REQUIREMENTS FOR HIGH VOLTAGE METERING

Last updated on January 30 2015

Approvals:
- All Meters/Instrument Transformers/Wiring will meet Measurement Canada Standards.
- Drawings of the proposed high voltage switch gear must be provided to the Customer Connections Metering Department and must show the metering cell(s) and is to be approved by Horizon Utilities Corp prior to manufacture.
- Final single line diagram must be approved by Horizon prior to purchasing.
- All equipment must be CSA approved.
- An ESA Authorization for Connection must be provided for the metering before the service will be energized.

IT Cell
- Instrument Transformer (IT) cell for each for each metering point.
- IT cell to be located in High Voltage switchgear
- IT cell is for the sole purpose of Horizon Instrument Transformers
- Configured for 3 Element metering, including 3 CTs and 3 PTs connected in a star configuration with the common point connected to the system neutral within the IT Cell.
- Provision for both primary and secondary metering connections to the system neutral within the IT cell.
- ITs to be installed and primary connections to be made by switchgear manufacturer.
- Horizon will have CT/PT’s ready for pickup by customer at 55 John St. N. location in Hamilton.
- Current Transformers (CT) and their secondary terminals are to be readily accessible (without dismantling bus work), usually from the front or back of the cell via a hinged door.
- Any access doors to the metering cell and equipment shall include provision for sealing and padlocking by Horizon Utilities Corp.
- Potential Transformers (PT) are to be positioned so that the fuses can be changed with the service energized. (transformer drawers are not permitted)
- PTs are to be connected to the line side of the CTs only.
- Grounding ball studs to be installed on the line and load side of the CT bus bars
- Switchgear enclosure heaters and adjustable thermostat are required for outdoor installations.

Meter Cabinet
- Remote meter cabinet to be located inside same electrical room as the IT Cell for indoor installation.
- Horizon must have unrestricted access to meter cabinet location.
- Meter enclosure must be padlockable, suggested meter enclosure for regular MV90 meter is Hydel Cat#: 74820585 or for iON meter installation use 2” deeper box Cat#: JPE-162410-SP611
- Dedicated 120Volt 15A receptacle located inside cabinet.
- To be grounded by customer as per ESA grounding rules.

Meter and Wiring
- Horizon to supply and install meter and associate wiring from meter (unless where it is pre-wired by the switchgear manufacturer and wiring meets Measurement Canada wiring standards and colour coding and must correspond to the primary phasing. ABC rotation).
- The customer is required to install one 1 1/4” conduit from EACH metering cell to the meter enclosure.
- The customer is required to install one 1 1/4” conduit from the meter enclosure to the nearest outside wall for communication antenna. Please schedule site meet with Horizon Metertech for location and route of the antenna conduit.
- Metering circuits and cabinets are for exclusive use of Horizon revenue metering.
- Standard meter does not include any customer accessible options. For consumption data access, please contact Horizon Customer Connections department.
Requirements for Customer-Owned Transformation

For Pad-Mounted Transformers, Metal Enclosed Switchgear and Unit Substations

General Information

1. All customers owned equipment must meet or exceed the requirements of the Ontario Electrical Safety Code.

2. System supply voltage is 27600/16000V or 13860/8000V grounded.

3. The main disconnecting device shall be suitable for:
   - 500MVA system with a minimum Basic Insulation Level of 95kV at 13860/8000V; or
   - 800MVA system with a minimum Basic Insulation Level of 150kV at 27600/16000V

4. The ownership and operational demarcation will be determined by Horizon Utilities Corporation by a case by case basis.

5. Suitable surge protection must be installed to protect the transformer.

6. Secondary metering up to 3000A is allowed provided the customer-owned transformer meets one of the following standards;
   - CAN/CSA C802.1 – Minimum Efficiency Values for Liquid-Filled Distribution Transformers
   - CAN/CSA C802.3 - Maximum Losses for Power Transformers
   - CSA C802.2 – Minimum Efficiency Values for Dry-Type Distribution Transformers

7. The customer must supply provision for Horizon Utilities Corporation installed metering and unrestricted access for meter reading. Detailed specifications to be provided upon request.

8. Transformation and ground grid, in its entirety, must be located on the customer’s property.

9. Guard posts are recommended to adequately protect the transformer from vehicular damage if it is located within 2.0m of a driveway or parking area. Galvanized steel guard posts must be bonded to the transformer ground loop.

10. Unit substations must be located in a suitably fenced enclosure. Pad-mounted transformers and outdoor metal enclosed switchgear must be tamperproof.
Requirements for Customer-Owned Transformation

For Pad-Mounted Transformers, Metal Enclosed Switchgear and Unit Substations

The following must be submitted to Horizon Utilities Corporation:

The customer must meet Horizon Utilities Corporation’s requirements for the components that affect the Horizon Utilities Corporation distribution system. The following must be submitted well in advance of tender documents being issued.

Two copies each of the following, certified by a registered Professional Engineer in the Province of Ontario:

- Site Plan
- Single Line Diagram, including all electrical components and ratings (including first overcurrent protection device(s) at demarcation point(s))
- Substation Layout (if applicable, including fence details, working and live parts clearances, grounding details, interlocking schemes, property lines, and metering location.
- Transformer Drawing(s) and Specifications
- Switchgear/Switchboard Drawing(s) and Specifications
- Electrical Safety Authority Plan Review Submission and Plan Review Approval

For used or refurbished transformers:

- Transformer PCB and complete gas test

For details on short circuit levels, contact the Customer Connections Engineering Technologist.

Prior to Energization

Provide Horizon with Electrical Safety Authority’s (ESA) response to the Plan Review prior to construction, showing equipment ownership. Horizon Utilities Corporation must receive a connection authorization directly from ESA.
Customer Owned Transformer Specs for Secondary Metering

Liquid Filled Trans:

**CAN/CSA C802.1** Minimum Efficiency Values for Liquid Filled Distribution Transformers
- 34.5kVA or less

<table>
<thead>
<tr>
<th>Min Voltage</th>
<th>kVA Range</th>
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<tbody>
<tr>
<td>120/240</td>
<td>10-333</td>
<td>208/120</td>
<td>15 - 1,000</td>
</tr>
<tr>
<td>277/480</td>
<td>333-833</td>
<td>480/277</td>
<td>1,000 - 3,000</td>
</tr>
</tbody>
</table>

**CAN/CSA C802.3** Maximum Losses for Power Transformers

<table>
<thead>
<tr>
<th>Max High Voltage</th>
<th>Min Low Voltage</th>
<th>kVA Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>44kV</td>
<td>600</td>
<td>501-3,000</td>
</tr>
<tr>
<td>34.5kV</td>
<td>4160</td>
<td>3,001-10,000</td>
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Dry Type Trans:

**CSA C802.2** Minimum Efficiency Values for Dry-Type Distribution Transformers

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<tr>
<td></td>
<td></td>
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<td>3,000</td>
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<tr>
<td></td>
<td></td>
<td>4160/2400</td>
<td>3,750 - 7,500</td>
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Referenced Specs:
The following standards are designed in accordance with the above specs, thus the transformer will be acceptable if it meets any of the following specs.

<table>
<thead>
<tr>
<th>CSA Spec</th>
<th>Description</th>
<th>In Accordance with</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA C2.1</td>
<td>Single-Phase and Three-Phase Liquid-Filled Distribution Transformers</td>
<td>CSA C802.1</td>
</tr>
<tr>
<td>CSA C2.2</td>
<td>Pole-Mounted, Single-Phase Distribution Transformers for Electric Utilities</td>
<td>CSA C802.1</td>
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<tr>
<td>CSA C227.3</td>
<td>Low-Profile, Single-Phase, Pad-Mounted Distribution Transformers with Separable Insulated High-Voltage Connectors</td>
<td>CSA C802.1</td>
</tr>
<tr>
<td>CSA C227.4</td>
<td>Three-Phase, Pad-Mounted Distribution Transformers with Separable Insulated High-Voltage Connectors</td>
<td>CSA C802.1</td>
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Updated: Oct 12, 2006