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b) for the purpose of connecting equipment to BC Hydro equipment;
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Scope

This manual is one of a series containing standards for construction of the BC Hydro electrical distribution plant within the service area of BC Hydro. A new distribution plant shall be designed, constructed, owned, operated, maintained and repaired to these standards.

Purpose of Standards

BC Hydro objectives require standardization to:

a) Ensure uniform safety requirements comply with BC statutes and regulations.
b) Provide uniform system reliability.
c) Provide uniform operating practices.
d) Permit economic bulk purchasing of materials.
e) Achieve optimum life cycle cost of plant construction.
f) Effect efficient quality assurance.

Responsibility

The Distribution Standards Department prepares these standards and verifies that specified plant and procedures will perform adequately under all normally expected conditions encountered throughout the province of British Columbia. These standards are approved by Professional Engineers. It is the responsibility of BC Hydro Managers to ensure that the standards are followed unless abnormal conditions are encountered that require variations. These variations should be kept to a minimum and their performance shall be the responsibility of the Professional of Record in charge of the project, who will record and seal the variation based on satisfactory qualifications and experience to do so. As per the latest revision of the BC Hydro Distribution Owner's Engineer Guide, these variations must be accepted by BC Hydro's Owner's Engineer.

Use of Stock Materials

The electrical distribution plant covered by these standards is built using stock materials approved by a Professional Engineer as required by law. The use of non-stock materials for special and unusual situations must be approved by Distribution Standards or the BC Hydro Engineer responsible for the project.

Revisions to Manual

These standards are revised from time to time to improve the safety, performance, workability, cost effectiveness or appearance of the plant. The existing plant built to previous standards need not be updated unless so specifically advised by BC Hydro. When maintenance or other work, such as voltage conversion or conductor change is being done, updating plant to current standards is encouraged.

Mailing Addresses

The manual has been issued to a corporation or firm rather than to an individual. The corporation or firm is responsible for the safekeeping of the manual, and for keeping it current. Changes of address or in number of copies required must be reported promptly.

Suggestions for changes in the manual, or required changes of address may be made on the pre-addressed comment sheet included in the Manual and with each issue of revision.

Requirements for Primary Service Voltage Revenue Metering (4 kV to 35 kV)

June 2022

BC Hydro
Power smart

Copyright and Reprint Provision

Table of Contents

1. Overview

This document contains the requirements for BC Hydro distribution system primary service voltage class revenue metering. The meter records the power delivered by BC Hydro to the Customer.

Responsibilities are for Load Only applications, where the **Customer** only purchases power from BC Hydro (BCH);

Possible primary service voltages include:

BC Hydro Power System	BC Hydro Primary Service Voltage Class	Nominal Voltage		CSA Equipment Voltage Class
Distribution System	35 kV *	19,920/34,500Y V	3 Phase, 4 Wire	35 kV
	25 kV	14,400/24,940Y V	3 Phase, 4 Wire	27.5 kV
	12 kV	7,200/12,470Y V	3 Phase, 4 Wire	15 kV
	4 kV	2,400/4,160Y V	3 Phase, 4 wire	5 kV
	35 kV *	19,920 V	1 Phase, 2 Wire	35 kV
	25 kV	14,400 V	1 Phase, 2 Wire	27.5 kV
	12 kV	7,200 V	1 Phase, 2 Wire	15 kV
	4 kV	2,400 V	1 Phase, 2 Wire	5 kV

* Restricted to a limited number of rural circuits in the Central Interior.

2. Disclaimer

This document is not intended as a design specification or as an instruction manual for the Customer and this document shall not be used by the Customer for those purposes. Persons using information included in this document do so at no risk to BC Hydro, and they rely solely upon themselves to ensure that their use of all or any part of this document is appropriate in the particular circumstances.

The Customer, its employees or agents must recognize that they are, at all times, solely responsible for the plant design, construction and operation. Neither BC Hydro nor any of their employees or agents shall be nor become the agents of the Customer in any manner howsoever arising.

BC Hydro's review of the specifications and detailed plans shall not be construed as confirming or endorsing the design or as warranting the safety, durability or reliability of the Customer's facilities. BC Hydro, by reason of such review or lack of review, shall be responsible for neither the strength, adequacy of design or capacity of equipment built pursuant to such specifications, nor shall BC Hydro, or any of their employees or agents, be responsible for any injury to the public or workers resulting from the failure of the Customer facilities.

In general, the advice by BC Hydro, any of its employees or agents, that the Customer's plant design or equipment meets certain limited requirements of BC Hydro does not mean, expressly or by implication, that all or any of the requirements of the law or other good engineering practices have been met by the Customer in its plant, and such judgement shall not be construed by the Customer or others as an endorsement of the design or as a warranty, by BC Hydro, or any of its employees.

The information contained in this document is subject to change and may be revised at any time. BC Hydro should be consulted in case of doubt on the current applicability of any item.

3. General

3.1 Approval

The proposed revenue metering equipment locations shall be approved by BC Hydro prior to installation and commissioning.

3.2 Location

Revenue metering equipment:

(a) Shall be installed in a clean readily accessible location free from severe or continual vibration; and
(b) Shall be installed in accordance with the latest edition of the Canadian Electrical Code; and
(c) Shall not be installed in locations which may be hazardous to persons installing, testing or maintaining the equipment; and
(d) Shall be protected from damage due to vandalism, vehicles, etc.

In accordance with Section 2 of the Canadian Electrical Code, a minimum working space of 1 m shall be provided and maintained about revenue metering equipment.

3.3 Access

BC Hydro shall have reasonable access to the revenue metering equipment to permit its installation, testing and maintenance.

For an indoor meter socket:

(a) Accessibility arrangements shall be agreed upon by BC Hydro prior to approval of the proposed location; and
(b) Where practicable, rooms containing a meter socket shall be accessible by a door leading directly to the exterior of the building; and
(c) Where the meter socket is not accessible due to locked doors or alarm systems, keys shall be provided to BC Hydro.

3.4 Illumination

When installed indoors, the meter socket shall be installed in a location with a minimum illumination of:

- 100 to 200 lux horizontal at 750 mm (2’ 6”) above grade; and
- 100 lux vertical at the front face of the meter socket.

Lighting, in rooms containing indoor metering equipment, shall be controlled by a wall switch at the room entrance.

4. Point-of-Metering

4.1 Load Only

Where practicable, for load only Customers, the point-of-metering (POM) shall be on the power transformer secondary side.

However, subject to BC Hydro's approval, the POM for primary service voltage Customers may be on the power transformer primary side under the following, or other, special circumstances:

(a) Multiple power transformer installation; or
(b) Customer owned primary voltage powerline; or
(c) Non-standard power transformer secondary voltage.

Where the POM is on the power transformer primary side, the revenue metering shall be in accordance with the requirements of this document.

Where the POM is on the power transformer secondary side, the revenue metering shall be in accordance with the separate BC Hydro "Requirements for Secondary Voltage Revenue Metering (750 V and less)" .

Where 2 or more POMs are required, the revenue metering shall be in accordance with the separate BC Hydro "Requirements for Complex Revenue Metering" document

The BC Hydro 12XX tariffs include an allowance for power transformer losses.

4.2 Generation

For Generation applications, the point-of-metering (POM) shall be determined for the specific situation.

Where the POM is on the power transformer primary side, the revenue metering shall be in accordance with the separate BC Hydro "Requirements for Complex Revenue Metering" document.

Where the POM is on the power transformer secondary side, the revenue metering shall be in accordance with the BC Hydro "Requirements for Secondary Metering Installations (750 V and Less)" document

5. Voltage Transformers and Current Transformers

5.1 General Requirements

The instrument transformers shall be installed at the POM in accordance with the general requirements of this section and specific requirements of the particular subsequent section.

Since the revenue metering is insensitive to phase rotation direction, the references to Phase A, B and C are totally arbitrary and do not necessarily comply with other designations in the Customer facility. If not explicitly identified, the convention of Phase A, B and C from left-to-right or from top-to-bottom is assumed.

5.1.1 Primary Winding

The VT H1 polarity primary windings shall be connected to the phases on the BC Hydro side of the CTs. The VT H2 primary windings shall be connected to the BC Hydro system neutral. The CT H1 polarity marks shall be towards BC Hydro.

The VT or CT shall not be used to support the primary winding connections or bus. The primary winding connections shall:

(a) Not subject the VT and CT bushings to strain; and
(b) Facilitate the easy replacement of the VT, CT, and associated equipment.

5.1.2 Lightning Arrestors

Where exposed to lightning, the VTs and CTs shall be located within a lightning arrestors zone of protection.

5.2 Outdoor Metering Kits

A metering kit consists of one or three VTs and one or three CTs mounted on a common support rack.

Where a pole top outdoor metering kit is installed, for 3 phase and 1 phase applications, it shall be installed in accordance with the requirements of this section

For pole mounted Meter socket refer to drawings ES43 J7-01.01 to 03 *in the "BC Hydro Distribution Standards Overhead Electrical ES43"* document.

5.3 Individual Indoor VTs and CTs

Where individual indoor VTs and CTs are installed in switchgear, they shall be installed in accordance with the requirements of this section and shall comply with the applicable CSA Standard.

5.3.1. Instrument Transformer Compartment

The VTs and CTs shall be installed in a switchgear instrument transformer compartment. The instrument transformer compartment shall:

(a) Not be used as a splitter; and
(b) Not contain devices and connections other than the BC Hydro revenue metering equipment.
(c) Not require access through other compartments; and
(d) Be permanently labelled as “BC Hydro Metering”.

It is acceptable to provide openings, of sufficient size to maintain the required phase bus clearances, through the sides of the instrument transformer compartment, i.e. there is no requirement to completely barrier these openings with insulating material up to and/or contacting the phase buses.

Where it is necessary to route the VT and CT secondary winding wiring through other switchgear compartments, the VT and CT secondary winding wiring shall be installed in a continuous conduit, without access fittings, within the switchgear.

5.3.2. Instrument Transformer Compartment Doors

When (viewed through the open front instrument transformer compartment door) the phase buses are “side-by-side” and all VT and CT primary winding and secondary winding connections are readily accessible, only a front hinged instrument transformer compartment door is required. See drawing TM-A-1144.

However, when (viewed through an open instrument transformer compartment door) the phase buses are “one-behind-the-other”, both a front and a rear hinged instrument transformer compartment door shall be provided. See drawing TM-A-1145.

No means of access, other than through the hinged instrument transformer compartment door(s) shall be provided. Each door shall have provision for locking with an 8 mm (5/16”) shank padlock.

5.3.3. Interlocks

All instrument transformer compartment doors shall be key interlocked.

Where there is both a front and a rear door, providing a latching mechanism, that can only be released from within the switchgear instrument transformer compartment, in lieu of a second key interlock, is not acceptable. Key interlocks are required on both doors. The interlock scheme shall be designed so that both doors can be opened concurrently.

Load Only Applications

For **load only** applications, **where there is not a likely potential for power backfeed,** all instrument transformer compartment doors shall be key interlocked with a BC Hydro (line) side disconnect device. The key interlock shall prevent opening the instrument transformer compartment door(s) unless the disconnect device is visibly open.

For **load only** applications, **where there is a likely potential for power backfeed,** all instrument transformer compartment doors shall be key interlocked with a BC Hydro side (line) disconnect device and a Customer (load) side disconnect device(s). The key interlocks shall prevent opening instrument transformer compartment door(s) unless all disconnect devices are visibly open.

Examples of the potential for power backfeed include:

- *Where, by special permission from BC Hydro, there are multiple POMs on the Customer side of multiple power transformers and the power transformer secondary windings may be paralleled; or*
- *Where the Customer has power generator that may be synchronized with BC Hydro.*

However, where the Customer has generator connected via a BC Hydro approved transfer switch, no potential for power backfeed is deemed to exist and only a BC Hydro (line) side disconnect is required.

Prior to energization, the Customer shall:

Completely install and test the key interlock system; and
Remove and secure any spare keys; and
Demonstrate the complete operation of the key interlock system to the BC Hydro field meter technician.

Problems arise more frequently when the Customer obtains the key interlock system from one vendor and is required to mount components on equipment supplied by another vendor. All of this work must be complete and functional.

5.3.4. Neutral Bus

The neutral bus, or a neutral bus tap extension, shall be extended to the instrument transformer compartment. It shall be rigid bus not less than 25 mm x 6 mm (1" x 1/4") Except where it connects to the ground bus, it shall be supported on insulators.

5.3.5. Ground Bus

The switchgear ground bus shall:

(a) Be extended to the instrument transformer compartment; and
(b) Have provision for terminating the BC Hydro installed meter socket conduit bonding conductor with either:
    - A 10-32 screw and washer; or
    - A mechanical connector suitable for a #12 to #8 AWG conductor.

5.3.6. Working Ground Points

In compliance with the WorkSafeBC, working ground points, complete with a permanently mounted 25 mm (1”) diameter ball type ground stud Maclean HC 30029-1 and/or 2 (or equivalent), shall be provided at the following locations within the instrument transformer compartment:

For 4 wire 3 element revenue metering applications:

- On each side of the phase A CT; and
- On each side of the phase B CT; and
- On each side of the phase C CT; and
- On the ground bus,
  i.e. a total of 7 ground studs

Each ground stud shall be positioned for unobstructed application of a ground clamp using a hot stick. Where there are two doors, all working ground points shall be accessible from each respective door.

The ground bus ground stud shall be located immediately behind the instrument transformer compartment door.

Where there is both a front and a rear instrument compartment door, a single ground bus ground stud may be located immediately behind the same door as the other ground studs.

5.3.7. VTs and CTs

5.3.7.1 Installation

The VTs and CTs should preferably be installed, and the primary winding connections made, at the switchgear manufacturer's factory. Alternatively, this work may be done by the Customer in the field. Regardless of where the work is done, the Customer shall be solely responsible for insuring that the installation is in accordance with the switchgear manufacturer's and the inspection authorities' requirements.

5.3.7.2 Electrical Clearances

Minimum electrical clearances shall be in accordance with the published switchgear manufacturer's requirements.

While the following clearances are typical:

- *150 mm (6") for 12 kV class Phase-to-Phase; and*
- *125 mm (5") for 12 kV class Phase-to-Ground; and*
- *230 mm (9") for 25 kV class Phase-to-Phase and Phase-to-Ground;*

it is essential that the specific switchgear manufacturer's requirements be maintained since the switchgear certification and electrical performance is based on maintaining the published clearances.
The minimum typical clearances between the VT or CT body and adjacent VT or CT bodies and ground shall be maintained.

5.3.7.3 Accessibility

The VT and CT primary winding terminals and secondary winding terminals shall remain accessible and the nameplates shall remain visible. The installation shall facilitate the easy replacement of the VTs, VT fuses and CTs.

When the phase buses are “one-behind-the-other”, the VT secondary winding terminals typically face the side of the instrument transformer compartment. 300 mm (12”) clearance should be maintained between the side of the instrument transformer compartment and the VT secondary winding terminals.

5.3.7.4 VT Installation and Connections

The VT primary winding fuses shall be in the horizontal position.

The VT shall be a minimum of 150mm (6”) above the bottom of the enclosure.

The VT H1 primary winding conductors:

(a) Shall be sized and supported in accordance with the switchgear manufacturer’s requirements with regard to clearances, fault current bracing, partial discharge etc.; and
(b) Shall be permanently connected. *Drawout or automatic self-disconnecting VT primary winding connections are not acceptable*. and;
(c) For 12 kV class and lower voltages, shall be not less than a #6 AWG conductor; and
(d) For 25 kV class voltages, shall be a 1” x ¼” rigid bus. See drawing TM-A-1146. *The fuse holder(s) for 25 kV class VTs is typically cantilevered from the primary winding VT terminal(s). The 1” x ¼” rigid bus is required to provide support and stability to the fuse holder and to prevent its rotation*.

Where applicable, VT H2 primary winding terminal shall be connected to the neutral bus with a separate minimum #8 AWG white insulation conductor, *i.e. daisy chaining is not acceptable.*

For switchgear applications only, and as an exception to the industry convention, the Phase C to Phase B VT primary winding polarity is reversed to simplify the connections. To correct the VT primary winding polarity reversal, BC Hydro also reverses the secondary winding polarity.

5.3.7.5 CT Installation and Connections

The CT H1 primary polarity marks shall be towards BC Hydro. Except that, if this orientation prevents access to the secondary winding terminals, the primary winding polarity marks may be towards the Customer. BC Hydro shall be advised if this exception occurs. *In this instance, to correct the CT primary winding polarity reversal, BC Hydro also reverses the secondary winding polarity.*

5.3.7.6 Mounting and Grounding

The VTs and CTs shall be bolted to grounded metal panels using all of the supplied mounting holes. Paint or other protective coatings shall be removed to ensure a low impedance ground connection. Lock washers shall be installed.

If the VTs or CTs **have** an external ground connector, it shall be connected to the ground bus with a minimum #8 AWG bare or green insulation conductor.

*If the VTs or CTs **do not have** an external ground connector, the mounting bolts and lock washers are considered to provide adequate bonding.*

5.3.7.7 Typical Installation Drawing
See drawing TM-A-1142.

6 Meter Socket

The meter socket shall be installed in an outdoor or indoor location acceptable to BC Hydro.

The Transformer-Type meter socket shall be as close as practicable to the instrument transformer enclosure/compartment and in the same room as the instrument transformer enclosure/compartment.

The **customer** shall:

- Supply and install CSA approved and acceptable for BC Hydro use (5 jaw for 1PH and 13 jaw for 3PH installations) Transformer-Type Meter Socket.
- Where required, supply and install communication conduit and termination boxes as required in section 8;
- Supply and install a conduit between the instrument transformer enclosure and the meter socket in accordance with section 9;

6.1 Indoor/Outdoor Installations

a) The customer supplied Transformer-Type Meter Socket and the sealing ring shall be certified in accordance with CSA Standard C22.2 No. 115, *Meter Mounting Devices* and they shall be approved by BC Hydro.

b) The Transformer-Type Meter Socket shall be installed, in a readily accessible location approved by BC Hydro, in accordance with the requirements in this guide.

The sealing ring shall be a screw type.

c) The Transformer-Type Meter Socket tilt shall not exceed 3° from vertical.

d) All Transformer-Type Meter Socket in indoor location shall be mounted, using all four predrilled holes meeting BC Electrical Code, Part 1, Rule 6-408, on a 19 mm (¾") plywood backing or metal support channels.

All Transformer-Type Meter Sockets in outdoor location shall be wall mounted on metal support channels.

The plywood or metal support channels shall be securely fastened to the wall. Shooting, or otherwise mounting the meter socket, directly to the wall is not permitted. Plywood backing for outdoor application will not be accepted.

e) The center of the meter shall be mounted between 1,500 mm to 1,800 mm above the finished grade.

A mounting height of 1,650 mm above finished grade is preferred.

f) Grounding lug(s) to be provided inside the Transformer-Type meter socket.

g) For pole mounted applications:

- The Transformer-Type Meter Socket shall be secured to the pole using the manufacturer's purpose-built pole mounting bracket (e.g. Microlectric PMB200) with lag screws; and
- The Transformer-Type Meter Socket shall be located on the side of the pole that is not subject to vehicle damage. If this is not practicable, protection posts shall be installed 600 mm in front of the Transformer-Type Meter Socket similar to those required under section.

h) The conduit shall enter the Transformer-Type Meter Socket from the bottom or side where knockouts provided.

i) The conduit shall not be entered from the back of the Transformer-Type Meter Socket.

Transformer-Type Meter Socket shall not be installed within 1000 mm of gas meters or within 3000 mm of propane meters, tanks, regulators or relief devices.

6.2 **Grounding**

In accordance with section 36 of the BC Electrical Code, an external ground conductor shall be provided for the Transformer-Type Meter Socket

A #2/0 AWG copper conductor is required since, due to skin effect, its large surface area provides a low impedance path for high frequency electrical noise.

7 VT and CT Secondary Winding Wiring

7.1. General

No other devices shall be connected to the VT and CT secondary windings used by the BC Hydro revenue metering equipment.

As per the Responsibilities and Charges section of this document, BC Hydro is responsible for all VT and CT secondary winding conductor terminations. BC Hydro will wire directly to the VT and CT secondary winding terminals with the Measurement Canada approved multi-colour insulation conductors.

7.2. Cables

7.2.1. Typical Configurations

Typical cable configurations are:

From	To	Typical Cable
Individual Outdoor VTs and CTs	Junction Box or Meter socket	Armoured cable strapped to VT/CT support structure *
Outdoor Metering Kit	Junction Box or Meter socket	Armoured cable strapped to pole
Junction Box	Meter socket	Armoured cable in underground PVC conduit or above ground cable tray
Individual Indoor VTs and CTs located in the Switchgear Instrument Transformer Compartment	Meter socket	Individual conductors in conduit

7.2.2. Armoured Cable Requirements

Where applicable and practicable, armoured cable between individual outdoor VTs and CTs or an outdoor metering kit and the junction box or meter socket shall not be installed underground.

Where applicable, armoured cable from the junction box to the meter socket may be installed underground. Underground armoured cable shall be installed in a 3” rigid PVC conduit. It shall not be installed in rigid metal conduit or be directly buried.

The VT secondary winding circuits in the armoured cable from the individual outdoor VTs and CTs do not have overcurrent protection. To reduce the chance of a fault, these armoured cables may not be installed underground. A possible exception is made where individual outdoor VTs and CTs are installed on separate outdoor pedestals and it is impractical to provide cable support between them and the junction box or meter socket.
When a junction box is used, it contains a circuit breaker to protect the VT secondary winding circuits in the armoured cable between the junction box and the meter socket.

Water in conduits can cause crushing and expansion of conductor insulation due to repeated freezing and thawing cycles. It has been BC Hydro's experience that, since it does not expand as much as PVC conduit, rigid metal conduit installations may result in conductor insulation damage.

7.2.3. Individual Conductors in Conduit Requirements

Where applicable, a conduit shall be installed between the switchgear instrument transformer compartment and the meter socket.

The conduit shall be either rigid metal, EMT or rigid PVC. The conduit shall have not more than the equivalent of three 90° bends and shall not exceed 25 m in length. The conduit minimum trade size shall be:

- 1 ¼" (35) trade size for lengths up to 10 m; or
- 1 ½" (41) trade size for lengths from 10 m to 25 m.

The conduit shall be continuous and without access fittings. Except that, a "LB style" fitting may be installed immediately adjacent to the meter socket provided the cover remains clearly visible and has provision for the installation of a cover seal.

The conduit shall remain visible for its entire length except where it is embedded in a concrete floor or, subject to approval by BC Hydro, where it passes through a wall. The conduit shall not be installed underground outdoors.

Where it is necessary to route the VT and CT secondary winding wiring through other switchgear compartments, the VT and CT secondary winding wiring shall be installed in a continuous conduit, without access fittings, within the switchgear.

A pull string shall be left in the conduit.

8 Meter Communications

BC Hydro revenue meters must be able to transmit data to and from the BC Hydro IT network. The data is transmitted by radio frequency (similar to cell phones). Radio frequency waves cannot transmit through concrete, metal, or earth; therefore, some buildings will require electrical conduit(s) and termination box(es) to enable meter communication through wires. Refer to Requirements for Secondary Voltage Revenue Metering (750 V and less), section 3.2.2 Meter Communications for further details.

Soft copy, dimensioned PDF drawing(s) shall be provided by the customer to BC Hydro prior to construction showing conduit configurations, and physical locations of terminations and pull boxes. BC Hydro conduits for the use of BC Hydro Meter Communications shall be clearly labelled on the drawing(s). Refer to Requirements for Secondary Voltage Revenue Metering (750 V and less), section 3.6 Drawings for further details.

9 Conduit

a) The Customer shall supply and install a conduit between the Transformer-Type meter socket and the instrument transformer enclosure/compartment.

b) The conduit shall be either rigid metal, EMT or rigid PVC.

ENT (electrical non-metallic tubing) is not permitted.

c) The conduit shall not have more than the equivalent of three 90° bends.

d) For 1 phase installations, the conduit length shall not exceed 3 m (10') and the minimum trade size shall be 21 (3/4").

e) For 3 phase installations, the conduit length shall not exceed 10 m (33') and the minimum trade size shall be 35 (1 ¼"). Except that, where special written approval is first obtained from BC Hydro, a 41 (1 ½") conduit with a length of between 10 m (33') and 25 m (82') may be installed.

f) The conduit shall be continuous and without access fittings. Except that, an "(LB, LL, and LR) style" fitting may be installed immediately adjacent to the meter socket providing the fitting's cover:

- Remains clearly visible; and
- Has provision for the installation of a BC Hydro wire seal.

Or as an alternative,

- Elbow 90 with minimum trade size 41 (1 ½") shall be installed immediately adjacent to the meter socket.

g) The conduit shall remain visible for its entire length except where it is embedded in a concrete floor or ceiling within the same room.

Conduits shall not be installed through walls or underground.

h) For switchgear applications, where it is necessary to route the conduit through other switchgear compartments, Customer shall provide a continuous metal or rigid PVC conduit, without access fittings, within the switchgear. Given this, if it is necessary to route through the service entry (wireway) compartment, the conduit shall enter and exit from either sides all the way towards the back of the compartment in order not to obstruct any cable pulling and/or termination.

i) The Customer shall leave a pull string in the conduit.

10 Responsibilities and Charges

The revenue metering responsibilities and charges shall be in accordance with the specific Customer contractual documents. *However, the following sections indicate the typical Customer responsibilities and charges.*

10.1 Responsibilities

The following table defines specific responsibilities.

- BCH BC Hydro
- Cust Customer

Item		**For Load Only Applications By**
For Individual Outdoor VT and CT Applications Only		
VTs and CTs	Material	BCH
	Support Structure	Cust
	Installation	Cust
	Primary Winding Conductor Terminations	Cust
	Secondary Winding Conductor Terminations	BCH
Junction Box (where applicable)	Material	BCH
	Installation	Cust
	Conductor Terminations	BCH
Cable and Connectors between: VTs and Junction Box CTs and Junction Box Junction Box and Meter socket	Material	BCH
	Installation	Cust
	Conductor Terminations	BCH

Item		For Load Only Applications By
For Outdoor Metering Kit Applications Only		
Metering Kit complete with VTs and CTs	Material	BCH
	Pole	Cust
	Installation	Cust
	Lightning Arrestors Material	BCH
	Lightning Arrestors Installation	Cust
	Primary Winding Conductor Terminations	Cust
	Secondary Winding Conductor Terminations	BCH
Metering socket bonding and ground equipment	Material	BCH
	Installation	Cust
Junction Box at Base of Pole (where applicable)	Material	BCH
	Installation	Cust
	Conductor Terminations	BCH
Cable and Connectors between the Metering Kit, Junction Box (where applicable) and Meter socket	Material	BCH
	Installation	Cust
	Conductor Terminations	BCH
For Individual Indoor VT and CT Applications Only		
VTs and CTs	Material	BCH
	Switchgear Instrument Transformer Compartment	Cust
	Installation	Cust
	Primary Winding Conductor Terminations	Cust
	Secondary Winding Conductor Terminations	BCH
Cable Between VTs, CTs and Meter socket	Conduit Material and Installation	Cust
	Cable Material	BCH
	Cable Installation	BCH
	Conductor Terminations	BCH

Item		For Load Only Applications By
For All Applications		
Measurement Canada Certificate of Registration	Documentation	BCH
Measurement Canada Approval Number for VTs/CTs	Documentation	BCH
Meter	Material & Installation	BCH
Meter socket	Material	BCH
	Installation	Cust
	Connections	BCH
Meter socket Ground	Material & Installation	Cust

10.2 Customer Charges for Load Only Applications

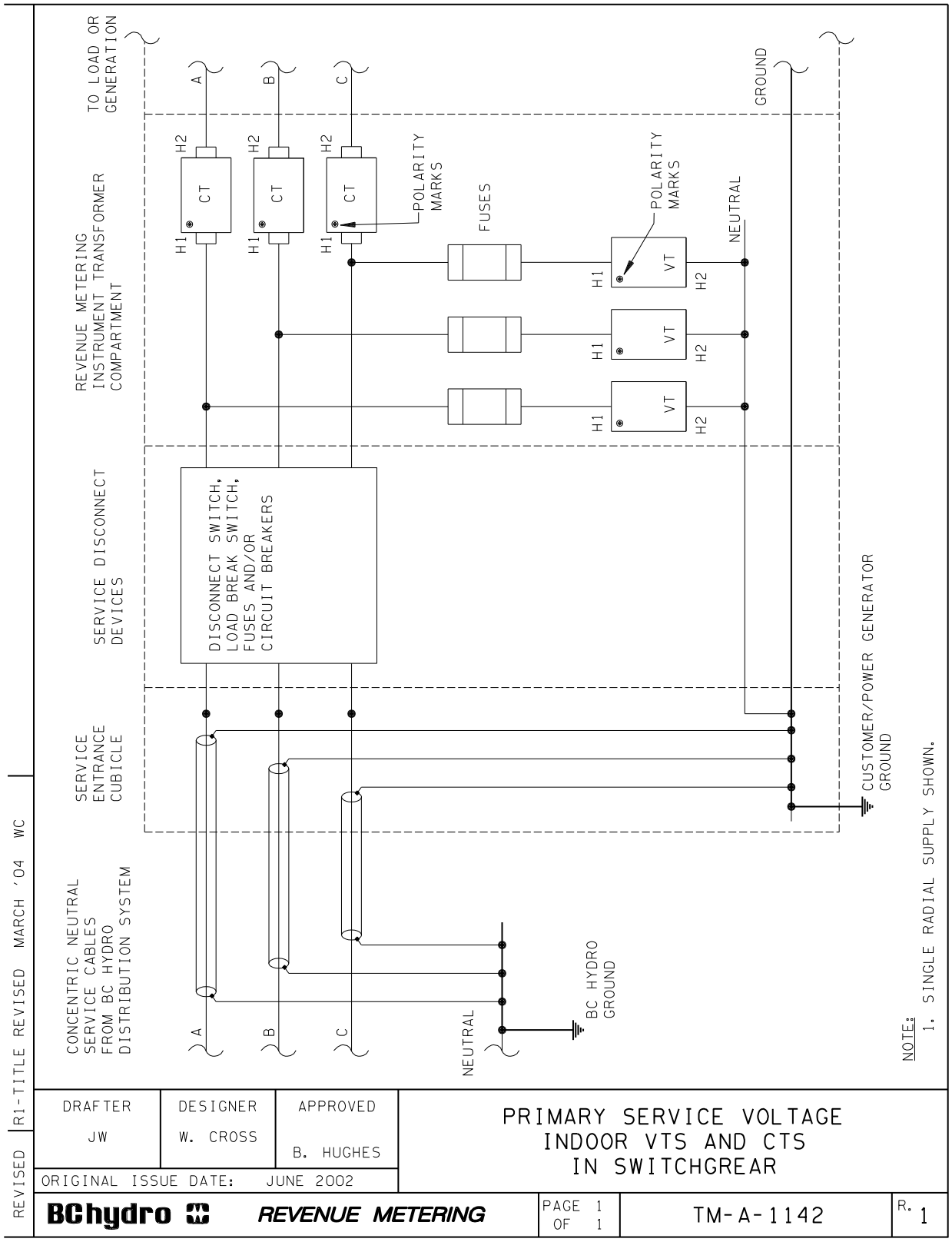
For a single POM as determined by BC Hydro, the Customer is typically not charged for the revenue metering material and labour provided by BC Hydro. However, if the Customer's design requests a single POM, different from the most cost-effective POM determined by BC Hydro, the Customer is typically charged for the incremental cost of their requested POM.

If the Customer requests multiple POMs, the Customer is typically charged for the incremental cost associated with the additional POM.

11 Drawings

Individual Indoor VTs and CTs	
TM-A-1142	Primary Service Voltage Indoor VTs and CTs in Switchgear
TM-A-1144	Switchgear Instrument Transformer Compartment “Side-by-Side” Phase Buses
TM-A-1145	Switchgear Instrument Transformer Compartment “One-Behind-the-Other” Phase Buses
TM-A-1146	Switchgear Instrument Transformer Compartment 25 kV Class VT Primary Winding Connections

TM-A-1142

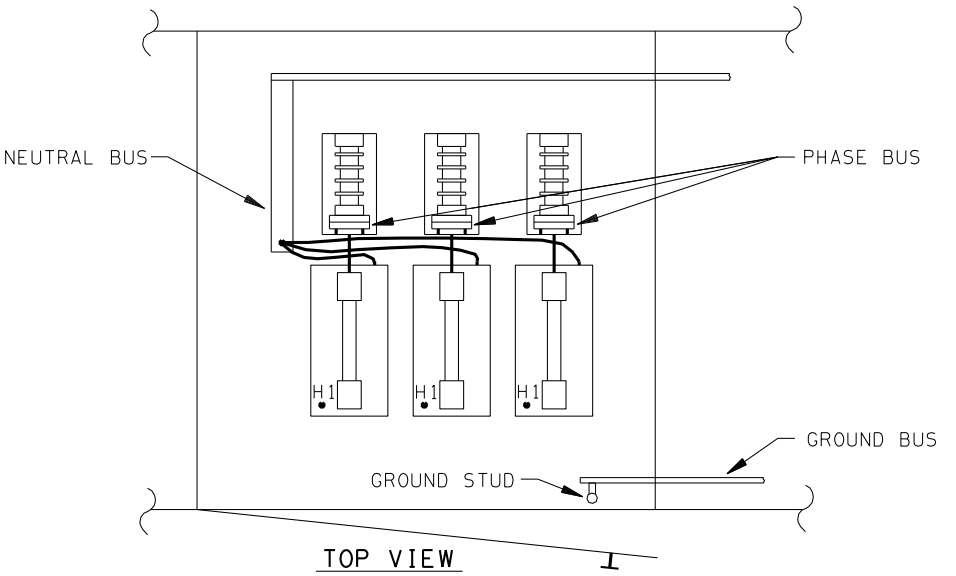


REVISED R1- TITLE REVISED MARCH '04 WC

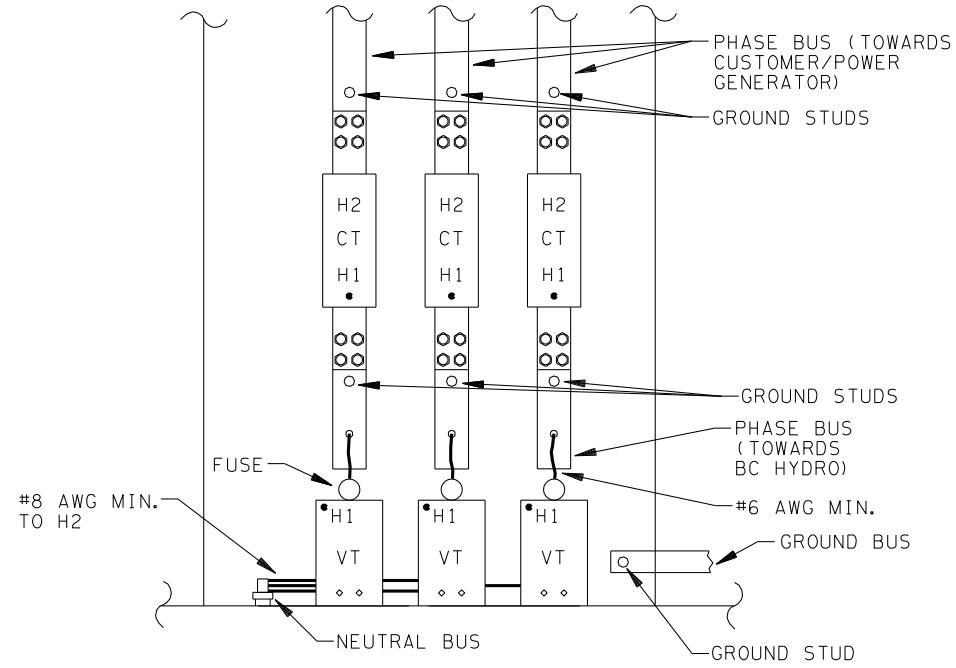
DRAFTER	DESIGNER	APPROVED	PRIMARY SERVICE VOLTAGE INDOOR VTS AND CTS IN SWITCHGREAR
JW	W. CROSS	B. HUGHES	
ORIGINAL ISSUE DATE: JUNE 2002			

BChydro — REVENUE METERING | PAGE 1 OF 1 | TM-A-1142 | R. 1

TM-A-1144



TOP VIEW



FRONT VIEW

NOTES:

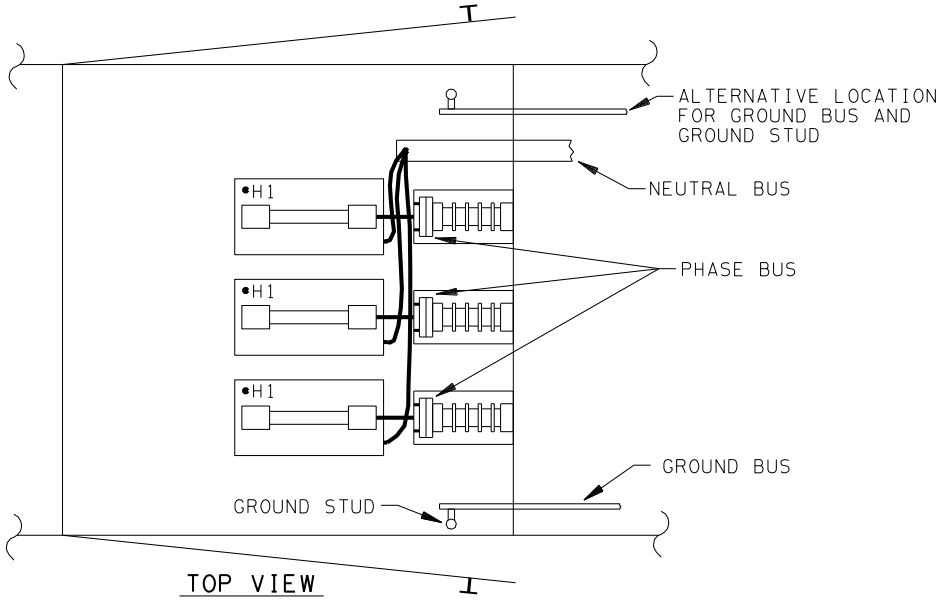
1. 12 kV CLASS 4 WIRE 3 ELEMENT ILLUSTRATED.
2. ONLY A FRONT DOOR IS REQUIRED.

DRAFTER	DESIGNER	APPROVED	SWITCHGEAR INSTRUMENT TRANSFORMER COMPARTMENT "SIDE-BY-SIDE" PHASE BUSES
JW	W. CROSS	B. HUGHES	
ORIGINAL ISSUE DATE: APRIL 2004			

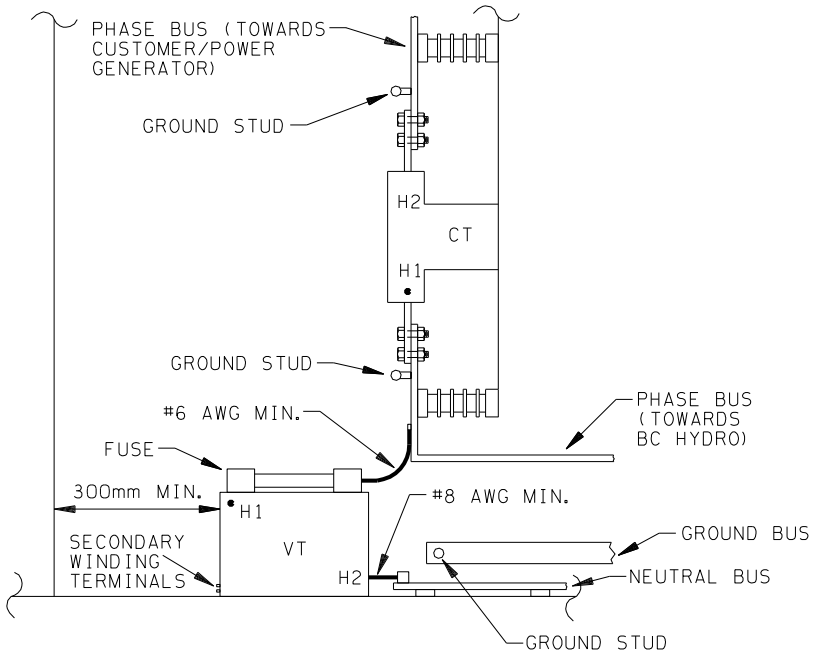
REVISED

BCHydro — REVENUE METERING | PAGE 1 OF 1 | TM-A-1144 | R. 0

TM-A-1145



TOP VIEW



FRONT VIEW

NOTES:

1. 12 kV CLASS 4 WIRE 3 ELEMENT ILLUSTRATED.
2. BOTH A FRONT AND A REAR DOOR ARE REQUIRED.

DRAFTER	DESIGNER	APPROVED	SWITCHGEAR INSTRUMENT TRANSFORMER COMPARTMENT "ONE-BEHIND-THE-OTHER" PHASE BUSES
JW	W. CROSS	B. HUGHES	
ORIGINAL ISSUE DATE: MARCH 2004			

REVISED

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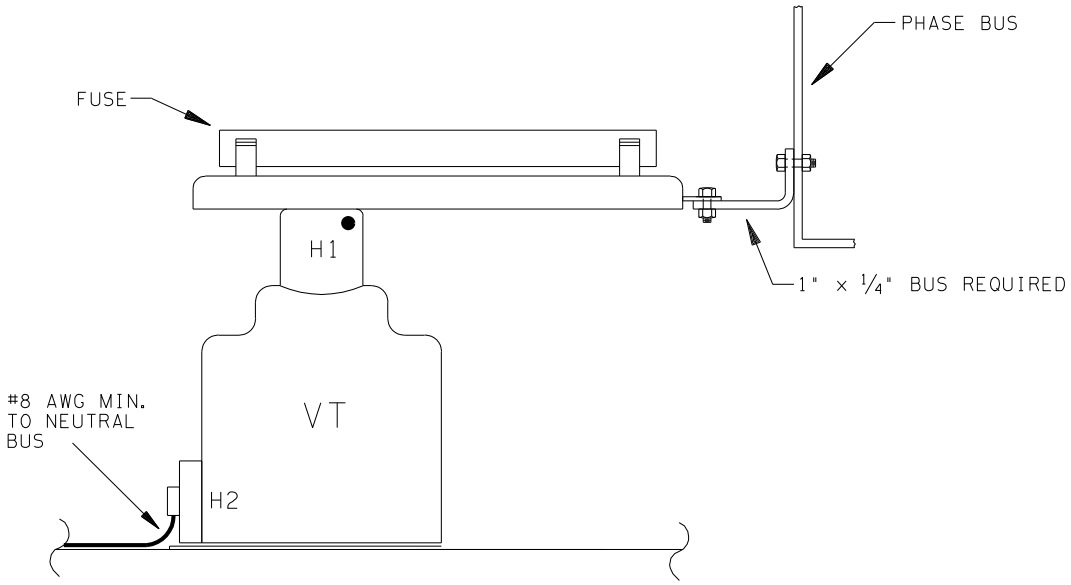
TM-A-1146



NOTE:

1. THE 1 X ¼" BUS IS REQUIRED TO PROVIDE SUPPORT AND STABILITY TO THE FUSE HOLDER AND TO PREVENT ITS ROTATION.

DRAFTER	DESIGNER	APPROVED	INDOOR 25 kV VT PRIMARY WINDING CONNECTION
JW	W. CROSS	B. HUGHES	
ORIGINAL ISSUE DATE: APRIL 2004			

REVISED

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