

October 2013

CEC-6 [rev-5]

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## CANADIAN ELECTRICAL CODE

**SUBJECT: Section 6 – Services and Service Equipment**

### **Rule 6-102 Number of Supply Services Permitted**

#### Row Housing Type Residential Dwelling Units

Discussion with various provincial and municipal inspection authorities has resulted in the interpretation of Rule 6-102 as permitting a multi-unit residential building of the row housing type to have more than one supply service, one to each self-contained occupancy, provided:

- a fire-separation, meeting the requirements of the Alberta Building Code, separates each occupancy, and
- each occupancy has a separate entrance with direct access to ground level.

### **Rule 6-112 Attachment of Overhead Service Conductors**

#### Use of Rigid Steel Conduit as a Service Mast

Rule 6-112(4) states that service masts shall be assembled from components suitable for such use. (See the Appendix B note for this rule). To be acceptable, a service mast must be able to withstand the stresses it may be subjected to.

In complying with 6-112(4), Alberta has historically accepted rigid steel conduit in trade sizes 1¼ and larger to be used as a service mast provided:

1. the point of attachment for the supply service drop does not extend above the roof more than the following distances:

Conduit Trade Size	Distance Above Roof
35	450 mm
41	600 mm
53	900 mm

**Note:** 1) If the distances above must be exceeded, an acceptable alternate type of service mast must be installed. To ensure an acceptable installation, consult with the inspection authority having jurisdiction.

2) Electrical metallic tubing and aluminum conduit are not suitable for use as a service mast.



Issue of this STANDATA is authorized by  
the Chief Electrical Administrator

[Original Signed]  
Clarence C. Cormier, P.Eng.



SAFETY CODES COUNCIL

2. Where 35 and 41 trade size conduits are used, the stress imposed by aluminum neutral supported (NS) cable is minimized by ensuring that the NS cable is No. 4 AWG or smaller and the span does not exceed 30 m in length with a sag of 450 mm at 15°C.
3. The conduit is secured to the building with at least two “anchor” or “U” bolts spaced at least 450 mm apart with one placed near the roof line and the other near the meter socket. Standard conduit straps are not acceptable for this purpose.
4. A suitable roof jack is installed where the mast extends through the upper section of the roof.
5. The service drop is attached to the mast with an insulator located at least 300 mm above the roof surface and not more than 300 mm below the service head.

Where a supporting mast is installed at a distance greater than 600 mm from the outer edge of the roof, or the service drop extends away from the building at an angle less than 45° from the roof edge, the vertical clearances in 12-310 will apply.

## **Rule 6-200 Service Equipment**

### Service Equipment

Equipment approved as switchgear, industrial control equipment, or distribution panelboards may not incorporate the features necessary to comply with the definition of “service box” contained in the Canadian Electrical Code. To be acceptable for this purpose, equipment should be constructed in conformance with the applicable requirements of the CSA Standards.

Following is a general guide for determining the suitability of a switch or circuit breaker forming part of an assembly for use as a service entrance:

1. The main switch or circuit breaker is separated from the feeder or branch circuit distribution compartment by sheet metal barriers or equivalent with bushed holes for the necessary wiring between compartments;
2. The main switch or circuit breaker compartment has a separate access cover with means for locking or sealing the cover in the closed position;
3. The service disconnecting means is manually operable with the cover closed and no bare live parts are exposed;
4. The operating handle of the switch or circuit breaker is capable of being locked in the “OFF” position;
5. The service enclosure has a neutral assembly with an adequate number of wire connectors for individual conductors; and
6. A solderless connector, clamp or other suitable means for bonding the enclosure to the neutral assembly in the main compartment.

In some jurisdictions in Alberta, single family farms with services up to 200 A have been permitted to use the utility-owned equipment as the consumer service disconnect. This has led to inconsistent application of Code requirements in the province. It is now recognized that the previously permitted installation is not compliant with the Canadian Electrical Code requirement for consumers’ services. Utility-owned equipment such as the commonly-used “economizer/totalizer” for farm services typically does not comply with the definition of “service box” and, therefore, cannot be considered to be acceptable as a consumer service disconnect.

Moving forward, several code-compliant installation methods exist and should provide sufficient flexibility for all services for farms under 200 A. The installation of the utility-owned equipment is not restricted under the requirements of the CEC and the installation of an “economizer/totalizer” is not prevented by this information bulletin. However, this piece of equipment cannot be considered to be the consumer’s service disconnect required by Rule 6-200(1). Users are reminded to consider Sections 6 and 10 requirements when planning the consumer’s service for a single family farm up to 200 A.

### **Rule 6-206 Consumer's Service Equipment Location**

#### Length of Service Conductors in Buildings

Rule 6-206(1)(c) requires that service equipment be located as close as practicable to the point where the service conductors enter the building. Rule 6-208 outlines where the conductors must be located. Both rules recognize that service conductors must enter the building to make connection to the service equipment. While it is generally agreed that in the interest of safety the unfused conductors within the building should be as short as possible, this distance is not clear.

A recommended practice in Alberta is to limit the length of service conductor in the building to 3m. Where this is not practicable, service conductors may extend further inside the building provided they are mechanically protected in rigid metal conduit. The maximum distance for service conductors inside a building should not exceed 7.5 m.

Alternatively, Rule 6-206(3) may be applied in situations when the service panel cannot be located near the point of entry of the consumer’s service conductors. In this case, a Safety Codes Officer must evaluate each situation on an individual basis.

### **Rule 6-300 Installation of Underground Consumer’s Services (0-750 V)**

#### Underground Service Cable on the Customers' Premises

Electrical utilities do not always install secondary underground service cable on the customers' premises. In these situations, it is necessary for the property owner, developer or contractor to arrange for the safe and reliable installation of this facility.

The following guidelines are recommended:

1. Only competent, qualified installers should install underground service conductors.
2. Obtain the appropriate electrical permits from the inspection authority having jurisdiction.
3. To facilitate connection to the utility distribution system, terminate the supply end of the service conductors in a location and manner acceptable to the supply authority.
4. Tape or otherwise seal the exposed supply end of the consumer's service conductors to prevent the entry of moisture into the conductors or cable.
5. Provide mechanical protection as necessary to prevent damage to the conductors or cable pending connection by the supply authority.
6. The supply authority is responsible for connecting the consumer's service conductors to the supply lines.
7. Ensure that service conductors and cables are approved and suitable for the application in accordance with Rule 2-024, 6-300 and Table 19.

8. Where settlement of earth is likely to occur, position conductors in a manner that will prevent settlement of the surrounding earth from placing any strain on the conductors entering the meter socket or building. Trench to a depth where the conductors will be laid on solid undisturbed ground.
9. To prevent strain on the connections in the meter socket, arrange the conductors to form an inverted "U" above the line side terminals.
10. Label the service box with wording similar to:

**Warning** - This building is supplied by an  
underground electric service.  
CALL "ALBERTA ONE-CALL"  
BEFORE YOU DIG at 1-800-242-3447  
(Toll Free)

11. To avoid inconvenience and unnecessary costs to the customer, co-ordinate the installation of the power conductors with telephone and/or T.V. services.

The telephone and T.V. cables may be installed without a fixed minimum separation from the power service conductors, provided:

- a concentric neutral cable or metal covered cable is used for the power conductors, or
- the power conductors are installed in a conduit or plastic pipe.

Otherwise, the separation between the communication cables and the power service conductors should be not less than 300 mm of well-tamped earth, 100 mm of brick, or 75 mm of concrete.

12. Place service conductors loosely on undisturbed earth and install and protect them in accordance with Rule 12-012.

### Depth of Burial

Rule 6-300(1)(b)(i) references Rule 12-012 for underground installation requirements. Rule 12-012(1) further references Table 53 for proper burial depths. Because of potentially much larger fault currents, Alberta has traditionally adopted more stringent depth requirements for direct-buried service entrance cables.

It is recommended that minimum cover requirements for direct buried service entrance conductors, cables or raceways be to the requirements for vehicular areas as shown in Table 53, even in non-vehicular areas.

### Underground Service Entrance (USE) Cables

Rule 6-300(1)(b) recognizes the use of service entrance cable for consumer's service conductors. Service entrance cable is also acceptable as a feeder conductor (sub-service) from the distribution panel to supply electrical service to other buildings when run underground. To comply with Rule 10-208(a), the grounded circuit conductor (neutral) of USE cables used as sub-service feeder conductors must be connected to a grounding electrode at the building or facility being supplied. At the point of supply, it may not be practical to isolate the bare neutral conductor of a USEB-90 sub-service feeder cable from ground as per Rule 10-204(1)(d).

Underground service entrance cable assemblies listed in Table 19 are not intended for above ground applications. The Code however, permits the cable to be extended out of the ground for termination on a structure, pole, or in a building and rigid conduit is used for mechanical protection as required.

When USEB-90 cable is used for an underground service installation, it may extend from the meter socket to the service box.

Any cable extending into a building is required to have the appropriate flame spread rating unless it is enclosed in metallic armour or a raceway. To comply with the Alberta Building Code, the raceway must be non-combustible unless the building is of combustible construction, in which case a combustible raceway having a flame spread rating of not more than 25 may be used.

Where USEB-90 is installed in a raceway, care must be taken to ensure the cable is not bent or handled in a way that will damage the conductors or the outer jacket. USEI-90 service entrance cable does not have an overall armour or concentric neutral and should be installed using the same wiring methods as for individual conductors.

#### Connection of Consumer's Service Conductors to Pad Mount Transformers

The supply authority is responsible for the safety and acceptability of secondary terminations on their pad mount transformers regardless of who makes the actual connections. The following guidelines are recommended regarding safety procedures for the connection of a Consumer's service to the secondary terminals of a utility pad mount transformers:

1. Obtain written authorization and supplementary instructions from the supply authority before commencing electrical work in the pad mount transformer enclosure.
2. Supply and install terminating lugs
  - approved for the type of conductors used, and
  - compatible with the secondary terminals or bus of the transformer
3. Ensure that the supply authority inspects the terminations prior to energizing the transformer.

#### Maintenance of Underground Consumer's Services

If breakdown occurs in underground service conductors or repairs become necessary, the local electrical utility company must be contacted to disconnect and isolate the consumer's service conductors from the power supply.

The electrical utility companies have an agreement with "Alberta One-Call" to locate and mark the location of the underground service conductors for digging postholes or other excavation and digging operations.

Rule 6-300(1)(b)(ii) requires that metallic sheathed cable or concentric neutral cable is to be installed without splice or joint from the point of connection at the supply service to the meter socket or service equipment in the building. However, Rule 12-112(5) allows underground runs of cable to be spliced with suitable splicing devices or materials (kits) when the original installation is damaged.

## Electrical Conductors and Gas Services in the Same Trench

The Electrical Code does not establish specific requirements for installing Electrical Conductors in the same trench as gas-lines. Gas services installed by gas utilities are subject to requirements administered by Alberta Infrastructure. If you wish to install electrical conductors in the same trench as a gas service, consult the local gas utility for advice.

Gas sub-service lines (i.e., house to garage) are an owner responsibility and when electrical conductors are installed in the same trench, it is recommended that the two systems be separated by 300mm of well tamped earth or a 50mm treated plank.

## **Rule 6-312 Condensation in Consumers' Service Raceway**

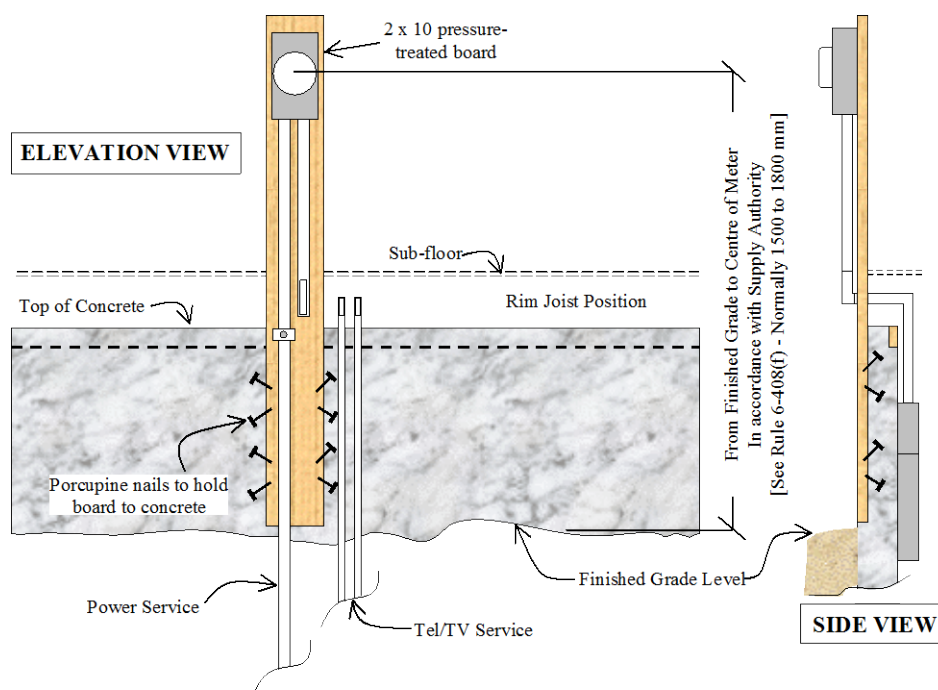
The industry has expressed concern with the ongoing use of fibreglass thermal insulation for sealing service raceways. The insulation often becomes saturated with moisture making it no longer effective and increasing the potential for rupture of the raceway during “freeze/thaw” cycles. Rule 2-122(2) does not permit the use of thermal insulation for this purpose. “Duct Seal” or other approved compounds are acceptable.

## **Rules 6-400 to 6-412 Metering Equipment**

The location and type of metering equipment must be acceptable to the supply authority. To avoid costly changes and delays in getting a power connection, please consult the local supply authority for metering requirements.

## Residential Permanent Meter Socket Support

Normally the meter socket and service equipment is installed once the outside walls are constructed. Some contractors however, have introduced alternate means of supporting the meter prior to outside walls being constructed in order to provide electrical service earlier during the



construction phase of the residence. In these circumstances, consideration must be given to ensuring that the meter is effectively supported. The diagram to the left shows one acceptable method of supporting the meter.

In addition to effective meter support, precautions must be taken to protect the panelboard from the effects of rain until the sub-floor is in place.

### Installation of Current Transformers

For protection and safety of workers, the industry is reminded to short circuit the terminals of current transformers before opening the metering circuit while the system is energized. By design, current transformers may produce an extremely high open circuit voltage with the potential for serious shock hazard and equipment damage.

At installation, an accessible shorting block or similar mechanism should be provided for workers to be able to readily short circuit the current transformer circuit prior to opening the circuit.