/09/2015 | Rocklea |
| 24/09/2015 | 25/09/2015 | Carlton North |
| 15/10/2015 | 16/10/2015 | Hobart |
| 22/10/2015 | 23/10/2015 | Adelaide |
| 29/10/2015 | 30/10/2015 | Rocklea |
| 29/10/2015 | 30/10/2015 | Perth |
| 12/11/2015 | 13/11/2015 | Brisbane |
| 19/11/2015 | 20/11/2015 | Carlton North |
| 26/11/2015 | 27/11/2015 | Rocklea |
| 26/11/2015 | 27/11/2015 | Sydney |

## Conext XW+ and SW/SW+ Inverter/Chargers for Off-Grid Applications

The Conext XW Inverter/Chargers course is aimed at product managers, technical staff and existing installers of off-grid, battery backed energy storage systems, small scale and commercial solar systems. The Conext XW Inverter/Charger course will equip the attendee with the skills to design off-grid systems, program the inverter charger, fault find and maintain off-grid and battery backed energy storage systems used in conjunction with external generators and solar charge controllers.

| Start date | End date | Location |
|---|---|---|
| 16/09/2015 | 17/09/2015 | Melbourne |
| 30/09/2015 | 1/10/2015 | Hobart |
| 28/10/2015 | 29/10/2015 | RFI Solar |
| 11/11/2015 | 12/11/2015 | Brisbane |

## DALIcontrol Advanced - DALIBuildings

The DALIcontrol Advanced – DALIBuildings training course is designed as gap training for system integrators who have previously attended DALIcontrol Advanced – Line Controller (PST251) and DALIcontrol Advanced Electronic Control Devices (PST252), which uses the previous version of the DALIcontrol software bundle.

| Start date | End date | Location |
|---|---|---|
| 15/10/2015 | 15/10/2015 | Townsville |
| 29/10/2015 | 29/10/2015 | Brisbane |
| 19/11/2015 | 19/11/2015 | Adelaide |
| 26/11/2015 | 26/11/2015 | Melbourne |

## DALIcontrol Advanced - Electronic Control Devices

The DALIcontrol Advanced – Electronic Control Device (ECD) training course is designed for system integrators who wish to expand their knowledge on the DALIcontrol system using advanced software features to program DALI native control devices such as DALIcontrol switches and sensors.

| Start date | End date | Location |
|---|---|---|
| 30/09/2015 | 1/10/2015 | Brisbane |
| 28/10/2015 | 29/10/2015 | Canberra |

## DALIcontrol Advanced - High Level Interface

The DALIcontrol Advanced – High Level Interface (HLI) training course is designed for system integrators who wish to expand their knowledge on integrating DALIcontrol system with C-Bus colour touch screens, Schedule Plus 5 or third party building management systems (BMS).

| Start date | End date | Location |
|---|---|---|
| 2/10/2015 | 2/10/2015 | Brisbane |
| 30/10/2015 | 30/10/2015 | Canberra |

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## WWW.CLIPSAL.COM

### DALIcontrol Advanced - Line Controller

The DALIcontrol Advanced – Line Controller training course is designed for system integrators who wish to learn the basics of how to program the DALIcontrol system. This course covers the installation practise and some troubleshooting techniques of a DALI system. It also covers the programming of a DALI system using a list of DALIcontrol Software.

| Start date | End date | Location |
|---|---|---|
| 28/09/2015 | 29/09/2015 | Brisbane |
| 26/10/2015 | 27/10/2015 | Canberra |

### DALIcontrol Simple Wizard

The DALIcontrol Simple Wizard training course is designed for electrical contractors and system integrators who wish to learn the installation and commissioning of a DALI system using user friendly Simple Wizard software.

| Start date | End date | Location |
|---|---|---|
| 15/10/2015 | 15/10/2015 | Townsville |
| 29/10/2015 | 29/10/2015 | Brisbane |
| 19/11/2015 | 19/11/2015 | Adelaide |
| 26/11/2015 | 26/11/2015 | Melbourne |

### EcoXpert - Practical Energy Audit

This training course will ensure that an EcoXpert understands the different types of energy audits and can use data to identify opportunities to save energy.

| Start date | End date | Location |
|---|---|---|
| 22/09/2015 | 23/09/2015 | Perth |

### EcoXpert - Selling and Negotiation

Using the tools, documents and learning from the previous training, this course will help you develop a compelling offer for your customer. This experiential learning process is designed to help you develop the fundamental skills and techniques required to more effectively meet your customer's needs.

| Start date | End date | Location |
|---|---|---|
| 15/09/2015 | 15/09/2015 | Sydney |
| 22/09/2015 | 22/09/2015 | Brisbane |
| 22/10/2015 | 22/10/2015 | Perth |
| 27/10/2015 | 27/10/2015 | Melbourne |

### EcoXpert - SEMS Design and Quote

This training course covers the basics of designing and quoting on the SEMS system. This course allows you to choose the right architectures, components and services for the end-users needs as well as providing solution quotation. This course will showcase the benefits of the technical aspects of the solution and provide technical information against competition.

| Start date | End date | Location |
|---|---|---|
| 5/10/2015 | 5/10/2015 | Melbourne |
| 28/10/2015 | 28/10/2015 | Adelaide |
| 11/11/2015 | 11/11/2015 | Brisbane |
| 25/11/2015 | 25/11/2015 | Perth |

### EcoXpert - SEMS Installation and Commissioning

This course is designed for partners, integrators and contractors who are interested in installing and commissioning the Schneider Electric SEMS system for energy management using the SIMs and EGX.

| Start date | End date | Location |
|---|---|---|
| 6/10/2015 | 7/10/2015 | Melbourne |
| 29/10/2015 | 30/10/2015 | Adelaide |
| 12/11/2015 | 13/11/2015 | Brisbane |
| 26/11/2015 | 27/11/2015 | Perth |

### Network Connectivity - Fibre Testing Update

This course allows participants to address the changes in fibre optic Standards and associated testing in the past two years.

| Start date | End date | Location |
|---|---|---|
| 16/09/2015 | 16/09/2015 | Brisbane |
| 14/10/2015 | 14/10/2015 | Perth |

## PUSH BY SCHNEIDER ELECTRIC
## WWW.PUSHCONTROLS.COM

### Push Control Core Principles

The Push Controls Core Principles training course is an entry level training course designed for electrical contractors and apprentices who wish to learn how to install and program Push Controls' products.

| Start date | End date | Location |
|---|---|---|
| 24/09/2015 | 25/09/2015 | Adelaide |
| 13/10/2015 | 14/10/2015 | Townsville |
| 27/10/2015 | 28/10/2015 | Brisbane |
| 24/11/2015 | 25/11/2015 | Melbourne |

## NECA VIC
## HTTP://NECA.ASN.AU/VIC/

### EcoSmart Electricians

This is the premier program for energy efficiency training to meet the rapidly growing demand for energy efficient technology, products and installations. This is a blended delivery program with approximately 15 hours online and one day in the classroom.

| Start date | End date | Location |
|---|---|---|
| 24/09/2015 | 24/09/2015 | South Melbourne |
| 22/10/2015 | 22/10/2015 | South Melbourne |
| 12/11/2015 | 12/11/2015 | South Melbourne |

### BCA Lighting (Commercial)

This two day course for electrical contractors provides computer aided design application knowledge for commercial lighting application and a comprehensive understanding of declaration requirements necessary for Part J6 Compliance Statements.
Pre-requisite: Lighting module of EcoSmart Electricians, Lighting for Living or approved equivalent.

| Start date | End date | Location |
|---|---|---|
| 19/11/2015 | 26/11/2015 | South Melbourne |

### Emergency and Exit Ligthing

Based on AS2293, the Australian Standard for Emergency lighting, this training workshop developed and delivered by MPower provides valuable information relating to the standards and the evolution of new technology. In a hands on workshop you will enhance your existing skills, culminating in the ability to design, install and maintain an emergency lighting installation. Participants will explore the different sections of AS2293 working through real world application examples, expanding their knowledge and providing a challenge for anyone who attends.

| Start date | End date | Location |
|---|---|---|
| 2/10/2015 | 2/10/2015 | Mordialloc |
| 9/10/2015 | 9/10/2015 | Traralgon |
| 16/10/2015 | 16/10/2015 | Geelong |
| 13/11/2015 | 13/11/2015 | Bendigo |

### OH&S Management

This two day intensive training program has been specifically designed to provide contractors and their management with a clear understanding of the role of Occupational Health and Safety in today's work environment and specifically in the electrotechnology industry.

| Start date | End date | Location |
|---|---|---|
| 19/10/2015 | 26/10/2015 | South Melbourne |

## ELECTRO-TRAINING INSTITUTE
## WWW.ELECTROTRAININGINSTITUTE.COM.AU

### Open Cabling - ACMA Open Rules

The completion of this course allows students to undertake the laying and termination of telecommunications cabling in buildings and premises. It encompasses working safely and to ACMA's Open Cabling Provider Rules, installing multiple telephone line, multi-pair cables, backbone cabling, terminating socket outlets, termination modules and distributors, testing and compliance checks and completing cabling documentation.

| Start date | End date | Location |
|---|---|---|
| 12/10/2015 | 14/10/2015 | Townsville |
| 23/11/2015 | 25/11/2015 | Brisbane |

### Restricted Electrical Course

This course is designed for trade persons to complete electrical work involved with their job.

| Start date | End date | Location |
|---|---|---|
| 27/10/2015 | 30/10/2015 | Mackay |
| 3/11/2015 | 6/11/2015 | Townsville |

### Test and Tag

This course is designed for anyone with basic literacy and numeracy skills who wishes to test and tag leads for themselves and/or their employer.

| Start date | End date | Location |
|---|---|---|
| 30/10/2015 | 30/10/2015 | Mackay |
| 6/11/2015 | 6/11/2015 | Townsville |

### Cert II in Split Air-Conditioning and Heat Pump Systems

This course is designed for electricians and electrical apprentices (that have completed the required units of competency). The qualification is delivered in a classroom environment. Students are given training in both the theory and practical elements of installing air conditioning split systems. A certificate will be issued on successful completion of the course that will enable the student to apply to the Australian Refrigeration Council (ARC) for a restricted refrigerant gas handling and/or purchasing licence.

| Start date | End date | Location |
|---|---|---|
| 28/10/2015 | 30/10/2015 | Mackay |
| 4/11/2015 | 6/11/2015 | Townsville |

### Structured Cabling and Co-Axial Cable

This course aims to give the skills necessary to competently cable integrated voice and data systems to the Australian Standard (AS 3080) and to meet client communication needs in a commercial environment.

| Start date | End date | Location |
|---|---|---|
| 19/10/2015 | 20/10/2015 | Townsville |
| 30/11/2015 | 1/12/2015 | Brisbane |

### Fibre Optics Course

This course aims to introduce you to the concepts of optical fibre cabling, so that you understand the different forms of fibre optic cable, gain an understanding of the propagation of light through the fibre and to understand the various connection and splicing methods of optical fibre and where they are used in installations through the industry.

| Start date | End date | Location |
|---|---|---|
| 15/10/2015 | 16/10/2015 | Townsville |
| 26/11/2015 | 27/11/2015 | Brisbane |

### Solar Install and Design

UEENEEK125A, UEENEEK148A and UEENEEK135A units of competency fulfil the qualification requirement for electricians to to gain their grid-connect install and design PV system accreditation from the Clean Energy Council (CEC).

| Start date | End date | Location |
|---|---|---|
| 24/11/2015 | 27/11/2015 | Brisbane |

## MILCOM COMMUNICATIONS
## WWW.MILCOM.EDU.AU

### Coax Cabling

This course aims to give skills necessary to competently install, terminate and test coaxial cabling.

| Start date | End date | Location |
|---|---|---|
| 14/09/2015 | 17/09/2015 | Chadstone |
| 24/09/2015 | 24/09/2015 | Chadstone |
| 28/09/2015 | 1/10/2015 | Chadstone |
| 26/10/2015 | 27/10/2015 | Chadstone |
| 26/10/2015 | 28/10/2015 | Chadstone |
| 28/10/2015 | 29/10/2015 | Granville |
| 30/10/2015 | 30/10/2015 | Granville |
| 9/11/2015 | 13/11/2015 | Granville |
| 9/11/2015 | 10/11/2015 | Salisbury |
| 10/11/2015 | 10/11/2015 | Salisbury |
| 11/11/2015 | 12/11/2015 | Salisbury |
| 16/11/2015 | 17/11/2015 | Granville |
| 30/11/2015 | 1/12/2015 | Granville |

### eLearning Open Registration

This course is for those looking to obtain their open registration. This is the best starting point for work within the telecommunications industry (on either the customer premises or carrier network).

| Start date | End date | Location |
|---|---|---|
| 1/10/2015 | 1/10/2015 | Granville |
| 12/10/2015 | 13/10/2015 | Maddington |
| 13/10/2015 | 13/10/2015 | Maddington |
| 16/10/2015 | 16/10/2015 | Maddington |
| 20/10/2015 | 20/10/2015 | Granville |
| 21/10/2015 | 22/10/2015 | Granville |
| 4/11/2015 | 5/11/2015 | Salisbury |
| 18/11/2015 | 19/11/2015 | Chadstone |
| 20/11/2015 | 20/11/2015 | Chadstone |
| 25/11/2015 | 26/11/2015 | Chadstone |

### NBN Install Underground Service Drop

This course is designed to provide workers with nationally consistent training and instruction to install an underground service drop sheath (SDS) and premises connection device (PCD).

| Start date | End date | Location |
|---|---|---|
| 19/10/2015 | 20/10/2015 | Granville |

### NBN Install, Commission and Maintain a Fibre NTD

This course is designed to provide workers with nationally consistent training and instruction to install, commission and maintain the NBN Co fibre network termination device (NTD), power supply with battery backup (PS/B), fibre wall outlet (FWO) and fibre NTD enclosure.

| Start date | End date | Location |
|---|---|---|
| 16/11/2015 | 17/11/2015 | Granville |

### NBN Safety and Awareness

Milcom has been selected as one of the RTOs who can deliver this course. It is required for workers who are hauling (rodding and roping) NBN Co fibre optic cable and installing, connecting or maintaining NBN Co network assets.

| Start date | End date | Location |
|---|---|---|
| 24/10/2015 | 25/10/2015 | Chadstone |
| 27/10/2015 | 27/10/2015 | Granville |
| 2/11/2015 | 5/11/2015 | Granville |
| 9/11/2015 | 13/11/2015 | Chadstone |
| 23/11/2015 | 24/11/2015 | Chadstone |
| 30/11/2015 | 2/12/2015 | Chadstone |

## MILCOM COMMUNICATIONS
## WWW.MILCOM.EDU.AU

### Open Registration

This course is for those looking to obtain their open registration. This is the best starting point for work within the telecommunications industry (on either the customer premises or carrier network).

| Start date | End date | Location |
|---|---|---|
| 14/09/2015 | 18/09/2015 | Granville |
| 14/09/2015 | 15/09/2015 | Chadstone |
| 28/09/2015 | 30/09/2015 | Granville |
| 8/10/2015 | 9/10/2015 | Chadstone |
| 19/10/2015 | 22/10/2015 | Chadstone |
| 24/11/2015 | 24/11/2015 | Chadstone |

### Optical Fibre Internal Cabling

The course aims to introduce you to the concepts of optical fibre cabling, so that you understand the different forms of fibre optic cable, gain an understanding of the propagation of light through the fibre and to understand the various connection and splicing methods of optical fibre and where they are used in installations thru industry.

| Start date | End date | Location |
|---|---|---|
| 14/09/2015 | 17/09/2015 | Maddington |
| 21/09/2015 | 23/09/2015 | Maddington |
| 23/09/2015 | 24/09/2015 | Granville |
| 28/09/2015 | 2/10/2015 | Chadstone |
| 6/10/2015 | 9/10/2015 | Granville |
| 12/10/2015 | 13/10/2015 | Chadstone |
| 13/10/2015 | 13/10/2015 | Chadstone |
| 14/10/2015 | 15/10/2015 | Chadstone |
| 16/10/2015 | 16/10/2015 | Chadstone |
| 29/10/2015 | 29/10/2015 | Chadstone |
| 2/11/2015 | 3/11/2015 | Salisbury |
| 16/11/2015 | 17/11/2015 | Chadstone |
| 30/11/2015 | 1/12/2015 | Granville |

### Structured Cabling

This course aims to give skills necessary to competently cable integrated voice and data systems to the Australian Standard AS3080 to meet client communication needs in a commercial environment.

| Start date | End date | Location |
|---|---|---|
| 23/09/2015 | 24/09/2015 | Salisbury |
| 24/09/2015 | 24/09/2015 | Salisbury |
| 24/09/2015 | 24/09/2015 | Maddington |
| 25/09/2015 | 25/09/2015 | Granville |
| 30/09/2015 | 1/10/2015 | Salisbury |
| 5/10/2015 | 6/10/2015 | Chadstone |
| 12/10/2015 | 16/10/2015 | Granville |
| 2/11/2015 | 3/11/2015 | Granville |
| 2/11/2015 | 3/11/2015 | Maddington |
| 9/11/2015 | 10/11/2015 | Maddington |
| 10/11/2015 | 10/11/2015 | Maddington |
| 11/11/2015 | 12/11/2015 | Maddington |
| 13/11/2015 | 13/11/2015 | Maddington |
| 30/11/2015 | 4/12/2015 | Chadstone |

### Alarm Installation

This course will provide you with the skills and knowledge to correctly install a basic alarm system from the sensors thru to the alarm panel and control pad and install and maintain a complex alarm system including back to base monitoring.

| Start date | End date | Location |
|---|---|---|
| 16/09/2015 | 16/09/2015 | Chadstone |

## MILCOM COMMUNICATIONS
## WWW.MILCOM.EDU.AU

### Cable Hauling (meets Telstra standards)

On completion of this package students will be able to describe the underground network, read and interpret conduit and cable hauling plans including duct occupancy, amd carry out pre-hauling requirements duct occupancy, sub ducting, individual haul distances, haul direction.

| Start date | End date | Location |
|---|---|---|
| 7/10/2015 | 8/10/2015 | Maddington |
| 14/10/2015 | 15/10/2015 | Maddington |
| 17/11/2015 | 17/11/2015 | Granville |

### CCTV Installation

From this course you will learn how to install and commission closed circuit TV systems from the cameras to the image processors and recorders.

| Start date | End date | Location |
|---|---|---|
| 7/10/2015 | 7/10/2015 | Chadstone |

### Pit & Pipe (meets Telstra standards)

By the end of the course, you will be able to prepare a site for installation, install pit and pipe or conduit to specification and manufacturers requirements, and ensure pipe and conduit internal surfaces are free from impediments, and pipe entry into enclosure is sealed against ingress from foreign matter.

| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 22/09/2015 | Granville |
| 21/09/2015 | 23/09/2015 | Chadstone |
| 22/09/2015 | 22/09/2015 | Granville |
| 29/09/2015 | 2/10/2015 | Maddington |
| 5/10/2015 | 6/10/2015 | Maddington |
| 10/10/2015 | 11/10/2015 | Granville |
| 4/11/2015 | 5/11/2015 | Maddington |
| 7/11/2015 | 7/11/2015 | Chadstone |
| 18/11/2015 | 19/11/2015 | Granville |

## VCOMM/RESI-LINX
## WWW.RESI-LINX.COM

### digi-MOD HD DVB-T/IP Encoding Training session

This 2.5 to 3 hour "hands on" training course looks at SD/HD RF and IP distribution, and how to install the technology in hotels, motels, homes, MDUs, schools, hospitals, etc. The course will explain how to distribute over existing RF cable, over long distances, to between one and 1,000 TVs, from one to 50 sources. The course gives attendees hands-on experience with resi-linx's range of products, including SD modulators, HD modulators and IP distribution.

| Start date | End date | Location |
|---|---|---|
| 1/10/2015 | 1/10/2015 | Glen Iris |
| 5/11/2015 | 5/11/2015 | Glen Iris |
| 3/12/2015 | 3/12/2015 | Glen Iris |

## FUTURE SKILLS
## WWW.FUTURESKILLS.ASN.AU

### NT Health and Safety Representative (HSR) training

Regulator approved training for Health and Safety Representatives (HSRs) and deputy HSRs to gain skills, knowledge, tools and confidence to effectively perform their role in the workplace.

| Start date | End date | Location |
|---|---|---|
| 14/09/2015 | 18/09/2015 | Darwin |

### QLD Health and Safety Representative (HSR) training

Regulator approved training for Health and Safety Representatives (HSRs) and deputy HSRs to gain skills, knowledge, tools and confidence to effectively perform their role in the workplace.

| Start date | End date | Location |
|---|---|---|
| 28/09/2015 | 2/10/2015 | Brisbane |

# TRAINING DIARY

## CRESTRON TECHNICAL INSTITUTE
## WWW.CRESTRON.COM.AU

### Smart Graphics Training

This two day program delves into the depths of smart graphics and their use on Crestron touch panels and web interfaces. The class covers subjects such as theme creating and modification, smart objects and colours. Students leave with a complete understanding of smart graphics and can produce truly interactive and personal interfaces to meet the wider needs of the industry.

| Start date | End date | Location |
|---|---|---|
| 12/10/2015 | 13/10/2015 | Sydney |
| 26/10/2015 | 27/10/2015 | Perth |

### DM Certified Engineer - 4K

This three-day course will provide an in-depth look into the world of digital video and the Crestron DigitalMedia solution. The course is designed for the AV integrator with a moderate level of AV systems integration experience. Upon successful completion of this course, and associated exam, attendees will achieve the DigitalMedia Certification Engineer certification.

| Start date | End date | Location |
|---|---|---|
| 23/09/2015 | 25/09/2015 | Perth |
| 7/10/2015 | 19/10/2015 | Melbourne |
| 26/10/2015 | 28/10/2015 | Auckland |
| 10/11/2015 | 12/11/2015 | Sydney |

### Crestron Fusion Programmer

During this three-day course all aspects of Crestron Fusion will be covered, ranging from functionality and features to a hands-on Crestron Fusion configuration. Step-by-step guides and procedures will be taught to ensure successful future Crestron Fusion deployments and efficient programming. Challenges regarding different IT infrastructures will be covered, providing the required skill set to successfully complete Crestron Fusion projects.

| Start date | End date | Location |
|---|---|---|
| 15/09/2015 | 17/09/2015 | Sydney |
| 29/09/2015 | 1/10/2015 | Auckland |
| 4/11/2015 | 6/11/2015 | Sydney |

### Crestron Commercial System Design

The target audience for this two-day instructor-led class is individuals in the commercial environment that are looking for knowledge in AV system design and integration of Crestron products.

| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 22/09/2015 | Perth |
| 8/10/2015 | 9/10/2015 | Canberra |
| 22/10/2015 | 23/10/2015 | Sydney |
| 29/10/2015 | 30/10/2015 | Sydney |
| 19/11/2015 | 20/11/2015 | Melbourne |

### Foundations of Crestron Programming

This class is three days in duration. The students will use SIMPL and VT Pro-e to make changes to and create programming for basic single room systems.

| Start date | End date | Location |
|---|---|---|
| 14/10/2015 | 16/10/2015 | Sydney |
| 28/10/2015 | 30/10/2015 | Perth |

### Crestron Core System Programming

This class is three days in duration. The students will use SIMPL and VT Pro-e to program complex systems using third party devices, Fusion integration and Crestron Equipment.

| Start date | End date | Location |
|---|---|---|
| 22/09/2015 | 24/09/2015 | Sydney |
| 20/10/2015 | 22/10/2015 | Melbourne |
| 24/11/2015 | 26/11/2015 | Sydney |
| 1/12/2015 | 3/12/2015 | Auckland |

### Crestron Advanced System Programming

The goal of this three-day class is to teach advanced programming skills beyond the day-to-day programming skills. This finishes the knowledge base needed to pass the certification practicum.

| Start date | End date | Location |
|---|---|---|
| 17/11/2015 | 19/11/2015 | Sydney |

## COLLEGE OF ELECTRICAL TRAINING (RTO 2394)
## WWW.CET.ASN.AU

### UEE42611 Certificate IV in Hazardous Areas - Electrical

This nationally endorsed qualification provides licensed electricians with the training, skills and knowledge requred to supervise, select, install, commission, maintain and test explosion-protected equipment and systems for control and monitoring of plant and processes. It also includes skill sets in working with explosion protection techniques applicable to pressurisation, and gas and dust atmospheres. The qualification includes the ERAC requirements for an "Electrician's Licence".

| Start date | End date | Location |
|---|---|---|
| 14/09/2015 | 20/11/2015 | Joondalup |
| 9/11/2015 | 20/11/2015 | Joondalup |

### Checking and Testing an Electrical Installation

This non-endorsed course provides licensed electrians and final year apprentice electrical mechanics with the training, skills and knowledge to visually inspect and test an electrical installation to verify that it complies with the requirements of AS/NZS 3000.

| Start date | End date | Location |
|---|---|---|
| 23/09/2015 | 23/09/2015 | Joondalup |
| 30/09/2015 | 30/09/2015 | Jandakot |
| 8/10/2015 | 8/10/2015 | Joondalup |
| 21/10/2015 | 21/10/2015 | Joondalup |
| 28/10/2015 | 28/10/2015 | Jandakot |
| 5/11/2015 | 5/11/2015 | Joondalup |
| 25/11/2015 | 25/11/2015 | Jandakot |

### Electrical Contractors Licence & Electrical Contractors Nominees / In-house Licence Course

This EnergySafety WA approved course provides licensed electricians with the training, skills and knowledge to identify, investigate and apply statutory rerequirements, and apply statutory requirements and legislation, inspect and test electrical installation work according to regulatory requirements, and apply business task management procedures and business monitoring operations.

| Start date | End date | Location |
|---|---|---|
| 5/10/2015 | 9/10/2015 | Joondalup |
| 10/10/2015 | 22/10/2015 | Joondalup |
| 12/10/2015 | 16/10/2015 | Jandakot |
| 2/11/2015 | 6/11/2015 | Jandakot |
| 7/11/2015 | 19/11/2015 | Jandakot |
| 9/11/2015 | 13/11/2015 | Joondalup |
| 14/11/2015 | 26/11/2015 | Joondalup |

### Electrical Cords & Plugs Course (Non-Licenced)

This non-endorsed course provides the training, skills and knowledge required to fit plug tops to low voltage electrical cord connected equipment and to assemble low voltage extension sets.

| Start date | End date | Location |
|---|---|---|
| 19/10/2015 | 19/10/2015 | Joondalup |

### High Voltage Switching Systems Operations Course

This nationally recognised course provides licensed electrical workers and engineers working with HV switchgear in industrial facilities and networks with the training, skills and knowledge to conduct switching operations and the responsibilities of permit users and recipients. A Certificate III in Electrotechnology Electrician or equivalent is a prerequisite entry requirement for the course.

| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 25/09/2015 | Jandakot |
| 5/10/2015 | 9/10/2015 | Jandakot |
| 12/10/2015 | 16/10/2015 | Jandakot |
| 26/10/2015 | 30/10/2015 | Jandakot |
| 2/11/2015 | 6/11/2015 | Jandakot |
| 9/11/2015 | 13/11/2015 | Jandakot |
| 23/11/2015 | 27/11/2015 | Jandakot |
| 30/11/2015 | 4/12/2015 | Jandakot |

## COLLEGE OF ELECTRICAL TRAINING (RTO 2394)
## WWW.CET.ASN.AU

### 80970 ACT Course in Electrician- Minimum Australian Context Gap Training

This nationally accredited course provides the holders of an Offshore Technical Skills Record (OTSR) with the skills and knowledge to complete the minimum Australian context gap training required for the UEE30807 Certificate III in Electrotechnology Electrician qualification.

| Start date | End date | Location |
|---|---|---|
| 12/10/2015 | 16/10/2015 | Joondalup |
| 2/11/2015 | 13/11/2015 | Joondalup |
| 9/11/2015 | 13/11/2015 | Jandakot |

### Portable Appliance Testing (PAT) Course

This non-endorsed course provides the training, skills and knowledge for persons not qualified to perform licenced electrical work to inspect and test electrical cord connected equipment and cord assemblies using a pass-fail portable appliance tester (PAT), and to test residual current devices (RCDs) for correct operation.

| Start date | End date | Location |
|---|---|---|
| 5/10/2015 | 6/10/2015 | Joondalup |
| 29/10/2015 | 30/10/2015 | Jandakot |
| 30/11/2015 | 1/12/2015 | Joondalup |

### Restricted Electrical Licence (REL) Course (Disconnect & Reconnect to 1000 Volts)

This EnergySafety WA approved course, provides those persons who regularly need to perform electrical work that is associated with a primary work function or activity, with the training, skills and knowledge required to apply for a Restricted Electrical Licence. Restricted electrical licences are issued to persons other than electricians to legally carry out a "restricted" range of electrical tasks. The holder of a restricted electrical licence is not permitted to carry out the installation or alterations to fixed wiring, or to repair or replace items such as power points and/or lighting fittings, etc.

| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 25/09/2015 | Joondalup |
| 19/10/2015 | 23/10/2015 | Joondalup |
| 16/11/2015 | 20/11/2015 | Joondalup |

### Western Power Service Apparatus Connection Scheme

This approved Western Power course provides licensed electrical workers authorised to undertake the course with the training, skills and knowledge to fit kilowatt hour (kWh) meters, terminate consumer's mains to Western Power's mini/universal pillars and test connections, leaving the customer's premise de-energised.

| Start date | End date | Location |
|---|---|---|
| 21/10/2015 | 21/10/2015 | Jandakot |
| 9/12/2015 | 9/12/2015 | Jandakot |

### UEENEEF104A Install and modify performance data communication copper cabling (Category 5/6/7 structured and coaxial cabling)

This nationally endorsed course is an extension of the ACMA Open Cabler Registration Training Requirements Course, and provides open cablers with the training, skills and knowledge required to correctly install and terminate category 5/6/7 structured and coaxial cabling.

| Start date | End date | Location |
|---|---|---|
| 23/10/2015 | 24/10/2015 | Joondalup |
| 18/12/2015 | 19/12/2015 | Joondalup |

### UEENEEF102A Install and maintain cabling for multiple access to telecommunication services (Open Cabler Registration)

This nationally endorsed course provides the training, skills and knowledge recognised by registrars for an Australian Communications Media Authority (ACMA) Open Cabling Registration.

| Start date | End date | Location |
|---|---|---|
| 17/10/2015 | 22/10/2015 | Joondalup |
| 7/11/2015 | 12/11/2015 | Jandakot |
| 12/12/2015 | 17/12/2015 | Joondalup |

## COLLEGE OF ELECTRICAL TRAINING (RTO 2394)
## WWW.CET.ASN.AU

### UEENEEF105A Install and modify optical fibre performance data communication (Optical Fibre Cabling Course)

This nationally recognised course is an extension of the ACMA Open Cabler Registration Training Requirements Course and provides open cablers with the training, skills and knowledge required to correctly install and terminate optical fibre cabling.

| Start date | End date | Location |
|---|---|---|
| 30/10/2015 | 31/10/2015 | Jandakot |
| 27/11/2015 | 28/11/2015 | Joondalup |

### UEE20111 Certificate II in Split Air-Conditioning and Heat Pump Systems

This nationally endorsed qualification provides licensed electricians with the training, skills and knowledge to install, commission and de-commission single head, split air conditioning and heat pump systems to a prescribed routine where the maximum plant capacity for each system does not exceed 18 kWr. It includes wall hung, floor, and ceiling suspended, cassette and ducted fan coil split and water heating heat pump systems.

| Start date | End date | Location |
|---|---|---|
| 10/10/2015 | 18/10/2015 | Jandakot |
| 5/12/2015 | 13/12/2015 | Jandakot |

### Programmable Logic Controllers Skill Set

UEENEEI150A Develop, Enter and Verify Discrete Control Programs for Programmable Controllers.
UEENEEI151A Develop, Enter and Verify Word and Analogue Control Programs for Programmable Logic Controllers.
Programmable Logic Controllers Skill Set
This nationally endorsed skill set provides the training, skills and knowledge to develop, enter and verify programs and control systems, enter and test programs, and verify, document and report programming activities.

| Start date | End date | Location |
|---|---|---|
| 29/09/2015 | 29/10/2015 | Jandakot |
| 3/11/2015 | 15/12/2015 | Jandakot |

### UEE11 Sustainable—Designer, Installer of Grid Connected Photovoltaic Systems Skill Set

This nationally endorsed skill set provides licensed electricians with the training, skills and knowledge required to provide known solutions to predictable problems in photovoltaic energy apparatus operating at extra low voltage and low voltage, the design of grid connected power supply systems and their installation, and the installation, adjustment and set-up of photovoltaic power systems and their connection to a supply grid connected inverter. It also covers design briefs incorporating schemes for protection of persons and property from the dangers of system mulfunction, safety and performance standards and functional requirements, documenting design calculation and criteria, working safely to installation standards, matching components with specifications, placing and securing components accurately, making required circuit connections and completing installation documentation.

| Start date | End date | Location |
|---|---|---|
| 12/10/2015 | 16/10/2015 | Jandakot |
| 23/11/2015 | 27/11/2015 | Jandakot |

COMPETENCY TRAINING
WWW.COMPETENCYTRAINING.COM.AU

### Installation And Maintenance Of Electrical Equipment In Hazardous Areas

This course is intended for electrical workers, technicians and engineers involved with installing and maintaining electrical equipment in hazardous areas. It covers the principles of hazardous area classification, explosion-protection techniques, equipment installation requirements, inspections and procedures for breakdowns and maintenance, with theory and practical components.

| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 25/09/2015 | Brisbane |
| 21/09/2015 | 25/09/2015 | Adelaide |

### High Voltage Switching Operations

Our nationally recognised course is derived from the latest training packages; UEP12 Electricity Supply Industry – Generation Sector Training Package and UET12 Transmission, Distribution and Rail Sector Training Package. This course is intended for electrical workers and engineers working with HV switchgear in industrial facilities and networks. Emphasis is placed on practical switching exercises, performed either at our facilities or on the customer's own HV equipment. Participants are also taught switching theory and the responsibilities of permit users and recipients.

| Start date | End date | Location |
|---|---|---|
| 14/09/2015 | 18/09/2015 | Brisbane |
| 14/09/2015 | 18/09/2015 | Adelaide |
| 21/09/2015 | 25/09/2015 | Perth |

### High Voltage Switching Operations - Refresher

Our nationally recognised course is derived from the latest training packages; UEP12 Electricity Supply Industry – Generation Sector Training Package and UET12 Transmission, Distribution and Rail Sector Training Package. This course is intended for electrical workers and engineers working with HV switchgear in industrial facilities and networks. This course highlights relevant changes in standards and legislation, and revisits the site's specific HVIA procedures, including switching officer responsibilities, access, test and work permit issuing and recipient duties. It is for personnel who are already authorised switching officers and is recommended every 2 years.

| Start date | End date | Location |
|---|---|---|
| 13/10/2015 | 14/10/2015 | Adelaide |

### Hazardous Areas Classification and Design

This is an advanced course, intended for electrical workers, technicians, engineers and senior engineers involved only in area classification for electrical equipment in hazardous areas. It covers hazardous area classification procedures and techniques for both gas/vapour installations and for combustible dusts, including the proper methods for documenting the classification. Participants complete several classification tasks using real world input data during the training.

| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 25/09/2015 | Sydney |

COMPETENCY TRAINING
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### High Voltage Switching Operations

Our nationally recognised course is derived from the latest training packages; UEP12 Electricity Supply Industry – Generation Sector Training Package and UET12 Transmission, Distribution and Rail Sector Training Package. This course is intended for electrical workers and engineers working with HV switchgear in industrial facilities and networks. Emphasis is placed on practical switching exercises, performed either at our facilities or on the customer's own HV equipment. Participants are also taught switching theory and the responsibilities of permit users and recipients.

| Start date | End date | Location |
|---|---|---|
| 5/10/2015 | 9/10/2015 | Perth |
| 12/10/2015 | 16/10/2015 | Perth |
| 19/10/2015 | 23/10/2015 | Gladstone |
| 26/10/2015 | 30/10/2015 | Perth |
| 26/10/2015 | 30/10/2015 | Melbourne |
| 2/11/2015 | 6/11/2015 | Brisbane |
| 2/11/2015 | 6/11/2015 | Perth |
| 9/11/2015 | 13/11/2015 | Perth |
| 23/11/2015 | 27/11/2015 | Adelaide |
| 23/11/2015 | 27/11/2015 | Perth |
| 30/11/2015 | 4/12/2015 | Gladstone |
| 30/11/2015 | 4/12/2015 | Perth |

### High Voltage Switching Operations - Refresher

Our nationally recognised course is derived from the latest training packages; UEP12 Electricity Supply Industry – Generation Sector Training Package and UET12 Transmission, Distribution and Rail Sector Training Package. This course is intended for electrical workers and engineers working with HV switchgear in industrial facilities and networks. This course highlights relevant changes in standards and legislation, and revisits the site's specific HVIA procedures, including switching officer responsibilities, access, test and work permit issuing and recipient duties. It is for personnel who are already authorised switching officers and is recommended every 2 years.

| Start date | End date | Location |
|---|---|---|
| 8/10/2015 | 9/10/2015 | Brisbane |
| 7/10/2015 | 8/10/2015 | Gladstone |
| 1/10/2015 | 2/10/2015 | Perth |
| 4/11/2015 | 5/11/2015 | Perth |

### Installation And Maintenance Of Electrical Equipment In Hazardous Areas

This course is intended for electrical workers, technicians and engineers involved with installing and maintaining electrical equipment in hazardous areas. It covers the principles of hazardous area classification, explosion-protection techniques, equipment installation requirements, inspections, and procedures for breakdowns and maintenance, with theory and practical components.

| Start date | End date | Location |
|---|---|---|
| 28/09/2015 | 2/10/2015 | Brisbane |
| 5/10/2015 | 9/10/2015 | Perth |
| 12/10/2015 | 16/10/2015 | Sydney |
| 19/10/2015 | 23/10/2015 | Perth |
| 26/10/2015 | 30/10/2015 | Brisbane |
| 26/10/2015 | 30/10/2015 | Melbourne |
| 2/11/2015 | 6/11/2015 | Gladstone |
| 9/11/2015 | 13/11/2015 | Perth |
| 16/11/2015 | 20/11/2015 | Brisbane |
| 16/11/2015 | 20/11/2015 | Adelaide |
| 23/11/2015 | 27/11/2015 | Perth |
| 30/11/2015 | 4/12/2015 | Perth |

### Electrical Supervisor

This Electrical Supervisors course has been designed for the mining industry to cover all aspects of duties and responsibilities of an electrical supervisor, and will include detailed explanation of the requirements of the Mines Safety and Inspection Act

| Start date | End date | Location |
|---|---|---|
| 6/11/2015 | 6/11/2015 | Perth |

## COMPETENCY TRAINING
## WWW.COMPETENCYTRAINING.COM.AU

### Installation And Maintenance Of Electrical Equipment In Hazardous Areas - Refresher

This course is intended as a periodic refresher (recommended every two years) for electrical workers and engineers who hold the competencies delivered by our five day course. It is typically delivered on site and can be customised to focus on the equipment and procedures in place at the customer's facility. The course can be two or three days in length according to the customer's requirements. Training focuses on the practical components of the five day course, particularly on inspections and testing.

| Start date | End date | Location |
|---|---|---|
| 29/09/2015 | 30/09/2015 | Perth |
| 7/10/2015 | 8/10/2015 | Sydney |
| 8/10/2015 | 9/10/2015 | Brisbane |
| 8/10/2015 | 9/10/2015 | Melbourne |
| 9/10/2015 | 10/12/2015 | Perth |
| 15/10/2015 | 16/10/2015 | Adelaide |
| 2/11/2015 | 3/11/2015 | Perth |
| 30/11/2015 | 1/12/2015 | Adelaide |

### Certificate IV - Electrical Instrumentation

This course is the full Certificate IV Hazardous Areas – Electrical. Comprised of two components, - the 5 day Installation and Maintenance of Electrical Equipment in Hazardous Areas course (or proof of equivalent competencies,) plus the completion of an RPL kit (Recognition of Prior Learning). This course is derived from the UEE11 Electrotechnology Training package and contains nationally recognised units of competency.

| Start date | End date | Location |
|---|---|---|
| 28/09/2015 | 2/10/2015 | Brisbane |
| 19/10/2015 | 23/10/2015 | Brisbane |
| 23/11/2015 | 27/11/2015 | Brisbane |
| 7/12/2015 | 11/12/2015 | Brisbane |

## NECA EDUCATION & CAREERS
## WWW.NECAEDUCATION.COM.AU

### Licensed Electrician Practice (LEP)

Brush up on your knowledge before you go for your electrical licence. This component prepares you for the LEP component.

| Start date | End date | Location |
|---|---|---|
| 14/09/2015 | 16/09/2015 | Carlton North |
| 26/09/2015 | 28/09/2015 | Carlton North |
| 14/10/2015 | 16/10/2015 | Carlton North |
| 24/10/2015 | 26/10/2015 | Carlton North |
| 28/10/2015 | 30/10/2015 | Carlton North |
| 10/11/2015 | 12/11/2015 | Carlton North |
| 16/11/2015 | 18/11/2015 | Carlton North |
| 21/11/2015 | 23/11/2015 | Carlton North |

### Safe Work Practice (SWP)

Brush up on your knowledge before you go for your electrical licence. This component prepares you for the SWP component.

| Start date | End date | Location |
|---|---|---|
| 17/09/2015 | 17/09/2015 | Carlton North |
| 29/09/2015 | 29/09/2015 | Carlton North |
| 1/10/2015 | 1/10/2015 | Carlton North |
| 9/11/2015 | 9/11/2015 | Carlton North |
| 19/11/2015 | 19/11/2015 | Carlton North |
| 30/11/2015 | 30/11/2015 | Carlton North |

## NECA EDUCATION & CAREERS
## WWW.NECAEDUCATION.COM.AU

### Construction Wiring

Construction wiring is a specialised area providing regulatory, industrial relations and cost challenges for contractors. Successfully managing these challenges requires comprehensive skills and knowledge of the relevant Australian and industry standards to ensure compliance and eliminate risks

| Start date | End date | Location |
|---|---|---|
| 23/09/2015 | 25/09/2015 | Carlton North |

### Electrical Installation Testing

Electricians and REC's have a legal obligation to test and certify that their electrical work complies with relevant standards. It is essential thay you or your employess have the essential testing skills so that you can test and sign of on COES with confidence.

| Start date | End date | Location |
|---|---|---|
| 25/09/2015 | 25/09/2015 | Carlton North |

### Estimating Electrotechnology Projects - Advanced Stage 2

Building on skills acquired in Stage 1, course will provide you with accurate and profitable estimating skills as well as undertaking practical construction of an estimate from the receipt of the render documents, through the practical tak eoff and pricing to final submission of the tender.

| Start date | End date | Location |
|---|---|---|
| 20/10/2015 | 27/10/2015 | Carlton North |

### Licensed Electrical Inspectors Practical (LEIP)

Increase your skills set an your service offerings by becoming an electrical inspector. NECA Education and Careers are the only RTO to offer tutorials to prepare you for the licensing assessment. This component prepares you for the practical component.

| Start date | End date | Location |
|---|---|---|
| 19/10/2015 | 21/10/2015 | Carlton North |

### Licensed Electrical Inspectors Safe Approach (LEISA)

Increase your skills set an your service offerings by becoming an Electrical Inspector. NECA Education and Careers are the only RTO to offer tutorials to prepare you for the licensing assessment. This component prepares you for the safe approach component.

| Start date | End date | Location |
|---|---|---|
| 5/11/2015 | 6/11/2015 | Carlton North |

### Licensed Electrical Inspectors Theory (LEIT)

Increase your skills set an your service offerings by becoming an Electrical Inspector. NECA Education and Careers are the only RTO to offer tutorials to prepare you for the licensing assessment. This component prepares you for the theory component.

| Start date | End date | Location |
|---|---|---|
| 28/09/2015 | 1/10/2015 | Carlton North |

### Licensed Electrican Theory (LET)

Brush up on your knowledge before you go for your electrical licence. This component prepares you for the LET component.

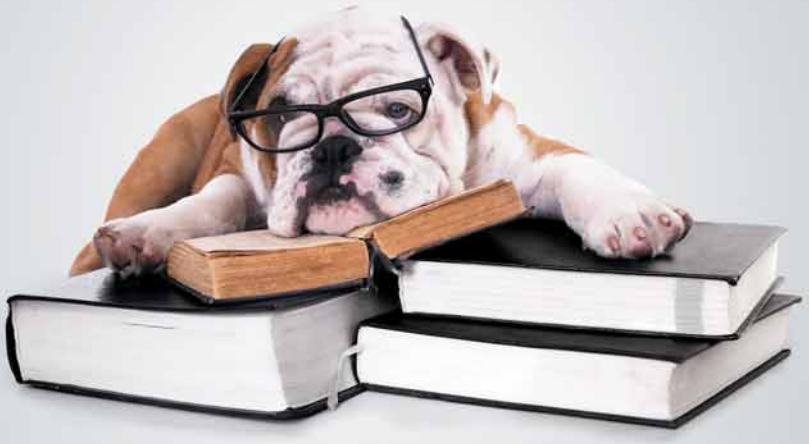
| Start date | End date | Location |
|---|---|---|
| 21/09/2015 | 24/09/2015 | Carlton North |
| 5/10/2015 | 8/10/2015 | Carlton North |
| 10/10/2015 | 13/10/2015 | Carlton North |
| 19/10/2015 | 22/10/2015 | Carlton North |
| 4/11/2015 | 7/11/2015 | Carlton North |
| 24/11/2015 | 27/11/2015 | Carlton North |

### Provide First Aid (Level 2)

You never know when you might be faced with an emergency. This course provides the skills and knowledge required to provide first aid response, life support, management of casualty(s), the incident and other first aiders, unitl the arrival of medical or other assistance.

| Start date | End date | Location |
|---|---|---|
| 19/09/2015 | 20/09/2015 | Carlton North |
| 14/11/2015 | 15/11/2015 | Carlton North |

ELECTRICAL CONNECTION



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# TRADESTUFF


## AS/NZS 3000:2007 The Wiring Rules (includes Amendment 1:2009 and Amendment 2:2012)


For electricians, the Wiring Rules are probably your most valuable tool, designed to protect you, your customers and their property – and every electrician in Australia and New Zealand is urged to familiarise themselves with the this Standard and its associated Amendments. Part 1 of this document provides uniform essential elements that constitute the minimum regulatory requirements for a safe electrical installation. Part 2 provides installation practices that achieve certainty of compliance with the essential safety requirements of Part 1. Recognised as the benchmark for safe and efficient electrical installations, this is one of the most widely used Standards in Australia and has played an important role in reducing the incidences of electrical mishaps and injuries.

**$229.00 Spiral bound.....CODE 431s**

## Electrical Principles for the Electrical Trades

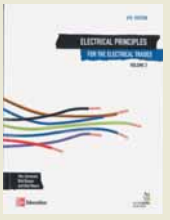
### Volume 1

Ideal for electrical apprentices, the 6th edition of *Electrical Principles for the Electrical Trades* is the first volume of a two-volume set. Written by two TAFE/VET teachers, the book looks at the fundamental knowledge required to become a successful electrician. A portion of the proceeds from this book will go to WorldSkills Australia.

**$74.95.....CODE 085**

## Electrical Principles for the Electrical Trades

### Volume 2



Volume 2 of *Electrical Principles for the Electrical Trades* explores the electrical applications of the principles learned in Volume 1. This is an excellent learning resource for electrical apprentices and teachers, as well as being a suitable long-term reference for tradespeople. A portion of the proceeds from this book will go to WorldSkills Australia.

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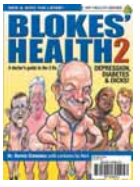
## Blokes' Health 2 – Depression, Diabetes and Dicks!




Following in the footsteps of Dr Bernie Crimmins original best-seller, Blokes' Health: comes Blokes Health 2. We all want to live as long and as healthy as we can, with good quality of life. In this book Dr Bernie Crimmins outlines the main health problems that affect males and gives some simple advice on how to prevent, or detect early, those particular diseases which may lead to an early demise.

**$19.95.....CODE 826**

## Electrical Wiring Practice

### Volume 1


Volume 1 of *Electrical Wiring Practice* has been updated to provide guidance in the use of the Australian and New Zealand Wiring Rules, AS/NZS 3000:2007, including the 2009 Amendments. Taking a practical approach, this book employs clear visual tools to illustrate the knowledge and practices required by specified products and the Standards.

**$89.95.....CODE 086**

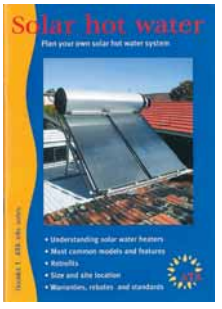
## Electrical Wiring Practice

### Volume 2


Volume 2 of *Electrical Wiring Practice* has been updated to provide guidance in the use of the Australian and New Zealand Wiring Rules, AS/NZS 3000:2007, including the 2009 Amendments. Taking a practical approach, this book employs clear visual tools to illustrate the knowledge and practices required by specified products and the Standards.

**$95.95.....CODE 364**

## Solar Hot Water




This booklet gives you an understanding of solar hot 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.

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### Electrical Estimator's Labour Unit Manual

14th edition

This labour unit manual has been produced to assist contractors to allow a realistic labour allocation to their jobs. These units have been developed over a number of years using actual time studies. This publication also includes a CD estimating spreadsheet and templates for calculating hourly charge out rates and minor installation quotations.

**$120.00** ..... **CODE 583**

## Electrical Installation Standards

### AS/NZS 3008.1.2:2010
### Selection of cables for alternating voltages up to and including 0.6/1kV

Plus Amendment 1

This Standard specifies current-carrying capacity, voltage drop and short-circuit temperature rise of cables, to provide a method of selection for those types of electric cables and methods of installation that are in common use at working voltages up to and including 0.6/1kV at 50Hz AC. It is applicable to typical Australian installation conditions where the ambient air temperature is 40°C and ambient soil temperature is 25°C.

**$200.00** ..... **CODE 347**

### AS/NZS 3001:2008
### Transportable structures and vehicles including their site supplies

Plus Amendment 1

This Standard sets out requirements for electrical installations associated with transportable structures and vehicles intended for connection to low-voltage AC supply systems (i.e. exceeding 50 V AC but not exceeding 1,000 V AC). For the purposes of this Standard the term transportable structure includes vehicles and structures with or without wheels that are capable of being readily moved from one site to another either under their own motive power or otherwise.

**$110.25** ..... **CODE 196**

### AS/NZS 3080:2013:
### Generic cabling for commercial premises

The Standard provides building owners, managers, architects, designers, manufacturers, installers, maintainers and users with the necessary requirements to ensure compatibility with equipment and services, and to ensure performance of infrastructure to meet present and foreseeable future requirements.

**$219.95** ..... **CODE 179**

### AS/NZS 3012:2010
### Construction and demolition sites

This Standard sets out requirements for electrical installations that supply electricity to equipment on construction and demolition sites. It includes requirements for the inspection and testing of electrical equipment used on building construction sites.

**$150.00** ..... **CODE 345**

### AS/NZS 4836:2011
### Safe working on or near low-voltage electrical installations and equipment

This Standard outlines the principles and procedures of safe work, organisation and performance on or near low-voltage electrical installations and equipment. It provides a minimum set of procedures, safety requirements and recommendations to manage the hazards associated with electricity, specifically arc blast, arc flash, electric shock and electrocution.

**$150.00** ..... **CODE 574**

### AS/NZS 3017:2007
### Verification guidelines

This Standard provides testing procedures and inspection guidelines to ensure that an electrical installation complies with the requirements of AS/NZS 3000 with regard to the prevention of a fire or preventing a person from receiving an electric shock. It includes tests for earth continuity, insulation resistance, polarity and incorrect circuit connections, fault-loop impedance and operation of residual current devices.

**$155.95** ..... **CODE 127**

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