THE INSPECTOR
Newsletter for the Members of the EIA of BC
ELECTRICAL INSPECTORS ASSOCIATION EIA of BRITISH COLUMBIA
November, 2008

The Canadian Perspective on Approved Electrical Equipment's Facts and Confusion

by Ark Tsisserev

Inside this issue:

How often in Canada perplexed distributors or wholesalers of electrical equipment provided with various trademarks or other symbols of identification hear from a visiting inspector: "This equipment is not approved. It must not be offered for sale." Electrical contractors can also share some of their confusion, when an inspector rejects a piece of electrical equipment for installation as being "unapproved," although the equipment bears a familiar certification monogram. So, where is the problem, and why do "innocent" wholesalers or contractors encounter such adamant actions from the Canadian electrical inspectors?

Let's establish some facts: Every provincial/territorial Electrical Safety Act or Regulation prohibits displays, advertisement or disposal of unapproved electrical equipment.

Rule 2-024 of the Canadian Electrical Code, Part I states that "Electrical equipment used in electrical installations within the jurisdiction of the inspection department shall be approved and shall be of a kind or type and rating approved for the specific purpose for which it is to be employed."

These two facts certainly shed some light of this subject. But what does it actually mean "approved equipment," and why in two earlier examples did an inspector reject a piece of equipment that contains a certification monogram?

Who makes such an approval: a manufacturer, a supplier, a testing agency, an inspector? As the electrical equipment in question is intended to be used under installation rules of the Canadian Electrical Code, definition of the CE Code could unravel this mystery.

The CE Code offers the following definition: "Approved as applied to electrical equipment means, that: (a) A certification organization accredited by the Standards Council of Canada has certified such equipment in accordance with the requirements of (i) CSA standards; or (ii) Other recognized documents where such CSA standards do not exist or are not applicable; or (b) Such equipment conforms to the requirements of the regulatory authority." Do we feel completely relieved after reading and digesting this

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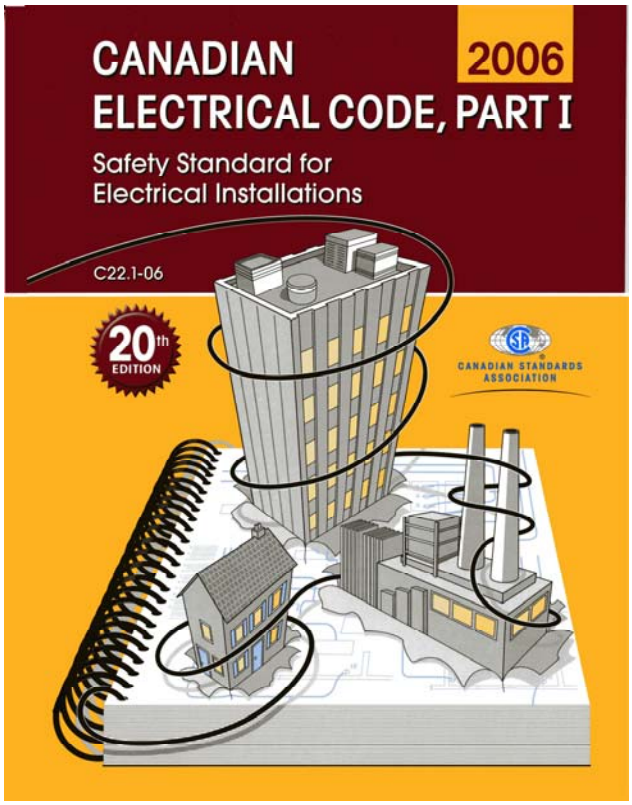
Understanding the layout of the C.E.C.

By Ted Simmons.

Before attempting to decipher the rules contained in the CEC, it is essential that code users understand the layout of the Code Book as well as the manner in which the rules are written.

At first glance it is easy to recognize that the CEC Part I has been divided into several evenly numbered sections, 44 to be exact, each providing specific requirements for the various types of electrical installations. Immediately following the final section there are 62 tables and 10 diagrams that provide essential information used in conjunction with the rules contained in the respective sections.



There is also a table of contents, preface, an index and several appendices which all play a vital role in location, understanding and application of the various rules.

First, we will start with the table of contents which provides a complete inventory of the topics contained in the CEC Part I, as well as a concise overview of the information contained in each of the 44 separate sections. This well defined overview was accomplished by subdividing the rules contained in each section into distinct subsections, each dealing with a specific subject and having its own title and numerical identity.

For example, the rules in Section 10 that pertain to the requirements detailing which systems have to be grounded are located in the subsection for **"System and circuit grounding"** and are identified numerically with the 10-100 series. ie: 10-100, 10-102, etc. Any rule pertaining to system and circuit grounding would be located in this subsection. Similarly, the rules that pertain to the bonding requirements for equipment are located in the subsection for **"Equipment bonding"** and are identified numerically with the 10-400 series. ie: 10-400, 10-402, etc.

The table of contents lists all of the Subsections contained in each Section to provide a quick and easy method for locating rules. Generally, the table of contents should be consulted first to determine what information is contained in each section, however, if you are searching for a specific requirement, such as voltage drop, it is a good idea to check the index which is arranged alphabetically and also provides the rule number where the information is located.

Following the table of contents we have the preface of the Code. As well as providing a brief overview of the history of the CEC, this section provides an extremely important piece of information pertaining to the layout of the book. It states that the **General Sections** of the Code include sections **0** through

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16 and **26** with the other sections being supplementary or amendatory. At first this information may not appear to have any significance, however, the Code is advising the user that rules contained in the "General" sections are the requirements we normally follow unless the installation is one in which for a particular reason the general requirements have to be supplemented or amended. For example, if we are sizing the maximum permitted overcurrent protective device for a conductor, we would generally go to Rule 14-104 which states the rating of the overcurrent protective device shall not exceed the maximum allowable ampacity of the conductor. This is the general requirement, however, there may be situations where it is not practical to comply with this requirement. For example, in sizing the overcurrent protective device for a motor branch circuit, the Code recognizes that motors have a high inrush current. In order to accommodate this situation Rule 28-200 of the Code amends the general requirement to permit the overcurrent protective device to exceed the ampacity of the conductor it protects, provided the motor circuit conductors are protected against overload.

A key point to be taken from the previous information is that one is not expected to know every rule in the Code book, however, Code users should have a solid understanding of the information contained in the "General Sections" of the book.

After identifying the sections of the CEC Part I that are considered General Sections, the preface continues with an explanation of the numbering system that is used throughout the code book. The preface indicates that the reason even numbers are used is to allow the use of odd numbers for new rules due to interim revisions. The preface also explains the method used to subdivide rules and provides an example of how an individual rule is subdivided. Another point worth noting regarding the preface is that key changes between the previous 2002 CEC and the present 2006 CEC are identified by the use of the delta symbol (Δ) in the margin adjacent to the rule.

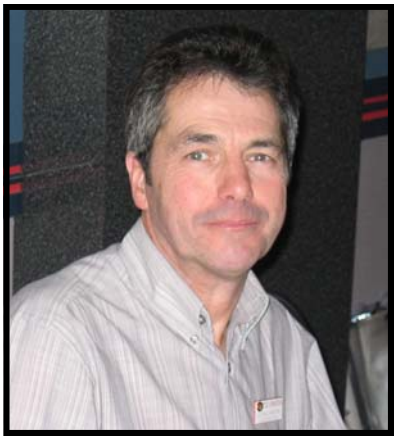
Now we will provide a brief overview of the manner in which code rules are written.

It is important to recognize that the CEC Part I is a prescriptive code. In other words, the rules in the code are written to indicate the requirements or conditions that shall be satisfied rather than what is not permitted. For example, rather than stating you cannot install liquid-tight flexible conduit without installing a bonding conductor, Rule 12-1306 states: a separate bonding conductor shall be installed in liquid-tight flexible conduit in accordance with Section 10.

The majority of rules contained in the CEC are generally straightforward, however, in some situations the code may deem it necessary to provide additional information or further clarification for a specific requirement. Appendix "B" was developed for this very purpose and includes information to assist code users in understanding the purpose and intent of many of the rules located in the CEC. Appendix "B" also contains several examples of how to perform specific calculations such as conductor ampacities, linear expansion, motor conductor and overcurrent protection requirements, etc.

Although Appendix "B" provides a substantial amount of worthwhile information, it is essential that code users recognize that as stated in the "Note" at the very beginning of the Appendix "This Appendix is an informative (non-mandatory) part of this standard".

More on Code layout in future articles. Ted Simmons, is Chief Instructor, Electrical Apprenticeship Program at the British Columbia Institute of Technology, Ted can he reached by e-mail at Ted_Simmons@bcit.ca.



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definition? Not exactly. It looks like we need some additional work of "deciphering" this intricate terminology.

Let's do it step by step. First of all: What do we know about such a "certification organization accredited by the Standards Council or Canada"? The answer will yield some agencies that are very well known to the industry. Certification organizations such as CSA, UL, ETL, etc., have applied to the Standards Council of Canada for accreditation to certify electrical equipment to the CSA Safety Standards for Electrical Equipment (to Part II standards that are listed in Appendix A of the Canadian Electrical Code). The SCC grants accreditation to a certification body when all criteria and procedures for accreditation are met (scope of accreditation is defined and the acceptable certification mark is established). Thus, for example, when the electrical equipment is certified by the CSA, the SCC requires that the "CSA" monogram must apply to the equipment. When the same electrical equipment is certified by UL to a relevant CSA Part II standard, the "cUL" mark must be shown on that equipment. [Note: small "c" is a Canadian Identifier. In accordance with the SCC requirements it must be located at 8 o'clock to the registered trademark "UL." This small "c" signifies that the equipment is, indeed, certified by the U.S. based Underwriters Laboratories Inc. to the CSA Safety Standards for Electrical Equipment - Part II standards].

Therefore, a certification mark appearing on an electrical product is a testimonial provided by the certification agency that the equipment has, in fact, been subjected to a satisfactory testing by that accredited Certification Organization to all applicable requirements of a specific CSA electrical safety standard for the electrical product that is intended to be installed under provisions of the CEC, Part I.

Thus, the puzzle with the CEC, Part I and Part II is now resolved: requirements that are covered in the CEC, Part I—constitute provisions for safe electrical installation, and conditions specified in an equipment standard—represent design and construction criteria under the scope of the CEC, Part II safety standard for that specific electrical equipment (that will be installed under rules of the CEC, Part I).

From a practical side this means that if, for example, a panelboard installed in a dwelling unit is marked "CSA," it implies that such a panelboard has been tested by the CSA Certification experts for conformance with the CSA standard C22.2 No. 29 (see Appendix A of the CE Code) This panelboard will be most likely accepted by an inspector as "approved electrical equipment." If the same panelboard bears "cUL" monogram, the inspector will also accept it for installation, as this monogram signifies the fact that UL staff certified the panelboard for conformance to the same CSA standard.

But what about paragraph (ii) of the definition "approved electrical equipment" that states that the equipment is approved if it is certified in accordance with "other recognized documents, where such CSA standards do not exist or are not applicable?" Where can these situations be encountered? Perhaps a few following examples might help:

If the life safety/fire alarm equipment is installed in accordance with Section 32 of the CEC, this equipment will not be certified to the CSA, Part II standards, as CSA never developed standards for a fire alarm equipment. Instead, such equipment (a smoke detector, a pull station, a fire alarm bell, etc.) would be certified to applicable ULC Standards. Appendix B Notes on Section 32 of the CEC provide explanation on this subject.

If there is no CSA Standard available for a specific type of electrical equipment (i.e., a unique control or protection device, etc.) CSA Certification Division may publish

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"other recognized document" (ORD). When the CSA publishes such ORD, it is called Technical Information Letter (TIL). This TIL provides interim certification requirements for such specialty equipment, until a complete standard is developed by a technical committee of experts via a CSA consensus based process.

And finally, paragraph (b) of the definition indicates that the equipment is deemed to be approved if it "conforms to the requirements of the regulatory authority." This, latter condition could be met, when a unique electrical equipment is constructed for which no applicable CSA Part II Standard exists and no certification program has been developed (no ORD has been published). In this case, inspection authorities may consider such equipment as "approved" if it meets criteria of a special inspection, provided by the testing agencies on behalf of the regulatory authority in conformance with SPE 1000, Model Code for the Field Evaluation of Electrical Equipment, or with other documents acceptable to the regulatory authority.

So, it looks like all aspects of the CEC definition have now been clarified, and the wholesalers' and contractors' confusion mentioned at the outset of this article can now be explained. Let's check out a few examples: Let's say, that a distributor sells a reel of a cable marked "UL." Is this approved equipment? The answer is "No." Not for use in Canada under rules of the CEC, Part I. If this cable is to be allowed to be sold and installed in a Canadian market, UL must apply a Canadian Identifier (small "c" to the "UL" registered trademark). Only this "cUL" monogram will signify that UL, in fact, tested this cable to the applicable CSA cable standard listed in the Appendix A of the CE Code. This is the reason many wholesalers and distributors are ordered to remove the equipment that is not appropriately marked. It should be noted that Rule 2-100 of the CE Code, Part I lists markings that are required to be provided on each piece of electrical equipment to ensure that the equipment is suitable for the particular installation.

If, for example, an inspector checks electrical installation in a paint spray operation (Class I; Zone 1 hazardous location) and finds a motor, or a panelboard marked "CSA." Does this equipment meet the inspector's acceptance? The answer is "No." Because in addition to the CSA monogram this equipment must be "approved for specific gas, vapors, etc." and marked accordingly as required by Section 18 of the CE Code. Referenced earlier, Rule 2-024 of the CEC is very helpful in understanding this additional requirement of being "approved for the specific purpose for which it is to be employed."

There are numerous situations where inspectors reject electrical equipment, although this equipment has been impeccably tested and bears an acceptable certification monogram. These situations are well described by Rule 2-026 of the CE Code, which grants an inspection authority power of rejection under the following conditions: (1) if the equipment is substandard with respect to the sample on which approval was granted; or (2) if the conditions of use indicate that the equipment is not suitable; or (3) if the terms of the approval agreement are not being carried out.

It is unfortunate, but lately inspectors encounter these situations more and more often. With a huge supply of offshore equipment ranging from heavy industrial circuit breakers to basic consumer oriented power bars and extension cords many substandard or outright counterfeit pieces of electrical equipment find their ways to wholesalers, distributors, contractors and, ultimately, to

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INSPECTOR NEWSLETTER— November 2008

Stephen Hinde, P.Eng., our Guest Speaker made a presentation and remarks regarding the latest news, plans, and changes taking place within the electrical industry, and at the BC Safety Authority.
Stephen spoke of the history of electrical inspections in BC, and the evolution of change undertaken by the Province and Municipalities to develop the method and policies that are in place today. Stephen spoke briefly of the differences between the Provincial Government's safety program and mandate versus the BCSA's mandate and methodology.
Explanations were provided regarding the change to Safety Officer from Inspector and Compliance Order from Certificate of Inspection if contents become prescriptive. The BCSA will maintain but minimize their SI Program, reserving the program for unique circumstances and locations due to private industry's increased number of agencies and qualified professionals. The Board of the BCSA has called for an increase in visibility and presence for SO's in the field and community. These are the BCSA's statistics for the 12 month period ending June 30, 2008. Compliance Orders – 180 * Disconnection Orders – 80 * Monetary Penalties – 1 * Discipline Orders – 12 Future change mentioned included resuming **Electrical Safety Matters** on a quarterly basis, and the quick adoption of 21st Edition of the Canadian Electric Code (2009). Although the Code was issued every 4 years, it will now be issued on a **3 year cycle** beginning in 2009. Stephen mentioned Provincial governments are working to minimize amendments to the Code to facilitate quicker adoption due to the 3 year cycle and to harmonize business and trade practice on a national basis. National Standards are being developed to enable tradespeople to work and be recognized throughout Canada as part of, and due to inter-Provincial trade agreements. The electrical trade is in better position due to the inter-Provincial Red Seal program, and with a decrease in jurisdictional amendments, portability of qualified people will be enhanced. Changes to the Electrical Safety Regulation will enable BCSA to make FSR upgrade training mandatory for every Code cycle. Stephen also mentioned that the new Arc Flash Standard (CSA-Z-462) will be available in a month.

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consumers. Therefore, today like never before electrical inspectors must exercise their vigilance in auditing electrical equipment that is intended for use in Canada. Thus, a mutual commitment and diligence by all stakeholders of the electrical industry in understanding of the facts and confusion about "approved" equipment, and acting upon this subject effectively is paramount in our successful efforts to uphold electrical safety in Canada.
Ark Tsisserev, P.Eng., is the chief electrical inspector for the city of Vancouver, Canada. He is a registered professional engineer, with a master's degree in electrical engineering. He is currently the chairman of the technical committee on the Canadian Electrical Code and represents the CE Code Committee on NEC CMP-1 as the CMP-1 non-voting member. Ark is presently the third vice president of the Canadian Section.

BCIT represented by Bill Scudamore and Don Zaklan were both the luck winners of the Prized EIA Valise draw.

What's New

Do you have any technical information or letters to the editor, please mail or email : info@eiabc.org

Eric Sipila Presenting Warren Hancock with a Dinner Ticket to our next meeting.

Presidents Message

Greetings members. Another year has come and is almost gone as we near our Christmas Dinner Meeting. Santa Len is no doubt already dreaming giving out the door prizes. I am happy to report that the International Association of Electrical Inspectors Convention in Toronto was well attended by many inspectors from all over the country as well as members from the various testing agencies. There were presentations given on some of the up coming code changes. Another on the terrible results of electrical incidents, and life safety systems, which was put on by our very own Arkady. The electrical trade show highlighted some new products such as child proof receptacles, which will be required in the new code and electrical fault circuit interrupters (EFCI). I would like to thank the membership for giving me the opportunity to attend. The year saw the very unfortunate passing of one of our highly respected members, Jim Barker in a car accident. He will surely be missed by all. As for the Electrical Contractor's Association, they hired a new Executive Director, Ms. Deborah Cahill and some new office staff. We will all get to meet her soon, as she will be giving us a presentation at our February dinner meeting. We are of course planning on a Code Seminar on the new Code next year, but we will have to wait until it is adopted first. The Plan is to get it adopted as soon as possible in the new year, but this has never happen before. So in closing, I would like to thank the membership for the privilege of serving as your president and hope to see you all at the Christmas Dinner Meeting.

Jack Ball, President

ELECTRICAL INSPECTOR'S ASSOCIATION of B.C. GENERAL MEETING

Monday, November 24, 2008

"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: $25

AGENDA:CHRISTMAS MEETING & ANNUAL CHRISTMAS DRAW

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

SANTA NEEDS HELP THIS YEAR SO!!! PLEASE HELP US BY EITHER BRINGING PRIZES FOR THE TABLE TO THE MEETING, OR SENDING-CHEQUES PAYABLE TO THE "EIA" AS SOON AS POSSIBLE SO SANTA CAN PROVIDE LOTS OF GREAT PRIZES, ETC.CALL JACK BALL (604) 983-7378. THANKS SANTA

Membership Application & Renewal Form

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

- ☐ **For 1 year (Jan 1, 2009—Dec. 31, 2009)** **$ 50.00**
- ☐ **For 2 year (Jan 1, 2009—Dec. 31, 2010)** **$ 100.00**
- ☐ **For 3 year (Jan 1, 2009—Dec. 31, 2011)** **$ 150.00**

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