# Medium Voltage Example Drawing Package

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Information in this document is accurate at the time of publication but is subject to change without notice.

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# **About This Package**

This *Medium Voltage Example Drawing Package* provides customers who are building medium voltage services with examples of the information that PGE needs to see from them. By modeling their submittal on this these examples, customers can speed up the review and approval of their project.

Individual drawings or pages do not represent the complete requirements for service, and they should not be cited out of their context. References to any code—including (but not limited to) the National Electrical Code, National Electrical Safety Code, or Oregon Electrical Specialty Code—always refers to the most recent edition of that code.

We strongly recommend that you consult PGE to discuss any questions you have concerning your service. PGE has an extensive review process and recommends that customers not purchase gear until PGE has reviewed the design documentation, one-line diagram, and other documentation, and approves the meter gear in full.

#### **Required Elements for a Customer Drawing Package**

PGE requires the drawings listed in this table to evaluate a customer request for new or upgraded service. The table lists the required content for each drawing.

**IMPORTANT:** Manufacturer specifications should be submitted separately. PGE does not want 300-page drawing packages.

Name of Drawing	Required Contents			
Site Plan Exterior Switchboard	<ul> <li>Location of switchboard.</li> <li>Working clearances.</li> <li>PGE vehicle access route.</li> <li>Legend that includes units of measure and symbol definitions.</li> </ul>			
Site Plan Interior Switchboard	<ul> <li>Utility metering.</li> <li>Load-side point of isolation.</li> <li>Downstream protection.</li> <li>Egress route(s) to the exterior of the building.</li> <li>Legend that includes units of measure and symbol definitions.</li> <li>PGE vehicle access route to electrical equipment room.</li> <li>Note: Customers must provide additional pages showing electrical equipment room clearances. See Section 13 of PGE's <i>Electric Service Requirements</i> book for requirements.</li> </ul>			

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Name of Drawing	Required Contents
One-Line Diagram	<ul> <li>Utility metering (billing and net meters, as applicable).</li> <li>Voltage transformer (VT) disconnect.</li> <li>Load-side point of isolation.</li> <li>First protective device downstream from the point of interconnection.</li> <li>First point of a visual open and ground downstream of the point of interconnection.</li> <li>Identification of loadbreak and non-loadbreak devices, proper opening direction of switches/disconnects, and ratings of these.</li> <li>Note: PGE requires the settings for the first protective device downstream from the point of interconnection at least 16 weeks before energization.</li> </ul>
Three-Line Diagram	<ul> <li>Utility metering.</li> <li>Voltage transformer (VT) disconnect.</li> <li>Load-side point of isolation.</li> <li>Downstream protection.</li> <li>Location of neutral-ground bonding.</li> <li>Identification of loadbreak and non-loadbreak devices, proper opening direction of switches/disconnects, and rating.</li> <li>Type, size, and rating of each customer-owned CT, CCVT, PT, VT, arrestor, or other equipment.</li> </ul>
Control Schematic	<ul> <li>Relay location.</li> <li>Relay type identified.</li> <li>Trip circuit shown.</li> <li>Status indication to relay (only if MBTT required for Generation).</li> <li>Close circuit (only if automatic closing is present).</li> <li>Lockout relay connections (if used).</li> <li>Voltage.</li> <li>Capacitive trip device must be shown (if used).</li> </ul>
Front View Layout or Back-View Layout	<ul> <li>Identify conformance to EUSERC drawing(s).</li> <li>NEMA rating.</li> <li>Rated voltage.</li> <li>Rated current.</li> <li>Basic insulation level (BIL) rating.</li> <li>Short-circuit current rating (SCR).</li> <li>Phase designation (3-phase) and rotation.</li> <li>Wire designation (4-wire).</li> <li>Dimensions of cabinet and dimensions within internal components, with units of measure listed.</li> </ul>

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Name of Drawing	Required Contents			
Top View of Gear	<ul> <li>Utility pull section.</li> <li>Utility metering.</li> <li>Load-line disconnect.</li> <li>Width measurements with units of measure.</li> <li>NEMA 3R doors indicated.</li> <li>Access doors open 90 degrees minimum.</li> <li>Working clearances.</li> </ul>			
Termination Section Side and Front Views	<ul> <li>Key measurements to termination points including neutral (EUSERC 418 for 12.47 kV only).</li> <li>Cabinet depth and working clearance depth.</li> <li>Phase/phase and phase/ground bus bar separation.</li> <li>Ground studs.</li> <li>Dimensions of cabinet and internal components.</li> </ul>			
Meter Section Interior Front and Side Views	<ul> <li>Interior measurements (EUSERC 401).</li> <li>Meter panel measurements (EUSERC 408).</li> <li>VT disconnect and Kirk key.</li> <li>PVC from CT/VT to meter panel.</li> <li>Continuation of neutral bus from termination section to load-side disconnect.</li> <li>Hinged clear barrier between the CTs and access doors.</li> <li>Hinged clear barrier between the VTs and access doors.</li> <li>Ground balls and studs.</li> </ul>			
CT and VT Mounting Details	<ul> <li>CT mounting plate and clearance dimensions.</li> <li>VT Unistrut mounting and clearance dimensions.</li> <li>NEMA hole pattern at CT ends. Include hole size and number of holes.</li> </ul>			
Nameplates	Nameplates for each section in accordance with EUSERC 400.			
Bill of Materials	<ul> <li>Customer circuit breaker.</li> <li>Protection relay.</li> <li>Potential transformer (PT) for customer-owned relay.</li> <li>Line-side disconnect (if provided).</li> <li>VT disconnect switch.</li> <li>Load-side point of isolation.</li> <li>Relay potential transformer.</li> <li>Kirk keys.</li> <li>PDF copy of the Kirk key interlock diagram.</li> </ul>			

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Name of Drawing	Required Contents					
Labels	<ul> <li>PGE requires mock-ups of these required labels:</li> <li>Basic one-line in phenolic across the front of the switchboard.</li> <li>Utility service termination compartment.</li> <li>Voltage label.</li> <li>Voltage phase signs.</li> <li>Utility line-side disconnect (if present).</li> <li>Utility CT compartment.</li> <li>Utility VT compartment.</li> <li>Utility VT compartment.</li> <li>Utility VT fuse compartment.</li> <li>Utility metering compartment.</li> <li>Utility load-side point of isolation.</li> <li>Additional labels may be required.</li> </ul>					

#### Formatting and Submitting Electronic Files

Follow these rules when preparing your drawing package and submitting it to PGE:

- Provide computer-aided drafting (CAD) files with civil engineering drawings of the site plan and profile. PGE accepts AutoCAD 2013 or greater.
  - PGE will use your files in the original survey coordinate system or datum; please specify this on the drawing.

Updates to these files are requested at milestones in the project.

- Include the same layers in the CAD files as are shown on the site plan and profile hard copy. The minimum layers needed are:
  - Survey control points.
  - Existing and future street right of way.
  - Lot lines.
  - Lot numbers.
  - Street names.
  - Building footprints.

- Curbs.
- Sidewalks.
- Centerlines of streets and roadways.
- Easements.Stationing.
- Existing electrical facility locations.

- Make sure that your data meets these requirements:
  - If survey control points are not available in CAD format, PGE software will accept these points in text or Excel file format.
  - If you use nonstandard file and layer naming conventions, provide guidelines for reference.
  - If your data contains attachments (such as aerial imagery), either provide the attachments or delete the files from your reference before submittal.
  - If you send multiple files, provide a description of what is included in each file.
  - Manufacturer specifications should *not* be included in the drawing package. They must be submitted separately.

- Submit your files via email. Zipped files are acceptable, but executable (\*.exe) files are not.
  - *Note:* Contact your PGE Project Manager for approved file transfer methods if your files are too large to transfer using e-mail.

## Updates To a Drawing Package

PGE needs to be able to easily see what has changed in your drawing package. If you send a file that is 90% complete and later send a second file that is 93% complete, it is critical that you let PGE know what was changed in the second file.

- In your email that accompanies the package, itemize all data that has changed.
- In the drawing, indicate where revision has changed using the cloud method, or place revision numbers next to affected portions of the drawing.

**IMPORTANT:** Non-itemized changes may result in inaccurate reviews or approval of gear, which upon discovery may require re-review and different gear at the customer's expense.

# **Example Drawings**

#### Site Plan Exterior Switchboard



#### Site Plan Interior Switchboard



#### **One-Line Diagram**



#### **Three-Line Diagram**



#### **Control Schematic**



#### Front View Layout or Back View Layout



### **Top View of Gear**



#### **Termination Section Side and Front Views**



#### Meter Section Interior Front and Side Views



# CT and VT Mounting Details



#### Nameplates



#### **Bill of Materials**

ITEM	QTY.	MANUFACTURER	CAT. No.	DESCRIPTION
VCB	A	1	XXXXXXX	VACUUM CIRCUIT BREAKER, 120VAC MOTOR, 120VAC CLOSE AND TRIP
SELXXX	В	2	XXXXXXX	FEEDER PROTECTIVE RELAY INCLUDING POWER ELEMENTS
PT FOR CUSTOMER OWNED RELAY	С	3	xxxxxxx	AS NEEDED - CUSTOMER'S POTENTIAL TRANSFORMER XX KV-YY V
KIRK KEY	E	5	XXXXXXX	KEY INTERLOCK BOLT
KIRK KEY	F	6	XXXXXXX	KEY INTERLOCK BOLT
VT DISCONNECT SWITCH	G	7	xxxxxxx	YYA XXKV INTERRUPTER SWITCH (POWER CD AND CUST VT CT DISCONNECT SWITCH)
LOAD-BREAK POINT OF ISOLATION	Н	8	xxxxxxx	
RELAY PT	I	9	XXXXXXX	

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GE	REQU

JIRES THE FOLLOWING LEMENTS ON THE BILL OF MATERIALS:

- CUSTOMER CIRCUIT BREAKER WITH MAKE, MODEL, SIZE, INTERRUPTING RATING & TYPE
- PROTECTION TRANSFORMER FOR CUSTOMER-OWNED RELAY WITH MAKE, MODEL, AND FIRMWARE VERSION AT INSTALL
- POTENTIAL TRANSFORMER DISCONNECT
- LINE-SIDE DISCONNECT WITH RATING AND INTERRUPTING RATING, IF APPLICABLE
- LOAD-SIDE POINT OF ISOLATION WITH RATING AND INTERRUPTING RATING, IF APPLICABLE
- RELAY POTENTIAL TRANSFORMER
- **KIRK KEYS**

PDF COPY OF THE KIRK-KEY INTERLOCK DIAGRAM

	DATE:	12/05/2021	DESIGNER:	CHECKED BY: MARA, SPIER	ING
	DRAWN BY:	MLMN	DESIGN ENGR.: WILSON, TUCKER	ENGR. MGR.: LOOMIS	
	SCALE:	CALE: NOT TO SCALE CAD FILE NAME: STD-M-3700			
	PORTLAND GENERAL ELECTRIC CO. 121 SW SALMON ST. PORTLAND, OR 97204				
	EXAMPLE DRAWING PACKAGE				
	BILL OF MATERIALS				
IF THIS BAR DOES NOT MEASURE X: THEN DRAWING IS NOT TO SCALE					
Public	DRAWING N	D.:		SHEET NO .:	REV. NO.:
Access Not Limited			STD-M-3700	) -10	02

#### Labels

