



CT Metering Installation Specifications

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I. INTRODUCTION

SECO - As used in this publication, "SECO" represents SECO Energy or any employee properly qualified to act on SECO Energy's behalf.

Member – As used in this publication, "Member" represents any present or prospective user of SECO's electric service, or any person, entity, or representative acting on the Member's behalf, such as an architect, engineer, electrical contractor, land developer, or builder, etc.

The purpose of this manual is to supply essential information to members, contractors, builders, architects, engineers, and others concerned with the planning and installation of electrical services involving current transformers(s). The information contained herein may not cover all conditions. For cases not specifically covered in this publication, SECO should be consulted. **This publication is not intended to substitute direct communication with SECO.**

SECO is required to comply with the rules and regulations in National Electric Safety Code (NESC) and Occupational Safety and Health Administration (OSHA) in the construction and operation of its electric facilities. All requirements in this publication are intended to meet or exceed those requirements.

SECO does not assume the function of inspecting member's wiring for adequacy, safety, or compliance with the electrical codes. This responsibility remains with the Member and the local inspecting authority.

This publication outlines standards to be followed to ensure safe and reliable service. **Consequently, SECO reserves the right to refuse service to any installation that does not meet these specified standards.**

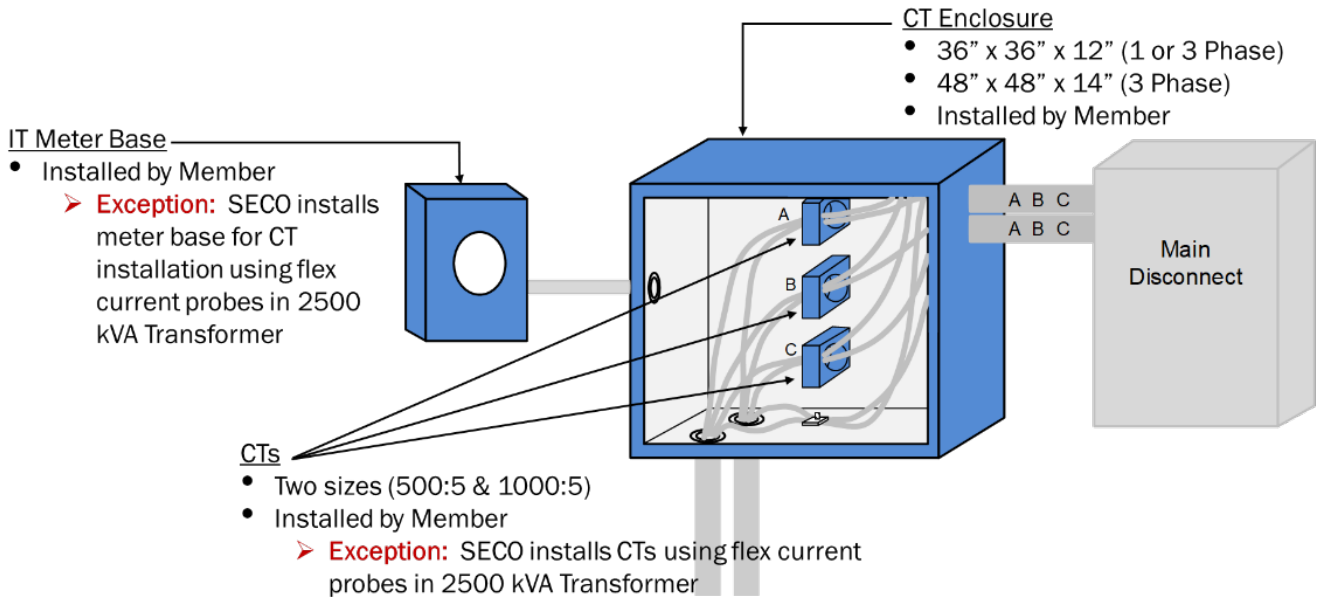
II. EQUIPMENT FURNISHED BY SECO

When in SECO’s judgment the load exceeds the capacity of a self-contained meter, SECO shall provide current transformer-rated metering. SECO shall provide, at its expense, adequate metering instruments to measure the electric service used by the Member. Usually, only one watt-hour meter per Member is needed. However, SECO will furnish whatever metering, in its opinion, is required. SECO does not support K-based meter installations. Self-contained meter applications end at 400 amps.

Current transformers (Table 1), a select size of instrument transformer (IT) or CT enclosures (Table 2), and IT meter bases (Table 3) are provided by SECO and installed by the Member or the Member’s electrician. **Note: This excludes the installation of instrument transformer equipment associated with 2500 kVA transformers. Please refer to Section VIII of this document.** SECO’s engineering representative will determine the appropriate size equipment based on Member-provided plans and information.

Figure 1

Illustrated Overview of CT Metering Equipment Furnished by SECO



SECO will furnish:

1. CTs

| Table 1 – SECO Provided Window Current Transformers (CTs) | | | |
|---|-----------------|----------------------------|--------------------------------------|
| CT Ratio | Window Diameter | Ampacity Amps (Low – High) | Mounting Location |
| 500:5 | 3" | 401 - 2000 | Cabinet |
| 1000:5 | 5.75" | 2000 - 4000 | Cabinet or 2500 kVA Padmount only |

II. EQUIPMENT FURNISHED BY SECO (cont.)

2. CT enclosure, when applicable

| Table 2 – SECO Provided CT Enclosures | | | |
|--|---------------------|-----------------------------------|---------------------------------|
| Dimensions (W" x L" x D") | Number of Phases | Max # of Conduits (In and out) | Max # and Size of Conductors |
| 36" x 36" x 12" | 1 or 3 | 4 – 4" | 8 - 600C or 8 - 500A |
| 48" x 48" x 14" | 3 | 8 – 4" | 16 - 600C or 16 - 500A |

3. Furnish IT rated meter socket and install the instrumentation wiring from the secondary to the meter and set the meter.

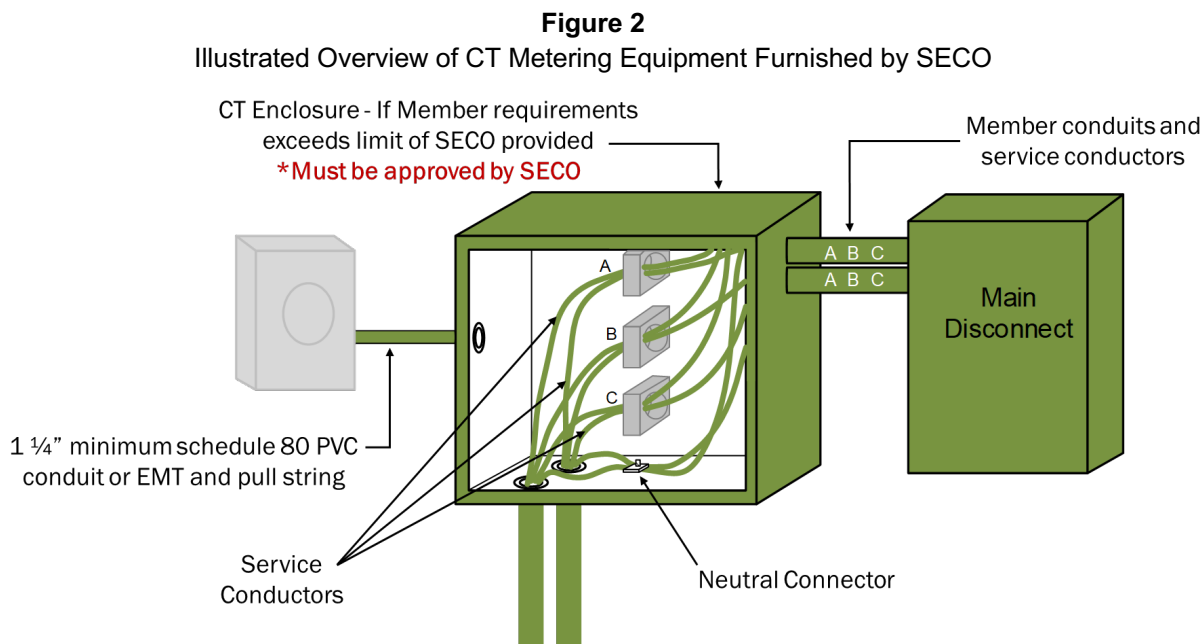
| Table 3 – IT Meter Bases | |
|---------------------------------|------------------------|
| Number of Phases | Description |
| 1 | 6 Terminal Meter Base |
| 3 | 13 Terminal Meter Base |

III. EQUIPMENT FURNISHED, INSTALLED, AND OWNED BY MEMBER

Some members prefer to purchase their own CT enclosure due to space constraints. In instances where the NEC and/or amp capacity requires a larger enclosure, the Member or Member's electrician shall provide the enclosure for the current transformers. The enclosure shall be rainproof NEMA (National Electrical Manufacturers Association) 3R rated and meet Underwriters Laboratories standards. In addition, provisions for padlocking the enclosure must be provided.

The Member is responsible for replacing or repairing the CT enclosure should it become damaged or deteriorated. The Member is also responsible for providing, installing, and maintaining service conductors, metering conduit between CT enclosure and meter base, protection equipment, and equipment grounds.

Current transformers shall be bolted to the back-plate of the enclosure and each shall be capable of being removed individually. The back plate is in addition to the back wall of the enclosure and shall be metal or $\frac{3}{4}$ " plywood. Meter sockets and CT enclosures shall not be used as raceways for other conductors.



Member will furnish:

1. CT enclosure when conduit and wire combinations of Member's service exceeds the limits of the SECO provided 48" x 48" x 14" CT enclosure. The CT enclosure must:
 - a. Be rainproof
 - b. Be NEMA 3R rated
 - c. Meet Underwriters Laboratories standards
 - d. Provide provision for padlocking enclosure
 - e. Be approved by SECO prior to installation
2. Schedule 80 conduit or EMT between CT enclosure and meter base with pull string
3. Service conductors
4. Equipment grounds

IV. LOCATION OF METERING EQUIPMENT

SECO requires all meter bases and CT enclosures to be securely attached to an exterior building wall, pedestal, metal rack, or other permanent, fixed structure where the view from the ground is unobstructed. The meter socket must be aligned so that the meter is both level and plumb. The metering equipment must be installed in a location that allows 24-hour access to SECO personnel for meter reading, testing, inspection, and maintenance with minimal disruption of service to the Member. For reasons of safety and maintenance of equipment, no metering facilities shall be installed in an electrical or storage room. **Electrical meter rooms are not allowed.**

The location of metering facilities should not be affected by a kitchen discharge fan or other vents, or the drain from a roof gutter or air conditioner and should be free from vibration. All metering facilities must be capable of being reached without climbing over objects or removing obstacles.

Metering equipment installed in areas accessible to vehicular traffic may require the installation of bollards, i.e., concrete filled 4" steel pipes firmly installed in the ground. The Member is responsible for providing, installing, and maintaining these posts when required by a SECO representative.

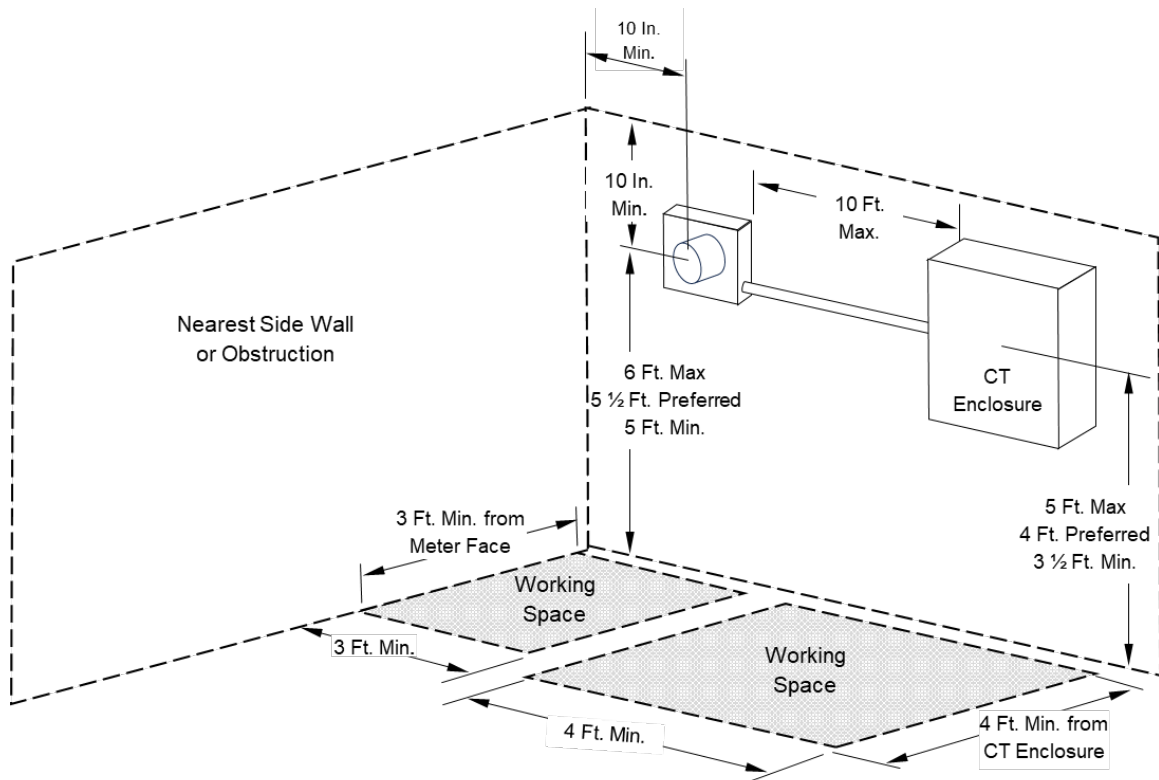
The Member must obtain permission from SECO for any deviations in advance of construction.

V. CLEARANCE REQUIREMENTS FOR METERING EQUIPMENT

The National Electrical Code (NEC) Section 110.26 requires adequate working space for all electrical equipment. The working space allows access for safe operation and maintenance of the equipment. Meter clearances are measured from the center of the meter socket or from the center of the face of the meter. The Member is required to provide and maintain these clearances. SECO requires the following clearances:

1. The preferred height of the centerline of the meter is 5 ½ feet above finished grade. It shall not be less than 5 feet and no more than 6 feet to center of meter.
2. The preferred height of the centerline of the CT enclosure is 4 feet above finished grade. It shall not be less than 3 ½ feet and no more than 5 feet to the center of the enclosure.
3. An unobstructed working space of 4 feet minimum wide by 4 feet minimum deep will be required in front of the meter face or CT enclosure. This space is to be kept clear of any obstructions including landscaping.
4. An unobstructed working space of 4 feet minimum wide by 4 feet minimum deep will be required in front of the meter face or CT enclosure. This space is to be kept clear of any obstructions including landscaping.
5. At no time shall open metering equipment doors impede access to and egress from the working space.
6. A 10-inch minimum horizontal and vertical clearance between the center of the electric meter and any obstruction.
7. The maximum allowed distance from meter socket to CT enclosure is 10 feet.
8. Meters located near natural gas piping require a minimum of 3 feet of clearance. Reference the National Fuel Gas Code (NFPA 54).

Figure 3
Metering Equipment Minimum Work Clearances



VI. IDENTIFICATION OF METERING EQUIPMENT

All meters and corresponding disconnects shall be permanently marked to properly identify the premises being served. Permanent markings can be either engraved identification nameplates, weather-proof acrylic-adhesive-type labels, or commercially available decals designed for this purpose. For service equipment rated 1200A and larger, refer to NEC 110.16(B) for additional permanent labeling requirements.

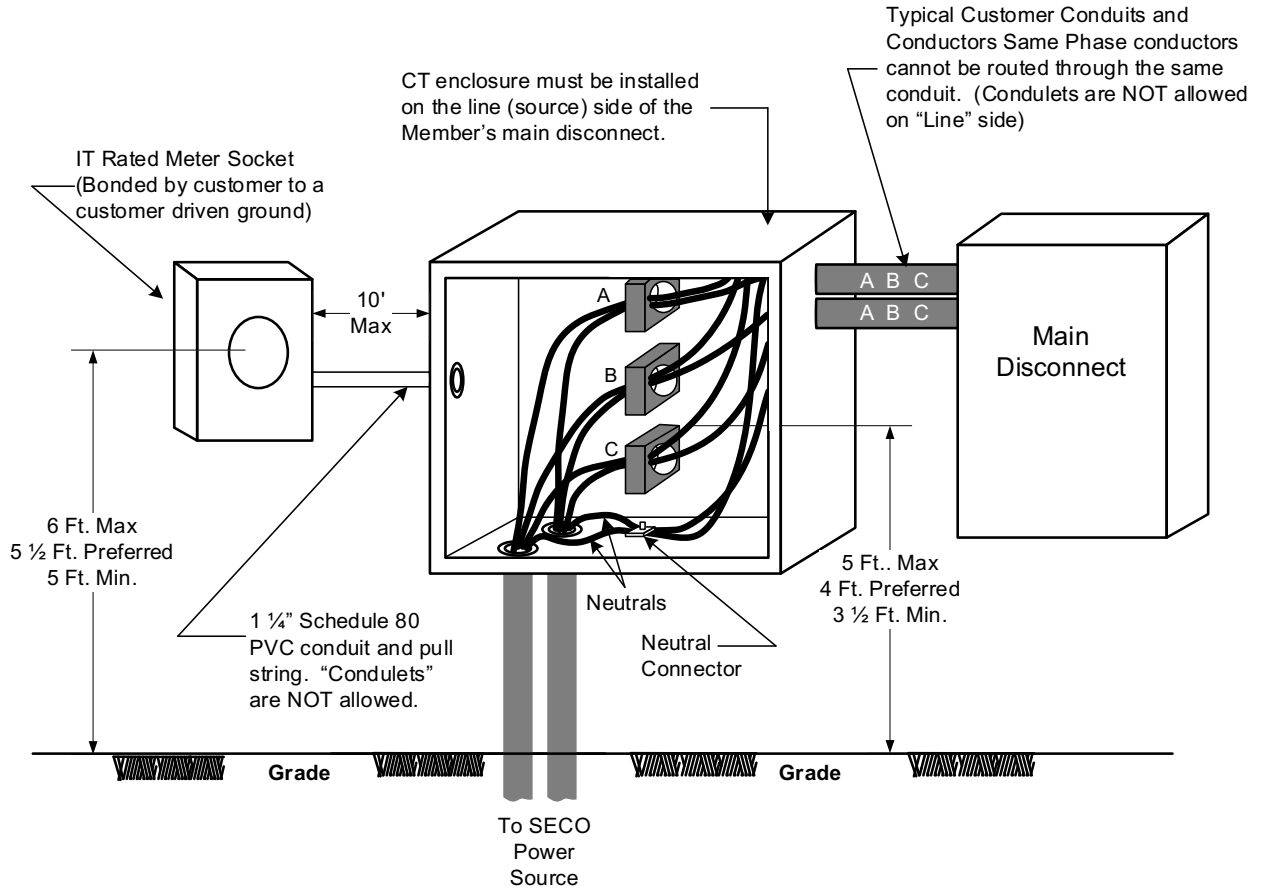
Acceptable Metering Equipment Identification:

1. Clear and acceptable identification means a legibly printed 911 street address. The relation of the meter socket, disconnect, and premise served must be easily discernable.
2. The name of the Member or business name may be included, but it does not constitute a valid marking by itself.
3. SECO will not be responsible for billing issues arising from meters installed in incorrectly marked meter sockets.

VII. CT METERING ILLUSTRATIONS FOR WALL MOUNTED ENCLOSURES

Figure 4

CT Metering for Wall Mounted Enclosures



| Table 4 – Maximum Number of Conductors and Conduits | | | | | | |
|--|---|-----------------------|------------------|---------------------------------------|------------------------|-----------------------|
| CT Enclosure Size (W" x L" x D") | Maximum Number of Conductors & Sizes | | | Maximum Number of Conduits & Sizes | | |
| | Wires per phase | Size Copper MCM | Size Alum MCM | Conduit size | # Conduits entering | # Conduits exiting |
| 36" x 36" x 13" | 2 | 600 | 500 | 4" | 2 | 2 |
| 48" x 48" x 14" | 4 | 600 | 500 | 4" | 4 | 4 |
| Custom Designed* | Custom Designed* | | | Per Member/Customer Requirements | | |

* All custom designed CT enclosures require SECO approval prior to installation.

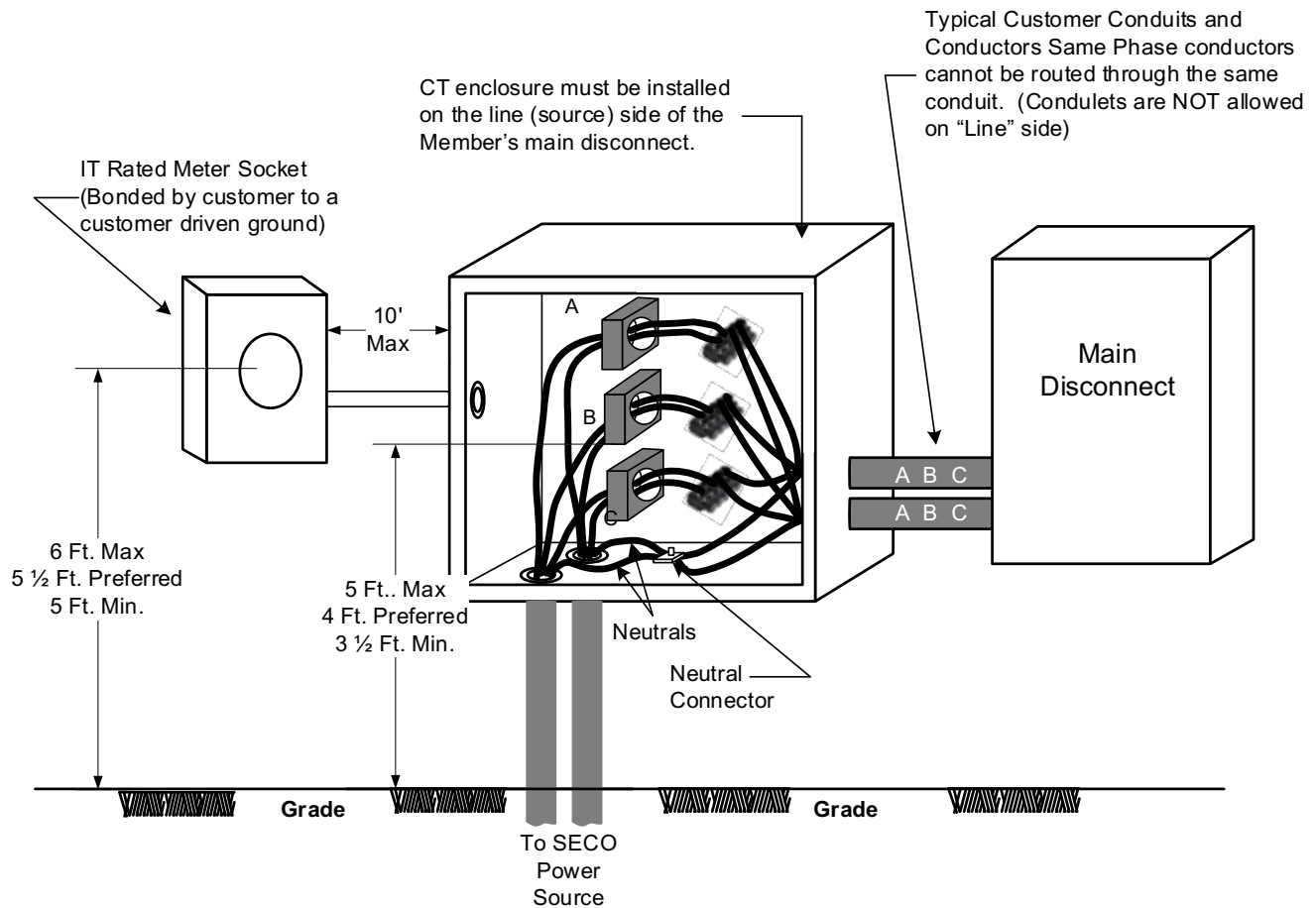
VII. CT METERING ILLUSTRATIONS FOR WALL MOUNTED ENCLOSURES (cont.)Notes – Figure 4

1. Member must supply load information to SECO Engineering representative for proper sizing of CTs.
2. IT rated meter socket is provided by SECO and installed by Member or Member's electrician.
3. Wall mounted current transformer (CT) enclosure may be provided by SECO or Member and installed by Member or Member's electrician.
4. A custom designed CT enclosure is required when conduit and wire combinations of Member's service exceeds the limits of the SECO provided 48" x 48" x 14" CT enclosure. This custom designed enclosure is provided and installed by Member or Member's electrician.
5. **All custom designed CT enclosures must be approved for use by SECO prior to its installation.**
6. **Site meeting with SECO Metering Technician is required prior to the installation of any CT wall mounted enclosure**, whether SECO provided or custom designed.
7. The Member or Member's electrician must install the CT enclosure on the line (source) side of the Member's main disconnect.
8. Any load monitoring equipment owned by the Member may only be installed on the load side of the Member's main disconnect. No Member equipment is allowed inside a meter or CT enclosure.
9. Member or member's electrician shall provide and install a 1 ¼" minimum schedule 80 PVC conduit or EMT with pull string between meter socket and CT enclosure. The maximum allowed distance from meter socket to CT enclosure is 10 feet (see Section V, Figure 1).
10. Window CTs are provided by SECO and installed in CT enclosure by Member prior to wire being pulled. **Coordination with SECO is required.**
11. CTs must be installed in the correct orientation, with white indicator dot (H1 for polarity) pointing towards the source.
12. Size and number of conductors entering CT enclosure shall equal the size and number of conductors exiting (Table 5).
13. Size and number of conduits entering CT enclosure shall equal the size and number of conduits exiting (Table 5).
14. SECO may refuse to connect a service or install a meter on any metering installation that does not conform to SECO's requirements.

VII. CT METERING ILLUSTRATIONS FOR WALL MOUNTED ENCLOSURES (cont.)

Figure 5

CT Metering Installation for Wall Mounted Enclosure Using UL Certified Wire Connectors



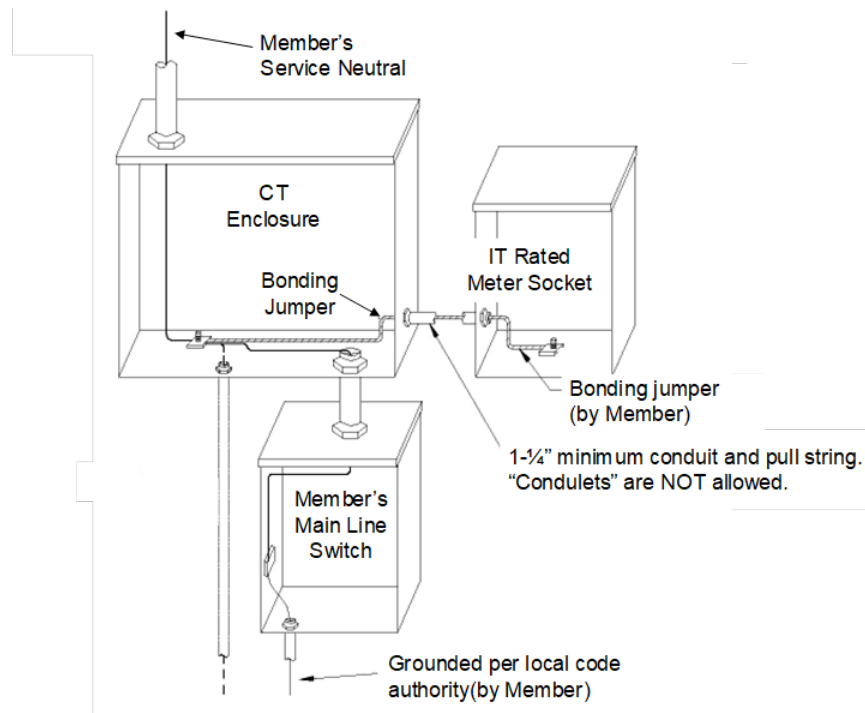
Notes – Figure 5

1. All notes for Figure 4 "CT Metering for Wall Mounted Enclosures" are applicable.
2. Wire connectors used for splicing or tapping conductors on the line side of service equipment to be UL Certified (Listed) and marked SR or "suitable for use on the line side of service equipment" (NEC 230.46).
3. Wire connectors must be fully insulated for the safety of SECO personnel.
4. Wire connectors must be approved by SECO prior to installation. The member or member's electrician must provide manufacturer's name and catalog number for SECO review and approval.
5. SECO may refuse to connect a service or install a meter on any metering installation that does not conform to SECO's requirements.

VII. CT METERING ILLUSTRATIONS FOR WALL MOUNTED ENCLOSURES (cont.)

Figure 6

Bonding for CT Enclosure and IT Rated Meter Socket Installation



SECO Will:

1. Furnish the CT enclosure (when applicable).
2. Furnish IT rated meter socket and CTs.
3. Furnish and install the instrumentation wiring from the secondary to the meter and set the meter.

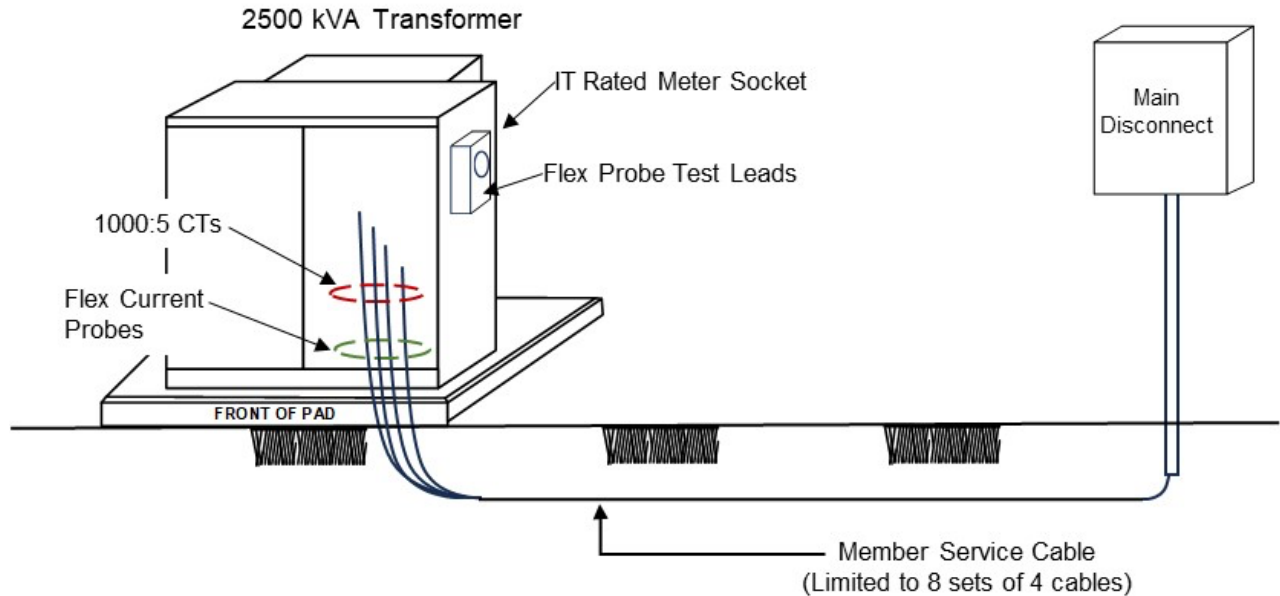
The Member or Member's Electrician Will:

1. Install SECO provided IT rated meter socket.
2. Fasten CT enclosure and meter socket to masonry walls with toggle screws or expansion shields (no plastic plugs or impact tools).
3. Mount CT enclosure with sealing ears at bottom.
4. Install SECO provided window CTs in CT enclosure prior to pulling wire.
5. Furnish and install the service entrance conduit, conductors, and equipment, including grounds.
6. Furnish and install any conduit necessary to connect the enclosure and socket including a pull string.
7. Install conduits entering top of enclosure with approved watertight connectors when enclosure is installed in exposed locations.
8. All IT rated meter sockets, current transformer enclosures, and equipment enclosures are to be bonded together per SECO specifications.
9. Satisfy all grounding requirements of the National Electric Code (reference NEC article 250), conform to applicable local building codes, and be subjected to acceptance by local inspecting authorities.

VIII. METERING EQUIPMENT CONFIGURATION WITH 2500 KVA PADMOUNT TRANSFORMER

Figure 7

CTs and Flex Current Probes in 2500 kVA Padmount Transformer



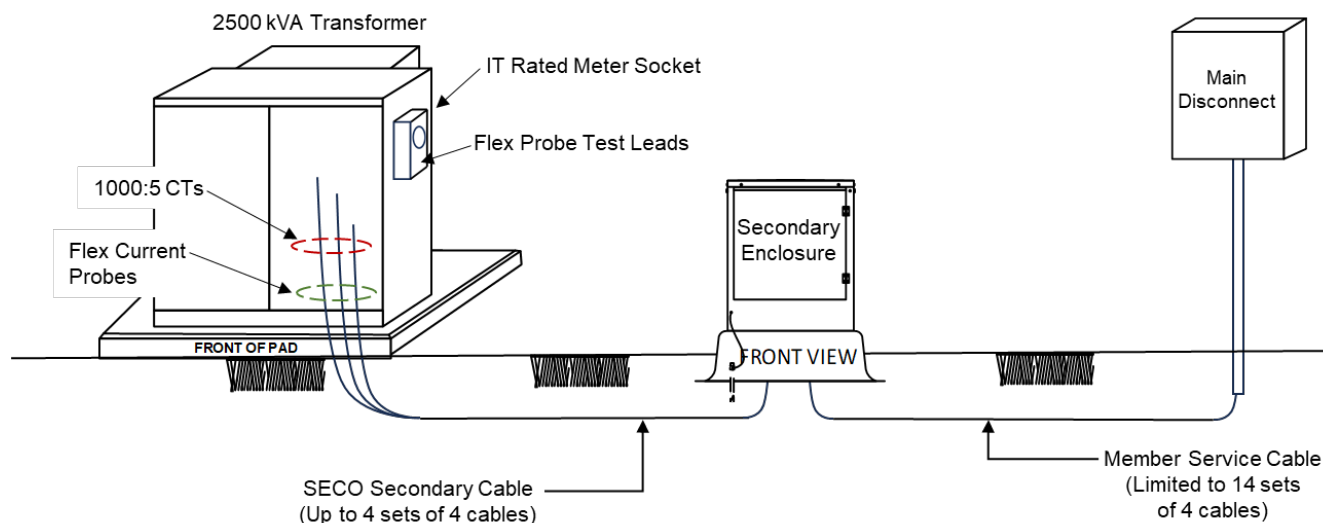
Notes – Figure 7

1. Member must supply load information to SECO Engineering representative for proper sizing of CTs.
2. IT rated meter socket is provided and installed by SECO.
3. SECO will provide and install two (2) sets of CTs (metering set and flex current probes) in padmount transformer.
4. SECO will provide and install a 1 ¼ " minimum schedule 80 PVC conduit between meter socket and padmount transformer.
5. This type of installation is restricted to one Member and a single meter per padmount transformer.
6. CT ratio is determined by SECO.
7. IT Meter socket shall be bonded by SECO to driven ground.
8. Eight (8) secondary/service conductors is the maximum number accepted by SECO padmount transformers.
9. The front of transformer pad must have a minimum clear working area of 10 feet.
10. The side and rear of transformer pad must have a minimum clear working area of 3 feet.
11. Any load monitoring equipment owned by the Member may only be installed on the load side of the Member's main disconnect. No Member equipment is allowed inside a meter or CT enclosure.
12. SECO may refuse to connect a service or install a meter on any metering installation that does not conform to SECO's requirements

VIII. METERING EQUIPMENT CONFIGURATION WITH 2500 KVA PADMOUNT TRANSFORMER (cont.)

Figure 8

CTs and Flex Current Probes in 2500 kVA Padmount Transformer with Secondary Enclosure



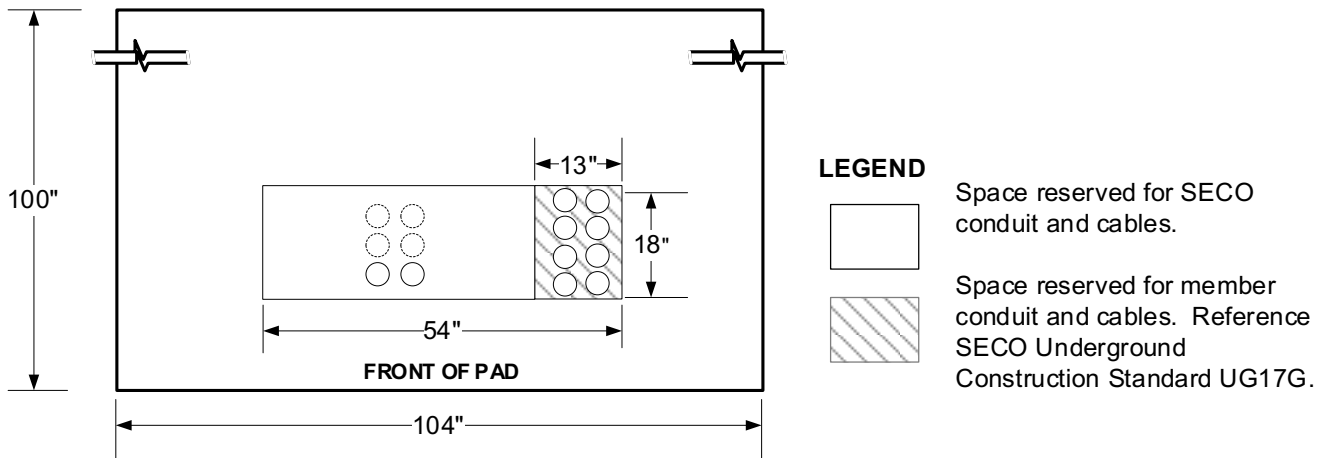
Notes – Figure 8

1. Member must supply load information to SECO Engineering representative for proper sizing of CTs.
2. IT rated meter socket is provided and installed by SECO.
3. SECO will provide and install two (2) sets of CTs (metering set and flex current probes) in padmount transformer.
4. SECO will provide and install a 1 ¼ " minimum schedule 80 PVC conduit between meter socket and padmount transformer.
5. This type of installation is restricted to one Member and a single meter per padmount transformer.
6. CT ratio is determined by SECO.
7. IT Meter socket shall be bonded by SECO to driven ground.
8. Secondary enclosure is used when the number of sets of conductors for the Member service exceeds 8 sets.
9. Secondary enclosure is limited to an amperage demand of 3000A.
10. The source conductors (from the transformer) shall be connected to the center of the secondary enclosure bus bar.
11. SECO will provide secondary cables between transformer and secondary enclosure. These cables will be sized according to the transformer capacity.
12. The front of transformer pad must have a minimum clear working area of 10 feet.
13. The side and rear of transformer pad must have a minimum clear working area of 3 feet.
14. A minimum clear working area of 10 feet required in front of secondary enclosure doors. Three feet of clear space required around the remainder of the enclosure.
15. Any load monitoring equipment owned by the Member may only be installed on the load side of the Member's main disconnect. No Member equipment is allowed inside a meter socket, CT enclosure, or secondary enclosure.
16. SECO may refuse to connect a service or install a meter on any metering installation that does not conform to SECO's requirements.

VIII. METERING EQUIPMENT CONFIGURATION WITH 2500 KVA PADMOUNT TRANSFORMER (cont.)

Figure 9

Conduit Placement for Three Phase Transformer Pad (750 kVA and larger)



Notes – Figure 9

1. The front of transformer pad must have a minimum clear working area of 10 feet.
2. The side and rear of transformer pad must have a minimum clear working area of 3 feet.
3. The pad is installed after conduit is installed.
4. Eight (8) secondary/service conductors is the maximum number accepted by SECO padmount transformers.