

Electrical Distribution Safety

DISTRIBUTION COMPANY AWARENESS

ESA received a request to review an LDC generated refurbishment agreement for major equipment (equipment approval) and make comment with respect to its compliance to Regulation 22/04. The result and lessons learned from the review have been documented in this bulletin.

This bulletin contains a generalized version of the practice for the Stakeholder's reference, on the following pages, that LDCs may wish to use to ensure/verify they are in compliance with Regulation 22/04. The published Guideline entitled "Technical Guideline for Equipment, Design and Construction" provides further direction and options on the topic of equipment approvals (references include Sections 2.7.2, 2.7.4 and 2.7.6).

REGULATION 22/04 GUIDELINE EXCERPTS

2.7.6 Good Utility Practice for Major Equipment used for Maintenance or Reuse:

How and when can *Good Utility Practice* be used to approve major equipment for the purpose of maintaining or reusing existing *electrical equipment* under the rule of the *distributor*?

...

- For equipment to be sent for testing (to confirm equipment functionality) or to be repaired (where the repair does **not** affect the ability of the equipment to fail in a safe manner **or** the repair meets or exceeds the manufacturer's design) the process shall include the inspection of used equipment. The inspection will be completed and documented by a *competent person* to confirm that there is *no undue hazard*. If the repair or work may affect the ability of the equipment to fail in a safe manner *Good Utility Practice* may not be used (See Rule 2-024 or Section 2.72 for approval options).



ESA RECOMMENDS

ESA recommends that LDCs review current refurbishment agreements/process/practices and ensure they are in compliance with Regulation 22/04. Some of the lessons learned from reviewing the LDCs practice are highlighted below.

1. "Distributor Developed Specifications" shall detail Requirements and not Expectations.
2. "Distributor Developed Specifications" shall detail what tests are to be performed.
3. Declaring that equipment is "tested to" a test is insufficient in a specification. The equipment is to meet or exceed a defined outcome.
4. Declarations of compliance shall be made to the Regulation and not the Guidelines.
5. Reference shall be made to identify all the equipment (e.g. by serial number) which is undergoing the LDCs approval process.

ADDITIONAL INFORMATION

Information requests and follow-up may be directed to ESA at Utility.Regulations@ElectricalSafety.on.ca. For questions on this bulletin please be prepared to quote Bulletin "DIB-05/14".

Electrical Distribution Safety

DISTRIBUTION TRANSFORMER SERVICE, REFURBISHMENT AGREEMENT

1.0 OBJECTIVE:

- 1.1 To develop a process agreement between the three aforementioned parties above, that ensures the following; quality product and service, maximum value for the transformer assets and a process which has a positive impact on the environment.
- 1.2 To develop an agreement that provides and stresses consistency in processes to ensure all Transformers serviced, refurbished or undergoing the refurbishment process, will be safe and reliable to re-introduce to the XXXXXX Corp. Distribution System.

2.0 REQUIREMENTS:

- 2.1 All XXXXXX transformers refurbished, serviced and/or recycled (refurbishment) by YYYYYY will be to the most recent XXXXXX specifications, unless otherwise requested by XXXXXX as per an emergency replacement situation.
- 2.2 All XXXXXX distribution transformers serviced, refurbished or refurbishment candidates will undergo full Routine Tests as per Clause “ ” in CSA C2.__, including meeting and/or exceeding the guidelines of CAN/CSA-802.1.

Note: The standard and specification listed are for current version. In all instances the current version or 1 version previous to the latest version of the specification or standard shall be followed.

3.0 DEFINITIONS:

- 3.1 **Test and Analysis** – Transformer analysis (refer to YYYYYY Quote and Analysis Form), will include a full review of the transformer versus the most current XXXXXX specification (any deviations will be identified). In addition, all gaskets, clearances, connections, components and condition of oil will be inspected and documented on this form. Tests will be performed on “every” transformer and will conform to CAN/CSA C2.__.

Note: The standard and specification listed are for current version. In all instances the current version or 1 version previous to the latest version of the specification or standard shall be followed.

- 3.2 **Service/Refurbishment** – All transformers returned from the field have been previously approved by XXXXXX at time of and/or previous to shipment. YYYYYY’s role will be to analyze and service/replace any damaged or worn components and/or gaskets with new, assure clearance and connections are compatible with YYYYYY’s ISO procedures and to confirm the transformer oil is in new like condition.
- 3.3 **Recycled tank** – In order to ensure the tank is in “new” like condition, YYYYYY will modify to new (where necessary to meet current specification), burn off existing painted coating, blast to bare metal and finish on YYYYYY’s powder coat assembly to provide the same finish/process as a new transformer. YYYYYY will only remove surface rust; any imbedded rust on a transformer tank will qualify as a new tank candidate.
- 3.4 **REFURBISHMENT** – Re-uses the core steel and tank (if possible) only. YYYYYY’s unique core/coil separation process enables the removal of the coil while keeping the core steel intact in its original form (unaltered). The core steel is measured (dimensions) and tested to determine grade & performance. YYYYYY engineering will utilize the dimension and test results to design a core/coil combination that will meet and/or exceed current TOC evaluation for the stock code candidate scheduled for manufacturing. New design will ensure clearances; losses and temperature rise will meet and/or exceed the requirements in ANSI/IEEE C57.12. Type Test Equivalency for refurbishment products will be applicable to new transformers designed and manufactured by YYYYYY. YYYYYY “will not” design or manufacture core/coils that do not meet our standard design profile.

Electrical Distribution Safety

4.0 SPECIFICATIONS:

- 4.1 CAN/CSA-C2.1-06 (2006) or latest version: Single & Three Phase Distribution Transformers (Type ONAN)
- 4.2 CAN/CSA-C2.2-06 (2006) or latest version: Single Phase Polemount Transformers (Type ONAN)
- 4.3 CAN/CSA-C227.3-06 (2006) or latest version: Low Profile, Single Phase Dead front Pad Mount
- 4.4 CAN/CSA-C227.4-06 (2006) or latest version: Three Phase Dead front Pad Mount Distribution
- 4.5 CAN/CSA-C301.1-06 (2006) or latest version: Single Phase Submersible Distribution Transformers

Note: The standard and specification listed are for current version. In all instances the current version or 1 version previous to the latest version of the specification or standard shall be followed.

5.0 TESTING:

Note: The standard and specification listed are for current version. In all instances the current version or 1 version previous to the latest version of the specification or standard shall be followed.

5.1 Routine tests

The tests specified in Items (a) to (h) below shall be performed as routine tests on all distribution transformers but need not necessarily be performed in the sequence given:

- a) Ratio on each connection;
- b) Polarity or angular displacement;
- c) No-load losses at rated voltage unless specified otherwise by the purchaser;
- d) Exciting Current at the voltage specified in Item (c);
- e) Load losses and impedance at rated current and on the rated voltage connection and corrected to a winding reference temperature of 85 °C. This test shall be performed on the rated high-voltage connection that has the highest measured loss value;
- f) Applied Voltage (Hi-Pot);
- g) Induced voltage; and
- h) Transformer tank leak-detection test. This test shall be performed on each transformer tank to verify the integrity of the welds and on the final assembled unit without the pressure-relief device.

5.2

A test report, certified by the manufacturer, acknowledging that all routine tests have been performed, documenting the energy efficiency according to CAN/CSA-C802.1 and the values of the tests specified in Items (c), (d), and (e), and signed by a professional engineer or otherwise authorized person, shall be submitted to the purchaser for each manufacturing lot.

6.0 SORT CRITERIA:

- 6.1 XXXXXX shall ensure all pool transformer candidates have a vintage date of 1985 and newer.
- 6.2 YYYYYY will provide a 3rd Party Logistics Company to pick-up and remove transformers from XXXXXX warehouse locations.

Electrical Distribution Safety

7.0 **TRIAGE - TEST AND ANALYSIS:**

7.1 All transformers received at YYYYYY will be checked and confirmed to ensure accuracy of shipment and added to the XXXXXX Transformer Pool Summary report. Transformers will undergo a Triage or Analysis to determine if they are candidates for minor service or refurbishment candidates. Tests will include minor electrical tests, TTR, MEGGER, Electrical Test and 100% Dielectric or DGA if requested.

7.2 A full inspection of the transformer will be completed to identify any concerns or damages and a full review/comparison with the current XXXXXX specification will be conducted and identified on a Transformer Analysis Report (accompanied by digital pictures of any defects and/or areas of concern). If a transformer is determined to require the removal of the core/coil, full stress tests will be performed prior to going forward.

8.0 **4 TYPES OF SERVICE CATEGORIES WILL BE PROVIDED:**

Note: The standard and specification listed are for current version. In all instances the current version or 1 version previous to the latest version of the specification or standard shall be followed.

Category 1 – Test & Analysis Only (emergency cases only):

1. Transformer will be tested and analyzed only, no repairs and/or parts replacements.
2. All electrical and stress tests to be performed as per CSA 2._ .
3. No product warranty provided.
4. No Quality Assurance sticker provided.
5. Type Test Equivalency – Original Manufacture (approved by the Utility)
6. YYYYYY Certified Test Report provided.
7. XXXXXX will provide written authorization for the request and acceptance of invoicing and shipment, prior to YYYYYY proceeding with Test & Analysis “only”.

Category 2 – Minor Service (“not” requiring new or recycled tank):

1. Transformer will be tested and analyzed.
2. YYYYYY will replace all gaskets, components and/or transformer oil deemed replaceable as per the results of the analysis and XXXXXX’s expectations.
3. Transformer will be returned to XXXXXX in “new” like condition.
4. All analysis tests and stress tests to be performed as per CSA 2._.
5. Full product warranty provided.
6. Full Quality Assurance applied and CT QA sticker provided.
7. Type Test Equivalency – Original Manufacture (approved by the Utility)
8. YYYYYY Certified Test Report provided and signed by a trained and authorized individual from within the Company, as per CSA 2._.

Electrical Distribution Safety

Category 3 – Recycled Tank or New Tank (requiring new or recycled tank):

1. Transformer will be tested and analyzed.
2. YYYYYY will provide “new” gaskets, components and transformer oil as per XXXXXX’s latest specification.
3. Based on condition of the transformer tank, the tank will be recycled or new.
4. Transformer will be returned to XXXXXX in “new” like condition.
5. All analysis tests and stress tests to be performed as per CSA 2.1.
6. Full product warranty provided.
7. Full Quality Assurance applied and CT QA sticker provided.
8. Type Test Equivalency – Original Manufacture (approved by the Utility)
9. YYYYYY Certified Test Report provided and signed by a trained and authorized individual from within the Company, as per CSA 2.1.

Category 4 – REFURBISHMENT:

1. Transformer will be tested and analyzed.
2. YYYYYY will provide “new” gaskets, components and transformer oil as per XXXXXX’s latest specification.
3. Based on condition of the transformer tank, the tank will be recycled or new.
4. YYYYYY will design and manufacture new coil based on core steel dimensions and transformer loss requirements to meet and/or exceed XXXXXX’s current TOC evaluation for this transformer.
5. Transformer will be returned to XXXXXX in “new” like condition.
6. All analysis tests and stress tests to be performed as per CSA 2.1.
7. Full product warranty provided.
8. Full Quality Assurance applied and CT QA sticker provided.
9. Type Test Equivalency – Based on YYYYYY’s core/coil design for new transformers. YYYYYY will “only” use recycled core steel formed to utilize our “standard” coil design criteria; all other core steel will be deemed scrap and shipped to have recycled.
10. YYYYYY Certified Test Report provided and signed by a trained and authorized individual from within the Company, as per CSA 2.1.



Authorization:

XXXXXX INC.

YYYYYY CO. LTD.

Name: _____

Name: _____

Signature: _____

Signature: _____

Title: _____

Title: _____

Stamp: _____

Stamp: _____

Date: _____

Date: _____



[Company Name]

Certificate of Compliance With Section 6 of Ontario Regulation 22/4

[Company Name] certifies that all of the remanufactured, repaired or refurbished transformers summarized in the attached report have been tested in accordance with the requirements of the following standards and if installed and operated under standard Utility practices, shall not present any undue hazard to public health and/or property:

- CAN/CSA-C2.1-06: Single & Three Phase Distribution Transformers (Type ONAN)
- CAN/CSA-C2.2-06: Single Phase Polemount Transformers (Type ONAN)
- CAN/CSA-C227.3-06: Low Profile, Single Phase Deadfront Pad Mount Distribution Transformers.
- CAN/CSA-C227.4-06: Three Phase Deadfront Pad Mount Distribution Transformers
- CAN/CSA-C301.1-06: Single Phase Submersible Distribution Transformers
- CAN/CSA-C301.2-06 Three Phase Submersible Distribution Transformers

Furthermore, [Company Name] certifies that all in-house routine tests are performed by QA Technicians who have the experience, knowledge and training to carry out these tests and have the authority to issue and sign test reports.

Professional Engineer

Date

Stamp