ONTARIO POWER GENERATION

OPG Proprietary
June 13, 2012

STANDARD TECHNICAL SPECIFICATION
OPG-M-772-12
Temporary Ground Assemblies

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1. SCOPE OF WORK

1.1 Standard Specification

This Specification discusses the technical requirements of supplier made Temporary Ground Assemblies (TGA) at Ontario Power Generation (OPG) hydro generating stations.

This Specification is written from the perspective that the Supplier Group supplying the equipment is the expert in TGAs and OPG is the expert in generating stations. The Supplier Group shall be expected to review and, if needed, question the information provided by OPG to ensure OPG will get the appropriate grounding equipment for each facility.

1.2 Supplementary Specification

A Supplementary Specification OPG-M-772S-12 and drawings for each specific project shall accompany, be read with and form part of this Technical Specification. The requirements of the applicable Supplementary Specification shall take precedence over the Standard Specification for the specific project under discussion.

All drawings supplied by the Owner's Engineer as part of the Supplementary Specification to the Supplier Group shall form part of this Specification. The drawings and specifications shall be deemed to be complementary to each other so that if anything is shown on the drawing but not mentioned in the specification or vice versa, it shall be furnished and built as if specifically set forth in both. In case of conflict between the Standard Specification, Supplementary Specification and/or the drawings, the Owner's Engineer shall be consulted for clarification.

2. LAWS, STANDARDS, AND CODES

2.1 General

All work shall conform to:

- The laws and regulations of Canada, the Province of Ontario, or local municipalities
- Specific standards listed below; their latest issues, amendments and supplements of which shall apply unless otherwise indicated in the contract documents
- Any other standards mentioned elsewhere in this document or that apply in general to this work.

The Supplier Group shall clearly state in its proposal any exceptions or deviations it intends to take to these standards and specifications.

Should any law, standard or code be revised, the Supplier Group and the Owner will make each other aware of the revision to discuss adoption of the revision.

Should conflict occur between laws, standards or codes and this Specification, the most stringent requirements shall govern.

Standards of Ontario Power Generation

- HED-MAN-001 -Temporary Grounding and Bonding Guide
- HED-MAN-002 - Station Grounding and Bonding Guide

Standards of the Underwriters Laboratories of Canada (ULC)

- ULC CAN/ULC-61230 - Live Working – Portable Equipment for Grounding and Bonding

Standards of the Institute of Electronics and Electrical Engineers (IEEE)

- EEE 1246 - IEEE Guide for Temporary Protective Grounding Systems Used in Substations
- IEEE C37.010 - Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis

Standards of International Electrotechnical Commission (IEC)

- IEC 60909: Short Circuit Currents in Three Phase AC Systems

3. DEFINITIONS AND ABBREVIATIONS

The following definitions and abbreviations apply throughout this Specification:

MSDS	Material Safety Data Sheet (Canadian version)
OPG	Ontario Power Generation, Inc.
Owner's Engineer	Engineer, employed by or representing OPG, responsible for ensuring that the Supplier Group is adhering to the specification
Rated Peak Factor	Ratio of the maximum peak current to its rated current
Supplier Group	Means the Supplier, the Subcontractors, the Supplier's Personnel or any other Person the Supplier or a Subcontractor is responsible for at law
TGA	Temporary ground assembly

4. SUPPLIER-MADE TEMPORARY GROUND ASSEMBLIES SPECIFICATIONS

The temporary ground assemblies (TGAs) and other components shall meet the requirements of OPG as described in the Supplementary Specification and shall have been type tested to and comply with the most recent version of CAN/ULC 61230.

The Supplier Group shall review the fault levels and timing information, provided for each different type of TGA required in the Supplementary Specification, and will propose TGA(s) that will perform for the stated conditions without failing.

The quantities that are relevant to the ratings of TGA and associated components are described in the Supplementary Specification.

4.1 Material Requirements

- All cable and ferrules shall be copper.
- Only clear heat shrink shall be used.
- Conductor with high visibility insulation shall be used when available.

4.2 Markings/Labelling Requirements

Each TGA shall have the following clearly engraved or placed on the assembly and protected by clear heat shrink:

- A serial number or other form of unique identification (and any other information as requested by OPG)
- Assembly weight
- Phase identification for cluster grounds (R, W, B or 1, 2, 3).

The TGA or an additional non-removable label on the TGA shall be marked with at least the following:

- Manufacturer's name or trade mark, or end assembler's name
- Model or type reference for the device
- Year of manufacturer
- Rated current, Ir (kA); rated time, tr (s) of the device and the value of the rated peak factor
- Number of relevant standard (i.e. CAN/ULC-61230).

The durability of the markings/labels shall be verified as per Section 5.8 of CAN/ULC-61230.

4.3 Supporting Information

4.3.1 Testing Documentation

The Supplier Group shall perform type testing to validate the TGA design, as per Section 5 of CAN/ULC 61230 and shall provide test results, which shall include at least:

- A clear designation of the device or component tested
- A description of the test arrangement, if necessary accompanied by photographs and/or drawings
- A recording with time trace and scales for the test voltage and test current.

The Supplier Group shall prove that the same documented assembly procedure and identical components used for the type tested device, is used in assembling subsequent TGA's. This ensures compliance with Section 5.7.6 and Annex F, CAN/ULC-61230.

Where the type test results do not fully meet the OPG requirements, the Supplier Group shall provide additional engineering analysis (i.e. product suitability) to support the Supplier Group's recommendations.

The Supplier Group shall provide a factory test information sheet (certificate) for each TGA that has, as a minimum, the following:

Facility name: _____

TGA reference name: _____

Ratings (continuous and transient current, duration, peak or asymmetry factor, temperature, etc.)

Supplier Groups Part Numbers used in the assembly

Assembly weight

Type test document reference

Supplier Group's statement of product suitability reference (if required)

Maintenance document reference

Resistance of assembly in micro ohms _____ μΩ

If a cluster ground assembly, provide each bus clamp to ground resistance in micro ohms and identify each phase by a marking system on the cluster (e.g. R, W, B). Provide drawings if necessary

R-G _____ μΩ

W-G _____ μΩ

B-G _____ μΩ

Temperature at time of resistance test(s) _____ °C

Date of factory in-service testing: _____ (DD-MM-YYYY)

Maximum recommended field-measured resistance in micro ohms: μΩ

A statement that the assembly meets or exceeds the requirements of CAN/ULC-D61230-99 and OPG Technical Specification OPG-772-11

Supplier's delegate name (please print): _____

Supplier's delegate signature: _____

Date (DD-MM-YYYY): _____

The intent is for OPG to have on file, a complete description of each TGA.

Field locations shall provide the Supplier Group with data and drawings as requested.

4.3.2 Use and Maintenance of TGA's

The Supplier Group shall provide 'Instructions for Use' as described in Section 4.10 of CAN/ULC-61230.

The Supplier Group shall provide a list of recommended lubricants. Any lubricants included with the assembly shall be accompanied by an up-to-date MSDS.

The Supplier Group will describe its TGA re-test program. OPG plans to carry out routine maintenance activities as recommended by the Supplier Group and may periodically send the TGAs back to the Supplier Group for retest, repair or re-certification.