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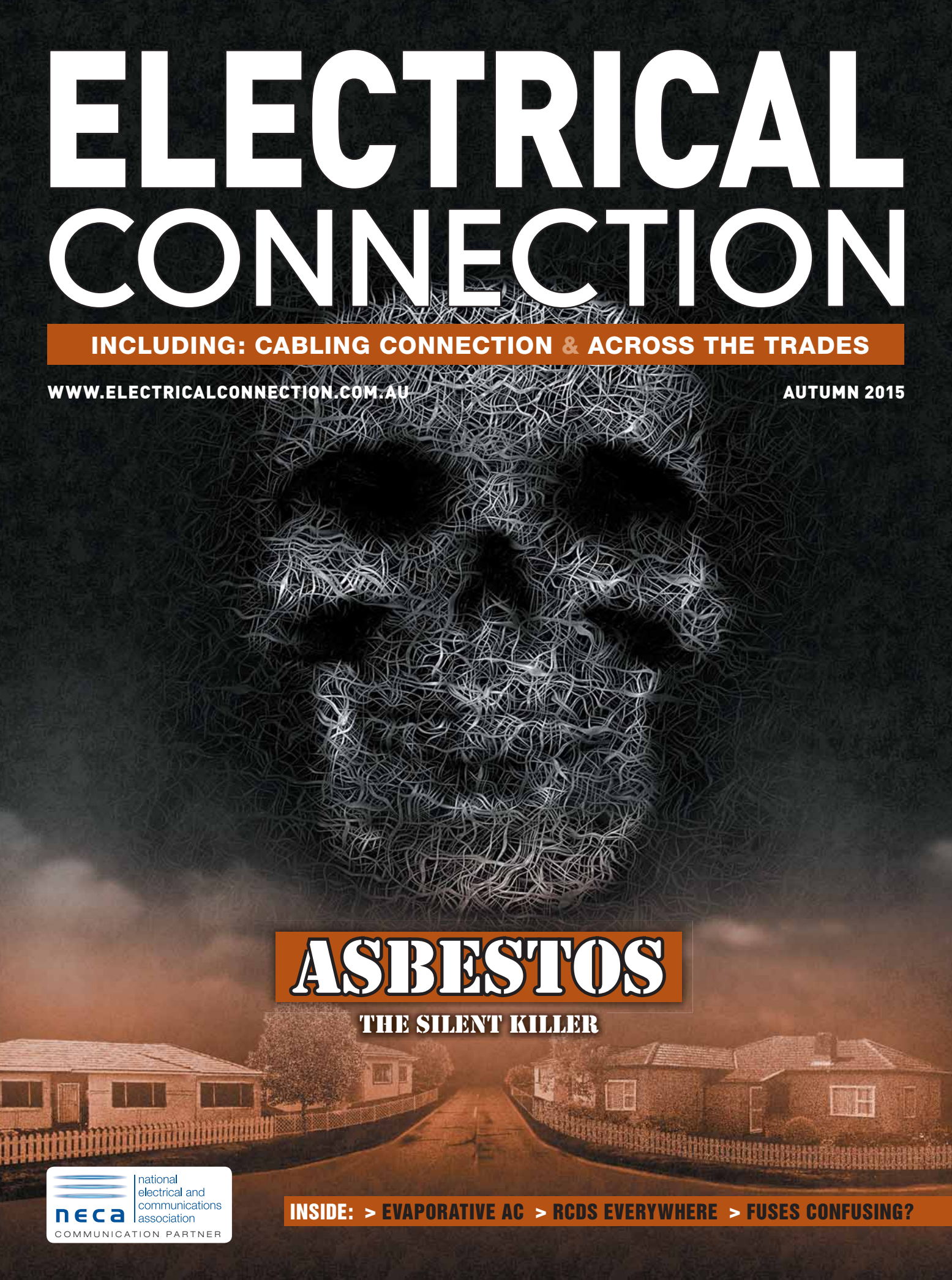

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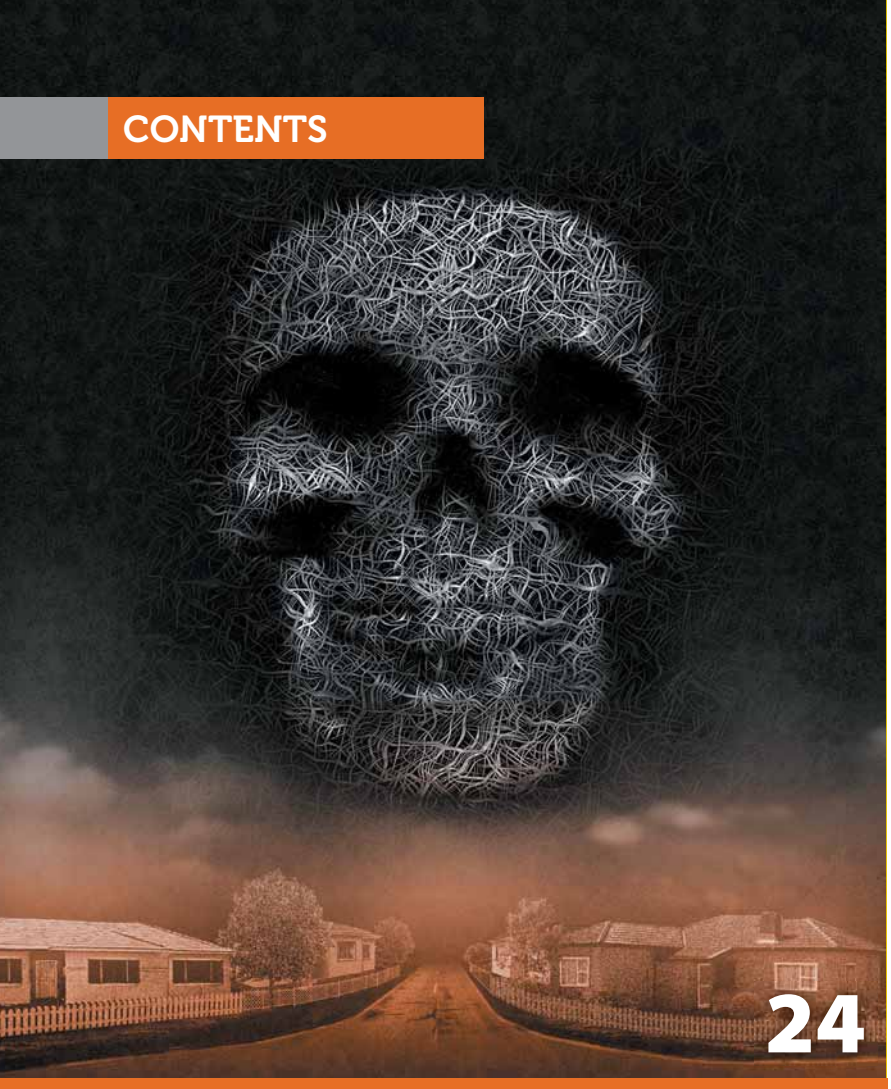

Cover story

DON'T BREATHE IN

Exposure to asbestos is an ongoing concern, but there are some younger members of the industry who have no idea what to look out for.

Features

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An industry in turmoil?

It seems like an ever-more-frequent occurence these days for a news story to appear, exposing questionable product or behaviour in the electrical cabling sector.

Non-compliant product has been on everybody's mind for quite a while. A few years ago, *Electrical Connection* started a charge against dodgy product with our 'Business Risk Update' campaign. Shortly after, NECA's 'Does It Comply?' campaign also commenced.

Both initiatives largely focused on contractors who did the wrong thing.

Awareness grew and non-compliant product became a water cooler topic among all members of the industry.

But what is a contractor, who is trying to do the right thing, supposed to do when it is the supplier that is at fault?

First, Infinity Cable happened. It was a colossal blunder but it was also easy to place blame on big box movers – "If you bought your product from the traditional supply chain then this wouldn't have happened."

But then it did.

A few months after the ACCC issued a national recall on Infinity Cable, reports surfaced of more faulty cable being supplied to the market – this time from a known supplier and sold through established distributors.

Ecables Copper Clad Aluminium RE 110 insulated power cables was recalled after extensive testing by the Australian Cablemakers Association (ACA - see page 20).

The cable is designated to operate at temperatures up to 110ºC and to conduct low-voltage power up to 1,000V, but comprehensive testing has shown that the insulation fails at temperatures well below this rating, and that the cable insulation actually melts if the temperature reaches 110ºC.

While the supplier is at fault in both of these examples, as far as consumers are concerned they bought product from their electrician so you are to blame.

These suppliers are potentially putting your livelihoods at risk. So, what do you do?

The argument is often made that you should trust established suppliers, using established delivery channels - something that I have been a strong advoate for in the past.

But now, the ACCC has issued proceedings in the Federal Court against five companies, six individuals and an industry association for alleged cartel and exclusionary conduct in the supply and acquisition of electrical cable throughout Australia (see page 56).

All of the companies involved are well established and well respected.

Where will this end?

I'm a big supporter of the traditional supply channel. I think contractors are taking too large a risk by circumventing it. But lately some members of the industry are really making it difficult to justify this position.

Where does that leave you, the electrical contractor?

Who knows?

Until next time,

Paul Skelton

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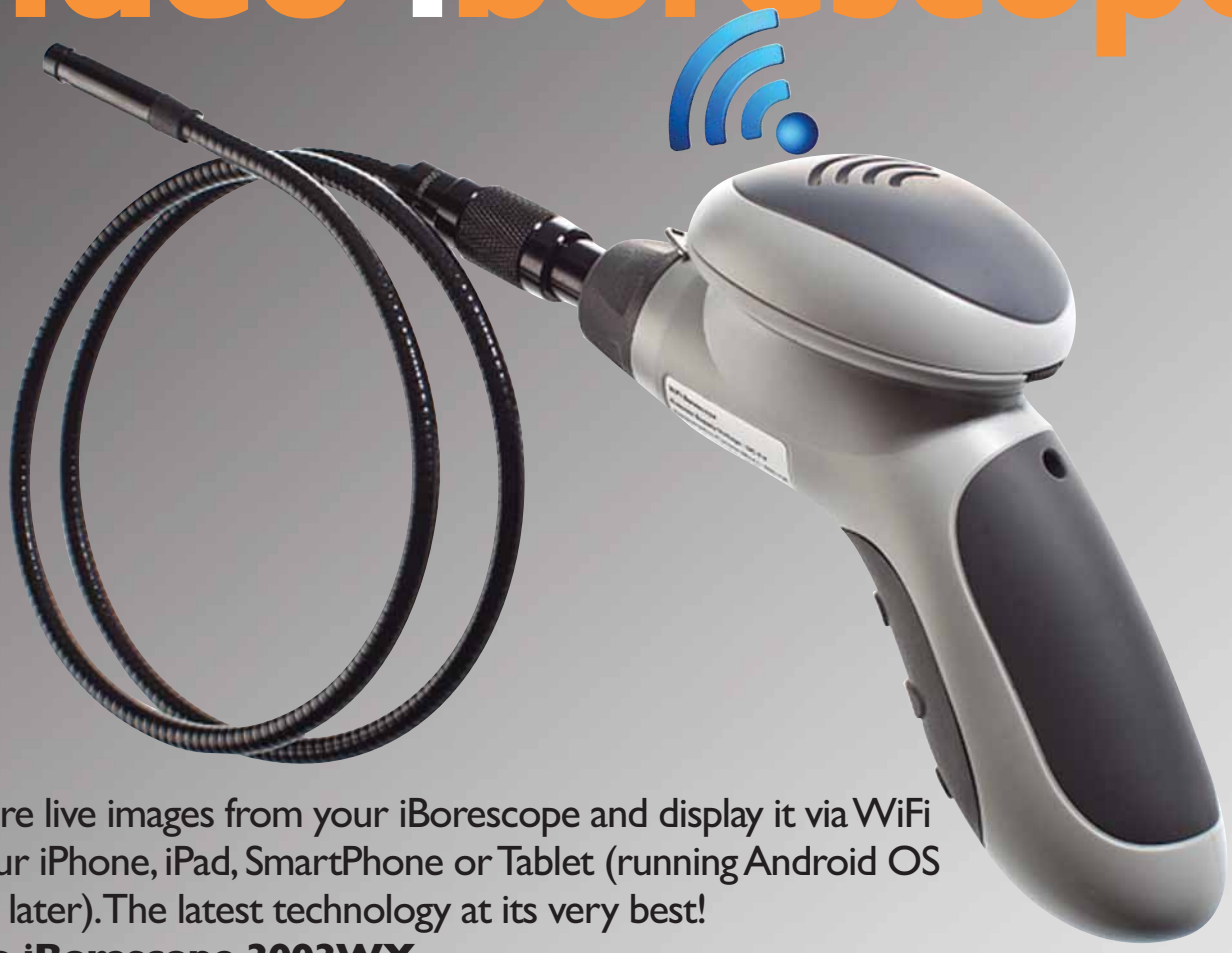

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Infinity cable... a wake up call

Dear Paul,

I have just read your article on the Infinity Cable debacle (*Electrical Connection* Summer 2014, page 20). As an end user, the fact that liability rests with the installer is very confronting.

Almost every day we see imported electrical items that do not look like they comply with our standards. If you follow through with making a complaint or giving the relevant government body information regarding non-compliant product, it takes months to see any sort of result, if any occurs at all.

I was recently called to repair some lighting in a small vet clinic. Someone had installed 36W to 28W T5 converters. Two of these fittings had failed after less than two years. Apart from the fact that any minute power savings had been nullified by my call out and materials cost, I pulled one of the adaptors apart to see what the fault was.

I must say I was very concerned to see a long circuit board stuffed inside an aluminium extrusion insulated by a thin plastic wrapped around the PCB. The PCB was burnt out and the insulation was damaged to the point where there was no insulation between the 240V and the aluminium body. The other area for concern is that the wiring from the tombstone pins to the PCB were not double insulated and exposed to the aluminium body.

This means that a fault in that adaptor could quite possibly make the body of the adaptor live. This poses a severe electrocution risk as an unqualified person could quite easily mistake the lights being off as being isolated. In fact, you have to disassemble the fitting to prove that the fitting is de-energised.

An attempt has been made to double insulate these fittings but it is not complete and these adaptors should be earthed, which is impossible. In my opinion these fittings are extremely dangerous and should be recalled or removed from the market.

We must have better regulators and tighter inspection and conditions. The Infinity Cable debacle should be a wake-up call and action must be taken as soon as possible to make it easier to report and more timely for these non-complying products to be removed.

-Bill Larkin


REPAIR SHOP

Setting up shop

Revisiting wrist straps

Dear Paul,

I am extremely worried by a suggestion made on page 33 of the Summer 2014 edition of *Electrical Connection*. In the article 'Setting Up Shop' by David Herres, he suggests making up an anti-static wristband using a piece of wire to connect a metal band to an earthed socket.

All anti-static wristband leads should have a 1MΩ resistor in series built into the lead.

Why? Well, consider this: You have the earthed (no series resistance) strap on one wrist and you touch an active conductor with your other hand. Guess where the electricity flows? Yes, straight through your heart and will most likely kill you. That is why anti-static wrist straps have the 1MΩ resistor in series, as that way if you do touch the mains then the current flow via the wrist strap is too low to kill you.

We take this matter so seriously that at my place of work we test all our wrist straps once a month and if the measured resistance is not in the range 900kΩ to 1.1MΩ then it fails the test and is destroyed.

-David Williams


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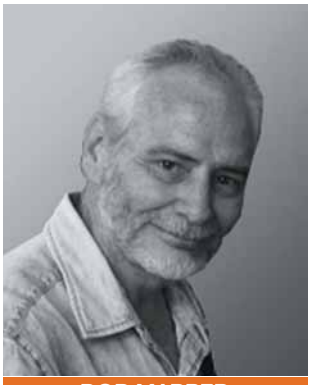


BOB HARPER

Electrical Principles

Bob Harper apprenticed as an electrician for the Queensland Government Railways in 1971. He worked as an electrician for 13 years and then as an electrical teacher at TAFE for the next 30.

> See page 54.

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.

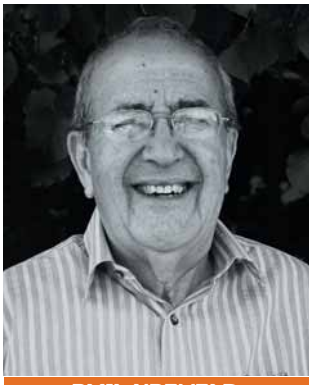
> See page 32.

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.

> See pages 36 and 44.

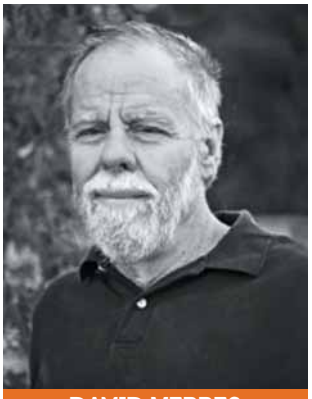


PHIL KREVELD

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 pages 28 and 52.



DAVID HERRES

Maintenance

David Herres is author of two books published by McGraw-Hill and has wrtitten over 80 articles for electrical and electronic publications throughout the world.

> See page 42.

BRIAN SEYMOUR

Estimating

Brian Seymour MBE, industry consultant, 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.

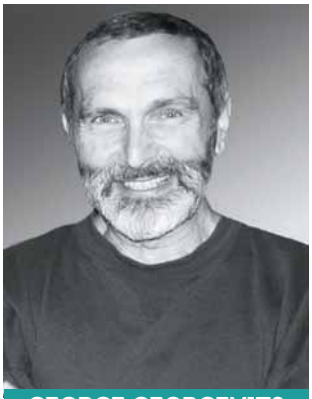
> See page 62.

PAUL SKELTON

Editorial

It is often said that multi-award seeking journalist Paul Skelton is a generous, althletic, kind and hilarious individual who is destined to save the world. He hopes that one day people will believe this enough for him to stop telling people.

> See page 10.



GEORGE GEORGEVITS

Troubleshooting

George Georgevits manages his own engineering consultancy, Power and Digital Instruments, established in 1980. PDI specialises in lab and field testing and troubleshooting of cabling systems and components.

> See page 76.

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INVENTORS OF BLUE LEDS WIN 2014 NOBEL PRIZE IN PHYSICS

The Royal Swedish Academy of Sciences has awarded the Nobel Prize in Physics for 2014 to Isamu Akasaki, Hiroshi Amano and Shuji Nakamura "for the invention of efficient blue light emitting diodes (LEDs) which has enabled bright and energy-saving white light sources".

In the spirit of Alfred Nobel, the prize rewards an invention of greatest benefit to mankind; using blue LEDs, white light can be created in a new way. With the advent of LED lamps we now have more long-lasting and more efficient alternatives to older light sources.

When Isamu, Hiroshi and Shuji produced bright blue light beams from their semi-conductors in the early 1990s, they triggered a fundamental transformation of lighting technology. Red and green diodes had been around for a long time but without blue light, white lamps could not be created. Despite considerable efforts, both in the scientific community and in industry, the blue LED had remained a challenge for three decades.

They succeeded where everyone else had failed. Their inventions were revolutionary. Incandescent light bulbs lit the 20th century; the 21st century will be lit by LED lamps.

White LED lamps emit a bright white light, are long-lasting and energy-efficient. They are constantly improved, getting more efficient with higher luminous flux (measured in lumens) per unit electrical input power (measured in Watts). The most recent record is just over 300lm/W, which can be compared to 16lm/W for regular light bulbs and close to 70lm/W for fluorescent lamps.

JIM BROWN NAMED TRADE TEACHER OF THE YEAR

NECA has named Jim Brown – a trades instructor at the College of Electrical Training in Western Australia – as the 2014 winner of the Trade Teacher of the Year award.

Jim has worked in the industry for over 50 years. As he approached the end of his career he thought it would be fitting to spend a short spell 'giving something back' and a training role seemed the best way to do just that. That was more than 13 years ago.

The judging panel – led by Wes McKnight (former NECA president), were so impressed by Jim that they asked him what advice he would give to young people entering the industry today.

"Just be yourself and focus on your clients," was Jim's answer. In addition, for anyone involved in promoting a career in the electrical contracting industry, Jim's additional advice is that people should "sell the reality of the job to better meet expectations".

MIDDY'S ANNOUNCES SCHOLARSHIP WINNERS

Middy's Data & Electrical, in conjunction with NECA, has awarded $90,000 worth of Scholarships to 12 of the "most progressive and forward looking electrical industry professionals".

The Scholarship Program, now in its sixth year, was created in 2009 and offers an extensive range of training and skill enhancement courses, delivering the skill sets and competitive edge needed to succeed in today's challenging environment. Over the past six years, Middy's has awarded nearly $500,000 in industry training.

The Scholarship Program awards six Gold Packages, each worth $10,000 and six Silver Packages, each worth $5,000. These Scholarship Packages allow recipients to undertake tailored training in 2015 from a range of courses incorporating subjects such as energy efficiency, project management, estimating and OH&S.

Judging of the record number of applications was conducted by an independent panel including representatives from NECA, Energy Safe Victoria and *Electrical Connection* magazine.

Congratulations the following recipients of the Gold Scholarship:

- **Matthew Bruce – WSP Services**
- **Tristan Grieve – A-Phase Electrical**
- **Jackson Harris – DN Bishop & Co**
- **Jamin Kenner – Kenner Electrics**
- **Rob McEwan – Copper Connections Electrical**
- **Andrew Smith – Murfett & Whiting P/L**

And to the winners of a Silver Scholarship:

- **Mark Baker – Watters Electrical**
- **Bradley Bosanko – R & J Bosanko**
- **Jonathan Dissanyake – Downer**
- **Shane Kean – Gordyn & Palmer**
- **Craig Meanes – C & B Electrical**
- **Nic Sim – Cobram Electrical & Data**

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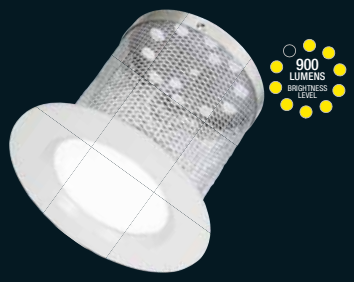

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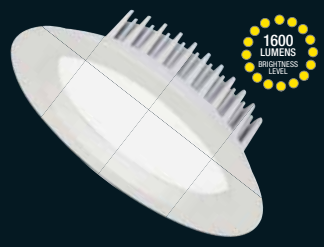

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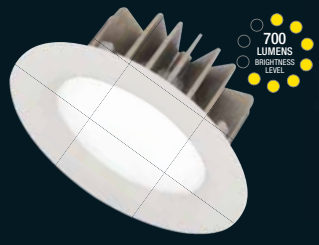
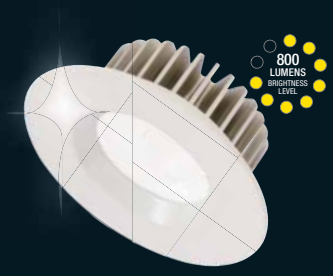


LEDlux Vivid dimmable



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HAGER GROUP ACQUIRES ITALY'S MARKET LEADER IN CABLE MANAGEMENT SYSTEMS

Hager Group has announced that it has taken over the family-owned Italian company Bocchiotti.

The contract of sale was signed by Hager Group chief executive Daniel Hager, chief group resources officer Philippe Ferragu and representatives of the Bocchiotti Group, in Blieskastel, Germany.

"This acquisition reinforces our position in the field of cable management and means that we are gaining a fantastic addition to our present offer to provide better solutions to our customers," Daniel says.

ROCKWELL AUTOMATION UNI HITS THE ROAD

Rockwell Automation has announced that Automation University will be touring regional centres around Australia and New Zealand throughout 2015. Following the success of previous years, this one-day event will highlight leading-edge automation solutions.

According to Matthew Treeby, commercial marketing manager at Rockwell Automation, "Technology is moving at such a fast pace that organisations can't afford to be left behind, but may also be short of time to keep up with the latest advances. To help organisations meet their business and plant requirements, Automation University will provide the platform to bring together people and products, as well as technologies and solutions."

Attendees will have the valuable opportunity to learn by experience through interactive demonstrations, hands on labs and presentations that show real-life industry environments and scenarios. Rockwell Automation specialists and industry leaders from the company's PartnerNetwork will lead each session. Each location will offer two or more streams, focussed on topical themes to ensure attendees can design their personal workshop program and follow technology sessions of their choice.

For dates, visit: www.rockwellautomation.com.au.

SCHNEIDER ELECTRIC APPOINTS NEW ZONE PRESIDENT FOR AUSTRALIA AND NEW ZEALAND

Schneider Electric has announced the appointment of Gareth O'Reilly as its new zone president for Australia and New Zealand, based in Sydney.

Gareth joined Schneider Electric in 2010 as regional manager for its buildings business, based in Victoria, before moving into the position of vice president for the buildings business in 2011.

Gareth, Irish by birth and calling Australia home, has enjoyed an extensive and international career within the energy and software industry, gaining experience in Europe, South East Asia and Australia.

After 16 years, Schneider Electric would like to thank and recognise outgoing zone president Stephen Coop for his strong contribution to the company.

GREATER REGULATION FOR LIGHTING WASTE DISPOSAL ON THE WAY

Ratification of the United Nations' Environment Program Minamata Convention on Mercury in 2016 is likely to lead to increased regulation on the disposal of lighting waste, says CMA Ecocycle general manager Nick Dodd.

"We estimate that just 10% of Australia's lighting waste is currently being recycled, so it makes up a large fraction of the mercury-containing waste stream," Nick says.

Mercury is a component of fluorescent lamps and other mercury vapour lamps. It is a highly toxic metal, yet most lighting waste is sent to landfill. From there it can leak into waterways and be converted to a more dangerous form of mercury, which then builds up in our ecosystem.

Nick says that to cope with the expected increase in demand, CMA Ecocycle has invested over $3 million in expanding its lamp recycling and mercury recovery systems in Melbourne, Sydney and Perth. These units not only handle the mercury lighting waste but can also process and recycle LED lighting waste. This waste also needs to be disposed of responsibly to ensure we protect our environment.

"Environment Protection Agencies in all states work closely with the industry to ensure we all work together to protect our environment and promote recycling," Nick says.

"They speak highly of the great work that Fluorocycle, the recycling scheme supported by the lighting industry, has done to build awareness.

"We need the entire industry to come on board and do the right thing. "

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STEPHEN COOP TAKES REIGNS AT NHP

NHP Electrical Engineering Products has announced the appointment of Stephen Coop as its new chief executive officer and managing director.

Stephen comes to NHP from Schneider Electric, where he has been CEO of its Pacific business (including Australia and New Zealand) since 2011. Prior to that appointment, he was CEO of Schneider Electric businesses in the United Kingdom, the Balkans and Slovakia for varying periods since 2001. In total, Stephen has nearly 30 years of senior management experience in the electrical engineering industry.

ROCKWELL AUTOMATION ACQUIRES ESC SERVICES

Rockwell Automation has purchased the assets of ESC Services, a global hazardous energy control provider of lockout-tagout services and solutions.

"ESC Services will enable Rockwell Automation customers to increase asset utilisation and strengthen enterprise risk management, while adding safety to our growing portfolio of data-driven, cloud-enabled services," Rockwell Automation consulting business manager Matt Fordenwalt says.

Based in Franklin, Wisconsin, USA, ESC Services will be integrated into Rockwell Automation's Control Products & Solutions segment as part of its customer support and maintenance business unit. Terms were not disclosed.

NHP NAMED AS DISTRIBUTION PARTNER FOR ITALIAN MANUFACTURER GM INTERNATIONAL

NHP Electrical Engineering Products has recently been appointed as the exclusive Australian and New Zealand distribution partner for GM International.

Based out of Italy, GM International is a specialist manufacturer of intrinsic safe isolators to support field devices in hazardous areas.

Used in hazardous area applications, intrinsic safe isolators are typically used between PLC or DCS systems and field devices. Their purpose is to ensure that electrical circuits that have low power requirements such as instrumentation, sensors and limit switches, don't carry enough energy to create a spark sufficient to ignite an explosive environment.

ACA ISSUES RECALL ON ECABLES POWER CABLES

The Australian Cablemakers Association (ACA) has warned of serious risk of fire and electric shock from yet another batch of faulty electrical cables which has been sold and installed over the last three years.

A voluntary trade recall has been issued for Ecables Copper Clad Aluminium RE 110 Insulated power cables, following sustained testing and advocacy by the ACA.

It is believed the products have been predominantly used for major projects such as apartment buildings, hotels and commercial installations.

ACA chairman Andrew Davenport says the latest round of cable recalls applies to Ecables CCA product sold between 1 January 2012 and 30 June 2014.

"This cabling is designated to operate at temperatures up to 110ºC and to conduct low-voltage power up to 1,000V, which means it is supposed to be able to withstand higher load currents than similar size but lower temperature rated cables," he says.

"Testing has shown that the insulation fails at temperatures well below this rating, and that the cable insulation actually melts if the temperature reaches 110ºC.

"ACA believes this insulation failure is even more dangerous and concerning than the recently recalled Infinity and Olsent cables."

NEW PRESIDENT OUTLINES VISION FOR IESANZ

Adele Locke has been elected as the first female national president of the Illuminating Engineering Society of Australia and New Zealand (IESANZ).

In outlining her vision for the society, Adele has nominated an ambitious set of goals during her tenure as president. Foremost among these is promotion of lighting education.

"I am determined to promote IESANZ as the gold standard for the Australian and New Zealand lighting industries by providing education opportunities for all people interested in lighting," she says.

"High on my list of priorities is establishment of a Lighting Education Trust to foster the pool of emerging lighting talent in our two countries."

Other goals she has nominated include providing transparency to members regarding Board and Chapter activities, and more interaction from members, bringing new ideas and solutions that promote the art, science and practice of lighting.

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ABB is helping commercial and industrial buildings optimise power consumption with the Emax 2 Ekip power controller, a load management software. It is an exclusive option of the new Emax 2, a smart low voltage air circuit breaker that has been recognised by Leadership in Energy and Environmental Design (LEED) – a rating system for green buildings.

To manage energy consumption, the Emax 2 Ekip power controller switches electricity supply off to non-essential equipment and back on again as soon as acceptable power levels are reached. Intelligent decision making is achieved with software that uses complex algorithms to decide when it is appropriate to switch the power, while maintaining the overall functionality or productivity of the connected equipment.

DUAL OCCUPANCY SENSOR

Clipsal by Schneider Electric
www.clipsal.com

Clipsal's 752 Dual-Tech occupancy sensors just got better with the release of a two-channel version. Already available, the one-channel version is ideal for lighting control applications or HVAC. The recently released two-channel version is ideal for simultaneous lighting and HVAC control from a single occupancy sensor.

The range features both ultrasonic and passive infrared (PIR) sensing technology, up to 600W LED load rating, the choice of either flush or surface-mounting and an optional remote control to make set-up and configuration faster and easier.

LED DOWNLIGHTS

Lumex Lighting
www.lumexlighting.com.au

Lumex Lighting has released a new range of NovaLED downlights, which boast a 25% reduction in wattage to now be only 8W total combined with standardised lumen output up to 770Lm.

Additionally, the Lumex NovaLED range of downlights has increased its colour rendering index (CRI) to greater than 90 (CRI>90), providing crisp, clear light output for any application.

The NovaLED series is the perfect replacement for traditional halogen lighting in residential or commercial applications. All products come complete with dimmable drivers, expanding the range beyond phase dimming to incorporate 1-10V capabilities.

TIMER SWITCHES

Thermofilm
www.thermofilm.com.au

Thermofilm has introduced Envirotouch, a range of affordable, intelligent, timer-based switches that allow easy control of lighting and electrical devices to deliver financial savings and reduced carbon emissions. The company says savings gained on one single switch being used for five years in a commercial lighting application amount to $1,104 and 5,466kg of greenhouse gas emissions abated.

The new range includes multiple preset, count-down timer options or cycles, so with the press of a button the Envirotouch switch will automatically turn off the light or appliance after the desired time.

FIRE-RATED DOWNLIGHTS

Megaman Lighting Australia
www.megamanlighting.com.au

The VERSOFIT from Megaman is a fully integrated fire-rated downlight incorporating a serviceable LED module to provide the ultimate control. Offering maximum versatility, the new 8W downlight incorporates a wealth of features, including the latest super efficient Megaman LED module, easy click connectors and large push button terminals. The fitting also has 'Loop in/Loop out' features to save on installation time and advanced thermal design to lower operating temperatures and extend life. Its honeycomb lens, which provides a beam angle of 36°, also matches Megaman's popular GU10 range, allowing seamless integration within projects.

THERMAL IMAGER

TechRentals

www.tr.com.au

The lightweight Flir T390 high temperature infrared camera, with a range of -20°C to 1,200°C, is suitable for almost any thermal imaging application. The Flir T390 can be used for electrical surveys, building diagnostics and mechanical inspections.

With an improved refresh rate (50Hz PAL) and laser locator, the Flir T390 is suitable for inspecting moving targets. A 3.5" colour touch screen, auto and manual focus, target illuminator and voice/text annotation all make for a very user friendly IR camera.

The T390 is also equipped with a 3.1MP visual light camera to complement the 320 x 240 thermal images.

REFRIGERATION CONNECTORS

RLS Refrigeration Press Fittings

www.rlspressfittings.com

Copper press-fittings are not new to the water or gas markets; however, until now there has been no approved system for handling refrigeration gases.

Recently released in the US is the RLS system for high pressure copper refrigeration connections. It is approved for use with R125, R32, R134a, R404A, R410A, R507, R407A, R407C and R407F. The supplier claims the system is 77% faster than brazing in independent testing. Obviously of interest to both OEM as well as service/repair applications, the company expects to release metric sizes in the coming months to mirror the existing range of ¼" to 1 ⅛".

ISO APPLIANCE INLETS

NHP Electrical Engineering Products

www.nhp.com.au

NHP's new ISO appliance inlets complement its existing range of ISO plugs and sockets. The new ISO appliance inlets are fully tested and comply with the requirements of AS/NZS 3123:2005 and AS/NZS 3120:2011. The new range of round pin ISO appliance inlets includes as standard a safety lock-off feature that prevents unauthorised connection of an incoming supply through a lockable cap mechanism. When matched with the corresponding ISO extension socket range, the patented lock-off mechanism prevents the unauthorised disconnection of loads by locking both appliance inlet and extension socket.

SMART SKYLIGHT

Kimberley

www.kimprod.com.au

Kimberley has released a range of smart, shaftless ambient light systems that allow electricians to introduce a natural light effect into just about all dark spaces, even multi-level buildings.

The illume Solar Shaftless skylight system comes in a range of sizes and configurations including windows, skylights and manholes. The advantage of the illume system is that it can be used in locations where traditional natural light conduits cannot be fitted.

illume is designed to convert the sun's energy to light and auto-adjust brightness levels to match external conditions thereby creating a harmony in your home or office between indoor and outdoor lighting.

PV ARRESTERS

Phoenix Contact

www.phoenixcontact.com.au

The VAL-MS…DC-PV surge arresters from Phoenix Contact are now short-circuit-proof up to 1,000A DC. Thanks to optimisations in the manufacturing process, the values for short-circuit current rating ISCPV could be increased from 300A to 1,000A. This affects Type 1 and 2 lightning/surge arresters, as well as just Type 2 surge arresters with 1,000V DC and 600V DC nominal voltage. All of the arrester types named here have been certified by the independent DEKRA test laboratory according to EN 50539-11 and have been awarded the KEMA test mark.

The VAL-MS…DC-PV photovoltaic arresters can be easily replaced by plug-in versions. Coding from plugs and base elements prevents incorrect plugging in the case of servicing. Integrated rotating latches offer reliable contact even at high loads. With remote indication contacts on the base elements, maintenance can therefore be planned more efficiently. Should the plug need to be replaced due to loads being too high, this is signaled by the visual status indicator.

Breathe easy about asbestos

Exposure to asbestos is an ongoing concern, but there are some younger members of the industry who have no idea what to look out for. Paul Skelton reports

"There is no safe level of exposure to asbestos fibres," Asbestos Education Committee chairman Peter Dunphy explains.

"With at least one in three Australian homes containing asbestos, many home owners, renovators, tradies and handymen are putting their health and the health of their families at risk when doing home renovations, maintenance and demolition if they release dangerous asbestos dust and fibres that can be inhaled and lead to asbestos-related diseases including mesothelioma."

The scary thing is, despite all the warnings there are members of the electrical industry who don't know the signs of asbestos, or the dangers of exposure.

Mesothelioma is a cancer that mostly affects the lining of the lungs and develops between 20 and 50 years after inhaling asbestos fibres. There is no cure and the average survival time after diagnosis is 10-12 months. Inhaling asbestos fibres may also cause other diseases such as lung cancer, asbestosis and benign pleural disease.

MESOTHELIOMA

Since 2003, approximately 600 Australians have been diagnosed with malignant mesothelioma each year and experts have estimated that there were at least another 1,350 Australians with lung cancer caused by asbestos.

It is estimated that these figures will continue to rise in the coming decades.

"We know that Australia has one of the highest rates of asbestos-related diseases in the world because Australia was among the highest consumers of asbestos products until a complete ban of asbestos came into force in Australia in 2003," Peter says.

"However, there is still a high volume of asbestos-containing building products used prior to 1987 that remain hidden dangers in homes and buildings such as garages and farm structures so it's critical that all Australians become asbestos aware.

"Many Australians wrongly believe that only fibro homes contain asbestos, with asbestos products still commonly found in and around brick, weatherboard, clad and fibro homes built or renovated before 1987.

OTHER DISEASES

Malignant mesothelioma is the most common of the asbestos-related diseases monitored in Australia. This is because there is a strong causal association between asbestos exposure and the disease.

A total of 11,667 people were newly diagnosed with malignant mesothelioma in Australia between 1982 and 2009, with men making up 85% of all cases.

That said, exposure to asbestos can lead to a number of other diseases:

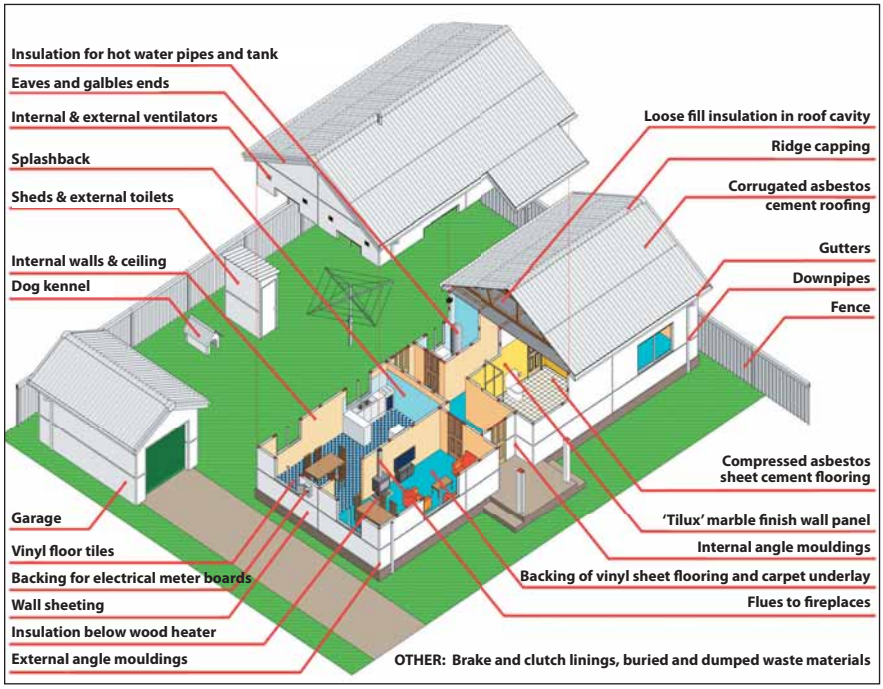
> Pleural Disease

This is inflammation of the outer lining of the lung – the pleura (where asbestos fibres are deposited). The pleura stiffens and thickens widely (diffuse thickening) or in patches (plaques), and can fill with fluid.

> Asbestosis

This is scarring of the lungs by inhalation of large quantities of asbestos fibres: the lung becomes inflamed and scarred (stiff) making breathing progressively difficult. Symptoms include tightness in the chest, dry cough, and in the later stages, a bluish tinge to the skin caused

Fibro homes... despite all the warnings there are members of the electrical industry who don't know the signs of asbestos, or the dangers of exposure.



Where is asbestos located in a typical pre-1987 home?

by lack of oxygen. Asbestosis is usually seen in former asbestos miners, asbestos manufacturing workers and insulation workers, and usually takes a decade or more to develop.

> Lung Cancer

Exposure to asbestos fibres greatly increases a person's risk of developing lung cancer, particularly if they are also a smoker.

HOW TO IDENTIFY ASBESTOS

"No one can tell if a product contains asbestos just by looking at it. Only scientific testing by an accredited National Association of Testing Authorities (NATA) can confirm if asbestos is present," Peter says.

"So, if people aren't sure if a product contains asbestos they should treat it as if it is asbestos and take all the necessary precautions to protect themselves.

"To be sure if asbestos is in homes, owners can have properties inspected by a licensed removalist or a licensed asbestos assessor to confirm if asbestos products are present.

"If in good condition and left undisturbed, asbestos generally doesn't pose a health risk; however, with the ageing of homes, the popularity of DIY, renovating, knock-down-rebuild and with the redevelopment of old fibro home sites, it's important that anyone working in or around homes or buildings constructed or renovated before 1987 know the dangers of asbestos and how to manage it safely."

It's a scary truth that asbestos could be anywhere: under floor coverings such as carpets, linoleum and vinyl tiles, behind wall and floor tiles, in cement floors, internal and external walls, ceilings and ceiling space (insulation), eaves, garages, roofs, around hot water pipes, fences, extensions to homes, garages, outdoor toilets, backyard and farm sheds, chook sheds and even dog kennels.

This means electricians need to be on high alert while working in older buildings.

Asbestos products can also be found buried beneath and around homes leftover from the original construction when it was common practice for builders and labourers to bury broken asbestos materials on building sites which can now be exposed when digging, gardening or redeveloping land.

In many coastal regions, 'weekenders' were often built from fibro (bonded asbestos cement sheeting) as low-cost >

NSW ASBESTOS REGULATIONS

In NSW, for example, the Government has regulations in force to protect you when you are working with asbestos.

These requirements include:

- **It is illegal to dispose of asbestos waste in domestic garbage bins.**
- **It is illegal to re-use or recycle asbestos products.**
- **It is illegal to dump asbestos products.**
- **Power tools should not be used unless the dust is captured or suppressed.**
- **It is illegal to waterblast asbestos cement sheets (fibro).**
- **Only licensed asbestos removalists can remove asbestos of 10m² or more (10m² is equivalent to the size of a typical bedroom wall in an average home or about the size of a small bathroom or an outside toilet or shed.)**
- **Only licensed friable asbestos removalists are able to handle or remove friable asbestos.**
- **Licensed removalists are to notify WorkCover of asbestos removal five days before removing friable or greater than 10m² of non-friable asbestos.**
- **All licensed contractors have to be able to give you a copy of their licence.**
- **It is illegal to bury asbestos on your own property.**
- **All asbestos must be legally disposed of at a lawful landfill site (to find a site near you visit: www.environment.nsw.gov.au).**
- **Local councils may also have policies regarding the removal of asbestos so visit your council's website to find out what's required.**

holiday homes. In rural settings many buildings were constructed from fibro as a cost-effective means of housing farm equipment and stock. It was also widely used to construct 'sleep-out' additions to farmhouses and workers accommodation.

ASBESTOS 101

Asbestos building materials are described as either 'friable' or 'non-friable'.

Friable asbestos is any material containing asbestos and is in the form of a powder or can be crumbled, pulverised or reduced to powder by hand pressure when dry.

Friable asbestos was mainly used in industrial applications.

Non-Friable asbestos is any material (other than friable asbestos) that contains asbestos. Non- friable asbestos cannot be crumbled, pulverised or reduced to a powder by hand pressure when dry.

Common uses for non-friable asbestos in buildings include: flat (fibro), corrugated or compressed asbestos cement sheets; water, drainage and flue pipes; and floor tiles.

Products made from bonded asbestos cement include electrical switchboards.

Dr Mike Lindsay, the acting director of environmental health for WA Health says most people mistakenly believe asbestos is only found in roofs, fences or walls in older style houses. But, products containing asbestos can also include paper backing material on sheet linoleum, backing panels in meter boxes and vinyl floor tiles.

"These types of products pose little risk to health when they are in good condition and undisturbed. But, people need to take precautions when they are renovating or doing maintenance work to prevent asbestos fibres being released into the air," he says.

"Asbestos containing products can be difficult to identify just by looking at them. So, if in any doubt, treat it like it is asbestos — just to be on the safe side."

WA Health's recommends:

If you're in any doubt, treat it like it is asbestos — just to be on the safe side.

- If doing maintenance, or renovating a house built before 1990, be aware it could have asbestos containing products and treat them with caution.
- If buying a house, ask that asbestos containing products be assessed as part of the building inspection report.
- Don't use power tools to drill, cut, sand or remove materials containing asbestos, as this will release asbestos fibres.
- Never use a high pressure cleaner to clean asbestos cement roofing or cladding.
- If removing small amounts of asbestos containing products yourself, learn how to safely remove and dispose of them first.
- If in doubt, hire a licensed asbestos removalist and check that the work area is free from visible asbestos at the end of the job.

So, when it comes to asbestos it's important to remember: don't cut it, don't drill it, don't drop it, don't sand it, don't saw it, don't scrape it, don't scrub it, don't dismantle it, don't tip it, don't waterblast it, don't demolish it and, whatever you do, don't dump it. ■

> **Asbestos Awareness**
> **www.asbestosawareness.com.au**

USEFUL WEBSITES

Thanks to the internet, you can now access vital information about managing asbestos safely.

National
> **Asbestos Safety and Eradication Agency**
www.asbestossafety.gov.au

Australian Capital Territory
> **Asbestos ACT**
www.asbestos.act.gov.au
> **ACT Asbestos Taskforce**
www.act.gov.au/asbestos-response-taskforce

New South Wales
> **WorkCover**
www.workcover.nsw.gov.au
> **EPA**
www.epa.nsw.gov.au/waste/asbestos/index.htm

Northern Territory
> **Asbestos Management**
www.health.nt.gov.au/Environmental_Health/Asbestos_Management

Queensland
> **Asbestos Queensland**
www.deir.qld.gov.au/asbestos/

South Australia
> **Asbestos Occupational Health and Safety**
www.safework.sa.gov.au

Tasmania
> **Asbestos Tasmania**
www.asbestos.tas.gov.au

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> **Asbestos Victoria**
www.asbestos.vic.gov.au

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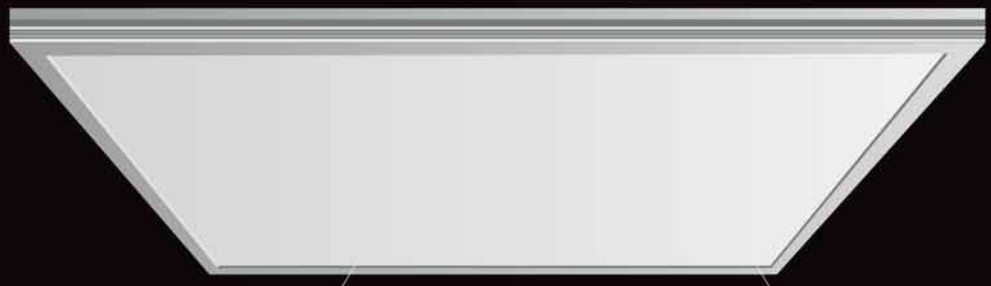

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Feed-in feeding frenzy

As 'distributed generation' increases, there's work to be done on power quality by electricity suppliers and the solar industry. Phil Kreveld reports.

The growth of solar around the country is seen as a good thing, helping us towards a 'greener' world.

Although small roof-mounted systems account for about 2% of grid electricity, their maximum power is about 4% of national generating capacity.

The bulk of domestic solar is grid connected and, irrespective of feed-in tariffs, this is beginning to affect the power quality of distribution networks.

Increased solar energy generation puts pressure on the generators' spinning reserve (extra capacity available from connected generators).

As the weather turns cloudy and solar energy production drops, the generators must supply the shortfall rapidly and devoid of network disturbance – that is, with minimal voltage sags and swells or frequency variation.

Distribution companies and energy retailers put some restrictions on commercial solar installations. Larger installations, of the order of hundreds of kilowatts, are generally required to have some battery storage so that demand is smoothed.

In the case of domestic installations, power limitations are invoked. Notwithstanding maximum power limitations, the growth of small installations can provide aggregate power likely to cause problems on portions of a distribution network.

The prevailing method of limiting the influence of solar on networks is relatively unsophisticated. There are restrictions on inverter output voltage – typically 267V on the high side and 207V on the low side for single-phase systems – and there are anti-islanding requirements.

Voltage restriction is in principle a bad thing for householders who want to reduce their energy bills. For example, when voltage rises to the upper limit during periods of intense sunlight, most inverters disconnect from the grid and cease operation.

Thus upper voltage limits are a problem in many urban situations where lots of solar installations are connected to a local transformer.

Rather than looking into possible supply problems and seeking engineering solutions, supply authorities tend to dictate the maximum solar power to be connected and impose strict voltage excursion limits.

Three-phase installations fall into a different bracket: they are generally installed in consultation with a supply authority.

Voltage regulation and power factor effects are genuine concerns, and we are in the early stages of these problems. In addition, federal and state governments are unlikely to have electrical engineers among their members.

Moves to reduce the renewable energy target (RET) can be seen as 'enlightened' by generators, transmission and distribution networks. However, the time has arrived for a more informed approach to feed-in problems.

One of the main concerns for power suppliers is that solar installations basically do not supply reactive current – that's a task for the network. Smart, four-quadrant metering notwithstanding, there are no apparent demand tariffs, and imposing them would be a political hot potato.

It is therefore not surprising that feed-in tariffs have fallen. It has all become too hard, and a low reward for installing solar

is one way of slowing the creep of connection problems.

The power factor issue is best explained by a simplified diagram (Figure 1). As more solar power is fed back into the network, the proportion of reactive power to net kilowatts becomes larger – in other words the power factor worsens. Network calculations are complex and outside the scope of this article, but in general, poor power factor worsens voltage regulation.

The situation is exacerbated in soft networks and may require special consideration in single-wire earth return (SWER) rural distribution. In stiff low-impedance networks, power factor effects are less noticeable.

Price pressure on domestic solar installations has made them increasingly affordable but not necessarily more sophisticated. They answer to Australian Standards requirements for their basic performance and safety aspects.

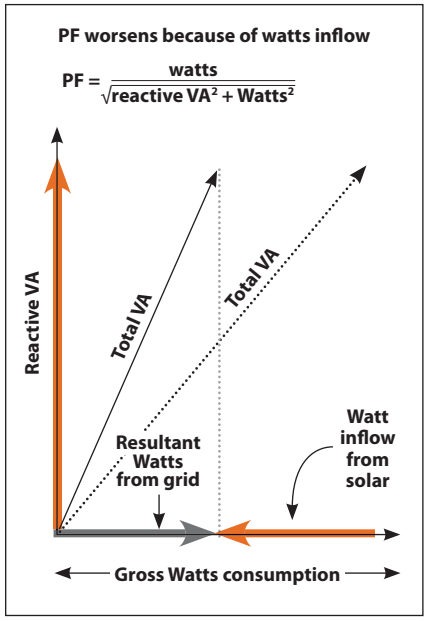

Figure 1.

As penetration increases, more features will be necessary in order to connect to the grid. An obvious one is battery storage.

Lithium-ion battery storage is still expensive, but longevity and reliability are steadily improving. The control algorithms have been developed for 'peak shaving', whereby excess energy on sunny days is diverted to a battery system.

Power factor is basically controllable via inverters, although it may not be not immediately obvious. There is also confusing information regarding the type of inverter to be used for this purpose – current based or voltage based. >

The first type has a large series choke in the DC link storing energy proportional to (current)^2, and the second has capacitors storing energy proportional to (voltage)^2. The voltage inverter is most frequently encountered and generally supplies unity power factor energy.

To control power factor, the phase angle of the current supplied to the grid must be compared with grid voltage, hence the usefulness of a current-based inverter. However by putting reactive impedance between the voltage inverter and grid connection point, a quasi-current generator has been produced and phase comparison between current and voltage can take place.

Domestic PV systems use maximum power point tracking (MPPT) on the DC side. Irrespective of the algorithm (although it is often the 'hill climb' one), there is a DC to DC converter supplying the DC link of the inverter.

The inverter, as a rule, has a lower rating than the solar panel so that the system has adequate power output control. The inverter pushes out unity power factor energy and, as already stated, therein lies a problem for power distributors.

A better approach is to more closely match the inverter to the PV panel by making the power point tracking operate directly on the inverter rather than on the DC link. This approach is available on some three-phase inverters. In one such system, the power available is – as would be the case in DC to DC converter systems – the product of panel voltage and current.

Using fuzzy logic semantic rules in conjunction with 'hill climb', a PI controller compares actual DC bus voltage and the reference generated by the MPPT and provides an active current reference. This reference is 'attached' to the grid voltage phasors and is part of a d-q transformation (Park transformation), similar to that used in active harmonic filters.

The inverse of the transformation generates the required phase current. The feedback mechanism is shown in Figure 2.

How serious is the feed-in problem likely to become? It's not in our brief to make forecasts.

The Clean Energy Council provides list of compliant inverters suitable for renewable energy certificates (RECs). Mainly, inverters have to comply with AS4777. For systems between 30kW and 200kW, compliance with IEC62109.1 or IEC 62109.2 is specified.

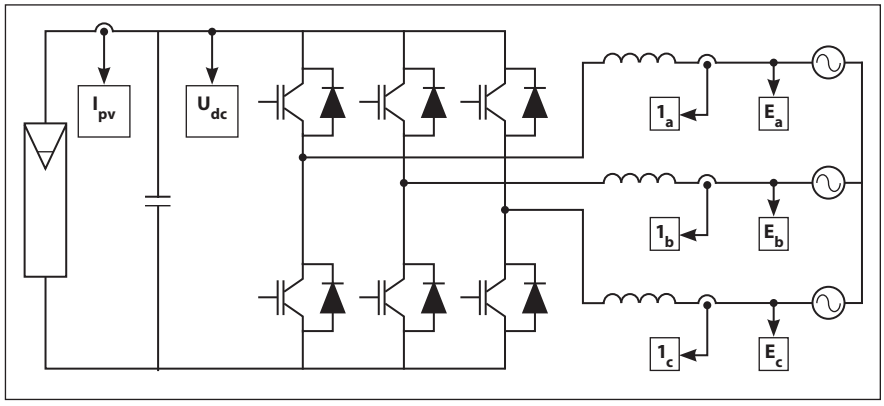

Figure 2: Inverter with powerfactor adjustment capability.

There may well be an increase in multimode inverters — they reduce reduce power when the upper voltage limit is reached.

The index for the Standards reveals nothing on power factor. For power above 200kW, the above IEC Standards or VDE AR-N4104 is specified.

The German specification has sections pertaining to influence on the grid, and these are specified by VDE AR-N4105 in regard to frequency stability – including photovoltaic installations.

The Standard says they need not be completely disconnected from the grid on reaching an over-frequency of 50.2Hz, but there should be a smooth transitional zone between 50.2Hz and 51.5 Hz, within which the installation may continue to feed in power at a reduced capacity.

This new application guide also affects existing plants with outputs of more than 10kW peak, and they need to be upgraded accordingly. We lack these requirements here, but individual distribution authorities (in particular in South Australia) enforce their own rules and provide for additional protection – for example, anti-islanding relays and phase loss relays in the sub-distribution network.

There may well be an increase in multi-mode inverters in the near future. Rather than ceasing operation when the upper voltage limit is reached, the control circuitry reduces energy production.

However, one unavoidable scenario is the presence of multiple inverters on the same sub-distribution circuit. Depending on the impedance of sections between the inverters, the practical effect may well be that 'imposed' voltage knocks out other inverters.

It seems some spade work must be done by supply authorities and the solar industry, irrespective of RET outcomes, as the penetration of 'distributed generation' grows. ■


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Expectant excursions

Standards committees are buzzing with activity, and Gary Busbridge sees parallels in business opportunities for contractors.

The Buzz is expecting in 2015 – no, I am not pregnant, just full of expectations for electrical Standards and the industry.

My calendar is filling up fast with Standards meetings and travel to various states for technical forums. It's a good gig that allows me to interact with our industry's stakeholders.

There are signs that the economy is on the up. Home loans have increased on the previous year, which will translate to more work and opportunity. On the domestic front we usually see improved sales about six months after construction starts.

Growth in commercial projects continues to impress, most of them being clinics, nursing homes and aged care facilities. No surprises there, considering the ageing population in Australia.

However, I have been pleasantly surprised by the number of contractors getting involved in the medical sector.

Industrial – specifically mining – is still volatile. Certain pockets are going ahead and others are pulling back due to low commodity prices. Keep your eye on this sector for opportunities.

Regarding industry in general, non-compliant and copy products continue to cause grief.

Imported cable is a big concern, and readers would be well aware of the Infinity cable debacle. About 40,000 dwellings could be affected – and probably more as the installations are tracked down.

Remember, the insulation on these cables will break down in quite a short time if exposed to heat (roof space temperatures in summer) and stress during installation (cable clips, ties, etc).

Another brand has been recalled for the same problem. Let me say it again – you only get what you pay for.

The next subject is not about inferior product, but it could be.

Replacement of halogen lamps with LEDs in downlights has caught me a little by surprise in recent times.

Some friends, thinking they were saving money, bought lots of LED lamps and proceeded to change them over.

After a few days the new lamps stopped working, or had a very bad flicker. The LEDs were a reputable brand but did not match the existing power supplies in the ceiling. Now those power supplies must be replaced – an expensive lesson.

If you recommend LEDs to customers to help them reduce energy bills, check the power supply and ensure that only a compatible lamp is used. Otherwise just install new power supplies and lamps.

So what is coming up on the electrical Standards front? Many committees are in the throes of revisions or amendments to some very important Standards, not least of which are the Wiring Rules.

The bible of the industry is being revised, and several issues are being sorted out as I write. A little sneak-peak is probably in order:

> RCDs on all final sub-circuits;
> the use of 10mA RCDs in primary schools;
> a total rewrite of the Safety Services section;
> clarification of outbuildings and bonding requirements;
> a total rewrite of the recessed luminaire section to incorporate classifications and subsequent markings;
> inclusion of electric vehicle charging installations;
> addition of arc fault detection devices for prevention of fire;
> reintroducing assessment of switchboards and clarity on recent developments in switchboard requirements;
> addition of prohibited zones around cooktops; and
> new figures to be added for damp areas.

The industrial sector – specifically mining – is still volatile.

These are just a few, but it's early days. With publication scheduled for late 2016, it is all hands on deck to get this revision completed.

From an accessories (or 'Bakelite') perspective a new electrical conduits Standard has been adopted from our European friends.

This means there will be two Australian and New Zealand Standards for conduits: the existing AS/NZS 2053 and the new AS/NZS 61386. They will run in parallel, and both will be accepted for our market.

Don't despair, as there is negligible difference between the two in regard to

strength and performance.

The good thing about AS/NZS 61386 is that a classification system will be marked on the conduit, giving you a better understanding of performance for 'light duty' through to 'heavy duty' conduits.

In my view, more information always helps the user to understand the practicalities of installation.

Even the switchboards committee is getting ready to publish a new suite of Standards to align with the international requirements for switchboard building and installation. Those of you in this game should take note, as there are a few changes regarding safety and performance.

The lighting committee has been working hard to complete the recessed luminaire Standard. This will help overcome some of the anomalies in the market regarding where and how to install these items to achieve a safe outcome.

In short, a new classification adapted from our friends in New Zealand will have to be marked on the downlight. It is a great system, allowing contractors to choose the correct downlight for an installation.

The latest version of the Photovoltaic Installation Rules has been released. To finish off this project, inverter requirements and inverter installation Standards will be released soon. Designers, installers and regulators will be able to determine the correct product and installation procedure well into the future.

The Medical Installation Rules revision is well under way and is scheduled for release early in 2016. This will mean much better alignment with the Wiring Rules, and more contractors will be able to consider working in this field.

The definition of patient areas and the determination of other relevant areas are the most urgent matters dealt with. The revision also means that the rules cover everything from the smallest clinic to the biggest hospital project.

The allowances for home dialysis machines and 10mA RCD protection are to be issued as an amendment in the near future.

Well, that's enough for the moment – except that there may be increasing opportunities for contractors in the near future. See you on the road. ■

Female sparky lights up the boys

For the first time ever, a girl has won the NECA Apprentice of the Year award in the Industrial category. Zach Broadhurst reports.

Taylor Fishlock accepting the Industrial Apprentice of the Year award at the National Electrical and Communications Association excellence awards.

The NECA Industrial Apprentice of the Year award is a coveted honour around the country. For winner Taylor Fishlock it was an exciting achievement, but she has given little thought to the fact she was the awards first winner to accept the accolade in a dress.

"I didn't really think about being the first female; I was just pretty stoked I'd won at all. A pretty proud moment I suppose," Taylor says.

While being the award's first ever female recipient is a great honour the girl from Katherine, in Australia's Northern Territory, doesn't see herself as any different from the previous winners. She was far more concerned with having to give a speech at the time.

"I was caught pretty off guard, I was like, 'Oh God, I've got to give a speech'. I'm not a very good public speaker," Taylor laughs.

"I'm not sure what it all means really, all the hard work is paying off I guess and I'm pretty happy about that and I'm excited for this trip too."

Along with $1,000, part of her prize is a trip to Europe where she will attend the Hannover Messe, one of the world's major trade fairs for industrial technology in Germany.

"I can't wait. I just spoke to Rod Edwards from NHP the other day and he was telling me that the trip isn't just to Germany, it's everywhere in Europe. I was lost for words."

Deciding to enter the electrical industry after high school, Taylor felt an apprenticeship could benefit her more than continuing to study at a university. Growing up surrounded by boys had also left her with few nerves about joining what is a predominantly male industry.

"I didn't want to go to uni, but I didn't want to have nothing behind me. I figured a trade was a pretty good option. I like to keep thinking and this industry certainly does that and it seemed like a pretty good fit at the time.

"I grew up on a cattle station with only brothers and the only other woman I ever had around in my life was my mum, so I'm pretty used to being surround by guys."

Growing up on a cattle station has also taught Taylor how remote the Northern Territory can be, having to remember to pack much more than her lunch each time she heads to a job.

"I'm actually out at Ngukurr at the moment, which is about 350km away from home," she says.

"We are out for the week and there is no wholesaler around, so if you forget something you're buggered. There is a lot of planning involved. If you forget something you're not going to do the 700km round trip for the wholesaler."

For Taylor, this is all just part of the challenge of a job that always keeps you guessing, forcing you to learn all the time.

"This job just constantly keeps me on my toes," she says.

"I've been pretty lucky, I haven't been stuck at the same old job every day, it's always different and that variety keeps me thinking all the time. I don't think there is a week that has gone by where I haven't learnt something new and that keeps me interested."

With her apprenticeship coming to an end early next year, Taylor has a few things she'd love to do, but her award and the constant workload has left her with little time to think too far ahead.

"I want to do a bit of travelling at some point, but I think I'll stick with the company I'm at for a while until I save up some money. My partner has his own electrical business, so I'll help him out with that, but I've got too much going on at the moment to even make plans," she laughs. ■

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with **Chris Halliday**

A life-saving trip

Do we need RCDs on all circuits, including stoves and hot water units, above and beyond the rules? Chris Halliday examines an important safety matter.

Electricians, as the experts in their trade, have an obligation to clients to provide safe outcomes, now and into the future.

The installation of safety switches is one very easy and important way of achieving this.

RESIDENTIAL INSTALLATIONS

Residual current devices (RCDs) have not always been installed on fixed equipment such as stoves, hot water systems or air conditioning circuits. However, they should be fitted to all circuits in residential installations to ensure safer outcomes.

Further, Clause 3.9.4 and Figure 3.4 of the Wiring Rules looks at clearances from wall linings. Where cables are fixed and concealed within 50mm of the surface of a wall, floor, ceiling or roof (neglecting the area within 150mm of internal wall-to-wall and wall-to-ceiling corners – see Figure 3.3), there are four ways of achieving compliance.

You could drill bigger holes to allow the cable to move freely, provide adequate mechanical protection, use earthed metallic armouring, etc, and/or protect the circuit with an RCD (refer Clause 3.9.4.4).

Bigger holes would allow mice to enter wall cavities. These creatures often chew the insulation off cables to get a little extra room to fit through – which is not a good result.

Unless you use one of the options it would be difficult to achieve compliance with 75mm wall studs, or with larger cables such as stove cables and 90mm wall studs.

In the Wiring Rules (Clause 2.6.2.3), RCDs are recommended for main switches in residential premises, with a trip current of 100mA to 300mA and a selective delay to ensure grading (to prevent fires).

If it's good enough for the Wiring Rules, then it's good enough for your clients. (A protected neutral link will be needed as an extra).

RCD protection at three-phase socket outlets may negate the need to replace a switchboard that may not have space for an RCD.

OTHER INSTALLATIONS

For non-residential applications, Clause 2.6.3.2.1 of the Wiring Rules specifies where RCDs should be fitted.

The clause states: Additional protection by RCDs with a maximum rated residual current of 30mA shall be provided for (a) final sub-circuits supplying socket-outlets where the rated current of any individual socket-outlet does not exceed 20A.

This generally means that circuits supplying socket outlets above 20A in other installations do not get RCDs. However, at the end of the aforementioned clause, the Wiring Rules refers you to workplace health and safety (WH&S) legislation, and does the lack of an RCD ensure safety? No!

More on this in the next section.

HARMONISED LEGISLATION

The harmonised WH&S legislation discusses "hostile environments" and stipulates RCD protection above and beyond Wiring Rules requirements.

If you are just following the Wiring Rules to where RCDs in "other electrical >

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installations" are to be installed, then you may be breaking the law.

The harmonised WH&S legislation requires appropriate RCDs for socket outlets where electrical equipment:

- in normal use is exposed to conditions likely to damage it or reduce its expected life span, including moisture, heat, vibration, mechanical damage, corrosive chemicals or dust;
- is moved between locations, and damage to the unit or flexible supply cord is reasonably likely;
- is frequently moved during normal use;
- forms part of, or used in connection with, an amusement device.

Check the legal requirements in your state and industry, as not all states have adopted the harmonised legislation. Some industry sectors, such as mining, are likely to have additional requirements.

MEDICAL PATIENT AREAS

You may be asked to perform electrical installation work in patient areas of hospitals, medical and dental practices, dialysis areas, home care, and self-harm areas.

The Standard has special installation requirements, including RCD protection, above and beyond the Wiring Rules.

You will need a copy of AS/NZS3003 to ensure all additional requirements are fulfilled. These requirements include additional certification by experts, as noted in the Standard, and regular inspections.

TESTING AND TAGGING

RCDs can and do fail, so testing is extremely important.

The RCD push button allows twice the rated residual current to flow, so this is a reasonably good test. It is particularly important for homes in which this may be the only RCD test ever carried out.

You could add additional revenue to your business by testing RCDs for residential customers, and by doing so you help to ensure safety. (It's always good to retain customers – especially by keeping them alive.)

AS/NZS3760 In-service safety inspection and testing of electrical equipment specifies that RCDs also be tested for trip time and must be tagged for places of work, public places, or equipment offered for sale.

This includes any residential areas such as hotels, motels, boarding houses, halls, hostels and accommodation houses. Again, this may be an additional revenue stream that you are not cashing in on.

OTHER ISSUES

It is important to select the right type of RCD for the load.

Much of our equipment is electronic in nature. It will probably need to include DC sensitivity for an RCD or residual current breaker with overcurrent (RCBO) to effectively operate when required.

An RCD or RCBO categorised as Class A will have sine wave and DC pulse sensitivity. Check the manufacturer's information to ensure you are using the right version for the situation.

Some makes and models of RCDs and RCBOs have electronic circuitry, so their life may be shortened by:

- overvoltage;
- transients such as those from lightning or load switching;
- harmonics; and
- heat (particularly shortens the life of capacitors).

With electronic circuitry, it will be more important than ever to test RCDs and RCBOs to ensure the electronics are operative.

With the drive to ensure safety, the installation of RCDs and RCBOs is relatively easy in small switchboards but can be problematic in larger boards.

Some switchboard manufacturers do supply a four-busbar carcass, making things easier, but four-pole RCBOs don't seem to be the norm.

Some manufacturers supply an additional pole and toroidal block to a standard miniature circuit breaker (MCB) to make a four-pole RCBO, and some of these even take up five poles on the switchboard.

Other makes of RCBO take up four poles and insulate the fourth pole from the three busbars, so only two poles are available for the next circuit breaker. Those two poles can then be used for single-phase circuits only, or become spare slots.

To get around the problem of available circuit breaker space on switchboards and the cost of replacing boards, some electricians are simply installing an MCB on the switchboard and using RCD-protected three-phase socket outlets (see accompanying photo).

CONCLUSION

It seems that RCDs are now a must for most situations, and you would be silly not to install them.

For the residential sector, this will include RCD protection on stoves, hot water systems and air-conditioners, with an RCD as a main switch. Some might say this will result in nuisance tripping, but there is no such thing. If an RCD is tripping, there's a problem.

Requirements above and beyond the Wiring Rules for RCDs include those detailed in workplace health and safety legislation and in specific Standards such as those for patient areas.

Socket outlets above 20A amps in "other installations", such as commercial or industrial, should be RCD protected to ensure safety and compliance with legislation.

When testing and tagging, replace faulty RCDs. Once identified, the circuit must be isolated there and then, as RCDs are essential safety equipment.

Read the Wiring Rules, other Standards and the applicable legislation. Become familiar with any additional requirements. If in doubt, fit RCDs to all circuits, or seek further advice. ■

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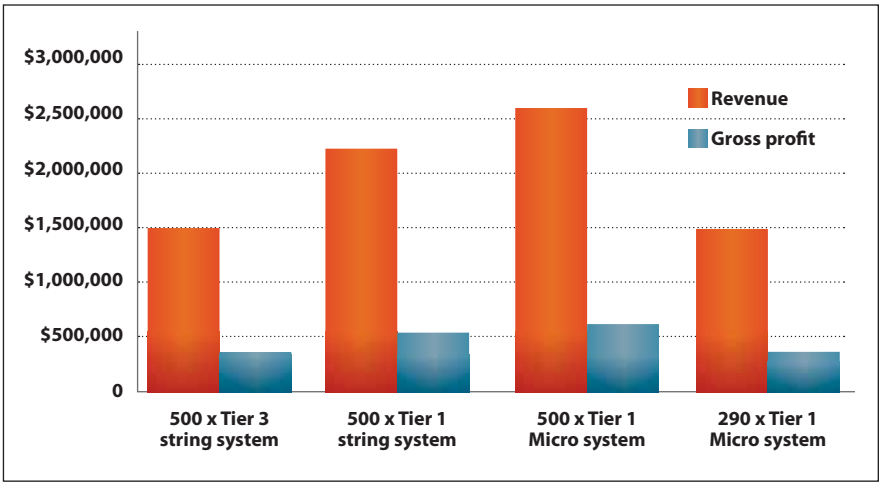
The rise of the microinverter

Solar microinverters convert DC to AC. SolarBusinessServices director Nigel Morris explains how the technology is changing solar business models.



The market... string inverters versus microinverters.

Someone asked me a great question recently: "Nige, I know you're a fan of microinverters. How big do you really think their share of the market will be?"

It's a great question because those of us who have been around for a while have seen plenty of excellent products never really take off because they don't have the engineering, sales and marketing mix right. The most fabulously engineered product will fail to sell if it's marketed poorly. The cheapest product will fail to gain sales momentum if it isn't supported or fails the test of time. A great all round product offer will fail if the timing or feature set isn't what the market wants.

Microinverters aren't miracle devices, but I have sense that the sales success they are achieving around some parts of the world is because some manufacturers have landed on the right mix and that's where it starts to get exciting. I would argue that Australia has a unique set of circumstances and that the recent growth in micro inverter sales is proof that the mix is particularly right for our market.

"They're too expensive," I hear you say. "Australia is a price driven market".

Really? I wrote a story about market prices recently, diving into this issue and I think that "big fat worm" of low price has turned. Sure, there will always be a market for the cheapest gear and you have to be competitive but there are several major reasons why I believe lowest cost models will continue to lose market share. Firstly because consumers are learning that to a large degree you get what you pay for. The data shows that Tier 1 inverters and Tier 1 modules are gaining share rapidly, despite the price premium. Secondly, consumers are also increasingly aware that if you don't buy from a reputable company who is making a profit you are unlikely to get support when it matters. I've personally spoken to crying customers who ring me for help when things go wrong. They are busy telling their friends how wonderful solar is and why they should learn from their mistakes and not buy the cheapest systems they can find. Thirdly, price data from several sources shows that despite the super low advertised prices, a large majority actually buy systems at a higher price than we often see promoted.

So, the data suggests that more people are willing to pay a premium if they can be convinced that there is real value in it.

This in itself tells us there is an increasing opportunity for companies to sell systems with microinverters. But more importantly, when you crunch the numbers and compare apples to apples, the gap between microinverters and string inverters is not as big as it first appears. In fact, one installer I spoke to today quoted me his numbers and demonstrated that from where he sits, microinverter systems are cheaper when you factor in warranty periods, ease of design, speed of installation and the simplicity of ordering and stock holding.

Even if this isn't the case in every situation, it certainly demonstrates that taking a second look at the real gap is probably worthwhile.

The second element of this equation is the solar retailer.

What many solar retailers also tell me that they need to increase sales and/or to cut costs. At the beginning of last year you could sell at perhaps $2.10/W net and today you have to sell at around $1.60/W net. That's a drop of almost 25% in revenue and margin dollars for the exact same work load. It's a hamster wheel that you have to get off.

Operational efficiency is one way to help cut costs that our industry simply has to tackle head on. Finding ways to get the

same outcomes with less effort is crucial; be it in design, purchasing, advertising, lead costs or conversion ratio's. This is where microinverters can really help.

Microinverters make a compelling case for retailers in a declining market, full of crappy products.

Need an easier design process for your relatively unskilled sales people? Would you really like to optimise the output of every single system through product matching but can't afford the time? Microinverters make it about as simple as it can be, with their Lego-like configuration models and intrinsic performance optimisation.

Sick of carrying a range of inverters to suit your ever widening range of system sizes? Ever been caught with old inverter stock that didn't suit the markets needs and had to sell it below cost to clear it? Problem solved with microinverters. One model, perhaps two at most and you have a range for almost every application.

Buying too many sales leads which have shaded roofs? Seeing increasing numbers of roofs that have multiple orientations? Worried that your commission incentivised sales gun might be overlooking minor shading? That's dead money and a recipe for disappointment. Microinverters will help.

The other way is to increase price. Few can get away with simply ratcheting price up without adding value, so tuning into what customers really want and developing offers loaded with benefits is essential.

Although we highlighted earlier that microinverters are much closer to the price of existing systems than was previously the case, let's assume there is a gap for a moment. I ran a quick model comparing three 3kW system types.

- A Tier 3 inverter/ module combo at $1/W (net)
- A Tier 1 inverter/module combo at $1.50/W (net)
- A Tier 1 micro inverter/module combo at $1.73 (net)

Let's assume you sell 500 3kW systems a year at 25% gross margin and compare the results. What you can see pretty quickly is that (logically) if you sell higher priced systems you'll make more revenue and margin dollars. But more importantly, you can also see that if you sold almost 40% fewer microinverter systems at that higher price, you would make the same revenue and gross profit as you would selling 500 crappy systems. For a whole lot less effort. And you would generate more energy for your customers.

In a nutshell I think microinverters provide a really compelling business case for clever solar retailers in a declining market, full of crappy products. ■

Article originally appeared at www.solarbusiness.com.au. Reproduced with permission.

Let's dish about dishwashers

Domestic dishwashers are practically standard equipment these days. David Herres outlines procedures for diagnosing and repairing them.

Domestic dishwashers differ from the commercial units installed in large restaurants and institutional kitchens.

In the latter the water is super heated, typically by externally supplied steam circulated through a heat exchanger. The idea is that very hot soapy wash water followed by a very hot rinse ensures consistent cleaning of dishes and glasses, without the need for inspection.

A conveyer carries dishes past top and bottom wash and rinse spray heads. Workers load and unload dishes at the front and rear ends of these big machines.

The domestic dishwasher is much more compact. Hot water may be supplied through a screw-on connection to the kitchen sink hot tap, with a discharge pipe placed in the sink. Otherwise the machine is plumbed into the hot water system and the drain.

A dishwasher mounted on swivelling casters can be rolled about the kitchen and parked out of the way when not in use. Because it is front loading, the top can be used for another purpose. Some home-owners place a large cutting board on it.

The residential model does not feed dishes through in a continuous flow like the large commercial units, so it operates on a timed cycle for cleaning, rinsing, and drying by an electric element and air blower.

When it comes to repairs, if there is no sound and no power light the repair may be simple. Check to see if the breaker in the entrance panel or load centre is tripped.

If it is, reset the breaker and see if the dishwasher performs normally. If the circuit breaker trips immediately, there is a short circuit in the supply wiring or internally.

Caution is needed to ensure that the outer cabinet is not energised. Check it with a neon test light or a multimeter.

Where water and electricity come together in an appliance, especially if it is not new, there is potential for shock to the technician and the end user. For this reason, it's a good idea to consult a plumber.

Such an appliance should be connected only to a ground-fault circuit interrupter. The receptacle (if it is cord and plug-connected) should be checked with a circuit analyser to make sure the wiring is correct and the equipment ground has continuity back to the service and system ground.

If the circuit breaker holds, but trips after a certain interval, watch the timer and see if this occurs as the machine enters a given state. Another possibility is that the motor is 'tired', with partly deteriorated winding insulation.

If the breaker holds but the machine is still unresponsive, several possibilities must be considered.

After checking the supply wiring, you can remove the access panel and check voltage at the input terminals – and at the power light, timer, printed circuit board and motor terminals.

Perhaps an easier approach is to begin with the door switch. Just about all appliances have a door or interlock switch. Its purpose is to make sure the power is cut off when the door is opened so that the user or an inquisitive child will not be injured.

The switch can fail, so as to be always closed (no protection) or always open (appliance will not run).

The switch may fail electrically or its linkage may be worn or out of alignment. Either way, the mechanism should not be disabled except temporarily for test purposes, as serious injury can result.

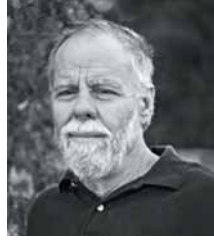
Putting a little extra pressure by hand on the door will often make the dishwasher spring to life. If this is the case, the repair is simple.

A further test, with the door open, involves depressing the switch actuator by hand to see if the machine powers up. However, be extremely wary of injury without the protection of the interlock switch.

Still another test, with power disconnected, is to check the switch with a multimeter set to a low range in the ohms function. The reading with the switch open should be infinite ohms, and with the switch closed it should be near zero.

The switch is also defective if, while the mechanism is jiggled, the resistance is seen to fluctuate erratically. Switch replacement is a simple matter.

If any of the above measures don't



restore operation, it is necessary to go a little deeper. Check the water temperature and pressure. At the inlet there could be a strainer, which may be cleaned by blowing out in the reverse direction.

Check the timer to see whether one of the functions is not operating.

The entire timer is often bad. In this case, with power disconnected, remove the timer and shift one wire at a time over to the replacement timer, being certain to hook the power supply and all terminations correctly.

These connections are usually of the spade push-on variety, which makes the changeover easy. Use needle-nose pliers.

Most dishwashers are prevented from overfilling by a float switch. If the float is stuck in the up position, water will not flow and everything comes to a halt. Usually, repair consists of cleaning debris from around the float.

Another possibility is that the float switch has failed electrically. With power disconnected, the switch can be checked with an ohmmeter, working the float up and down manually.

The heating element could be burnt out, or it may not have voltage at the terminals. Check it with the multimeter.

Most dishwashers have a water pump under the sprayer arms, and the parts may need to be cleaned. Worn O-rings and seals are easy to replace. The sprayer arms have holes that may be clogged by debris or mineral deposits. They are easily cleaned using a sharpened hardwood dowel.

Some problems are more elusive and may be specific to an individual make or model. It is usually possible to get a schematic and service information from the internet.

Appliance technicians are a talkative lot, and online forums are fertile ground. You should be able to type in an exact description of the problem and find an answer in an existing archive or when an eager participant jumps in.

YouTube videos are excellent sources of information for tough repairs.

If it all comes down to the circuit board, that can be a bit of a problem. Prices vary widely. If you replace an expensive circuit board and the machine fails to work because you missed something simple, it may take some time to restore your image – but a lesson will have been learnt. ■

An acceptable drop

It might have been some time since you learned about voltage drop, so what are the requirements and the calculations? Chris Halliday explains.

The voltage in a circuit will drop due to the resistance and reactance of cables.

Designers and installers must consider voltage drop to ensure safety and proper operation of the equipment, i.e.: adequate voltage must be supplied.

If there is too much voltage drop the equipment won't work, or safety will be compromised – such as a motor overheating and catching fire.

We therefore need to consider voltage drop before running cables and connecting loads. A larger cable than intended may be needed to ensure compliance with voltage drop requirements. Considering the voltage drop issue at the design stage of an installation will help avoid problems.

The Wiring Rules – AS/NZS 3000, Section 2 at Clause 3.6 – provides the relevant detail for low-voltage installations. Clause 7.3 covers stand-alone systems and Clause 7.5.7 covers extra-low-voltage installations.

All sparkies should be familiar with these requirements.

LOW VOLTAGE

Clause 3.6.1 discusses having the voltage for a piece of equipment higher than the lower limit of the Standard for that equipment.

The clause does allow for equipment not covered by a Standard to function safely at lower voltage, but it does not say this negates other sub-clauses in Section 3.6.

Conductors shall be sized to ensure that the voltage at any point in an installation does not drop more than 5% from the nominal (refer Clause 3.6.2). This equates to 11.5V for a 230V system and 20V for a 400V system.

The clause does not consider transient currents such as motor starting, solenoid closing and other similar applications.

The permissible voltage drop can be 7% if the supply comes from the low-voltage terminals of a substation on the premises and is dedicated to the installation (refer exceptions for Clause 3.6.2).

The voltage drop limits just mentioned are the total voltage drops for an installation. Voltage drops in the consumer mains, sub-mains and final sub-circuits must be tallied to ensure compliance with the limits.

Most of the voltage drop could be allocated to the final sub-circuit if there are no sub-mains and very short consumer mains. Likewise, long consumer mains and sub-mains will severely limit the available voltage drop in the final sub-circuit.

The old Australian Standards handbook HB301, for designing to the Wiring Rules, states that 2% to 3% is considered reasonable for the final sub-circuits, but it also discusses rearranging percentages for a satisfactory outcome.

Prudent placement of main switchboards and sub-boards will help to ensure that voltage drop is not an issue. This is a design matter and cannot be left to chance.

STAND-ALONE SYSTEMS

Stand-alone systems, in accordance with Clause 7.3, are required to have a voltage drop of no less than 11% from the nominal.

This must take account of the output voltage of the source and the drop within the installation under normal operating conditions (refer exceptions for Clause 3.6.2).

It is really the same voltage-drop limit as for a grid-connected system, as the network company can have a drop of 6% and the installation a further 5%.

EXTRA-LOW VOLTAGE

A maximum voltage drop of 10% for extra-low-voltage installations, when conductors are carrying the circuit-operating current, is applied by Clause 7.5.7.

That is, unless the extra-low-voltage equipment (not exceeding 50V AC or 120V ripple-free DC) is specially designed to operate over a wider voltage range.

The 10% limit excludes transient currents caused by such things as motor starting, solenoid closing and other similar events.

CALCULATING VOLTAGE DROP

Two methods are generally used for calculating voltage drop, as provided by AS/NZS 3008.1.1, and both use a value of current in the calculation.

Clause 3.6.2 of AS/NZS 3000 provides guidance on what value of current should be used in calculations and should not exceed:

- total circuit current;
- circuit maximum demand; or
- circuit protective device rating.

For circuits such as lighting and socket outlets, where the load is distributed over the circuit length, half the current rating of the protective device may be used for calculations (refer exceptions for Clause 3.6.2).

The first method uses conductor impedance, length and current for the calculation. This is slightly complex, as the resistance and reactance of the cable must be known to allow calculation of the cable impedance (refer Clause 4.3 of AS/NZS 3008.1.1).

The resistance and reactance values for various cable types are provided by Tables 30-39 of AS/NZ 3008.1.1. For smaller cables

Table 1 - Voltage Drop Requirements Compared to Loop Impedance - Maximum Route Lengths

Active(s) &/or Neutral (mm^2)	Earth (mm^2)	No. of Phases	Protective device rating (A)	MAXIMUM ROUTE LENGTH								
				Voltage Drop (%)					Loop Impedance (Table B1)			
				2%	3%	4%	5%	6%	Type B	Type C	Type D	Fuses
1	1	1	6	14.8	22.3	29.7	37.1	44.5	170	91	55	204
1	1	1	10	8.9	13.4	17.8	22.3	26.7	102	55	33	114
1.5	1.5	1	10	13.9	20.9	27.9	34.8	41.8	153	82	49	170
1.5	1.5	1	16	8.7	13.1	17.4	21.8	26.1	96	51	31	82
2.5	2.5	1	16	16.0	23.9	31.9	39.9	47.9	160	85	51	136
2.5	2.5	1	20	12.8	19.1	25.5	31.9	38.3	128	68	41	93
4	2.5	1	25	16.4	24.6	32.8	41.0	49.2	126	67	40	90
4	2.5	1	32	12.8	19.2	25.6	32.0	38.5	98	52	31	70
6	2.5	1	40	15.3	23.0	30.7	38.4	46.0	90	48	29	60
10	4	1	50	20.6	31.0	41.3	51.6	61.9	117	62	37	73
16	6	1	63	26.0	39.0	52.0	65.0	78.0	142	76	45	85
16	6	1	80	20.5	30.7	41.0	51.2	61.5	112	59	36	59
25	6	1	80	32.3	48.5	64.7	80.8	97.0	124	66	40	66
25	6	1	100	25.9	38.8	51.7	64.7	77.6	99	53	32	47
35	10	3	100	41.4	62.2	82.9	103.6	124.3	159	85	51	75
35	10	3	125	33.2	49.7	66.3	82.9	99.5	127	68	41	58
50	16	3	125	44.4	66.6	88.8	111.0	133.2	198	106	63	90
50	16	3	160	34.7	52.0	69.4	86.7	104.0	155	83	50	71
70	25	3	160	49.3	74.0	98.6	123.3	147.9	235	126	75	108
70	25	3	200	39.5	59.2	78.9	98.6	118.4	188	100	60	84

Notes: 1. Voltage drop values are calculated using 75°C values from Table 42 of AS/NZS3008.1.1
2. Double the route length where the load is distributed over whole length of the circuit such as a lighting or socket outlet circuit.
3. For smaller three phase circuits multiply the route length of any single phase circuits above by 1.155.

the reactance will have little effect on the total impedance and so can often be ignored.

Ohm's law is used for this method as follows: Vd = I x Zc.

Where:

> Vd = voltage drop in volts
> I = circuit current in amps
> Zc = impedance of the circuit

Most sparkies will be more familiar with the second method: Vd = (L x I x Vc)/1000.

Where:

> Vd = voltage drop in volts
> L = route length of the circuit in metres
> I = circuit current in amps
> Vc = cable voltage drop per ampere-metre length of circuit in millivolts per ampere-metre (mV/Am)

The value of Vc is provided by Tables 40-51 of AS/NZS 3008.1.1.

The formula can also be rearranged to calculate Vc then look up a cable with a mV/Am value less than the value specified (not equal to, as there is no built-in margin for this simplified method).

Tables 40-51 are for three-phase circuits. Single-phase values of Vc require the three-phase values to be multiplied by 1.155. Don't get caught by this little trap for young players.

The value of Vc is based on the maximum conductor temperature permitted by the cable insulation material. Allowance can be made if the cable operating temperature is considerably less than the maximum (refer Clause 4.4 of AS/NZS 3008.1.1) and for differences in power factor.

The values of voltage drop calculated can be converted to a percentage by multiplying by 100 then dividing by 230 (for a 230V system).

The Wiring Rules has a simplified version of the latter method at Table C7. You simply need to multiply the length in metres by the current in amps and divide by the allowable voltage drop percentage, then find the size of cable with a value more than that provided by the Table C7.

EXAMPLES

A sparkie wants to connect a normal 16A single-phase power circuit using standard power cable – 2.5mm^2 twin and earth, PVC and PVC thermoplastic sheathed.

Voltage drop in the consumer mains and sub-mains has been calculated, and 3% is left of the allowable 5% for the circuit. The final socket outlet has a route length of 40m. >

Table 2 - Maximum Values of Circuit Resistance from Table 8.2 of the Wiring Rules Converted to Voltage Drop

Active & Neutral (mm^2)	Earth (mm^2)	No of Phases	Protective device rating (A)	VOLTAGE DROP			
				Type B	Type C	Type D	Fuses
1	1	1	6	16.0%	8.6%	5.1%	19.2%
1	1	1	10	16.0%	8.5%	5.1%	17.8%
1.5	1.5	1	10	16.0%	8.5%	5.1%	17.8%
1.5	1.5	1	16	16.0%	8.5%	5.1%	13.6%
2.5	2.5	1	16	16.0%	8.5%	5.1%	13.6%
2.5	2.5	1	20	16.0%	8.5%	5.0%	11.7%
4	2.5	1	25	12.4%	6.5%	3.9%	8.7%
4	2.5	1	32	12.2%	6.7%	3.9%	8.9%
6	2.5	1	40	9.4%	4.9%	3.1%	6.3%
10	4	1	50	9.1%	4.8%	3.0%	5.7%
16	6	1	63	8.8%	4.9%	2.7%	5.5%

Notes: 1. Halve the percentage voltage drop where the load is distributed over whole length of the circuit such as a lighting or socket outlet circuit.
2. For three phase circuits multiply the percentage voltage drop values above by 0.866."

A 3% voltage drop = 0.03 x 230 = 6.9V (this value must not be exceeded).

The current for the calculations will be 8A, as the socket outlets will be distributed along the circuit (refer Clause 3.6.2 exception 1 of the Wiring Rules).

The impedance method:

The resistance of the cable is found by using Table 35 of AS/NZS3008.1.1 and the 75°C value, i.e.: 9.01Ω/km.

Vd = I Zc

= 8 x 9.01/1000 x 40 x 2 (don't forget there are two conductors, the active and the neutral return).

= 5.8V. This value passes the 3%/6.9V voltage drop requirement set by the installation requirements.

The mV/Am method

The Vc value is found for the 2.5mm^2 cable using Table 42 of AS/NZS3008.1.1 and the 75°C value, i.e.: 15.6mV/Am

Vd = (L x I x Vc)/1000

= (40 x 8 x 15.6 x 1.155)/1000 (don't forget the 1.155, as the mV/Am value in the table is for a three-phase circuit)

= 5.8V

Both methods align – we must know what we are doing! Again this passes the 3% requirement.

Designers and installers must consider voltage drop to ensure safety and proper operation of the equipment.

The simplified mV/Am method

Am/%V = (L x I)/%Vd

= (40 x 8)/3

= 106.7 Am/%V

Looking up Table C7 and selecting the cable with a value not less than 106.7 Am/%V, we find that 2.5mm^2 is the minimum size standard cable we can use for this project. So, we come up with the same result – it's 2.5mm^2 cable.

OTHER CONSIDERATIONS

The Wiring Rules provides Table B1 for maximum route lengths for circuits based on loop impedance.

This does not consider voltage drop, so I have created Table 1 to compare maximum route lengths for loop impedance with voltage drop in the same circuits.

I have also created Table 2, which converts the values of loop impedance to voltage drop.

A comparison of both tables shows that, in most cases, voltage drop requirements are often more stringent than loop impedance requirements. Using loop impedance route lengths or impedance values in isolation is likely to result in non-compliance with the Wiring Rules for voltage drop.

CONCLUSION

Voltage drop must be considered when designing and installing electrical wiring.

Compliance with voltage drop requirements will be achieved mainly by installing a large enough cable.

Total voltage drop in a low-voltage installation is usually 5%. However, this can be 7% if the supply comes from the low-voltage terminals of a substation on the premises and is dedicated to the installation.

The allowable voltage drop must be split between the consumer mains, sub-mains and final sub-circuits to achieve an overall compliant outcome.

Maximum route lengths and fault loop impedance requirements do not generally ensure compliance with voltage drop rules. ■

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The rationale evaporates

Those roof-top systems that rely on water evaporating just don't measure up compared with modern air conditioning. John Konstantakopolous and Matthew Wright present the argument.

To anyone thinking about buying an evaporative cooler, the advice is … don't.

These units offer poor performance and inefficient cooling, and they are expensive to uninstall.

Evaporative cooling is primitive and outdated. It has been superseded by fast, efficient reverse cycle air conditioning based on the technology that runs the kitchen fridge, which reliably keeps our food from spoiling.

Evaporative cooling is common due to heavy marketing by the two or three companies that are heavily vested in it.

About 20% of households in Victoria have a unit and about 60,000 units are sold each year.

Evaporative systems are included in off-the-plan large-volume standardised dwellings built on Melbourne's fringe.

These systems are less common in Sydney, where it is generally accepted that they don't provide the level of cooling required for coastal suburbs.

Some units are still being installed in the marginally drier western suburbs.

The performance of evaporative coolers varies depending on daily fluctuations in temperature and humidity, and the level of maintenance.

They can sometimes make occupants feel a bit cooler, but most of the time the atmosphere is muggy, with high humidity beyond the accepted comfort zone.

HOW IT WORKS; WHY IT DOESN'T

Evaporative cooling adds lots of moisture to the outside air, then pumps that air at high volume through the dwelling.

Generally, for the effect to be perceivable, the outdoor air needs to be below 30% relative humidity (RH).

RH indicates the amount of moisture in the air at a given temperature. As air gets warmer it can hold more moisture; as it gets cooler it can't hold nearly as much.

RH is the difference in readings between two mercury-filled glass thermometers: one exposed to the open air (dry bulb), the other wrapped in a wet wick (wet bulb).

An evaporative cooler can effectively operate only when windows and doors are open, thereby introducing a security risk.

Any work that has been done to upgrade the building envelope is compromised in an extreme way.

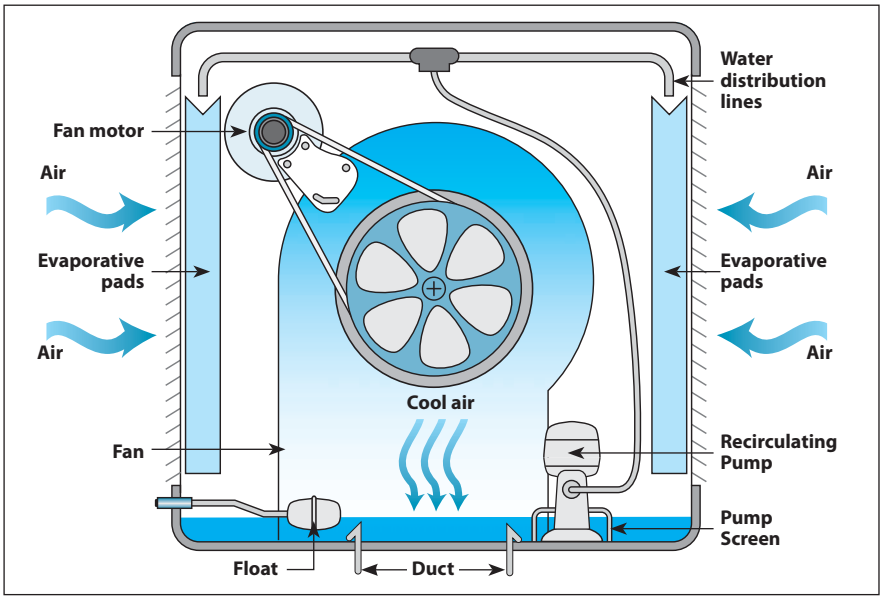
Insulation and weather sealing is wasted. Instead of having consistent insulation over ceiling areas where the evaporative registers are located, there is a big 'thermal chimney' in each room.

Occupants are directly exposed to the varying temperature and humidity outside. This is a particularly important matter in southern states where winter heating requirements are great, and much heat is lost through this ducting-induced thermal chimney.

In Melbourne, where evaporative coolers are common, Sustainability Victoria states that humidity is usually in the range of 40-50% on hot afternoons. This is outside the effective range for using evaporative coolers.

In places such as Mildura, which has a humidity range of 20-30% on a hot afternoon, it is still hit and miss. Often the outside humidity, coupled with high temperatures, is well above 50% and the evaporative cooling fails to do anything appreciable for the occupants.

The use of evaporative coolers has other downsides, as outlined below.



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Fire risk. According to the Fire and Emergency Services Authority in Western Australia, 35 of 70 houses that burned down in a catastrophic bushfire experienced fire that started in the evaporative cooler unit on the roof.

It is estimated that a substantial proportion of the hundreds of houses destroyed in Victoria's Black Saturday fires had evaporative coolers that ignited under ember attack.

Costly servicing. A unit needs to be serviced at least every two years and the pads replaced every two to seven years. Servicing starts at $200, and parts are usually required at extra cost.

Home security. It is difficult to secure a dwelling with all the doors and windows open, which is mandatory for these units.

Many householders shut up the house in the evening, hoping that their evaporative cooler will work. Without a free air-flow it won't.

Water leaks. These systems can leak due to pad failure, or neglecting to replace pads early, which results in water damage. There is also substantial risk in having the plumbing connections above your lounge room.

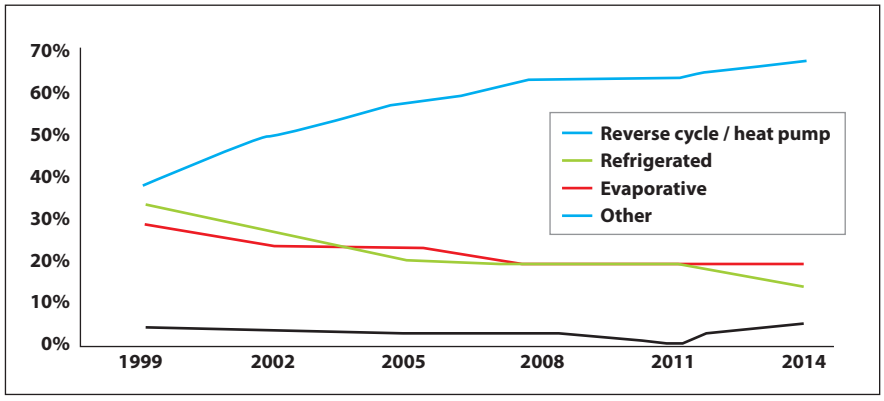
Mould and damp. This can result from using an evaporative cooler, as the indoor humidity rises to 80%.

It is a similar scenario to mould growth in the bathroom or shower when the exhaust fan has not been turned on.

Furthermore, the Victorian Government states that evaporative coolers can cause swelling to doors, doorframes and furniture.

Installation. Often there is not enough care taken to seal the perimeters of ceiling vents. Coupled with an ineffective damper, or no damper at all, this negates the building's thermal envelope. Householders will pay much more for winter heating.

An air pressurisation test of 12 houses was conducted by the building performance company Efficiency Matrix. It showed that 40% of total building air leakage can be attributed to conventional evaporative coolers and 20% to the more expensive units with a damper.



Space cooler market penetration. Source: ABS Environmental Issues: Energy Use and Conservation 2014, 2011 and 2008 reports; TrueDemand analysis.

Space. Evaporative coolers are bulky and take up valuable space on the roof that would be far better allocated to solar panels.

A badly placed evaporative cooler can block up to 3kW of the potential of a continuous solar panel array. This is equivalent to 30-50% of a household's annual electricity needs.

MODERN SOLUTION THAT WORKS

A quality reverse cycle air-conditioner can pay for itself, because it not only cools but also heats.

Heating with a reverse cycle unit can be as much as 22 times cheaper (using your own solar energy without exporting any to the grid is the best case) than with gas systems, which can lose about half their heat to the atmosphere.

The United States Department of Energy, California Energy Commission and Sustainability Victoria estimate the running cost of an evaporative cooler at half that of a reverse cycle air conditioner in cooling mode.

However, such claims are misleading, as they compare evaporative coolers with poor performing air-conditioners rated at half the efficiency of the best modern units.

When an evaporative cooler is compared with a Daikin Ururu Sarara US7, for example, or other air conditioners rated at six or seven stars, the energy consumption is about the same, but the cooling performance of the Ururu Sarara is far superior. It achieves the desired temperature set point that you dial up on the remote and gives you the required level of humidity for optimum comfort.

If you need further convincing that evaporative cooling is on the way out, analysis of the ABS Energy Use and Conservation Surveys by TrueDemand shows that evaporative cooling continues its decline, and reverse cycle split systems are on the rise.

The US7 split system delivers a comfortable and cool environment – not one that makes you feel as though you are in a sauna.

US7 is modular, so as many indoor units as needed can be installed and used as you wish. For comfort the optimum level is 20-24ºC and about 50% humidity.

On a 40ºC day with 50% humidity, as is common in Melbourne, the best an evaporative cooler will do is 34ºC and 80% humidity. This is well outside the comfort zone.

Psychrometry deals mainly with the mixture of water vapor and air due to its application in heating, ventilation and air conditioning, and meteorology.

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It's not where but how that matters

Solar panels from China are not necessarily inferior, as they often use Western technology under licence. Phil Kreveld draws attention to other important quality and performance factors.

There has been a lot of talk recently about Chinese made solar panels being inferior to those made elsewhere. Is there any truth to this?

Solar panels are manufactured in North America, China and Europe – mainly Germany.

Prices have been tumbling, and solar energy conversion efficiencies have been increasing.

But solar panel selection should not only dictated by price or technology alone, as much depends on external factors. Weather patterns, temperature and siting, to name a few, make the biggest differences in energy generation.

The three main production centres provide good quality panels. Technology developed in Germany and elsewhere is used in Chinese factories run in partnership with local investors. So there is no primary reason to go for a German panel rather than a Chinese one on the basis of where they are made.

Cutting-edge solar cell development can be found in several countries, including Australia. (In our case it is lamentable that university research results drift off to other countries.)

Installers of solar cannot be expected to pay attention to laboratory developments. Price, performance and durability – in that order – are their main concerns.

Polycrystalline and crystalline silicon are the commercially available panel types, then there are compound semiconductor materials such as CIGS, CdTe and CdS. Chinese panels are mainly based on silicon. The CIGS panel types manufactured in Europe and the United States have recently started to be made in China.

A large part of the academic research goes into basic science, mainly quantum efficiency and energy efficiency. There is a theoretical upper limit of 35% for solar cell efficiency (energy out over energy in). This is the Shockley Queisser limit, abbreviated as SQ.

In practice nothing gets close, although by stacking one PV junction on top of another, placing them in series, efficiency can be greatly improved. Tandem cell technology is expensive but becomes economically viable when used in conjunction with solar concentrators.

Bifacial solar is an older idea going through a renaissance with European and Chinese manufacturers. Both sides of the panel are employed to convert solar radiation. Vertically mounted panels use this concept, but there are weight disadvantages because of the protective glass on both sides.

Applications for bifacial cells include balconies, bus shelters, porch coverings, canopies, carports, facades, and fences.

In practice, energy conversion percentages vary from the low teens to the low twenties. For silicon, crystalline efficiency is better than for polycrystalline or amorphous silicon (the latter is used in thin panels, and is not as temperature sensitive – not much used in Australia).

The temperature de-rating factor can be a severe limitation on solar panels. When sunshine is greatest so is the temperature, and the result is often a net reduction in output.

Ambient temperature is no indication, as solar panels are light absorbent (also longer wavelength absorbent) and will experience much higher temperatures. For example, at 25°C, panel temperature might well be 50°C. A drop in output of 10% or more can occur just because of heat.

Surface treatment is important because pure silicon is shiny and can reflect up to 35% of the sunlight. To reduce the amount of sunlight lost, an anti-reflective coating is applied to the silicon wafer. The most commonly used coatings are titanium dioxide and silicon oxide.

Thin panel technology is becoming more

popular in Europe. It also requires back surface treatment to increase light trapping, in particular for the near infra-red wavelengths. The use of gratings on the back surface increases light trapping and overall efficiency.

Rating the performance of solar panels from a large list of manufacturers is a daunting task. The international journal Photon evaluates panels and inverters on a scientific basis, sometimes for years.

The primary number is 'yield', the ratio of kilowatt/hours (generated over a fixed period) to kilowatt power rating. The tests are conducted during Northern Hemisphere summers and winters.

The October 2014 issue of *Photon* indicates that the best yield rating was for a Chinese mono-crystalline panel installed in 2013. A close inspection of the 110 listed products reveals that most are from Chinese manufacturers. However, it is difficult to know the extent of joint ventures, technology agreements, licences, etc.

Ratings also take durability into account, so quality and certification issues are important rather than the underlying science. Panel scratches, cracks caused by poor soldering, and damaged charge-transfer fingers are likely to affect output and longevity.

Certification is important as a measure of trust. However, some certification is not genuine. Certification bodies include TUV Rheinland, TUV Sud, VDE (all in Germany), SGS (Switzerland) and Intertek (United States).

Solar panel samples need to be submitted following a factory audit, then accelerated tests including mechanical and temperature tests lasting several months. International certifications include IEC 61215, IEC 61646 (specific for thin film panels) and IEC 61730 for electrical safety.

Electrical safety aspects, as covered by the IEC Standard, are often unsatisfactory. Failure of the wet leakage test due to faulty connectors is not a rare event.

Part of the problem is that there is no Standard covering PV connectors. The nearest one that could be used is EN50521, which covers thermal cycles and damp heat testing. According to TUV, wet leakage current is one of the most frequent failures.

In the Australian market, the performance and durability of products from China and Europe are generally warranted. However, watch out for parallel imports which have no valid warranty or may be rebranded products. ■

Fuses confusing?

In solar systems, fires are caused by bad connections rather than fault currents. Bob Harper explains.

After a recent house fire in which solar panels were suspected, I got into a group discussion about what might have happened and why the fuses or circuit breakers didn't operate.

It came down to the others not understanding what a fuse does. One of them is an electrician, and he had some odd ideas about how fuses work.

The common perception is that a fuse 'knows' when the current exceeds a set value and abruptly turns off. It's not totally wrong, but it is an over-simplification.

ROLE OF A FUSE

First let's define the job we want a fuse or circuit breaker to do:

- carry the expected load current forever without blowing;
- open circuit when the load current exceeds the rated load current;
- stop excess current from flowing, even if many times the load current, ie: rated fault current; and
- remain off after the fuse has 'blown' and not allow dangerous leakage currents to flow, ie: rated safe voltage.

To that end, a fuse designed to meet these four conditions will have three ratings and a performance curve or utilisation category:

- rated load current – above which the fuse is expected to blow;
- safe working voltage – for the system in which the fuse will be used;
- current rupturing capacity – which is chosen for the potential fault current of the system; and
- utilisation category – which defines the performance curve of the fuse, ie: current time curve (for example, the fuse for a motor must not blow during start-up, when the starting current may be much greater than the running current.

FUSE OPERATION

The simplest fuse is a piece of wire between two terminals, and older electricians know them as SERFs (single element re-wirable fuses).

SERFs had the reputation of being very unreliable, but not because of any design fault. It was because the current rating depended greatly on the temperature in which they were situated, and because of meddling by various people.

It was common to have a client say: "The fuse kept blowing so I put in a bigger fuse wire."

Sometimes it meant two or three fuse wires, or a piece of circuit conductor (remember 1/044-inch copper cable?). Many electricians have seen a fuse holder hot, maybe smoking, and burning the base board.

SERFs were replaced with cartridge fuses, and later with circuit breakers. However, cartridge fuses still make a reliable back-up to a circuit breaker and are serious contenders whenever there is a fault.

HOW IT REALLY WORKS

The fuse element is simply a wire, which therefore has resistance and heats up when passing a current.

When the current exceeds the design level, the wire reaches a temperature sufficient for it to melt. Hence the name fuse.

The melting wire becomes a liquid, and the current flowing through it causes the wire to squeeze in on itself, further reducing its cross section, and therefore increasing the heat at that point on the wire.

The wire ends up either side of the 'blow' with a ball created by this magnetic process.

If the fuse is just over-current, the wire separates easily and there are no dramas to see.

A larger fault not only melts the fuse wire much faster, but the resulting arc bursts the fuse into tiny balls of metal, and sometimes burnt metallic soot as well. Glass automotive fuses often appear to be copper foil coated inside the glass.

Older electricians can tell what kind of fault occurred by inspecting the remains of fuses.

Even if the fuse element is a silver conductor, it has a current-carrying capacity based on its cross-sectional area, length and cooling capacity. Silver is preferred because it is less prone to corrosion than copper and

The common perception is that a fuse 'knows' when the current exceeds a set value and abruptly turns off.

melts at a lower temperature.

In the design of high rupturing capacity (HRC) fuses, the element is often 'dimpled' or 'punched' to create or define the places where the fuse elements will blow, always providing a chain of fusible links.

In addition, the HRC fuse is inside a ceramic tube surrounded by fine silica sand. The tube and sand help by making the operating value more consistent and also in quenching the arc.

When the HRC fuse experiences a significant fault, the element melts in less than a quarter of a cycle (5ms), and the heat generated melts the silica which then forms a glass coating around the resulting silver balls.

In effect, the silver element is quickly transformed from a good conductor to a good insulator.

This 'expulsion' of the fault current, and its arc, is the reason for using HRC fuses.

SOLAR PANEL FIRE RISK

Just to conclude, solar panels generate a maximum current depending on the amount of light available.

Therefore there will never be a fault current greater than the generating capacity of the panels, unless from another source, such as the supply or from batteries.

DC faults do not stop arcing easily, and any DC fault current will be limited by the generating capacity of the panels.

This means fuses will not operate and are of no use in protecting the DC solar circuit.

Instead, thermal fuses may be useful if employed wherever there is a DC connection that could become faulty. The thermal fuse would operate not by the current flow, but by the temperature of the DC connection, ie: by detecting the heat from a DC fault.

Bad DC connections generate a lot of heat, as the bad connection is by definition a high-resistance joint with a high current flow (H=I^2RT). In solar systems, bad connections cause fires rather than fault currents.

My suggestion is that all solar installations require regular inspection and testing that checks for developing high resistance joints and the security of all connections. ■

Tackling cartel behaviour

The ACCC says it has identified cartel-like behaviour in the electrical cablemaking industry and has taken legal action against those involved.

The Australian Competition and Consumer Commission (ACCC) has issued proceedings in the Federal Court against five companies, six individuals and an industry association for alleged cartel and exclusionary conduct in the supply and acquisition of electrical cable throughout Australia.

The conduct primarily involves low voltage electrical cables used within residential and commercial buildings.

Proceedings have been filed against:

- Australia's two largest manufacturers of electrical cable, Olex Australia and Prysmian Power Cables & Systems Australia;
- The electrical wholesaling businesses L&H and Rexel;
- Six senior executives from these manufacturing and wholesaling companies; and,
- Industry association, Electrical Wholesalers Association of Australia Limited (EWAA).

Olex and Prysmian supply electrical cable and other services throughout Australia from manufacturing facilities largely based in Victoria and New South Wales.

The ACCC alleges that during 2011, Olex, Prysmian, Rexel and L&H entered into and gave effect to an arrangement that included provisions that had the purpose of:

- preventing, restricting or limiting the supply of electrical cable by Olex and Prysmian directly to contractors and other customers;
- allocating electrical contractors and other customers to the wholesalers;
- preventing, restricting or limiting the acquisition of electrical cable by certain wholesalers from suppliers other than Olex and Prysmian; and,
- fixing, controlling, or maintaining the price of cutting services provided by Olex and Prysmian.

The alleged conduct mainly occurred at industry association meetings. The ACCC is alleging that the EWAA aided, abetted and/or was knowingly concerned in the contraventions of the manufacturers and wholesalers.

The ACCC also alleges that Rexel and Prysmian engaged in bid rigging by making and giving effect to a contract, arrangement or understanding that Prysmian would submit a higher bid to Caltex than the price it submitted to Rexel for the supply of electrical cable for an upgrade of the Kurnell Refinery in Botany Bay, NSW.

"Identifying and prosecuting cartel conduct is a key priority for the ACCC because of the significant damage that cartels can cause to competitors and consumers by driving up prices," ACCC chairman Rod Sims says.

"This alleged cartel spanned most of the major players in the supply chain for electrical cable, so the potential for harm to customers such as electricians and commercial contractors, and therefore ultimately businesses and households, was considerable.

"Indeed, the investigation of this matter was triggered by user complaints.

"At the time the arrangement was entered into, manufacturers were supplying not only to wholesalers but also directly to contractors and end users (such as industrial companies like BHP and Rio Tinto), and wholesalers were increasing the amount of electrical cable they imported. We allege that the alleged conduct was entered into to address these issues.

"This case also serves as a warning that the ACCC will act if it suspects an industry association or any other forum is being used as an apparatus for collusion."

"Identifying and prosecuting cartel conduct is a key priority for the ACCC."

It is also alleged by the ACCC that a senior executive from each of Olex, Prysmian, Rexel, and L&H aided, abetted, counselled, procured, induced, and/or was knowingly concerned in the alleged conduct of their company.

In addition, the ACCC alleges that two senior executives from wholesaler CNW attended EWAA meetings on behalf of the wholesaler buying group Gemcell, and were involved in the contraventions by the manufacturers and wholesalers.

The ACCC is seeking pecuniary penalties, declarations, and costs against the companies and individuals, as well as orders for compliance programs against the companies.

Directions were heard in court in February, with a verdict expected in December 2015. ■

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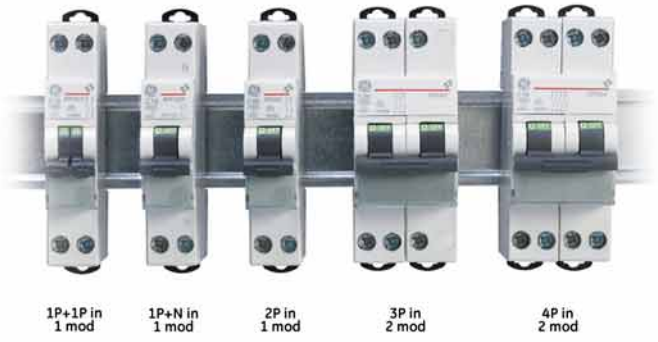

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Add in residual current devices for MCB's.
For 2 to 4 pole MCB
30mA up to 1000mA.
Meeting AS/NZS 61009-1.

RCBO's
Residual current operated circuit breakers with integral overcurrent protection.
From 4 to 40A and 10mA to 300mA, 1P+N.
Meeting AS/NZS 61009-1.

Unibis™ Miniature Circuit Breakers (MCB)
Developed by GE a fully functional 6KA MCB based on a 9mm format.
2 x 1P MCB in 1 module (18mm)
2P in 1 module, 3 & 4 pole in 2 modules.
From 2A to 40A.
Meeting AS/NZS 60898.

RCCB's
Residual current operated circuit breakers Without integral overcurrent protection.
From 16A to 100A and 10mA to 1000mA.
Meeting AS/NZS 61008-1.

Compact eRCBO
Providing personnel protect with integrated overcurrent protection in the same size as and MCB.
Available in two formats to suit DIN mount Domestic and Chassis mount Commercial/ Industrial applications.
From 6A to 32A, 6KA rated.
Meeting AS/NZS 61009-1.

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The International Year of Light

2015 is the International Year of Light and light-based technologies, explains Steve Arthur, and education is key.

The United Nations has proclaimed 2015 as the International Year of Light (IYL), recognising the importance of the role light plays in everybody's lives.

An entire year dedicated to light, you ask? Well, thanks to light's properties as both a tangible technology and element, it is perhaps the number one cross-cutting discipline of science in the 21st century (remember that without light running across cables, there would be no internet).

The timing of last year's Nobel Prize in Physics could not have provided a better segue into the IYL.

The 2014 prize was awarded to the creators of the blue light emitting diode (LED). This discovery enabled not only a multitude of modern devices from sensory lighting to mobile phones, but also a new generation of bright, energy-efficient bulbs, with the Nobel committee recognising the transition from incandescent bulbs lighting up the 20th century, to present LED lamps.

LIGHTING UP THE 21ST CENTURY

The lighting industry is undergoing a radical transformation that has opened up exciting and ground-breaking possibilities, and it is all thanks to LED.

LED technology has come a long way since being introduced decades ago as mere indicators for gadgets. Today, LED lighting has been rapidly gaining traction as a sustainable, highly efficient way to light up homes and buildings, to stadiums and cities.

But what is it about LED technology that has driven the switch from incandescent bulbs to LEDs? The long list of advantages associated with LED lighting systems has led to the significant and sustained increase in their use around the world.

Key factors that have heightened the use of LED in both indoor and outdoor applications include energy efficiency, absence of mercury, long lifetimes in residential and commercial use, no emitted infrared or ultraviolet radiation and durability.

UNDERSTANDING LED

In the IYL, education is a key pillar across every aspect of light and light-based technologies for the global initiative. When you start exploring LED technologies you very quickly find there are a few basic terms and concepts that it is worth getting familiar with or re-familiarising yourself with. These include:

> **LED:** An LED is a semi-conductor device or chip that produces light when an electrical current is applied. What's important to remember is that LEDs are just one of many components – optics, housing, power sources, to name a few – used to create an LED fixture or lamp. When looking at claims about lifetime, efficiency, and design, it is essential to compare the specifications of the entire LED system as a whole, not just the specifications of the individual system components.

> **Efficiency and efficacy:** The 'efficacy' of a lighting fixture is usually expressed as the amount of light (in lumens) produced by a certain amount of electricity (in Watts). Lighting fixture 'efficiency' is the ratio of the total lumens exiting the fixture to the total lumens produced by the light source.
It is important to note that the efficacy of the LEDs themselves is always greater than the efficacy of the LED fixture. This is caused by many factors including losses as light bounces off reflectors and passes through lenses. Make sure when

specifying a light fixture that you are looking at the appropriate fixture data versus the LED source data.

> **Lifetime:** For traditional lighting sources, lifetime is reported as 'mean time to failure', which means the average time it takes for some percentage of lamps (usually 50%) to fail completely. With an LED source, light output diminishes gradually. So for LED sources, lifetime translates to how long a lighting fixture retains a certain percentage of its initial light output, which is also called lumen maintenance. The lifetimes of LED sources and traditional light sources are defined differently. For white LEDs, lifetime is referred to as the time after which usually 70% of the original light output remains, not when the source has completely burnt out.

> **Directionality:** LEDs are directional sources. Traditional light sources emit light in all directions. In order to collect light and direct it onto the surface you are trying to illuminate, you must use lenses and reflectors, which absorb light and reduce the total output of the fixture. Given an LED source is already emitting the majority of light in a defined direction, it requires significantly less beam shaping optics, leading to a more efficient light fixture. A traditional source may produce more lumens than an LED source, but it may lose much of its light when passing through the required optics. It is therefore important to consider total illuminance, measured in lux, when making comparisons between light fixtures.

> **Correlated Colour Temperature (CCT):** CCT indicates the relative colour appearance of a white light source, from yellowish-white or 'warm' (2,700-3,000K) to bluish-white or 'cool' (5,000K+). Certain light sources are associated with particular colour temperatures. LED fixtures come in a variety of fixed colour temperatures, making them easy to replace or combine with current light sources. Some LED fixtures also provide a range of colour temperatures within a single fixture.

> **Colour Rendering Index (CRI):** CRI is a measure of the ability of a light source to render colours, compared to a reference source (incandescent1 or daylight), on a scale of up to 100, with 100 being identical to the reference source. What's important to remember is the higher the CRI, the better the fixture's ability to show true colours.

LED BUYERS GUIDE

With there being so many opportunities for contractors to capitalise on advances in LED technology, in addition to the basics, it is worthwhile revisiting key questions that all contractors should consider before specifying or purchasing LED lighting. This is to ensure any solution best meets your requirements and importantly, your customers' requirements.

The following Q&A serves as a guide to help you get the best quality and most appropriate fixture for each application.

Q: How does the manufacturer define lifetime? How is it measured?

A: For LED sources, light output diminishes over time, and lifetime typically refers to >

the useful life of the light output (also referred to as lumen maintenance). As mentioned earlier, the lifetime of a white LED is the time after which usually 70% of the original light output remains.

Q: Does the quoted lifetime include the electronics and other components necessary to drive the LED source?

A: Under the right conditions, LEDs can operate for very long periods of time; however, it is important that the supporting components used in the fixture design also have long lifetimes and are of high quality.

Q: What is the maximum ambient temperature under which the fixture can operate and achieve rated life?

A: The lifetime numbers for many fixtures are quoted at room temperature. Make sure to ask what the fixture lifetime will be at the extreme end of the quoted operating temperature range.

Q: Does the fixture design have any special features for heat sinking/ thermal management?

A: Thermal management plays an integral part in the length of LED source lifetime and is directly affected by fixture design. Heat must be properly drawn away from the LED source in order to maximise product lifetime– this can be achieved through an appropriately designed heat sink.

Q: What warranty is offered by the manufacturer?

A: Ask for a documented, clear definition of the warranty terms for the product. Beware of vague 'guarantees'.

If multiple white light fixtures are used on a project, are colour points among them adequately matched?

The tint or hue of white LEDs vary from batch to batch due to inherent variations that occur in all semiconductor fabrication processes. Make sure to ask how the manufacturer ensures consistent colour performance from fixture to fixture.

Q: How does optics affect system efficiency?

A: Beam shaping optics such as reflectors and cover lenses can have a dramatic effect on fixture performance. Make sure performance claims include these necessary system components. Leading manufacturers will offer photometric data produced by accredited testing laboratories.

Q: Does the proposal for my job include all of the necessary components to operate the LED fixtures?

A: Many LED fixtures require external transformers and other necessary controls in order to complete installation. Be sure to include all of these components in your project budget.

BECOMING AN EXPERT

Electrical contractors who understand LED basics and know the right questions to ask prior to specification or installation will be better able to deliver the best LED lighting solution for each project, no matter whether it's a home, office or stadium.

Keeping up to date with the latest lighting trends, products, requirements, standards and legislation means regularly visiting industry, government and lighting manufacturer websites as well as supplementing knowledge through up-skilling courses. ■

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 bringing his expertise and passion for lighting and energy efficient LED lighting solutions to the Trade Channel.

To find out more about the International Year of Light, visit www.light2015.org.

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Developing winning tenders

Successfully bidding for tenders is pretty much the only thing that keeps most companies in business. Brian Seymour explains what it takes to convert proposals to jobs.

In these tough times, more prospective customers are requesting tenders or quotations than ever before, so it is incredibly important for estimators to sharpen their skills and submit tenders that have the best chance of success.

Successful tenders are rarely based on price alone; most clients also want to know what services they are going to get for their money. So, talk to your contact, establish what they really want from this project and make sure you make mention of these key points in the proposal.

Further, to give yourself the best chance of winning a tender, you need to be selective in which jobs you actually bid for. So many contractors I come across say: "I price everything I can get my hands on". This is not a good strategy because it will either mean you are expending an extraordinary amount of time estimating for little return or you're winning work below market value.

The easiest tender documents to obtain are for publicly advertised jobs, where every Tom, Dick and Harry submits a price. In cases like this, typically the lowest tender will win and the successful contractor rarely makes a respectable profit (in fact, the winner is usually the company that has made the biggest mistake).

The next easiest documents to get are projects with multiple building contractors. They put the tender out to several electrical contractors each, possibly six or eight a piece, which results in 40 to 50 electrical contractors bidding for the one job.

More difficult to access are jobs that are under contract to one building contractor, or are being invited by the owner. Usually in this instance only three or four companies are tendering against you, giving you a far better chance (one in three or four) of winning the project.

Naturally the most desirable projects are with those clients you have a relationship with. The client calls you, asks for a price and gives you the go-ahead. The difficulty about these projects is creating and maintaining these relationships.

PROPOSAL SCHEDULE

It's important that your tender response shows an understanding of the contract and the client's needs.

Make one proposal and stick with it. A well prepared proposal must be professional and easily understood by the recipient and a proposal schedule should include:

- Outline of the client's requirements.
- Analysis of the competition.
- An assessment on the presentation/ structure.
- Best available information.
- Edit and proof read.
- Critical review.

REQUEST FOR PROPOSAL (RFP)

The RFP is no more than an invitation to submit a tender.

The main advantage is that it may be a selective group of bidders invited as opposed to a public tender request, which would encourage a multitude of bidders.

Read the RFP before you start your take off and be aware that information critical to your tender may be disseminated throughout the document.

ANALYSIS AND PROPOSAL PLANNING

Firstly, outline your proposal structure to ensure you cover all the criteria required by the tender assessor. Make sure you understand the scope of work and set the planning agenda to address every single element of the scope.

Points to remember:

> Choose the projects that best fit your market strengths.
> Do not promise what you cannot deliver.
> Do not use jargon which will require the assessor the use of a thesaurus to evaluate your proposal.
> Observe the closing date and time.

You will also need to assess your competition:

> Do they have an ongoing relationship with the client?
> Do they specialise in this type of work?
> Are they part of a greater conglomerate with common directors?
> Do they possess the specialised tools and equipment for this project?
> Do they have specialised skills among their staff?
> Is the job within their scope of travel?

The more you know about your competition, the better the opportunity you have to outshine their proposal and offer the services that they lack.

WRITE THE PROPOSAL

The best research material for a new tender is your own past successful projects. Can those that are still in production give you any specialised knowledge on what may be expected in this new proposal? How do those projects compare to this estimate?

There is nothing more soul destroying than having your tender discarded in the initial round of assessment due to the fact you have not made clear in the synopsis of your proposal that you have included all obligations of the RFP.

To avoid rejection in the first round, a tender must address all requirements. That said, to be a winner it must also be competitive and persuasive – it must clearly show your company's point of difference and explain exactly why you should be awarded the contract.

> The tender review panel may consist of people who only specialise in one or more facets of the contract (your proposal may be divided into a number of reviews) and know nothing about your company. Therefore you must project your best image.

The clients, (apart from Developers) in the main, are looking for value for money and a quality outcome.

Just because your company has operated within this sector of the market for years, does not necessarily follow that the tender review panel (especially with government projects) know anything about your ability to complete a project of this type and size and this current submission is the only chance you will have to convince them of your skills.

When tendering for a major project that will be of enormous benefit to your company, it may be wise to employ a tender consultant who will have the skills of a professional writer to improve your tender and submission.

Prior to your submission, you will need to thoroughly review the estimate and proposal, be sure you have met the submission criteria, provided the required information and answered all the questions. Check for mistakes or omissions and provide a proposal which will engender interest from the assessors. ■

Successful tenders are rarely based on price alone.

Successful tendering is more than an accurate estimate. The estimate is the basis for the tender, but the tender proposal requires a lot more than the price for the job. Your proposal must reflect your knowledge of your business and industry, your marketing skills and attention to detail.

WRITING GUIDELINES TO OBSERVE:

> Know how your tender will be assessed and provide a concise response to each of the assessment criterion.
> Use previous experience and provide examples of your capability to complete this project on time and within budget.
> Reinforce your commitment to quality and best practice.
> Ensure you address in detail the requirements of the tender specifications and the conditions of contract. Enumerate every criterion spelt out in the contract documents.
> Present your proposal in plain English and a simple format.
> Ensure you complete the price schedule and cost break-up as per tender instructions and also the schedule of rates if required.
> Include details on the background of your company's profile, experience and your services.

Brian Seymour MBE, industry consultant, 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. Visit www.moyseur-consulting.com.*

LAMP RECYCLERS
NATIONAL NEWSLETTER - AUTUMN 2015

WHY LAMP RECYCLING MATTERS

What's in it for me? That is a question many contractors & facility managers ask when it comes to fluorescent lamp recycling, and for good reason. Lamp Recycling is an important environmental step that requires a little more effort on everyone's behalf and some cost - but the all-round benefits to your business and your customers are compelling.

Simply throwing the tubes & globes out is a tempting option. Under budgetary constraints, it can be difficult to see the point of recycling—trashing lamps costs next to nothing upfront and requires virtually no labor, giving it a short-term advantage over lamp recycling. But throwing away lamps carries other financial, environmental, and public relations risks, which often outweigh the comparatively small fee for recycling in the long run.

THE CASE FOR LAMP RECYCLING

In some Australian states & territories, throwing away mercury-containing fluorescent tubes & globes is a violation of environmental regulations. By throwing out lamps, and violating the regulations, companies risk incurring large fines. Government environmental officials regularly investigate reports of illegal dumping and, if violations are found, fines may be issued for tens of thousands of dollars.

Regulations requiring fluorescent tube & globe recycling are enforced for a reason. The mercury contained in every tube or globe is potently toxic: just one gram is capable of polluting a 20-acre lake for an entire year. Once polluted, a mercury-tainted environment can contaminate wildlife, including human food sources such as fish. With an estimated 70 million mercury-containing tubes burning out each year in Australia, this causes a major potential for large-scale mercury contamination if they are not recycled properly.

Find our more information on Lamp Recycling and how your organisation can get started today at our website - www.lamprecyclers.com.au.

FLUOROCYCLE SCHEME UPDATE

We would like to congratulate all signatories to the Fluorocycle scheme, including the newly joined - Australia Post.

THE REAL COST OF LAMP RECYCLING

Mercury-Containing lamps are becoming less expensive to recycle. Unfortunately, the logistics and processing of a fluorescent tube costs significantly more than the recyclable content is worth in recyclable elements, so end-users must pay a small fee to make sure their lamps don't end up in landfill.

How small? Well over the life-cycle of a fluorescent tube, the cost to recycle today is approximately only 1% of the cost of ownership! Is a 1% life-cycle saving worth the cost of polluting the Aussie environment with mercury?

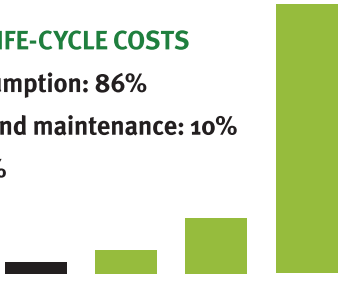
FLUORECENT TUBE LIFE-CYCLE COSTS

Cost of energy consumption: 86%

Cost of installation and maintenance: 10%

Cost of materials: 3%

Cost of recycling: 1%



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national electrical and communications association

A word from the CEO

As we head into 2015, it becomes clear that this is going to be another challenging year for our industry.

No sooner were we back at work than we heard that ECables had gone into liquidation. At this point, it's unclear what the ramifications will be, but we can be sure this will not be the end of the saga.

So I would stress again the importance of only buying compliant products from reputable distributors. The investment the large manufacturers and bigger wholesalers make in testing products is, in many ways, your insurance.

When we first heard that ECables was recalling its product, we were assured that they had the appropriate insurance. While this most recent development casts some doubt on this, if you purchased your product from a major wholesaler, you will still be protected.

Recall insurance, or assurance?

On the back of the Infinity Cable debacle, we spoke to the major wholesalers and manufacturers about the merits of compulsory recall insurance.

The overwhelming view was that if the regulators were to force this onto the market, it would only make legitimate products more expensive, in turn encouraging consumers to buy the cheaper, potentially non-compliant products available.

The better option would be to better define what 'good governance' looks like and build that into the regulatory requirements. This would then provide the assurance that the industry, and contractors, need.

At the same time, regulators need to work with manufacturers and wholesalers to improve the testing process for all products – especially those produced by unknown manufacturers.

To be effective, this needs to be done independently and regularly. Both Infinity and ECables appeared to have been

through successful testing at some point. However, subsequent tests failed, suggesting initial tests could have been performed on a special sample rather than a random one. This is another challenge we face. And we believe that the solution is that everyone plays by the same set of rules.

The role of the consumer?

These developments also suggest the consumer has a role to play. We need to make consumers more aware of the risks associated with non-compliant products and make sure they ask the right questions. This is harder to achieve, but we're starting to look at how we can engage more with consumers. The 'Find an Electrician' form on our website is the first small step in this direction.

NECA Policies

February saw the first official set of NECA Public Policies being launched at our first 2015 Parliamentary Luncheon with Federal Treasurer Joe Hockey in Sydney.

We engaged with our members, state chapters and NECA Councillors to develop this suite of policies, which is the first of its kind for our organisation.

It outlines eight key policy themes and 21 specific policy recommendations. If actioned by the Government, NECA believes that it will deliver a more prosperous and effective electrical contracting sector through the creation of new employment opportunities, increased safety and compliance standards and a boost in growth for our national economy.

As the peak industry voice for the electrical and communications sector, NECA will continue to engage with key stakeholders on a range of policy positions and in a number of forums. NECA holds the view that the ongoing advocacy of our industry, via parliamentary discussions, parliamentary and departmental policy submissions and policy forums are a critical element in effecting positive change for our industry. The policies are available on our website and we hope you find them of interest.

2015 Market Monitor

Finally, I would like to remind you that it is Market Monitor time again. The first study was almost 10 years ago and we have made a number of changes this year.

Firstly, we are opening up the survey to everyone in the industry. Secondly, this survey is online and the questions have been streamlined to make it easier, and faster, for you to complete this year.

This will give us real-time results and enable us to look at trends by age groups to, for example, identify the different purchasing habits of the under-35 contractor. The data can also be split into metro and regional areas, owners, business managers, employed contractors and even apprentices.

So, please read on to hear more about how this year's survey will take shape, and do make sure you have your say. At least one lucky person will win a trip to the proposed NECA National Industry Conference in Cape Town in 2016!

You need only visit the NECA website (www.neca.asn.au) to complete the questionnaire.

Best regards,
Suresh Manickam

NECA 2015 Market Monitor in detail

This year's Market Monitor is the single largest national survey undertaken by the electrical contracting industry, with a scope spanning a contractor's relationship with their consumers and wholesalers, to their concerns and challenges for the years ahead.

This year's survey will be even easier for participants to fill out than in previous years, as it is both online and interactive. The feedback you provide is invaluable to manufacturers and wholesalers, as well as giving NECA the help we need in determining the direction of our governance and industry representation.

This year, as in previous years, the study focuses on specific areas relevant to today's contractor. There are six sections in this year's survey, all designed to give us a better idea of how you operate and make decisions – plus, it's an opportunity for you to identify areas that you think could do with some improvement.

Broad Industry Overview

This section of the survey notes the changes that are occurring in the industry and lets us know what we might reasonably expect in the coming months.

It looks at how you source your work, if the flow of work is constant and your costs and knowledge of new products. It also asks about general concerns you might have for the future of the industry and your feelings about the direction in which it is headed.

This is your chance to have a direct say about where the industry is going, notify us of any upcoming issues you might foresee and help us plan for the next two years.

Purchase Process and Decision Making

Who makes the decisions in regards to which brands your business uses and where they come from? What informs this decision? What channels do you use when you do purchase equipment?

This section asks these questions, giving us an impression of how electrical contractors typically purchase their goods and what thinking goes into it. This informs the release of educational material that helps you avoid defective products and other potential pitfalls for contractors, making the industry safer for everyone involved.

'The Grey Market'

There is little question as to the existence of a parallel marketplace for wholesale electrical goods in Australia, but at the same time there is little information on what is driving electrical contractors to import when they buy. This section of the study looks at how the rise of this 'grey market' will affect businesses and member impressions on the safety or legitimacy of these channels.

Your feedback here notifies homegrown wholesalers of the areas that they've fallen short in and also works to let the industry know of the risks they may face when choosing to purchase electrical goods through these routes.

The Role of Digital

There's no question that the internet has transformed our industry, with enormous changes in the way we receive, conduct and carry out business. This section attempts to determine if the industry is successfully meeting the challenge of new technologies and adopting them at a rate swift enough to capture the consumer.

We're also interested in how you, as a business, have been using these technologies to make things easier and better for yourself and your consumer. It's your chance to proudly let us know the ways in which you've adopted technology to your advantage and how it's changed the way you manage your business.

The End Consumer

This section is all about arguably the most important component of our industry: the consumer.

We're looking to find out how exactly you interact with your customers, what questions they're asking, how much they know and what changes this makes to the way you do your job. We want to know if the consumer in 2015 is more knowledgeable and more empowered to make decisions than their 2013 counterpart – and if not, why not?

The results of this section of the survey can assist contractors in better connecting with their customers and help make sure that your business prospers, whatever the climate.

As Businesses Evolve

In order to meet the growing demands of businesses, we will carefully examine the purchasing decisions of consumers within different age brackets. It is essential for us to understand the changing consumer patterns and how this could influence the industry as businesses continuously evolve.

About SurveyMonkey

NECA's 2015 Market Monitor Study will utilise SurveyMonkey's powerful FluidSurveys tool.

- SurveyMonkey is the world's leading online survey platform.
- Created in 1999 by Ryan Finley, a college junior who needed to survey customers for his part-time job.
- Now has more than 450 employees worldwide with customers including 99% of the Fortune 500.
- SurveyMoneky also provides its services for brands such as Facebook, Virgin, Samsung and Kraft Foods.
- SurveyMonkey opened it's first APAC office in Sydney last year with a team of seven with plans to grow to 20 in 2015.

FluidSurveys is an intuitive online service that actively reacts to the answers that users give it. Unlike previous years, the participants will open up different pathways as they work through the survey, making sure that the questions you're being asked remain relevant to you and useful to us.

The FluidSurveys tool will also allow us to begin analysing results long before all participants have finished filling the survey out – meaning that the valuable insights we gain can be released to the community even sooner.

national electrical and communications association

Highlights of the NECA 2013 Market Monitor

The 2013 survey found that even with a 7% increase in charge-out rates, the cost of doing business rose by 25% overall, leaving the average electrical contractor considerably worse off than they were when NECA conducted its 2011 Market Monitor.

NECA was concerned that though media were reporting a rise in business confidence, this change hadn't been reflected in real terms across the industry.

"Our industry – which employs more than 50,000 people across Australia – is in many ways a barometer of the Australian economy," said our then CEO.

"[2013's] overwhelming message is that it is getting harder and harder for the smaller businesses to survive, with rising costs of materials and labour, higher taxes and never-ending red and green tape… it is not surprising that as many as 5% of contractors doing business in 2011 have since closed their businesses."

The key findings of the 2013 Market Monitor include:

- The average contracting business employed 13 people (increase of 9 since 2011).
- Less than 8% of the industry employed more than 25 people.
- On-going maintenance work (in both residential and commercial work) was a considerably smaller percentage of the work done in 2013 when compared with 2011's study.
- There was a 40% increase in specialisation on the part of contractors, up 40% since 2011.
- Overheads rose by up to 40%.
- Home automation - possibly due to the NBN - emerged as a key skills requirement.
- The number of apprentices being taken on fell.
- The most significant 'new technology' skills in the 2013 period related to renewable energy and energy efficiency.
- 96% of contractors carried smart phones – though the apps most commonly used were banking, maps and the weather.
- The mainstream suppliers grew their share of the top-end of the industry.
- The percentage of direct imports, while small at the time, was growing.

This year, NECA anticipates dramatic differences in the findings of our 2015 Market Monitor. Read on to learn about the areas being focused on in this year's study.

NECA Releases New Policies

NECA has recently released its 2015 Policy Statement. A first of its type for the organisation, the statement has been formulated as a result of internal engagement with our members, state chapters and elected Councillors. The statement was ratified by the NECA National Executive in January 2015.

The NECA Policy Statement 2015 contains eight key policy themes and thirty specific policy recommendations that we strongly believe, if actioned by the Government, will lead to a more prosperous and effective industry sector, presently generating an annual turnover in excess of $23 Billion and employment for 145,000 workers. These policy outcomes would additionally deliver a boost to Australia's economy through the creation of new employment opportunities and enhanced safety and compliance standards.

Designed to highlight to policy makers and key decision makers within the Government the barriers, threats and opportunities that presently exist for our industry, the statement outlines the necessary solutions and policy outcomes that can improve the lot of businesses within our industry.

Some of NECA's core themes are highlighted within the statement, such as calling for the establishment of a driver's licence model for national licensing, support for the reform of the Vocational Education and Training sector, the stability of payment for electrical contractors in the event of a collapse of a construction company and support for an industry focused, national register to stamp out the sale of non-compliant electrical products and parts to name just a few.

Throughout 2015, NECA will continue to engage with key stakeholders, on a range of policy positions and in a number of forums. We strongly believe that the ongoing advocacy of our industry, via Parliamentary discussions, parliamentary and departmental policy submissions and policy forums, are a critical element in effecting positive change for our industry.

To find out more visit the NECA website and look for the 2014 Annual Review which has a full version of the policy statement.

Win a trip to the 2016 NECA National Industry Conference in Cape Town, South Africa.

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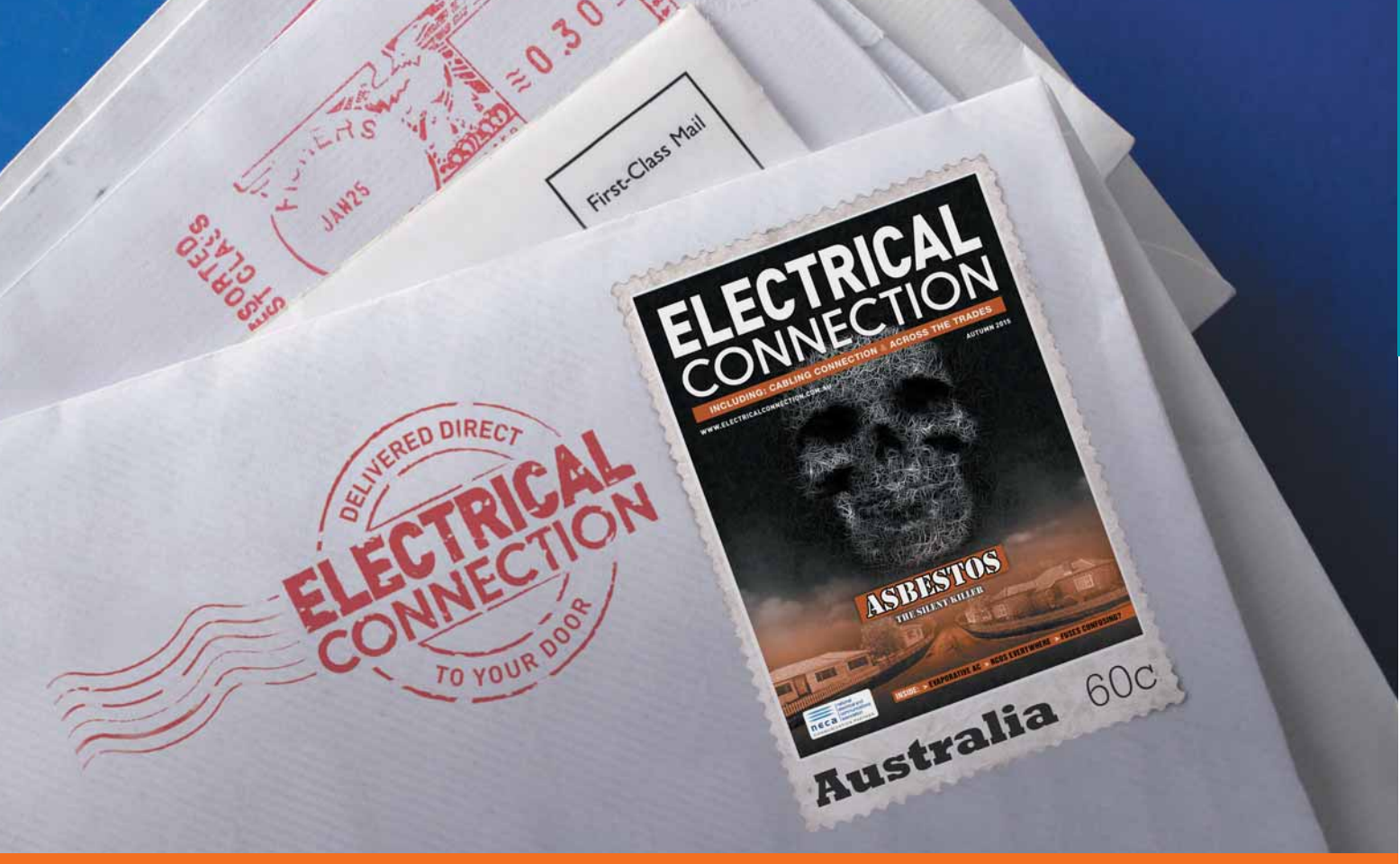
Go to www.neca.asn.au to enter.



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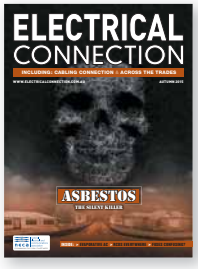

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Competition at basement level

TPG Telecom has vowed to fight back against new rules that it claims stifle competition to the Commonwealth-owned NBN network. The Federal Government argues it is acting in the best interests of both consumers and industry. Caroline Reidy investigates.

Until recently the Commonwealth-owned NBN Co. has primarily used Fibre to the Premises (FTTP) technology in its rollout of the National Broadband Network (NBN), an Australia-wide project to upgrade existing internet network infrastructure, and in turn prepare Australia for a digital-ready future.

FTTP technology connects fibre optic cabling directly to each premise and is perfect for standalone homes and ideal in rural and regional areas, but difficult and expensive to roll out in situations where multiple homes or offices sit in the same buildings – such as apartments, high-rises and office blocks.

Fibre to the Basement (FTTB) technology differs in that it runs fibre optic cabling to one point in a building (usually the basement), before switching to existing copper cabling to complete the connection to premise.

While FTTP is faster, FTTB is cheaper and far easier to roll out in high-density areas. As such, FTTB – and its roll-out in Australian cities – offers a lucrative market for broadband companies.

For this reason, NBN Co. has been hurriedly working to introduce its own FTTB product. In May 2014, NBN Co. delayed its FTTB product by "five months"; on 22 January this year it announced the location of the first 2,000 premises to receive its FTTB product by the end of March 2015. Pilot trials are currently underway and the initial rollout will be followed by a staged release rollout across the country.

Meanwhile, TPG Telecom has been offering an FTTB product since September 2013, when it launched its plan to provide 500,000 Australian premises with FTTB services. It was able to launch what is essentially a rival product to the NBN because a legislative loophole allowed the extension of fibre networks built before January 2011, and TPG's FTTB offering was to be an extension of its existing network.

Despite this, TPG's 500,000 FTTB rollout was, and has remained, a controversial plan, criticised by both NBN Co., and rival telcos including Telstra and Sing-Tel Optus. Those opposing TPG's FTTB rollout argue that by targeting only the lucrative city market, TPG is taking the profits that could otherwise be using to connect regional Australia – a necessary, yet less lucrative job.

In other words, if NBN Co. could generate profits by supplying FTTB >

to city customers, this would in turn help supply costly broadband infrastructure to rural and regional areas without adding more expense to the Federal Budget in its commitment to roll out a nation-wide high-speed broadband network.

It has also been argued that rolling out a FTTB city-based network would allow TPG to have a monopoly of sorts, and as such, assert price control, which is not in the best interests of consumers.

TPG Telecom executive chairman David Teoh told shareholders at the TPG Annual General Meeting in September 2014 that the FTTB rollout wasn't all roses.

"Not everyone agrees with what we want to do, even if it is beneficial to the apartment owners," he said.

"There is a process involved and initially, it is quite slow and very difficult to implement. When we go to 20 buildings on a street, maybe two buildings agree. The rest take a long time."

During 2014, The Australian Competition and Consumer Commission (ACCC) investigated TPG's FTTB project and the legality of the company's plan to connect 500,000 apartments with FTTB connections in direct competition with NBN Co.

A Government-appointed panel ran a concurrent investigation.

In September 2014 the ACCC decided that TPG's FTTB rollout was permitted under the Telecommunications Act, and would take no action against the company.

ACCC chairman Rod Sims ruled: "Having carefully examined TPG's plans, the ACCC does not propose to take further action in relation to TPG's planned FTTB network rollout to supply residential customers in high-rise buildings in Brisbane, Sydney, Melbourne, Adelaide and Perth.

"The ACCC has reached this decision based on information and evidence that TPG's networks were capable of supplying superfast carriage services to small business or residential customers at 1 January 2011, and confirmation that TPG is not extending the footprint of these networks by more than 1km.

"The ACCC will now conduct a declaration inquiry into whether a superfast broadband access service like the type to be provided by TPG over its FTTB networks should be the subject of access regulation.

"Among other matters, the inquiry will consider whether regulation is necessary to ensure that consumers in TPG connected buildings can benefit from competitive retail markets for high speed broadband services."

In December 2014, Federal Minister for Communications, Malcom Turnbull MP pushed ahead with new rules he says are designed to do just that – protect customers of new superfast broadband networks. The rules involve a new carrier licence condition declaration for owners of superfast fixed line broadband networks targeting residential customers.

The *Carrier Licence Conditions (Networks supplying Superfast Carriage Services to Residential Customers) Declaration 2014* requires affected carriers to offer wholesale services on a non-discriminatory basis and to functionally separate their wholesale and retail businesses.

The rules are essentially designed to force fairer industry competition by forcing all FTTB carriers to offer wholesale access to their networks, essentially allowing rival broadband companies to access the networks to prevent any one company building a monopoly.

The Federal Government claims to have made provisions to assist industry transition to the new arrangements: from 1 January 2015 carriers who operate such access lines will only need to offer wholesale services on a non-discriminatory basis.

From 1 July 2015, affected carriers need to have separate wholesale and retail companies with separate directors, management, staff and operational support systems.

TPG has since stopped offering its FTTB service to new customers, though it continues to supply existing customers.

A TPG website announcement related to its FTTB offering now states: "On 14 December 2014, we were advised of a regulation that precludes us from selling our FTTB products after 1 January 2015 unless we have taken certain steps. There has been insufficient time to complete those steps before 1 January so until we complete the required changes we are required to remove our FTTB products from sale."

Mr Turnbull has publicly stated that despite the seemingly short deadline, the new rules followed extensive industry consultation, and that the industry players were well aware. Despite TPG's objections, The Federal Government also says the legislation has been mostly well-received by others in the industry.

"The rules are designed to support fairer and more effective retail competition by ensuring competing service providers can access new residential broadband networks and provide alternative offerings," he says.

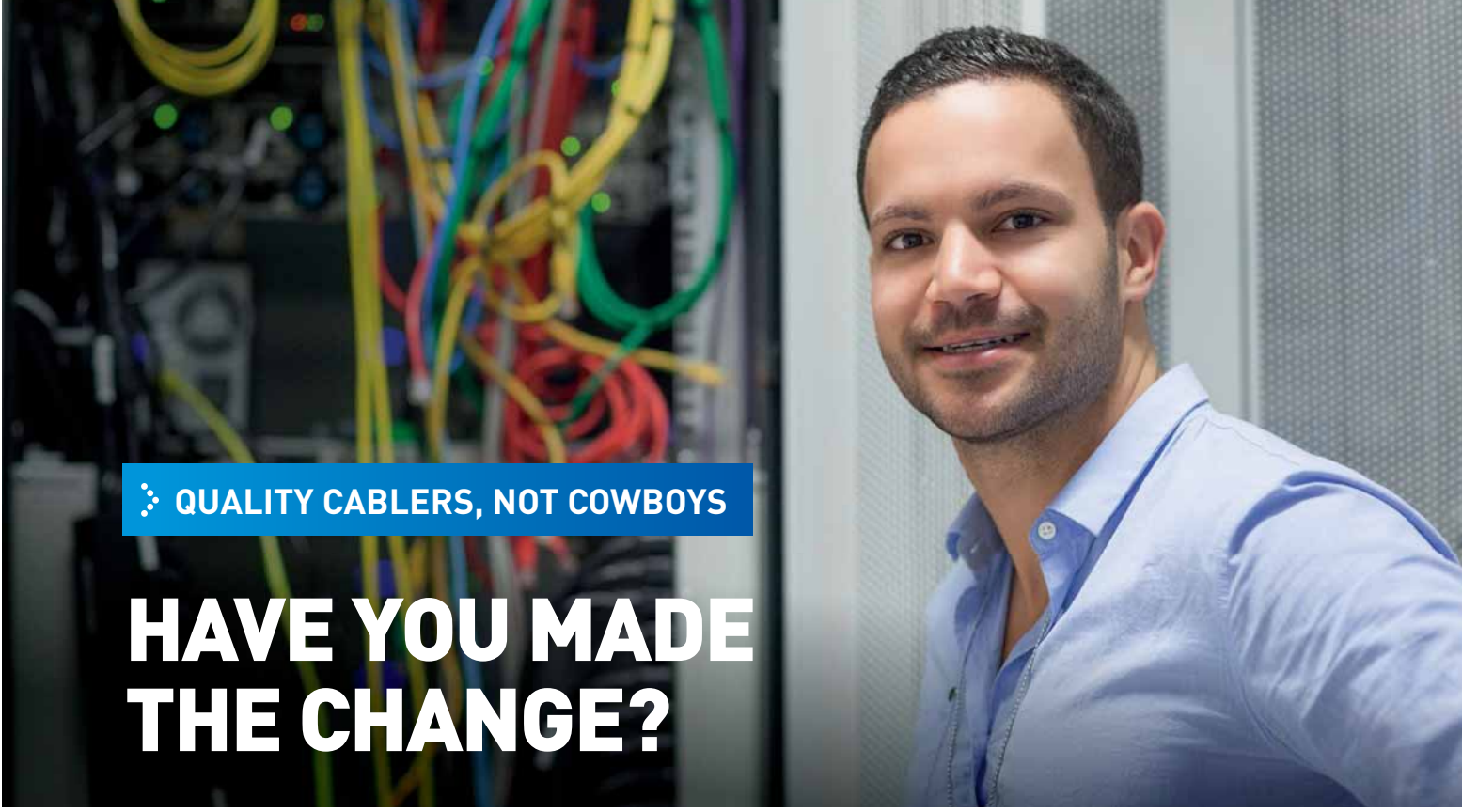
"Competition will give residential consumers choice about who they want as their internet retailer and creates the conditions for reduced prices, better service standards and greater innovation in the services being offered.

"Without providing competing providers with infrastructure access, consumers face the real possibility of a single retail provider and potentially higher prices.

"The new rules also mean that carriers like NBN Co., Telstra and others who either operate, or will operate, as either wholesale-only or retail-only providers in the residential market are not disadvantaged by having to compete with vertically integrated firms that can favour their own downstream operations."

TPG has vowed that it will soon again offer its FTTB service. The company is said to be in talks with rival broadband company iiNet to allow wholesale access to its network, which would seemingly go some way towards meeting the new requirements.

Watch this space. ■



QUALITY CABLERS, NOT COWBOYS

HAVE YOU MADE THE CHANGE?

The revised 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 these changes and also advise on any training you may need to comply.

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Stratospheric internet ambitions

Google's Project Loon could see internet delivered by balloon to even the most remote corner of the globe.

Tech giant Google is running trials to measure the efficacy of internet-enabling hot air balloons in remote areas of Australia and New Zealand.

Google is trialling a new internet delivery system that is built around what is one of the oldest forms of long distance transportation – the hot air balloon.

The most recent test of Google's 'Internet Balloons' was in December 2014. The tech giant flew 20 of its Project Loon balloons in Western Queensland in partnership with Telstra, which provided the ground infrastructure with which the balloons communicated.

The balloons sail 20km above the earth's surface, in the Stratosphere – above weather events and aeroplanes. They move on stratospheric winds, each layer of which varies in speed and direction. Using wind and weather data, Google engineers plot an optimal path and deliver each balloon onto one layer of wind. The ultimate aim is that at any one time 400 or more internet balloons will be circling the globe, carefully arranged and moving with the wind, to form one large communications network.

The Project Loon team explains: "Loon balloons can arrange themselves to provide good coverage on the ground. But in order for any given balloon to get to the right place at the right time, it will need to surf a wind blowing in the right direction. Like travellers who use a train schedule, Loon balloons require a sort of wind schedule that they can reference to see what winds are leaving from where, when."

Each balloon provides connectivity to a ground area of about 40km diameter using Long Term Evolution (LTE) wireless technology, more commonly known as 4G, and is designed to support roaming internet access by mobile phones and handheld devices.

"To use LTE, Project Loon partners with telecommunications companies to share cellular spectrum so that people will be able to access the internet everywhere," explains the Project Loon team.

"We've enabled people to connect to the balloon network directly from their phones and other LTE-enable devices. This signal is then passed across the balloon network and back down to the global Internet on earth."

Google's aim is to reach those parts of the world lacking internet as well as provide a complementary service to existing networks by providing coverage in black spots.

The balloons may also have applications in areas hit by natural disaster and for use in developing nations, where the installation of internet infrastructure is cost prohibitive.

Initial trials for The Loon were held in Christchurch, New Zealand in June 2013, followed by further trials in rural Piaui in Northwest Brazil. While Google has not committed to commercialising the project, as the technology advances, it has hinted that the project is creeping closer to becoming a reality.

During the initial Christchurch trials, the longest a Loon balloon stayed in the air for was 11 days and 22 hours. In November 2014 Project Loon confirmed that the majority of its balloons now last 100 days or more, with the longest having lasted 130 days.

"It's one thing for our balloons to last longer, but to build a ring of connectivity around the world we'll also need to get more in the air," explains the Project Loon team.

"Other challenges include designing the balloon to withstand the extreme variations in temperature, which can reach as low as -80°C in the stratosphere, intense UV radiation, as well as air pressure that is just 1% of that at sea level."

> **Google**
> **www.google.com/loon**

DTX CABLEANALYZER SERIES DISCONTINUED

Fluke Networks has announced that it is discontinuing its popular DTX CableAnalyzer Series.

After 12 years of service, the DTX Series of testers will no longer be sold in Australia and New Zealand as of 1 January 2015.

The DTX Series will be superseded by the new Versiv range of testers, which includes the DSX-5000 cable certification analyser, CertiFiber Pro fibre certification analyser and the OptiFiber Pro OTDR fibre fault-finding analyser.

Fluke Networks will continue to support the existing DTX Series with accessories and adapters.

NEW CPRS IN EFFECT

The Telecommunications Cabling Provider Rules (CPRs) 2014 has been registered with Comlaw and is now operational.

All registered cablers need to make themselves familiar with the new document.

The 2014 CPRs sees the consolidation of the three instruments into a single resource without any substantial changes to regulatory requirements.

The new CPRs include:

- **Telecommunications Cabling Provider Rules 2000;**
- **Accreditation Procedures for Cabling Provider Registrars; and,**
- **Telecommunications Cabling Provider Rules 2000 – Arrangements for Operation of the Registration System (No. 3) (2012).**

A copy of the CPRs can be found at http://bit.ly/1yWRzDX.

TE ANNOUNCES SALE OF ITS BROADBAND NETWORK SOLUTIONS BUSINESS TO COMMSCOPE

TE Connectivity has reached a definitive agreement to sell its Broadband Network Solutions business unit to CommScope for $3 billion.

The BNS business, which consists of TE's Telecommunications, Enterprise Networks and Wireless businesses, had revenue of $1.9 billion in fiscal year 2014.

"Our decision to sell our BNS business reflects our strategy to continue focusing on and expanding our leadership position in the attractive connectivity and sensor markets, with particular emphasis on harsh environment applications," said TE Connectivity chairman and CEO Tom Lynch says.

"These markets represent a $165 billion opportunity for TE and have strong growth rates and attractive profit levels driven by the global trends of a safer, smarter, greener and more connected world."

CORNING TO ACQUIRE SAMSUNG ELECTRONICS' FIBRE OPTICS BUSINESS

Corning Incorporated has reached a definitive agreement with Samsung Electronics to acquire its fibre optics business.

Terms of the agreement were not released.

The acquisition is expected to be completed by the end of Q1 2015, subject to customary closing conditions, including receipt of regulatory approvals.

When complete, the acquisition will augment Corning's market access and enhance its broad portfolio of optical communications products in Asia.

Corning will integrate Samsung's fibre optic business, with manufacturing facilities in Gumi, South Korea, as well as in Hainan, China, into the Corning Optical Communications business segment upon closing of the acquisition.

ROCKWELL AND CISCO LAUNCH GUIDE FOR WIRELESS ENTERPRISES

Rockwell Automation and Cisco have released a white paper and design and implementation guide titled, *Deploying 802.11 Wireless LAN Technology within a Converged Plantwide Ethernet Architecture*. The detailed design guidance will help control system engineers, IT network engineers and system integrators implement standard, IP-based wireless networks in a more robust, secure and scalable way.

The guide provides in-depth information on 802.11 wireless LAN (WLAN) solutions within a Converged Plantwide Ethernet (CPwE) architecture, including design considerations for fixed position, nomadic and mobile equipment use cases. It also includes explanations for how to configure, maintain and troubleshoot WLAN for each use case, and detailed documentation on how the architectures were tested and validated by Cisco and Rockwell Automation. With this new resource, network designers can create a small network within a plant using a single autonomous access point, and scale up to create a larger, unified WLAN architecture.

To download the document, visit http://bit.ly/1zMr87G.

The NBN via FTTN

It is generally recognised that in today's business environment, high speed internet access is essential for economic growth, job creation and global competitiveness. George Georgevits looks at the basics of FTTN.

Unfortunately, internet access over the existing copper telephone cable network is woefully slow in many places in Australia, particularly in rural and regional areas. This has been a long-standing thorny issue.

The previous Labor Federal Government decided to address this problem by launching an initiative to provide a National Broadband Network (NBN).

The NBN is a national, wholesale-only, open-access high-speed data network.

A key feature of the initial implementation of the NBN was the installation of fibre all the way to the customer's premises (Fibre to the Premises, or FTTP), wherever it was deemed to be viable. The remainder was to be served by fixed wireless or satellite.

An organisation named NBN Co. was created, via the NBN Co. Act (2011), to oversee the implementation of the Government's NBN strategy.

While the FTTP solution certainly has the capability to provide a quantum leap in performance over the various existing copper access counterparts, it came at a cost ($A43 billion over a 10 year timeframe was one early estimate).

With the change of government in 2013 came a review of this strategy, particularly in the light of Australia's rapidly deteriorating economic circumstances. The mining boom was coming to an end and there was a large debt that was inherited from the previous government. There arose a need to reign in government expenditure and included in this was a rationalisation of how the remaining NBN was to be implemented.

The solution adopted by the new government is known as Fibre to the Node, or FTTN.

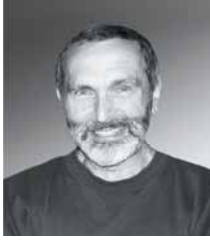
COMMUNICATIONS CABLING - BANDWIDTH VS REACH

With any form of communications cabling, the bandwidth (and hence link speed) it can support is dependent on both the characteristics of the medium (be it copper or fibre) and the distance over which the link is to be run.

As a general rule, the longer the link length, the lower the bandwidth it can support.

This is why fibre optic cable link performance is specified in terms of the product of bandwidth (in MHz) and the link length in kilometres (i.e. MHz-km). For example, a link based on 50/125µm fibre is specified as 500MHz-km.

Similarly, Category 6 copper cable links for local area networks (LANs) are tested to 250MHz for transmission performance, but this applies to 100m long links. Achieving Cat 6 performance compliance is not



sufficient to support 10G Ethernet.

However, if the maximum link length is restricted to ~50m (as suggested in the TIA TSB155 document), then a Cat 6 link can be re-tested to Cat 6A requirements (500MHz) and if it passes, support for 10G Ethernet can be guaranteed in many cases.

In summary, for any particular type of cable, the shorter the link, the higher the bandwidth it will support.

FTTN BASICS

The bandwidth-reach product for fibre cabling far exceeds that of its copper cable counterpart, particularly so for single mode fibre.

Also, a large percentage of the cost of implementing FTTP is associated with the last mile, where the cable is distributed to and terminated in the customer's premises.

Given the above, a compromise solution, in terms of cost versus performance, for attaining relatively high speed internet access at the customer's premises can be realised by running fibre for most of the way and completing the last mile of each link with existing Telstra's copper telephone cabling network.

This is the essence of FTTN. The 'node' is the name given to the equipment that terminates the fibre cabling that serves the neighbourhood. This equipment also drives the copper telephone cabling for the final leg of the link to the customer's premises.

The maximum internet speeds achievable with FTTN are not as great as that achievable with the all fibre solution (i.e. FTTP), but they are still a big improvement on the various existing all copper telephone cabling network based solutions (e.g. ADSL), because with FTTN, the length of the copper cabling component for each link is relatively short.

NBN IMPLEMENTATION USING FTTN

NBN implementation is simpler for FTTN than for FTTP, and consequently the projected rollout for the NBN is now projected to be on a much faster timescale.

One of NBN Co.'s objectives is to ensure that by 2020, all homes, businesses and communities across Australia can access high speed broadband. FTTN will make it much easier to achieve this goal.

Also, installation costs will be significantly lower than that projected for the original FTTP based NBN.

RECENT DEVELOPMENTS

Late last year, NBN Co announced a multi-technology approach to NBN deployment for most households and businesses, as follows:

- Those already served by the Optus or Telstra Hybrid Fibre Coaxial (HFC) cable networks, will receive fast broadband over an upgraded HFC network;
- Where the NBN FTTP network has been deployed or is in advanced stages of being built, they will remain part of the FTTP rollout;
- Where the NBN fixed wireless or satellite networks are earmarked for deployment, they will remain part of the fixed wireless or satellite rollout.
- All other communities are likely to receive fast broadband over FTTN and, in the case of multi-dwelling units such as apartment blocks, Fibre to the Basement (FTTB).

Last October, NBN Co revealed details of the first 140 suburbs set to receive FTTN technology over the NBN.

The company released a list of areas where work is underway to bring the NBN to more than 200,000 homes and businesses in parts of the Central Coast, Newcastle and Lake Macquarie regions in New South Wales as well as the Greater Brisbane, Moreton Bay and Wide Bay Burnett regions in Queensland.

In keeping with the above plan, in December 2014 NBN Co. announced that it had entered into agreements with Telstra and Optus to make use of their existing HFC networks, albeit in an upgraded form. Making use of this existing high-speed network technology will speed up the transition to NBN in areas presently served by these networks.

DOWNLOAD SPEEDS

With regards to projected NBN download speeds, it is NBN Co.'s stated goal to provide all homes and businesses with access to download data rates of at least 25Mbps by 2020.

The majority of premises in the fixed line footprint (i.e. those not served by a wireless or satellite implementation of NBN) are planned to have access to download data rates of at least 50Mbps.

CONCLUSIONS

Implementing an NBN using FTTP technology has the benefit of providing very fast internet access to the customer's premises; however, it has the disadvantages of very high implementation cost and a very long deployment time.

FTTN offers more modest performance in terms of access speed, but still far in excess of what many customers present experience via their existing copper telephone cable based service.

In addition, the planned NBN rollout will be achieved on a much faster timescale, and at a fraction of the cost. ■

George Georgevits manages his own communications engineering consultancy firm, Power and Digital Instruments Pty Ltd (PDI). Established in 1980, PDI specialises in lab and field transmission testing and troubleshooting of cabling systems and components, as well as provision of consulting engineering services. You can contact PDI on +61 2 9411 4442.

Media are the message

The communications evolution has spawned multiple species of devices, transmission media and technologies. Patrick Attard clears the air.

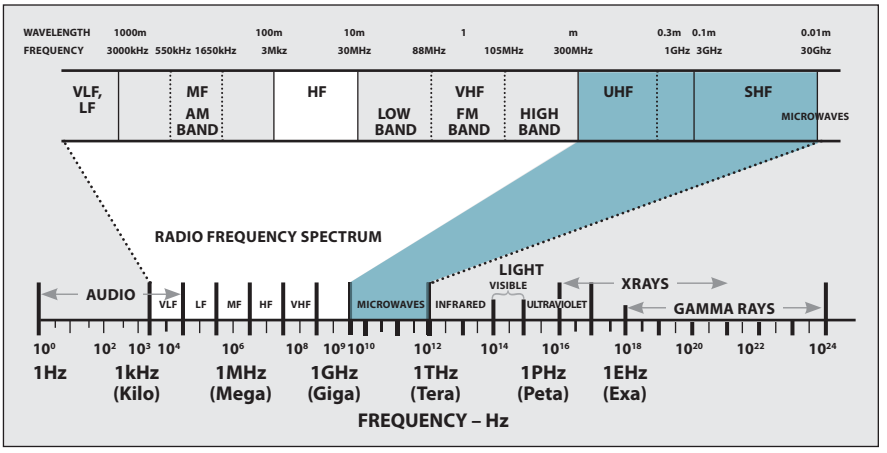


Table 1: RF Spectrum.

We live in exciting times in which the dream of communicating with anyone and anything at any time in any place is materialising before our eyes.

Those of us who have been around for a while have lost count of the generations of communications equipment and devices used for work and leisure.

It feels as though we got onto a roller coaster that became faster and more exciting as we immersed ourselves in the communications 'ether'.

LIMITED BANDWIDTH RESOURCE

The amount of data traffic in various media keeps increasing at an exponential rate.

Until a few years ago, one gigabyte was considered excessive. Now we talk about application data traffic in terms of terabytes (1012 bytes), petabytes (1015 bytes) and exabytes (1018 bytes).

These huge amounts of data being carried over internet protocol networks are stressing transport media to their limits.

The bandwidth available is finite (see Table 1). It is determined by the frequency spectrum ranging from very low frequency (VLF) radio waves to gamma rays. Communication media generally use the band from VLF to infrared.

Different media use different parts of the spectrum. Complex modulation schemes are developed to capture every last bit of capacity in the finite spectrum.

INSATIABLE DEMAND

Every conceivable device is being connected to every possible entity.

The electronic communication world is multi-faceted and includes live streaming of video and audio for entertainment, cloud computing, building automation, social audio and video networking, security at the community and personal levels, and energy consumption monitoring.

These applications are supported over bounded (wired) and unbounded media, depending on location and cost effectiveness. All this requires bandwidth.

BANDWIDTH EFFICIENCY AND MODULATION

Communication bandwidth depends on the frequency spectrum used by the transmission medium and the electromagnetic environment affecting the medium.

The channel frequency spectrum (Hz) and the signal-to-noise ratio of the transmission medium determine the maximum possible capacity (data rate: bits per second) of the band-limited communication system, in accordance with the well-known Shannon-Hartley Law.

The most common definition of bandwidth is the half-power (3dB) bandwidth. The efficiency of the allocated bandwidth is expressed in terms of bits per second/Hertz (bps/Hz). Obviously, the greater the bps rate over a frequency of 1Hz, the smaller the frequency spectrum required to transmit the maximum bps in the shortest time possible.

A useful analogy would be the maximum energy of a fluid flowing through a pipe at the highest volume flow rate possible. This analogy supports the claim that electronic communication is the fourth utility.

Much effort is expended in devising complex modulation schemes to improve the transmission efficiency of the signal, thereby using the smallest possible bandwidth.

Such schemes include pulse amplitude modulation at various levels, QAM 16/64 (quadrature amplitude modulation: efficiency 4/6bps/Hz), QPSK (quadrature phase shift keying: efficiency 2bps/Hz), OFDM (orthogonal frequency division multiplexing: efficiency >10bps/Hz) and many others.

Different modulation schemes are used to obtain the best bandwidth efficiency for specific systems.

ENCODING V. MODULATION

Modulation means superimposing the desired signal by changing one of the properties of the carrier (e.g.: frequency, amplitude, phase) to represent the original signal carrying the information.

This enables the original signal to travel farther. The original signal is recovered by the reverse process – de-modulation.

Encoding means converting analogue signals to digital. Several encoding schemes, as mentioned above, use binary codes according to a particular algorithm.

TRANSPORT MEDIA OPTIONS

The communications media used in various scenarios include bounded media (copper and optical fibre) and unbounded media (wireless).

The choice depends on many factors. However, bounded media generally perform better than unbounded media, under the same conditions. This is the outcome of the Shannon-Hartley Law.

Generally speaking, everything else being the same, optical fibre provides the highest bandwidth (lowest attenuation, longest distance) between transmitter and receiver.

Copper cabling is generally suited for indoor applications, where data rates of more than 1Gb and shorter distances are involved.

The transmission medium's bandwidth requirements depend on factors such as the applications being supported simultaneously, maximum latency tolerated by the most sensitive application, electromagnetic noise, distance, data security requirements and reliability of the medium.

HOW MUCH BANDWIDTH?

Often, this question is asked in the context of determining type of medium, number of simultaneous applications involved and distance.

This is a complicated question, and a detailed answer cannot be given here. Table 2 is a generic guide to bandwidth (data rate) requirements.

Table 2: Guide to bandwidth requirements

APPLICATIONS	TRANSFER RATE
Netflix	0.5-1.5Mbps – minimum broadband connection speed 2-3Mbps for SD video on TV 5Mbps – best HD video, audio experience 25Mbps – ultra HD 4K
Web page or email	minimal
Apple iTunes music streaming or download Webcam video (352×288 at 15fps)	128kbps 298kbps 192kbps to 256kbps
Skype high-quality video chat	400kbps
AM radio	20kbps – excellent bit rate for broadcasts
FM radio	32kbps – industry standard for broadcasts
MP3 audio lossy data compression.	32kbps – acceptable only for speech 128 or 160kbps – mid-range bit rate quality 192kbps – high-quality bit rate 320kbps – highest supported by MP3 standard
Digital audio broadcasting (DAB)	256kbps – MP2 bit rate for high-quality signal.
Static image	16-128kbps – used for videophone when significant movement is not expected
Standard video broadcast (video conferences, webinars, etc)	128-384kbps – current internet standard for video broadcasting; high-speed connection (DSL, cable, etc.) can support these broadcasts
Very high quality broadcasting	1128kbps – for fast action video
SDTVMPEG-2 HDTV (MPEG-4) HDTV 1080i (MPEG2)	1.15Mbps max 9.8Mbps max – HDTV 25Mbps approximate
WAN (wide area network)	ISDN with two 64kbps channels (144kbps gross bit rate) V.90 modems – 56kbps down, 33.6kbps up V.92 modems – 56kbps down, 48kbps up ADSL <= 8Mbps, ADSL2 <= 12Mbps ADSL2+ <= 24Mbps VDSL2 <= 200Mbps OC-192 10Gbps
LAN (local area network)	10Mbps 10BASE-T 100Mbps fast Ethernet Gigabit Ethernet 10GbE
WLAN (wireless local area network)	802.11b 11Mbps 802.11a 54Mbps 802.11g 54Mbps 802.11n 600Mbps 802.11ac 6.7Gbps
Mobile data	3G – 2001: UMTS-FDD (WCDMA) 384kbps 2011: HSPA+ accelerated (with MIMO) 42Mbps downstream WiMAX (IEEE 802.16e) 144Mbps down, 35 Mbps up LTE (4G) 100Mbps down (360Mbps with MIMO 2x2), 50Mbps up
Cable broadband	52Mbps (Coaxial)

CONCLUSION

Bandwidth is a finite resource and needs to be managed efficiently.

New technologies are constantly being developed to get the highest possible density of bits per Hertz.

Transmission media are a crucial component in achieving bandwidth efficiency. ■

To the cloud!

Fluke Networks Asia Pacific vice president of sales Simon Lee explains how cloud-based reporting tools can help cable installers increase efficiency and profitability.

Cloud-based tools can help cable installers increase efficiency and profitability.

Data-communications installers certify cabling systems for many reasons, including supporting manufacturer warranty requirements, meeting customer qualifications or just to ensure quality workmanship. Managing the results generated by the testers is a critical yet time-consuming part of the certification process.

In a recent Fluke Networks survey of 880 installers worldwide, the respondents reported installing an average of 1,026 links in just the prior month. The job of consolidating all those tests into a single report can be time-consuming and is a source of considerable cost. In another survey, 77% of installers reported having to deal with results management issues in the prior month.

RESULTS MANAGEMENT ISSUES

Customers report a number of problems in results management that take up time. The most common three problems are:

> Cable identifiers in the reports don't match the specifications and need to be manually edited;
> Multiple test types (copper, fibre tier 1, tier two, different standards) need to be combined into a single report;
> Reports have to be reworked because they are incomplete.

Contractors report spending 7.9 hours per month, nearly a full day, on these issues. This is in addition to the time required to get the results (typically stored in the tester) from the job site back to the office where the results management takes place. This also takes a tester out of circulation, which may impact other jobs.

The more testers you have, the more complex it gets.

For a contractor using a single tester on a single job, these problems are significant. But very few contractors have the luxury of dedicating a single tester to a single job at a time. To maximise efficiency, most contractors own or rent multiple testers and use them on multiple concurrent jobs.

Properly keeping track of results under these conditions becomes even more difficult, leading to a whole new set of issues including:

> Test results stored in multiple testers, which have to be hunted down and the results consolidated.
> Tests from another job get into the report by mistake and have to be removed.
> Generating a report and discovering not all the links were tested, so a crew has to return to the site to finish the job.

Installers report spending, on average, another 7.3 hours per month on these issues, for a total of nearly two days a month. And the more testers owned by a company, the larger the scope of the reported problem. A related issue cited by customers is the lack of visibility in keeping track of job status under these circumstances.

WORST-CASE SCENARIO

Other, less common, problems can be far worse. With tens of thousands of testers on the market, there may be many problems organisations have not even considered such as how to recover inadvertently erased or corrupted memory cards which store the results. Unfortunately, in most cases, the only answer is to perform all the tests again.

Testers or memory cards with results stored on them can also be lost or stolen, requiring retesting. Thankfully, these are not common problems, because a single lost tester or erased data card can mean losing a

full day's or even a week's worth of multiple technicians' time, which translates to dozens of hours lost and long delays in a project.

Cloud services offer a solution

With the advent of high speed mobile networks and low-cost data storage, a new approach to managing and storing data–the cloud–has become commonplace. By getting results out of the tester and up to the cloud, the chances of losing data are minimised. Testers don't need to be recalled from the field. Results can be automatically consolidated into the correct job.

Once connected to the network, results can be uploaded with just a few keystrokes. Tests are tied to projects, so, once they get to the cloud service, it adds them to the appropriate project automatically. Since the process is so quick, it can be done many times a day, so that the impact of a card failure or stolen tester is minimised.

Information can be accessed from anywhere by tablet or smart phone. This gives the project manager or consultant a real-time view into the status of the project and the ability to drill down into individual test results to ensure they are done properly.

When the time comes to generate the report, the contractor simply downloads the results onto a PC or laptop. From there, the status of the project can be checked, and missing or improper results immediately identified.

CONCLUSION

Managing results through a cloud-based service offers significant advantages including:

- Increased productivity by no longer needing to recall testers from the field just to download test results.
- Reduced time by automatically consolidating all results into the correct job.
- Less rework by reducing the likelihood of losing test results when testers or memory cards are lost, stolen or erased.
- Instant access to results for faster troubleshooting.
- Real-time visibility into project status from any location.

Using a cloud-based service is a sensible approach that can prevent problems and save time. ■

> **Fluke Networks**
> **www.flukenetworks.com**

TERMINATION TOOLS

Molex Premise Networks
www.molexpn.com.au

Molex has announced the release of two new termination tools – the DataGate 4-pair termination tool and the MOD-Clip 4-pair termination tool – both offering an efficient way to terminate all four pairs of cable simultaneously ensuring the speed of jack terminations time and time again.

Designed specifically for use with Molex DataGate, Keystone, and Cat 6A shielded Jacks, the DataGate 4-pair termination tool frame accepts either the UTP termination head (for termination of the UTP DataGate, and Molex Keystone Jacks) or the C6A termination head (for termination of the Molex C6A shielded DataGate Jacks).

Both tools enable fool proof placement of the jack and produces accurately seated and neatly trimmed wires in one simple operation, to give a more consistent punchdown ensuring more consistent performance.

HANDHELD LIGHT SOURCE

AFC Group
www.afcgroup.com.au

AFC has released the JDSU SmartClassTM Fibre OLS-85 handheld light source. The OLS-85 is a professional, versatile and compact instrument used for fibre optic network qualification and certification. Specific wavelength combinations make it optimised for link loss testing and long-haul, metro and access telecommunication network characterisation, as well as data centre and local area network testing.

The OLS-85 inspection-ready optical light source can be used anywhere today's fibre technicians go, up poles or down holes. Technicians get ultimate flexibility and performance from this powerful easy-to-use solution.

CABLE CERTIFIER

Fluke Networks
www.flukenetworks.com

Fluke Networks has unveiled LinkWare Live, the first cloud-based service that lets installers using the Versiv family of certification testers to upload, manage and analyse certification test results from cabling projects — anytime, anywhere.

LinkWare Live works with DSX-5000, OptiFibre Pro and CertiFibre Pro certification testers to optimise project management and safeguard contractor profitability.

LinkWare Live is a free service available to all Versiv customers.

ACCESS SWITCHES

Allied Telesis
www.alliedtelesis.com

Allied Telesis has announced that it has launched its x310 Series of Fast Ethernet/Power over Ethernet Plus (PoE+)/Copper stackable access switches. Ideal for applications at the network edge, such as IP video surveillance, building management integration, office connectivity and IP telephony, Allied Telesis has introduced the x310 Series as a high-performing and scalable access solution for today's IP networks. The x310 Series comes with a choice of 24- and 48-port 10/100T versions with Gigabit uplinks, PoE+ and the ability to stack up to four units.

INDUSTRIAL ROUTER

Ethernet Australia
www.ethernetaustralia.com.au

Ethernet Australia has introduced the Robustel GoRugged R3000 industrial cellular VPN router to meet the needs of remote sites where stable and secure access to the internet or company network is essential.

Its key features include cellular 3G/4G connectivity, primary or backup WAN port, dynamic DNS support and a range of modern router features including DHCP, NAT, firewall and DMZ.

ATT

ACROSS THE TRADES

AUTUMN 2015

The great TOOL BRUSH OFF

INSIDE:

DON'T GIVE BRUSHLESS MOTORS THE BRUSH OFF

More and more power tools are being marketed with brushless motor technology, but what is it? **Paul Skelton** reports.

Brushless motor technology is a relatively new innovation in the world of cordless power tools, and it's important to understand the associated benefits.

Brushless motors reduce friction caused by the internal brushes to provide longer motor and battery life. The reduced friction also allows for more torque and power, as well as a more consistent performance, making it a truly 'smart' tool.

"A traditional brushed motor uses carbon brushes, which make contact on the motor to complete the circuit and power the tool," Hitachi Power Tools assistant product manager Justin Woolgar explains.

"Brushes wear and occasionally need maintenance for replacement. The mechanical contact of the brushes on the motor causes electrical loss and frictional resistance, as well as heat build-up and contact wear – all of which rob the motor of performance and decrease durability."

Further, he says, a mechanical contact switch must be used to control the increased and decreased flow of electricity to the motor, which causes further electrical loss and wear.

"Now, Hitachi brushless motors, for example, use a micro-processor which controls the current flow through the motor. This means there are no carbon brushes, which reduces maintenance and unexpected downtime.

"Due to the lack of mechanical contact on the motor, minimal heat and motor wear occur. This results in vastly improved electrical efficiency and power transfer. An optical switch is used to communicate with the micro-processor, providing a more responsive variable speed actuation and wear-resistant switch assembly."

Located beneath the tool grip, the micro-processor chip manages the tool's motor and makes the tool capable of advanced digital speed settings for ultimate precision and control by the user, Justin says.

"Electronic switches are more efficient in transferring energy and only require half the pull force of conventional switches. This results in longer battery and tool life, while reducing user fatigue and discomfort."

Festool cordless drills also use brushless motor technology, which the company is calling EC-TEC (or 'electronically commutated technology') motors.

"The biggest difference between the latest EC-TEC motors and the conventional DC brush motor is that EC-TEC motors do not use carbon brushes," the company says.

Due to the lack of mechanical contact on the motor, minimal heat and motor wear occur.

TSC 55 CORDLESS PLUNGE-CUT SAW

Festool
www.festool.com.au

Precise, quick and guided cuts with lots of power and no cable? Not a problem with the new cordless plunge-cut saw TSC 55 from Festool.

Festool has equipped its new TSC with a brushless EC-TEC motor and dual battery concept for operation up to 36V. Together with a new dust bag, it ensures dust-free work and as a cordless version it is the ideal plunge-cut saw for work in interior fittings and assembly independent of a mains power supply.

At 5,200 revolutions per minute, the new plunge-cut saw has a 24% higher speed than conventional cordless plunge-cut saws. This guarantees optimal cutting quality and quick work progress at the highest level.

18V 6.0Ah BATTERY

GOES HARDER FOR LONGER

Go harder for longer with Bosch Blue's high capacity Li-Ion technology. With more power and 50% longer run time*, the world's first 6.0Ah battery is compact, lightweight and 100% compatible with the entire Bosch Blue 18V Range. So you can get the job done, Bosch's built in Electronic Cell Protection (ECP) and CoolPack technologies defend your battery against overheating, overload and deep-discharge – extending its lifetime by up to 100%^.

BOSCH
Invented for life

You Tube Bosch Blue Power Tools

*Comparison between 4.0Ah and 6.0Ah batteries.
^Comparison of batteries with/without CoolPack cooling technology

www.bosch-pt.com.au/professional

"The EC-TEC motor is completely controlled by electronics, which sequentially energise windings within the motor to induce rotation – no mechanical contact is required, so the motor is free to spin without loss of power/efficiency due to friction.

"In fact, the only wearing parts in the motor are the bearings."

Also believing in brushless motor technology is Bosch.

"Aside from power tools, brushless motor technology is already used in ceiling fans, model helicopters and airplanes, and high-end professional hairdryers," a spokesperson for Bosch Power Tools says.

The Bosch CORE brushless motor is electronically commutated, which means it is more power efficient and resilient to shocks. It also means there is no friction loss from brushes rubbing against a commutator, so it does not wear out over time with use.

"A brushless motor is essentially a permanent-magnet motor turned inside-out that operates with a rotating magnet within electronically switched coils. This means there are no brushes, windings or electrical connections.

"The higher efficiency of the motors makes for greater power and longer runtime than a conventional motor for the same time." ▲

C18DBL 125MM CIRCULAR SAW

Hitachi
www.hitachi-powertools.com.au

The new 18V slide brushless 125mm circular saw from Hitachi proves that bigger is not always better. The C18DBL achieves a 47mm depth of cut and will also be able to make over 500 cuts from a single charge with a BSL1850 18V 5.0Ah li-ion battery.

Another feature of the C18DBL is a rotation speed changeover function that allows dual mode settings. The silent mode setting reduces the max motor RPM enabling efficient work with less noise and when the load increases during silent mode, the tool will automatically switch over to power mode and revert back to silent mode when the load decreases. In power mode, no change is made to silent mode even when the load decreases.

WX373 HAMMER DRILL

Worx
www.worx.com

Combining two-speed selection for enhanced control and a heavy-duty 13mm Jacobs keyless chuck with safety lock, the brushless WX373 hammer drill from Worx allows you to get the tough jobs done safely.

The WX373 is designed with 20V Lithium Powershare battery technology, which brings a longer run time and higher working efficiency. It also allows battery sharing across the entire WORX 20V range. The LED lights allow for better sight in dark areas and the 20-second LED light delay after trigger release means that you can double check that last screw you've just drilled in.

M18 FUEL SDS PLUS ROTARY HAMMER

Milwaukee
www.milwaukeetools.com.au

Milwaukee has added two cordless SDS Plus rotary hammers powered by one battery platform.

The line-up now includes a lightweight M18 16mm for the compact segment, a M18 22mm and M18 FUEL 26mm for the medium segment which makes up the majority of the market and lastly a M18 FUEL 28mm for the most demanding applications in the large segment.

Milwaukee's POWERSTATE brushless motor technology converts energy into power more efficiently and has no wearable parts, which extends the life of the motor, reduces motor friction and cools more rapidly to deliver years of maintenance-free performance.

TRA1007EC

PRECISION & CONTROL.

Everyday, thousands of trade professionals rely on one brand to deliver superior precision, power and control. If you love what you do and love doing it well. Trust Tradeflame to get the job done.
For your nearest stockist, call 1300 555 197 or visit www.tradeflame.com.au

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Igniting Business

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DUAL POWER GUN
30W WITH 100W BOOST FUNCTION

TIPS

HIRING IN THE 21ST CENTURY

Linda Nall discusses the state of the labour market – and what works best when you're looking for the right people for the job.

With the *Future Forecasts: Construction and Property Services Skills* report and the *Construction and Property Services Industry Skills Council (CPSISC)* e-scan predicting an upturn in the construction market, your business will need to be agile enough to take advantage of new projects.

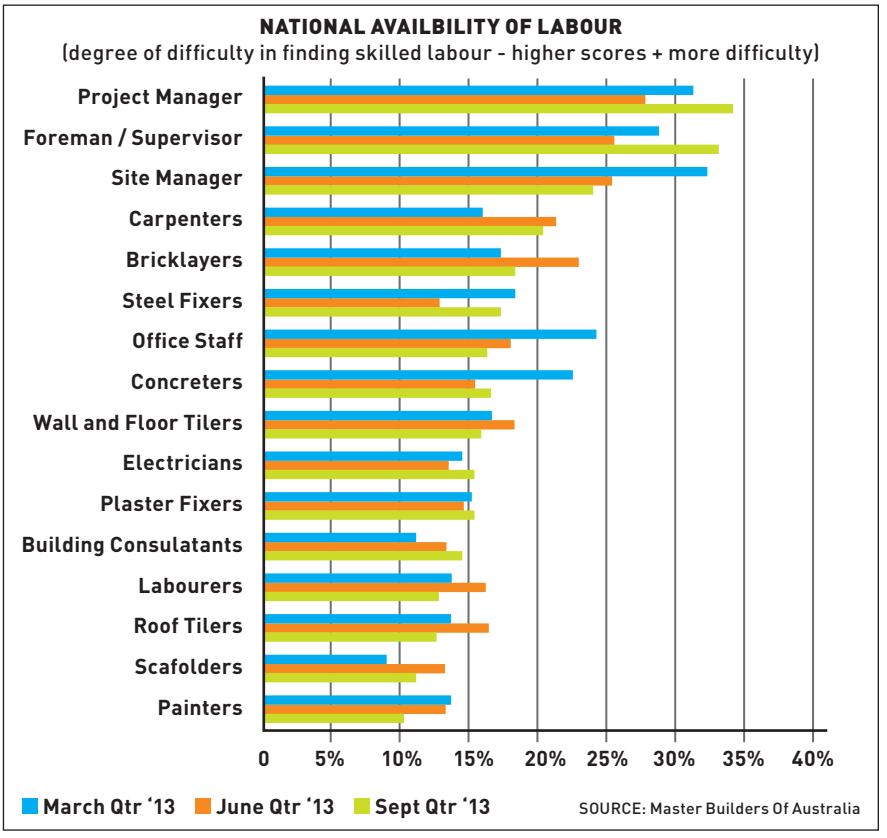
On the flip side, the Master Builders Australia graph on national availability of labour provides a good picture of the difficulty in finding skilled labour. This means it's getting tougher for businesses to ensure they are structured appropriately.

The e-scan reiterates its 2013 emphasis on the need to replace skilled, older workers, which in turn puts pressure on businesses to invest time in bringing young people up to speed.

It means that the younger worker will not provide as big a return on investment, or as quickly, as a fully qualified or fourth year apprentice in the short term - but the longer we put off employing younger apprentices, the worse it will become in terms of having fully qualified workers available.

So given the difficulty in finding skilled labour, what should a business be doing differently – or more of?

Over the last 31 years, our experience is that the media businesses use to attract prospective apprentices to job vacancies has changed – except the most successful way, that is, through personal contacts and referrals. And the way job seekers are finding out about work is also through personal contacts.



The National Availability of Labour survey reiterates the need to replace skilled, older workers.

WHERE YOUNG PEOPLE ARE LOOKING FOR WORK

In a recent survey of the apprentices we employ and place with businesses across Australia, most young people are still saying they just don't read print news – but they do use their networks to help them decide on their career.

Peer endorsement is really important and can affect the number of applicants you're getting for your job vacancies.

35.56% of our own apprentices use Facebook all the time; 25.94% are using it often. On top of this, there are all the other social media networks with varying levels of popularity. Social networking is the basis for their peer endorsement.

The *UK Commission for Employment and Skills*, published in November 2014, provides insight into the thoughts and behaviour of over 18,000 employers across the UK as they make decisions about how to engage with training providers, schools, colleges and individuals in the wider skills system, to get the skills they need.

According to the UK survey, around three quarters of employers used free private recruitment channels such as word of mouth, their own websites, internal notices or other free websites. Word of mouth continues to be the most commonly used private recruitment channel, used by 30% of employers. Since 2012, there's been an increase in the use of social media as a recruitment channel (from 3% to 7%), but this remains substantially less used than other more established 'private free' channels.

28% of those UK employers used work experience as a recruitment tool. They give a young person the opportunity to undertake work experience while they're still at school, and then pick the person that works out best for their business.

So if you are to 'fish where the fish are' when looking for new staff, it's pretty clear it's a good idea to drop the word

around to school teachers, to parents, to people you know and get into the social media space.

Just be aware that while you check out the candidates on social media to see what type of person they are – candidates are also looking at you. Managing your reputation works both ways, and Whirlpool Forums can be lethal.

We've got a free job vacancy service for employers wanting apprentices and trainees, and we've had to adjust the site to allow young people to upload a variety of formats of applications I never would have considered before; including taking photos of every page of their resume and sending each page as a separate picture. So job applications are coming in via an increasing array of formats beyond the traditional PDFs and Word documents.

It's all fast communication – fast decision making – and heavily based on peer endorsement.

To keep up with this trend, the way we've been writing recruitment ads has been changing too, and we're seeing the difference in the number of applicants. If the young person we want to hire makes a decision based on the first few words they see on their phone or in a text – then the first lines of the ad need to include the reason why someone should work in that job. If you're not getting the number of applicants you used to – then try out different descriptions on the free job sites and see what works best.

USE YOUR CONNECTIONS

Around the end of January to the end of February is a big time of year for taking on apprentices and getting them into their courses, signing them up in their Training Contract and getting things sorted at the same time that the building industry gets back into full swing.

The competition for the best applicants is between you and every other construction industry employer, and can mean either you are the one with the extra pair of hands you need – or the one that has to make do. Or worse, you could miss out on projects because of lack of resources.

The construction industry has always used its connections for work – tradies networking with suppliers and other tradies. Turn them into your recruitment network and put the word out about why you're a good boss to work for. And take the plunge into the ether for the networking power of social media. Check out candidates online and make sure your own profile is a good one.

If in doubt – ask a teenager! ▲

Linda Nall is group marketing manager for MEGT Australian Apprenticeships Centre – providing a free service by local people with local, state and federal knowledge across every state and the ACT. Visit www.megt.com.au.

CREDIT CARDS HIT PAY DIRT

New credit card payment facilities are making it easier for tradies to get paid in a timely fashion. **Paul Skelton** reports.

Two in three small business operators don't offer credit card payment facilities (61%), with 27% citing the cost of processing these payments as a barrier to entry, according to new research conducted by popular Australian provider of tax and accounting software MYOB.

Further, one in 10 respondents said they have lost customers due to not having credit card payment options.

And of the respondents who issued invoices to customers (86%), more than one in three (37%) said at least one quarter of their customers paid them later than their invoice terms.

This can put unbearable (and unnecessary) strain on a tradie.

"One of the most important indicators of business health is cash flow. It's also the second most common business pain point," MYOB chief executive Tim Reed says.

"Having solid control over money-in and money-out is core to the long term success and viability of every business, and can be the difference between it thriving and failing."

For this reason, MYOB and a number of other financial services companies have launched mobile payment devices that are designed to make it easier for mobile operators like tradies to be paid on the spot.

IN ACTION

Jim's Group chief operating officer Neil Welsh says the addition of a mobile payment system to its business – in this instance MYOB PayDirect – allows Jim's franchisees to close the loop and carry-out the work, present the invoice and collect payment, all on the same day.

"This impacted significantly on their cash flow," Neil says.

"By fully integrating our Jimbo CRM, the MYOB financial package and PayDirect, we provide our franchisees with significant relief around the administrative burden of running a small business. The new system provides them with more time to spend with their family or to further develop their business.

"By implementing PayDirect into our franchisee network we also expect our client experience to be enhanced. Clients will be able to choose between multiple payment options, including credit and debit card transactions."

With mobile payments expanding quickly across the world, are you best servicing your customers' needs?

PAYMATE ONTHEGO

Paymate
www.paymate.com/cms/specialoffercr

Paymate OnTheGo is designed for businesses that currently don't accept card payments. It allows you to get paid wherever you do business. All you need is the mobile Card Reader, your smart phone with internet connection plus the free Paymate OnTheGo app.

Paymate OnTheGo is an inexpensive innovation for your business. Plans start from just $16.50 a month. And for a limited time, the Card Reader is half price at only $149 (inc GST). Plus a technician will come and set up Paymate OnTheGo for your business at no extra charge.

Payments go directly into your business's bank account, improving your cash flow by getting paid faster – no more chasing invoices.

All transactions are secured to the highest industry standards (PCI-PED Lvl 3).

PAYPAL HERE

PayPal
www.paypal.com/au

PayPal Here is a credit card reader that has been developed to make doing business easier and more convenient for merchants and their customers.

For merchants, it provides a whole ecosystem from which to manage their money, giving them the ability to accept debit cards, credit cards and checks anytime, anywhere. It also helps them track cash payments and generate invoices so they can run their business easily and in a 100% secure environment.

Consumers get the convenience of new payment methods handled through their PayPal account, allowing them to have purchasing options beyond swiping a card or handing over cash.

EMMY BY COMMBANK

Commonwealth Bank
www.commbank.com.au

Emmy, CommBank's new compact payment terminal, uses Bluetooth to pair with the CommBank Small Business app to turn your Apple or Android smart phone or tablet into a powerful payment tool.

This compact, light-weight solution provides CommBank's small mobile business customers the ability to accept on-the-spot payments, create estimates and manage invoices using their compatible iOS or Android smart device. Key features include the ability to accept secure card payments on-the-spot via secure contactless, EMV Chip and PIN, and swipe card payments via the connected Emmy terminal, create and track estimates and invoices help you to reduce time spent on admin allowing small businesses to follow up opportunities and track their cash-flow on-the-go.

Customers simply sign-up to for the $30 monthly Simple Merchant Plan to receive:

- Emmy terminal.
- Small Business App.
- $1,500 of included credit card and debit card turnover.
- Business Transaction Account with no monthly fee.
- NetBank or CommBiz online banking.
- 24 hour phone support and a 4 hour terminal swap-out SLA.

MYOB PAYDIRECT

MYOB
www.myob.com.au

MYOB PayDirect turns businesses' smart phones into quick, easy payment terminals and offers deep integration with popular cloud accounting solution AccountRight so payments are automatically entered into clients' books.

Like the fuel gauge in your car, the new MYOB PayDirect app enables small business owners to view and manage cash flow on-the-go. Business owners will also be able to take action to improve their cash flow by issuing invoices, taking credit card payments and administering receipts on the spot. Compared to the current process of returning to the office to generate invoices at the end of the week or month and then waiting 30 days or more to get paid; MYOB is accelerating the cash cycle dramatically.

The streamlined application process, affordable monthly payment plans and no lock-in contracts make this an ideal solution for all mobile businesses.

IPINPAY

iPinPay
www.ipinpay.com.au

With iPinPay you can turn your iPhone into a mobile credit card terminal for processing your customers' credit card payments through 'Pin Payments'.

With Pin Payments, you no longer need to go to a bank, set up a merchant facility and then a payment gateway. iPinPay turns your iPhone into a credit card terminal.

It's quick to set up, just punch in your company name and your Pin Payments secret API key (note: this is a very long code) and you are up and running.

All data is transmitted securely over SSL and credit card numbers are not stored on your iPhone. Credit cards are processed live for fast instant feedback of approved or declined transactions.

METAL PECKER

Cuts metal penetrations in a flash

It's New!

THE METAL PECKER® is specifically designed to cut penetrations in profiled metal roofing for in-situ vent pipe and skylight installation ...as well as air-conditioning duct, furring channel and other straight or formed metal sheet. The tool's precisely engineered slot-shear cutting action eats up folded sheets, seams and joints, like no other hand or power tool, you've ever used. The more you use the tool, the more uses you will find for it onsite.

HOW IT WORKS

The Metal Pecker's bolt-cutter sized handles provide far greater cutting leverage than other metal cutting hand tools.

Its precision cutter blade shears the metal between the anvils and pushes out a 1.7" (43mm) x 0.24" (6mm) slug with each cutting stroke. There is no blade face to blunt.

To cut, you simply punch a pilot opening in the metal sheet, poke the beak of the Metal Pecker's cutting jaw into the opening and commence cutting.

A MULTITUDE OF USES

The Metal Pecker compliments other tools that do their best work on single thickness profile cutting at ground level, or on flat sheet.

However, when the going gets tough with in-situ penetrations and other tools pass up under-folds or have difficulty cutting through a profile, reach for the Metal Pecker.

Its extended handles keep you away from the sheet's sharp edges and provide greater reach and leverage in hard to access places - reducing your work time.

ORDER TODAY AT
www.metalpecker.com

- ***Saves time and gives a clean cut every time***
- ***Doesn't deform the metal, leaves no swarf to rust***
- ***Keeps hands away from those nasty metal edges!***
- ***No need for power cords on roofs anymore***
- ***Cuts both hi-tensile and soft metal sheet***




Every Tool Kit Needs A Metal Pecker, The Tool With 1001 Deconstruction Uses

Non-slip serrated cutting jaw

Slot-shear design

Heavy duty construction

Precision honed cutting blade

Cuts Clean – no swarf

Comfort-grip PVC moulded handles

Manufactured from hardened tool steel

Cutter blade shears the metal between the anvils

Full length handles provide greater leverage

www.metalpecker.com

NEW TOOLS

CIRCULAR SAW

Milwaukee Power Tools
www.milwaukeetools.com.au

Milwaukee Power Tools has introduced the new M12 FUEL 140mm and M18 FUEL 184mm circular saws. Engineered to provide powerful cutting capacity and capable of cutting most frequently used jobsite materials, the new circular saws bring unmatched durability and increased productivity to users across every trade.

REDLINK PLUS Intelligence hardware and software integrates full-circle communication between tool, battery and charger to protect them from overloading, overheating and over-discharging.

PORTABLE COMPRESSOR

Kaeser
www.kaeser.com.au

The Mobilair 31 portable compressor from Kaeser features a scratch and corrosion resistant rotation-sintered polyethylene (PE) sound enclosure. The screw airend with energy-saving Sigma Profile rotors is designed for continuous duty and is driven by a powerful, water-cooled Kubota turbo-diesel engine.

The Mobilair 31 provides a free air delivery of 3.15m³/min at 7 bar, which makes it the ideal choice for simultaneously powering two 20kg breakers, or other tools such as air lances, spaders, impact borers and sandblasting equipment.

WORK BOOT

Wolverine
www.wolverine.com/AU/en

Incorporating technologies exclusive to Wolverine, the new Tarmac wook boot has CarbonMax Nano carbon fibre toe caps, making it 50% lighter than steel cap boots and stronger under compression loads, while ArmorTek toe bumper and heel counter guards are lighter than a rubber bump cap and three times more abrasion resistant.

The Boa Closure System offers on-and-off convenience like never before. With no laces, zips or gussets, the simple turn of a knob allows adjustments.

COMMUNICATOR

Navman Wireless
www.navmanwireless.com.au

The Navman Wireless Lone Worker helps address the safety needs of workers in remote regions. The two-way communication device remotely connects workers to their managers via the Telstra Mobile Network or Iridium satellite communication network.

The Lone Worker includes a small, lightweight pendant that workers carry at all times, which connects back to their vehicle. It uses the Navman Wireless tracking unit and satellite communications device to send notifications.

WALL SCANNER

Bosch Blue
www.bosch-pt.com.au

Bosch Blue's D-Tect 120 professional wall scanner has an innovative 'centre finder' function and spot measurement, in combination with three detection modes, which enables precise detection on any surface. It has a measuring depth of 120mm.

Featuring a centre finder for precision work and an AC warning alarm to avoid drilling into live wire, the D-Tect 120 provides accurate and immediate measurement on all work sites. The rings on display indicate the strength of the signal while the arrows indicate the direction of the detected material – making visibility through walls virtually fool-proof.

SNIPS

Wiss
www.wisstool.com

With the ability to cut up to five kilometres of steel, the Wiss Edge Aviation Snips are perfect for any job big or small. The Wiss wave blade serrations spread cutting force across the entire blade, improving cut quality, precision and tool life.

These snips are built to be ultra-durable, meaning they won't bend or break thanks to their pivot design, giving them longer overall snip life.

The Aviation snips use 20% less force to cut and their handle design and compound-leverage mechanism reduce hand fatigue.

VACUUM CLAMP

Festool
www.festool.com.au

In the future assembly work can be carried out even easier, because the vacuum clamping nozzle CT WINGS from Festool enables simple clamping and fixing of work pieces in horizontal and vertical areas. With the suction power of a mobile dust extractor the work piece stays where it is supposed to. As a result, the user has his hands free for other work and can concentrate on the actual job at hand.

DUMPER

Makinex
www.makinex.com.au

The new Cormidi 85 dumper is a high performance compact dumper that efficiently transports bulk materials. At only 835mm wide, the Cormidi 85 can easily manoeuvre through the narrowest of spaces and navigate over all types of terrain.

The skip capacity of the new Cormidi 85 is 15% greater than the previous model, allowing contractors to load and shift more materials in each load. The new dumper also travels at an increased speed, reducing the overall hours needed to complete a job.

SAFETY SHOES

KingGee
www.kinggee.com.au

The original work boot has received a makeover with the introduction of KingGee's Comp-Tec Safety Shoe, a sports inspired shoe with the protection of a composite safety toe.

With its shock absorbing dual density midsole, abrasion resistant PU trims, breathable mesh upper, removable contoured PU and gel footbed, the Comp-Tec Safety Shoe has been specially designed to provide ultimate comfort for those long and tiring work days.

RUGGEDISED CASE

Griffin Technology
www.griffintechnology.com

Survivor All-Terrain for iPad Air 2 by Griffin Technology is a case designed to meet military standards and is synonymous with extreme-duty protection. Built on a shatter-resistant polycarbonate frame and clad in rugged, impact-absorbing silicone, Survivor All-Terrain protects against dirt, sand, rain, impact, vibration and a host of other environmental factors.

Survivor All-Terrain for iPad Air 2 is available for purchase in a variety of colours at JB Hi-Fi and Harvey Norman.

TIPS

OFFSETTING RISK

From copper thieves to flammable dust, worksites pose serious risks for tradies' businesses. AAMI Commercial Portfolio senior leader **Theo Pitsikas** explains how to protect your interests.

As a tradie, there are many risks that have the potential to put you out of business – sometimes for good.

Some of these risks are fairly obvious. One of the biggest is that someone will be injured or even killed as a result of your work environment or because of the incorrect use of equipment.

Electricians face the very serious risk that they, a member of the public or one of their workers, could be electrocuted due to their workmanship.

Likewise, carpenters are of course responsible for the integrity of structures they construct. A collapsing roof or floor in a house can have deadly consequences.

You can also be accountable if somebody's property is damaged as a result of work you've undertaken, or products you've installed.

For example, faulty electrical work in a house can potentially ignite and engulf the property in fire and then spread to nearby houses. Electricians can be liable for the damage to the neighbours' properties as well as their actual customer's property.

Plumbers can get themselves into strife if their customers' homes become water damaged due to substandard pipes or incorrect fittings, leaking or faulty workmanship.

Being responsible for serious injuries or property damage can be both extremely costly and severely detrimental to your business' reputation. As well as this, it could have a devastating personal impact on you.

Thankfully, most tradies are all too aware of these risks and take the proper precautions, including covering their business with public and products liability.

However, there are many other less-obvious risks that should not be overlooked.

Some of these risks include:

- **Dust build-up:** This often occurs during construction and carpentry work. Dust exposure can cause members of the public to become unwell, such as causing asthma attacks and other respiratory conditions. Dust is also flammable, so it can pose a fire risk.
- **Soldering and welding:** These are undertaken by a wide variety of trades. Sparks from these tools can easily start a fire if they're used in uncontrolled conditions.
- **Flammable building materials:** Materials, such as wood, pose a fire risk if they're not kept in safe locations.
- **Dangerous tools:** Certain tools, such as power saws, drills and nail guns, can pose a threat to members of the public if they are used improperly or left unsupervised.
- **Copper theft:** This is a particular problem for plumbers and electricians. Copper wiring and plumbing is expensive and may be a tempting target for thieves, particularly if they're left unsecured or in the back of your vehicle.
- **Damaged infrastructure:** Any tradies who are involved in excavations, construction or renovations, can easily damage a house's water or gas plumbing, or electrical and communication wiring if they are not careful in the process of their work. This could cause water damage, fires or power outages. The risks include the use of lower-quality materials, failure to follow specifications, building codes or safety precaution standards, and defective work.

To cover your business against these situations, it's imperative you have public and products liability insurance and portable and valuable property insurance.

Public and products liability covers your legal liability for injury or damage that you, your employees or your business causes to other people or their property. Fortunately, most tradies are required to take out this cover when they take up a contract.

In cases such as these, it's important to remember you are responsible for any product you use in the course of your work, even if you don't manufacture it. This includes fittings and wiring, building materials and tools.

You should also take proper precautions to mitigate these risks. Ensure you and your staff are well trained and certified to perform the work and use the tools and equipment. If doing underground work, it's important to use the 'dial before you dig service'. If undertaking hot work, such as grinding or welding, ensure you comply with the relevant Australian safety standards.

It's also very important to perform all the correct safety checks and use materials, products and tools with the right quality standards. Ensure your tools and equipment are secured or supervised when not in use so they cannot harm a member of the public.

Meanwhile, portable and valuable property (also known as general property) covers any portable business items carried in the course of your business for theft and accidental loss or damage.

This includes items such as tools and mobile phones, as well as tablets, cameras and other such equipment. It can also include copper products, such as wires and pipes.

You must remember that items stolen from an unlocked vehicle are generally not covered. If you have a ute, you must put your tools in a locked box that is securely attached to the vehicle or chain them up to the vehicle itself or within the locked cab.

Proof of ownership for items like tools is often an issue when making a claim. If you don't have receipts, you can take photos and make a record of the serial numbers to make sure the claims experience is quick and easy.

AAMI
www.aami.com.au

As from the end of **February 2015**
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FORD TRANSIT

Ford Australia has expanded its European-bred new-generation Transit range with five key new heavier-duty model variants joining the smaller Custom one-tonner introduced last year.

Three long-wheelbase (3,750mm) vans – a 350L, 350E Jumbo and 470E Jumbo – and a longer-wheelbase (3,954mm) 470E single and double cab chassis are now available, each offering "significant increases", Ford says, in key areas such as safety, reliability, cargo capacity and standard equipment.

All are powered by a 2.2L Duratorq TDCi turbo-diesel engine, producing 114kW of power at 3,500rpm and 385Nm of torque from 1,600-2,300rpm and driving the rear wheels via a six-speed manual gearbox – there is no automatic transmission available.

Standard safety features are a strongpoint, running to front, side and curtain airbags, traction and stability control, a host of other electronic handling aids (rollover mitigation, load adaptive control, torque vectoring control and trailer sway control, for example) and Ford's Sync Emergency Assistance system which can automatically dial emergency services in the event of an accident.

Other items onboard include air conditioning, cruise control, a trip computer, heated exterior mirrors (with a power fold function), remote central locking, perimeter alarm, 3.5" display screen, digital radio, CD stereo, USB input, Bluetooth phone connection and audio streaming.

The vans have a side door and 270° rear swing doors, while the load compartment includes lighting, wooden wall cladding, tie-downs and a 12V power socket. Load volume is well up on the previous generation, ranging from 11m³ on the 350L with standard mid-roof – a high roof can also be ordered, creating 12.4m³ – to 15.1m³ on the Jumbo vans, which have an extended body and high roof as standard.

The key difference between the 350E and 470E models – both in van and cab chassis spec – is the fitment of dual rear wheels on the latter. As such, gross combination mass increases from 5,500kg on the 350L and 350E to 7,000kg on the 470E van and single cab chassis.

Maximum payload is 1,295kg for the 350L (high-roof version: 1,267kg), 1,122kg on the 350E Jumbo, 1,946kg on the 470E Jumbo and 2,500kg on the 270E single cab chassis. GVM is 4,490kg on both Jumbo vans and the cab chassis, with the entry 350L at 3,550kg.

Pricing starts from $47,680 plus on-road costs for the 350L van (the high roof adds $1,500), rising to $51,180 for the 350E Jumbo and to $54,180 for the 470E Jumbo. The 470E single cab chassis kicks off at $49,180, while the double is priced from $52,680. ▲

Ford Australia
www.ford.com.au

MITSUBISHI TRITON

Mitsubishi has taken the covers off its fifth-generation Triton one-tonne ute ahead of its Australian launch around mid-2015.

Local specifications are still to be revealed, but the fully redesigned Thai-built ute – to again be offered in single, club and dual cab body styles, with 4x2 and 4x4 drivelines – is billed as being more efficient and comfortable while maintaining a rugged edge required for the working class in which it is one of the biggest-selling models.

One of the headline acts is an all-new '4N15' 2.4L MIVEC turbo-diesel engine, which produces 133kW of power at 3,500rpm and 430Nm of torque from 2,500rpm – up 2kW and a useful 30Nm compared to the high-output version of the current bigger-displacement 2.5L diesel (dubbed '4D56').

Mitsubishi claims a particularly low compression ratio of 15.5:1 and lightweight construction of the engine, including an aluminium cylinder block, have helped achieve a 20% reduction in fuel economy – and a corresponding reduction in CO2 emissions – over the current top-shelf 2.5.

It combines with a newly developed six-speed manual gearbox or five-speed automatic with a 'Sport' mode, driving either the rear wheels or all four via the carryover Easy Select 4WD system.

Now with common rail direct fuel injection, the 4D56 engine continues for select markets – output remains at 94kW/240Nm for 4x2 models and 131kW/400Nm for 4x4s – while the 94kW/194Nm '4G64' 2.4L petrol engine also carries over with some minor improvements.

Vehicle handling, stability and refinement are said to have gone up a notch, thanks in part to a 7% improvement in torsional rigidity that stems from measures such as more extensive use of high-strength (but lightweight) steel in both the cab and cargo bed.

The cabin offers more room for occupants in all directions, including rear-seat legroom in the double cab, and plenty more in the way of general comfort, amenities and equipment, from the heavily upgraded infotainment unit and bigger seats to improved all-round visibility and a keyless start/stop system.

It has not, however, come at the expense of carrying capacity.

The new model continues to sit on a 3,000mm wheelbase, with overall length stretching a little further on all body styles. The load area is virtually the same length as the equivalent current model, and while the width is the same, Mitsubishi says it has sculpted out a deeper bed to give each cab variant a higher payload capacity. ▲

Mitsubishi Motors
www.mitsubishi-motors.com.au

TOYOTA 4X4 SR DOUBLE CAB

Toyota says it had small and medium-sized businesses such as plumbers, electricians and building industry contractors top of mind with the introduction of a new Hilux variant that combines an automatic transmission with its 126kW/360Nm 3.0L turbo-diesel engine and dual cab chassis body style.

It comes in the highly equipped SR model grade and is priced from $43,740 plus on-road costs – $1,500 less than the identically equipped pick-up version. Combined-cycle fuel economy is 8.7L/100km.

HOLDEN COLORADO MY15

Holden has upgraded its Colorado utility for the 2015 model year, introducing significant changes including revised suspension for the top-spec LTZ and a new refinement-enhancing 'acoustic' package across the range.

Signifying the ever-increasing dual-purpose role of the lion brand's Thai-built light truck, operating as tradies' workhorse during business hours and family or recreational transport at other times, the MY15 Colorado LTZ – available in 4x4 Space Cab Pick Up and 4x2 and 4x4 Crew Cab Pick Up body styles – now has 'comfort' suspension tuning that comprises softer spring and damper rates and a stiffer front stabiliser bar.

Holden says the upshot is improved ride balance and isolation "resulting in a smoother, more comfortable ride, particularly on urban roads". However, payload also reduces slightly as a result, down to 825kg in the LTZ 4x4 Crew Cab.

Inside, LTZ models pick up soft-touch trim on the doors and armrest, a classier jet black finish on the instrument panel and centre console, and piano black trim on the centre stack and steering wheel. The 4x4 Crew Cab also now includes the option of heated leather seats.

The range-wide refinement measures include various sound-deadening applications in and around the engine bay targeting unwanted powertrain noise, while wind-tunnel testing conducted in Australia has led to revised door seals and "tighter build tolerances" in key areas.

Refinements were also made to the electronic hill-start assist and hill-descent control systems.

Holden has held pricing firm on the broad Colorado ute range with the MY15 update, kicking off from $28,390 plus on-road costs for the LS 4x2 Single Cab Chassis manual and topping out at $52,690 for the LTZ 4x4 Crew Cab Pick Up with automatic transmission.

Exterior changes to the Colorado are restricted to a new 'satin steel grey' colour added to the paint palette.

As before, the full range spans single, space and dual cab body styles, cab chassis and boxed ute back ends, four trim levels (DX, LS, LT and LTZ) and 4x2 and 4x4 drivelines.

Since MY14, just the one powertrain has been in service – a 2.8L 'Duramax 2' four-cylinder turbo-diesel producing 147kW at 3600rpm and 440Nm at 2000rpm with the standard six-speed manual gearbox. The optional ($2200) six-speed auto offers the same power output but a beefier 500Nm.

Holden
www.holden.com.au

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FIAT DOBLO

After years of deliberation, Fiat Professional has finally launched its Doblo van in Australia, pitched at established compact cargo carriers such as the market-leading Volkswagen Caddy, Renault's Kangoo and the Citroen Berlingo.

Priced from $22,000, the front-drive Doblo has arrived with petrol and diesel powertrain options, two wheelbase lengths (4,390mm and 4,740mm), plenty of standard equipment for the money and claims from the Australian subsidiary of the Italian manufacturer that it sets "a new benchmark in the commercial vehicle sector".

At the $22K entry level is a 70kW/127Nm 1.4L four-cylinder petrol engine, paired exclusively with a five-speed manual gearbox, while an extra $5,000 will bring diesel power into play with a stronger and more economical 77kW/290Nm 1.6L Multijet engine combining with a six-speed manual.

A five-speed Comfort-matic automatic (more accurately defined as a clutch-less manual) is available $2,000 further upstream from $29,000, although the gearbox convenience comes at the expense of engine output, which is pegged back to 66kW/200Nm.

On the flipside, this variant has a fuel-saving engine idle-stop system and the lowest consumption at 4.9L/100km on the combined cycle, down from 5.4L with the manual and 7.3L with the petrol engine.

At the top of the range is the longer-wheelbase Maxi, priced from $31,000 and offering more muscle with a 99kW/320Nm 2.0L Multijet diesel that returns 5.9L/100km. It is only available as a six-speed manual.

Fiat claims class-leading payload capacity for the Doblo, which manages 750kg in SWB guise or 1,000kg for the Maxi. The load compartment length is 1,820mm in the SWB, with the Maxi stretching a further 350mm (to 2,170mm), while on all models width is 1,518mm (1,230mm between the wheel arches) and height 1,305mm.

Overall cargo volume is 3.4m³ for the SWB and 4.2m³ for the Maxi. Access to the cargo area is made via a sliding door on each side of the van and rear doors (side-hinged or tailgate).

All models have air conditioning, remote central locking, a trip computer, Bluetooth connection, height/reach-adjustable steering wheel and a large lockage glovebox capable of holding a 14" laptop, while cruise control and rear parking sensors are found across the diesel range.

Standard safety equipment includes four airbags, electronic stability control, a hill-holder and ABS brakes with EBD. ▲

Fiat
www.fiat.com.au

CITROEN BERLINGO ETG LONG BODY

Citroen has upgraded the long-bodied version of its Berlingo van with a new ETG automated manual transmission for its 66kW/215Nm 1.6L turbo-diesel engine, offering a clutch-less alternative to its five-speed manual.

It is priced from $28,990 plus on-road costs and returns fuel economy of 4.7L/100km on the official combined cycle – 1L down on the conventional manual, thanks in part to the inclusion of an automatic engine idle-stop system. Traction control and hill-start assist are also fitted standard.

FORD FG X FALCON UTE

Ford Australia's final Falcon ute has hit the road for a two-year fling before the company closes its factories here in October 2016 and, in doing so, pulls down the shutters on the unique two-door workhorse.

Unlike the Falcon sedan, which will also be retired, there is no high-performance V8-powered XR8 to take the ute out with a bang, leaving the XR6 Turbo at the top of the new FG X series, priced from $41,990 (plus on-road costs) in ZF six-speed auto guise – a $1,380 reduction on the previous model.

That said, the final model is easily the most advanced to emerge from the Broadmeadows assembly plant, bringing with it a host of new technology and high-grade equipment headlined by the latest 'Sync2' in-car connectivity system which offers voice control of entertainment, audio and climate systems – using unique Aussie accent recognition and a female voice known as Karen!

A high-resolution 8" colour touch screen is part of the package, along with the standard inclusion of digital radio, WiFi hot spot capability, an SD card slot, extra USB port and Ford's 'Emergency Assistance' system, which can automatically call emergency services if the vehicle is involved in a crash.

Climate control air conditioning and front parking sensors are now fitted to the base model, simply known as Falcon, adding to the long list of features already onboard including electric windows/mirrors, power-adjustable driver's seat, cruise control, Bluetooth and iPod integration, electronic traction and stability control, ABS brakes with EBD and brake assist, and front and side head/thorax airbags for both the driver and front passenger.

Entry level pricing for the Falcon ute has climbed $800 in both cab chassis and style side box form, starting from $29,390 and $29,790 respectively; however, the value equation has skyrocketed with the extra cabin equipment, exterior styling upgrades and, not least of all, the inclusion of a new, lighter and more fuel efficient six-speed ZF automatic transmission.

This is now the standard-issue gearbox with the venerable 195kW/391Nm 4.0L inline six-cylinder engine used on Falcon and the XR6 ute, the latter now priced from $32,140 as a cab chassis and $32,640 with the boxed back end – a saving of more than $3,500 compared to the previous FG MkII series.

A manual transmission is still available on the boxed XR6 in both natural-breathing and 270kW/533Nm turbo form, while the new ZF auto also now applies to the 198kW/409Nm EcoLPi dedicated gas version available for an extra $2,500 on base Falcon and the non-turbo XR.

The new XR models are easily spotted on the road with their unique LED daytime running lights, sports grille and new alloy wheel designs – an 18" set on XR6 and 19" rims on XR6T. Rain-sensing windscreen wipers also now kick in at XR level, along with upgraded interior trim across the sports-themed cabin. ▲

Ford Australia
www.ford.com.au

LDV V80

Chinese auto giant SAIC has relaunched its LDV V80 in Australia through a new distributor, Ateco Automotive, which has reduced the starting point of the light commercial van to less than $30,000.

In a pitch to price-sensitive small business operators, the V80 range now kicks off from $29,990 drive away for ABN holders. This brings the entry level short-wheelbase (3,100mm) model, while the long-wheelbase (3,850mm) versions – still available in either mid or high roof variants – are priced from $34,990 and $38,990 respectively.

As before, the V80 is based on a front-wheel-drive platform originally developed by the now defunct Leyland DAF commercial vehicle group but thoroughly revised under SAIC as a key export model to western markets such as Australia and Europe.

Power comes from a VM Motori-sourced 2.5L turbo-diesel engine developing 100kW of power at 3,800rpm and 330Nm of torque from 1,800-2,600rpm, paired with a five-speed manual gearbox or, for a further $2,000, a six-speed automated manual transmission. Combined-cycle fuel consumption is listed as 8.9L per 100km.

The SWB offers a payload of 1,160kg with a 3.2t GVM, and the two LWB variants deliver a 1,480kg payload in a 3.5t GVM package. Cargo volume ranges from 6.4m³ to 10.4m³ on the LWB mid-roof and 11.6m³ on the high roof model.

The equipment level remains generous across the range, with standard features including 16" alloy wheels, dual sliding side doors, rear barn doors (opening to 180°), front and rear fog lights, four reverse parking sensors, remote central locking, dual airbags and ABS brakes with EBD and brake assist. Four-wheel disc brakes are also fitted.

Cabin creature comforts include air conditioning, cruise control, power windows, eight-way adjustable driver's seat

and a stereo with MP3 player. Three seating positions are provided.

The cargo area is easily accessed with a low floor height, aided by non-slip entry steps, interior lighting, heavy duty floor mat and recessed tie-down points.

The all-important cargo measurements are 2,550mm (SWB) or 3,300mm (LWB) in length, width of 1,770mm across the range (1380mm between the wheel arches), while height is 1,505mm on the SWB, 1,710mm on the LWB mid-roof and 1,925mm on the high roof version.

Ateco offers a three year/100,000km warranty with roadside assistance. ▲

LDV
www.ldvautomotive.com.au.

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DUCATO

Volume capacity range: 8 – 15m³

Payload range: 1.5 – 2.1 tonne

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The value packed commercial range from Fiat Professional includes the all-new Doblo's class leading 1,000kg payload, the Scudo's best price for a diesel in its category, and the Ducato's position as the most powerful FWD full size van. Upgrade your most valued business asset. Book a test drive today. For more information visit **fiat.com.au**

FIAT PROFESSIONAL

FIAT DUCATO

Fiat Professional has launched its new-generation Ducato in Australia, bringing the large van and cab chassis range up to date with a comprehensive overhaul headlined by a new powertrain and a raft of advanced technology.

A 3.0L '180 Multijet' turbo-diesel engine is fitted across the range, producing 130kW of power at 3,500rpm and 400Nm of torque at 1,400rpm – enough for the Italian brand to boast that Ducato is the now most powerful front-wheel-drive van in its segment.

The engine is paired with either a six-speed manual gearbox or a six-speed Comfort-matic robotised clutch-less manual and returns fuel consumption as low as 7.2L/100km (cab chassis) on the official combined cycle.

As well as improved efficiency and lower running costs, Fiat says robustness and reliability, and high-tech features, were development priorities for the new Ducato.

Body and chassis reinforcements have been made, weight-saving measures employed (including composite materials in the rear suspension), braking hardware upgraded to match the improved performance, and a three-part front bumper introduced to keep repair costs down.

Among the electronic safety features onboard are traction and stability control, rollover mitigation, load and centre of gravity detection, a hill-holder and emergency brake assist. A reversing camera (vans only), hill-descent control and lane-departure warning with high-beam recognition are also now optionally available.

A highlight of the fully refitted three-seater cabin is a new 5" colour touch-screen infotainment system with steering wheel controls. Other notable inclusions are newly developed seats, bulkhead with viewing window, air conditioning, cruise control, twin airbags, power windows/mirrors, Bluetooth connectivity and rear parking sensors.

In terms of suitability for various trades, Fiat has plenty of bases covered with the Ducato van range offering three wheelbase lengths (short/3,000mm, medium/3,450mm and long/4,035mm), four overall lengths (4,963mm, 5,413mm, 5,998mm and 6,363mm) and two roof heights (low/medium).

This provides for several different cargo load capacities, from 8m³ through to 15 m³. Payload ranges from 1,560kg to 2,110kg, with GVM between 3,510kg and 4,005kg.

Priced from $44,000 plus on-road costs, the cab chassis has a 3,800mm wheelbase and 4,005kg GVM.

Van pricing starts from $38,000 for the SWB low-roof, rising to $40,000 for the MWB low-roof and to $44,000 for the MWB mid-roof. The Comfort-matic gearbox is fitted standard to the LWB mid-roof (from $48,000) and the extra-long van (from $52,000). ▲

Fiat
www.fiat.com.au

CELEMETRIX
WWW.CELEMETRIX.COM.AU

Fibre Optic Test Commissioning and Reporting

Designed for all skill levels, this course provides all the information required to confidently operate and assess the quality of an optical fibre transmission link. This course will provide a comprehensive awareness of a variety of commonly used commissioning techniques and tooling including tri-band OTDR testing. Attendees will also learn techniques to develop carrier approved commissioning reporting including NBN and Telstra.

Start date	End date	Location
20/04/2015	22/04/15	QLD
27/04/2015	29/04/15	WA

Fibre Optic Splicing and Joint Enclosure

Designed for all skill levels, this course provides each attendee with an opportunity to secure the skills required to confidently install fibre optic joint enclosures used within a carrier network and splice fibre optic cores. Each attendee will construct a minimum of six carrier certified high fibre count joint enclosures. These are chosen to incorporate all the disciplines needed to confidently assemble most joint enclosures available and splice fibre optic cores without causing fault conditions.

Start date	End date	Location
13/04/2015	17/04/15	QLD
20/04/2015	24/04/15	WA

NBN Network Design

Designed for people with FTTP network design responsibilities, this course provides attendees with the skills and knowledge to efficiently design FTTP networks using the latest GPON technologies. Designed for all skill levels this course will introduce attendees to the functionality of each network element as well as basic and enhanced design and architectural methodologies.

Start date	End date	Location
13/04/2015	13/04/15	NSW

Advanced Optical Commissioning and Reporting

This course is designed to provide attendees with the required skills to confidently provide an accurate OTDR analysis report with repeatable results. This one day course focuses on an understanding of OTDR trace elements, trace analysis, report generation and automation.

Start date	End date	Location
2/04/2015	2/04/15	VIC
23/04/2015	23/04/15	QLD
30/04/2015	30/04/15	WA

FTTP Base Level Installer

This course will provide the attendee with a detailed overview of FTTP (NBN) network construction and commissioning. Attendees will use a range of test equipment including Buttinski, PON power meters, loss test sets, visual inspection probes and visual fault locators.

Start date	End date	Location
13/04/2015	17/04/15	QLD
20/04/2015	24/04/15	WA

FTTP Test and Commission Skilll Set (Advanced Level Installer)

Designed for all skill levels, this course will provide the attendee the skills and knowledge required to confidently commission test and fault find FTTP/FTTN optical fibre links.

Start date	End date	Location
20/04/2015	23/04/15	QLD
27/04/2015	30/04/15	WA

CELEMETRIX
WWW.CELEMETRIX.COM.AU

Install Underground Service Drop

This course is an NBN-accredited course intended for personnel installing the NBN Co. Premises Connection Device (PCD) and Underground Service Drop Sheath (SDS) cable.

Start date	End date	Location
8/04/2015	8/04/15	NSW
27/04/2015	27/04/15	QLD

Install, Commission and Maintain a Fibre NTD

This course is an NBN-accredited course intended for personnel installing the NBN Co. Fibre Network Termination Device (NTD), Power Supply with Battery Backup (PS/B) and Fibre Wall Outlet (FWO).

Start date	End date	Location
9/04/2015	10/04/15	NSW
28/04/2015	29/04/15	QLD

Survey and Report Underground Network

This NBN-accredited course provides individuals who are required to survey and validate the Telstra underground infrastructure with the practical issues associated with using the existing pit and pipe network and ensure they are competent in supplying quality information for the creation of the Field Inspection Report (FIR).

Start date	End date	Location
15/04/2015	15/04/15	NSW
30/04/2015	30/04/15	QLD

MDU Cabling and Hardware Installation

This is an NBN-accredited course intended for personnel installing the NBN Co. Fibre Network Premises Distribution Hubs (PDH), Cable Transition Location enclosures (CTL), Fibre Collector Distributors (FCD), Fibre Distribution Terminals (FDT) and Premises Connection devices (PCD) in a Multi Dwelling Unit (MDU) in the Brownfields environment.

Start date	End date	Location
16/04/2015	17/04/15	NSW

Prepare, Splice and Enclosure Ribbon Fibre

This NBN-accredited course provides individuals with the accreditation and competence and skills to work on the splice enclosures used in the NBN network, safely and in accordance with legal requirements. It also equips them to identify the Telstra Infrastructure and comply with the Telstra's distribution area (DA) requirements.

Start date	End date	Location
14/04/2015	17/04/15	NSW
28/04/2015	1/05/15	VIC

Ethernet Networking and TCP/IP

This course is designed to provide individuals with the knowledge of Ethernet and TCP/IP and associated communications standards and architectures. It focuses on guiding attendees on basic ethernet through the OSI layers, IP subnetting and different networking technologies that will help the individual build from a simple topology to a more complex one.

Start date	End date	Location
21/04/2015	24/04/15	NSW

NBN Safety & Awareness Course

This course is designed to provide workers with a nationally consistent introduction to the National Broadband Network (NBN) and ensure workers are trained to a minimum standard of Health, Safety & Environment.

Start date	End date	Location
13/04/2015	13/04/15	NSW

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. As of 1st July 2014, Open Registrated Cablers must undertake this course to comply with new ACMA rules requiring all cablers undertaking specialist cabling to have the relevant endorsement.

Start date	End date	Location
27/04/2015	28/04/15	St Leonards
20/04/2015	21/04/15	Salisbury
18/05/2015	19/05/15	Murdoch
11/05/2015	12/05/15	Preston
25/05/2015	26/05/14	Regency Park
22/06/2015	23/06/15	Salisbury

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. Open Registrated Cablers have until 1 July 2014 to comply with new ACMA rules requiring all cablers to have the relevant endorsement.

Start date	End date	Location
22/04/2015	23/04/15	Salisbury
29/04/2015	30/04/15	St Leonards
13/05/2015	14/05/15	Preston
20/05/2015	21/05/15	Murdoch
27/05/2015	28/05/15	Regency Park
24/06/2015	25/06/15	Salisbury

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. Open Registrated Cablers have until 1 July 2014 to comply with new ACMA rules requiring all cablers undertaking specialist cabling to have the relevant endorsement.

Start date	End date	Location
24/04/2015	24/04/15	Salisbury
1/05/2015	1/05/15	St Leonards
22/05/2015	22/05/15	Murdoch
15/05/2015	15/05/15	Preston
29/05/2015	29/05/15	Regency Park
26/06/2015	26/06/15	Salisbury

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
16/04/2015	17/04/15	St Leonards
13/05/2015	14/05/15	Murdoch
14/05/2015	15/05/15	Salisbury
18/06/2015	19/06/15	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 is delivered online through eLearning, followed by a half-day practical course.

Start date	End date	Location
16/04/2015	16/04/15	St Leonards
13/05/2015	13/05/15	Murdoch
14/05/2015	14/05/15	Salisbury
18/06/2015	18/06/15	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 is delivered online through eLearning, followed by a one-and-a-half-day practical course.

Start date	End date	Location
16/04/2015	17/04/15	St Leonards
13/05/2015	14/05/15	Murdoch
14/05/2015	15/05/15	Salisbury
18/06/2015	19/06/15	Lambton

NBN Safety & Awareness

The course has been designed by NBN Co to provide workers with a nationally consistent introduction to the National Broadband Network (NBN) and ensure workers are trained to a minimum standard of Health, Safety and Environment and CPR.

Start date	End date	Location
16/04/2015	17/04/15	Murdoch
4/05/2015	5/05/15	Salisbury

MILCOM COMMUNICATIONS
HTTP://MILCOM.COM.AU/

Coax Cabling

The course aims to give skills necessary to competently install, terminate and test coaxial cabling.

Start date	End date	Location
5/05/2015	5/05/15	NSW
26/05/2015	26/05/15	VIC
10/06/2015	10/06/15	NSW

Open Registration - eLearning Course

This course is for those looking to obtain the 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
11/05/2015	12/05/15	NSW
15/06/2015	16/06/15	NSW

Open Registration Course

This course is for those looking to obtain the 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
27/04/2015	1/05/15	NSW
11/05/2015	15/05/15	VIC
1/06/2015	5/06/15	NSW

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
1/04/2015	2/04/15	VIC
6/05/2015	7/05/15	NSW
27/05/2015	28/05/15	VIC
11/06/2015	12/06/15	NSW

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
4/05/2015	5/05/15	NSW
25/05/2015	26/05/15	VIC
9/06/2015	10/06/15	NSW

Pit and Pipe

By the end of the course, you will be able prepare a site for installation, excavate, select conduit and restore a site and complete documentation.

Start date	End date	Location
1/04/2015	2/04/15	NSW
7/04/2015	8/04/15	VIC
9/06/2015	10/06/15	NSW
9/06/2015	10/06/15	VIC

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
9/04/2015	9/04/15	VIC
11/06/2015	11/06/15	VIC

Cable Hauling

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; carry out pre-hauling requirements duct occupancy, sub ducting, individual haul distances, haul direction; state safety procedures relating the various safety precautions to be implemented/ considered; and more.

Start date	End date	Location
11/06/2015	11/06/15	NSW

NECA WA
WWW.CET.ASN.AU

national electrical and communications association

Certificate IV in Hazardous Areas - Electrical

The course provides competencies to supervise, select, install, commission, maintain and test explosion-protected equipment and systems, for control and monitoring of plant and processes. It also contains skills sets in working with explosion protection techniques and how they apply to pressurisation, and gas and dust atmospheres.

Start date	End date	Location
4/05/2015	15/05/15	Joondalup
15/06/2015	26/06/15	Joondalup

Checking and Testing an Electrical Installation

This course is designed to update the holders of a current unrestricted electricians licence and 4th Year apprentice Electrotechnology electricians in current testing procedures, applicable to the WA Electrical Requirements and A/NZ Standards. The course requires applicants to demonstrate competence in completing practical tasks involving fault identification and producing the required test results while adhering to current standards and requirements.

Start date	End date	Location
15/04/2015	15/04/15	Joondalup
29/04/2015	29/04/15	Joondalup
29/04/2015	29/04/15	Jandakot
8/05/2015	8/05/15	Joondalup
20/05/2015	20/05/15	Joondalup
27/05/2015	27/05/15	Jandakot
10/06/2015	10/06/15	Joondalup
24/06/2015	24/06/15	Joondalup
24/06/2015	24/06/15	Jandakot

Electrical Contractors Licence and Electrical Contractors Nominees/ In-house Licence Course

This course provides qualified electricians with the training, skills and knowledge required to apply for the Electrical Contractors or Electrical Contractors Nominees/In-house Licence. The course is structured to include both theoretical and practical training.

Start date	End date	Location
13/04/2015	17/04/15	Jandakot
18/04/2015	1/05/15	Jandakot
20/04/2015	24/04/15	Joondalup
4/05/2015	8/05/15	Joondalup
9/05/2015	21/05/15	Joondalup
11/05/2015	15/05/15	Jandakot
16/05/2015	28/05/15	Jandakot
8/06/2015	12/06/15	Jandakot
13/06/2015	25/06/15	Jandakot
15/06/2015	19/06/15	Joondalup
20/06/2015	2/07/15	Joondalup

High Voltage Switching Systems Operations Course

The course provides the student with the knowledge required for entry to the High Voltage Switching industry. The course is designed for persons who require an understanding of or who are required to operate high voltage equipment.

Start date	End date	Location
13/04/2015	17/04/15	Jandakot
20/04/2015	24/04/15	Jandakot
4/05/2015	8/05/15	Jandakot
11/05/2015	15/05/15	Jandakot
18/05/2015	22/05/15	Jandakot
25/05/2015	29/05/15	Jandakot
8/06/2015	12/06/15	Jandakot
15/06/2015	19/06/15	Jandakot
22/06/2015	26/06/15	Jandakot

Portable Appliance Testing (PAT) Course

This course provides information regarding the safe and accurate operation of the Portable Appliance Tester (PAT) and testing of RCDs for persons required to operate this type of equipment. Essentially, the course is aimed at persons who have little or no understanding of electrical theory and are required to endorse equipment as safe to use.

Start date	End date	Location
20/04/2015	21/04/15	Joondalup
21/05/2015	22/05/15	Jandakot
25/05/2015	26/05/15	Joondalup
8/06/2015	9/06/15	Joondalup

NECA WA
WWW.CET.ASN.AU

national electrical and communications association

Restricted Electrical Licence (REL) Course

The Restricted Electrical Licence course provides eligible persons with the training, skills and knowledge required to apply for a Restricted Electrical Licence.

Start date	End date	Location
20/04/2015	24/04/15	Joondalup
8/06/2015	12/06/15	Joondalup

Western Power Service Apparatus Connection Scheme

This course is designed for Western Power accredited electrical contractors and authorised electrical workers to be approved to connect consumers to the network.

Start date	End date	
15/04/2015	15/04/15	Jandakot
17/04/2015	17/04/15	Joondalup
29/05/2015	29/05/15	Joondalup
12/06/2015	12/06/15	Joondalup
17/06/2015	17/06/15	Jandakot

ACMA Category 5/6/7 and Coaxial Endorsements

This course is an extension of the ACMA Open Cabler Registration training course and provides applicants 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
17/04/2015	18/04/15	Joondalup
29/05/2015	30/05/15	Jandakot
19/06/2015	20/06/15	Joondalup

ACMA Open Cabling Training Requirements

The skill set lerned in this course meets the minimum ACMA prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved.

Start date	End date	Location
11/04/2015	16/04/15	Joondalup
16/05/2015	21/05/15	Jandakot
13/06/2015	18/06/15	Joondalup

Optical Fibre Cabling Course

This course is an extension of the ACMA Open Cabler Registration training course and provides applicants with the training, skills and knowledge required to correctly install and terminate optical fibre cabling.

Start date	End date	Location
10/04/2015	11/04/15	Jandakot
22/05/2015	23/05/15	Joondalup
12/06/2015	13/06/15	Jandakot

Certificate II in Split Air-Conditioning and Heat Pump Systems

This nationally recognised course covers installation, commissioning and de-commissioning of single head, split air conditioning and heat pumps systems to a prescribed routine where the maximum plant capacity for each system does not exceed 18kWr. It included wall hung, floor and ceiling suspended, cassette and ducted fan coil split systems and water heating heat pump systems.

Start date	End date	Location
11/04/2015	12/04/15	Jandakot
18/04/2015	19/04/15	Jandakot
22/04/2015	23/04/15	Jandakot
6/06/2015	7/06/15	Jandakot
10/06/2015	11/06/15	Jandakot
13/06/2015	14/06/15	Jandakot

Programmable Logic Controllers Skill Set

The course provides training in development, installation and testing of programs for programmable logic controllers and industrial systems requiring advanced control functions.

Start date	End date	Location
14/04/2015	14/05/15	Jandakot
18/05/2015	22/05/15	Joondalup
19/05/2015	30/06/15	Jandakot
26/05/2015	25/06/15	Joondalup

Minimum Australian Context Gap Training

This course provides the Minimum Australian Context Gap training to holders of an Offshore Technical Skills Record (OTSR) for the UEE30807 Certificate III in Electrotechnology Electrician qualification.

Start date	End date	Location
4/05/2015	15/05/15	Joondalup
11/05/2015	15/05/15	Jandakot
25/05/2015	29/05/15	Joondalup
15/06/2015	26/06/15	Jandakot

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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
13/04/2015	15/04/15	Townsville
13/04/2015	15/04/15	Rocklea
13/04/2015	15/04/15	Sydney
13/04/2015	15/04/15	Carlton North
14/04/2015	16/04/15	Perth
20/04/2015	22/04/15	Hobart
4/05/2015	6/05/15	Sydney Olympic Park
5/05/2015	7/05/15	Melbourne
11/05/2015	13/05/15	Rocklea
25/05/2015	27/05/15	Brisbane
15/06/2015	17/06/15	Rocklea
15/06/2015	17/06/15	Sydney Olympic Park
15/06/2015	17/06/15	Carlton North
15/06/2015	17/06/15	Adelaide
23/06/2015	25/06/15	Perth

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
2/04/2015	2/04/15	Brisbane
24/04/2015	24/04/15	Adelaide
8/05/2015	8/05/15	Sydney
27/05/2015	27/05/15	Perth
5/06/2015	5/06/15	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 Screen.

Start date	End date	Location
13/04/2015	17/04/15	Townsville
13/04/2015	17/04/15	Rocklea
13/04/2015	17/04/15	Sydney
20/04/2015	24/05/15	Hobart
4/05/2015	8/05/15	Sydney Olympic Park
11/05/2015	15/05/15	Rocklea
25/05/2015	29/05/15	Brisbane
15/06/2015	19/06/15	Rocklea
15/06/2015	19/06/15	Carlton North
15/06/2015	19/06/15	Sydney Olympic Park

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
20/04/2015	21/04/15	Adelaide
4/05/2015	5/05/15	Perth
26/05/2015	27/05/15	Melbourne
2/06/2015	3/06/15	Brisbane
16/06/2015	17/06/15	Townsville
23/06/2015	24/06/15	Canberra

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WWW.CLIPSAL.COM

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
22/04/2015	22/04/15	Adelaide
6/05/2015	6/05/15	Perth
28/05/2015	28/05/15	Melbourne
4/06/2015	4/06/15	Brisbane
18/06/2015	18/06/15	Townsville
25/06/2015	25/06/15	Canberra

C-Bus Touch Screen

The C-Bus Touch Screens 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
16/04/2015	17/04/15	Townsville
16/04/2015	17/04/15	Rocklea
16/04/2015	17/04/15	Sydney
23/04/2015	24/04/15	Hobart
29/04/2015	30/04/15	Carlton North
5/05/2015	6/05/15	Canberra
7/05/2015	8/05/15	Sydney Olympic Park
14/05/2015	15/05/15	Rocklea
21/05/2015	22/05/15	Carlton North
28/05/2015	29/05/15	Brisbane
18/06/2015	19/06/15	Rocklea
18/06/2015	19/06/15	Sydney Olympic Park
18/06/2015	19/06/15	Carlton North

Conext XW+ & 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.

Start date	End date	Location
22/04/2015	23/04/15	RFI Solar
13/05/2015	14/05/15	Brisbane
3/06/2015	4/06/15	Townsville
24/06/2015	25/06/15	Perth

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 utilises the previous version of DALIcontrol software bundle.

Start date	End date	Location
1/04/2015	1/04/15	Brisbane
24/04/2015	24/04/15	Adelaide
7/05/2015	7/05/15	Sydney
26/05/2015	26/05/15	Perth
4/06/2015	4/06/15	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 the DALI Native Control Devices such as DALIcontrol switches and sensors.

Start date	End date	Location
22/04/2015	23/04/15	Sydney
13/05/2015	14/05/15	Brisbane
3/06/2015	4/06/15	Canberra
17/06/2015	18/06/15	Perth

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WWW.CLIPSAL.COM

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 Screen, Schedule Plus 5 or third party Building Management System (BMS).

Start date	End date	Location
24/04/2015	24/04/15	Sydney
15/05/2015	15/05/15	Brisbane
5/06/2015	5/06/15	Canberra
19/06/2015	19/06/15	Perth

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
20/04/2015	21/04/15	Sydney
11/05/2015	12/05/15	Brisbane
1/06/2015	2/06/15	Canberra
15/06/2015	16/06/15	Perth

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 utilising user friendly Simple Wizard software.

Start date	End date	Location
1/04/2015	1/04/15	Brisbane
23/04/2015	23/04/15	Adelaide
7/05/2015	7/05/15	Sydney
26/05/2015	26/05/15	Perth
4/06/2015	4/06/15	Melbourne

EcoXpert - Energy Efficiency Growth Opportunities

This training session will:
- Add to your knowledge and gain a better grasp of this rapidly changing sector
- Acquire the know-how to successfully conduct a simplified energy audit
- Use methods, tools and solutions to develop business in energy efficiency

Start date	End date	Location
13/04/2015	13/04/15	Melbourne

EcoXpert - Power Factor Correction

This course details the fundamentals of power factor correction. It describes their importance for efficient network use and what must be considered when applying power factor correction in a poor quality environment.

Start date	End date	Location
14/04/2015	14/04/15	Brisbane
28/04/2015	28/04/15	Melbourne
19/05/2015	19/05/15	Townsville
28/05/2015	28/05/15	Cairns

EcoXpert - Practical Energy Audit

This training course will ensure that EcoXpert
- Understands the different types of Energy Audits
- Can undertake an energy audit step by step
- Can utilise data to identify opportunities to save energy
- Is capable of generating an energy audit report

Start date	End date	Location
15/04/2015	16/04/15	Adelaide
12/05/2015	13/05/15	Perth
19/05/2015	20/05/15	Melbourne

CLIPSAL BY SCHNEIDER ELECTRIC
WWW.CLIPSAL.COM

Network Connectivity - Fibre Testing Update

This course allows participants to address the changes in fibre optic Standards and associated testing in the last two years

Start date	End date	Location
22/04/2015	22/04/15	Brisbane
6/05/2015	6/05/15	Hobart
20/05/2015	20/05/15	Perth
5/06/2015	5/06/15	Adelaide

Network Connectivity - Introduction to Fibre Optical Testing

The Introduction to Optical Fibre Testing training course provides the necessary understanding of the requirements for infield testing for LAN (customer) optical fibre cabling systems to meets Standards and certification requirements.

Start date	End date	Location
21/04/2015	21/04/15	Brisbane
5/05/2015	5/05/15	Hobart
19/05/2015	19/05/15	Perth
4/06/2015	4/06/15	Adelaide

Network Connectivity - Twisted Pair Testing

The twisted pair training course provides the necessary understanding of the requirements for infield testing of high performance twisted pair telecommunication cabling to meet Standards, customer and certification requirements.

Start date	End date	Location
20/04/2015	20/04/15	Brisbane
4/05/2015	4/05/15	Hobart
18/05/2015	18/05/15	Perth
3/06/2015	3/06/15	Adelaide

Network Connectivity - Twisted Pair Update

This course allows participants to address the changes in Twisted Pair Standards and associated testing in the last two years.

Start date	End date	Location
22/04/2015	22/04/15	Brisbane
6/05/2015	6/05/15	Hobart
20/05/2015	20/05/15	Perth
5/06/2015	5/06/15	Adelaide

PUSH BY SCHNEIDER ELECTRIC
WWW.PUSHCONTROLS.COM

Push Controls Core Principles

The Push Control Basic 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
21/04/2015	22/04/15	Perth
5/05/2015	6/05/15	Sydney
2/06/2015	3/06/15	Melbourne
18/06/2015	19/06/15	Adelaide

ROCKWELL AUTOMATION
WWW.ROCKWELLAUTOMATION.COM/AUS

Automation University

Automation University will be touring 16 locations around Australia and New Zealand. Following the success of previous years, this one-day event will highlight leading-edge automation solutions while providing a unique, indepth experience with technology. The program is full of insight, vision, ideas and practical solutions to help participants stay ahead of their competition.

Start date	End date	Location
19/05/2015	19/05/15	Mildura
22/05/2015	22/05/15	Mt Gambier
16/06/2015	16/06/15	Bayswater
18/06/2015	18/06/15	Laverton

ELECTRO-TRAINING INSTITUTE
WWW.ELECTROTRAININGINSTITUTE.COM.AU

Cert II in Split Air-Conditioning and Heat Pump Systems

This course is designed for electricians and electrical apprentices and is delivered in a classroom based environment with the completion of a Recognised Prior Learning (RPL) process prior to course commencement. 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.

Start date	End date	Location
13/04/2015	15/04/15	Mackay
25/05/2015	27/05/15	Adelaide

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
20/04/2015	22/04/14	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
30/04/2015	1/05/15	Townsville

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
28/04/2015	28/04/15	Townsville

Restricted Electrical Course

This course is designed for trade persons to complete electrical work involved with their job.

Start date	End date	Location
4/05/2015	7/05/15	Townsville
12/05/2015	15/05/15	Mackay

Solar PV Install and Design

UEENEEK125A, UEENEEK148A & UEENEEK135A units of competency fulfill 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
30/03/2015	2/04/15	Sydney
14/04/2015	17/04/15	Townsville

Test & 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
7/05/2015	7/05/15	Townsville
15/05/2015	15/05/15	Mackay

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Hazardous Areas Refresher Training

This is a refresher for those who have previously completed the Electrical Equipment in Hazardous Areas (EEHA) training. Required by industry practice every two to three years. All assessment completed in class.

Start date	End date	
9/04/2015	10/04/15	Salisbury
2/06/2015	3/06/15	Salisbury

Cert IV Hazardous Areas (HA) - Electrical (UEE42611) - Gap Training Program

A nationally recognised post-trade qualification. Skills and knowledge to supervise installation, breakdowns, maintenance, testing, detailed inspections of hazardous areas and installations relating to gas, dust atmospheres and pressurisation.

Start date	End date	Location
20/04/2015	21/04/15	Salisbury
29/06/2015	30/06/15	Salisbury

Certificate IV Work Health and Safety (Cert IV WHS - BSB41412)

A nationally recognised qualification in Work Health and Safety. 5-days face-to-face training. All assessment completed in class.

Start date	End date	Location
20/04/2015	24/04/15	Salisbury
11/05/2015	15/05/15	Salisbury

Comcare 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
4/05/2015	8/05/15	Salisbury
1/06/2015	5/06/15	Salisbury

Diploma Work Health and Safety (Dip WHS - BSB51312)

A nationally recognised qualification in Work Health and Safety for those who have completed the Cert IV WHS. Face-to-face delivery in 2 separate weeks approximately 2 months apart. Assessment activities commenced in class and completed in own time.

Start date	End date	Location
18/05/2015	24/07/15	Salisbury

Electrical Equipment in Hazardous Areas (EEHA)

Skills and knowledge to select, install, commission, maintain and test explosion-protected equipment and systems for control and monitoring of plant and processes. 4-day face-to-face training covering 17 units of the nationally recognised Cert IV in Hazardous Areas - Electrical (UEE42611). All assessment completed in class.

Start date	End date	Location
13/04/2015	16/04/15	Darwin
13/04/2015	16/04/15	Salisbury
27/04/2015	30/04/15	Salisbury

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
27/04/2015	1/05/15	Salisbury
29/06/2015	3/07/15	Salisbury

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
15/06/2015	19/06/15	Darwin

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 808

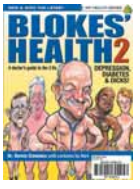
Electrical Principles for the Electrical Trades

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.

$77.00.....CODE 823

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.

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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 809

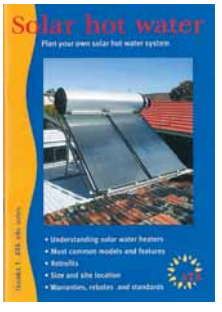
Electrical Wiring Practice

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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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.

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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.

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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.

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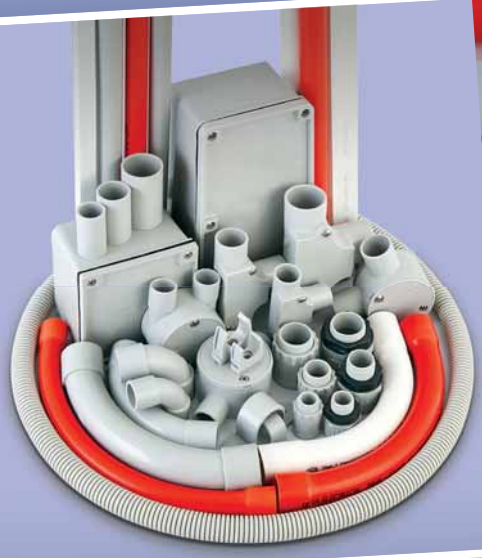

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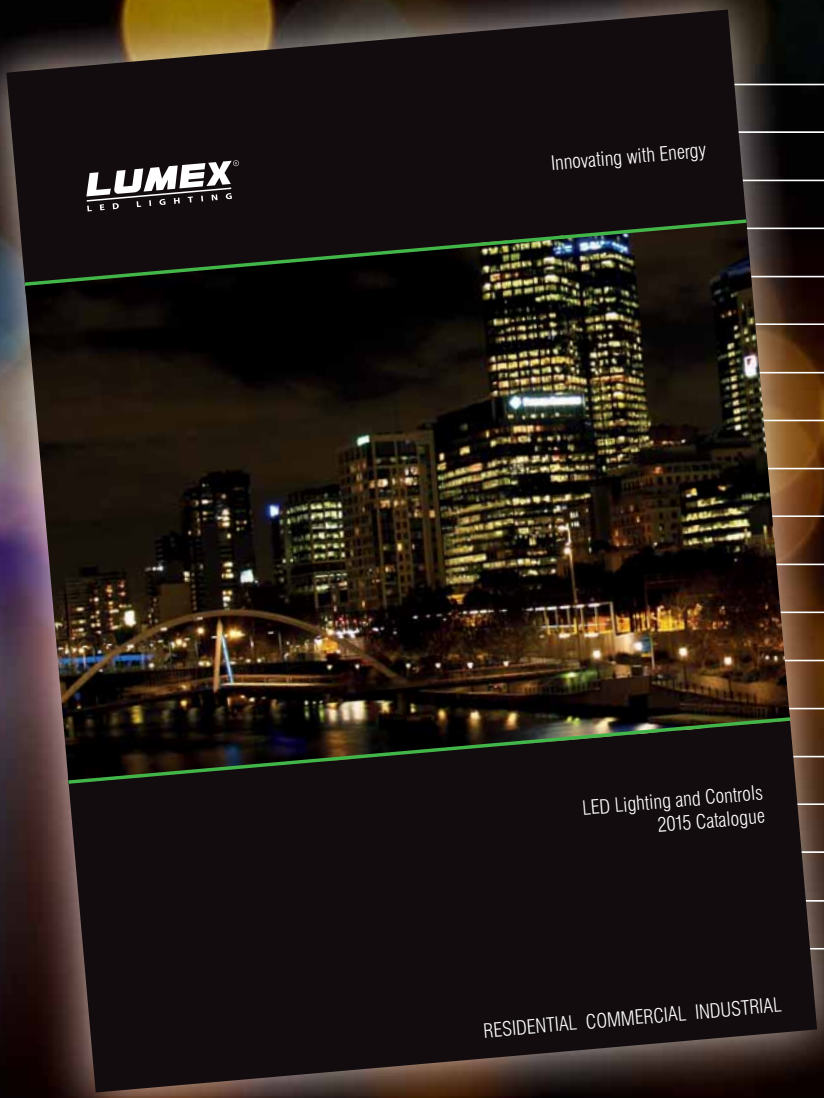

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