2008 Annual Technical Conference

Agenda item # 2008ag-01 **Professional Engineering**

Submitted by: Stan Misyk

Question/enquiry: SCO's (electrical) on occasion question the practice of a Professional Engineer with academic training (for example in the mechanical discipline) stamping and signing drawings relevant to classified hazardous areas in the electrical discipline.

Recommendation: For information/discussion.

Background information:

From: Stan Misyk
To: Ray Chopiuk - APEGGA

Electrical Safety Code Officers / Inspectors are often approached / questioned / challenged on the topic of "hazardous area classification".

Regarding this matter, Section 18 CEC is silent on this. Our avenue of recourse for information is the Code for Electrical Installations at Oil & Gas Facilities. We may also choose to use the NEC, API 500/505 or other documents to assist us only in understanding / evaluating the situation

In any case, it is NOT our role as Electrical SCO,s to classify areas and we believe and understand that this is the role of the Professional Engineer(s)

The question is: Can a Professional Engineer in other than the Electrical discipline (mechanical, structural etc) apply the Professional Seal and Signature for an electrical area classification drawing? We realize that they may discuss this with their peers in the industry, review fugitive emission studies etc. in conjunction with their decision.

From: Ray Chopiuk - APEGGA
Subject: RE: Electrical Industry Concerns

Professional engineers are not registered by discipline in Alberta. As such, engineers are not restricted to a particular defined scope of practice, e.g., electrical, mechanical, etc., to the exclusion of other disciplines. Engineers are restricted to practicing within their areas of competence, however.

To use your example, a person might understandably be "labelled" as a mechanical or structural engineer because of an academic degree he or she has obtained. However, when that person becomes registered, he or she is licensed as a professional engineer. That person would be entitled to engage not only in mechanical or structural engineering, as the case may be, but also in some aspect of electrical engineering if he or she is competent in that area (or, as you phrased it, to apply his or her professional seal and signature to an electrical drawing). Simply put, it is not possible to determine an engineer's area of competence by merely being aware of his or her academic degree.

In any event, an engineer is responsible for the engineering that he or she has done or for which he or she has accepted responsibility, in the case of work done by others. As you noted, that acceptance of responsibility is indicated by the engineer signing and sealing a drawing or other document of a professional nature.

Additional Information from the preamble section of the Code for installations at Oil and Gas facilities:

“It is the responsibility of the person doing the area classification on behalf of the owner to ensure that the result is consistent with CEC requirements. This code allows for professional engineers, with adequate related experience, to set the proper area classification of facilities and to document them under their seal. Without professional involvement, the specific area classifications outlined in this code shall be the minimum requirements. It remains the responsibility of the facility owner to determine that these requirements are adequate for each installation.”

APPEGA COMPLAINT PROCESS:

The Discipline Committee hears and decides complaints of unskilled practice and unprofessional conduct against APEGGA members (individuals and organizations) that are brought before it by the Investigative Committee.

HOW THE DISCIPLINE PROCESS WORKS

APEGGA's discipline process is designed to maintain high standards of professional practice and ethics. The process is not an alternative to the civil courts. It deals solely with professional and ethical practice. Anyone with a concern about the conduct of an individual APEGGA member or permit holder is encouraged to contact the Association.

To ensure fairness and impartiality, a separate committee or board handles each stage of the process. The Investigative Committee, Discipline Committee and Appeal Board are composed of APEGGA members and public representatives appointed by the Government of Alberta.

All complaints are kept strictly confidential. However, discipline hearings are open to the public unless the case being heard is of a sensitive nature and the Discipline Committee panel orders otherwise. Similarly, such open hearing decisions are also available to the public.

Gathering Evidence About Your Complaint

If you believe that a member of APEGGA or a permit holder may have acted in an improper or incompetent manner, we would like to hear from you.

APEGGA staff can answer questions about what to expect from an engineer or geoscientist, even if you do not wish to register a formal complaint. They can also verify whether someone is a licensed to practice as an individual or a permit holder.

If you decide to lay a complaint, they will review your concerns with you and provide assistance in advising what material is required to support allegations of either unprofessional conduct or unskilled practice, or both.

Investigation of the Complaint

An investigative panel of the Investigative Committee will review the material provided. They may obtain additional information from the person making the complaint, or from other sources, if required. In turn, the panel will recommend to the Investigative Committee either that:

- that the complaint be dismissed if it is of the opinion the complaint is frivolous, vexatious or if there is insufficient evidence, or
- that a formal hearing be held regarding the complaint. In this instance the Investigative Committee will prosecute the complaint in front of the Discipline Committee.

There is also an alternative available if the member under investigation admits to unprofessional conduct or unskilled practice. A formal hearing may be unnecessary. In that case, the Investigative Committee may recommend an order to the Discipline Committee. The Discipline Committee then appoints one of its members as the case manager to review the admission and the recommended order, along with an agreed statement of facts. If the case manager agrees with the recommendation, he or she will discuss the matter with the member. If the member also agrees, the order has the same force and effect as an order following a formal hearing. If the recommended order is rejected, the matter then proceeds to a formal discipline hearing.

2008 Annual Technical Conference

Agenda item # 2008ag-02 **S.C.O. Designation**

Submitted by: Ken Bjerke

Question/enquiry: To provide SCO designation to Senior SCO when as SCO completes 10 years of service with designation of powers.

Recommendation: For discussion.

Background information: n/a

Agenda item # 2008ag-03

CEC 2-004 (and section 60)

Permitting for communication wiring on customer premises

Submitted by: JIM PROVOST - TELECOM APPLICATION SERVICES

Question/enquiry: COMMUNICATIONS WHETHER IT BE CATV / THE PHONE COMPANY OR A PRIVATE CONTRACTOR, THIS PORTION OF THE ELECTRICAL INDUSTRY IS IN THE CODE BOOK AND ALL REQUIREMENTS AND STANDARDS SHOULD BE FOLLOWED. THE FIRE CODE COVERS THIS THROUGH THE FIRE STOPPING REGULATIONS. THIS COULD HAVE DETRIMENTAL BAD SITUATIONS FOR THE LANDLORDS AND BUILDING OWNERS.

Recommendation: DEVELOP A COMMUNICATIONS INSPECTION DEPARTMENT STAFFED WITH TELECOM ELECTRICIANS WORKING IN CONJUNCTION WITH THE ELECTRICAL INSPECTORS. THE ONLY EXCEPTION WOULD BE THE CATV AND THE TELEPHONE COMPANY ON THEIR OUTSIDE PLANT ONLY.
IF THEY WORK IN CUSTOMERS PREMISES THEY BOTH REQUIRE PERMITS AND QUALIFIED PERSONEL TO OVER SEE THE JOB AND TO GET AN INSPECTION APPROVAL BY THE GOVERNING ELECTRICAL JURISDICTION.

Background information: SUPPLIED BY JIM PROVOST'S EXPERIENCE ON BE HALF OF THE CONSUMER AND THE CODE BOOK AND WORKING WITH ELECTRICIANS
JIM PROVOST IS A TELECOMMUNICATION ELECTRICIAN AS SUPPLIED BY ALBERTA APPRENTISHIP BRANCH IN 1980,
AS WELL AS A MEMBER OF THE ECAA.

ATTACHED: *Article from Electrical Line summarizing code items relating to communications systems.*

Code Matters!

Section 60

Electrical Communication Systems

By Ted Simmons

Until recently, the installation of a communication system was generally the responsibility of the telephone company or other utility involved with communications. With deregulation and the tremendous increase in data cable networks for computers, etc. this is no longer the case, and an ever increasing amount of this work is being performed by electricians. Electricians working in this field should have a good understanding of *Section 60*. Special attention should be given to the following requirements for communication circuits.

Rule 60-302 - Raceways

Raceways for communication conductors shall comply with the requirements of *Section 12* and if made of metal shall be bonded to ground in accordance with *Section 10*.

- Care should be taken to ensure the following requirements are satisfied:
- Conduits shall be properly supported.
- Conduit ends shall be reamed and equipped with bushings.
- Non-metallic raceways installed in buildings shall comply with the flame spread requirements of the *National Building Code of Canada*.
- The minimum bending radius for raceways shall be at least 6 times the internal diameter of the raceways. Over bending can result in serious cable damage. It is recommended that a minimum cable bending radius of no less than 10 times the outer diameter of the cable sheath is provided.
- Metallic conduits must be bonded to ground. This is generally accomplished by installing a grounding bushing on the supply end of the conduit and connecting an insulated No.6 AWG copper conductor between the grounding bushing and a grounding busbar.

Rule 60-304 - Insulation

This rule reminds electrical personnel to consult *Table 19* to ensure that conductors and cables installed for communication systems are acceptable for the respective locations and expected conditions of use.

Rule 60-306 - Grounding of Conductors with an Outer Metal Covering

The outer covering or sheath for a communication cable, if made of metal, must be bonded to ground. The metal cable sheath is required to be bonded to ground to ensure the sheath does not rise above ground potential due to induction or accidental contact with an energized conductor of a power or lighting circuit.

Rule 60-308 - Separation from Other Conductors

In order to prevent accidental contact with the energized conductors of a power or lighting circuit, *Rule 60-308* requires that communication conductors be separated at least 50mm from insulated conductors of lighting, power or class 1 circuits operating at 300V or less, unless effective separation is provided by:

- Installing either the communication conductors or the electric circuit conductors in a grounded metal raceway, a grounded metal sheathed cable, or a grounded armoured cable.
- The use of a flexible cord of the hard or extra hard usage types for the electric circuit conductors.
- Installing either the communication conductors or the electric circuit conductors in a non-metallic raceway.

Communication conductors shall not be placed in any raceways, boxes, or similar fittings that contain conductors for power and lighting circuits.

Rule 60-310 - Penetration of a Fire Separation

Fire stopping is a critical concern for all cable installations. Fire stopping is required to protect life and property by preventing the spread of fire and toxic gases. When communication conductors pass through walls, floors and ceilings, any openings around the raceway or cable shall be sealed in accordance with the requirements of the *National Building Code of Canada*. *Rule 2-124* and

Appendix "B" provide additional information on fire stopping requirements.

Rule 60-312 - Communication Cables in Hoistways

Unless special permission is obtained, communication conductors shall not be installed in hoistways. However, the code will allow an exception to this rule for communication conductors supplying an elevator car. Refer to *Rule 38-021* for details.

Rule 60-314 - Communication Conductors in Ducts and Plenum Chambers

In order to prevent the spread of fire and toxic gases, it is essential that any conductors or cables installed in ducts or plenum chambers comply with the requirements identified in *Rules 2-126* and *12-010*.

Rule 60-318 - Conductors Under Raised Floors

Communication conductors may be run exposed under a raised floor provided the floor is constructed of non-combustible material and a 50mm separation is maintained between communication conductors supplying data processing units and conductors installed for power circuits. If the raised floor is also used as an air plenum, the communication conductors can only supply equipment placed directly on the raised floor and consideration must be given to the flame spread requirements of *Rules 2-126* and *12-010*.

Rule 60-322 - Type CFC Under-Carpet Wiring System Rules

Communication Flat Cable type CFC is a wiring method designed for installation under removable carpet squares. Type CFC systems are mainly for use in office areas and should only be used for the extension of conventional wiring methods in lengths not exceeding 15m measured from the point of transition. CFC cables are permitted for use in dry locations and shall be installed on hard, *smooth, continuous floor surfaces. Rule 60-326* identifies several locations where type CFC cables cannot be used including outdoors, dwelling units, etc. To gain a good understanding of the requirements for type CFC systems, review *Rules 60-324* to *60-334*.

Rule 60-400 - Communication Equipment in Bathrooms

In order to reduce the risk of shock, the code requires that communication equipment installed in bathrooms be permanently attached on the wall and be located so that no part of the equipment can be reached or used from the bath or shower enclosure. The code relaxes this requirement in situations where a person, for safety reasons, may require access to a communication device. In these situations the communication device is still required to be located out of reach from the bath or shower enclosure, however, it shall be permitted to be actuated by means of a cord with an isolating link.

It should be noted that communication jacks are <u>not</u> permitted in bathrooms.

Rule 60-402 - Equipment in Air Ducts, Plenums, or Suspended Ceilings

Communication equipment shall not be installed in ducts or plenums although connecting blocks of a non-protective type (ie: non-fused) may be installed in ducts or plenums created by a suspended ceiling, having lay-in panels, provided the connecting blocks are installed in accessible enclosures.

Rule 60-404 - Exposed Equipment and Terminations

In order to reduce shock hazards, communication equipment with exposed live parts shall be installed in a suitable room or similar area as required by *Rule 2-202*. This requirement does not apply to equipment where the terminals are protected from contact by means of cabinets or other approved enclosures.

Rule 60-600 - Direct Buried Systems

When communication conductors are direct buried they shall:

- Not be installed in the same vertical plane with conductors supplying power and lighting.
- Maintain a 300mm horizontal separation from conductors supplying power and lighting.
- Be placed at a minimum depth of 600mm in non-vehicular areas and 900mm in vehicular areas unless mechanical protection is provided in accordance with *Rule 60-600(e)(i)* and *(ii)*.

Rule 60-602 - Underground Raceways

Underground raceways containing communication conductors shall:

- Maintain a 300mm separation from raceways containing power conductors. If concrete is used, the separation may be reduced to 50mm.
- Be placed at a minimum depth of 450mm in non-vehicular areas and 600mm in vehicular areas.

Rule 60-700 - Bonding of Cable Sheath

The outer metal sheath or shield of communication cables shall be bonded to ground as close to the point of cable entry as possible.

Rule 60-702 - Cable Sheath Bonding Conductor

The bonding conductor for the outer conductive sheath must be copper and have an ampacity at least equal to or greater than that of the outer conductive sheath.

More on Section 60 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.

Agenda item # 2008ag-04 **3 wire service conductors**

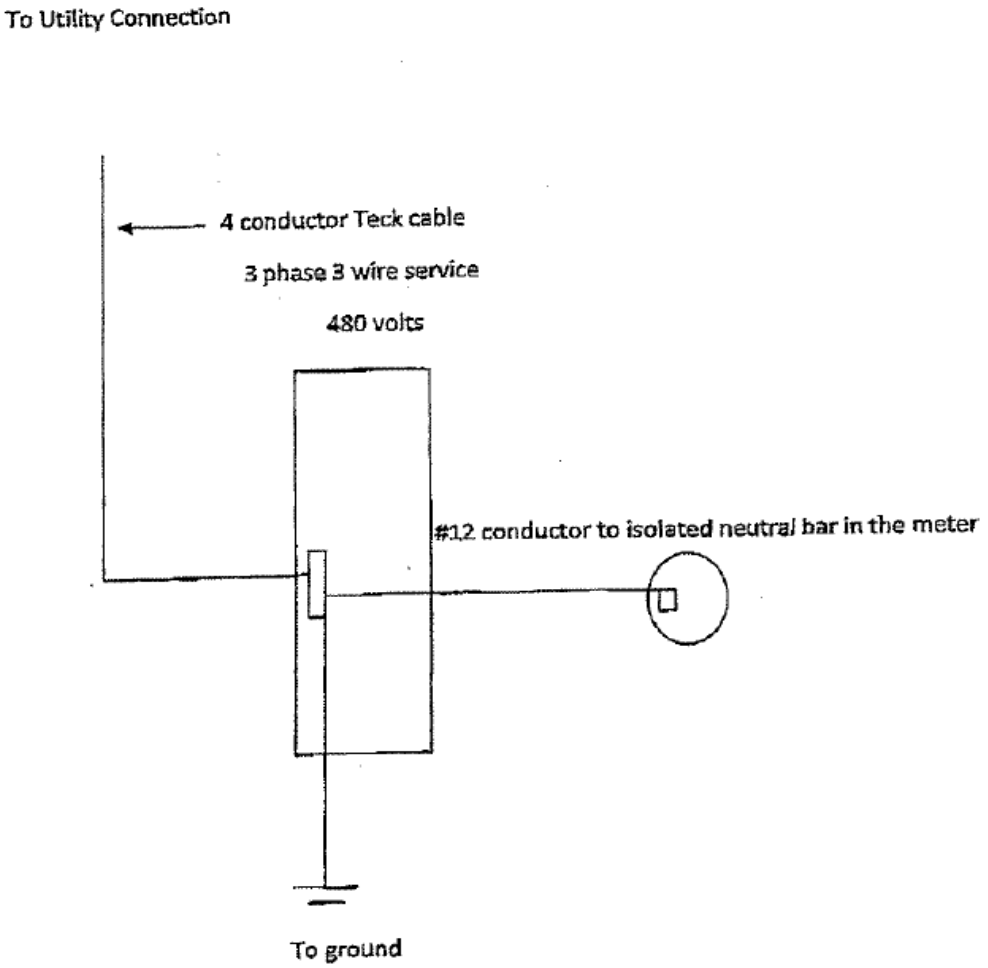
4-022 Size of neutral conductor & 6-308 Bare neutral

Submitted by: John Biollo

Question/enquiry: Are all utilities insisting on a neutral the same size as the current carrying conductor?

Recommendation: For discussion

Background information: A utility company is insisting on 4 conductor teck cable for this type of service. They will not accept 3 conductor teck and use the bonding conductor in the teck as a neutral. Note: Teck90 is approved as a service entrance cable above/ below ground -Table 19



6-308 Use of bare neutral in consumer's service

The neutral conductor of a consumer's service shall be permitted to be bare if this conductor is
(c) part of a busway or of a service entrance cable; or

4-022 Size of neutral conductor

(1) The neutral conductor shall have sufficient ampacity to carry the unbalanced load.
(3) The size of a service neutral shall be not smaller than the size of a neutral selected in accordance with Subrule (1) and shall
(a) be not smaller than No. 10 AWG copper or No. 8 AWG aluminum; and
(b) be sized not smaller than a grounded conductor as required by **Rule 10-204(3),** except in service entrance cable or where the service conductors are No. 10 AWG copper or No. 8 AWG aluminum.

10-204 Grounding connections for alternating-current systems (see Appendix B)

(3) Where the system is grounded at any point, the grounded conductor shall
(a) be run to each individual service;
(b) have a minimum size as specified for bonding conductors in Table 16;
(c) also comply with Rule 4-022 where it serves as the neutral; and
(d) be included in each parallel run where the service conductors are run in parallel.

STANDATA
CEC-4 [rev-4]
Page 3 of 4

Rule 4-022 Size of Neutral Conductor

Reduced Neutral Conductor Size for Single Family Dwellings
For a single family dwelling with provision for a 120/240 V electric range, or a 120/240 V electric dryer, the neutral conductor of the consumer's service, or feeder, may be reduced to a size having not less than 70% of the ampacity of the ungrounded conductors.

This concept may be equally applied to a feeder or service supplying more than one unit of row housing or similar installations.

As explained in Rule 4-004 (4), the common conductor of a consumer's service or feeder connected to 2-phase wires and the neutral of a 4-wire, 3-phase system carries approximately the same current as the other conductors and therefore shall not be reduced.

Neutral Overload from the Effect of Harmonics on a System
When designing an installation that will incorporate a number of electronic devices, a professional engineer should review the design to ensure that conductors will not be subject to an overload condition due to harmonic effect.

Note: The standard averaging type clamp-on ammeter cannot measure the overload imposed on a system from the effect of harmonics accurately. A "true RMS" type must be used.

Agenda item # 2008ag-05 **CEC 6-206 residential service disconnect outside**

Submitted by: EIAA South chapter

Question/enquiry: Rule 6-206 States that the service equipment be placed within the building being served unless environmental conditions within the building are unsuitable. Sometimes it is very difficult to keep the service conductors as short as practical within the house to comply with Standata 6-206. Or the premises is developed making it awkward or very difficult to comply this requirement. Placing the service entrance equipment on the exterior may ultimately be safer as it eliminates un-fused conductors inside the residence. There are combination service entrance devices available that are CSA approved marked for service entrance. Because of Rule 6-206, this equipment is restricted in use.

Recommendation:

1) Remove special permission requirement to mount a Combination Service Entrance Device (meter base/service disconnect) outside a residential development **or**
2) The rule should be re-worded to say "placed in or on the bldg being served" **or**
3) The Province could issue a province wide variance to allow the practice without special permission.

Background information:

6-206 Consumer's service equipment location (see Appendix B and Appendix G)

(1) Service boxes or other consumer's service equipment shall be
(a) installed in a location that is in compliance with the requirements of the supply authority;
(b) readily accessible or have the means of operation readily accessible;
(c) not located in coal bins, clothes closets, bathrooms, stairways, rooms in which the temperature normally exceeds 30 °C, dangerous or hazardous locations, locations where the headroom clearance is less than 2 m, nor in any similar undesirable locations;
(d) placed within the building being served, unless environmental conditions within the structure are unsuitable, in which case, **where there is a deviation allowed in accordance with Rule 2-030**, the service box or other consumer's service equipment shall be permitted to be placed on the outside of the building or on a pole and shall be
(i) protected from the weather, or be weatherproof; and
(ii) protected from mechanical injury if less than 2 m above ground; and
(e) as close as practicable to the point where the consumer's service conductors enter the building.
(2) Notwithstanding Subrule (1)(b), where subject to unauthorized operation, the service disconnecting means shall be permitted to be rendered inaccessible by
(a) an integral locking device;
(b) an external lockable cover; or
(c) location of the service box inside a separate building, room, or enclosure.

Appendix B note on Rule 6-206(2)

The local regulatory authority may forbid the locking of service boxes in the ON position, for example, on construction sites. Where the operating means of a service switch or circuit breaker is rendered inaccessible, it is recommended that a notice be displayed on the outside of the service box enclosure, room, or building advising of the location of the key to gain access to the service box operating means.

Appendix G note on Rule 6-206(2)

References NBC Section 9.34 Electrical Facilities

9.34.1.3 Entrance switches, meters, panel boxes, splitter boxes, time clocks and other similar equipment shall not be located in any public area unless adequate precautions ate taken to prevent interference with the equipment

Agenda item # 2008ag-06

CEC 10-618 (4) **Bonding methods – stainless steel jacketed Mineral Insulated heat tracing cable**

Question/enquiry: Does industry understand the difference between the stainless steel sheath of MI Cable used to supply power to equipment and the stainless steel sheath of MI Electric Heat Tracing Cable?

Submitted by: Rene Leduc – Marex Canada

Background information:

MI EHT with a stainless steel jacket is a common installation in the oil and gas industry and only comes with 2 conductors enveloped by the outer stainless steel sheath.

Rule 10-618 implies that the SS sheath is unsuitable as a bonding conductor. However, this requirement is intended for when the sheath is to be used as a bonding conductor when supplying power to an end device or equipment. In this case of EHT, the heat tracing itself is the end device.

I believe that Rule 10-618 is intended to address how to ensure that fixed equipment is properly bonded. If a fault occurs at the fixed equipment, the fault current must have a low-impedance path back to source so as to effectively operate any overcurrent devices in the circuit. In the case of a circuit feeding equipment with SS MI cable, a bonding conductor would have to be included in the MI cable since the SS is not adequate. However, MI EHT is not feeding fixed equipment but rather is the fixed equipment, so the MI SS sheath is not serving as a bonding conductor, but rather as the metallic enclosure of a piece of fixed equipment (the EHT). It of course must be bonded by connecting it to a suitable bonding conductor just as stainless steel enclosures in a commercial kitchen must be connected to a suitable bonding conductor.

Recommendation:

A STANDATA to clarify this should be developed as follows:

Rule 10-618 sets "Bonding Methods" for bonding fixed electrical equipment. Subrule (1) prescribes acceptable methods of bonding fixed equipment, while Subrules (2), (3) and (4) describes situations where certain applications are "...not considered as fulfilling the requirements of a bonding conductor...". In Subrule (4), the sheath of mineral insulated (MI) cable when not of copper or aluminum (e.g., stainless steel) is not considered a suitable bonding conductor.

In the application of this requirement, we need to distinguish between:
1) stainless steel MI cable supplying power to electrical equipment; and
2) stainless steel MI electrical heat tracing being supplied power as electrical equipment

In the first situation, a suitable bonding conductor is required to carry any fault currents resulting from a short circuit at the equipment being supplied by the MI cable. A stainless steel sheath on the MI is not considered suitable as a bonding conductor and the MI cable would need to incorporate a suitable bonding conductor.

In the latter situation, the MI electric heat tracing is the equipment being supplied and the stainless steel sheath is not serving as a bonding conductor but rather as the equipment metallic enclosure. The stainless steel metallic sheath of the electrical heat tracing is however, required to be bonded as required by Rule 10-400 and more specifically by Rules in Section 62 such as 62-122(7).

In summary, the stainless steel sheath of mineral-insulated electrical heat tracing is not considered a bonding conductor and consequently, Rule 10-619(4) does not apply. The electrical heat tracing is however fixed electrical equipment and its stainless steel sheath is required to be connected to a bonding conductor.

10-618 Fixed equipment

(4) The sheath of mineral-insulated cable, when not of copper or aluminum, shall not be considered as fulfilling the requirements of a bonding conductor for the purposes of this Rule and bonding shall be by one of the methods specified in Subrule (1)(b), (c), or (d).

(1) Fixed equipment as specified in Rules 10-400 and 10-402 shall, subject to the provisions of Rule 10-804, be bonded to ground in one of the following ways:
(a) an effective metallic connection to grounded metal raceways, metal sheath, or cable armour except
(i) armour as specified in Subrules (2) and (3); and/or
(ii) sheath of mineral-insulated cable when not of copper or aluminum, as specified in Subrule (4); or
(iii) where the raceway or cables are run underground, in locations coming within the scope of Section 22, or otherwise subject to corrosion;
(b) a bonding conductor that is run with circuit conductors as a part of a cable assembly and that may be uninsulated, but, if provided with an individual covering, the covering shall be finished to show a green colour or a green/yellow combination;
(c) a separate bonding conductor installed in the same way as a bonding conductor for conduit and the like; or
(d) other means, where a deviation has been allowed in accordance with Rule 2-030.

Agenda item # 2008ag-07

CEC 10-700 **Grounding of cable tray in classified area**

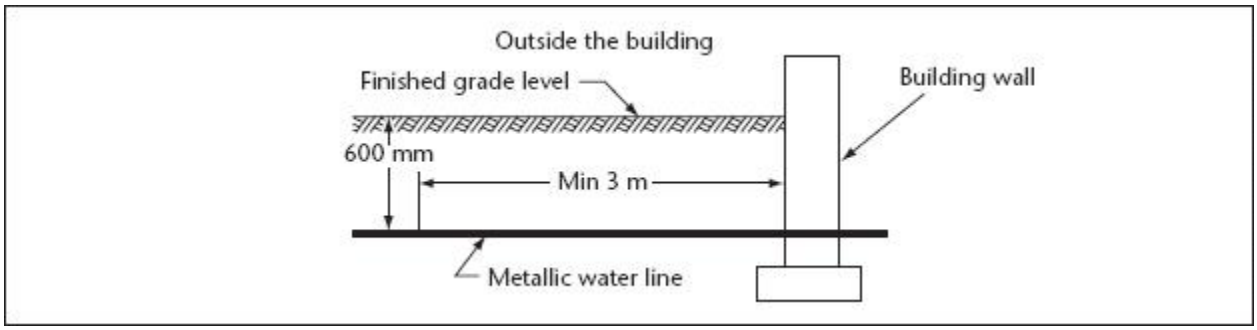
Submitted by: Harry Langner BP Canada Energy

Question/enquiry: Is it necessary to install a ground wire from a pile to the bonding conductor (in cabletray)?

Recommendation: Accept two piles on building (connected) and ground wire in tray as a grounding conductor. It is generally impossible to touch two piles at same time, due to distance. Discussed this with The Administrator (used reference IEEE-142) believes it should be OK.

Background Information:

CEC 10-700 handbook talks about (fig 10-29) use of piles, iron pilings in significant contact with earth. If these pilings are used as a ground, does the cabletray ground require to be bonded at each pile on a highline (usually spaced 20 feet apart?)



Handbook figure 10-29 In-situ grounding electrode — Water piping

12-2208 Provisions for bonding (cable tray)

(1) Where metal supports for metal cable trays are bolted to the tray and are in good electrical contact with the grounded structural metal frame of a building, the tray shall be deemed to be bonded to ground.
(2) Where the conditions of Subrule (1) do not apply, the metal cable tray shall be adequately bonded at intervals not exceeding 15 m and the size of bonding conductors shall be based on the ampacity of the largest ungrounded conductor as specified in Rule 10-814 in the circuits carried by the cable tray.

Subrule (1) allows a metal cable tray to be bonded to ground through the tray's metal supports that are bolted to the tray and in electrical contact with the grounded structural metal frame of the building.

When the tray cannot be bonded to ground by the method in Subrule (1), Subrule (2) requires that a bonding conductor be installed. The bonding conductor must be bonded to the metal cable tray at intervals not exceeding 15 m. The size of the bonding conductor must be based on Table 16 and the largest ungrounded conductor in the circuits in the cable tray.

18-074 Bonding in hazardous locations

(1) Exposed non-current-carrying metal parts of electrical equipment, including the frames or metal exteriors of motors, fixed or portable lamps or other utilization equipment, lighting fixtures, cabinets, cases, and conduit shall be bonded to ground using
(a) bonding conductors sized in accordance with Rule 10-814 .

10-814 Bonding conductor size (see Appendix B)

(1) The size of a bonding conductor shall be not less than that given in Table 16, but in no case does it need to be larger than the largest ungrounded conductor in the circuit.
(2) Where circuit conductors are paralleled in separate cables or raceways, the bonding conductor shall be permitted to be paralleled and the size of bonding conductor in each parallel run shall not be less than that specified in Table 16 based on the size of the circuit conductors contained in the raceway or cable.
(3) Notwithstanding the requirements of Rule 12-108, the size of the bonding conductor in each parallel run shall be permitted to be smaller than No. 1/0 AWG.

Agenda item # 2008ag-08

CEC 12-1114 **Rigid PVC - spacing of supports**

Submitted by: Dennis Smith – Accucode Inspections

Question/enquiry:

1. C.E. Code Is everyone requiring a trade size of 63 or larger Rigid PVC or HFT conduit with 2.5 m spacing between the lower supports?
2. Does this conduit require a weather head?
3. Have the supply authorities co-operated with the required number of stand-offs after the first two?

Recommendation: Open for discussion

Background information:

C.E. Code Rule 12-1114 Maximum Spacing of Conduit Supports and the "Use of Stand-offs to Support Conduit Risers on Supply Authority Poles"

1. C.E. Code Rule 12-1114 Standata
2. Contractors claim this is not being required in all areas of Alberta.

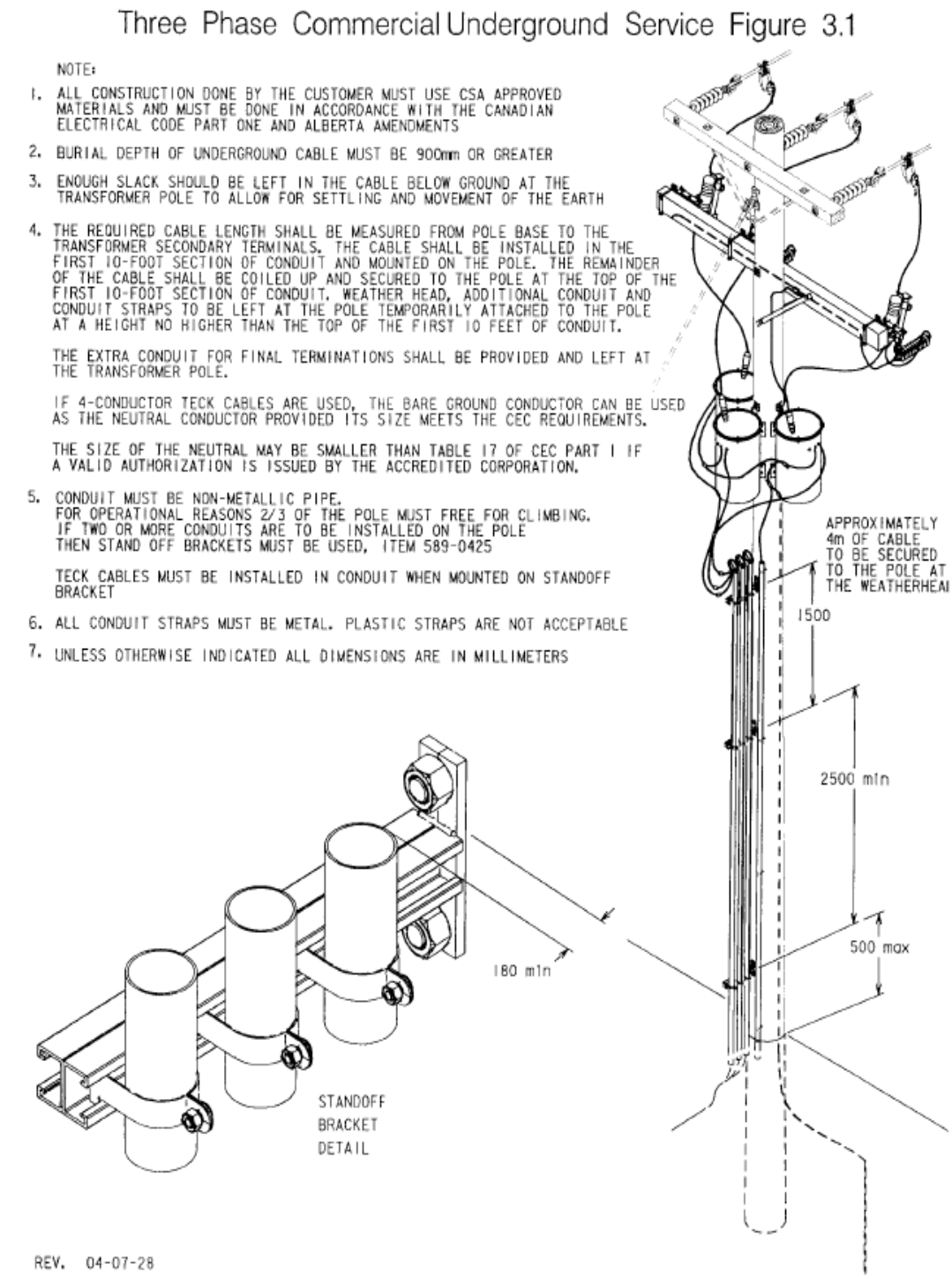
STANDATA CEC 12 Rule 12-1114 Maximum Spacing of Conduit Supports

Use of Stand-offs To Support Conduit Risers on Supply Authority Poles

The Electrical and Communication Utility Code has requirements for mounting equipment on poles to discourage unauthorized climbing. Where the supply authority requires stand-offs and the required distance between supports exceeds that required in the Canadian Electrical Code, Part I, for the raceway the following is recommended:

Rigid PVC or HFT conduit with a trade size of 63 or larger will be acceptable with spacing between supports of 2.5 m, at one point only, to comply with the ECUC requirement. Spacing between supports for the balance of the riser is to comply with Rule 12-1114. This raceway may be installed as a continuous run, or as a sleeve to support a raceway with a smaller trade size. Please contact the local supply authority before placing any equipment on their pole.

Figure 3.1 - Three-Phase Commercial Underground Service



Agenda item # 2008ag-09

CEC 12-2200 **Expansion joint installations in Cable Tray Systems installed in an uncontrolled temperature environment (outdoors).**

Submitted by: Kevin Manchur – Marex Canada

Question/enquiry: Many existing aluminum cable tray installations exceed the expansion joint recommendations from the manufacture. Temperature differential in Alberta is approximately 80 degrees Celsius throughout the year. Accordingly expansion joints and supports within 610mm on either side are recommended every 13 M approximately. How do we justify this rule when the majority of aluminum cable tray that has been installed throughout the years and has expansion joints at 90-100 foot intervals is still intact without any problems? This is a major expense and presents a lot of questions especially when we try to enforce this ruling in existing facilities that are doing expansions involving cable tray. Process Modules are another area that typically do not have expansion joints in cable tray. They are shipped usually in 18 meter straight sections where NEMA VE-2 recommends expansion joints approximately every 13 meters.

Recommendation:

Have a Cable Tray representative discuss this matter to the audience and validate the expansion joint requirement at 13 meters versus the existing Aluminum tray systems that have expansion joints every 27-30 meters. As inspectors we need uniformity and clarification when inspecting cable tray systems.

Background information:

12-2200 Method of installation (see Appendix B)

(1) Cable trays shall be installed as a complete system using fittings or other means to provide adequate cable support and bending radius before the conductors are installed.
(2) **The maximum design and support spacing shall not exceed the ratings specified by the manufacturer**.

Appendix B note on Rule 12-2200

Recommended installation requirements are available **from the manufacturer** of cable trays. Additional points to consider include the following:
(a) The ideal support point for cable tray is at the one-quarter span point.
(b) There should not be more than one joint between support points.
(c) Allowance for wind and snow loading should be included within the maximum design load.
(d) Some fittings (particularly horizontal elbows) may require additional support, depending on the loading.

EEMAC STANDARDS (Canadian)

Electrical Equipment Manufacturers Association of Canada (EEMAC) EEMAC has not supported the development or updating of any EEMAC Industry Product Standards since 1994. While most EEMAC Standards are inactive and out of date, a number of them continue to be referenced in Federal and Provincial legislation and some are still being used by its member companies. There is no plan to formally withdraw the EEMAC Standards at this time. All of the known EEMAC and CEMA Standards are available free of charge for information by downloading from the Electrofederation Canada website.

EEMAC Standard F5-1 (developed 1976) has section 6.4

Expansion and contraction joints shall be provided in straight runs of cabletrough where 1inch or greater movement may be expected, or to coincide with building expansion joints. Table 6.4 is furnished as an aid in determining whether special provision shall be made for contraction and expansion. EG Aluminum: for 25 degree F temperature differential you will get 1" expansion or contraction for every 250 ft of length.

National Electrical Manufacturers Association Standard

NEMA VE 2-2000 (most current version is 2006 – data is the same for expansion plates)

4.3.2 Expansion Splice Plates
It is important that thermal contraction and expansion be considered when installing cable tray systems. The length of the straight cable tray run and the temperature differential govern the number of expansion splice plates required (see Figure 4.12 and Table 4-2).

Where to get design data for temperatures:

Alberta Building Code - Table C2 provides design data for selected areas in Alberta. For example, you can obtain temperature differential from these tables to calculate the number of expansion joints:

Fort McMurray Low temp -39ºc High temp +28ºc = temperature differential of 67ºc

4.3.2 Expansion Splice Plates

It is important that thermal contraction and expansion be considered when installing cable tray systems. The length of the straight cable tray run and the temperature differential govern the number of expansion splice plates required (see Figure 4.12 and Table 4-2).

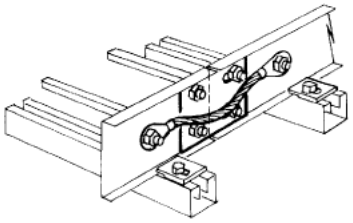


Figure 4.12
EXPANSION SPLICE PLATE ATTACHMENT

*Bonding jumper not required for fiberglass cable tray systems

Table 4-2
MAXIMUM SPACING BETWEEN EXPANSION JOINTS THAT PROVIDE FOR ONE INCH MOVEMENT**

Temperature Differential		Steel		Aluminum		Fiberglass	
°F	(°C)	feet	(m)	feet	(m)	feet	(m)
25	(14)	512	(156)	260	(79)	667	(203)
50	(28)	256	(78)	130	(40)	333	(102)
75	(42)	171	(52)	87	(27)	222	(68)
100	(56)	128	(39)	65	(20)	167	(51)
125	(70)	102	(31)	52	(16)	133	(41)
150	(83)	85	(26)	43	(13)	111	(34)
175	(97)	73	(22)	37	(11)	95	(29)

* The temperature differential is the difference in the temperature between the hottest and coldest days of the year.

** For designs that provide for 5/8 in. (16 mm) movement (typically non-metallic), multiply maximum spacing between expansion joints by 0.625.

The cable tray should be anchored at the support nearest to its midpoint between the expansion splice plates and secured by expansion guides at all other support locations (see Figure 4.13A). The cable tray should be permitted longitudinal movement in both directions from that fixed point.

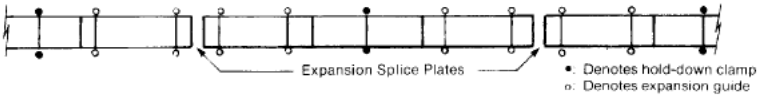


Figure 4.13A
HOLD DOWN AND GUIDE CLAMP LOCATIONS

Accurate gap setting at the time of installation is necessary for the proper operation of the expansion splice plates. The following procedure should assist the installer in determining the correct gap (see Figure 4.13B):

a. Plot the highest expected temperature on the maximum temperature line. Example Value = 100°F (38°C)

b. Plot the lowest expected temperature on the minimum temperature line.

Example Value = -28°F (-33°C)

c. Draw a line between the maximum and minimum points.

d. Plot the temperature at the time of installation to determine the gap setting.
Example Value = 3/8 in. (9.5 mm), 50°F (10°C).

Special hardware is supplied with expansion splice plates. The nuts may have a stopping device (plastic stop nut). **Important**—for plastic stop nut designs, tighten hardware, and then loosen 1/2 turn. For other types of hardware, follow manufacturer's instructions.

Metal Cable tray expansion joints require bonding for electrical continuity. Refer to Section 4.7 for bonding jumper installation (see Figure 4.12).

Supports should be located within 2 ft. (600 mm) of each side of expansion splice plates.

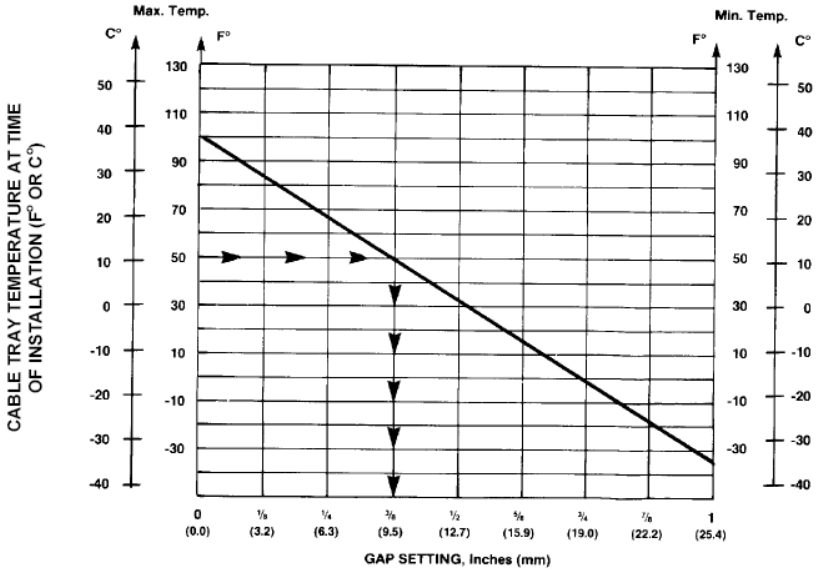


Figure 4.13B
GAP SETTING OF EXPANSION SPLICE PLATE
1 in. (25.4 mm) Gap Maximum*

*For designs using 5/8 in. (15.9 mm) maximum gap (typically non-metallic), multiply gap setting by 0.625.

4.3.3 Vertical Adjustable Splice Plates (See Figures 4.14A and 4.14B.)

For changes in vertical direction not requiring a radius, vertical adjustable splice plates can be used. Supports should be located within 2 ft. (600 mm) of each side of vertical adjustable splice plates.

a. Position splice halves so that offsets adjust for material thickness and fasten with nut and bolt using hole (A).

Agenda item # 2008ag-10

CEC 12-3022 (7) (8) **Terminating single conductor tray cables**

Submitted by: Don Ursuliak

Question/enquiry:

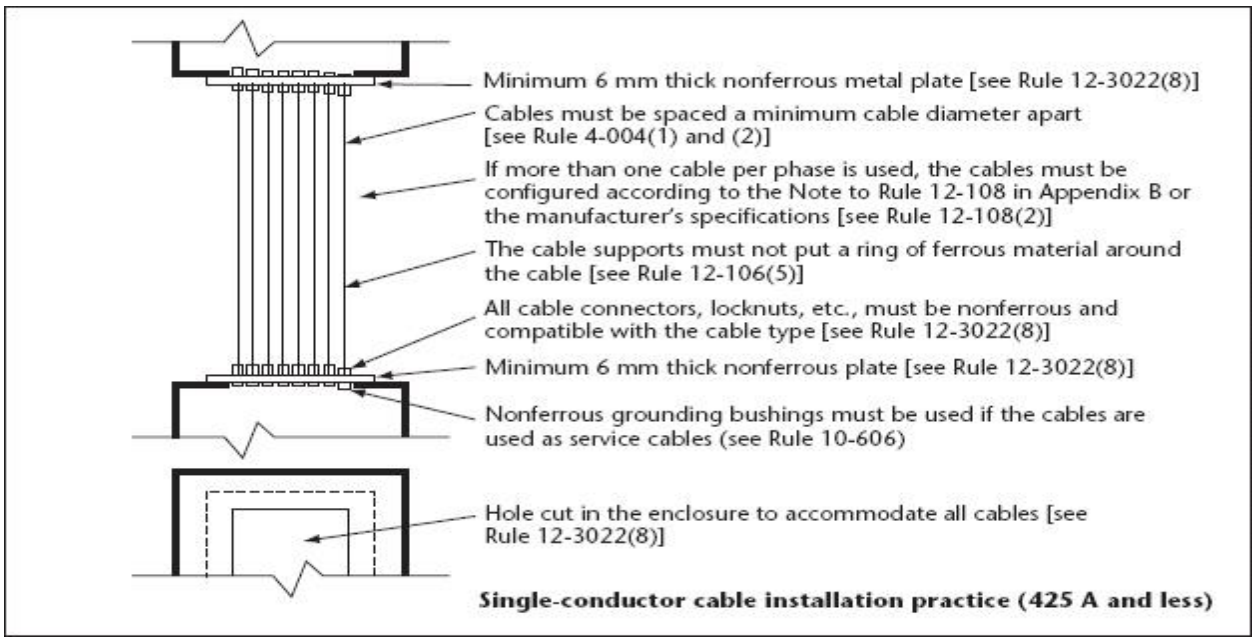
When terminating single conductor un-armoured (cable tray), do the precautions outlined in rule 12-3022 have to be observed?

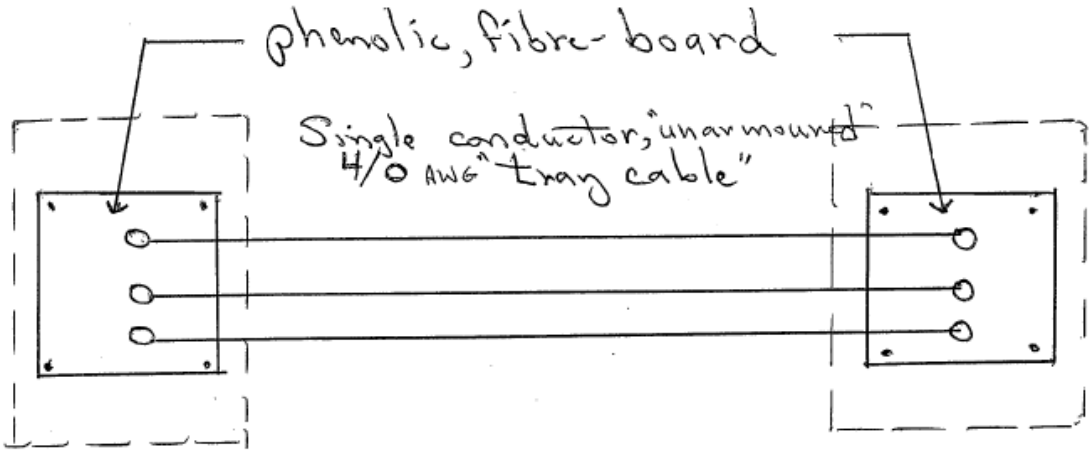
Background Information:

- See pages 181, 182 of the 2006 handbook (425A or less) indicating single conductor metal sheath cable.

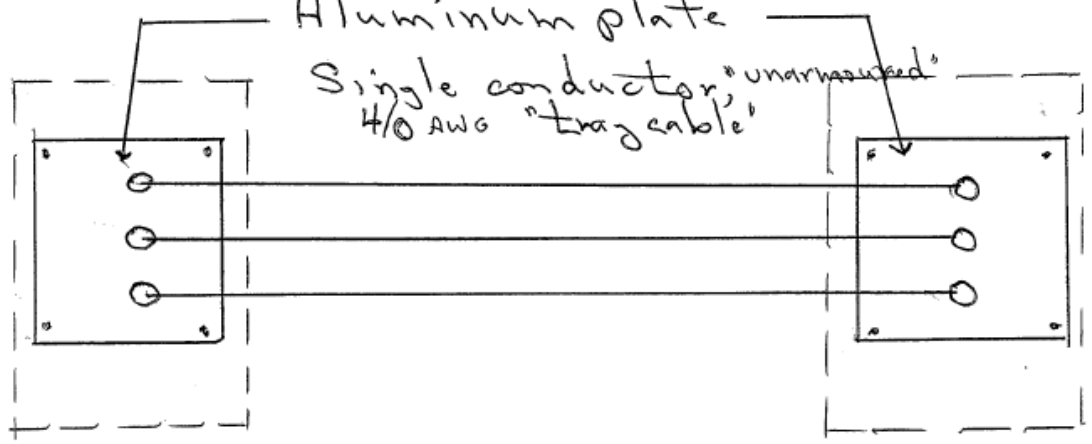
12-3022 Entrance of conductors into boxes, cabinets, and fittings (see Appendix B)

(7) Where single-conductor cables or conductors enter metal boxes through separate openings, precaution shall be taken to prevent overheating of the metal by induction if the current carried per conductor exceeds 200 A.
(8) Precautions to be taken to prevent overheating of the metal by induction shall include the use of nonferrous or non-metallic box connectors, locknuts, and bushings and if nonferrous metal plates or insulating plates are field installed, they shall be at least 6 mm thick unless a deviation is allowed in accordance with Rule 2-030.





a) Using PVC, glands connectors to terminate cable
b) " non-magnetic " " " "
c) " steel " " " "



a) Using non-magnetic connectors to terminate cable
(b) " steel " " " "

Agenda item # 2008ag-11

CEC 12-3022 **Tray cables with connectors**

Submitted by: Ken Bjerke

Question/enquiry:

Does the code intend that we do not require connectors on tray cables?

Recommendation: A STANDATA to be issued to include cable tray under definition of non-metallic sheathed cable in Table 19 and definitions in section 0 or to include tray cable in rule 12-3022 (3)

Background Information:

- Seeing tray Cables randomly inserted into panels, switchgear and end devices via conduit sleeves.

12-3022 Entrance of conductors into boxes, cabinets, and fittings (see Appendix B)

(1) Where conductors pass through the walls of boxes, cabinets, or fittings, provision shall be made to
(a) protect the insulation on the conductors from injury;
(b) protect terminal connections from external strain;
(c) provide electrical continuity between a metal box, cabinet, or fitting and conduit, armour, or metal sheathing of conductors, whether or not the armour or metal sheathing is to be used as a grounding conductor;
(d) prevent injury to a non-metallic sheath applied over armour or metal sheathing for protection against moisture or corrosion; and
(e) close the openings through which the conductors pass in such a manner that any remaining opening will not permit entrance of a test rod 6.75 mm in diameter.
(2) Where conductors run as open wiring enter a box, cabinet, or fitting, they shall pass through insulating bushings or be installed in raceways or insulating tubing.
(3) Where non-metallic-sheathed cable enters a box, cabinet, or fitting, a box connector, either as a separate device designed for use with such cable or as part of the box, cabinet, or fitting, shall be used to secure the cable in place adequately and without injury to the conductors.

Agenda item # 2008ag-12

CEC 16-212 **Interlocking furnace blower and principal ventilation fan**

Submitted by: Noel LaCasseur – Accucode Inspections

Question/enquiry:

1. C.E. Code Rule 16-212 Standata April 2004 displays a diagram and then states or other acceptable methods. What are some other acceptable methods?

2. Where the bathroom fan is used as a Principle Exhaust Fan can it be run independent of the furnace from the bathroom switch and be interlocked with a two pole Principle Exhaust Fan switch in the hallway?

Background information:

C.E. Code Rule 16-212 STANDATA April 2004

Recommendation:

Open for discussion

2008 Annual Technical Conference

Agenda item # 2008ag-13 **CEC 18-092 Variances STANDATA**

Submitted by: Ken Butler

Question/enquiry: Is it possible to have the rule rescinded or modified? If it is not possible on the provincial level, is it possible that the PCAC can move the request to the Part 1 committee?

Recommendation: That this rule be taken out of Part 1 of the code. That end devices designed to be in contact with fluids under pressure be able to comply with the ANSI standard to qualify for any approval status for installation in Alberta. Failing that, have them shipped with the required and properly rated secondary seal with instructions for its correct installation. Please forward this to the CEC Part 1 and 2 committees.

Background information: The present rule (provincial variance) encompasses too many installations and pieces of equipment and too many wiring methods and installation techniques. In too many cases the rule as it is required to be applied makes no sense, and adds no value to an installation. It does add a great burden in cost and care, both in the field and at the administrative level. The Administrator has been approached with this problem, but has stated that he is not prepared to change it (the STANDATA). This is unfortunate, as the problem is not going to go away and the issue that precipitated the all encompassing Part 1 rule would be better death with in Part 2. It should be deleted in its present place and wording.

Agenda item # 2008ag-14

CEC 26-724 **Residential outside receptacles – handbook errors**

Submitted by: Len Elford – City of Calgary

Question/enquiry:

Although only one outdoor receptacle is required by rule 26-714(a), if additional receptacles are installed outdoors are they required to be on a dedicated circuit as well or if only one receptacle is required to be on a separate circuit, why do they refer to receptacles in 26-724?

Recommendation:

Change the wording in the Code Book or Handbook to clarify the intent.

Background Information:

Rule 26-724(a) States that: Outdoor receptacles installed in accordance with Rule 26-714(a) be supplied from at least one branch circuit dedicated for those outdoor receptacles. (plural)

Rule 26-724 (page 334) in the CE Code Handbook requires provision of a dedicated branch circuit for the "receptacle" (singular) located outdoors to ensure that electric tools and appliances do not affect the circuit for loads inside the single dwelling. Also on page 323 of the handbook and page 21 of the CE Code Pocket Reference indicates that: when additional receptacles (plural) are installed outdoors, they are not required to be on a separate branch circuit.

26-714 Receptacles for single dwellings (see Appendix B and Appendix G)

This Rule applies to receptacles for single dwellings only as follows:
(a) for each single dwelling, at least one duplex receptacle shall be installed outdoors so as to be readily accessible from ground or grade level for the use of appliances that need to be used outdoors;

26-724 Branch circuits for single dwellings

This Rule applies to branch circuits for single dwellings only as follows:
(a) outdoor receptacles readily accessible from ground level and installed in accordance with Rule 26-714(a) shall be supplied from at least one branch circuit dedicated for those outdoor receptacles

Agenda item # 2008ag-15 **Location of residential furnace disconnect switch**

C.E.C. 26-806 **Submitted by: unknown**

Question/enquiry: Some furnace disconnects (switches) are not readily accessible and may require a step ladder to reach it. This is not considered as readily accessible as per CEC 28-604(3)

Recommendation: Have a stipulation in CEC or STANDATA stating maximum height from floor level for furnace disconnect switch similar to breaker heights

Background information: see rule 28-604 (3) (6)

26-806 Heating equipment rated 117 kW and less (see Appendix B)

(5) Suitable disconnecting means shall be provided for the branch circuit.
(6) The disconnecting means shall be permitted to be a branch circuit breaker at the distribution panelboard, provided that the panelboard is located between the furnace and the point of entry to the area where the furnace is located.
(7) Where a separate switch is required, due to the unsuitable location of the branch circuit breaker, it shall
(a) not be located on the furnace nor in a location that can be reached only by passing close to the furnace; and
(b) be marked to indicate the equipment it controls.

28-604 Location of disconnecting means

(1) Motor branch circuit disconnecting means described in Rule 28-602(1)(a), (b), (c), and (d) shall
(a) be located at the distribution centre from where the motor branch circuit originates; and
(b) where intended to serve as a single disconnecting means for a motor branch circuit, motor, and controller or starter shall also be
(i) located in accordance with Subrule (3); or
(ii) capable of being locked in the open position by a lock-off device approved for the purpose and be clearly labelled to describe the load or loads connected.
(2) Motor branch circuit disconnecting means described in Rule 28-602(1)(f) shall be located in accordance with Subrule (3).
(3) Except as required in Subrule (5), motor and motor starter or controller disconnecting means shall be located
(a) within sight of and within 9 m of the motor and the machinery driven by it; and
(b) within sight of and within 9 m of the motor starter or controller.
(6) Disconnecting means shall **be readily accessible** or have the means for operating them readily accessible.

Agenda item # 2008ag-16 **CEC 30-504 Stairway (lighting)**

Submitted by: Dan Sereda City of Calgary

Question/enquiry: Do motion detectors and wireless switches comply with the intent of sub-rule 30-504 (1)

Recommendation: For discussion.

Background information:

When the basement is developed a 3-way wall switch is required. If the staircase is drywalled it is difficult to install the three wire conductor to the existing switch located at the head of the staircase. Motion detectors and new wireless switches are available that can be installed rather than a conventionally wired 3 way switch. These are approved and appear to meet the intent of the rule when wall mounted at the head and foot of the stairway.

30-504 Stairways (see Appendix G)

(1) Every stairway shall be lighted.
(2) Except as provided in Subrule (3), 3-way wall switches located at the head and foot of every stairway shall be provided to control at least one luminaire for stairways with four or more risers in dwelling units.

Switch- defined term in Section 0

Switch — a device for making, breaking, or changing connection in a circuit.

General-use switch — a switch intended for use in general distribution and branch circuits and that is rated in amperes and is capable of interrupting its rated current at rated voltage.

Agenda item # 2008ag-17

CEC 46-202 **Emergency systems reference to CSA standard**

Submitted by: Don Bradshaw – City of Airdrie

Question/enquiry: There have recently been installations utilize emergency generators running selected lighting rather than providing (battery powered) unit equipment emergency lighting. The 2006 CEC has a new clause requiring the installation to conform to CSA C282. Is it the electrical SCO's responsibility to ensure all the installation, testing and maintenance program items listed in this standard are met? Or does this responsibility fall to the Building SCO as both codes have this requirement?

Recommendation: As with fire alarms, the building and electrical disciplines must work together to ensure everyone involved in the development are aware of and meet the code requirements, including those requirements in required reference standards. The installation performance tests listed in section 9 of the CSA C282 should be witnessed and signed off by the electrical engineer of record.

Background information:

Section 46 — Emergency systems, unit equipment, and exit signs

46-000 Scope

(1) This Section applies to the installation, operation, and maintenance of emergency systems and unit equipment intended to supply illumination and to emergency systems intended to supply power, in the event of failure of the normal supply, where required by the National Building Code of Canada.
(2) This Section applies to the wiring of exit signs.
(3) The requirements of this Section supplement or amend the general requirements of this Code.

46-202 Supply **(see Appendix G)**

(1) The emergency supply shall be a standby supply consisting of
(a) a storage battery…..to supply and maintain at not less than 91% of full voltage the total load of the emergency circuits for the time period required by the National Building Code of Canada, but in no case less than 30 min….. or
(b) a generator driven by a dependable prime mover.
(3) Where a generator is used, it shall be
(a) of sufficient capacity to carry the load;
(b) arranged to start automatically without failure and without undue delay upon the failure of the normal power supply of the equipment connected to this generator; and
(c) **in conformance with CAN/CSA-C282**, except for a generator installed in health care facilities as described in Rule 24-306.

ABC 3.2.7. Lighting and Emergency Power Systems

3.2.7.4. Emergency Power for Lighting

1) An emergency power supply shall be

a) provided to maintain the emergency lighting required by this Subsection from a power source such as **batteries or generators** that will continue to supply power in the event that the regular power supply to the building is interrupted, and
b) so designed and installed that upon failure of the regular power it will assume the electrical load automatically for a period of
i) 2 h for a building within the scope of Subsection 3.2.6.,
ii) 1 h for a building of Group B major occupancy classification that is not within the scope of Subsection 3.2.6., and
iii) 30 min for a building of any other occupancy.

3.2.7.5. Emergency Power Supply Installation

1) Except as required by Articles 3.2.7.6. and 3.2.7.7., an emergency electrical power system shall be **installed in conformance with CAN/CSA-C282-M, "Emergency Electrical Power Supply for Buildings."**

3.2.7.6. Emergency Power for Health Care Facilities

1) Except as required by Article 3.2.7.7., an emergency electrical power system for emergency equipment required by this Part for health care facilities shall be installed in conformance with CAN/CSA-Z32.4-M, "Essential Electrical Systems in Health Care Facilities."

Note:
ABC 3.2.7.8 - references emergency power for fire alarm systems
ABC 3.2.7.9 - references emergency power for building services in high rises

CAN-CSA C282 - Emergency Electrical Power Supply for Buildings

1. Scope
2. Definitions and Reference Publications
3. General Requirements
4. Emergency Electrical Power Supply System
5. Emergency Electrical Power Supply Plant
6. Generator Set
7. Generators, Exciters, and Voltage Regulators
8. Transfer Switches
9. Initial Installation Performance Tests
*** 9.2 Operational Test**
*** 9.3 Full Load Test**
10. Operation and Maintenance Program