

## Installation Of Electrically Connected Carbon Monoxide Detectors

April, 2008

By Ark Tsisserev, P.Eng.

The 2005 edition of the National Building Code of Canada (NBCC) has already been adopted by the majority of provincial and territorial jurisdictions. This means that one change that has been introduced into the latest edition of the NBCC could be very interesting (and very relevant) to the electrical designers, installers and electrical safety regulators. This change to the NBCC requires that carbon monoxide alarms must be provided in each suite of residential occupancy where a fuel-burning appliance is installed in that suite.

If a fuel-burning appliance is installed in a service room, and this service room is not located in a suite of residential occupancy, the NBCC mandates installation of a carbon monoxide alarm in every suite of residential occupancy that shares a wall or floor/ceiling assembly with the service room, and in addition – installation of a carbon monoxide alarm in that service room.



2005 in comparison with the earlier editions of the National Building Code now will affect every dwelling unit with a fuel-burning appliance.

While the previous editions of the NBCC mandated carbon monoxide detectors in those

### Inside this issue:

Grounding Basics	2
Continuation of the 2006 CEC Revisions	3
Dave Jackson becomes Life Member	4
Richard Campbell Acknowledged	5
Shaun Hollingsworth becomes Life Member	7
President's Message	9
General Meeting Agenda	10

The NBCC also requires installation of a carbon monoxide alarm in each suite of residential occupancy that shares a wall or floor/ceiling assembly with a storage garage or in a suite of residential occupancy that is adjacent to an attic or crawl space to which that storage garage is also adjacent.

The Building Code identifies the location of a carbon monoxide alarm in the following areas of the residential suite: (a) inside each bedroom, or (b) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.

“So what, and why do we have to be concerned?” may ask the electrically minded readers.

It should be noted that the major change that has been introduced in the NBCC

(Continued on page 4)

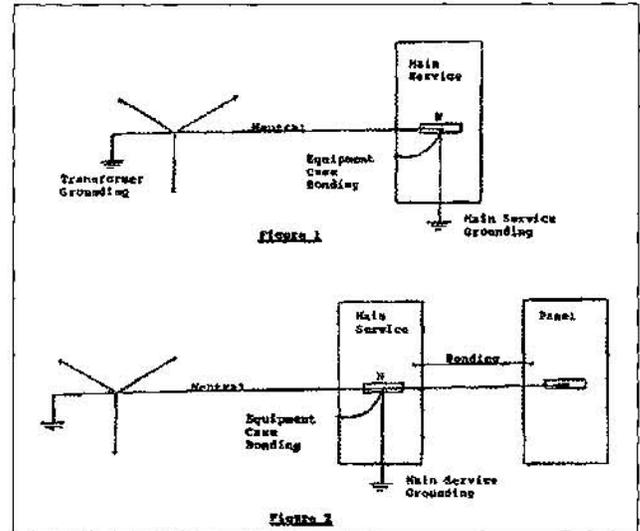
# GROUNDING BASICS

By Les Stoch, P. Eng.

**E**lectrical system grounding is not widely understood, and it may lead to many different discussions, interpretations and a wide variation of philosophies. This article reviews some of the electrical system grounding requirements as spelled out in the Canadian Electrical Code and it throws in a few curve balls to hopefully keep things interesting.

The CEC Rule 10-106 requires that alternating current systems must always be grounded when their voltage-to-ground is 150 volts to ground or less, or when the electrical system has a neutral conductor. In general, this requirement would apply to both 208Y/120-volt and 120/240-volt systems.

Rule 10-204 tells us that neutral connections to ground must be made at the main service equipment and again at the transformer that supplies the utilization voltage. But the rule specifies there must be no neutral connections to ground anywhere in the electrical system past the main service equipment (see figures 1 and 2). If there is bonding between the cases of electrical



Figures 1 and 2.

equipment and the system neutral downstream from the main electrical service, the bonding must be removed.

You might be justified in asking why the CEC prohibits all interconnections between the electrical system neutral and the case of the equipment downstream from the main electrical service. Two good reasons come to mind:

1. an inadvertent parallel return path for load currents is created when the neutral becomes grounded anywhere past its

(Continued on page 6)

## What's New

**You have any technical information or letters to the editor, please email : [info@eiabc.org](mailto:info@eiabc.org)**

# The Continuation of 2006 Electrical Code Revisions

By: Ted Simmons, Chief Instructor, BCIT

This article, the eighth in a series, will complete the review of the revisions to the 2006 CEC Part I. In the previous edition we examined the changes made to Sections 70 to 76. This article will focus on the revisions that have been incorporated into Sections 80 and 84, as well as minor changes to Tables 2, 4 and D3.

## **Section 80 - Cathodic Protection**

### **Rule 80-010 - Operating Voltage**

In order to eliminate shock hazards, this rule has been revised to restrict the voltage difference between any exposed point of the protected system, or any point in the vicinity of the anodes and any point 1m away on the earth's surface to a maximum of 10 volts.

Basically, the Code does not limit the voltage of the cathodic protection system, however, it does limit the touch voltage to 10 volts.

## **Section 84 - Interconnection of Electric Power Production Sources**

This section has been extensively rewritten to recognize changing technology and new requirements for interconnection of power sources. Particular attention should be given to the following revisions:

### **Rule 84-000 - Scope**

The words "electric power generation" have been replaced with the words "electric power production sources" to recognize the use of alternate energy sources such as: solar, wind, etc.

A new note has been added to Appendix "B" to indicate where alternate power sources such as PV, micro-turbines, etc. supply power through an approved inverter, the output of the inverter is considered to be the "electric power production source".

### **Rule 84-004 - Interconnection**

The former restriction to interconnection on the load side of the consumer's service

equipment has been removed. It is critical however, that the outputs of the interconnected power sources provide protection against back-feed into a supply authority system fault.

### **Rule 84-006 - Synchronization**

The wording "generators in parallel" has been replaced with "electric power production sources". This change will recognize the use of inverters for interconnection purposes. It is essential that the alternate power sources be provided with an approved means to establish and maintain synchronism with the inter-connected supply authority.

### **Rule 84-008 - Loss Of Supply Authority Voltage**

Subrule (2) has been added and permits an inverter to be used to satisfy the disconnecting requirements identified in Subrule (1) if approved by the supply authority

A new note, describing the possible effects of the utility losing one phase of a 3-phase system, has been added to Appendix "B".

### **Rule 84-010 - Overcurrent Protection**

The previous subrule (1) which required equipment and conductors to be protected in accordance with the rules of this Code has been deleted.

### **Rule 84-016 - Ground Fault Protection**

The previous rule which identified the requirements for generators has been deleted.

Rule 84-016 now identifies the requirements for ground fault protection.

### **Rule 84-018 - Loss Of Electric Power Production Source Voltage**

This rule was added to identify the requirements that must be satisfied upon loss of the electric power production

*(Continued on page 5)*

# The INSPECTOR NEWSLETTER— April 2008

(Continued from page 1)

suites where a solid-fuel burning appliance is installed, the requirements for carbon monoxide alarms in the NBCC 2005 are not limited to solid-fuel burning appliances only.

Specific provisions for installation of carbon monoxide alarms may be found in Subsection 6.2.4. and in Article 9.32.4.2 of the NBCC.

“So far - so good” may say the readers of this column, “but what’s in this requirement that might affect us?”

The trick is in a very inconspicuous looking requirement of the building code. This requirement is articulated in Sentence 6.2.4.1.(2)© and in Sentence 9.32.4.2.(2)© of the NBCC and it states that the carbon monoxide alarms required by one of these Articles must: “Have no disconnect switch between the overcurrent device and the carbon monoxide alarm, where the carbon monoxide alarm is powered by the dwelling unit’s electrical system”. This means that if a permanently connected carbon monoxide alarm is installed in a dwelling unit, wiring of this piece of electrical equipment must be similar to the provisions of Rule 32-110 of the CE Code for smoke alarms.

This means that an installer of such a permanently connected carbon monoxide alarm would have installed the carbon monoxide alarm s, that it is powered by a circuit that supplies a mix of lighting and receptacles, and the circuit cannot be protected by

a GFCI or AFCI, and the circuit has no disconnecting means (On-Off switches) between the carbon monoxide alarm and the branch circuit overcurrent device (the circuit breaker located in the dwelling unit panel-board).

This also means that if more than one permanently connected carbon monoxide alarm is installed in a dwelling unit, all such devices must be interconnected similarly to the NBCC and the CEC provisions for permanently connected smoke alarms.

However, such requirement is not specifically articulated in the CEC, and the installers of electrical equipment appear to be in the dark regarding this very important safety requirement of the Building Code. Needless to say, Subcommittee on Section 32 of the CE Code has already recognized the existing gap between the NBCC and the CEC and recommended necessary changes to Rule 32-110 in order to capture installation requirements for permanently connected carbon monoxide alarms.

It is interesting to note that some jurisdictions do not allow use of battery powered carbon monoxide alarms, but mandate only installation of permanently connected devices, similar to the NBCC provisions for installation of smoke alarms.

Furthermore, these jurisdictions mandate interconnection of carbon monoxide alarms with smoke alarms installed in a

(Continued on page 7)



Dave Jackson a long time member and supporter of the EIA being presented with EIA Life Membership Certificate by President Dave Shavalier. Dave held numerous positions on the EIA executive including President. Dave's electrical career included being Chief Electrical Inspector, City of Burnaby and Chief Electrical Inspector for City of Vancouver. Dave then moved up the corporate ladder to be Assistant Chief Building Inspector and ultimately Chief Building Inspector for the City Of Vancouver, the position he held at retirement.

(Continued from page 3)

source voltage. For example, if loss of voltage occurs in one or more of its phases, the electric power production source must automatically disconnect all phases from the interconnected system.

**Rule 84-020 - Disconnecting Means - Electric Power Production Source**

This rule has been revised to cover any electric power production source of an interconnected system.

**Rule 84-022 - Disconnecting Means - Supply Authority System**

In order to provide safety for supply authority personnel, all interconnected power production sources must be capable of being simultaneously disconnected from the supply authority line. A note clarifying the requirements for the supply authority disconnecting means has been added to Appendix "B".

**Rule 84-024 - Disconnecting Means - General**

A note explaining the use of inverters with an anti-islanding feature has been added to Appendix "B". The note indicates the supply authority disconnecting means should provide the supply authority a single point of access to simultaneously isolate one or more electric power production sources on a premise.

**Rule 84-028 - Grounding**

A note has been added to Appendix "B" indicating the isolating transformer used to separate the inverter AC power from the supply authority system may be located remote from or integral to the inverter.

**Rule 84-030 - Warning Notice and Diagram**

This rule has been revised to identify the specific locations for placement of the warning notices and the single line diagram. For example, warning notices are required to be posted at both the supply authority disconnecting means and the supply authority meter location.

A note indicating the information that must be included on the single line diagram has been added to Appendix "B" Tables 2 and 4

The double dagger note in Table 2 and the double asterisk note in Table 4 have been revised for clarity.

Table D3, Note 3 has been revised to advise users that where the calculation of allowable ampacity falls between two columns the factor in the higher percent-age column shall be used.

Note 9 has been expanded to include an additional example on the use of the distance correction factor.

This concludes the overview of the revisions to the 2006 CEC. In the next edition we will review the requirements for services and service equipment as outlined in Section 6.

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](mailto:Ted.Simmons@bcit.ca).



**Richard Campbell being recognized for all his support to the Electrical Inspector's Association during his tenure as the Electrical Contractors Associations' Executive Director.**

# The INSPECTOR NEWSLETTER— April 2008

(Continued from page 2)

grounding point at the main service; and

2. if the main electrical service has ground-fault protection of the zero sequence or residually connected types, grounding the neutral downstream from the fault sensing equipment will effectively disable the ground-fault protection.

I'm sure that none of this is news to you. But how can unintentional grounding show up in your electrical system that violates the CEC and creates the problems discussed? An emergency standby generator could be one way. The frames of some generators are bonded to the generator neutral. This information should be noted somewhere on the machine. Connecting this type of standby generator to an electrical system will create an unintended downstream ground point. A 4-pole transfer switch is then required to ensure this doesn't become a problem, by ensuring the generator neutral is disconnected at all times when the machine is not in operation.

Another way that an unplanned downstream ground can show up is by the installation of electrical equipment such as a panelboard that has a bonding screw or bonding jumper connecting its neutral bar to the case of the equipment. These should always be removed to avoid the above problems, since bonding to the case will create accidental downstream grounding.

But as you know, there is one exception to this rule. Rule 10-208 specifies that when two or more buildings are supplied from a single service, either:

1. the service neutral may be grounded at each of the buildings; or

2. the system neutral is grounded only at the main electrical service.

One frequent example would be when a building is supplied as a feeder from another building. In this example, the neutral may be grounded at the service entrance of each building, but there must be no bonding conductor between the two buildings, since the service equipment is already bonded to the system neutral in each building. Adding bonding between the two buildings would create a parallel neutral conductor. You should note that this is the only grounding arrangement permitted by the CEC if the second building will contain livestock.

A second grounding arrangement is also permitted. In this scheme, the system neutral is grounded only at the main service in the first building. The case of service equipment in the second building must not be bonded to the neutral, since it creates an additional grounding point. However, a bonding conductor must be installed between services in the two buildings; otherwise, there would be no effective return path for ground-fault currents.

As with previous articles, you should always check with the electrical inspection authority in each province or territory for a more precise interpretation of any of the above.\*

*Leslie Stoch, P.Eng. is principal of L. Stoch & Associates, providing electrical engineering and ISO 9000 quality systems consulting. Prior to that, he spent over 20 years with Ontario Hydro as an electrical inspection manager and engineer. Les holds a B.S. in electrical engineering from Concordia University in Montreal.*

Courtesy, IAEI News

(Continued from page 4)

dwelling – to ensure that the safety alarm sounds will be expeditiously transmitted throughout the dwelling.

The City of Vancouver, for example, has published an explanatory bulletin to interpret the requirements of the Vancouver Building By-law 2007 for installation of carbon monoxide alarms as follows:

1. Sentence 6.2.4.1.(2) to be read to require that carbon monoxide alarms: “be permanently connected to an electrical circuit and shall have no disconnect switch between the overcurrent device and the carbon monoxide alarm, and be wired so that its activation will activate smoke alarms required by Article 3.2.4.20”

2. Sentence 9.32.4.2.(2) to be read to require that carbon monoxide alarms: “be permanently connected to an electrical circuit and shall have no disconnect switch between the overcurrent device and the carbon monoxide alarm, and be wired so that its activation will activate smoke alarms required by Subsection 9.10.19”

This interpretation by the City of Vancouver was intended to improve performance and reliability of the required carbon monoxide alarms by mandating their permanent connection similar to the requirement for connection of smoke alarms, and by mandating interconnection of carbon monoxide alarms with smoke alarms installed in a dwelling unit.

It is also interesting to note that the industry has immediately responded to the

Building Code requirement in respect to carbon monoxide detectors by introducing an approved combination of a smoke alarm/ carbon monoxide alarm.

Although each of these separate devices is designed and constructed in accordance with different standards, the Underwriters Laboratory of Canada (ULC) certifies such combination devices that meet the NBCC specific requirements for location of smoke alarms and for location of carbon monoxide alarms, and such combination devices are readily available on the market.

Although this article intends to provide a general information on this important life safety issue, the Authority Having Jurisdiction must be consulted in each case of installation of these devices – in order to meet specific requirements of the AHJ for this particular subject.

Arkady (Ark) Tsisserev, is the Electrical Safety Manager/ Chief Electrical Inspector for the City of Vancouver. He is a registered Professional Engineer with a Master’s degree in electrical engineering. Ark is the Chair of the Technical Committee for the CE Code, Part I. He can be reached at:

[arkady.tsisserev@vancouver.ca](mailto:arkady.tsisserev@vancouver.ca).



Here we have Shaun Hollingsworth receiving his Life Membership Certificate from Dave Shavalier. Shaun has been a long time supporter of the EIA. He was always there for us when we started planning our Code Seminars. He along with his fellow TELUS members ensured we had a place to put on our Seminars. Shaun was with CT&S, BC TEL and TELUS for 32 years. He is the past treasurer of the BC Wild Life Federation. He is presently a board member of the Skagit Economic Endowment Commission.

# The INSPECTOR NEWSLETTER— April 2008

## Last Call!

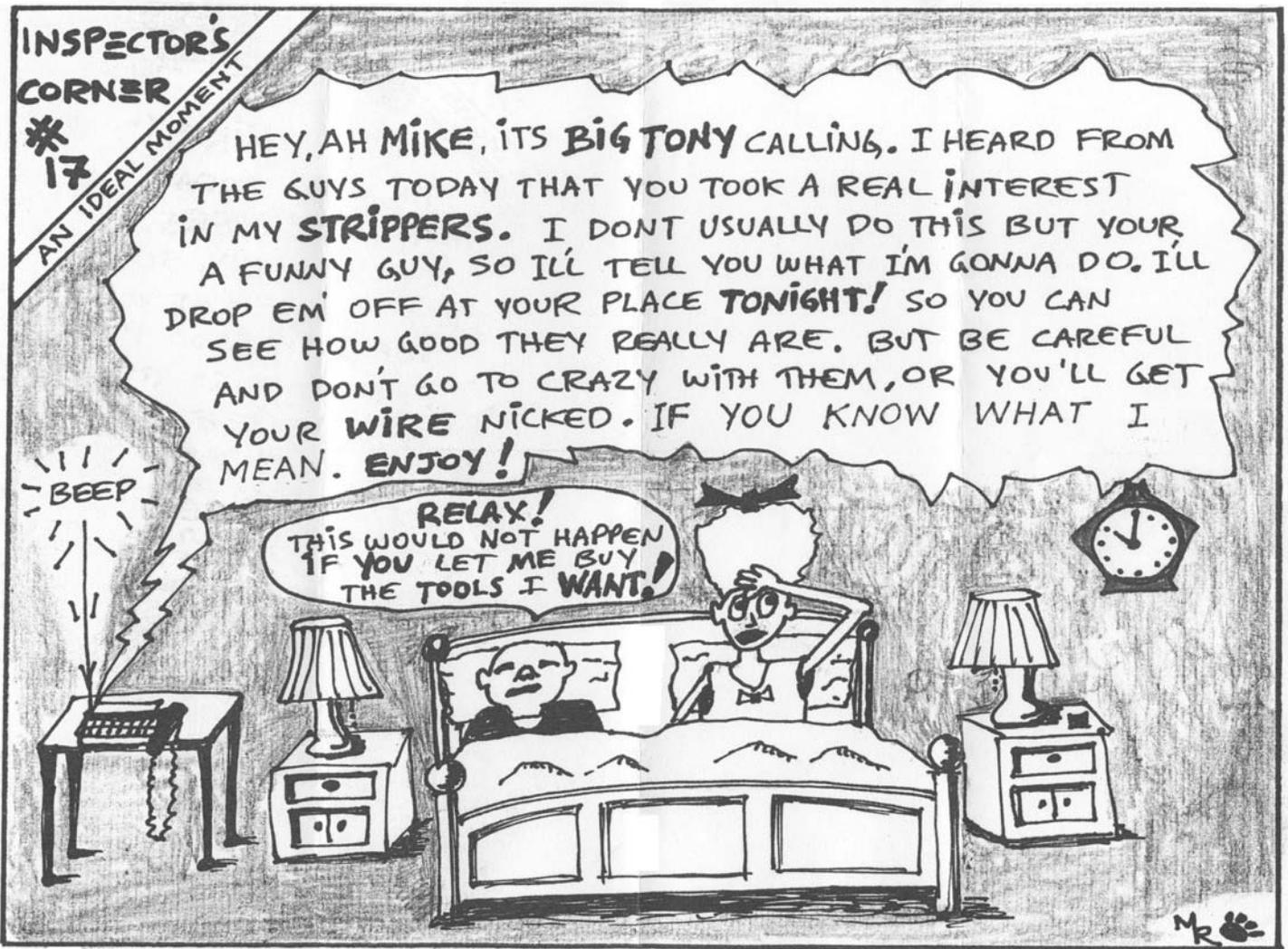
According to the EIA records on March 17, 2008, the following members have not yet renewed. If you find your name on the list, and would like to renew just circle your name and return this page with your renewal fee. Thanks, *George Razzo*

Suher Alhashimi	John Arnott	Dwayne Askin	Malcolm Balmer
Fred Bray	Keith Broad	Ben Chesshire	Ian Cornwall
Ken Cornwell	Kim A. Davies	Randy De Gryp	Peter Den Uyl
Kavinder Dhillon	Cam Duncan	John Falkenholt	John Gali
Keiller Gowans	Doug Hann	Bruce Harwood	Dan Harwood
Onkar Singh Hundal	Dan Ip	Roy Jurgensen	Michael Krygier
Norm McGladdery	Norm McGladdery	John McMahon	Doug Nott
Ross Patterson	Francesco Perrizzolo	Kerry Peterson	Len Rhodes
Dan Robertson	Derek Rodgers	Gurmit Rooprai	Russell Roper
Jason Rowley	Mauro Rubini	Balihar Sangha	Hossein Shirzad
Bill Simpson	Ian Skedd	Robert Smith	Jeffrey Su
Ram Surup	Roy Swallow	Frank Szeto	Scott Tilley
Ark Tsisserev	Matthew Ward	Kurt Wensler	Paul Wilson
Randy Wryha	Bernie Zimmermann	Ralf Zimmermann	

**Has anything changed, if so please complete the renewal form on the last page of this Newsletter.**



Bill Burr, Director, Regulatory Relations and Code Development with CSA International was the guest speaker at our Annual General meeting. He provided a very informative insight into the Regulatory Systems across Canada. It was noted that although each Province and Territory have individual Acts and Regulations they are very similar in focus and intent. Every Province and Territory adopt the same installation code. The Canadian Electrical Code is a model of regulatory harmonization using national standards. He provided some back ground into the working of the Canadian Advisory Council on Electrical Safety (CACES). The membership is made up of Provincial, Territorial, and Municipal, Regulatory Authorities; Standards Council of Canada; Health Canada; Accredited Organizations and Associated Members. Bill closed with update on Certification and Marking of Products, a very interesting and informative presentation.



## Presidents Message

First of all I would like to thank everyone that attended the last dinner meeting for electing me as president of your association. I would like to thank the past and present executive for all their efforts now and in the future. I consider it an honor and a privilege to represent such a great group of professionals. Most of you know me as the guy at the door collecting your money, or Santa Len's helper. Yes, I have been your treasurer for the past 10 tens and I have been working as an electrical inspector for the City North Vancouver for 28 years and a code course instructor for longer than that. So I have gotten to know most of you one way or another. My only hope as your president is that I represent you now as well as I did on the Electrical Safety Advisory Committee (ESAC). In the coming year I look forward to working with the newly re-established BC chapter of the International Association of Electrical Inspectors

(IAEI) as we have done with many other organizations in the past. They are presently recruiting for new members and are planning a seminar. Speaking of seminars: I also look forward to the adoption of a new code in 2009 and therefore a code seminar put on by our organization. The BCSA and CSA are presently looking into what can be done to have the new code adopted as soon as possible after it is published in January. And last but not least I look forward working with executive and the membership in the coming year. Thanks again.

**Jack Ball**  
President



## EIA Executive

### President

Jack Ball,  
City of North Vancouver  
jball@cnv.org  
604-983-7378

### Vice President

Bob Cornwell,  
City of Vancouver  
bob.cornwell@vancouver.ca  
604-873-7572

### Treasurer

Eric Sipila,  
City of Burnaby  
eric.sipila@burnaby.ca  
604-294-7161

### Membership Secretary

George Razzo, BC Safety  
Authority, Chilliwack  
leachtown@shaw.ca  
604-795-8470

### Recording Secretary

Ted Simmons, BCIT  
tsimmons@bcit.ca  
604-453-4045

### Directors

Farmand Ghafari, City of Burnaby  
farmand.ghafari@burnaby.ca

Kerry Peterson, CSA  
kerry.peterson@csa-international.org

Rick Porcina, City of Surrey  
rporcina@dccnet.com

Paul Stevens, Earth Tech  
stev0851@telus.net

Mauro Rubini, Panther Electric Ltd.  
604-251-2515  
Pager: 604-686-0747

### Past President

Roger Tuttle, City of Vancouver  
roger.tuttle@vancouver.ca  
604-873-7601

**Editor:** Rick Porcina,  
Email: [info@eiabc.org](mailto:info@eiabc.org)  
604-594-0124

The Electrical Inspectors'  
Association of British Columbia  
Suite 201, 3989 Henning Drive  
Burnaby, B.C., V5C 6N5  
Fax: 604-294-4120  
E-mail: [info@eiabc.org](mailto:info@eiabc.org)

## **ELECTRICAL INSPECTORS' ASSOCIATION of B.C. GENERAL MEETING**

**Monday, April 28, 2008**

**"Cheers Restaurant"**

**125 — East 2<sup>nd</sup> 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: \$25**

### **AGENDA**

#### **Presentation:**

**Don Cabatoff of Specialty Bulb Products Inc.  
Update on the Major Benefits LED Technology**

**Most Important for Reservations:** Please Phone Dwayne Askin  
(604) 660-0885 or Email: [Dwayne.Askin@safetyauthority.ca](mailto:Dwayne.Askin@safetyauthority.ca)

### Membership Application & Renewal Form

Please accept my application for membership in the EIA of B.C.

- |   |                  |
|---|------------------|
| <input type="checkbox"/> For 1 year (Jan 1, 2008—Dec. 31, 2008) | <b>\$ 50.00</b>  |
| <input type="checkbox"/> For 2 year (Jan 1, 2008—Dec. 31, 2009) | <b>\$ 100.00</b> |
| <input type="checkbox"/> For 3 year (Jan 1, 2008—Dec. 31, 2010) | <b>\$ 150.00</b> |

New Membership

Name (Please Print)

Renewal

Address

Inspector

City

Postal Code

Associate

Company

Title

Phone

Fax

Email

**Mail to: The EIA of BC, 201— 3989 Henning Drive, Burnaby, B.C., V5C 6N5**