

THE INSPECTOR

Newsletter for the Members of the EIA of BC



Separation of Wiring: Facts and Fiction?

by Ark Tsisserev P.Eng.

Let's say a designer decided to utilize optical fiber cables for control of lighting circuits or to amalgamate wiring connecting the fire alarm field devices with wiring supplying the components of a security system.

Is such integration of wiring allowed by the Canadian Electrical Code?

And what about use of a nurse call panel in a hospital as a means for announcement of a patient's room (sleeping room) smoke detector mandated by the National Building Code of Canada (NBCC)?

And how about installing conductors of communication/IT system in a raceway occupied by power circuit conductors?

And is there a problem in pulling conductors that are connected to different distribution transformers or to different generators – in the same raceway and in the same enclosure?

And let's try to review whether a wiring to the corridor lighting could be installed in the same raceway as wiring to the exit signs located at the exit doors in this corridor?

So far – the answer is a bit ambiguous – as it depends on specific details of each particular installation.

So, let's evaluate the examples mentioned above in conjunction with provisions of the CE Code on this subject.

Perhaps, at the outset of this review we should emphasize the reasons for the Code provisions on this issue. As the Code's main objective is to provide such electrical installation requirements that would safeguard users against electric shock and fire hazard, then prescriptive rules of the Code on this matter must certainly reflect this safety objective. In addition to this main goal, the objective of the CE Code is to ascertain performance of the electrically connected life safety systems that are mandated by the NBCC. This additional objective is met by complying with the CE Code's very specific criteria for installation (including separation) of conductors comprising life safety systems.

Now is a good time to look at some of our examples.

Let's start with optical fiber cables. Section 56 of the CE Code covers installation of non-conductive, conductive and hybrid optical fiber cables. Rule 56-200 states that non-conductive optical fiber cables cannot occupy the raceway or enclosure (cabinet, panel, box, etc.) that is occupied by conductors of electric light, power or Class 1 circuits, unless:

- (a) the number and size of non-conductive optical fiber cables and other types of electrical conductors installed in the raceway or enclosure meet the applicable requirements of the Code for wiring methods of electrical conductors, and these non-conductive optical fiber cables are functionally associated with conductors comprising the electric power, lighting or Class 1 circuit, and each such circuit does not exceed 750 V; or
- (b) such installation is done in an industrial establishment where condi-

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tions of maintenance and supervision ensure that only qualified personnel service all components of such installation.

Conductive optical fiber cables are allowed by the CE Code to be installed in the same raceway, box or cabinet that is used by conductors of communication circuits, conductors of community antenna circuits or by conductors supplying Class 2 circuits. But under no circumstances are conductive optical fiber conductors allowed to be installed in a raceway, box or a compartment that is already occupied by the conductors connected to Class 1, electric lighting or power circuits. However, if hybrid cables are utilized, then there is no separation mandated by the CE Code between optical fibers and other conductors used for connection of electric light, power or Class 1 circuit.

In this case, a single hybrid cable could be used, provided that:

- (a) voltage of the cable insulation does not exceed 750 V and the functions between the optical fibers and electrical conductors supplying electric light, power or Class 1 circuits are integrally associated; or
- (b) functions of optical fibers and electrical conductors are associated.

If we are interested in evaluating separation requirements between conductors supplying community antenna distribution and TV network, and conductors connected to electric lighting, power or Class 1 circuits, Rule 54-400 of the CE Code covers these provisions for installations in buildings. These separation requirements range from 500 mm to 3 m, and the criteria for such minimum clearances are based on the voltage levels at which electric lighting, power or Class 1 circuits operate. Although Rule 54-400 always requires separation

between conductors connected to the community antenna distribution and conductors supplying electric light, power or Class 1 circuits, such separation may be waived if the power or Class 1 circuit conductors are placed in a raceway, box or compartment for the sole purpose of supplying power to a community antenna distribution circuit. Section 60 of the CE Code (that covers installation of communication circuits) also mandates separation of communication conductors from conductors connected to other circuits (power, electric light, Class 1), and these clearance requirements between conductors of these different circuits (and relaxation of such clearances) are similar to the provisions of Sec-

tion 56.

Conductors supplying Class 2 circuits (control, security circuits wiring, etc.) are also required to be separated from conductors of other systems and circuits. Such separation requirements are stipulated by Rule 16-212 of the Code. This Rule, however, relaxes the separation requirements between Class 2 circuit conductors and conductors of power or Class 1 circuits if these power circuit conductors are installed in the same raceway, box or compartment as class 2 conductors and the following conditions are met:

- (a) Class 2 circuit conductors are insulated for the maximum voltage level of the conductors located in the raceway, box or compartment; and
- (b) conductors of the power circuit are located in the enclosure (raceway, box, compartment) for the sole purpose of supplying power to the Class 2 circuit.

In addition to the specific separation requirements between conductors of particular systems or circuits (Class 2, control, communication, community antenna distribution, etc.) and conductors of power, electric lighting and Class 1 circuits, Rules 12-904 and 12-3030 provide generic requirements for separation between any conductors that are connected to different power sources (different transformers, generators, batteries, etc.), where Rule 12-904 articulates such separation requirements between conductors in raceways, and Rule 12-3030 establishes such separation criteria for various conductors pulled in cabinets, boxes or compartments. If conductors of different power sources are run underground (direct buried or in raceways), particular Rules of Sections 16, 54, 56 or 60 establish minimum clearances requirements between these conductors.

It should be noted that CSA standard C22.3 No. 7 “Underground Systems” must be also used in conjunction with the applicable CE Code rules for underground clearances.

The Code users should be aware that certain conductors (supplying such life safety equipment as fire pumps, elevators, smoke control and smoke venting fans, etc.) may not only require a physical separation from other conductors, but outright protection against exposure to fire for a period not less than 1 hour. Except for Rule 32-200(b) for fire pumps, this latter requirement is contained in the NBCC. So, as we’re aware of the Code separation criteria be-

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tween various conductors we can review the questions posed at the outset of this article.

Thus, we can with full certainty decide that a hybrid cable consisting of electric lighting circuits conductors and optical fiber circuit could be installed in the same raceway or cabinet provided that the functions of these conductors are associated by application.

And what about amalgamating wiring for a security system with the wiring for a fire alarm system?

The answer could be found in Rule 32-102(3). This Rule strictly mandates that conductors of a fire alarm system must be installed completely separate and independent from all other conductors. Besides, ULC S524 “standard for installation of fire alarm system”, requires that all wiring to the fire alarm devices must be electrically supervised.

Therefore, wiring to the devices of a security alarm system can not be installed in the same raceway, cabinet or box which houses a fire alarm system wiring.

However, if a fire alarm system is designed, constructed, tested and certified as an integrated “fire alarm/security” system, (and the operation of the security component will not compromise operation of the NBCC mandated fire alarm system), the security wiring could be installed as part of the fire alarm system wiring, and all relevant provisions of Section 32 of the CE Code would have to be applied to the wiring of the security alarm system.

Another example of such potential amalgamation is use (or restriction of such use) of a nurse call panel for the purpose of annunciation of an audible and visual signal from a smoke detector located in a sleeping room of a hospital (see Sentence 3.2.4.11(2) of the NBCC).

The nurse call panel could be used for such a purpose if the audible and visible signal from each smoke detector located in the sleeping room functions only as a fire alarm ancillary device, (i.e. wiring to this visible and audible signal would not have to be electrically supervised as part of the fire alarm system electrical supervision that is required by the ULC S524). This could be done only:

- (a) if the wiring to such visual and audible signal at the nurse panel is installed in addition to the independent wiring to such device (which is already being installed) as an integral required component of the fire alarm system; or
- (b) a nurse call panel (that contains the NBCC required audible and visual signal) is specifi-

cally designed, constructed and certified as a remote fire alarm system annunciator conforming to the standard ULC S527.

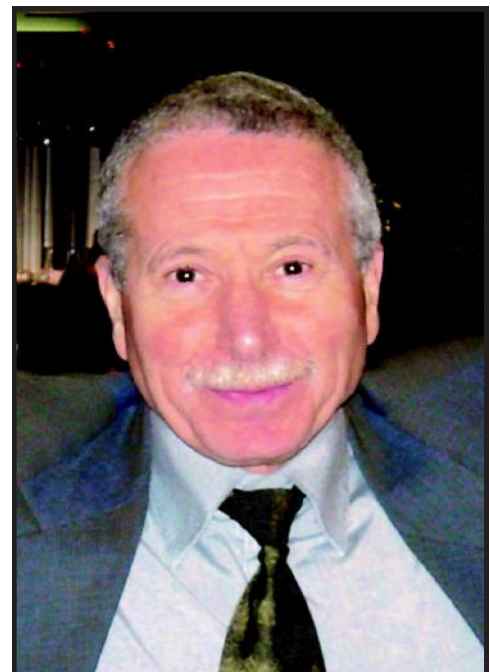
And of course, the CE Code has an answer for wiring conductors of exit signs to the circuit that feeds emergency lighting in the area where such exit signs are located.

Although Rule 46-400(1) mandates a separate electrical circuit for exit signs, Subrule (2) allows connection of exit signs located in a corridor to be fed from the circuit that supplies emergency lighting in that particular corridor.

Of course, there are numerous unique cases where the Code requirements should be analyzed in detail for the purpose of separation of wiring. But the most important is our understanding and confidence that the Code, indeed, provides necessary guidance on this important subject.

And as usual, the respective AHJ’s should be consulted on the specifics of each particular installation where separation of conductors might be perceived as a design and installation challenge.

Ark is one of the principals of Stantec which is a multi-discipline consulting company which provides professional services throughout Canada and USA. Ark is a registered professional engineer with a master's degree in Electrical Engineering. He is currently the Chair of the Technical Committee for the Canadian Electrical Code and is representing the CE Code Committee on the CMP-1 of the National Electrical Code.





ENFORCING A LEVEL PLAYING FIELD

Safety Authority takes 30 enforcement actions in electrical

A total of 30 enforcement actions were issued by the BC Safety Authority (BCSA) against contractors, equipment owners and others using regulated products and doing work in the electrical technology during the second quarter of 2010.

Enforcement actions are part of an effort by the Safety Authority to promote compliance with safety standards and legislation. Of the 30 enforcement actions issued in the electrical technology, 28 were compliance orders and two were monetary penalties.

A compliance order is most commonly issued to require a person to either take action, stop, and/or modify their regulated work or use of a regulated product because it doesn't meet code or otherwise contravenes the legislation.

The provincial electrical safety manager issued two monetary penalties of \$750 each. One penalty was issued to an individual who failed to comply with the requirements of a compliance order - the individual had performed regulated work without the required licence or permit in accordance with the *Safety Standards Act*.

The other monetary penalty was issued to Creative Door Services Ltd, an electrical contractor, for performing regulated work outside the scope of their licence and for directing their employees to perform regulated work without the required qualifications.

A total of 69 enforcement actions* were issued in Q2 by the BCSA. Of these, 63 were compliance orders and five were monetary penalties. Across all seven BCSA-regulated technologies 133 enforcement actions were taken in the first half of 2010.

Quarterly statistics on enforcement actions are published on the Safety Authority's website at: www.safetyauthority.ca/enforcement.

*In order to understand enforcement actions in the broader perspective of BC's safety system, please refer to the State of Safety Report which can be accessed through the BCSA website at www.safetyauthority.ca/about/publications.

The Safety Authority keeps people safe. As the Province's delegated authority, BCSA mandates the safe installation and use of technical equipment. It is a not-for-profit that administers safety standards through education, and through issuing permits and licences. BCSA also enforces compliance to standards to ensure consistency and fairness, and conducts onsite inspections – particularly in high-risk situations. The BC Safety Authority continuously researches trends to advance the standard of safe practices in BC.

For more information visit the BCSA web site at www.safetyauthority.ca

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Note: Provincial privacy legislation restricts the information that may be published with respect to individuals. Accordingly, the BC Safety Authority may provide descriptions of enforcement actions taken against individuals but will only identify corporate entities by name.

Review of the Change to the 2009 Canadian Electrical Code

by Ted Simmons

This is the seventh article in a series reviewing the changes to the 2009 Canadian Electrical Code. This article will focus on the changes regarding **Sections 26 to 32**.

Section 26

Rule 26-260 – Transformer continuous load

As noted in a previous article this rule was added to indicate that the maximum circuit loading requirements outlined in **Rule 8-104(4) and (5)** must be taken into account when selecting transformer overcurrent protection and conductor ampacities in accordance with **Rules 26-252 to 26-258**. The intent of this requirement is to ensure the load connected to the secondary of a transformer does not exceed the ampere rating of the transformer circuit which as noted in **Rule 8-104(1)** shall be the ampere rating of the overcurrent device protecting the circuit or the ampacity of the conductors, whichever is less.

It is essential to recognize when applying the maximum circuit loading requirements as outlined in **Rule 8-104** to transformer circuits, it is not the rating of the transformer that is in question, but instead the actual load that is connected to the secondary of the transformer.

Receptacles

Rule 26-700 – General

Subrule (2) has been revised to require receptacles having configurations in accordance with Diagrams 1 and 2 are connected only to circuits having a nominal system voltage and ampere rating corresponding to the rating of the configuration. The intent of this requirement is to ensure the ampere rating of the branch circuit conduc-

tors and overcurrent protection correspond with the rating of the receptacle configuration.

In other words, a 5-20R receptacle would not be permitted on a 15 amp branch circuit.

Subrule (11) was revised to reflect the change in designation for the 5-20R receptacle configuration identified in Diagram 1. In the previous Code the 5-20R (T-slot) configuration was designated as a 5-20RA (or alternate). However, due to decreasing production and availability the former 5-20R receptacles have now been designated as the “Alternate” or configuration 5-20RA. This change was also applied to the former 6-20R and 6-20RA configurations.

Receptacles for residential occupancies

Rule 26-710 – General

In the previous Code there was no provision for a receptacle outlet to be installed in a cabinet or a cupboard to supply a cord connected hood fan or cord connected combination microwave/hood fan. In order to address this situation, **Items (IV) and (V)** have been added to **Subrule (h)** to permit the installation of a receptacle in a cabinet or cupboard to supply the aforementioned appliances.

Rule 26-712 – Receptacles for dwelling units

In order to increase the level of safety for young children, **subrule (g)** was added and requires that all receptacles of CSA configuration 5-15R and 5-20R shall be tamper resistant and be so marked. The only exceptions to this requirement are identified in **Subrule (h)** which indicates that receptacles dedicated for microwaves, refrigerators, freezers, kitchen counters, or those receptacles located in an attic or a crawl space, shall not be required to be tamper resistant. The new require-

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ments for tamper resistant receptacles and information pertaining to their operation, was covered in detail in the January/February 2009 edition of the Electrical Line.

Since the introduction of this requirement there have been numerous questions as to whether the receptacles installed in a garage or a carport of a single dwelling are required to be tamper resistant. The answer to this question is indeed yes and can be found in the introductory sentence for **Rule 26-712** which states: “This Rule applies to receptacles for dwelling units (including single dwellings). Essentially this statement indicates that all of the requirements outlined in **Rule 26-712** also apply to the receptacles for single dwellings which, as noted in **Rule 26-714(b)**, pertain to receptacles installed in a garage or carport of a single dwelling.”

Section 28 - Motors and generators

Rule 28-204 – Feeder overcurrent protection

When performing calculations to determine the rating or setting permitted for the feeder overcurrent device for a group of motors, questions often arise as to whether to use the actual rating or setting of the overcurrent device for the motor that is permitted the highest rated overcurrent device, or to use the calculated value of the overcurrent device for the motor that is permitted the highest rated overcurrent device. **Rule 28-204(1)** has been revised to clearly indicate that the calculated value of the overcurrent device is to be used.

Section 30 – Installation of lighting equipment

Rule 30-000 – Scope

This rule has been revised to indicate that the Scope of Section 30 includes the installation of all lighting equipment regardless of type and location.

Rule 30-002 – Special terminology

The definition for “Landscape lighting system” has been revised to include luminaire assemblies and fittings that provide flood or decorative lighting for gardens, walkways, patio areas or similar outdoor locations, and for specific indoor locations such as atriums or malls.

Rule 30-502 – Luminaires in dwelling units

This rule has been revised to indicate that a luminaire controlled by a wall switch shall be provided in a laundry room.

Rule 30-906 – Luminaires designed for thermal insulation contact

In order to be more specific, the word thermal was added to the title of **Rule 30-906**.

Rule 30-912 – Wiring of recessed fluorescent luminaires

In order to eliminate redundancy, the requirements for recessed fluorescent luminaires installed in a suspended ceiling that creates a plenum have been relocated from **Rule 12-010(4)** in Section 12 to **Rule 30-912** in Section 30.

Rules 30-1004 and **30-1012** have been revised to recognize the use of copper sheathed cables.

Section 32 – Fire alarm systems, fire pumps, and carbon monoxide alarms

The title and scope of Section 32 have been revised to indicate that this section now includes the installation requirements for carbon monoxide alarms.

Rule 32-110 – Installation of smoke alarms and carbon monoxide alarms in dwelling units

This rule has been revised to indicate the existing requirements for smoke alarms will now also apply to carbon monoxide alarms. The notes for **Rule 32-110** located in Appendix “B” have also been revised to reflect this change.

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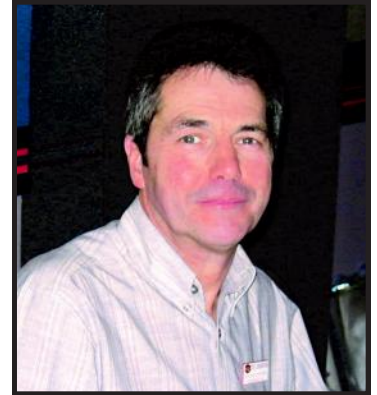
Rule 32-206 – Disconnecting means and over-current protection

The previous **Rule 32-206(1)** required that no device other than “a circuit breaker specifically approved for fire pump service” could be placed between the service box and a fire pump transfer switch or a fire pump controller. Being that a circuit breaker specifically approved for fire pump service is not available, this requirement has been removed from the Code. The requirement to allow only a circuit breaker specifically approved

for fire pump service was also removed from the note located in Appendix “B” for **Rule 32-206**.

More on the changes to the 2009 CEC in future articles.

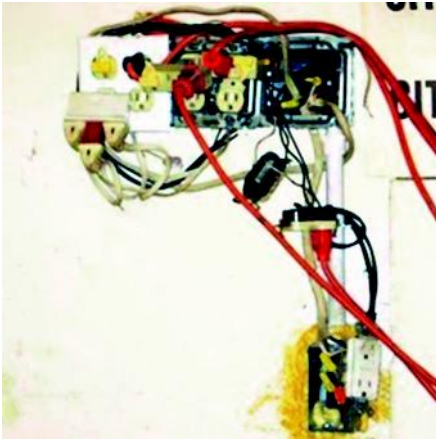
Ted Simmons, is Chief Instructor, Electrical Apprenticeship Program at the British Columbia Institute of Technology, Ted can be reached by e-mail at Ted_Simmons@bcit.ca.



Collage of the September Dinner Meeting

Pictures during Fire Verification Report Presentation

by Frank Kurz



There's arcing? I wonder why



Breakers keep tripping so let's take it out



The down spout can't handle the heavy rain then let's help it



New! sideways elbow



Eventually it will become a concrete wall equipped with weeping holes?



How to install an attic vent fan.....you require the following parts: drywall, sheet metal, fiberglass batt, wire ties, electrical tape, duct tape and nails



The first one couldn't shut off the water so let's put in a second one



If one elbow is good, why not put two in

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How about a 360 degree to an inline trap equipped with a u-trap along the way



What! The trap is there...just turn your head sideways



Leaky drain - out of duct tape, then use electrical tape



Don't need a light switch



Upside down - sideways trap



How about a light in the shower



Why not just buy some shorter nails....



Who's going to work on this.....if there is an electrical or plumbing problem ???



If these can hold you up then why not here?

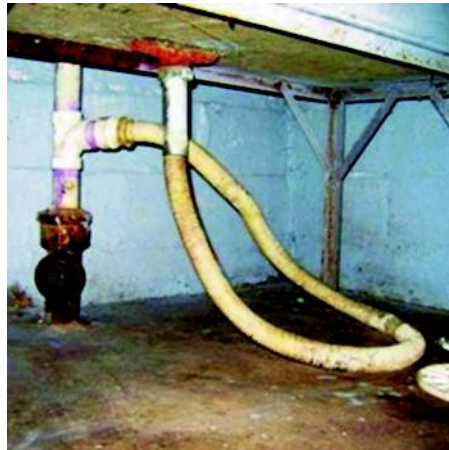
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Off by a few inches, just use a couple pieces of wood to hold up the main joist



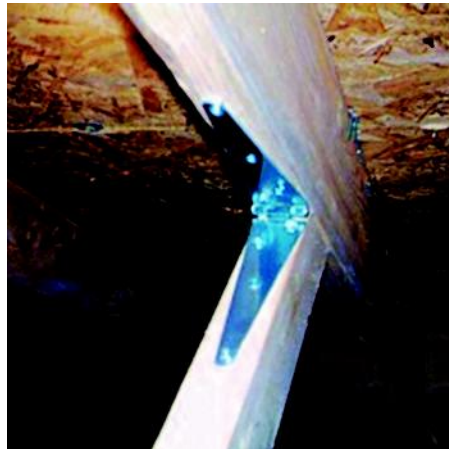
Long flexible elbow?



Missed it by a foot, why not use a bunch of spare electrical boxes?



There's room here...let's put the u-trap here



Adjustable bracket for any angle



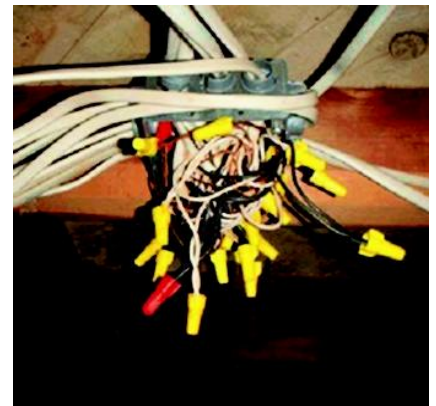
The ceiling was too low by a foot



Can't mount it on the roof....so let's just stick it in the venting pipe



No place to put the sink? Then let's make it a combination sink and shower



I wonder if there is room for one more wire??? NOT

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An extension cord would of been better.



Farmand Ghafari thanking Frank Kurz from The Fire Technicians Network. He provide a very interesting presentation regarding what a proper fire verification report should include and included in the presentation were the pictures he's acquired over his career.



Jack Ball receives his life time membership Certificate from Farmand Ghafari, Vice President of the EIA. The Electrical Inspector's Association membership appreciate all the dedication and hard work provided over the years to the Association, Congratulation Jack and well deserved.

What's New

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EIA of B.C.

Christmas Meeting

Monday, November 29, 2010



Cheers Restaurant

125—East 2nd Street, North Vancouver, B.C.
(just off Lonsdale Avenue)

SOCIAL HOUR: 5:15 — 6:00 p.m.

DINNER: 6:00 — 7:00 p.m.

MEETING: 7:00 — 9:00 p.m.

Dinner: \$30

Santa “Len” Needs Help this year so !!!!!!!!!!! Please help us by either bringing Prizes for the Table to the Meeting, or by sending Cheques to the “EIA” or drop them off if you will not be able to attend. Thank you

Most Important for Reservations: Please Phone Dwayne Askin (778) 396-2050 or Email: Dwayne.Askin@safetyauthority.ca

Membership Application & Renewal Form

- For 1 year (Jan 1, 2011—Dec. 31, 2011) \$ 50.00
- For 2 years (Jan 1, 2011—Dec. 31, 2012) \$ 100.00
- For 3 years (Jan 1, 2011—Dec. 31, 2013) \$ 150.00

- New Membership Name (Please Print) _____
- Address _____
- Renewal City _____ Postal Code _____
- Inspector Company _____ Title _____
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