



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

This standard was reviewed and approved by key managers with final approval by an officer of Oncor Electric Delivery on July 28, 2010.

1.0 SCOPE

- 1.1 This guide applies to the interconnection of a Customer with the Company's system via a new or existing interconnection at transmission voltages (69 kV and higher), in compliance with NERC Reliability Standard FAC-001-0.
- 1.2 This guide does not apply to a Point of Interconnection capable of bi-directional power transfer.
- 1.3 The interconnection arrangements covered in this guide are not intended to cover all possible scenarios. Interconnection scenarios that differ from the arrangements covered in this guide will be addressed on a case by case basis.
- 1.4 Company reserves the right to deviate from the requirements specified in this guide based on the circumstances specific to a given Point of Interconnection.
- 1.5 Interconnections will be provided in accordance with the Regulations specified herein. In the event of a conflict between this guide and the Regulations, the Regulations will control.
- 1.6 This guide is subject to revision at the sole discretion of Company. It is Customer's responsibility to request and comply with the latest revision of this guide.

2.0 DEFINITIONS

- 2.1 ANSI Standards – American National Standards Institute Standards
- 2.2 Customer – An end-use retail customer who purchases electric power and energy and ultimately consumes it.
- 2.3 Company – Oncor Electric Delivery Company LLC or its successors and assigns.
- 2.4 Customer's Facilities or Customer Facilities – Customer-owned electric lines, electrical equipment, protection equipment and other facilities that function as part of Customer's electric system and which must be used, installed and/or modified to accept electrical service from Company's Facilities.
- 2.5 Company's Facilities or Company Facilities – Company-owned electric lines, electrical equipment, protection equipment, metering equipment, and other facilities that function as part of Company's electric system and which must be used, installed and/or modified to deliver electrical service from Company's transmission system to the Customer's Facilities.
- 2.6 ERCOT – Electric Reliability Council of Texas.
- 2.7 Good Utility Practice – As defined in the Tariff.
- 2.8 IEEE Standards – Institute of Electrical and Electronic Engineers Standards



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

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- 2.9 NERC Reliability Standards – North American Electric Reliability Corporation Reliability Standards
 - 2.10 Point of Interconnection (POI) – The point where the Company's conductors are connected to the Customer's conductors and a change of ownership occurs.
 - 2.11 PUCT – Public Utility Commission of Texas.
 - 2.12 Regulations - Laws, regulations, tariffs, and agreements applicable to the services provided under this guide.
 - 2.13 Tariff – Oncor Tariff for Retail Delivery Service approved by the PUCT. Such Tariff is available on the Company website at:
http://oncor.com/pdf/tariffs/Tariff%20for%20Retail%20Delivery%20Service_Searchable_06-09-10.pdf.
- 3.0 NERC RELIABILITY STANDARD FAC 001 FACILITY CONNECTION REQUIREMENTS
- 3.1 Procedures for Coordinated Joint Studies

Company will perform assessments of the reliability impacts of new Points of Interconnection, or changes to existing Points of Interconnection, in accordance with the Oncor Electric Delivery Transmission Planning Procedures. Such procedures are available upon request.
 - 3.2 Procedures for Notification of New or Modified Facilities
 - 3.2.1 Company will notify ERCOT of new or modified transmission facilities as required by the ERCOT Nodal Protocols section 3.10.
 - 3.2.2 Company will provide advance notice to ERCOT of its future plans to make changes to its transmission system in accordance with Company Standard 0107 NOMCR Process. At the time such changes are to be made, Company will obtain approval from ERCOT for such changes prior to making such changes and will notify ERCOT when such changes are implemented, both in accordance with Company's Transmission Grid Management Guide T-011 System Change Process.
 - 3.3 Voltage Level and MW and MVAR Demand
 - 3.3.1 Company's transmission voltages are 69 kV, 138 kV, and 345 kV. The actual voltage for a Point of Interconnection will be determined through analyses performed by Company. Not all voltages may be available to Customer at its location.
 - 3.3.2 Customer will provide its load information in accordance with section 4.1.8 below.
 - 3.3.3 Customer will comply with section 3.9 below regarding MVAR demand.



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

3.4 Breaker Duty and Surge Protection

3.4.1 Customer will comply with section 5.2.1 below.

3.4.2 Customer's transmission voltage facilities directly connecting to the POI should meet the applicable IEEE Standards for direct lightning stroke shielding and surge arrester protection including but not necessarily limited to IEEE Standards 998 and C62.22.

3.5 System Protection and Coordination

Customer will comply with the provisions regarding system protection, as specified in sections 5, 6, and 7 below.

3.6 Metering and Telecommunication

3.6.1 Metering of service at each POI is required. The metering configuration will be determined on a per case basis. Company may at its option, install metering at the POI or on the low-side of Customer's transformer. An adder for loss compensation shall be used for metering installed on the low side of Customer's transformer.

3.6.2 If Company meters on the low side of Customer's transformer, Company shall provide a metering enclosure, metering voltage transformers (VTs) and current transformers (CTs) or reimburse Customer for the cost of Company specified, Customer purchased transformers. The Customer shall be responsible for installing the metering enclosure, the VTs and CTs and all associated fuses, structures, foundations, conduit, lockable junction boxes, Company specified cable, and grounding. The exact location of metering will be determined on a per case basis. VTs and CTs shall be installed so as to provide Company employees easy access without unnecessary intrusion into Customer's Facilities. The standard location for the installation of Company's metering enclosure shall be outside the Customer's substation fence. Customer shall be responsible for installing Company specified conduit and cable directly from the metering transformers to the metering enclosure. Company will complete and terminate the cable at the junction boxes and metering enclosure. If the installation of free standing VTs and CTs is not an option due to space limitations Customer may request an exception to install the VTs and CTs in Customer's switchgear. Company shall review request for exception on a per case basis and Customer must give Company sufficient notice for the VTs and CTs to be installed in Customer's switchgear before the switchgear is fabricated. Prior to procurement and construction, Customer will provide to Company for review drawings sufficient to show in detail the aforementioned equipment, including a one line diagram.

3.6.3 Customer will not install bypasses around any Company CTs.

3.7 Grounding and Safety Issues

3.7.1 Customer will ground its transmission voltage equipment at the POI in accordance



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

with applicable IEEE Standards including but not necessarily limited to IEEE Standard 80.

3.7.2 Customer and Company will coordinate switching and tagging of switches at a POI in accordance with Company's procedures. Such procedures will be made available to Customer upon request.

3.8 Insulation and Insulation Coordination

Customer will meet the applicable requirements of the applicable IEEE Standards with respect to insulation, insulation coordination, and electrical clearances for its facilities at the POI, including but not necessarily limited to IEEE Standards 1313.1, 1313.2, and 1427.

3.9 Voltage, Reactive Power, and Power Factor Control

Customer will comply with the applicable provisions of the Tariff with respect to the power factor of its load.

3.10 Power Quality Issues

Customer will comply with the applicable provisions of the Tariff and section 5.2.2 below with respect to its obligations not to create adverse effects on Company's transmission system.

3.11 Equipment Ratings

Customer's equipment will be rated in accordance with applicable ANSI Standards, including but not necessarily limited to ANSI Standards C84.1 and C92.2.

3.12 Maintenance Coordination

Company and Customer will conduct maintenance activities on their respective facilities in accordance with the applicable provisions of the Tariff.

3.13 Operational Issues (abnormal frequency and voltages)

Abnormal voltage and frequency may occur at a POI as is described in the Tariff. Customer is responsible for installing necessary equipment to protect its system in the event of abnormal voltage or frequency as is described in the Tariff.

3.14 Inspection Requirements

3.14.1 Customer shall have the responsibility for inspecting the Customer Facilities to determine if such facilities have been constructed in accordance with all requirements applicable to such facilities.

3.14.2 Customer is responsible for obtaining all electrical inspections required by governmental authorities having jurisdiction.



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

3.15 Communications and Procedures during normal and emergency operating conditions

Company and Customer will communicate with each other in accordance with the applicable provisions of the Tariff and section 6 below.

4.0 CUSTOMER INFORMATION

4.1 Customer will provide the following information to Company and secure from Company a commitment to interconnect Customer's Facilities with Company's Facilities prior to Customer finalizing the design of Customer's Facilities.

4.1.1 Desired in-service date for requested POI.

4.1.2 Physical location of proposed POI.

4.1.3 Company's transmission line structure number for each structure on either side of the proposed POI if Customer's requested POI is to an existing transmission circuit.

4.1.4 Voltage at which interconnection is being requested.

4.1.5 Length and calculated positive and zero sequence impedance of the transmission line extension from the POI, if Customer plans to build a line extension.

4.1.6 One line electrical diagram of proposed Customer Facilities, both initial and ultimate.

4.1.7 Proposed transformer ratings including:

- Voltages and winding connections
- MVA (both base and maximum ratings)
- Impedances (both positive and zero sequence at base rating)

4.1.8 Initial and five year load projections (MW) including peak load power factor at the POI.

4.1.9 List of all motors greater than 500 horsepower associated with the load addition and the following information for each motor listed:

- Horsepower rating of each motor
- Code (A, B, C, D, etc.)
- Rated voltage
- Minimum starting voltage

4.1.10 Size, voltage, and impedance of any step down transformers

4.1.11 Special service requirements (e.g. information on special requirements for Customer's manufacturing processes.)

4.1.12 Relay functional diagram of Customer's proposed facilities for Company's review. Relay functional will specifically include all facilities that may impact Company's system and relaying performance.



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

4.1.13 Drawings of proposed physical facilities, including initial installation and any anticipated future additions.

4.1.14 Surveyed or detailed site plan showing proposed Customer Facilities in proximity to existing Company Facilities.

5.0 CONSTRUCTION AND OWNERSHIP

5.1 Company's Facilities

5.1.1 Company's Facilities will be designed, installed, owned, and operated by Company. Company will perform all maintenance work related to Company's Facilities.

5.1.2 Company will determine requirements for relaying protection of Company's Facilities and will specify and implement protection and control schemes to meet such requirements. Company will work with the Customer to determine protection requirements of Customer's Facilities necessary to provide coordination with protection of Company's Facilities.

5.1.3 Company will have no obligation to begin design, procurement of materials, construction of Company's Facilities, nor make other project specific improvements until Customer and Company have completed contractual arrangements.

5.1.4 Company will not begin construction of Company's Facilities within Customer's property until any required easement and/or right of way has been provided, the required environmental site assessments have been made, and the required permitting requirements have been met.

5.1.5 At points of interconnection where existing Company Facilities are not equipped with ac and/or dc service and new Company Facilities will require ac and/or dc service and Customer's Facilities are or will be equipped with ac and/or dc service, Customer will, if requested by Company, provide the necessary ac and/or dc service to Company's Facilities at no cost to Company.

5.2 Customer's Facilities

5.2.1 Customer will be responsible for the design, installation, ownership, operation, and protection of Customer's Facilities. Customer's protective equipment will be fully rated to interrupt available fault current (See Section 7).

5.2.2 Customer's Facilities, and any modifications thereof, will meet all applicable national, state, and local construction, operation, and safety codes. Design of Customer's Facilities is subject to Company's review as to suitability for safe, compatible, and reliable operation with Company's system so as not to reduce or adversely impact the quality of electric service being provided by Company to all customers.

5.2.3 Customer's Facilities will be constructed and operated in accordance with Company's Tariff and any applicable agreement.



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

- 5.2.4 Customer will submit to Company proposed modifications to Customer Facilities prior to making the modifications so that Company can determine if the proposed modifications will impact Company Facilities.
- 5.2.5 A manual or motor operated switch with visible break for the purpose of isolating Customer's Facilities from Company's Facilities will be provided by Customer. The switch location is shown in Figure 1. Such switch shall be accessible to Company personnel for operation at all times, and capable of being locked in an open position by Company and Customer. (See Section 7.2.2)
- 5.2.6 Customer will provide relay settings and relay testing documentation to Company certifying that all protection equipment has been properly adjusted and trip tested before Customer's Facilities are placed in service.

6.0 OPERATIONAL REQUIREMENTS

- 6.1 Operating provisions governing the interconnected operations between Company's Facilities and Customer's Facilities when Customer's Facilities will consist of multiple substation transformers connected to multiple transmission lines will be in accordance with this guide, Company procedures, and Regulations. Figure 2 is a typical representation of this type of interconnection.
 - 6.1.1 In the event of a scheduled outage of a Customer substation transformer or a Point of Interconnection, if Company's transmission system conditions permit, Company's transmission system dispatcher will permit Customer to transfer all or a part of its load from one Customer substation transformer to a Customer substation transformer connected to another transmission line by paralleling the secondary sides of the transformers, but only if appropriate relaying is in service in Customer's substation to either limit the closed transition load transfer time or to restrict reverse power flow through the transformers in accordance with Company's guidelines. Customer shall not parallel the secondary sides of Customer substation transformers connected to different transmission lines without the approval of Company's transmission system dispatcher. Company will make reasonable efforts to support such request to transfer load. Customer's load-side bus-tie device used to transfer Customer's substation load between transformers connected to different transmission lines shall normally be operated in the open position.
 - 6.1.2 In the event a Customer substation transformer or a Point of Interconnection is de-energized due to an unscheduled event, Customer may transfer all or a part of its load from the de-energized transformer to a Customer substation transformer connected to another transmission line without Company's transmission system dispatcher's prior approval, but only after the Customer opens a circuit breaker or switch to isolate the Customer's substation load from the de-energized transformer. In the event Customer transfers its load in accordance with this paragraph, Customer shall notify Company's transmission system dispatcher of the load transfer as soon as reasonably possible after the transfer takes place.
 - 6.1.3 Company reserves the right to demand Customer, and Customer shall comply with such demand, to remove all or a part of Customer's load from a Point of Interconnection, including load normally served from a Point of Interconnection and



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

load transferred to a Point of Interconnection upon Company's approval, if Company believes that conditions exist which, in accordance with Good Utility Practice, may endanger persons or property.

7.0 SYSTEM PROTECTION REQUIREMENTS

7.1 General System Protection

7.1.1 Customer is responsible for the installation and maintenance of at least two separate fault sensing and clearing schemes. Each scheme will have its own lockout relay.

7.1.2 Customer will provide equipment necessary to automatically disconnect Customer's substation transformer, and/or any other equipment beyond the transformer, from Company's Facilities in the event of a fault on Customer's Facilities detected by the primary and/or backup protection scheme. The primary clearing device will complete a disconnection within 0.133 seconds (8 cycles). The backup disconnect device will visibly isolate the faulted equipment within 5 seconds, coordinate with Company's system, and not adversely affect other customers. A motor-operated disconnect switch meets the visible backup disconnect device requirement if the HSI is a circuit breaker. A circuit switcher that incorporates a motor-operated air break switch also meets the requirement of an HSI and a visible backup disconnect device. If the HSI is a fuse, the visible backup disconnect device is not required to be motor-operated. Customer will be responsible for all risk associated with the exposure to ferroresonance, if fuses are used. To insure coordination, Company will review Customer's choice of disconnect device.

7.1.3 Customer's protection equipment will be maintained in service at all times that Customer's Facilities are connected to Company's Facilities.

7.2 POI and Customer Substation Adjacent to Existing Line (See Figure 4)

7.2.1 Company will install a full tension conductor dead-end structure in the Company's transmission line if a tap point is required. Company will also own all facilities in Company's through flow transmission current path. All switches in Company's through flow path will be operated by or under the dispatch authority of Company. The Customer's line extension will contact Company Facilities at slack tension. Exact tension requirements will be determined for each installation.

7.2.2 Interconnection to Transmission Line with Carrier Relaying - Although it rarely occurs, the location of a POI on Company's transmission system along with the characteristics of the Customer's transformer may result in a situation where the transmission line's power line carrier signal is shorted to ground by the Customer's transformer. If normal mitigating techniques do not resolve this problem Company may install a wave trap at the POI. To accommodate this possibility, Customer's Facilities design will provide space for the installation of such wave trap.



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

7.3 POI and Customer Substation Adjacent to Company's Substation or Switching Station.
(See Figure 5)

The standard interconnection will be to tap a Company transmission circuit outside the Company's substation or switching station to establish the POI. However, if it becomes necessary to connect the POI directly to Company's substation or switching station bus, Customer will install the system protection equipment specified in Section 6.2. In addition, depending on the Company's bus differential protection scheme, Company may require Customer's Facilities to include Company specified current transformers for inclusion in the bus differential scheme. When Customer Facilities are included in the Company's bus differential scheme or when any control wiring is shared between the Company and Customer Facilities the Company's and Customer's station ground grids must be interconnected.

7.4 POI With Customer Substation Remote From Company's Existing Line

7.4.1 Case 1

Assumptions:

- Line Extension Does not Exceed 1000 feet.
- No carrier relaying on Company's existing line.

7.4.1.1 Minimum Requirements at the POI (See Figure 6)

A. Customer equipment:

- An air switch for isolation of Customer's Facilities from Company's Facilities.

B. Company equipment:

- Air switches to sectionalize Company's existing line.

7.4.1.2 Minimum Requirements at Customer's remote substation (See Figure 3)

A. Customer will install equipment in accordance with Section 7.1.

B. Company will install revenue metering equipment in accordance with Section 3.6.

7.4.2 Case 2

Assumptions:

- Customer's line extension exceeds 1,000 feet.
- No carrier relaying on Company's existing line.
- Company's line relaying can adequately detect faults to the end of Customer's transmission line extension without significant degradation to the protection and without restricting loading of Company's existing line.



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

7.4.2.1 Minimum Requirements at the POI (See Figure 7)

A. Customer equipment:

- A circuit breaker.
- Air switch to isolate Customer's Facilities from Company's Facilities.
- Instantaneous phase and ground relays to detect faults to the end of Customer's line extension. These relays will be connected to trip the Customer's breaker with no additional delay.

B. Company equipment:

- Air switches to sectionalize Company's existing line.
- Revenue metering equipment (See Section 3.6)

7.4.2.2 Minimum Requirements at Customer's remote substation (See Figure 3)

Customer will install equipment in accordance with Section 7.1.

7.4.3 Case 3

Assumptions:

- Customer's line extension exceeds 1,000 feet.
- No carrier relaying on Company's existing line.
- No Customers with critical processes exist in the area of influence.
- Company's line relaying cannot adequately detect faults to the end of Customer's transmission line extension without significant degradation to the protection and without restricting loading of Company's existing line.

7.4.3.1 Minimum Requirements at the POI (See Figure 8)

A. Customer equipment:

- A circuit breaker.
- Instantaneous phase and ground relays to detect faults to the end of Customer's line extension. These relays will be connected to trip the Customer's breaker with no additional delay.
- Air switch to isolate Customer's Facilities from Company's Facilities.

B. Company equipment:

- Air switches to sectionalize Company's existing line.
- A motor operated air switch (MOAS) as part of the breaker failure backup protection to isolate Customer's Facilities from Company's Facilities.
- A single-phase high speed grounding switch connected on the Customer's side of the MOAS.
- Backup phase and ground relays to provide breaker failure protection. The backup protection will be connected to trip the MOAS and the high speed grounding switch.
- Revenue metering equipment (See Section 3.6)



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

7.4.3.2 Minimum Requirements at Customer's remote substation (See Figure 3)

Customer will install equipment in accordance with Section 7.1

7.4.4 Case 4

Assumptions:

- Line Extension Does not Exceed 1000 feet.
- Carrier relaying on Company's existing line.
- Company's line relaying can adequately detect faults to the end of Customer's transmission line extension without significant degradation to the protection and without restricting loading of Company's existing line.

7.4.4.1 Minimum Requirements at the POI (See Figure 9)

A. Customer equipment:

- An air switch for isolation of Customer's Facilities from Company's Facilities.

B. Company equipment:

- Air switches to sectionalize Company's existing line.
- Wave trap if required (See Section 7.2.2)

7.4.4.2 Minimum Requirements at Customer's remote substation (See Figure 3)

A. Customer will install equipment in accordance with Section 7.1.

B. Company will install revenue metering equipment in accordance with Section 3.6.

7.4.5 Case 5

Assumptions:

- Customer's line extension exceeds 1,000 feet.
- Carrier relaying on Company's existing line
- Company's line relaying can adequately detect faults to the end of Customer's transmission line extension without significant degradation to the protection and without restricting loading of Company's existing line.

7.4.5.1 Minimum Requirements at the POI (See Figure 10)

A. Customer equipment:

- A circuit breaker
- An air switch (AS) for isolation of Customer's Facilities from Company's Facilities.
- Instantaneous phase and ground relays to detect faults to the end of Customer's line extension. These relays will be connected to trip the Customer's breaker with no additional delay.



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

B. Company equipment:

- Air switches to sectionalize Company's existing line.
- A motor-operated air switch (MOAS) as part of the breaker failure backup protection to isolate Customer's Facilities from Company's Facilities.
- Backup phase and ground relays to provide breaker failure protection. The backup protection will be connected to trip the MOAS.
- Carrier equipment to establish a carrier blocking terminal. The blocking terminal is installed to prevent Company's remote terminals from tripping on high speed carrier relaying when a fault occurs on Customer's line extension.
- Revenue metering equipment (See Section 3.6)

Note: If the POI is close to one of Company's remote terminals so as to negatively impact the use of Company's zone one relaying, Company may delay zone one and ground relaying to allow the Customer's relays at the POI time to initiate tripping.

7.4.5.2 Minimum Requirements at Customer's remote substation (See Figure 3)

Customer will install equipment in accordance with Section 7.1.

7.4.6 Case 6

Assumptions:

- Customer's line extension exceeds 1,000 feet.
- Carrier relaying on Company's existing line.
- No Customers with critical processes exist in the area of influence.
- Company's line relaying cannot adequately detect faults to the end of Customer's transmission line extension without significant degradation to the protection and without restricting loading of Company's existing line.

7.4.6.1 Minimum Requirements at the POI (See Figure 11)

A. Customer equipment:

- A circuit breaker.
- Air switch to isolate Customer's Facilities from Company's Facilities.
- Instantaneous phase and ground relays to detect faults to the end of Customer's line extension. These relays will be connected to trip the Customer's breaker with no additional delay.

B. Company equipment:

- Air switches to sectionalize Company's existing line.
- A motor-operated air switch (MOAS) as part of the breaker failure backup protection to isolate Customer's Facilities from Company's Facilities.



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

- A single-phase high speed grounding switch connected on the Customer's side of the MOAS.
- Backup phase and ground relays to provide breaker failure protection. The backup protection will be connected to trip the MOAS and the high speed ground switch.
- Carrier equipment to establish a carrier blocking terminal. The blocking terminal is installed to prevent Company's remote terminals from tripping on high speed carrier relaying when a fault occurs on Customer's line extension.
- Revenue metering equipment (See Section 3.6)

Note: If the POI is close to one of Company's remote terminals so as to negatively impact the use of Company's zone one relaying, Company may delay zone one and ground relaying to allow the Customer's relays at the POI time to initiate tripping.

7.4.6.2 Minimum Requirements at Customer's remote substation (See Figure 3)

Customer will install equipment in accordance with Section 7.1.

7.4.7 Case 7

Assumptions:

- Customer's line extension exceeds 1,000 feet.
- Carrier relaying on Company's existing line.
- Customers with critical processes exist in the area of influence.
- Company's line relaying cannot adequately detect faults to the end of Customer's transmission line extension without significant degradation to the protection and without restricting loading of Company's existing line.

7.4.7.1 Minimum Requirements at the POI (See Figure 12)

A. Customer equipment:

- A circuit breaker.
- Air switch to isolate Customer's Facilities from Company's Facilities.
- Instantaneous phase and ground relays to detect faults to the end of Customer's line extension. These relays will be connected to trip the Customer's breaker with no additional delay.

B. Company equipment:

- Air switches to sectionalize Company's existing line.
- A motor-operated air switch (MOAS) as part of the breaker failure backup protection to isolate Customer's Facilities from Company's Facilities.
- Transfer trip and associated equipment.
- Backup phase and ground relays to provide breaker failure protection. The backup protection will be connected to trip the MOAS and activate transfer trip.



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005

LAST REVISION DATE: July 28, 2010

- Carrier equipment to establish a carrier blocking terminal. The blocking terminal is installed to prevent Company's remote terminals from tripping on high speed carrier relaying when a fault occurs on Customer's line extension.
- Revenue metering equipment (See Section 3.6)

Note: If the POI is close to one of Company's remote terminals so as to negatively impact the use of Company's zone one relaying, Company may delay zone one and ground relaying to allow the Customer's relays at the POI time to initiate tripping.

7.4.7.2 Minimum Requirements at Customer's remote substation (See Figure 3)

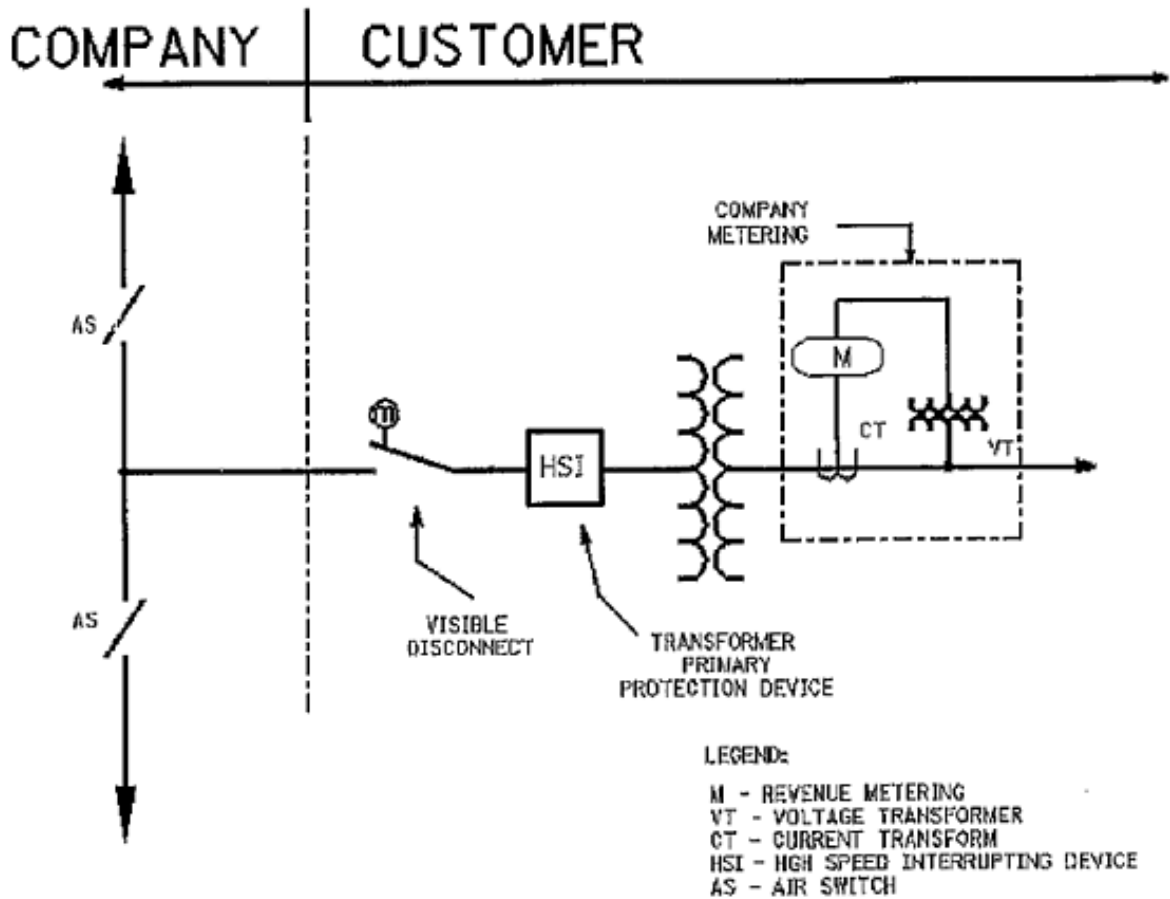
Customer will install equipment in accordance with Section 7.1.

TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005
LAST REVISION DATE: July 28, 2010

Figure 1

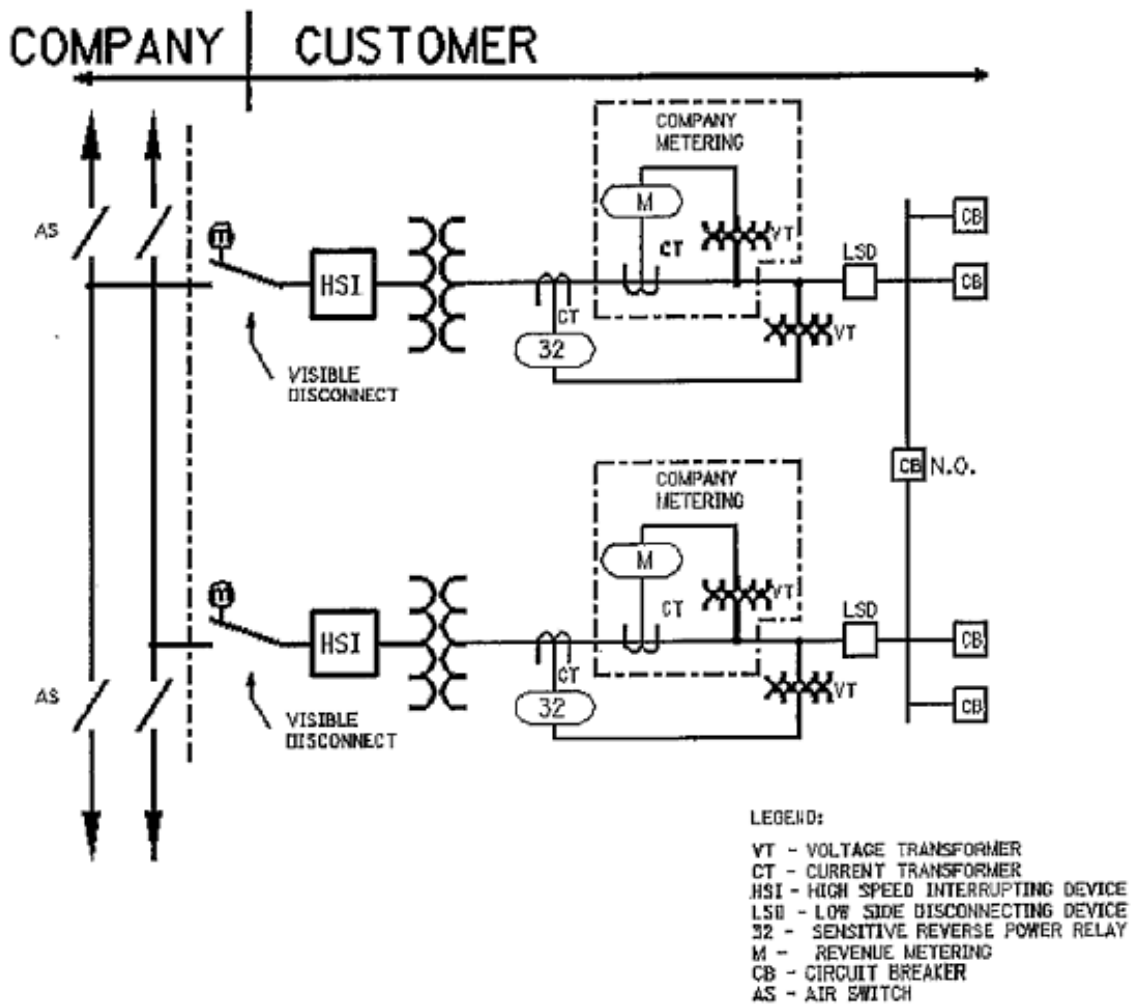


TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005
LAST REVISION DATE: July 28, 2010

Figure 2

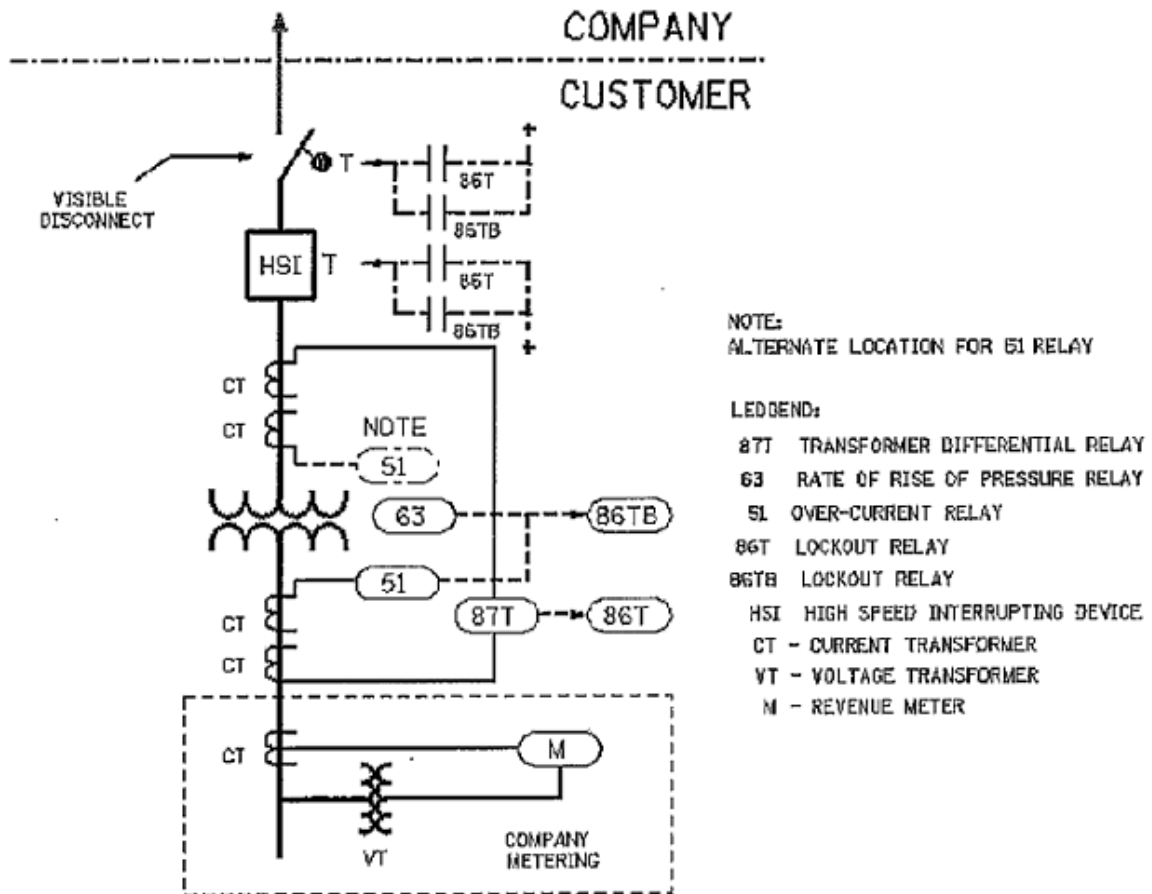


TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005
LAST REVISION DATE: July 28, 2010

Figure 3

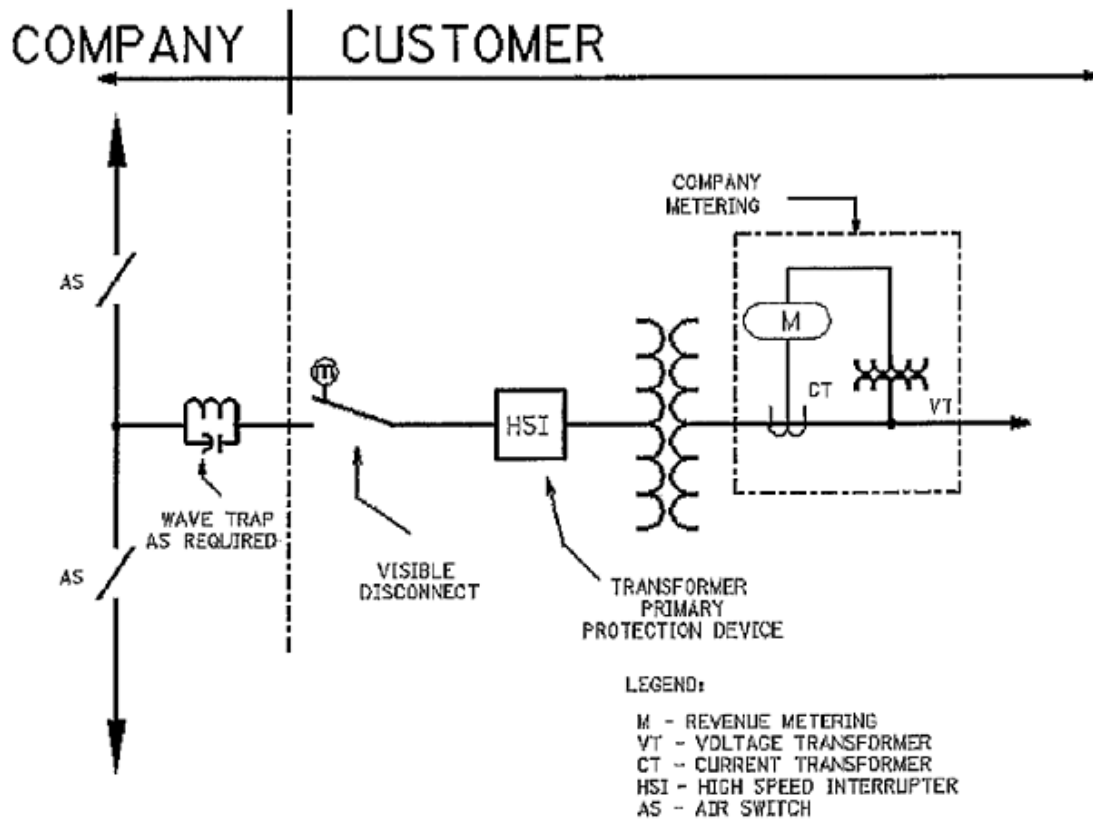


TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

INITIAL RELEASE DATE: December 30, 2005
LAST REVISION DATE: July 28, 2010

Figure 4

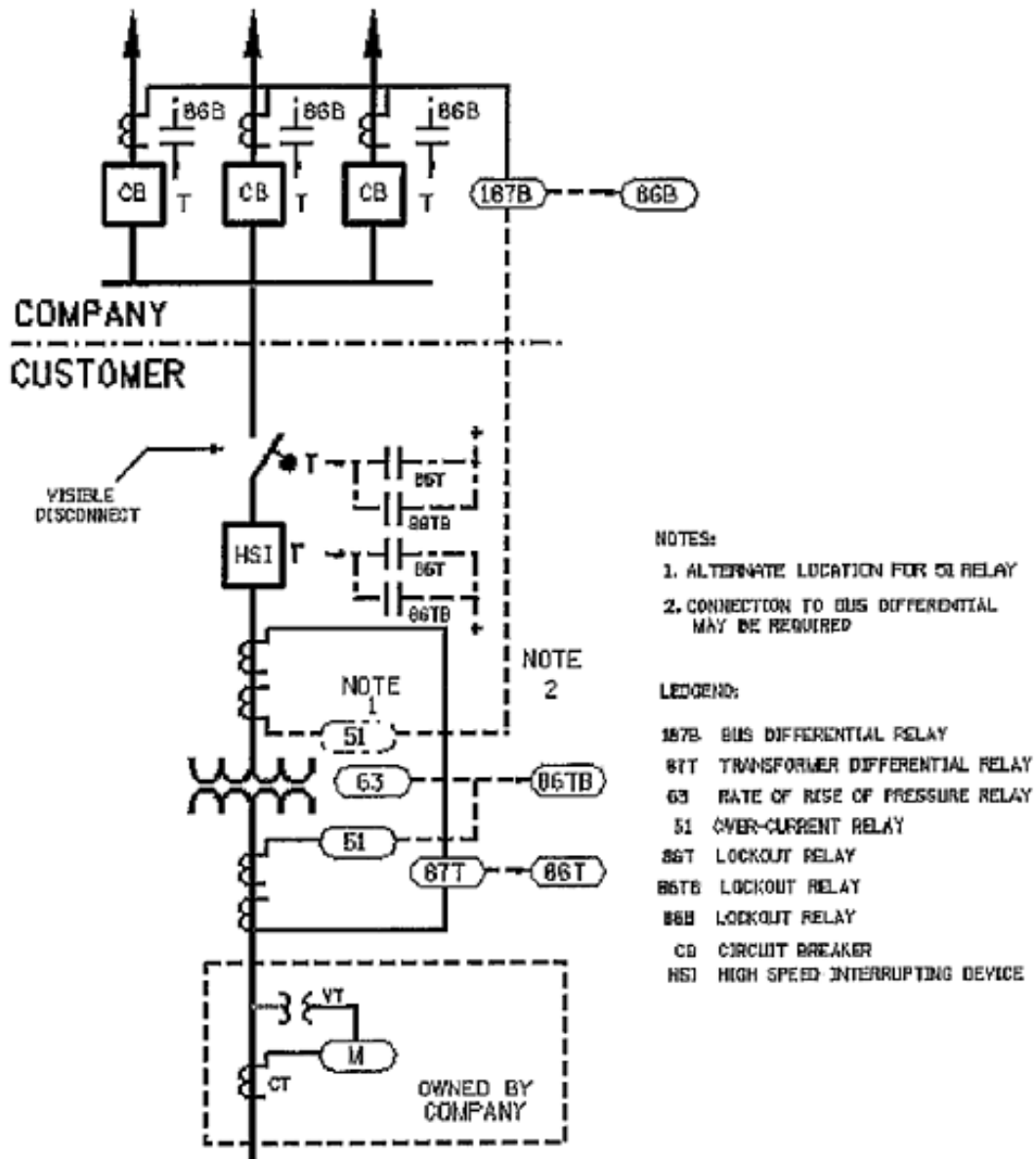


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Figure 5

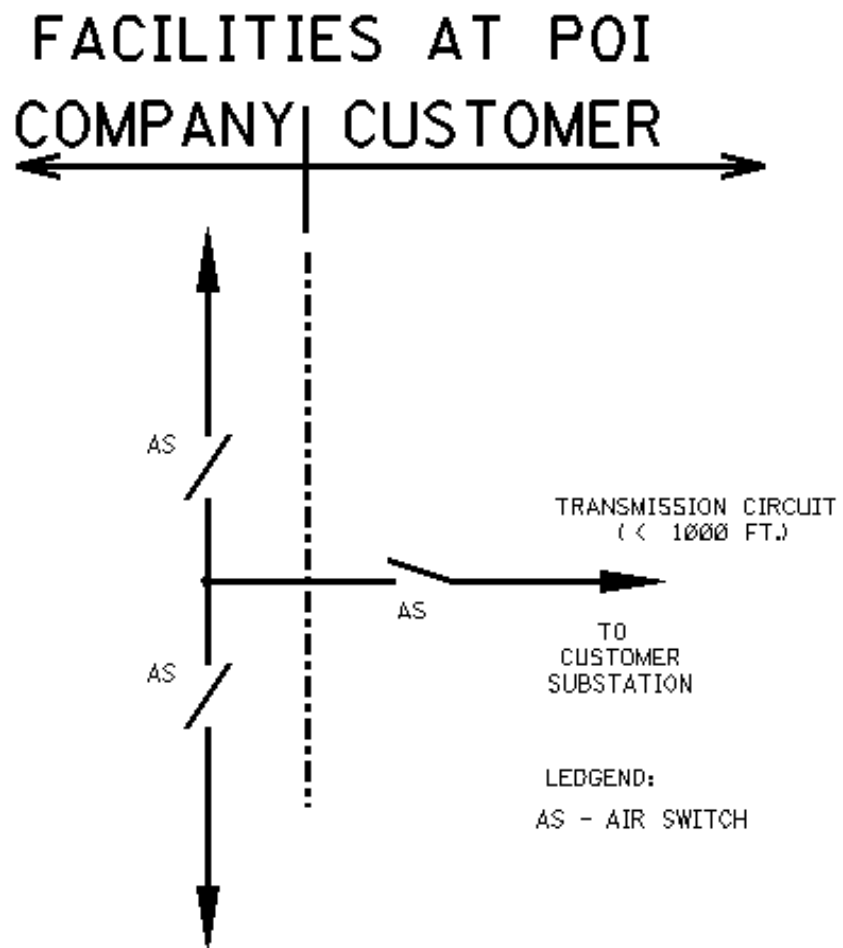


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Figure 6



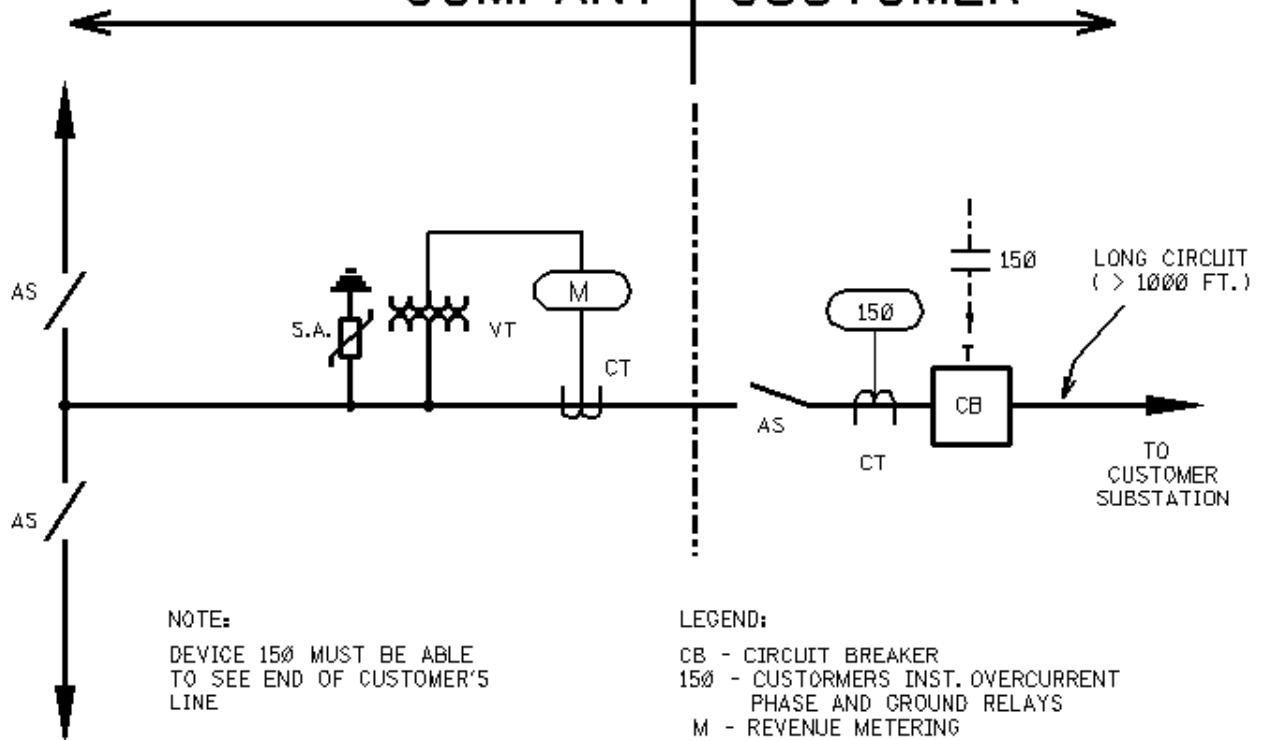
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500-251 Guideline - Facility Connection Requirements for Points of Interconnection at Transmission Voltages with Retail Customers

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Figure 7

FACILITIES AT POI COMPANY | CUSTOMER

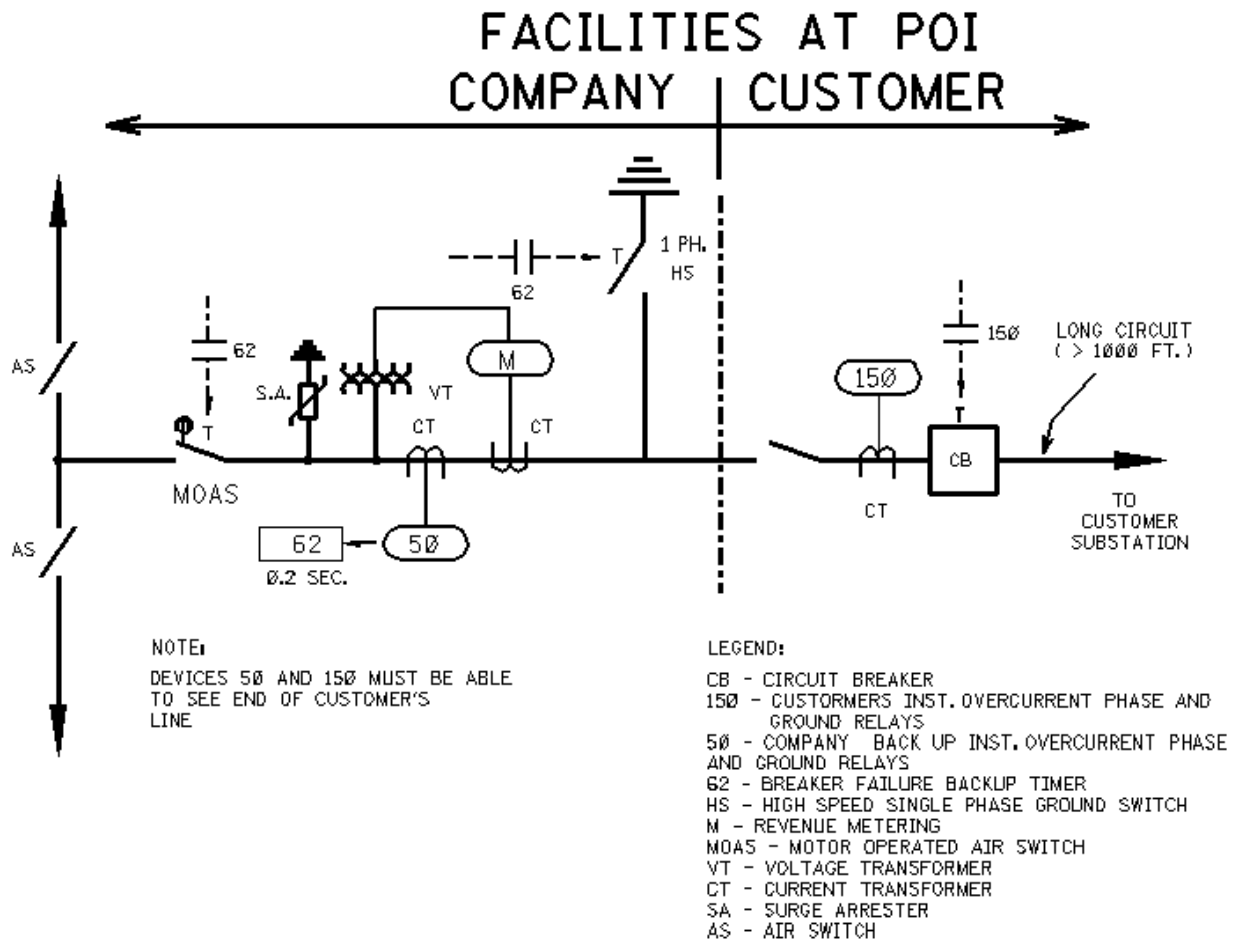


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Figure 8

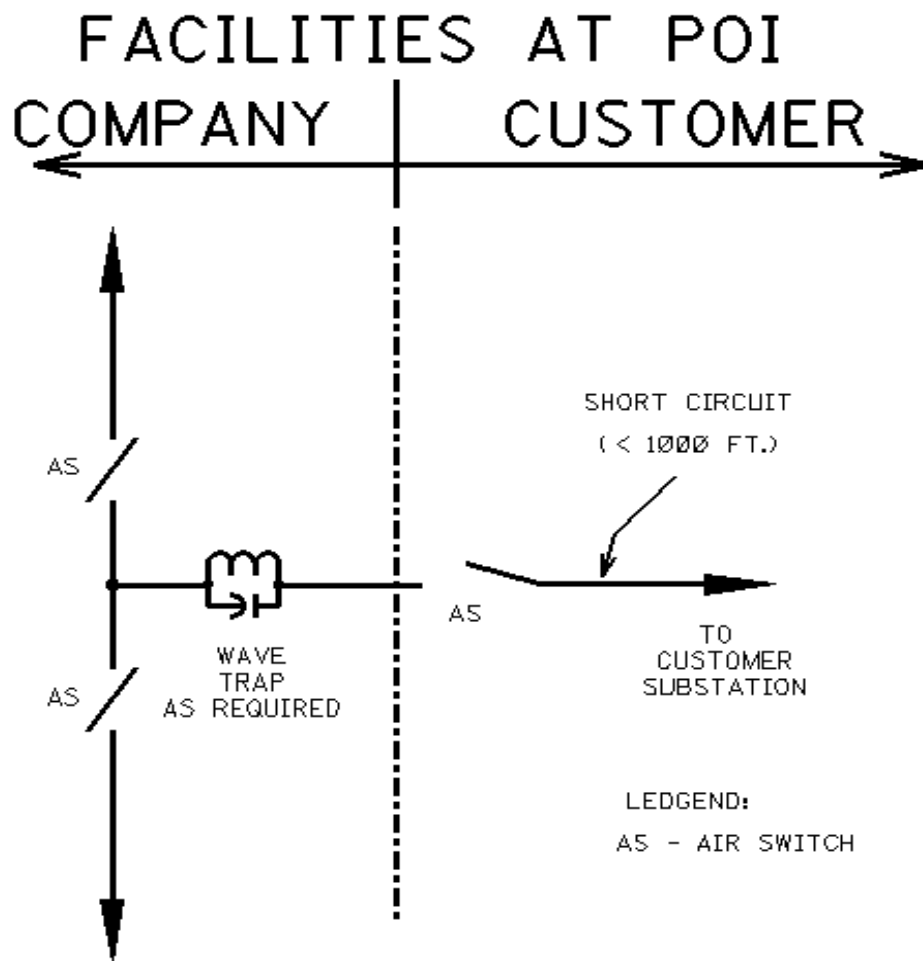


TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

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Figure 9

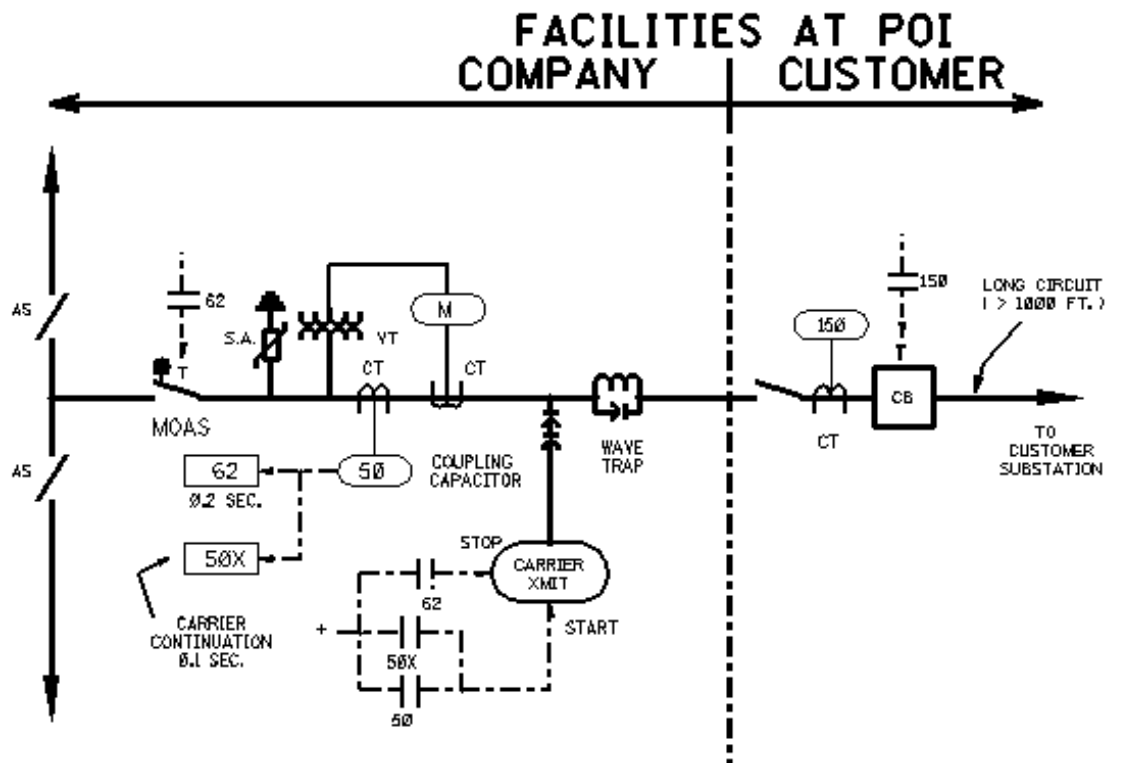


TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

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Figure 10



NOTE:
 DEVICE 50 AND 150 MUST BE ABLE
 TO SEE END OF CUSTOMER'S LINE

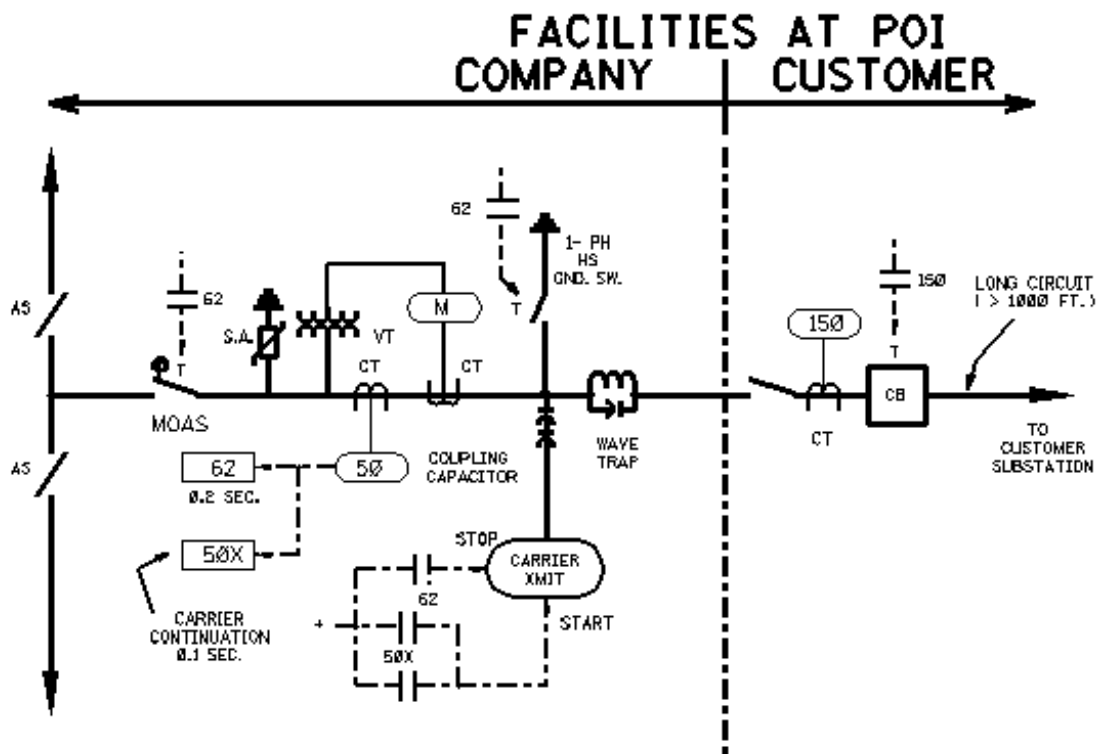
- LEGEND:
- CB - CIRCUIT BREAKER
 - 150 - CUSTOMER'S INST. OVERCURRENT PHASE AND GROUND RELAYS
 - 50 - COMPANY'S BACK UP INST. OVERCURRENT PHASE AND GROUND RELAYS
 - 50X - APPROXIMATELY 0.1 SECOND CARRIER CONTINUATION LOGIC
 - 62 - BREAKER FAILURE BACKUP TIMER
 - M - REVENUE METERING
 - MOAS - MOTOR OPERATED AIR SWITCH
 - VT - VOLTAGE TRANSFORMER
 - SA - SURGE ARRESTER
 - CT - CURRENT TRANSFORMER
 - AS - AIR SWITCH

TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

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Figure 11



NOTE:
 DEVICE 50 AND 150 MUST BE ABLE
 TO SEE END OF CUSTOMER'S LINE

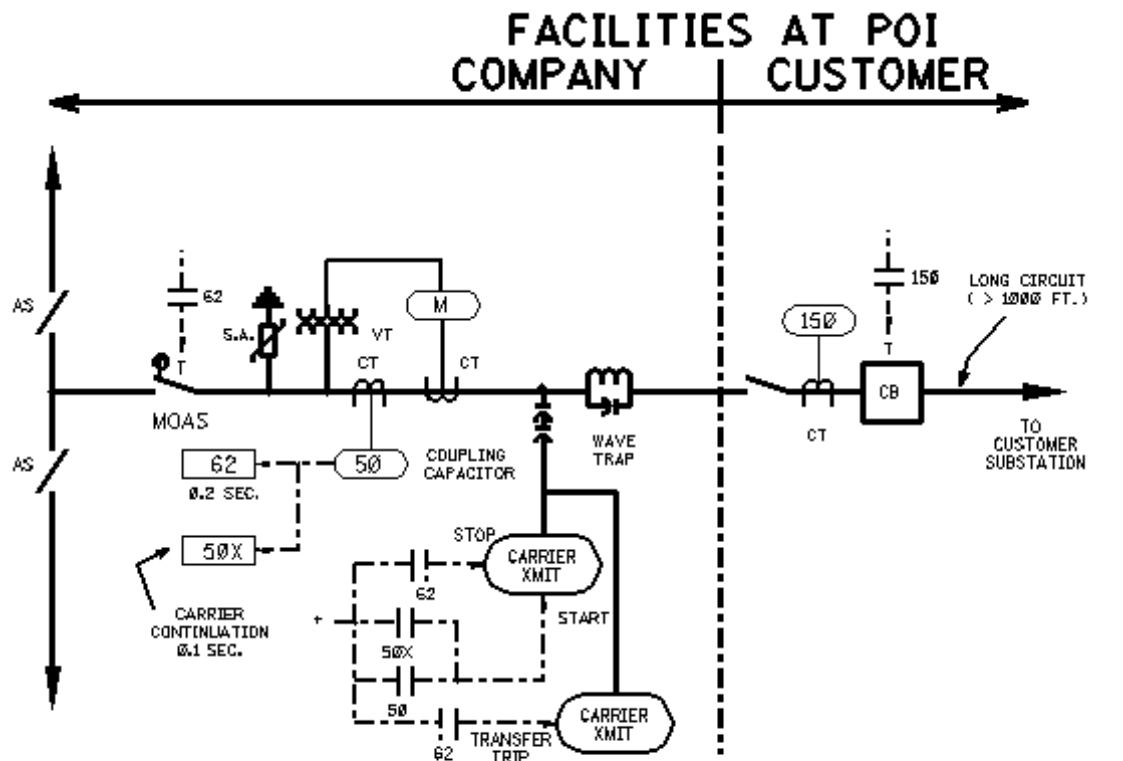
- LEGEND:
- CB - CIRCUIT BREAKER
 - 150 - CUSTOMER'S INST. OVERCURRENT PHASE AND GROUND RELAYS
 - 50 - COMPANY'S BACK UP INST. OVERCURRENT PHASE AND GROUND RELAYS
 - 50X - APPROXIMATELY 0.1 SECOND CARRIER CONTINUATION LOGIC
 - 62 - BREAKER FAILURE BACKUP TIMER
 - N - REVENUE METERING
 - MOAS - MOTOR OPERATED AIR SWITCH
 - VT - VOLTAGE TRANSFORMER
 - SA - SURGE ARRESTER
 - CT - CURRENT TRANSFORMER
 - AS - AJR SWITCH

TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

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Figure 12



NOTE:
 DEVICE 50 AND 150 MUST BE ABLE
 TO SEE END OF CUSTOMER'S LINE

- LEGEND:
- CB - CIRCUIT BREAKER
 - 150 - CUSTOMER'S INST. OVERCURRENT PHASE AND GROUND RELAYS
 - 50 - COMPANY'S BACK UP INST. OVERCURRENT PHASE AND GROUND RELAYS
 - 50X - APPROXIMATELY 0.1 SECOND CARRIER CONTINUATION LOGIC
 - 62 - BREAKER FAILURE BACKUP TIMER
 - M - REVENUE METERING
 - MOAS - MOTOR OPERATED AIR SWITCH
 - VT - VOLTAGE TRANSFORMER
 - SA - SURGE ARRESTER
 - CT - CURRENT TRANSFORMER
 - AS - AIR SWITCH



TRANSMISSION ENGINEERING STANDARDS SUBSTATIONS

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REVISION HISTORY (most recent listed first)

Revision Date	Revision Request Number	Changes Made by	Summary of Changes	Background/Historical Information
7-28-10	N/A	B. Dietzman	Guidelines revised to comply with NERC Standard FAC-001-0 - Facility Connection Requirements.	Initial release and officer approval - 7-28-2010.
9-11-08	F-00102	Libby Smith	Template format change – added “Oncor Proprietary Information”	
9-10-07		Libby Smith	Template format changes	
12-30-05		Rafael Garcia	Initial Release The original 500-250 was split into 500-250 and 500-251 in order to better define the differences between retail customers and non-retail customers and to provide better guidance on allowable interconnections to Jeff Herring’s group who has to deal with the customers up front.	