



ENMAX POWER CORPORATION



Network 25kV Switchgear and Switchroom Policies & Guidelines

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ENMAX Power Corporation (EPC)

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Last Revised: January 3, 2014

Electrical Engineering
ENMAX Power Corporation (EPC)
141 - 50 Ave. SE Calgary, Alberta T2G 4S7

Important - Please note the following:

If there is any inconsistency between this document and any applicable EPC tariff or agreement, the terms of that tariff or agreement will prevail.

The contents of this document are provided for information purposes only. The information contained within this document is not binding on EPC and can be modified by EPC without notice.

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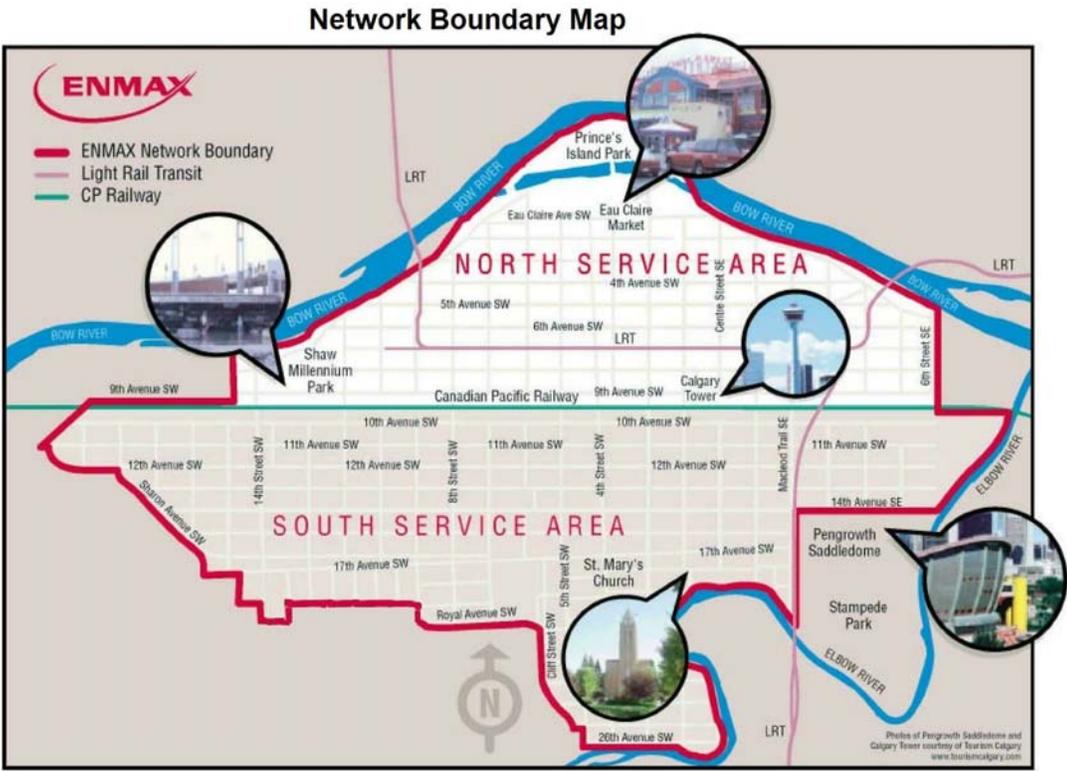
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1. INTRODUCTION

1.1 Purpose of This Guideline

This purpose of this guideline is to explain the basic procedural and technical requirements that must be met by the customer before ENMAX Power Corporation (EPC) can provide a 25kV High Voltage Service within the network boundaries.

The term “Network,” as it is used in this publication, refers to the area of EPC’s electrical distribution system that is located in Calgary’s downtown core and portions of the adjacent communities (see Network Boundary Map).



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Please note the following:

- EPC can connect your service only after all of the general and technical requirements have been met. A customer checklist for “Downtown Primary Metered Services” can be found in the attachments
- For all other aspects of Network servicing, please refer to the *Network Servicing Policies and Guidelines*
- This guideline does *not* exempt the customer from the City of Calgary building codes.
- Prior to any construction that will affect EPC’s Network system, EPC requires a site coordination meeting. At the meeting, an ENMAX Network representative will review, with the project manager, any outstanding conflicts that will need to be corrected prior to the beginning of the construction of the vault. The EPC Network coordinator will then establish a tentative schedule for construction that will commence when the customer meets all the requirements in the Network guidelines.

1.2 EPC Network 25kV Operational Philosophy

The EPC Network 25kV high voltage system consists of two (2) 25kV 3 phase 4-wire feeders, which operate under a preferred and alternate feeder configuration. The operating philosophy is as follows:

- The preferred feeder will supply the customer’s load under normal operating conditions.
- Upon loss of supply on the preferred feeder, the customer switchgear will automatically transfer to the alternate feeder in a break-before-make transition. A momentary interruption to downstream loads will occur.
- A manual transfer back to the preferred feeder will take place under EPC supervision only. This transfer will be done in a make-before-break transition. A momentary interruption to downstream loads will not occur.

2. DESIGN GUIDELINES FOR STRUCTURES AND FACILITIES

2.1 Location of the 25kV Electrical Room

The customer built 25kV electrical room must be located and constructed in a manner such that:

- There are two (2) points of access. EPC personnel must have 24 hour direct access from outside of the building via one of the access points. This is necessary so that EPC

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personnel can perform emergency and/or routine switching and maintenance on the EPC system without delays.

- The 25kV Electrical room must be located on the customer’s property and cannot be located above the +15 level of the building.

2.2 25kV Electrical Room Requirements

At least one (1) meter of unobstructed space past the rack out point for the incoming breakers is required around the perimeter of the 25kV high voltage room. For pull out style equipment, a minimum front clearance of two (2) meters of unobstructed space is required.

Sufficient space for the placement of the interrupting device or grounding buggy shall be available.

Elevation of the floor and carriage track must be such that removal and insertion of the interrupting device or ground buggy is ensured.

Concrete walls, floors and ceiling within the 25kV high voltage room should be painted and area kept as clean as possible.

2.3 25kV Interrupting SF6 Switch Chamber (EDD Chamber) Requirements

EPC requires a separate chamber for 25kV switches with an interrupting switch (emergency disconnect device - EDD). This equipment will allow for the disconnection of the EPC 25kV primary cable system from the customers switchgear in the event of an emergency without affecting other customers.

EPC will supply and install the emergency disconnect devices, at the customer’s expense.

The emergency disconnect device chamber must be located in a manner so that EPC is provided with 24-hour direct access from outside the building. The suggested structure is to be:

- A room inside the building providing that the room meets the access requirements under section 2.1.

OR

- Other options for the chamber dependent upon the specific site as approved by ENMAX Power Electrical Engineering.

2.4 Additional 25kV Electrical Room Requirements

A telephone line is required within the 25kV Electrical room with direct dial out capabilities (local calls only) for emergency use only. All power requirements for the telephone system must be connected to the emergency power system in the event of a power failure.

A stepladder must be kept at all times in the 25kV high voltage room for use by EPC personnel.

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The location of the lighting and receptacles must be reviewed with the EPC Electrical Engineering section prior to installation. Location of lighting must provide adequate light for ENMAX crews. Installation of one duplex receptacle is required. The lighting and power receptacles are to be supplied and installed at the customer's cost and connected to the emergency power system. Emergency lighting and power receptacles must be operational prior to the energizing of the 25kV electrical service.

3. SUBMISSION OF PLANS

3.1 Introduction

Any customer requesting a Network 25kV High Voltage Service must contact the EPC Electrical Engineering section well in advance of the anticipated energization date.

The lead time required by EPC can exceed 6 months due to the extra equipment required for these services.

3.2 Required Drawings

For Network 25kV High Voltage Service, the customer must submit a set of plans and electrical details as listed below:

- A site plan with the legal property description showing all of the buildings (existing or proposed) on the property. The site plan must include:
 - All of the street designations;
 - The location of service entrance, switchgear, meter centres, and other utilities (gas, telephone, sewer, etc.);
 - A north or direction arrow; and
 - The property boundary designations and the dimensions of building to property line.
- A site access diagram for EPC access to the proposed high voltage switch room.
- A single line diagram
- Electrical switchgear shop drawings which clearly indicate the phasing
- A written description of the customer transfer scheme operation.
- Electrical protection coordination study which includes:
 - Relay settings
 - C/T curves
- For customer checklist please see *Downtown Primary Metered Service Customer Checklist* in the attachments.

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4. EPC NETWORK 25kV CUSTOMER SWITCHGEAR REQUIREMENTS

Customer switchgear shop drawings must be submitted to EPC Electrical Engineering for approval prior to construction.

4.1 General Customer Equipment Ratings

The customer's 25kV high voltage switchgear must meet the following ratings:

- Operate at 60Hz, 25kV, 3-phase 4-wire service.
- Minimum symmetrical interrupting device rating of 750 MVA.
- Basic impulse level (BIL) rating of 125kV.

4.2 Switchgear Interrupting Device Ratings

The interrupting devices must be rated to a minimum of 600 amperes for both the preferred and alternate EPC feeders. The preferred and alternate feeder interrupting devices must be either:

- A circuit breaker of a draw out style or fixed provided it is equipped with an isolating means to permit breaker maintenance while the EPC supply cables are energized.
- A loadbreak switch with a visible point of isolation.

Isolating switches must be installed between the interrupting device and the bus to allow for isolation of EPC metering equipment.

4.3 25kV Customer Switchgear Transfer Scheme

The 25kV Customer switchgears transfer scheme must comply with the following:

- Open transition transfer to the alternate feeder upon loss of supply on the preferred feeder after a set time delay. If no supply is available on the alternate feeder, the transfer should not take place.
- No automatic transfer from the alternate feeder back to the preferred feeder is permitted.
- Closed transition transfers from the alternate to the preferred feeder will take place ONLY under the supervision of EPC Network operational Staff. This transfer shall be undertaken manually by the operation of the interrupting device control switches.
- Trips on the 86 lockout relay device must initiate a lock out of both the preferred and alternate interrupting devices.
- Both incoming feeders should have the ability to operate as either the preferred or alternate feeders.

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Key interlocks between incoming feeder breakers and downstream inline switches must ensure that:

- The incoming feeder breaker is open and racked out prior to the downstream switch being opened.
- The downstream switch is closed prior to the incoming feeder breaker being racked in and closed.

Proposed switchgear transfer schemes must be submitted to the EPC Electrical Engineering section along with switchgear shop drawings for approval by EPC. Approval of the transfer scheme by Electrical Engineering must be received prior to energization.

Note: Additional reviews of the transfer scheme will be rechargeable to the customer.

4.4 25kV Customer Switchgear Lightning Arrestors

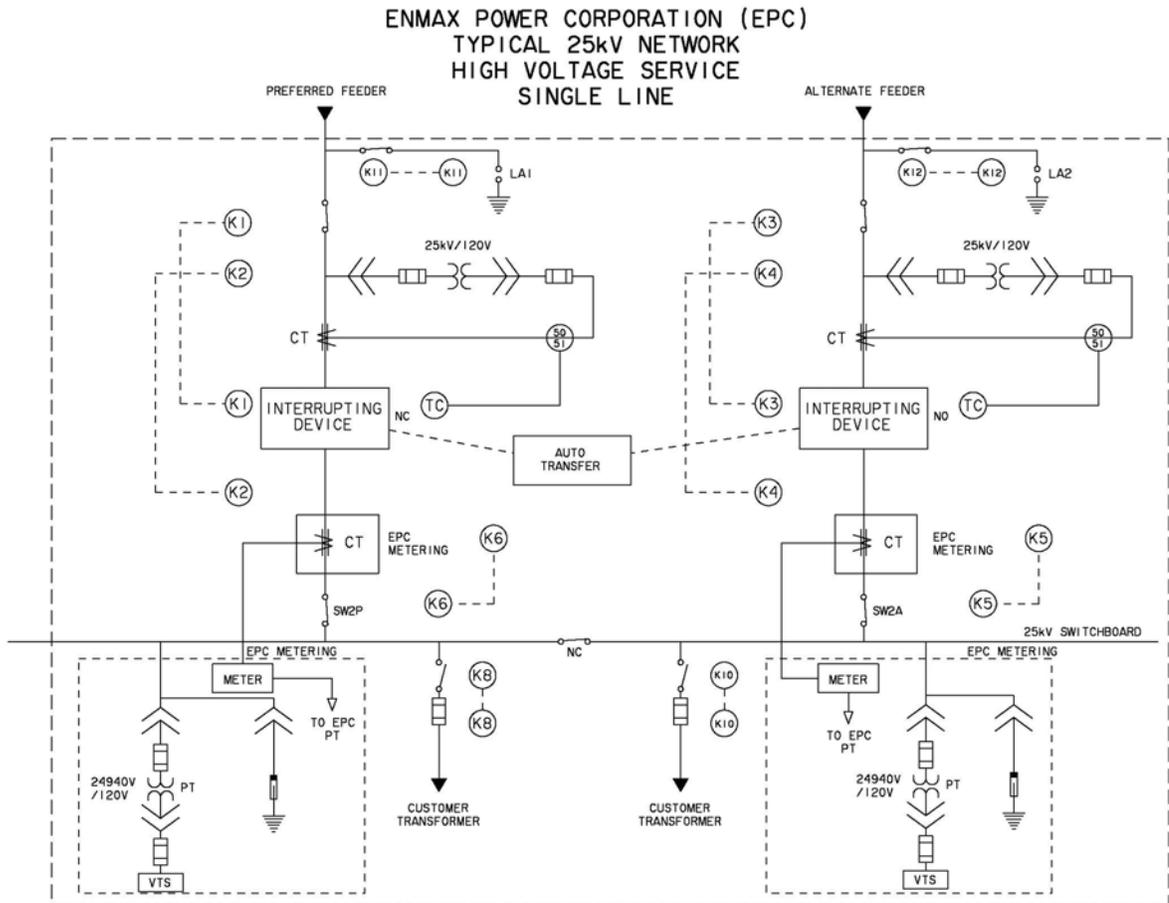
Lightning arrestors on the incoming feeder cables are not required, but may be installed at the discretion of the customer. If installed, lightning arrestors must be of Intermediate class 21kV rated with an isolating disconnect switch between the bus and the lightning arrestor for the purpose of supply line testing. Disconnects shall be suitable for hot stick operation or draw out style.

4.5 25kV Customer Switchgear Buss Tie

The buss tie must be an isolating gang-operated load break device interlocked to both incoming feeder interrupting devices.

4.6 Typical Customer Single Line Drawing

A typical Network 25kV High Voltage Service single line is outlined below.



See Appendix A for larger image.

4.7 25kV Customer Switchgear Mimic Buss

The customer switchgear assembly must be clearly marked with a mimic buss which indicates the circuit configuration as per the customer single line drawing.

4.8 25kV Customer Switchgear Phasing

The customer shop drawings shall clearly indicate the phasing. The installed switchgear must also be clearly marked to indicate the phasing.

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4.9 25kV Customer Switchgear Breaker Signage

The incoming utility breaker cells must be signed to indicate that “**Operation is Only Permitted Under Direct Supervision by ENMAX Power Corporation**”.

5. EPC NETWORK 25kV CUSTOMER SWITCHGEAR PROTECTION SETTINGS

The switchgear must comply with the co-ordination and protection requirements of EPC. Upon request, the EPC Electrical Engineering section will supply the time/current characteristics for all upstream devices on the supply feeders. The customer must obtain approval from the EPC Electrical Engineering section for all over current protective settings on the customer’s preferred and alternate feeders’ protective equipment.

6. EPC NETWORK 25kV CUSTOMER SWITCHGEAR GROUNDING

The switchgear grounding provision or device must be rated to meet the EPC fault level at the location installed. The EPC Electrical Engineering section will supply the fault levels when requested by the customer.

Ground ball studs are required on all incoming utility feeder breaker compartments.

The customer shall arrange for the supply of a grounding buggy to be used with the interrupting device on the incoming feeders from the EPC system. The grounding device shall be capable of grounding either the supply side or the customer’s buss side of the switchgear. It shall also be equipped with a single phase disconnect for each phase so that ground connections can be opened or closed via a hot stick.

7. EPC NETWORK 25kV CUSTOMER SWITCHGEAR METERING

The utility metering cell shall be separated from the customer’s apparatus and be accessible by EPC Revenue Metering or an accredited metering contractor approved by EPC. Refer to Revenue Metering Guideline.

The neutral bus must extend into the metering cell to facilitate PT connections.

EPC Meter Department will supply the metering current transformers and potential transformers to be installed by the customer’s electrical contractor.

Note that some items may have long lead times and must be requested well in advance of construction.

Please refer to the “Revenue Metering Guideline” for detailed metering information. The guideline can be found at:

<https://www.enmax.com/business/meter-services>

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8. DOCUMENTATION HISTORY

Date	Description of Changes
September 01, 2011	Updated document format; changed title of 25kV High Voltage Customer Checklist to Downtown Primary Metered Service Customer Checklist
January 3, 2014	Updated document format; updated Revenue Metering Link

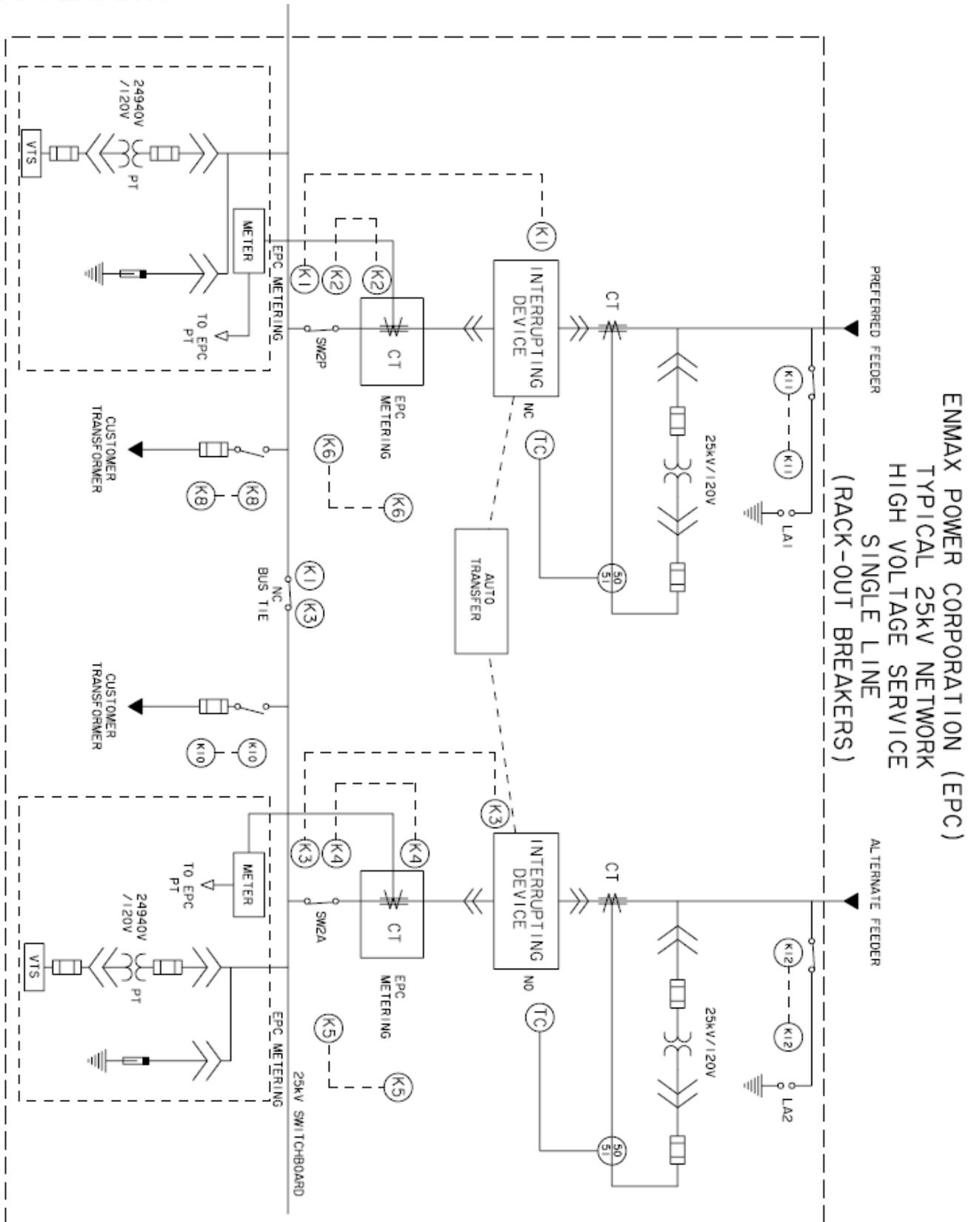


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APPENDIX A





**ATTACHMENT A - ENMAX POWER CORPORATION
DOWNTOWN PRIMARY METERED SERVICE – CUSTOMER CHECKLIST**

Project Description: _____ Date: _____

	Description	Submit to ENMAX Power	Submit to Electrical Inspection	*Must be Completed for <u>Both</u> Preferred and Alternate Feeders
1.	Request Copy of ENMAX 25kV Guideline			
2.	Connected Electrical Load (kVA)	Yes		
3.	Site Plan: <ul style="list-style-type: none"> • Electrical • Architectural 	Yes	Yes	
4.	Site Access Design	Yes		
5.	Single Line Diagram	Yes	Yes	
6.	Distributed Generation Application c/w Required Information	Yes		
7.	Distributed Generation Interconnection Agreement	Yes		
8.	Request Copy of ENMAX Metering Cell Specifications*	Yes		
9.	Electrical Switchgear Shop Drawings (Phasing Designation Required)	Yes	Yes	
10.	Detailed Description of Switchgear Transfer Scheme Operation	Yes		
11.	Apply for Electrical Permit		Yes	
12.	Provide Electrical Inspector Name to ENMAX	Yes		
13.	Apply for Site ID at 403-514-2807	Yes		Yes
14.	Enroll Site with Retailer of Choice	Service Order will be Generated Automatically		Yes
15.	Request Fault Levels and Upstream Coordination Settings from ENMAX	Yes		Yes
16.	Electrical Protection Coordination Study: <ul style="list-style-type: none"> • Relay Settings • C/T Curves 	Yes		Yes
17.	Order CTs and PTs	Yes		Yes
18.	Metering Communications Conduit	Yes		Yes
19.	ENMAX Inspects Metering Cell on Site	Yes		Yes
20.	High Potential Test (Certified by Engineer): <ul style="list-style-type: none"> • Switchgear • Utility Compartment 	Yes	Yes	Yes
21.	Retailer Request for Energization	Yes		Yes
22.	ENMAX Witnesses Field Test of Relays: <ul style="list-style-type: none"> • Correct Settings • Functions Properly • Transfer Scheme 	Yes		
23.	Electrical/Meter Room Access Key (lock box provided by ENMAX)	Yes		
24.	Compliance with all Electrical Inspection Requirements		Yes	Yes

• Note 1: Revenue Metering Guidelines (pdf, meters) available online at www.enmax.com

ENMAX Power Corporation Contacts:

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