TORONTO HYDRO

METERING REQUIREMENTS

750 VOLTS OR LESS

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CERTIFICATE OF APPROVAL

THIS TECHNICAL SPECIFICATION MEETS THE SAFETY REQUIREMENTS OF SECTION 4 OF ONTARIO REGULATION 22/04

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Metering Requirements 750 Volts or Less

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CONDITIONS OF SERVICE, SECTION 6 – REFERENCE #6

1.0 SCOPE

1.1 Toronto Hydro Requirements

This publication covers the requirements of Toronto Hydro, in addition to the requirements of the "Supply Authority" stated in the Ontario Electrical Safety Code, for service entrance, connection, and metering of electrical energy to Toronto Hydro customers for Permanent and Temporary Services.

1.2 Ontario Electrical Safety Code

Nothing contained in these Requirements shall prejudice or supersede any requirements of the Ontario Electrical Safety Code or affect regulations of existing building codes, unless specifically stated herein.

Some of these requirements identified by the latest edition of the Ontario Electrical Safety Code have been included for convenience and reference purposes, even though they may be under the Electrical Safety Authority (ESA) jurisdiction.

2.0 PURPOSE

This document is intended to provide guidance to Toronto Hydro customers and their agents in the design, preparation of plans and construction of the proposed service installation with respect to revenue metering. The requirements apply to all new, rearranged or upgraded services, both permanent and temporary, and are intended to provide an efficient and safe supply of electrical energy with respect to revenue metering.

It shall be the responsibility of the Customer to conform to the latest edition of the Toronto Hydro Conditions of Service and the Ontario Electrical Safety Code. In the event that requirements between this document, the Conditions of Service, or any other Toronto Hydro document are different, the more stringent requirement shall govern.

3.0 DEFINITIONS, PUBLICATIONS AND THE INTERNATIONAL SYSTEM OF UNITS

3.1 Definitions

In addition to the definitions stated in Section "0" of the Electrical Safety Code, the following meanings have been ascribed to the already defined or new terms.

Acceptable	Meets Toronto Hydro Requirements.
Approval	Approval of drawings and customer's equipment is limited to Toronto Hydro's requirements and should not be construed as acceptance of liability due to faulty design and/or workmanships.
Compartment	A subdivision of a switchgear/switchboard unit.

Customer/Consumer	The person or persons, firm, Corporation or their agents who request or use Toronto Hydro Services.
Meter-Mounting Devices	A meter socket or a meter cabinet.
Service Box	An assembly consisting of an enclosure that can be locked or sealed, containing either fuses and a switch, or a circuit breaker, and of such design that it is possible to operate either the switch or circuit breaker to the open position by manual means when the box is closed as per OESC.
Switchboard	A full height and full depth module of a switchgear or switchboard assembly. It is sometimes referred to as "cell", "unit", 'cubicle" or "section".

3.2 Associated Publications and Standards

In addition to all applicable Toronto Hydro Standards and the applicable reference publications listed in the latest edition of the Ontario Electrical Safety Code, the following publications shall also apply:

- Toronto Hydro Conditions of Service ("Conditions of Service")
- Ontario Electrical Safety Code (OESC)
- Canadian Standards Association (CSA) Standard
- CSA Standard, C22.2 No. 4, Enclosed Switches
- CSA Standard, C22.2 No. 31, Switchgear Assemblies
- CSA Standard, C22.2 No. 115, Meter - Mounting Devices
- CSA Standard, C22.2 No. 229, Switching and Meter Centres
- Electrical and Electronic Manufacturers Association of Canada (EEMAC) Standard for Switchgear Assemblies G8 – 2
- The Ontario Municipal Engineers Association (MEA) Guide to Municipal Standard Construction Part V-Metering and Service Entrance Equipment
- Electrical and Electronic Manufacturers Association for Revenue Metering Equipment in Switchgear Assemblies G10-1
- Ontario Building Code
- The *Occupational Health and Safety Act* and Regulations for Industrial Establishments
- CSA Standard, C235-83 – Preferred Voltage Levels for AC Systems 0 to 50,000 V

NOTE: All publications shall be of the latest edition.

3.3 The International System of Units

SI units have been used in this publication for measurements and weights. The metric units have been rounded as close as possible to the previously used units. Equipment

or materials not available in metric units shall be equal to or larger than the units specified in this publication.

All drawings submitted by customers shall be in metric units.

4.0 PROCEDURE FOR SERVICE APPLICATION

4.1 Approval Routine

In additional to compliance with the OESC, Consumer's service equipment and associated revenue metering equipment are subject to Toronto Hydro requirements and approvals. An approval and/or a Connection Authorization from the Electrical Safety Authority (ESA) is not to be interpreted as Toronto Hydro approval or compliance with Toronto Hydro requirements.

4.1.1 Initial Data Requirements

Application for supply of service shall include service address, load details, size and location of service and desired service date.

4.1.2 Drawings and Information Required

Once the type of service has been determined, detailed drawings and specifications shall be submitted for review and acceptance (see Section 4.2).

If the drawings and information provided do not meet Toronto Hydro requirements or are unclear, the Customer shall revise or provide additional drawings and information for further review and acceptance by Toronto Hydro.

4.1.3 Approvals Prior to Manufacture

Manufacture or work associated with the installation of equipment should start only after the design has been reviewed and accepted by Toronto Hydro.

4.2 Engineering Drawings and Specifications

4.2.1 Drawings Required for Acceptance

Fully dimensioned and scaled drawings submitted for Toronto Hydro's review and acceptance shall include but not be limited to the following list:

(a) Electrical room layout drawing showing the location of the electrical switchboard and all revenue metering equipment (meter cabinets and/or meter centres). (2)

(b) Single line distribution diagram. (2)

(c) Manufacturer's or shop drawings of the proposed switchboard, with a utility compartment detail drawing. (2)

(d) Meter centre drawings. (2)

The minimum number of copies of drawings required is indicated in brackets. This requirement may change without notice. Additional drawings may be requested.

4.2.2 **Drawing Revisions**

If any drawings require revision, Toronto Hydro will determine the number of copies of each drawing to be re-submitted for further review and acceptance.

4.3 Service Change, Relocations and New Services

4.3.1 **Meter Installation and Meter Disconnection**

Under no circumstances is the Toronto Hydro meter seal to be cut or tampered with, or the meter to be removed from its socket by the Customer or their representative. The activity of a meter installation or meter disconnection shall only be performed by Toronto Hydro. For a meter installation or meter disconnection, the customer or their representative is to call 416-542-2533.

5.0 SERVICE ENTRANCE AND ELECTRICAL ROOMS

5.1 General Requirements

Equipment shall be installed in a suitable location in accordance with Toronto Hydro requirements at a location acceptable to Toronto Hydro. Refer to Table I for applicable requirements associated with the location and application of revenue metering equipment.

5.1.1 Self Contained Meter(s) – Residential (Up to 6 Meters)

All residential meters for new, changed or relocated services shall be mounted outdoors.

Where the residential meter cannot be located outdoors due to reasons including but not limited to accessibility and safety, the residential meter may be located indoors with the main service box/switch located on the line side of the meter. The location must be approved by Toronto Hydro.

5.1.2 Self Contained Meter(s) – Residential (> 6 Meters), Multi-Residential, Non-Residential, Mixed Use

Meters for new, changed or relocated services shall be mounted indoors with main service box/main switch connected on the line of the meter. All meters for high rise apartment and condominium buildings shall be mounted indoors with the main service box/switch located on the line side of the meter. The location must be approved by Toronto Hydro.

5.1.3 Self Contained Meter – (Outdoor Pedestal) Parks and Utilities

Meters for utilities and parks can be located outdoors, for single phase 120/240V or two phase 120/208V services, up to 200A only.

5.1.4 Self Contained Meter – (Outdoor Pole) Temporary Services

Meters for temporary services up to 200A, can be located outdoors. For three phase temporary services up to 200A, service entrance equipment (i.e. meter, meter socket, main service box/main switch) shall be installed within a meter cabinet that is weatherproof, NEMA Type 3R, CSA approved. The main service box/switch shall be connected on the line side of the meter for three phase services.

5.1.5 Transformer Rated Meter – (Indoor/Outdoor Power Shack) Temporary Services

Meters for temporary services, 400A or 600A three phase 347/600V, can be located indoors or outdoors. Revenue metering equipment (i.e. meter, meter socket, instrument transformers) shall be installed within a meter cabinet that

is CSA approved and weatherproof, NEMA Type 3R (when installed outdoors). The main service box/switch shall be connected on the line side of the meter for three phase services.

5.1.6 Transformer Rated Meter – (Transformer Rated Socket with Integral CT – 300/5) Residential

Meters for new, changed or relocated residential services shall be mounted outdoors.

5.1.7 Transformer Rated Meter – (Transformer Rated Socket and Meter Cabinet) Residential

Meters for new, changed or relocated residential single phase, 600A or 800A services, shall be mounted outdoors. Both the meter cabinet and main service box shall be located indoors. Main service box/main switch shall be connected on the line side of the revenue (i.e. meter cabinet, CTs, meter).

5.1.8 Transformer Rated Meter – Multi-Residential, Non-Residential, Mixed Use

Meters for new, changed, or relocated multi-residential, commercial or industrial services shall be mounted indoors with the main service box/switch located on the line side of the meter. The location must be approved by Toronto Hydro.

Metering Requirements 750 Volts or Less

TABLE I – LOCATION OF REVENUE METERING EQUIPMENT

Meter Type	Meter Mounting Device	Location	Main Bus/ Switch Size	System	Main Switch/ Service Box Location	Application
Self Contained (200A or Less)	Meter Socket (Single Position)	Outdoor	Up to 200A	1Φ – 120/240V 2Φ – 120/208V	Load side of meter	Residential (1 meter)
	Meter Socket (Multiple Position – Ganged)	Outdoor	200A or 400A	1Φ – 120/240V 2Φ – 120/208V	Load or line side of meter.	Residential (2 to 6 meters)
	Meter Socket (Meter Centre/ Kiosk/Splitter)	Indoor	200A or 400A	1Φ – 120/240V 2Φ – 120/208V 3Φ – 120/208V 3Φ – 347/600V	Line side of meter	Residential (>6 meters), Multi-Residential, Non-Residential, Mixed Use
	Meter Socket	Outdoor – Pedestal	Up to 200A	1Φ – 120/240V 2Φ – 120/208V	Load side of meter	Parks, Utilities
	Meter Socket	Outdoor – Pole	Up to 200A	1Φ – 120/240V 2Φ – 120/208V	Load side of meter	Temporary Services
	Meter Cabinet* with Meter Socket	Outdoor – Pole	Up to 200A	3Φ – 120/208V 3Φ – 347/600V	Line side of meter	Temporary Services
Transformer Rated	Meter Cabinet* (48”x48”x12”) with Instrument Transformers	Indoor/ Outdoor – Power Shack	400A or 600A	3Φ – 347/600V	Line side of meter	Temporary Services
	Transformer Rated Socket (Integral CT – 300/5)	Outdoor	400A	1Φ – 120/240V	Load side of meter	Residential (1 meter)
	Transformer Rated Socket and Meter Cabinet	Indoor – Meter Cabinet Outdoor – Meter Socket	600A or 800A**	1Φ – 120/240V	Line side of revenue metering equipment	Residential (1 meter)
	Meter Cabinet* (48”x48”x12”) with Instrument Transformers	Indoor	>200 – 800A	Table III	Line side of meter	Multi-Residential, Non-Residential, Mixed Use
	Meter Cabinet* or Transformer Rated Socket (Switchboard Compartment for Instrument Transformers)	Indoor	≤800A >800A**	Table II & IV	Line side of meter	Multi-Residential, Non-Residential, Mixed Use

* Revenue metering equipment within meter cabinet. Refer to Table II, III & IV for minimum meter cabinet sizes, where applicable.

** Where main switch capacity exceeds 800A, an enclosed switchboard is required.

5.2 Legislation and Specified Requirements

(a) Where a service entrance electrical room contains a switchboard, the means of egress from such a hazardous room shall conform to the latest revisions of the Ontario Building Code and to the Ontario *Occupational Health and Safety Act* and Ontario Regulation 851 for Industrial Establishments made thereunder.

(b) Working Space: A clear space of at least 1.0 m with secure footing shall be provided and maintained about electrical equipment and revenue metering equipment, as specified by the OESC.

(c) Natural Gas and Propane Clearance: All arc producing electrical equipment considered a source of ignition shall maintain minimum clearance distances specified in CSA B149.1 Natural Gas and Propane requirements as well as any applicable codes and regulations. In the event that requirements between different codes, regulations or rules, or any other Toronto Hydro document are different, the most stringent requirement shall govern.

5.3 Exit Doors and Hardware

In addition to Section 3.4 of the Ontario Building Code on "Exits", the following shall be provided for exit doors:

(a) Exit doors shall open in the direction of exit travel and shall be equipped with panic type hardware.

(b) No exit door shall open directly to the street or open space where there is danger of blockage from ice or snow and pedestrian or vehicular traffic. Such situations shall be discussed with Toronto Hydro to find solutions.

(c) Exit doors shall be clearly identified.

5.4 600 Volt Delta and 347/600 Volt Y – In Electrical Rooms

600 Volt Delta and 347/600 Volt Y services are NOT ACCEPTABLE in the same electrical room.

5.5 Fire Pump Services

Fire pump service shall be metered using a 1220 mm x 1220 mm x 305 mm (48" x 48" x 12") meter cabinet. When instrument transformers are located within a meter cabinet, a neutral conductor to the metering cabinet, minimum size #8 CU, for metering purposes only shall be provided.

6.0 REVENUE METERING EQUIPMENT

6.1 General Information and Requirements

6.1.1 Scope of Supply

Toronto Hydro will supply all meters, metering instrument transformers (i.e. potential transformers and current transformers) and secondary wiring required for revenue metering. All revenue metering equipment shall remain the property of Toronto Hydro.

In additional to compliance with the OESC, Consumer's service equipment and associated revenue metering equipment are subject to Toronto Hydro requirements and approvals. An approval and/or a Connection Authorization from the Electrical Safety Authority (ESA) is not to be interpreted as Toronto Hydro approval or compliance with Toronto Hydro requirements.

6.1.2 Customer's Instrumentation

(a) Customer's instrumentation shall be connected on the load side of the Toronto Hydro metering and must be located in a separate compartment.

(b) Customer's relays, instruments or other devices shall not be connected in the metering circuit.

(c) Meter-mounting devices, including but not limited to, bottom connected A and P base type meters, shall not be used as splitter boxes.

(d) The only exception to (a) or (b) is the installation of a Toronto Hydro approved meter base plug-in transfer device used to connect a portable generator for emergency back-up generation. Refer to Section 2.3.6 of the Conditions of Service.

6.1.3 Service Identification

Marking and labelling of service boxes and equipment shall be provided:

(a) The customer shall permanently and legibly identify each metered service with respect to its specific address which shall include the store, suite, unit or apartment number, where applicable.

(b) The identification shall be applied to all service equipment including but not limited to service boxes, service switches, circuit breakers, meter cabinets and meter sockets.

(c) Weather-resistant laminated engraving required. Permanent markers or paper labels are not acceptable on equipment which requires identification.

6.1.4 Access and Locking Provision

Revenue metering equipment shall be accessible to Toronto Hydro employees and its authorized agents. The Customer and Consumer must provide unimpeded, unobstructed, safe, secure access for Toronto Hydro employees, or its contractors, at all times for the purpose of installing, inspecting, testing, reading, operating, replacing, removing, or maintaining, Toronto Hydro distribution equipment or revenue metering, including reading the revenue meter and switching operations. This right to access applies to Toronto Hydro distribution equipment and/or revenue metering equipment on, under, over or inside Customer-owned Property, twenty-four (24) hours a day seven (7) days a week. Refer to the Conditions of Service for further details including information on notice requirements. Secured access (e.g. to property, to electrical room, through gates and etc.), where applicable, shall be provided with:

(a) Provision for Toronto Hydro lockbox housing Customer's access key.

(b) Provision for accepting both Toronto Hydro and Customer padlock.

6.2 Metering Instrument Transformers

6.2.1 Instrument Transformer Data

Toronto Hydro will provide the manufacturer's name, type and rating of metering instrument transformers. Additional information, if required, will be available at the request of the customer.

6.2.2 Meter Instrument Transformer Enclosures

All metering instrument transformers and associated meters shall be installed in an approved enclosure. For indoor applications the cabinet shall be National Electrical Manufacturers Association (NEMA) type 1. For outdoor installations the cabinet shall be NEMA type 3R. CSA approval is required for both types.

6.2.3 Metering Transformers on Load Side

Metering transformers shall be connected on the load side of the main service box (e.g. main fused switch or circuit breaker). The only exception is approved 400 A single phase transformer rated meter sockets with integral CT.

6.2.4 Mounting Arrangements

Provision shall be made by the customer for mounting the metering instrument transformers (see Sections 6.4 and 6.5) including the supply and installation of all material for the primary connections to the current transformers.

6.3 Meter Cabinet Size for Meters without Instrument Transformers

6.3.1 Meter Cabinet for Meters Only

Meter cabinet size requirements for meters are shown in Table II. All dimensions are in mm.

6.3.2 Approved Transformer Rated Meter Sockets

Only approved transformer rated meter socket(s) outlined in Table II for the intended application and associated meter type shall be used.

6.3.3 Multiple Metering Points

Where there are multiple metering points requiring more than one set of metering transformers to be totalized, or where a recording instrument or special equipment is required, Toronto Hydro shall be consulted regarding cabinet size.

TABLE II – MINIMUM METER CABINET SIZE FOR METERS AND APPROVED TRANSFORMER RATED METER SOCKETS

Meter Type	Phase	No. of Meters	Minimum Meter Cabinet Size (in mm)	Approved Transformer Rated Meter Socket (Manufacturer – Part Number)
Self Contained (200A or Less)	Poly or Single Phase	1 or more	Not applicable	See Section 6.7
Transformer-rated Bottom Connected	Poly or Single Phase	1 or 2	915w x 915h x 305d	Not Applicable
Remotely Interrogated Metering (RIMS) *Transformer-rated Bottom Connected	3PH 3Wire	1	915w x 915h x 305d	Eaton – TSU8 Microlectric – CT108 Hydel – CTS800PW See Diagram #4 See Note 1 below.
	3PH 4Wire	1	915w x 915h x 305d	Eaton – TSU13 Microlectric – CT113 Hydel – CTS130PW See Diagram #4 See Note 1 below.
*Transformer-rated Socket (S base)	3PH 3Wire	1	Not applicable	Eaton – TSU8 Microlectric – CT108 Hydel – CTS800PW
	3PH 4Wire	1	Not applicable	Eaton – TSU13 Microlectric – CT113 Hydel – CTS130PW
Transformer-rated Socket (S base)	Single Phase (400A)	1	Not applicable	Eaton – TCC5-TH Hydel – CT4-TSB3 (Integral CT - 300/5) See Diagram #3 for wiring.
Transformer-rated Socket	Single Phase	1	915w x 915h x 305d	Eaton – TSU5

*** Where metering instrument transformers are located remotely (i.e. in switchboard).**

Notes:

1. Not applicable for totalized services.

6.4 Meter Cabinet Size for Meters with Instrument Transformers

6.4.1 Meter Cabinet for Meters, Instrument Transformers, and Associated Equipment

Meter cabinet size for meters, instrument transformers, and associated equipment is shown in Table III. All dimensions are in mm.

TABLE III – MINIMUM METER CABINET SIZE FOR METERS

Voltage (V)	Phase	Wire	Main Switch Size	Minimum Meter Cabinet Size (in mm)
120/240	1	3	>400 – 800 A.	1220 w x 1220 h x 305 d
600* 120/208 347/600 Y	3 3	3 4	>200 – 800 A.	1220 w x 1220 h x 305 d
240/416*	3	4	>200 – 800 A.	1220 w x 1220 h x 305 d

*For existing services only.

Notes:

(1) A larger cabinet or two (2) separate cabinets may be required:

- Where cable size exceeds the main switch capacity, or
- Where more than 2-500 kcmil CU or 2-750 kcmil AL are used, or
- Where meter cables do not enter the meter cabinet in a location to permit efficient use of space

(2) Meter cables in a meter cabinet will be located so that the most efficient use of the space is accomplished. Diagram #2 shows the preferred meter cabinet area that will be utilized for the installation of meter(s) and accompanying test switches. The cables and instrument transformers must not encroach on the metering area shown in the diagram.

(3) Once the meter cabinet has been installed, but before the conduit/corflex cable has been installed, the customer/electrician **must** contact Toronto Hydro (see Diagram #2 for phone numbers) to arrange for metering inspection.

(4) Where main switch capacity exceeds 800 A, a switchboard is required with a separate compartment for the instrument transformers. See Section 6.8 for details.

(5) A neutral wire is required for metering 120/208 Volt and 347/600 Volt services. The customer shall provide and install a full-size neutral cable (white) from the neutral bus in the main switch or splitter to the meter cabinet. If the neutral cable is provided for metering purposes only, it shall be terminated at an insulated neutral block. See Diagram #2.

6.5 Meter Cabinets

Meter cabinet(s) shall be supplied and installed by the Customer. Meter Cabinet sizing and associated requirements shall be in accordance with Section 6.3 or 6.4, as applicable.

6.5.1 General Requirements

(a) Service entrance, location, application and associated requirements as per Section 5.

(b) Meter cabinets containing Toronto Hydro equipment shall not be used as splitter boxes.

(c) Meter cabinets, installed outdoors or where sprinklers are used, shall be weatherproof type, NEMA type 3R, CSA approved.

(d) Meter cabinets installed outdoors shall be equipped with door stops.

6.5.2 Material

All meter cabinets shall be made of sheet steel, #16 Manufacturers Standard Gauge (MSG) minimum.

6.5.3 Doors

Meter cabinets for indoor and outdoor installation shall be equipped with vertically hinged doors. Cabinets 915 mm x 915 mm x 305 mm or larger shall have double doors opening at the center.

6.5.4 Locking and Sealing

Meter cabinets for indoor and outdoor installations shall be equipped with a door latch and handle (or combination latch-handle) with provision for a Toronto Hydro padlock and seal. Equipment access doors shall be equipped with metal padlock hasps measuring at least 30mm wide by 5mm thick capable of accepting a standard Toronto Hydro padlock with an 8mm shackle.

6.5.5 Mounting Panel (Back Plate)

Meter cabinets shall be equipped with removable #16 MSG min. sheet metal interior panels. The panel shall be 75 mm narrower and 75 mm shorter than the meter cabinet and mounted with a clearance of 15 mm behind it.

6.5.6 Mounting Height

Minimum distance from finished floor to base of cabinets shall be 600mm. Maximum distance from finished floor to top of cabinets shall be 1830mm.

Note: Any deviation from these dimensions shall require Toronto Hydro approval.

6.5.7 Freedom from Vibration and Potential Damages

Equipment such as meter cabinets, panels and meter-mounting devices shall be mounted so as to be free from vibration, mechanical shock and potential damages. Equipment shall be protected against mechanical damage as required by OESC.

6.5.8 Entry Points

Line and load entry points shall be located so that meters and/or instrument transformers can be mounted to permit efficient use of space provided. See Section 6.4.1 note 2, and Diagram #2.

6.5.9 Primary Connections in Meter Cabinet

The customer/electrician shall make all primary connections on the meter cables in the meter cabinet:

(a) The customer/electrician is to contact Toronto Hydro (see Diagram #2 for phone number) to arrange installation of the metering current transformers.

(b) Once the metering transformers have been installed, the customer/electrician is to either insert the primary meter cables through the window type current transformers or make compression sleeve connection on the primary meter cables. Should bar type metering current transformers be used, then the customer/electrician shall make compression type terminal lug connections to the bar type metering current transformers. Mechanical connections are not acceptable.

(c) The customer/electrician shall supply all compression sleeves and or compression lugs.

(d) Toronto Hydro will wrap all the connections at the current transformers.

6.6 Main Service Box or Main Switch

6.6.1 General Requirements

The main service box (e.g. fused switch or circuit breaker) or main switch shall immediately precede the revenue metering equipment, be located in a suitable location with adequate space and clearance acceptable to Toronto Hydro, and shall meet the following requirements:

(a) Customer responsible for the supply and installation in accordance with the OESC

(b) Shall be visible, accessible, operable and lockable meeting Toronto Hydro requirements

(c) Shall be located adjacent to the revenue metering equipment (in direct line of sight of metering equipment)

(d) The top of the main service box or main switch shall be no higher than 1.83 m and the bottom of the main service box or main switch shall be no lower than 1.0 m from the finished floor.

(e) Unauthorized access to live conductors or components not permitted.

(f) Shall permit the sealing and padlocking of:

(i) The operating handle in the “open” (OFF) positions; and

(ii) The cover or door in the closed (ON) position

(g) Meet or exceed minimum equipment ratings, including but not limited to:

(i) Electrical equipment marked with a short-circuit current rating or withstand rating, shall have a rating sufficient for the voltage employed and for the maximum fault current available as per the OESC.

(ii) Electrical equipment marked with an interrupting rating or interrupting capacity shall have a rating sufficient for the voltage employed and for the maximum fault current available as per the OESC.

(iii) Short circuit rating as per Conditions of Service

In the event that requirements between different codes, regulations or rules, or any other Toronto Hydro document are different, the most stringent requirement shall govern.

(h) A main service box or main switch on the line side of the revenue metering equipment is required if any one or more of the following applies:

(i) Service entrance, location, application and associated requirements as per Section 5.

(ii) When revenue metering equipment is located indoors.

(iii) When transformer rated meters are used, except for approved transformer rated socket with integral CT 300/5 for outdoor residential applications.

(iv) Three phase services.

(v) Residential (>6 meters), multi-residential, non-residential, mixed-use applications.

(vi) Multiple position (ganged) metering applications where available fault levels exceed 10kA.

6.7 Meter Socket (Self Contained – 200A or Less)

Meter socket shall be certified in accordance with CSA Standard C22.2 No. 115, Meter - Mounting Devices.

6.7.1 Customer Supplied Equipment

(a) Meter socket(s) shall be provided and maintained by the customer.

(b) Service box(es) or switch(es), on the line and/or load side of the meter socket or revenue metering equipment, as required.

(c) Splitter box and/or meter cabinets where permitted.

6.7.2 General Requirements

(a) Service entrance, location, application and associated requirements as per Section 5.

(b) General requirements and service identification as per Section 6.1.

(c) Meter socket(s) shall be supplied with a metal sealing ring. Ringless meter sockets are not permitted. Round and shallow square meter socket not permitted.

(d) Meter socket(s) shall not be used as a splitter.

(e) Enclosure cannot contain other auxiliary device(s)

(f) Automatic bypass devices are not permitted.

(g) Meter mounting device with spare and/or unused position(s) not permitted.

(h) Unauthorized access to unmetered portion(s) of the service not permitted. Service equipment, conduit fittings and junction boxes with removable covers providing unauthorized access to unmetered portions of the service, up to point of metering, not permitted.

6.7.3 Terminal Arrangements for Self Contained Meters

Only meter sockets listed below with terminal arrangement outlined in Diagram #1 shall be used.

120/240 V	1 Phase	3 Wire	4-jaw socket
120/208 V	2 Phase	3 Wire	5-jaw socket
120/208 V	3 Phase	4 Wire	7-jaw socket
347/600 V	3 Phase	4 Wire	7-jaw socket
600 V*	3 Phase	3 Wire	5-jaw socket

* (Existing Services Only)

6.7.4 Line Side Connector Type

(a) Meter socket to come with stud type connector on the line side when Toronto Hydro underground secondary service cable termination at the meter socket with compression type lug is required (e.g. single phase 120/240V or two phase 120/208V underground services with metering outdoor).

(b) Meter socket to come with tunnel type connector on the line side when Toronto Hydro overhead secondary service conductor termination at the meter socket is required or when Toronto Hydro secondary service conductor/cable termination is at the main switch/main service box on the line side of the meter socket.

6.7.5 Rating

(a) All new and upgraded services shall be 100 A, 200 A or 400 A and shall utilize weatherproof, NEMA Type 3R, CSA approved meter socket(s).

(b) Meter mounting device bus mains ampere rating:

1. For a 100 A service, bus mains shall have a minimum rating of 100A

2. For a 200 A service, bus mains shall have a minimum rating of 200A

3. For a 400 A service, bus mains shall be rated at 400A

(c) Electrical equipment marked with a short circuit current rating or withstand rating, shall have a rating sufficient for the voltage employed and for the maximum fault current available as per the OESC.

(d) Electrical equipment marked with an interrupting rating or interrupting capacity shall have a rating sufficient for the voltage employed and for the maximum fault current available as per the OESC.

(e) Equipment short circuit rating as per Conditions of Service

(f) All equipment shall be suitability sized and rated for the application and CSA approved.

6.7.6 Mounting and Space Requirements

(a) Meter sockets shall be installed in an acceptable manner and location. They must be mounted level in the horizontal and vertical planes (see Diagram #1 for terminal arrangements) at heights indicated below:

Outdoors – The centerline of the meter shall be 1700 mm ± 100 mm.

Indoors – The centerline of the meter shall be approximately 1700 mm but in no case shall it be more than 1800 mm or less than 600 mm.

(b) A clear space of 400 mm (w) x 600 mm (h) shall be provided for each meter mounting device.

(c) A clear space of at least 1000 mm with secure footing shall be provided and maintained about electrical equipment including revenue metering equipment, as specified by the OESC.

(d) All arc producing electrical equipment considered a source of ignition shall maintain minimum clearance distances specified in CSA B149.1 Natural Gas and Propane requirements as well as any applicable codes and regulations. In the event that requirements between different codes, regulations or rules, or any other Toronto Hydro document are different, the most stringent requirement shall govern.

6.7.7 Energization Prior to Installation of Meter

When the service is to be energized prior to the installation of the meter, acceptable temporary jumper bars may be used in the meter socket. Should the meter jaws be found to be damaged by improper use of jumpers, the customer shall replace the meter socket.

6.7.8 Multiple Position (Ganged) Metering

Where multiple-position (ganged) is permitted:

(a) Service entrance, location, application and associated requirements as per Section 5.

(b) Single phase 120/240V or two phase 120/208V applications only.

(c) One CSA approved, manufactured, multiple position (ganged) meter socket assembly shall be used.

(d) The number of meters within a gang metering unit cannot exceed six. Spare position(s) not permitted.

(e) The bus mains cannot exceed 400 A.

(f) Each metered service shall have a separate service identification, on the exterior of each meter socket cover and service box, as per Section 6.1.3 prior to meter installation.

(g) Where maximum available fault levels exceed 10kA, short circuit protection limiting maximum available fault current to 10kA or below shall be provided. Example of acceptable fuses, intended for limiting fault currents to 10kA or below, are listed below:

1. Eaton/Cooper Bussmann (JKS Series - Class J) – Suitable for 200A and 400A

2. Littelfuse Fast-Acting (JLS Series - Class J) – Suitable for 200A and 400A

3. Merson (AJT Series - Class J) – Suitable for 200A only

(h) See Diagram #6 for details.

6.7.9 **Splitter Box**

Where a splitter box is permitted:

(a) Service entrance, location, application and associated requirements as per Section 5.

(b) Main service box shall be located on the line side of all metered services. Each metered service shall be provided with a separate service box/switch on the line side of the revenue metering equipment.

(c) Main service box, splitter, revenue metering equipment, and the service box/switch of each metered service on the line side of revenue metering equipment, shall be grouped and located in a suitable location acceptable to Toronto Hydro. All service box(es) and switch(es) on the line side of revenue metering equipment, shall be in direct line of sight with revenue metering equipment.

(d) Splitter shall be located immediately after the main service box.

(e) Locking and sealing provisions for the splitter box shall be provided.

(f) Each metered service shall have a separate service identification, on the exterior of each meter socket cover and each service box/switch, as per Section 6.1.3 prior to meter installation.

(g) See Diagram #7 for details.

6.8 Enclosed Switchboards

Where main switch capacity exceeds 800A, an enclosed switchboard located inside a service or electrical room with separate compartment(s) for instrument transformers is required. Switchboard shall be certified in accordance with CSA Standard C22.2 No. 31 Switchgear Assemblies. Service entrance, location, application and associated requirements as per Section 5.

6.8.1 Compartment Isolation

The following items of equipment shall be isolated by means of separate compartments:

(a) Each service entrance switch or breaker (CSA Standard C22.2 No. 4)

(b) Each set of Toronto Hydro revenue metering instrument transformers.

NOTE: Barriers shall be installed between metered and unmetered sections.

6.8.2 Separate Compartment

A separate compartment with a vertically hinged access door having provision for sealing and locking shall be provided for each set of metering instrument transformers for the exclusive use of Toronto Hydro. See Section 6.3 for sealing and locking requirements.

6.8.3 Electrical Clearances - Canadian Standards Association (CSA) Requirements

Where cable or bus connections are made to any component supplied or installed by Toronto Hydro (i.e. revenue metering current and voltage transformers), such connections shall be assumed to be bare conductor and full clearances shall be maintained in accordance with the following CSA table and note, below:

Table 3 of CSA Standard C22.2 No. 31, M89

Nominal voltage Rating (v)	Minimum Spacing (mm)			
	Opposite Polarity		To ground	
	Through Air	Over Surface	Through Air	Over Surface
120 ac	12.5	19	12.5	19
240 ac	19	31	19	25
480 ac	22	44	22	34
600 ac	25	50	25	38

NOTE: Where a neutral is involved, the spacing between the neutral and other current-carrying parts may be based on the lower voltage that normally occurs between them. The spacing from neutral to grounded metal parts are to be the same as those between the current carrying conductors and grounded metal parts.

6.8.4 Equipment and Access Door Working Space Requirement

Doors with vertical hinges shall be installed on the electrical cabinets and compartments containing live equipment where Toronto Hydro personnel will be required to work, such as service entrance switches, metering compartments, switchboard covers over main breakers and unmetered sections of the switchboards.

Working space and clearance share be in accordance with the OESC.

6.8.5 Provision for Sealing and Padlocking Equipment Access Doors

Hinged doors as described in section 6.8.4 shall have provision for sealing. Where bolts are used for fastening they shall be of the captive knurled type with minimum 25 mm diameter slotted heads.

Equipment access doors shall be equipped with metal padlock hasps measuring at least 30 mm wide by 5 mm thick capable of accepting a standard Toronto Hydro padlock with an 8 mm shackle.

6.8.6 Equipment Access Door Openings

All hinged outer access doors shall open at least 135° and all hinged inner doors or screens shall open at least 90°.

6.8.7 Mounting Hardware

Mounting bolts or nuts shall be installed in a manner which will permit complete installation and/or removal of the instrument transformers from within the compartment in which they are installed. Fixed mounting nuts or bolts shall be required for this purpose.

6.8.8 Installation by Manufacturer/Customer

(a) When the switchboard drawings have been approved, the metering instrument transformers will be delivered upon request to the switchboard manufacturer for installation in the switchboard. The current transformers shall be installed with the polarity marks on the line side. The type and rating of instrument transformers to be supplied shall be determined by Toronto Hydro.

(b) Metering instrument transformers delivered to the site by Toronto Hydro are to be installed in the switchboard by the customer/manufacturer.

(c) All hardware, bus work and/or cable required for primary connections to metering current transformers shall be provided by the customer or the switchboard manufacturer.

(d) The customer and or manufacturer shall not disassemble and/or change in any manner the Toronto Hydro equipment sent to them.

6.8.9 Window-Type Current Transformers

(a) Where window-type current transformers are to be installed, the bus shall be sectionalized. The removable bus links through the current transformers shall be bolted in the vertical bus section directly above and below the current transformers. Where three window-type current transformers are used, they shall be mounted in a staggered arrangement.

(b) Where window current transformers are used and the switchboard bus is larger than the window opening, the customer or switchboard manufacturer shall modify the bus to accommodate the current transformers.

(c) The instrument transformers will be supplied by and will remain the property of Toronto Hydro.

6.8.10 Voltage Transformers

Where required, provision shall be made for the installation of voltage transformers on a #16 MSG steel panel in an accessible location in the instrument transformer compartment. This panel must not obstruct access to the current transformers or the removable bus links through the current transformers. This panel is to be a minimum of 140 mm from the front of the instrument transformer compartment.

The voltage transformers are to be installed in the instrument transformer compartment by the switchboard manufacturer and/or electrician on site.

6.8.11 Neutral Bus Tap

A readily accessible continuous neutral copper bus of 25 mm x 3 mm or equivalent (#6 copper white TW75 wire), with three 10-24 tapped holes, shall be provided in each instrument transformer compartment for all 3 phase 4 wire services. If the main neutral bus passes through a metering instrument transformer compartment, the bus shall be provided with three 10-24 tapped holes.

6.8.12 Grounding Stud

A readily accessible grounding stud with a connector suitable for a #10 copper wire or a ground bar provided with three 10-24 tapped hole shall be provided in each instrument transformer compartment. The grounding facility in the compartment shall be connected directly to the switchboard ground bus.

6.8.13 Compartment Sizes

The minimum metering instrument transformer compartment size is provided in Table IV.

TABLE IV

METERING INSTRUMENT TRANSFORMER COMPARTMENT – MINIMUM SIZES

Metering Transformers and Compartments						
Voltage (Volts)	**Phase**	**Wire**	**Service Size (Amperes)**	**Compartment Size**	**Number of Metering Transformers (Provision for)**	
					Current	**Voltage**
240/120	1	3	Up to 800	A	1 or 2	0
208/120 N/W	3	3	Over 800 Up to 4000	B		
208/120 416/240 600/347	3	4	Up to 800	A	3	3
			Over 800 Up to 4000	B	3	
600*	3	3	Up to 800	A	2	2
			Over 800 Up to 4000	B	2	
Voltages up to 600	(*) 3	(*) 3	Over 4000	C	2	2
	3	4			3	3

***** For existing services only.

COMPARTMENT SIZES [width x height x depth (from CT mounting plate)]

A - 762 mm x 762 mm x 210 mm (30” x 30” x 8.25”)
B - 915 mm x 762 mm x 324 mm (36” x 30” x 12.75”)
C - 965 mm x 914 mm x 381 mm (38” x 36” x 15”)

6.8.14 Meter Cabinet and Transformer Rated Meter Socket Requirements

Meter cabinet shall be installed in accordance with specifications outlined in Table II and Section 6.5. Where permitted, approved transformer rated meter sockets listed in Table II, installed as per Diagram #4, are acceptable and can be used instead of a meter cabinet.

6.8.15 Location of Meter Cabinet and Transformer Rated Meter Socket

Meter cabinet (or transformer rated meter socket as per Diagram #4) associated with revenue metering transformers mounted in a switchboard shall be installed in a location close to the switchboard and approved by Toronto Hydro.

6.8.16 Conduit and Metering Compartment

A separate conduit (to be continuous within the switchboard) is required from each revenue metering switchboard compartment to the meter cabinet (or transformer rated meter socket as per Diagram #4). The meter conduit is to terminate at the front right or left corner of the revenue metering compartment and be unobstructed.

6.8.17 Conduit Length and Size

The maximum length of conduit shall be no longer than 30 m. The customer shall supply and install a conduit of a nominal diameter of not less than 38 mm.

6.8.18 Conduit Fittings and Covers

(a) The number of bends shall be kept to a minimum, but in no case shall there be more than three 90 degree bends.

(b) The metering conduit run within the switchboard and between the switchboard and the meter cabinet (or transformer rated meter socket) shall not have fittings with removable covers. Pull boxes and or ‘LBs” are not permitted.

(c) The 51mm (2”) metering conduit between the revenue metering instrument transformer compartment in the switchboard and the meter cabinet (or transformer rated meter socket) is to be rigid steel, EMT or PVC. Flexible conduit (e.g. corrugated, non-metallic) underground not recommended, above ground is not acceptable.

6.8.19 Pull Line in Conduit Run

The customer shall install a strong nylon or polyrope pull line in the conduit between each revenue metering transformer compartment and the meter cabinet. An excess of 1500 mm loop shall be left at each end.

6.8.20 **Connection of Meter Wires**

Under no circumstances will Toronto Hydro install and connect meter wires unless the service is de-energized.

6.8.21 **Meter Cabinet Bonding**

The meter cabinet is to be bonded to the system ground in accordance with the OESC and ESA requirements.

6.9 Meter Centres

Meter Centres shall be certified in accordance with CSA Standard C22.2 No. 229 Switching and Metering Centres. Service entrance, location, application and associated requirement as per Section 5. Refer to Diagram #8 for Meter Centre standard configuration.

6.9.1 **Provision for Sealing**

The customer shall make provision for the installation of Toronto Hydro seals on the following:

(a) removable covers and doors which provide access to unmetered circuits.

(b) handles of all circuit breakers in the "OFF" position.

6.9.2 **Provision for Padlocking**

Circuit breakers or fused switches protecting a meter socket shall have provision for padlocking in the open position.

6.9.3 **Meter Socket Assemblies**

Only meter socket assemblies listed below with terminal arrangement outlined in Diagram #1 shall be used in Meter Centres. The meter sockets shall be properly aligned and mounted on a rigid base to prevent subsequent misalignment.

120/240 V	1 Phase	3 Wire	4-jaw socket
120/208 V	2 Phase	3 Wire	5-jaw socket
120/208 V	3 Phase	4 Wire	7-jaw socket
347/600 V	3 Phase	4 Wire	7-jaw socket
600 V*	3 Phase	3 Wire	5-jaw socket

* (Existing Services Only)

6.9.4 Protection of Meter-Mounting Devices

Each meter-mounting device shall be protected by a rated circuit breaker having adequate short circuit interruption capacity. The circuit breaker shall be connected ahead of the meter-mounting device commonly known as "cold" metering.

6.9.5 Identification of Socket and Cover

Each removable meter socket and circuit breaker cover shall be identified by a permanent and unique mark (number, letter, etc.) so that it cannot be interchanged with other similar covers. The same identification mark shall appear on the frame of the meter centre at the compartment where the cover belongs and shall be clearly visible when the covers and meters are in place. This identification mark need not be the number of the suite metered, thus making it feasible to have the identification marks applied during manufacture of the meter centre.

6.9.6 Identification of Individual Service

Each circuit breaker required for an individual service shall have a permanent customer identification plate (metal or engraved plastic) which cannot be erased or obscured by paint. The circuit breakers must easily be recognized.

6.9.7 Positioning of Meters

(a) The centerline of the lowest meters shall not be less than 600 mm from the finished floor level. The centerline of the upper meters shall not exceed 1800 mm from the finished floor level.

(b) The minimum horizontal distance between the adjacent meter and sockets shall be 152 mm rim-to-rim.

(c) The minimum vertical distance rim-to-rim between the adjacent meter socket openings shall be as follows:

(i) 76 mm: for 100 A, 4 or 5 jaw.

(ii) 152 mm: for 100 A, 7 jaw.

(iii) 152 mm: for 200 A, 4, 5, and 7 jaw.

6.9.8 Neutral for Meters

Where a neutral is required for metering, the meter - mounting device shall have a pre-wired neutral connection (see Diagram #1). This neutral connection shall be ungrounded. The connection to the 5^{th} or 7^{th} terminal, if not made directly to the distribution neutral bus, shall be not less than #12 AWG copper

or equivalent. Where a connection is to be made between aluminum and copper conductors, a proper bi-metallic connector shall be used.

6.9.9 **Barrier for Meters**

Each meter socket shall be separated from others by a suitable barrier.

6.9.10 **Sealing Ring**

Each meter socket shall be equipped with a metal sealing ring.

6.10 Remote Interrogated Metering (RIMS) – Services 50 kW and Greater

The customer is to provide and install the following:

(a) A 120 Volt duplex receptacle, to be located at the bottom right corner inside the meter cabinet or ebox (when approved transformer rated meter socket is used). The receptacle is to be connected to an uninterruptible power supply (UPS) if available. Should the meter cabinet be located in an outdoor environment, then the 120 Volt duplex shall be equipped with GFI protection.

(b) The name and phone number of an on-site contact person.

(c) In locations where cellular communication is unable to connect (typically underground), the customer will need to provide a 19 mm (¾") conduit to an above ground location that has been tested with a cell reception of better than -80 dBm. The conduit length can't be longer than 21 metres. Clearance around the end point of the conduit must be minimum 1 metre.

7.0 METERING REQUIREMENTS FOR MULTI-RESIDENTIAL BUILDING WITH SUB-METERING

7.1 Standard Metering Configuration

Developers are required to conform to Toronto Hydro's Standard Metering Configuration, see Diagram #5 "Typical Signal Line Diagram Layout for Multi-Residential Building with Sub-Metering ".

7.2 Electric Vehicle Charging Stations

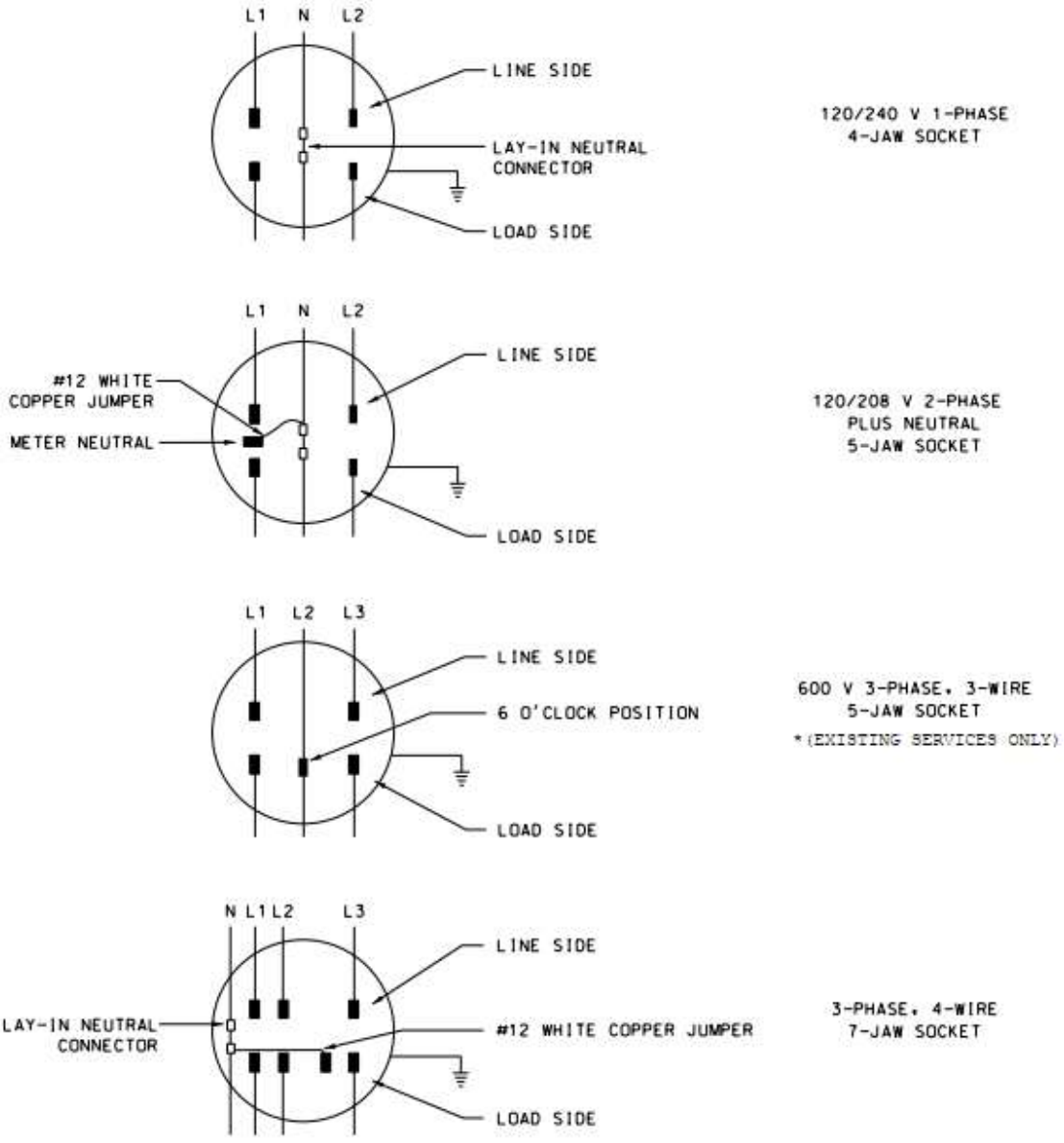
Electric vehicle (EV) charging stations, when required, may be metered separately as shown on Diagram #5 "Typical Signal Line Diagram Layout for Multi-Residential Building with Sub-Metering " .

8.0 DIAGRAMS

The diagrams in this section are intended to enhance understanding of the requirements. They are subject to the conditions specified elsewhere in this document.

Diagram #1

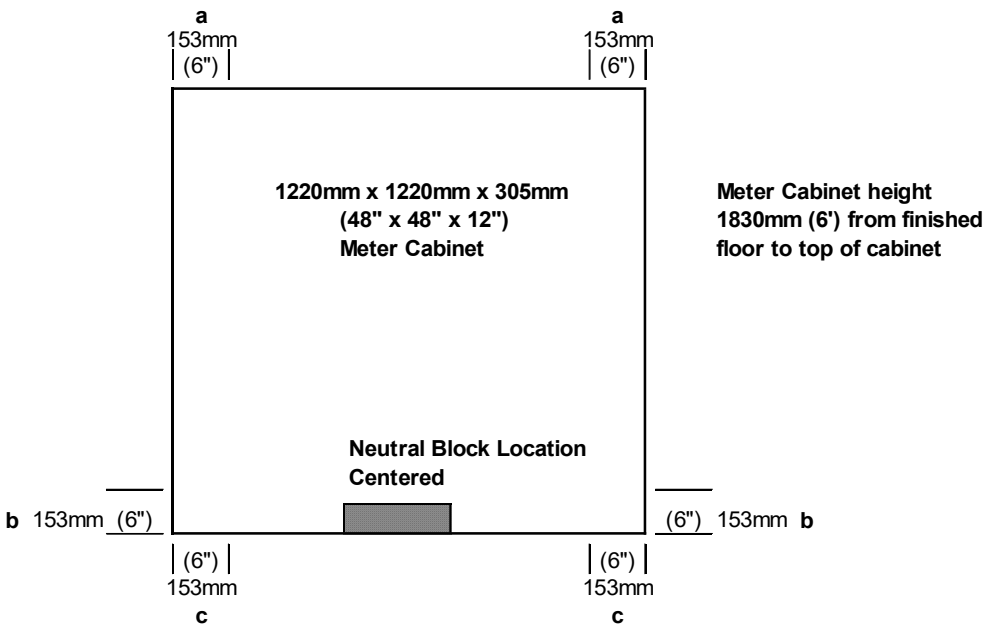
Terminal Arrangements for Meter Mounting Devices



NOTES:
1) L1, L2, & L3 ARE SECONDARY LINE TERMINALS.
2) N IS NEUTRAL.

Diagram #2

Cabinet Layout for CTs/PTs Located Within the Meter Cabinet



1. Entry and exit points must be at points **a to a, b to b or c to c**. Any other conditions require approval from Meter Crew Leader from the district you are working within.

2. The electrician will inform the Meter Crew Leader once the meter cabinet is mounted but before the conductors are pulled in. The Crew Leader will the arrange for the installation of the metering equipment. All new jobs will utilize window type current transformers. The current transformers must be installed prior to the electrician pulling in the conductors.

3. The electrician will be responsible for pulling the cables through the appropriate current transformers and ensuring that phases correspond in cases of multiple conductors per phase. The electrician will lock off the switch until the metering installation is complete and all conditions are met with Toronto Hydro Electric System and ESA.

4. The electrician will be responsible for any splices, sleeve or lugs in the meter cabinet once the cable is pulled through the current transformers. Toronto Hydro will **not** provide any material for splices. Compression sleeves are recommended. All spice material must pass inspection by ESA.

5. For WYE type installation, the neutral must enter the meter cabinet. If the neutral is to be terminated in the meter cabinet, an insulated neutral block centered at the bottom of the meter cabinet will be required.

6. For any deviations from these requirements, please contact a Toronto Hydro Crew Leader for the area:

   Crew Leader: West of Yonge Street – Joe Dipinto – 416-726-5485
   Crew Leader: East of Yonge Street – Matthew Kirk – 647-962-8005

Revision Date: January 1, 2025

Diagram #3

Transformer Rated Socket - 400 A (Integral CT – 300/5) Wiring Diagram

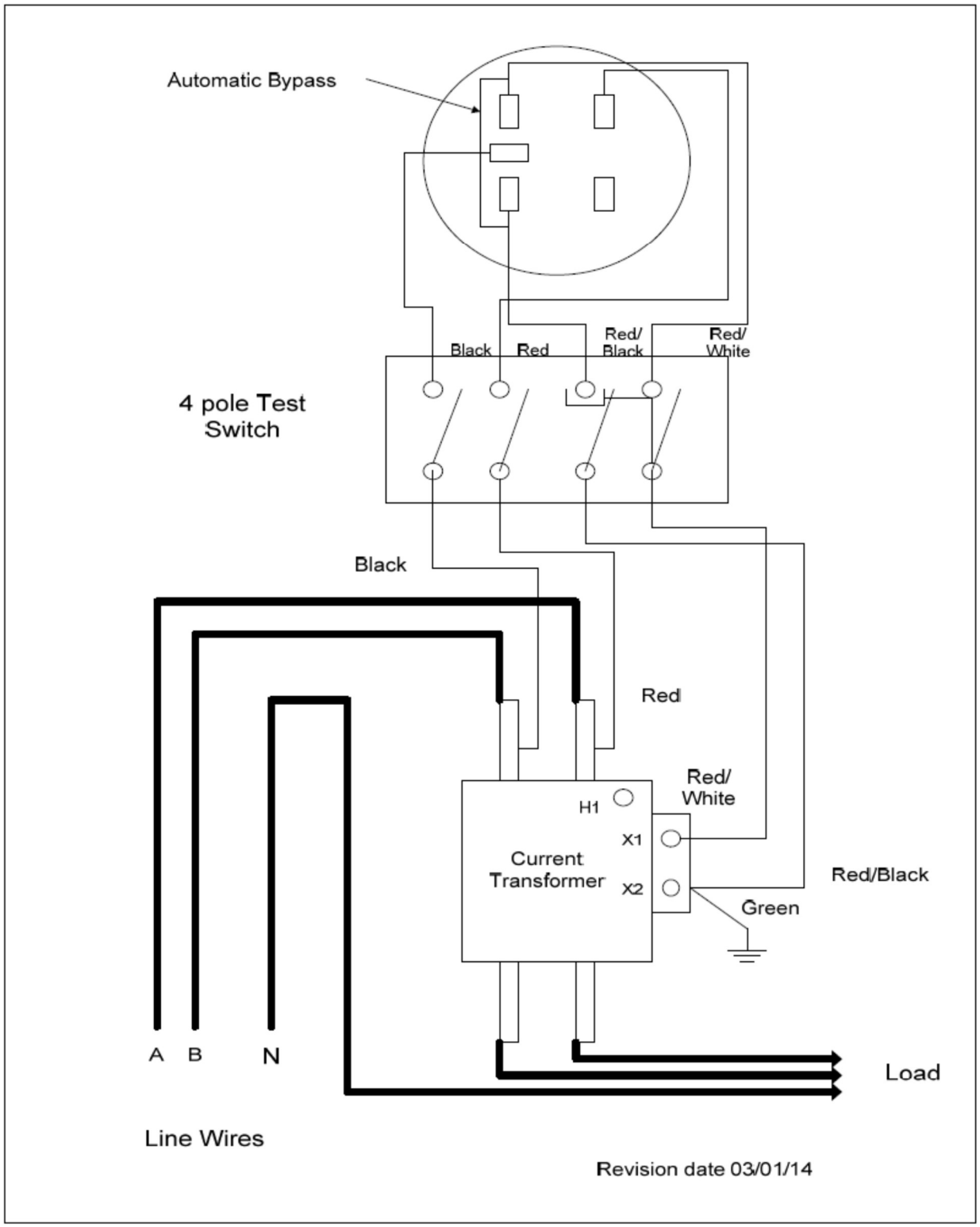
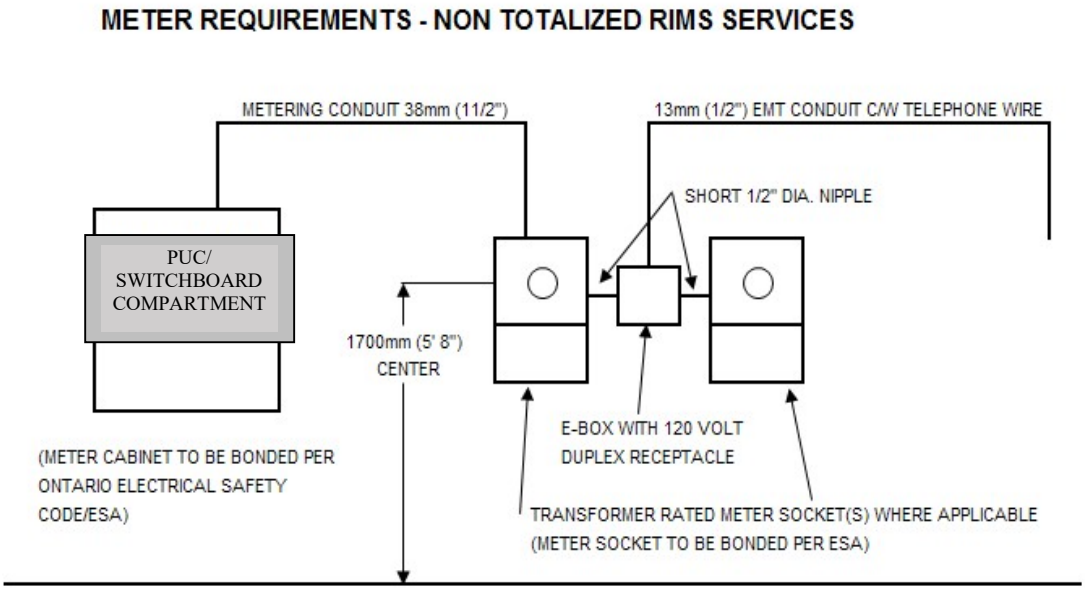


Diagram #4



Requirements

1. **Meter Socket** – must be an approved transformer rated meter socket, no automatic bypass, provision for a 10 pole test panel, lockable cover to be bounded as per ESA, 1700mm (5' 8") to center of opening, socket can be located outdoors.

2. **Meter Conduit** – 51mm (2") conduit, no LB's permitted, continuous from the meter instrument transformers to the meter socket, maximum of three 90 degree bends, maximum conduit length is 30m (100').

3. **E-Box** – A 305mm x 30mm x 102mm (12" x 12" x 4") e-box with a hinged door directly adjacent [less than 102mm (4")] to the meter socket. The e-box will be connected to the meter socket with a 13mm (1/2") conduit. The connection to the meter socket is to be made at the top half of the meter socket opposite the meter socket jaws assembly. A 120 V duplex receptacle is to be located in this e-box. If possible, the 120 V supply should come from a UPS. The e-box must be lockable. E-box is also used for RS-485 communication cable.

4. **Telephone Conduit** – A 13mm (12") EMT conduit, with bushings at both ends, complete with a 2-pair telephone cable, must extend from the e-box to where the telephone trunk lines terminate in the main telephone room. The telephone cable in the telephone room is to be clearly labelled "TORONTO HYDRO METERING". A RJ11 (4 pin) telephone jack is to be connected to the telephone cable in the e-box and left at the bottom of the e-box. See 6.10 for further information.

5. **Meter Compartment in Switchboard** – Housing the revenue metering instrument transformers. The meter conduit is to extend continuously from this compartment to the meter socket. See item 2 above for meter conduit requirements.

Diagram #5

TYPICAL SINGLE LINE DIAGRAM
LAYOUT FOR MULTI-RESIDENTIAL BUILDINGS WITH SUB-METERING

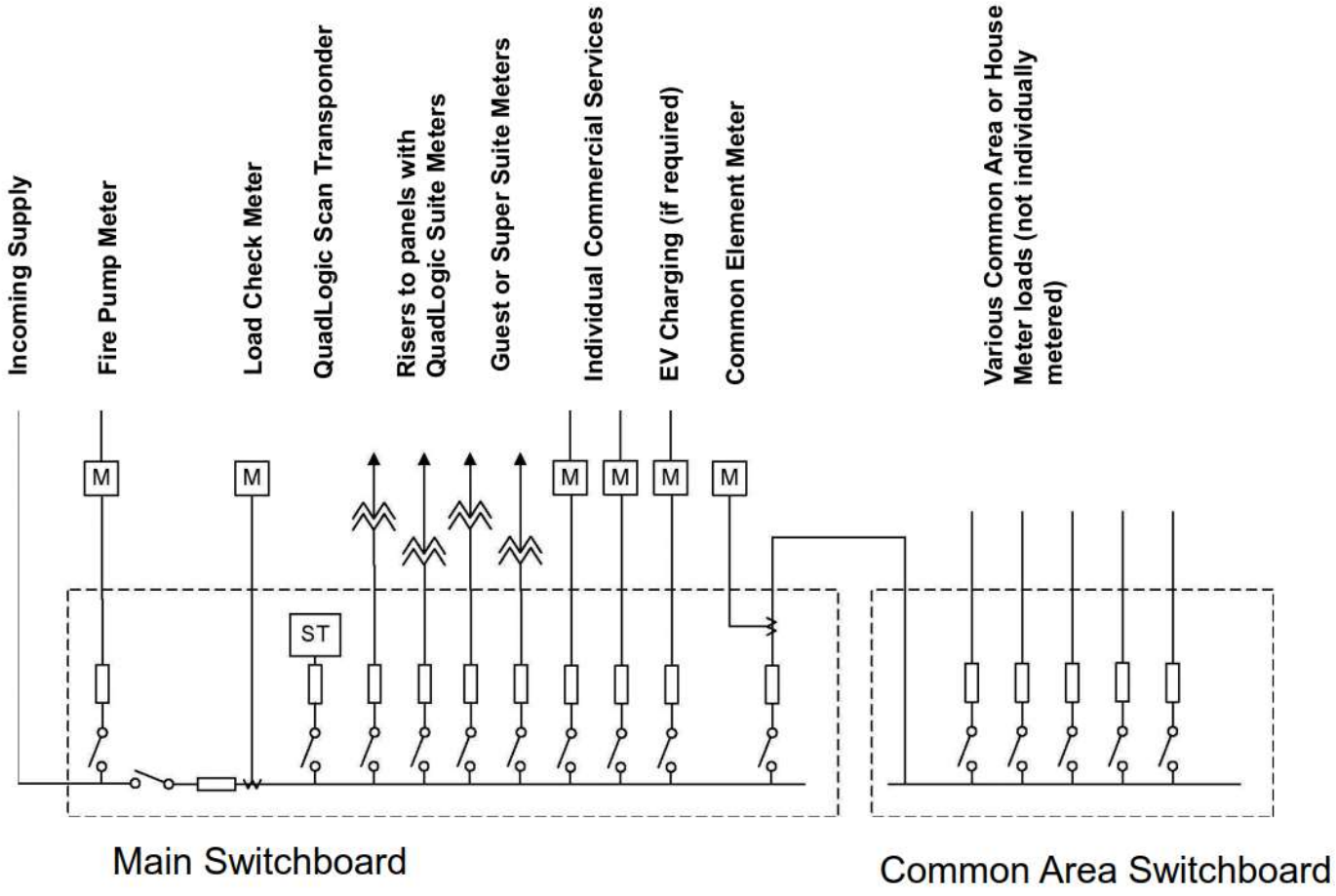
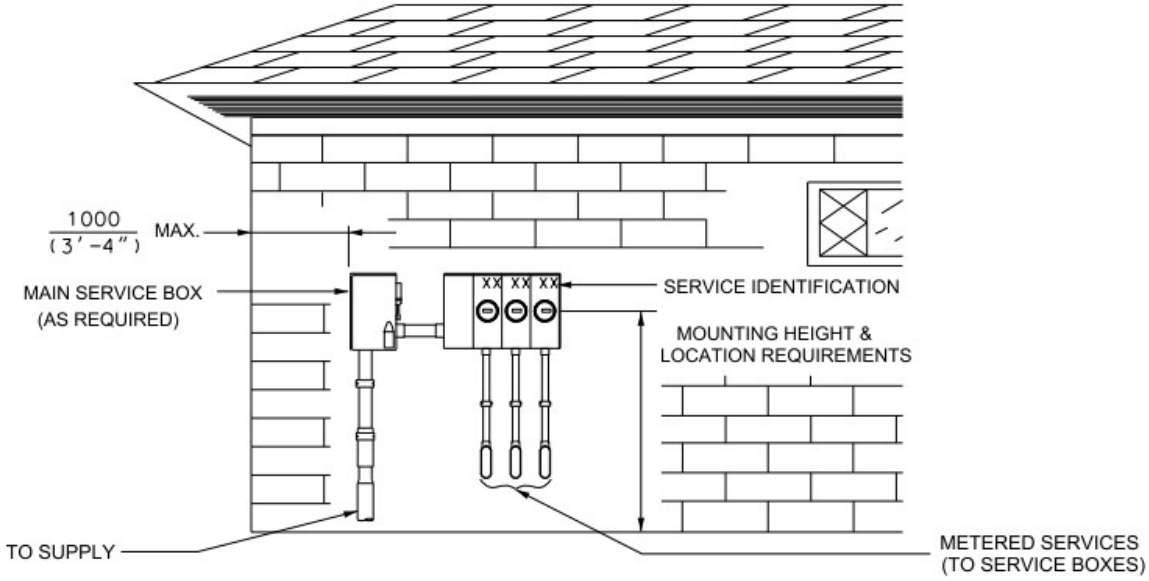


Diagram #6

OUTDOOR RESIDENTIAL – METERING (UP TO 6 METERS)



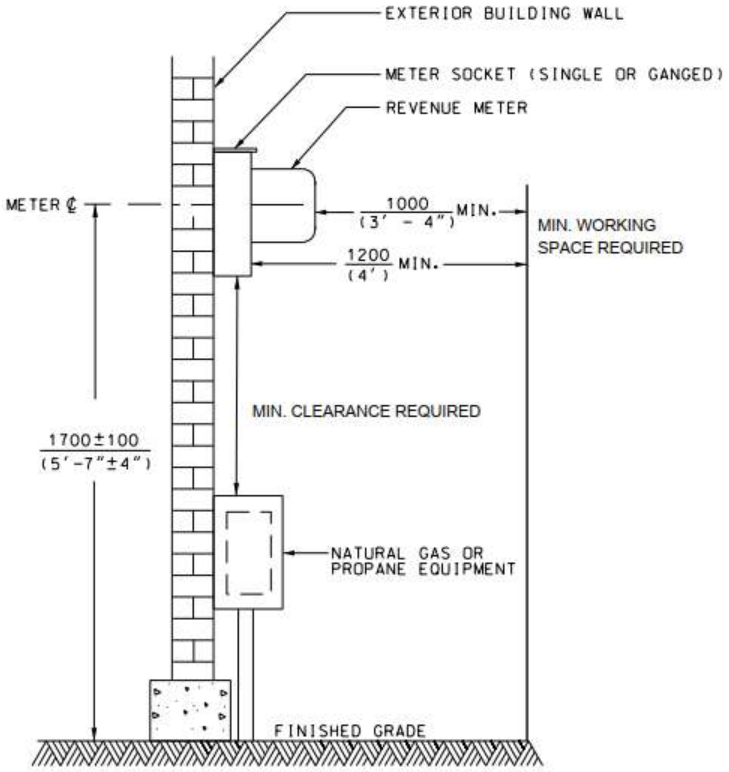


Diagram #7

SPLITTER – STANDARD CONFIGURATION

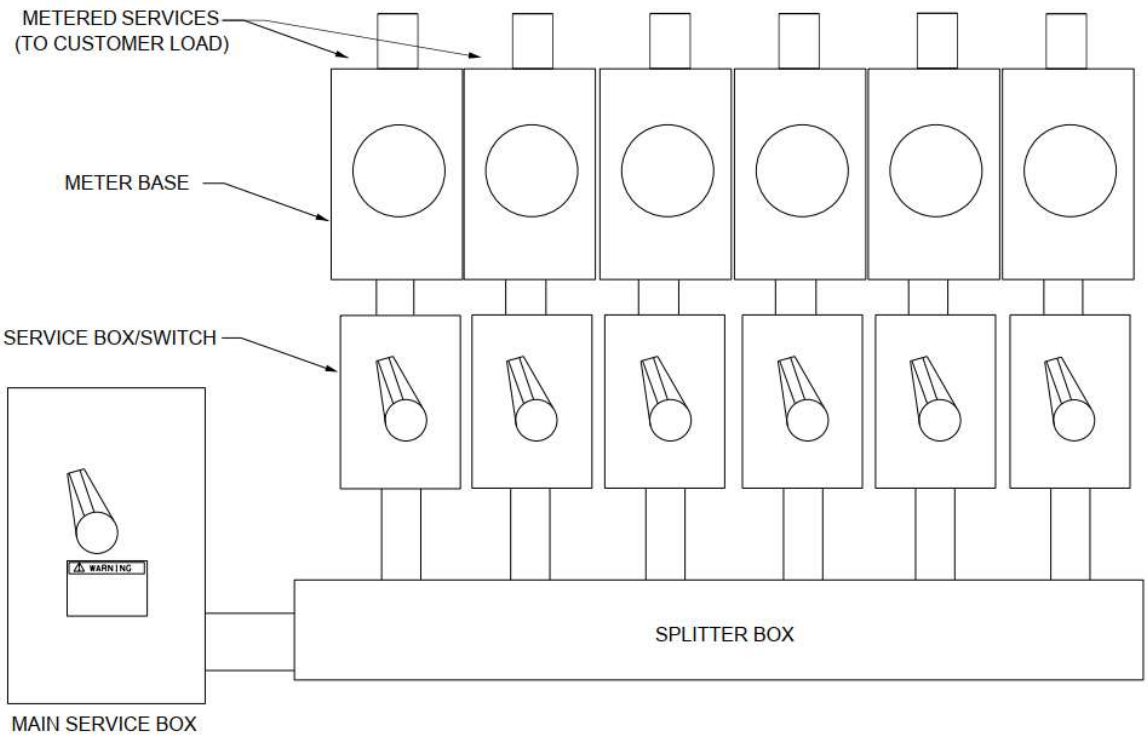


Diagram #8

METER CENTRE – STANDARD CONFIGURATION