


**REVISION CONTROL**

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A	Initial release	01/21/13	M.Hale
B	Allowance for low voltage Wye w/ insulated neutral.	04/10/13	M.Hale
C	Secondary Configuration added. Added Primary Configuration for Wye with high impedance ground.	12/12/2014	M. Kneizys
D	Primary voltage changed to 208V.	2/24/2015	M.Kneizys

**Component Requirement Specification**  
**for**  
**SGI 500XT Isolation Transformer**

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### 1. Purpose

The purpose of this document is to specify the minimum component requirements for the external isolation transformer required to be installed in conjunction with a Solectria SGI 500XT inverter. These specifications and minimum requirements are required for proper inverter operation.

### 2. Scope

This specification defines requirements for the external isolation transformer necessary for SGI 500-XT inverter applications. Requirements are specified for two scenarios; one SGI 500-XT inverter paired with one 500kVA transformer, and two SGI 500-XT inverters sharing the same 1000kVA transformer.

### 3. External Transformer Requirements

#### 3.1. Transformer Type

The transformer shall be three phase, self-cooled, and designed for step-up operation. Transformer shall be UL listed. Pad mount, distribution type transformers shall comply with the latest issue of IEEE/ANSI C57.12.34.

Transformer shall operate at 60Hz nominal and shall be tolerant of continuous frequencies between 54.0Hz and 60.5Hz. Transformer shall be capable of operating at 1.1p.u. voltage at full load without saturation for periods of time typical of the expected generation profile. Different frequency and voltage requirements may be necessary for projects with voltage or frequency ride through requirements other than those defined in IEEE 1547-2003. Requirements outside of this standard range must be reviewed and approved by Solectria.

#### 3.2. Transformer Rating

The transformer kVA rating shall be either 500kVA or 1000kVA.

500kVA transformers shall have one primary winding and one secondary winding.

1000kVA transformers shall have three windings total; one 1000kVA secondary winding and two 500kVA primary windings. The two primary windings shall have the same voltage, winding configuration and BIL. The three windings shall be constructed in a Low-High-Low configuration.

#### 3.3. Transformer Impedance

For 1000kVA transformers, the percent impedance between both low voltage primary windings must be greater than 7%. The percent impedance between low voltage winding #1 and the high voltage winding as well as percent impedance between low voltage winding #2 and the high voltage winding must satisfy the minimum impedance voltage requirements in Table 1.

For 500kVA transformers, the transformer impedance voltage Z(%) must satisfy the conditions in Table 1 on the following page.

kVA Rating	Impedance (Absolute Minimum)
500	1.8%
1000	High-Low#1 3.5% High-Low #2 3.5% Low#1-Low#2 7%

**Table 1 – Percent Impedance %Z**

**3.4. Primary Configuration**

The primary winding(s) shall be completely floating or grounded through a high impedance (>1Mohms).

- 208V nominal Delta  
*or*
- 208V nominal Wye with the neutral fully insulated from ground and constructed such that the neutral terminal is not accessible

**3.5. Secondary Configuration**

The secondary winding configuration shall be either:

- Delta  
*or*
- Floating Wye  
*or*
- Grounded Wye

Note for Grounded Wye Configuration: A transformer configuration of solidly grounded wye on the secondary and delta on the primary induces neutral current to the transformer and through three-phase over current protection devices on the secondary side of the transformer. The additional current could lead to unintended activation of the over current protection. It may also reduce the inverter’s ability to detect a single open phase condition. For this transformer configuration, the customer must provide supplemental single open phase detection.

**3.6. Taps**

The transformer shall be furnished with secondary capacity high-voltage taps with a minimum of two – 2 ½% taps above and below the rated nameplate voltage.

**3.7. Electrostatic Shield**

Transformers rated 1000kVA with three windings shall include electrostatic shielding between the low and high voltage windings. The shielding must be grounded to the transformer tank or enclosure.

**3.8. Low Voltage Bushings and Terminals**

The minimum quantity of connection holes must accommodate the total number of conductor terminations per phase. Pad mount distribution transformers shall be provided with spade-type bushings.

### **3.9. Tank Grounding**

Clamp-type tank grounding connections shall be provided for pad mount distribution transformers in accordance with ANSI C57.12.34.

### **3.10. Submittal Drawings**

Final transformer submittal drawings must be received and reviewed by Solectria prior to inverter ship date.

## 4. Reference Documents

### 4.1. Solectria Renewables References

Ref. Number	Title/Description
04-02-01	Standard Practice for Product Development and Design Control

### 4.2. Industry and Regulatory References

Ref. Number	Title/Description
ANSI C57.12.34	Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 5 MVA and Smaller
IEEE 1547-2003	Standard for Interconnecting Distributed Resources with Electric Power Systems

### 4.3. Definitions

Term/Acronym	Definition
Percent Impedance Z (%)	Percentage of the normal terminal voltage required to circulate full-load current under short circuit conditions.
Primary Winding	Transformer winding connected to the inverters.
Secondary Winding	Transformer winding connected to medium voltage distribution.
Smart Grid Inverter	An inverter which has not only the generating capability but also provides intelligent features which help to operate the power grid more effectively by controlling the reactive power or providing the additional control and communication methods.
Step-Up Operation	Power flows from low voltage primary to medium voltage secondary.
VA	Volt-Ampere; Apparent power magnitude.

Solectria Renewables is available for assistance in determining utility related requirements related to the isolation transformer and other inverter related requirements. Please contact Solectria should additional information be required.

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