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CHRISTMAS**

with Thomas & Betts
on page 5.

PERFORMERS BOYCOTT, AUDIENCES DISAPPEAR

A live theatre's recent remodel unleashes an unwanted curse. P.10

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- + Choose the right UPS to avoid downtime

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from the **EDITOR**

ANTHONY CAPKUN

Proud of your projects? Tell us!

You've seen the full-page ads in Electrical Business Magazine and the wallpapers at EBMag.com. You've had most of the spring, and all of summer, but *now is the time* to hunker down and take 10 to 15 minutes to fill in your nomination for the 2017 Canadian Electrical Awards, which recognize noteworthy Canadian electrical installations and electrical safety champions.

The beauty of the Canadian Electrical Awards program—which still includes the special category of Electrical Safety Champion—is its *inclusivity*. We accept Nominations from Electrical Contractors, of course, but also anyone involved in the electrical scope of the project, including:

- Distributors
- Manufacturers and their Agents
- Engineers
- Designers, Architects, Owners, etc.

That's right: if you're reading this book, then either *you belong* in the Canadian Electrical Awards program, or *you know someone* who does. Nominate!

Everyone is busy, I get it... because of that, we've made the nomination process as simple as possible. Seriously, go now and check out:

EBMag.com/awards/award-entry

You'll see the Nomination form is amazingly short and sweet. And unlike other awards programs, there is no cost to enter... just 10-15 minutes of your time.

That's thanks in large part to our program sponsor I-Gard, who is helping us deliver this much-needed national recognition program for electrical professionals.

As a reminder, the award categories are:

- Industrial
- Commercial
- Institutional
- Residential
- Special (something unique)

The Electrical Safety Champion remains a special award, but rather than individual sub-categories for Contractor, Maintenance Team, Utility and Individual, all submissions from any of these groups will be judged together to produce 2017's champion.

Finally, if you submitted a nomination in the past but did not walk away with an award, please re-submit. We received some excellent nominations in the past, and would love to judge those same nominations again. This could be your year!

The deadline is September 15, 2017, so don't put it off any longer. Visit EBMag.com/awards. **EB**

acapkun@annexweb.com

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When a job is run horribly wrong... from start to lethal finish

In 2013, the owner of a career college facility in Mississauga, Ont., hired Elias Mikhail (an unlicensed contractor) to do some electrical work. It was a cash transaction with no receipt or record of work, and no electrical permits secured. And it gets worse...

Mikhail was electrocuted while working alone, and was not found until the next day by the facility's owner. An Electrical Safety Authority (ESA) investigation determined Mikhail received a fatal shock while working on wiring carrying 347V of electricity, which had not been disconnected from power.

In May 2017, the owner was convicted in Ontario court of hiring an unlicensed contractor to do electrical work at his business, and fined \$18,750.

"This is an important reminder that business owners and operators must understand legal requirements when hiring people to do electrical work," said ESA's Scott Saint. "It's the law in Ontario that only Licensed Electrical Contractors can be hired to do so."

The fine includes a 25% victim fine surcharge, which is credited to a provincial government fund to assist victims of crime.

Canadian Commission on Building & Fire Codes seeks volunteers

There is an immediate need for volunteers to serve on either the Canadian Commission on Building & Fire Codes (CCBFC)—a senior committee responsible for the development of Codes Canada publications—or on one of CCBFC's nine technical standing committees to replace membership vacancies for the current (2015-2020) code cycle.

Any applications received would also be considered for the next 5-year code cycle (2020-2025).

To have balanced representation on the committees, a pool of candidates is needed to represent all regions of Canada and all sectors of the construction industry that use, or benefit from, the national and provincial codes based on these models.

There is no remuneration, but the National Research Council of Canada (NRC) does reimburse expenses incurred in attending meetings.

CCBFC is an independent committee of volunteers established by NRC to develop

and maintain the National Construction Codes, which serve as the basis for related provincial/territorial regulations.

The commission is also responsible for setting code development policy direction and overseeing the development process to ensure it is open, transparent and consensus-based.

CCBFC members are senior-level individuals who are expected to be broadly knowledgeable on code-related matters and policy considerations, and able to exercise objective judgments.

Standing committee members are expected to be knowledgeable and experienced on matters considered by the committee and must demonstrate the capacity to make independent decisions.

All members are selected for their individual knowledge and experience with the codes, not as delegates from a particular organization or interest group.

For more information, email Anne Gribbon, CCBFC secretary, at anne.gribbon@nrc-cnrc.gc.ca.

Builders' Lien Act amendments in effect in Nova Scotia

Legislative amendments and regulations that aim to better protect subcontractors and suppliers in Nova Scotia's building trades came into effect June 30, 2017.

"The changes to the Builders' Lien Act will free up money, allowing it to flow back into the economy earlier," said Duncan Williams, president, Construction Association of Nova Scotia. "The changes will enable contractors to reinvest in their companies, people and capital. We hope to see significant improvements in productivity for all in the construction pyramid."

Amendments to the Builders' Lien Act will allow for the earlier release of financial holdbacks to those in the trades who complete their work on construction projects, reports the Department of Justice. New regulations will also ensure notice is given when a construction project is substantially completed.

The requirement to give notice does not apply to owners who are having work done on their residential properties when the contract or work is less than \$75,000.

"When homes or commercial buildings are under construction, everyone should be paid in full for their work in a timely manner," said Mark Furey, minister responsible for the Act. "These changes will allow electricians, plumbers and other subcontractors to be paid sooner for their work."

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World's largest "floatovoltaic" test bed features ABB tech



IMW floatovoltaic test bed in Singapore.
PHOTO COURTESY ABB.

Land scarcity has severely limited Singapore's adoption of solar power, says ABB, adding floating solar panels (a.k.a. floatovoltaics) could be over 10% more efficient than solar panels placed on land, and may be a viable alternative for the city-state, which is surrounded by water.

ABB says it is providing components to a 1-hectare, IMW floatovoltaic test bed, calling it the world's largest. The energy generated will be fed into the national grid, providing electricity for up to 250 households.

"This project is perfectly aligned with our Next Level strategy around the energy revolution, and is an important step in collaborating with partners to bring more renewables into the future energy mix," said Tarak Mehta, president of ABB's Electrification Products division.

Located in the Tengeh Reservoir, the installation features multiple solar solutions from providers to study the performance and cost-effectiveness of floating solar platforms. ABB supplied 100 kW of TRIO-50 solar inverters to Phoenix Solar, one of several system integrators for the project. These components convert the DC produced in solar panels into AC for use in the grid. Additionally, ABB low-voltage moulded-case and miniature circuit breakers protect the electrical circuits on the water.

Singapore enjoys high average annual solar irradiation of about 1500 kWh/m², says ABB, making solar an attractive source for renewable energy. The floating solar test-bed will be naturally cooled by the surrounding water, which may make the cells up to 11% more efficient than panels placed on land.

Wow! Milton Shop marks 40 years without LT injury

Believe it or not, there hasn't been a lost-time injury at Nova Scotia Power's Milton Heavy Maintenance Shop since June 27, 1977. Congratulations!

"It's an amazing accomplishment," said Jamie MacDonald, senior director of Power Production. "The team at Milton does high-risk work, and they've proven that all injuries are preventable. They are an inspiration for all our teams at Nova Scotia Power."

The Queens County shop directly employs 20 permanent and part-time workers, supported by a six-member planning and engineering group, and three administrative staff. They perform maintenance on hydroelectric generating equipment across the province. The generators date back as far as the 1920s so, at times, the Milton team must fabricate new parts from scratch because replacement parts don't exist.



Current team members at the shop include: Raymond Alexander, Phillip Anthony, Jared Blades, Dwayne Bond, Stephen Cole, Craig Comeau, Dylan Doucette, Brandon Fralic, Bobbi-Jo Goulden, Andrew Hamm, Bernard Hemeon, Mike Hupman, Jimmy Jeddry, Jeffrey Levy, Becky McDonald, Gary McLeod, Bevan Rhyno, Aaron Walsh, Paul Westhaver, Jason Wolfe and James Zong.

PHOTO COURTESY NOVA SCOTIA POWER.

Components that can be moved to the Milton shop are refurbished there, but staff will travel to sites across the province to work on pieces that cannot be moved. The equipment they work on ranges from a few thousand kilograms to 140 metric tons.

"The shop consists of a very talented group of individuals," said Scott Whynot, superintendent of Hydro Maintenance. "They are machinists, millwrights, welders

and utility workers who work in situations that involve confined space, rigging and manipulation of large components, machining, welding and various other hazards. All of these hazards are mitigated on a daily basis by a strong safety culture."

"The common thread that has brought this team to this achievement is the team's respect for one another and their willingness to speak up to ensure their co-workers and themselves go home safely at the end of every day," Whynot added.

— With files from Nova Scotia Power.

Kent Hills 3 to make up for "lower-than-anticipated energy production"



Kent Hills Wind Farm, PHOTO COURTESY MARITIMES ENERGY ASSOCIATION.

To supply additional generation and make up for "lower-than-anticipated energy production at the existing wind farm", NB Power and TransAlta have agreed to add 17.25MW of wind-generating capacity at the existing Kent Hills site.

The existing wind farm accounts for 150MW of capacity and consists of two separate projects (hence, Kent Hills 3 for the new initiative). Subject to regulatory approvals and the completion of a successful engagement process with First Nations and other stakeholders, it is expected to begin operation late 2018.

Located southwest of Moncton, Kent Hills began commercial operation December 2008. Natural Forces Technologies Inc.—a wind-energy developer based in Atlantic Canada—co-developed and co-owns the wind farm with TransAlta. The second Kent Hills wind project began commercial operation November 2010.

The farm boasts 50 V90-3.0 MW Vestas turbines, each on 80-m towers with 45-m blade length.

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CSA Z463 transforming from Guideline into Standard

CSA Z463 "Maintenance of electrical systems" has been adopted across Canada—even globally—since being first published in November 2013.

In November 2015, the 8th Z463 Technical Committee (TC) meeting was held in Montreal, where it was unanimously agreed to request approval from CSA for a 2nd edition. Instead, the steering committees and CSA Group senior staff approved the development of Z463 as a *standard* rather than as a 2nd edition *guideline*.

In October 2016, the first meeting setting the stage to develop Z463 as a standard was held in Calgary, and a draft completed in December 2016. The Working Groups used this draft to move forward with recommendations to convert Z463 clauses from advisory language to mandatory (normative) form.

In addition, enhancements for Z463 and the need to improve the French translation were addressed. Changes include renaming sections as required, revising clauses and any necessary revisions to improve content and the document's flow.

In May 2017, the 10th Z463 TC meeting was held in Ottawa, attended by 33 participants, including five members online and five guests. The vice-chair position was filled in November 2015 by two nominees (Bob Chernish and Bryce Kelly), and there were a few changes to Working Group (WG) leaders.

To learn more about sponsorship, membership and guest opportunities with CSA Z463, contact the following:

Kerry Heid, chair
kheid@shermco.ca

Bob Chernish, vice-chair
bob.chernish@forces.gc.ca

Bryce Kelly, vice-chair
bryce.kelly@lethbridge.ca

The next meeting is scheduled for October 4, 2017, at the TransAlta office in Calgary.

— With files from Hany Soloumah,
Ph.D, P.Eng., PMP



Christian Grenier (second from left) and Mathieu Legris (second from right).

PHOTO COURTESY ELECTRIMAT.

Electrimat recognized for entrepreneurial excellence

Brossard, Que.-based distributor Electrimat (electrimat.com) received a Silver Medal in the Entrepreneurial category at the 11th edition of the Business Transfer Awards, which took place at the Caisse de dépôt et placement du Québec. Congratulations!

Founded in 1980, Electrimat was acquired in 2011 by Christian Grenier and Mathieu Legris and, according to PwC, has since grown rapidly. Electrimat is a player in the wholesale and retail of electrical equipment, heating and lighting, serving the industrial, commercial, institutional, residential and utility sectors.

"Ever since the transfer, Electrimat has seen remarkable growth with revenues that have almost tripled," says vice-president Legris. "Our strength resides in the fact that we offer the flexibility that master electricians are looking for while giving them access to the largest buying group in North America."

Established by PwC in collaboration with several partners, the Business Transfer Awards celebrate the achievements of Quebec businesses that have successfully gone through the succession process, thereby ensuring their long-term sustainability. This year, the awards featured two different succession categories: Family Transfers and Entrepreneurial Transfers.

Electrimat is a member of Affiliated Distributors (AD) and Electro-Federation Canada.

BC Hydro harmonizing concrete encasement requirements with BCSCA

To facilitate the practice of installing service conduits within building walls to improve a home's exterior appearance, BC Hydro harmonized its requirements for concrete encasement of utility supply service raceways (120/240V up to 600A) installed within building walls, along with the BC Electrical Code requirement for consumer's service raceways for residential supply services.

BC Hydro issued a Bulletin covering details of the connection of underground residential services, and clarifies the BC Hydro and BC Safety Authority requirements for:

- concrete encasement of customer-owned electrical service ducts, and
- the location of large 400A and 600A 120/240V electrical services

BC Electrical Code Rule 6-208 states that raceways or cables containing service conductors shall be located outside the building, unless they are embedded in, and encircled by, no less than 50 mm (2 in.) of concrete or masonry.

BC Hydro installation experience, however, has shown that a 50 mm encasement has a relatively short life expectancy and is inadequate, which is why the utility stipulates a minimum of 75 mm (3 in.) of concrete encasement inside the building. This apparent conflict has caused challenges for BC Hydro customers.

For underground services, BC Hydro's jurisdiction ends at the meter socket or the utility cable compartment inside the customer's service box. To mitigate the code conflict with the BC Safety Authority, BC Hydro will harmonize its requirement with the BC Electrical Code, specifying a 50 mm (2 in.) minimum concrete encasement inside the building for 120/240V services up to 600A.

For overhead services, BC Hydro jurisdiction on private property ends at the point of the customer service connection—the service mast "drip loops". Accordingly, BC Hydro cannot request concrete encasement.

BC Electrical Code Rule 6-206 specifies various requirements for the customer service location. However, the past history of BC Hydro legal disputes to gain access into single-family dwellings has forced BC Hydro to reject all installations of customer residential services up to 600A located inside customer-owned buildings. **EB**

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This is a stock photo used for illustrative purposes only. It is not a photo of the actual theatre under investigation.

PERFORMERS BOYCOTT, AUDIENCES DISAPPEAR

A live theatre's recent remodel unleashes an unwanted curse / **PATRICK J. LYNCH, P.ENG.**

For live indoor stage theatre events, it is extremely important that the audience clearly hears the performance. These days, many performers use very small, portable wireless microphones. Their musical equipment—violins, guitars, pianos, etc.—are also equipped with these microphone-type devices.

At one particular 800-seat live stage theatre, it was almost impossible to book performers to come. Why?

It would appear that word had leaked out via online communities that this particular theatre had the curse of the *power hum*. Every performing artist had been drowned out by a very loud and annoying 60Hz hum that reverberated throughout

“In fact, no matter where I stood on stage with the guitar, I was shadowed by a huge power hum.”

the entire theatre. Regardless of where the performer stood on stage, the power hum was ever-present.

Sound engineers were hired to combat this unwanted noise. They installed separate electrical power supplies, separate grounding systems, specially designed hum-bucking coils, etc., yet none of this worked!

They had poured over two months of labour and material into solving the power hum problem, but the dreaded curse could not be lifted.

Digging into the theatre's background

The facility had been a very successful live theatre site for almost 20 years. However, it had recently been upgraded and remodelled with all the latest

high-tech gadgetry. Special sound consultants had been retained during this remodelling process to ensure optimal stage performances would continue.

Unfortunately, the sound engineers discovered this power hum problem during their final sound checks. They quickly scrambled to get the sound system up and running—free from power hum. After they failed, a second group of sound specialists were recruited to solve the problem, but they, too, came up empty.

And, speaking of empty, the theatre itself was sitting completely empty, month after month, with no performers and no paying audiences! The facility was losing tons of money, and was having difficulty making its payments for the very expensive remodel.

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Curse-lifters called in

Our group was called in to perform a professional electrical engineering investigation. Hearing there was a possibility I would finally *make it* on stage, I quickly went out and rented an electrical guitar and portable amplifier.

Upon arriving onsite, I set up a portable generator outside (isolated power source) and ran extension cords to the stage area. Then I plugged in the guitar/amplifier setup.

At this point in the investigation, it was extremely important to recreate the exact power hum problem with equipment similar to that which various other performers have used. This would establish a power hum baseline.

So, was my performance about to launch a stunning musical career? Well, no. As I suspected, all I heard was a very loud power hum coming from my portable guitar/amplifier system. In fact, no matter where I stood on stage with the guitar, I was shadowed by a huge power hum.

Time for serious forensics

My guitar time was officially over, and it was time to bring out all of our professional sensors, oscilloscopes, spectrum analyzers, etc. A quick magnetic field plot of the stage area revealed a 60Hz radiated magnetic field. It was very strong near the stage floor level and ran completely through the central part of the stage area, from stage left to stage right.

Elapsed investigation time: 30 minutes.

Under the entire stage area was the main dressing room. There we found new 400A parallel runs of single-conductor power cable conductors suspended from the ceiling. These conductors ran the complete length of this room, corresponding exactly to the high magnetic field mapping levels we recorded earlier at stage level above, which ran from stage left to stage right.

Elapsed investigation time: 60 minutes.

High-ampacity single-conductor power cables will radiate extremely large 60Hz magnetic fields 30-ft to 40-ft away. These magnetic field flux lines will also penetrate through any wood, steel, etc., that's in their path.

It was discovered these power cables fed all electrical power to the theatre, elevators, lighting, air-conditioning, etc.

Disconnecting the electrical power to these circuits immediately eliminated the power hum. All the radiated magnetic field plots around the

stage area were now also zero.

Elapsed investigation time: 90 minutes.

The culprit revealed

The final, long-term solution involved going back to the (now very expensive) drawing board. The electrical feeder had to be completely torn down, redesigned and rerouted away from the stage area.

But this now very expensive problem could have been easily avoided. Had it been performed at the initial design stage, computerized magnetic field modelling would have easily identified this as a problem area.

In any event, the theatre has been back in business for several years with absolutely no power hum issues. All performance dates are 100% booked up.

Unfortunately for me, my stage debut was cut way too short to be any real threat to Bryan Adams. **EB**

A regular contributor to Electrical Business Magazine, Patrick J. Lynch, P.Eng., has been the president of Power Line Systems Engineering Inc. (www.powerlinesystems.ca) since 1986. He graduated Electrical Engineering from the University of Waterloo in 1975, and has successfully directed Power Line's completion of over 1100 complex electrical engineering site disturbance investigations around the globe. As with his other articles, this piece summarizes a serious, complex and expensive electrical system deficiency in a lighter narrative tone. Confidentiality is paramount, and all of these investigations have been resolved and settled before being presented here anonymously.

"Had it been performed at the initial design stage, computerized magnetic field modelling would have easily identified this as a problem area."



Bruce Diplock (right) helps Jim Milne try out new whipped cream headgear during the Power2Feed Pie Challenge of 2015.

PHOTO A. CAPKUN.

The world has lost a real character... it is with sadness we report the passing of **Bruce Diplock**—former president of **Dixon Electric**. He was 66. Bruce passed away peacefully, July 22, at Health Sciences North after a short battle with cancer. Bruce is survived by his wife of 44 years, Lorraine (née Flear) and his children Jessica Diplock (Gord Turner), Bradley (Lisa) and Jonathon, plus grandpa to grandchildren Joshua, Kate, Lucas and Alicia. Donations may be made to the Northern Cancer Foundation. Visit ncfsudbury.com.



After 31 years with **Elec-Tech Sales** (Richmond, B.C.)—and the last 20 years as its president—**John Baron** announced he would retire at the end of August (last month). John's career in the industry spans over 37 years, reports Elec-Tech. His journey started after graduating from the

University of Manitoba when he joined Sylvania Lighting in a sales & marketing role in Calgary and Edmonton. He joined Elec-Tech in 1986, eventually becoming president in 1997. He also contributed his time and skills to industry associations, including **Illuminating Engineering Society (IES) BC Section**, **Canadian Electrical Manufacturers Representatives Association (CEMRA)** and **BC Electrical Association (BCEA)**.

Liteline (liteline.com) is expanding its team to increase sales & marketing efforts. **Salyna Nguyen** joins the company as channel marketing manager, Commercial & Industrial. Also, **Shauna MacGowan** is taking on a new role as regional sales manager, Northeast U.S., working with **Sarah Silverstein** to support the company's agent network.



Stéphane Larocque, national sales manager, **Ouellet Canada**—a manufacturer and marketer of electric heating products—announced the appointment of **Chris Kennedy** (top left) as a sales rep for British Columbia, sharing his territory with **Doug Crone**. Meantime, **Vincent Tremblay** (bottom left) has been appointed sales rep for the provinces of New Brunswick and Prince Edward Island. The remainder of the Atlantic Provinces will be covered by **William Healey** (ouellet.com).



Pilz Canada—a player in safety automation—has appointed **Manufacturers Automation Inc.** (St. Jacobs) as its new distribution partner for Southwestern Ontario. "At Pilz Canada, we continue to follow our ambitious growth plan for this and upcoming years," said **Andreas Sobotta**, CEO & general manager. **EB**

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4010AST or 404010AST	AC90 .460 to .505 ACG90 .450 to .550	.405 to .610	.405 to .580	3/8" Flex	14/2 to 10/3
5010AST or 505010AST	.550 to .850 .650 to .850	.590 to .920	.610 to .780 .590 to .820	1/2" Flex	10/3 to 8/3

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Arlington

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8413	1-1/4"	1.000 1.460	.870 1.370	2-3, 2-4, 1-3, 1-4, 1/0-3, 1/0-4, 2/0-3, 2/0-4, 3/0-3
8414	1-1/2"	1.360 1.770	1.250 1.590	2/0-4, 3/0-3, 3/0-4, 4/0-3, 4/0-4, 250-3, 250-4
8415	2"	1.700 2.200	1.550 2.050	250-4, 300-4, 350-3, 350-4, 500-3
8416	2-1/2"	2.100 2.700	1.950 2.400	500-3, 500-4, 600-3, 600-4, 750-3
8417	3"	2.500 3.300	2.350 3.000	600-4, 750-3, 750-4

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* Examples of 3- and 4-conductor cables accommodated.



CHOOSE THE RIGHT UPS & ACCESSORIES TO AVOID DOWNTIME DISASTERS

ED SPEARS

A well-built power protection solution with highly efficient uninterruptible power system (UPS) hardware helps keep business applications available, power costs manageable and important data safe. By becoming familiar with the basics of a UPS and how to choose the right one, facilities operators and IT staff can ensure mission-critical systems always have the clean, reliable electricity they need to drive long-term success.

Choosing the right UPS

A UPS is the central component of any well-designed power protection architecture. So, how do you choose the right one to fit your specific ap-

plication? There are some key areas to consider that can help guide you in selecting the right UPS and accessories.

3

Main kinds of redundant UPS architectures: zone, serial and parallel.

TOPOLOGY

The first consideration is whether you should get a single-conversion, double-conversion or multi-mode UPS. The answer depends largely on the importance of energy efficiency to your organization relative to protection.

Single-conversion UPSs are more efficient than double-conversion devices, but offer less protection. That makes them a good fit for loads with a higher tolerance for power anomalies, or where the incoming power is more stable. More specifically, standby UPSs are generally the best

option for smaller applications, like desktop and point-of-sale solutions. *Line-interactive* UPSs are typically preferable for smaller server, storage and network applications located in facilities with access to relatively trouble-free AC utility power.

Double-conversion UPSs, which provide the highest levels of isolation from the utility AC source, are less efficient but are usually the standard choice for protecting mission-critical systems. They are also the most preferred topology in electrically poor environments, such as industrial applications and areas where severe weather is common.

While they may be more expensive than either single- or double-conversion systems, *multi-mode* UPSs are the best choice for companies looking to achieve an optimal blend of both efficiency and protection.

POWER RATING

A UPS's power rating is the amount of load—in volt-amperes (VA) or watts (W)—that it is designed to support. UPSs are available with ratings as low as 300 VA and as high as 5,000,000 VA (and even higher). Use this basic procedure to approximate the UPS rating your organization requires:

- List all the equipment your UPS will protect.
- From the list, determine how many volts and amps each device draws.
- For each device, multiply volts by amps to arrive at a VA figure.
- Add all the VA figures together and you have a decent approximation. Note: it is good practice to multiply that sum by 1.2 to accommodate for growth.

The UPS you buy should have a rating equal to or greater than the final number you arrived at, unless you have more precise load data for the equipment you are protecting. Here are a few additional considerations to keep in mind:

- When deploying a centralized power protection architecture, you typically deploy larger kVA UPSs than you would deploy using a distributed power protection scheme.

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- When your UPS is supporting motors, variable-speed drives, medical imaging devices or laser printers, add more VA capacity to your requirements to account for the high power inrush that occurs when those devices start-up. Your UPS vendor can assist in applying the proper UPS and rating for these types of applications.
- Companies that anticipate rapid near- or medium-term growth should use a multiple higher than 1.2 when building in room for growth in the procedure above. Organizations that expect to upgrade server hardware soon should also accommodate for more growth, as newer servers tend to have higher power requirements than older models.

AVAILABILITY

Organizations can utilize a variety of deployment options, technologies and services to increase the reliability of their power protection solution. The most effective techniques revolve around redundant deployment architectures, whereby UPSs are deployed in redundant groups to increase availability by ensuring critical loads remain protected should one or more UPS fail.

There are three main kinds of redundant UPS architectures:

- **Zone:** In a zone architecture, one or more UPS provide dedicated support for a specific set of data centre resources. That way, should a UPS fail during a power outage, the impact is limited to the zone that device supports.
- **Serial:** In a serial architecture, multiple UPSs are connected end to end such that, should any one UPS in the string fail, the others can compensate automatically.
- **Parallel:** Parallel and dual-bus architectures use multiple, independent parallel-connected UPSs to achieve increased redundancy. Should any UPS fail completely, the other systems can keep protected IT equipment loads operational.

FORM FACTOR

UPSs come in a range of form factors that fit into two master categories: rack-mounted and freestanding.

“A UPS’s power rating is the amount of load—in volt-amperes (VA) or watts (W)—that it is designed to support.”

“When an administrator can track data like battery date codes and service history, they can provide efficient planning and analysis.”

The largest UPSs aren’t available in rack-mounted form factors, so companies with substantial power requirements will use freestanding devices. For companies with more modest needs, deciding between rack-mounted and freestanding is largely a matter of data centre design philosophy.

Some organizations use rack-mounted UPSs in an effort to consolidate as much hardware as possible in their enclosures. Others prefer to maximize the amount of rack space available for servers by using freestanding UPSs. From a technical and financial standpoint, neither approach is inherently superior to the other.

BATTERY RUNTIMES AND MAINTENANCE

A typical UPS battery provides five to 15 minutes of backup power. Organizations that need more can use supplemental external battery modules or cabinets to add as much as several hours of emergency runtime at full load.

The battery is one of the most important parts of a UPS platform, which typically serves as the energy storage system. Most power protection solutions get their emergency standby power from either sealed batteries (a.k.a. valve-regulated lead acid [VRLA] batteries) or flooded batteries (a.k.a. vented lead acid [VLA] batteries).

Sealed batteries tend to be less expensive, but also wear out sooner. Flooded batteries generally require specialized installation and maintenance. New on the scene are lithium-ion batteries, which save floor space and weight, while offering a longer service life. They can also be instrumental in pioneering UPS applications like grid sharing and peak shaving, which were not viable with older technologies. Deciding which kind of battery is right for you basically comes down to whether you’re willing to pay more upfront for batteries that you won’t have to replace as often.

Many UPS systems continually *float-charge* the battery, which has a tendency to degrade the battery’s internal chemical composition over time, reducing battery service life. While large banks of flooded electrolyte batteries for high-power

(>500kVA) UPS systems need to have the battery float charged, most non-spillable VRLA batteries used in today’s lower kVA UPSs can benefit from a charging technique where the charger turns off periodically and “rests”. This technique could help increase battery service life by as much as 50% with a three-stage charging process.

TYING IT TOGETHER WITH ADVANCED POWER MONITORING

Next-generation power monitoring services deliver comprehensive asset management capabilities. These solutions provide the capability to track data about a UPS, which includes details such as battery date code, model and type, firmware version, service history, capacitors, and so on.

This kind of information can be extremely useful. When an administrator can track data like battery date codes and service history, they can provide efficient planning and analysis. For example, they may see that a battery is five years old. That means it may be reaching the end of its useful life, and so will need to be replaced soon. The same principles apply for other consumable components in the UPS like fans and capacitors.

Whether it’s a data centre, health-care or other environment where uptime is critical, power protection is an important consideration for today’s facilities. Choosing the right UPS and accessories will help you avoid downtime disasters. With the deployment of a strategic UPS platform backed by advanced power monitoring software, you can rest easy knowing that systems are up and running, and critical data is protected. **EB**

Ed Spears is a product marketing manager in Eaton’s Critical Power Solutions Division in Raleigh, N.C. A 37-year veteran of the power systems industry, Ed has experience in UPS systems testing, sales, applications engineering and training—as well as working in power-quality engineering and marketing for telecom, data centre, cable television and broadband public networks.

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LEVEL UP

ANDREW HOUSTON

What separates you from your competition?

No contractor has zero competition. With the evolution of the internet and social media, your prospects can find other contractors that do exactly what you do faster and easier than ever. So how do you win jobs over your competitors?

To do this, you need to understand some core marketing principles:

1. All businesses have one goal: create fan clients.
2. All customers have one want: receive the best value.

Your marketing needs to do one thing: articulate why *you* provide

the best value, thereby creating fan clients.

The majority of the marketing I see from contractors employs *black hole* words, such as “cheapest”, “professional”, “quality service”, “speedy”, “convenient” and “best”. These words *do not* separate you from the competition: they only amplify the fact you’re the same as every other contractor in town!

When you and your competition all promise to be the “best, most professional, speedy contractor” in town, the only thing that will separate you is

“The idea is for the prospect to be *Wowed* enough to make the decision to work with you on the spot.”

price—and that’s never a good strategy.

Take a moment to think about your current marketing channels (e.g. Yellow Pages, website, printed mailers, etc.), and ask yourself whether the message you’re sending is:

- a) Generic
- b) Unique

If you chose “A”, then definitely keep reading. If “B”, keep reading to make your marketing even better.

Unique proposition

For your marketing to articulate why you are the best value, you

must define your Unique Selling Proposition (USP), which is a set of clear and distinct benefits that set your business apart from the competition. The steps for creating your own USP are:

1. Define your niche (your target clientele). To whom can you provide the most benefit? Which of your clients are the most profitable?
2. Define your niche’s fears, frustrations, wants and aspirations. Ask some of your past and current Grade A clients about theirs.
3. List the benefits. Make a list of everything that sets you apart from your

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LEVEL UP

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competition. What are you particularly good at? What makes your customers buy from you? What are you known for? Do you have any additional credentials that support you?

Some of my clients have doubled their conversion rates and profits by sharing a simple document with their prospects called “How to Choose a Contractor Checklist”, which is customized to build trust and articulate your unique benefits. The idea is for the prospect to be *Wowed* enough to make the decision to work with you on the spot.

Prospects may still wish to meet other contractors before making a decision; however, they will rely on *your* checklist for sizing up the competition.

You can add the checklist to your sales collateral e.g. client binder or marketing package,

alongside guarantees, before and after photos, and testimonials.

And guess which contractor is the only one who can meet all the criteria on the checklist? That’s right, you!

The prospect will do the heavy lifting for you by *de-selecting* your competition.

When you employ the checklist, you establish yourself as unique, and an authority on the work. You educate the prospect while articulating your benefits. Your conversion rate will improve, your crew will be kept busier, and you will be more consistent across your marketing channels. You’ll be able to expand your business faster while maximizing profits.

“These words do not separate you from the competition: they only amplify the fact you’re the same as every other contractor in town!”

Grab your copy of the “How to Choose a Contractor Checklist” at tinyurl.com/gS7d4jx. Meantime, I’ll be covering this topic and the checklist in the upcoming EBMag webinar “How to Become the Obvious Choice in a Competitive Market” on September 12 at 2 pm EST. During this training session, you’ll learn:

- 4 easy principles for creating a winning marketing plan.
- How to increase your bid-to-win ratio by 25%.
- How to personalize a marketing budget that works for your company.
- How to create a board showing you the best times for dialling up or down your marketing.

Visit EBMag.com/webinars to Register. While you’re there, check out our previous webinars, which are part of our 4-part series “Blueprint to Profits, Systems & Time”. **EB**

Andrew Houston is the owner and founder of Profit for Contractors. He has been consulting to trades business owners for nearly a decade, helping them improve their business skills so they can achieve their personal and business goals. A graduate of George Brown College, Andrew achieved Industrial Controls Licensed Electrician as well as Electronics Engineering Technologist. Visit www.profitforcontractors.com or call 613-209-3828.

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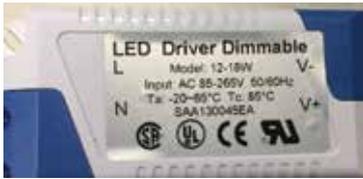
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19 product additions in Arani's Spring 2017 catalogue

Montreal-based lighting supplier Arani launched 19 new products (41 new SKUs) with its Spring Catalogue 2017. "[By] expanding our product offerings, we help our clients consolidate their transactions and worry less about managing multiple suppliers," said Sean Arani. The product additions include: high-lumen LED floodlights, LED disc high-bay, Altum LED linear lighting, LED filament lamps (ST19 and G25), LED PAR30 short-neck and specialty lamps (G4 and G9). arani.ca

WARNING: Counterfeit UL Marks on LED driver



UL has identified an LED driver—which may have been sold separately or packaged with an LED light kit—bearing a counterfeit UL Mark. This driver has not been evaluated by UL to the appropriate standards for safety. As such, it is unknown whether it complies with any safety requirements. The product is marked with a counterfeit UL Listing and Recognition Marks, plus the following:

LED Driver Dimmable
Model: 12-18W
Input: AC 85-265V 50/60 Hz
Ta: -20~65°C Tc: 85°C
SAA130045EA

The driver is known to be distributed by Smart Energy Solution Norcross LLC (Norcross, Ga.).

Decora boasts Bluetooth dimmers and fan control

Leviton has added three new devices—an electronic low-voltage dimmer, a 0-10V LED/Mark 7 fluorescent dimmer and a quiet fan speed control—to its existing line of



Decora digital controls with Bluetooth. These devices work without a hub, gateway or internet connection; users just pair the device with the Leviton Decora digital dimmer & timer app, and use onscreen menu options to control lights or fan speed with Apple or Android smartphones or tablets within a 30-ft range.

leviton.com

Added sizes for Hammond Eclipse family

Hammond Manufacturing says its Eclipse family of wallmount enclosures promises to meet the needs and size variability of IoT and Industry 4.0 installations. Ranging in size from 12 x 10 x 6 in. up to 72 x 30 x 24 in., the painted mild-steel family has now been extended to offer 100+ different size options, offered in ANSI61 Gray and RAL7035 colours.

hammfg.com

Rockwell PowerFlex 755T drives



Rockwell Automation says its Allen-Bradley PowerFlex 755T drives will help users reduce energy costs and increase machine uptime. The drives provide harmonic mitigation, regeneration and common bus system configurations. They also mark the introduction of "TotalForce" technology from Rockwell.

rockwellautomation.com

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TACKLE THE CODE CONUNDRUM IF YOU DARE!

Answers to this month's questions in October's Electrical Business.

Compiled by Ray Yousef, code engineer

Ontario's Electrical Safety Authority • esasafe.com

QUESTION 1

When a two-conductor NMS cable is used for a switch loop, and the connections are made so that the black wire is the return conductor from the switch to the outlet, does the CE Code require you to tape the white wire with black tape at the switch?

- a) Yes b) No

QUESTION 2

What is the minimum distance for spacing between supports for electrical non-metallic tubing?

- a) 300 mm b) 600 mm c) 1.0 m d) 1.5 m

QUESTION 3

The CE Code does not allow Class 2 circuits to be installed underground.

- a) True b) False

ANSWERS Electrical Business, July-August 2017

Question 1

The ampacity of the supply conductors from a small turbine system shall not be less than _____ of the generator's maximum current rating.

- a) **125%**. Rule 64-304.

Question 2

The ampacity of the feeder supplying a total of 60 kW of heating equipment in an apartment building, from a 208V, 3-phase switchboard is:

- a) **132A**. Ref. Rule 62-118(3)

Question 3

T-slot (5-20R) receptacles installed at a commercial building and exposed to the weather are required to be provided with wet location cover plates, regardless of whether a plug is inserted into the receptacle or marked "Extra Duty".

- a) **True**. Rule 26-702(2).

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CODE file

DAVID PILON

Section 62 “Fixed electric heating systems”

In addition to a number of changes in 2012, CE Code Section 62 “Fixed electric heating systems” underwent a fairly substantial rewrite in 2015. So what’s changed?

The first thing of note is the title was changed to encompass more fixed electric heating systems. This eliminates anything portable (which involves an approval agency label) and allows for the inclusion of new technology as it evolves without having to be specifically identified.

Next is the addition of Rule 62-112, which deals with the temperature of adjacent combustible materials. After all, who hasn’t seen a hotel bathroom door with charred or peeling paint due to being left partially open under a heat lamp? This situation was partially addressed by Rule 62-118 which required a timer for the lamp, but the new Rule requires the relocation of either the fixture or the door.

Ground fault protection has been required for a couple of code cycles; however, ground fault requirements were taken out of the individual clauses in the 2015 code and put into one Rule (62-116) with two exemptions:

The first is for industrial establishments with maintenance and supervision provided by qualified persons servicing the installation to use ground fault detection. The second is for heating cable and panel sets connected to an ungrounded Class 1 extra-low-voltage power circuit supplied from the sec-

“I always hated installing heat trace and heaters when it was minus 35 and customers were looking over my shoulder because their lines were freezing up.”

ondary of an isolating transformer, supplied by not more than 150V-to-ground.

The next new addition to Section 62 was the creation of Table 67 “Clearance requirements of installed heating systems”. While the rules and clearances existed in the previous code, they were cumbersome to read and, at times, difficult to understand. In conjunction with Diagrams B62-1 to B62-5, Table 67 clarifies what those rules mean, and how different types of heating fixtures are to be installed.

Appendix B also provides a table based on the proposed maximum temperatures table for CSA C22.2 No.130 (which forms the basis for the creation of Table 67). This table provides guidance on the maximum temperatures of the different materials, and lists the sources for this information.

New Rule 62-314 was created to cover requirements for skin effect heat tracing—a new method of surface heating using a ferromagnetic envelope (heat tube) that produces heat through the I²R losses of return current. This is why the conductor does not meet Table 19 or 4-004 rules for conductor sizing, as these losses are part of the approved functionality of the equipment.

It is important to note the heat tube will often be approved

separately from the isolation transformer and control equipment feeding it. Each are manufactured for a specific job and may require special coatings for corrosion or other forms of protection depending on the location. Appendix B and Diagram B62-6 go into what to look for when installing a skin effect heating system.

Lastly, bare element water heaters, infrared drying lamps, storage tank water heaters and induction and dielectric heating equipment were taken out of Section 26 and dropped into Section 62. This resulted in a 4th section, “Other heating systems”, which brings together heating cables and panels within pipes and ducts, as well as pipeline impedance heating rules (pipeline resistance heating).

Now, nowhere in the code does it say heating equipment should be installed during the summer and fall, but it’s sure nice to have it in place when the cold snap hits! I always hated installing heat trace and heaters when it was minus 35

and customers were looking over my shoulder because their lines were freezing up, so now is the time to get those systems installed, tested and working. **EB**

“After all, who hasn’t seen a hotel bathroom door with charred or peeling paint due to being left partially open under a heat lamp?”

Always consult your AHJ for more specific interpretations.

David Pilon has been an electrical inspector with SaskPower since 2000, and is currently the vice-chair of the Canadian Certified Electrical Inspector (CCEI) committee of the International Association of Electrical Inspectors (IAEI), Canadian Section. David can be reached at dpilon@saskpower.com.

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Int’l Association of Electrical Inspectors
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CANEW

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EB AD North American Meeting

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ECABC 65th AGM

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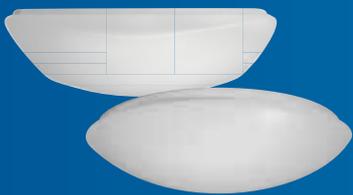
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Round and square
2 700, 3 000, 4 000 K



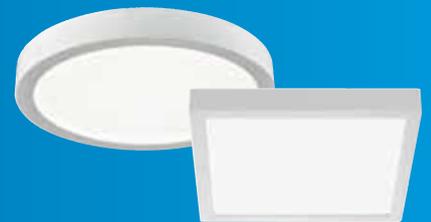
Brushed Nickel

6" to 14"
3 000 and 4 000 K



Double ring

12", 14" and 16"
3 000 and 4 000 K



Edge-Lit

6", 8" and 12"
Round and square
3 000 and 4 000 K

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BRIGHTER
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A portion of 2017 sales proceeds
for LED ceiling luminaires
will be donated to
Habitat for Humanity Canada

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