



Technical Guideline  
for  
Section 6. Approval of electrical equipment

Version 1.2

Ontario Regulation 22/04

**Electrical Distribution Safety**

Approved - January 12, 2005

Revised - September 15, 2008

**Legal Disclaimer**

**This document contains GUIDELINES ONLY to assist members of the industry in interpreting Ontario Regulation 22/04 - Electrical Distribution Safety -made under subsection 113(1) of Part VIII of the Electricity Act, 1998. These guidelines do not have the force of law. Where there is a conflict between these guidelines and any legislation or regulation which may apply, the relevant law prevails.**

**Retention periods stated in guidelines set out the minimum period for which referenced documents are to be retained. Each distributor needs to make its own assessment of the appropriate retention period for specific documents based on its assessment of risk factors and potential liability.**

## 1.0 General

### 1.1 Purpose

The purpose of this Guideline is to clarify and interpret the requirements outlined in various sections of Regulation 22/04 “Electrical Distribution Safety”. The sections of the Regulation outlined in this Guideline include:

- Section 6.0, “Approval of electrical equipment” – the requirements *distributors* are to follow **for approving equipment for use on new construction and on repairs to existing distribution systems**
- Section 7.0, “Approval of plans, drawings and specifications for installation work” – the requirements distributors are to follow **when designing installations that form part of their distribution systems.**
- Section 8.0, “Inspection and approval of construction” – the requirements distributors are to follow **prior to putting any new construction or repairs to distribution systems into use.**

This Guideline references sections 4, 5, 6, 7, 8, and 9 of the Regulation, as they relate to the distributor’s ability to meet the requirements of each section. This Guideline along with the Regulation provides a complete explanation of the requirements for the design, construction and equipment certification of electrical distribution systems.

As a condition to using its distribution systems, each distributor will need to engage an auditor on an annual basis to prepare an audit report and demonstrate compliance with sections 4, 5, 6, 7 and 8 of the Regulation. The checklists included in the appendices of this Guideline will assist in highlighting those areas where documentation will need to be available for audit purposes.

This Guideline along with the Regulation and other appropriate standards form the basis on which the ESA will assess the safety of the electrical distribution installations within the Province of Ontario.

**1.2 Table of Contents**

**Legal Disclaimer**.....2

    Ontario Regulation 22/04 \_\_\_\_\_ 1

    Approved - January 12, 2005 \_\_\_\_\_ 1

**Legal Disclaimer** \_\_\_\_\_ 2

**1.0 General** \_\_\_\_\_ **3**

**1.1 Purpose** \_\_\_\_\_ **3**

**1.2 Table of Contents** \_\_\_\_\_ **4**

**1.3 Definitions** \_\_\_\_\_ **5**

**2.0 Approval of Electrical Equipment** \_\_\_\_\_ **11**

**2.1 General** \_\_\_\_\_ **11**

**2.1.1 What is required under Section 6 of Regulation 22/04?** \_\_\_\_\_ 11

**2.1.2 Is it the expectation that all equipment must be formally approved.** \_\_\_\_\_ 11

**2.1.3 What are the choices available to distributors for equipment approval?** \_\_\_\_\_ 12

**2.1.4 What are the three options offered by Rule 2-024 of the ESC?** \_\_\_\_\_ 14

**2.2 Certification of Equipment** \_\_\_\_\_ **14**

**What conditions must be met for equipment to be certified?** \_\_\_\_\_ 14

**2.2.1 To what standards does equipment need to be certified to?** \_\_\_\_\_ 14

**2.2.2 What organizations are recognized in Ontario for certifying equipment?** \_\_\_\_\_ 14

**2.2.3 How does a distributor know that equipment is certified?** \_\_\_\_\_ 14

**2.3 Field Evaluation of Equipment** \_\_\_\_\_ **14**

**What are the conditions associated with the use of field-evaluated equipment?** \_\_\_\_\_ 14

**2.3.1 What organizations are recognized in Ontario for performing field evaluation and approval?** \_\_\_\_\_ 15

**2.3.2 Where does a field evaluation take place?** \_\_\_\_\_ 15

**2.3.3 What standards are applied to complete field evaluations?** \_\_\_\_\_ 15

**2.3.4 How does a distributor know that a piece of equipment has been field approved?** \_\_\_\_\_ 15

**2.4 ESA Approval of Equipment** \_\_\_\_\_ **15**

**What are the conditions associated with use of ESA for approval?** \_\_\_\_\_ 16

**2.5 Qualifying Tests** \_\_\_\_\_ **16**

**When qualifying tests are required, what are the options for providing appropriate testing information?** \_\_\_\_\_ 16

**2.6 Sub-rule 2-024(5)** \_\_\_\_\_ **16**

**When does sub-rule 2-024(5) of the ESC apply to distribution equipment?** \_\_\_\_\_ 16

**2.7 Rule of the Distributor** \_\_\_\_\_ **16**

**2.7.1 What safety requirements are to be met for electrical equipment approved under a rule of the distributor?** \_\_\_\_\_ 16

**2.7.2 Under the rule of the distributor, how can the distributor provide assurance of equipment safety equivalent to rule 2-024?** \_\_\_\_\_ 17

**2.7.3 Industry Standards - How are industry standards used under the Rule of the Distributor?** \_\_\_\_\_ 17

**2.7.4 Distributor Developed Specifications - What is required for distributor-developed specifications under the rule of the distributor?** \_\_\_\_\_ 18

**2.7.5 Good Utility Practice for Non-Major Equipment - How and when can Good Utility Practice be used to approve equipment under the rule of the distributor?** \_\_\_\_\_ 18

2.7.6	<i>Good Utility Practice for Major Equipment used for Maintenance or Reuse:</i>	19
2.7.7	How can a <i>distributor</i> integrate approved equipment with its <i>Standard Designs</i> ?	19
2.7.8	What elements could be included in a <i>distributor's equipment approval system</i> ?	19
2.8	<b>Documentation</b>	<b>20</b>
	How long do records of <i>equipment approval</i> need to be kept?	20
2.9	<b>Appendices for Equipment Approval</b>	<b>20</b>
	<b>Appendix A</b>	21
	Electrical Safety Code Rule 2-024	21
	<b>Appendix B</b>	23
	CSA Standards Related to Electricity Distribution	23
	<b>Appendix C</b>	27
	ESA Bulletin 2-7-20	27
	<i>Entela</i>	28
	<i>QPS</i>	28
	<i>TUV America</i>	28
	<i>Underwriters'</i>	28
	<b>Appendix D</b>	32
	Examples of common Industry Standards	32
	<b>Appendix E</b>	34
	Sample Equipment Approval Sheet	34
	<b>Appendix F</b>	36
	Equipment Approval Check List	36

**1.3 Definitions**

- 1.3.1 **“ancillary equipment”** means electrical installations (not located in buildings, or rooms in buildings, used as offices, washrooms, cafeterias, warehouses, garages, machine shops and recreational facilities) that are operating at 750 Volts or below to support but are not a direct part of a *distribution system* such as sump pumps, SCADA equipment, strip heating, etc.;
- 1.3.2 **“approved equipment”** means equipment that meet rule 2-024 of the Electrical Safety Code or that has been purchased, tested and inspected in accordance with industry standards, or equipment specification, or *Good Utility Practice* and procedures of the distributor and an assurance of safety of the equipment equivalent to rule 2-024 of the Electrical Safety Code is provided;
- 1.3.3 **“Authority”** means the Electrical Safety Authority;
- 1.3.4 **“authorized person”** means a *competent person* authorized by a distributor to have access to areas containing, or structures supporting, energized apparatus or conductors. O. Reg.22/04;
- 1.3.5 **“barriered”** means separated by clearances, burial, separations, spacings, insulation, fences, railings, enclosures, structures and other physical barriers, signage, markers or any combination of the above (Reg.22/04);

- 1.3.6 “Certificate”** means a certificate issued by a *professional engineer*, ESA or a *qualified person* identified in the distributor’s construction verification program, that the construction meets the safety standards set out in Section 4 of the Regulation;
- 1.3.7 “certificate of approval”** means the certificate issued by a professional engineer or ESA confirming that a plan or Standard Design meets the safety standards set out in section 4 of the Regulation and provided to the distributor;
- 1.3.8 “certification organization”** means an organization accredited by the Standards Council of Canada;
- 1.3.9 “Certified Test Report”** means a report that contains sufficient information to allow the distributor’s competent person to approve the electrical equipment. The report shall provide sufficient information to ensure the equipment meets or exceeds the applicable industry standard or distributor developed equipment specification. A Certified Test Report must be signed by a P.Eng or an Engineer where the licensure’s obligation to public safety of the home jurisdiction are substantially equivalent to those required by Ontario.
- 1.3.10 “competent person”** means a person who,
- (a) is qualified because of knowledge, training and experience,
    - (i) to perform specific work, or
    - (ii) to organize work and its performance,
  - (b) has knowledge of any potential or actual danger to health or safety in the workplace in relation to the work, and
  - (c) is familiar with section 113 of the Act and the regulations made under it, and with the *Occupational Health and Safety Act* and the regulations made under that Act, that apply to the work. O. Reg.22/04;
- 1.3.11 “construction verification”** means the inspection, approval and documentation of any new construction or repairs to *distribution systems* including replacements of part or portion of a distribution system, *like-for-like replacements*, and *legacy construction* replacement with respect to the safety standards set out in Section 4 of the Regulation;
- 1.3.12 “contractor”** means any person who performs work on electrical equipment or an electrical installation. O. Reg.22/04;
- 1.3.13 “disconnecting means”** means a device, group of devices or other means whereby the conductors of a circuit can be disconnected from their source of supply. O. Reg.22/04;

- 1.3.14 “distribution line” or “line”** means an electricity distribution line, transformers, plant or equipment used for conveying electricity at voltages of 50,000 volts or less (Reg.22/04);
- 1.3.15 “distribution station”** means an enclosed assemblage of equipment, including but not limited to switches, circuit breakers, buses and transformers, through which electrical energy is passed for the purpose of transforming one primary voltage to another primary voltage. O. Reg.22/04;
- 1.3.16 “distribution system”** means a system for distributing electricity, and includes any structures equipment or other things used by a *distributor* for that purpose;
- 1.3.17 “distributor”** means a person who owns or operates a *distribution system* in the service territory defined in the electricity distribution license issued by the Ontario Energy Board (OEB);
- 1.3.18 “effectively grounded”** means permanently connected to earth through a ground connection of sufficiently low impedance and having sufficient current-carrying capacity to prevent the building up of voltages that may result in undue hazard to persons. O. Reg.22/04;
- 1.3.19 "electrical installation"** means the installation, repair, replacement, alteration or extension of any wiring or electrical equipment that forms part of a distribution system (Reg.22/04);
- 1.3.20 “ESC”** means the Electrical Safety Code referred to in Ontario Regulation 164/99;
- 1.3.21 "equipment" or “electrical equipment”** means any apparatus, device or material used for the distribution of electricity, including materials that are non-electric in origin (*refer to the Regulation for the complete definition of “electrical equipment”*)(Reg.22/04);
- 1.3.22 “field evaluation agency”** means an organization accredited by the Standards Council of Canada and recognized by the Electrical Safety Authority (ESA) as being qualified to carry out a safety evaluation of electrical equipment that is limited in scope to essential safety considerations;
- 1.3.23 “Good Utility Practice”** means any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry in North America during the relevant time period, or any of the practices, methods and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good practices, reliability, safety and expedition. Good utility practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather to be acceptable practices, methods, or acts generally accepted in North America (DSC);
- 1.3.24 “hazard”** means a potential for injury to a person or property;

- 1.3.25 “**legacy construction**” means existing construction built in accordance with *Good Utility Practice*, that does not meet current Standard Designs;
- 1.3.26 “**like-for-like replacement**” means the replacement of one piece of electrical equipment (one assembly) under all conditions, or a part or portion of a line under emergency conditions, on an existing distribution system that maintains as a minimum the characteristics and functionalities of the original installation;
- 1.3.27 “**line upgrade**” means the replacement or significant improvement of an existing *distribution line*;
- 1.3.28 “**live**” means electrically connected to a source of voltage difference or electrically charged so as to have a voltage different from that of the earth O. Reg.22/04;
- 1.3.29 “**no undue hazard**” for the purpose of approving equipment for use in the distribution system where indicated in this Guideline means that:
- energized parts of the equipment are **insulated or barriered**,
  - the equipment has sufficient **mechanical strength** to withstand the loads imposed on it by the intended application in the distribution system,
  - the equipment has **grounding provision** so that it can be *effectively grounded* where required,
  - the equipment design and construction has no unprotected **sharp edges**, or dangerous **moving parts**,
  - the equipment electrical characteristics and protection minimize the possibility of **excessive temperature, fire or explosion** under expected operation conditions;
- 1.3.30 “**no undue hazard**” for the purpose of construction verification of an *electrical installation* where indicated in this Guideline means that:
- metal parts that are not intended to be energized and that are accessible to unauthorized persons are adequately grounded,
  - *live* parts are adequately insulated or *barriered*,
  - the installation meets the minimum CSA clearances from buildings, signs and ground or barriers are installed to protect,
  - the structure has adequate strength where adequate means in accordance with *Good Utility Practice*;
- 1.3.31 “**ownership demarcation point**” means the point,
- (a) at which the distributor’s ownership of a distribution system, including connection assets, ends at the customer, and
  - (b) that is not located beyond,

- i. the first set of terminals located on or in any building, or
  - ii. an electrical room or *vault* in a building where the electrical room or *vault* is of tamperproof construction, bears a sign to indicate that it is an electrical room or *vault* and is accessible only to *authorized persons* (Reg.22/04);
- 1.3.32 “plan”** means the drawings and instructions that are prepared for the construction of new or modified *distribution system* that have been reviewed and approved by a *professional engineer* or ESA;
- 1.3.33 “primary distribution line”** means a distribution line conveying electricity at more than 750 volts but not more than 50,000 volts phase to phase; O. Reg.22/04
- 1.3.34 “professional engineer”** means a person who holds a license or temporary license under the Professional Engineers Act (Reg. 22/04);
- 1.3.35 “putting a system into use”** means making an *electrical installation* forming part of the electrical *distribution system* available for service;
- 1.3.36 “qualified person”** means a person identified in a *construction verification* program developed by the distributor and approved by ESA for the purpose of inspection and approval of construction;
- 1.3.37 “record of inspection”** means a record prepared by a *professional engineer*, ESA, or a *qualified person* identified in the distributor’s *construction verification* program, detailing the inspection of a constructed or repaired portion of an electrical distribution system with respect to the safety standards set out in section 4 of the Regulation;
- 1.3.38 “Regulation”** means the Ontario Regulation 22/04 – Electrical Distribution Safety;
- 1.3.39 “safety standards”** means the safety standards set out in section 4 of the Regulation;
- 1.3.40 “secondary distribution line”** means an electricity distribution line conveying electricity at 750 volts or less phase to phase. O. Reg.22/04;
- 1.3.41 “Standard Designs”** means the standards such as standard design drawings, standard design specifications, technical specifications, and construction standards that have been reviewed and approved by a *professional engineer* or ESA for use by a *distributor* and that the *distributor* uses on an ongoing basis for the construction, operation, and maintenance of its distribution system;
- 1.3.42 “Utility Advisory Council (UAC)”** means an advisory body formed to provide advice to ESA specific to the Electrical Distribution Safety Regulation governing the distribution of electricity in Ontario;

- 1.3.43 “vault”** means an isolated enclosure, either above or below ground, with fire-resistant walls, ceilings and floors in which transformers and other *electrical equipment* are housed. O. Reg. 22/04, s. 1.
- 1.3.44 “work instruction”** means the assembly of *Standard Designs* into drawings and instructions prepared by a *competent person* in accordance with the distributor’s job planning process used for the installation of new or modified *electrical equipment* that forms part of a *distribution system*.

## 2.0 Approval of Electrical Equipment

The purpose of this section of the Guideline is to clarify and interpret the requirements outlined in section **6.0 of Regulation 22/04** “Electrical Distribution Safety”. Section 6.0, “Approval of electrical equipment” contains the requirements *distributors* are to **follow for approving equipment for use on new construction and on repairs to existing *distribution systems*.**

### 2.1 General

#### 2.1.1 What is required under Section 6 of Regulation 22/04?

Section 6 of *Regulation 22/04* requires that *equipment* to be used for the construction of new or the repair and extension of existing *distribution systems* after February 11, 2005 be *approved equipment*. This new requirement may constitute a major change for the *distributors* depending on their existing *equipment* approval program.

#### 2.1.2 Is it the expectation that all *equipment* must be formally approved.

Recognizing the diverse nature of the electrical *equipment* utilized and the impact various components can have on the overall safety of the *distribution system*, ESA expects, as a minimum, all major *equipment*, listed below, to be formally approved:

- Transformers
- Conductors
- Load break switches, including single and three phase units (air, SF6, oil, vacuum insulated, solid dielectric, etc)
- Reclosing switches
- Switchgears
- Insulators
- Protective devices and lightning arrestors
- Poles
- Station breakers

ESA in consultation with the *Utility Advisory Council* (UAC) may establish timelines for other *equipment* to be formally approved. In the meantime, *distributors* must approve, as a minimum, *distribution equipment*, other than those listed above, in accordance with *Good Utility Practice* as outlined in this Guideline. *Distributors* are encouraged to follow major *equipment* approval processes, especially for mechanical load bearing *equipment* (eg. bolts) whenever possible.

*Equipment* approval under *Good Utility Practice* is to include supporting documentation by a *competent person* that the *equipment* is

suitable for a specific application in the *distributor's distribution systems* and the *equipment* presents *no undue hazard* to persons or property.

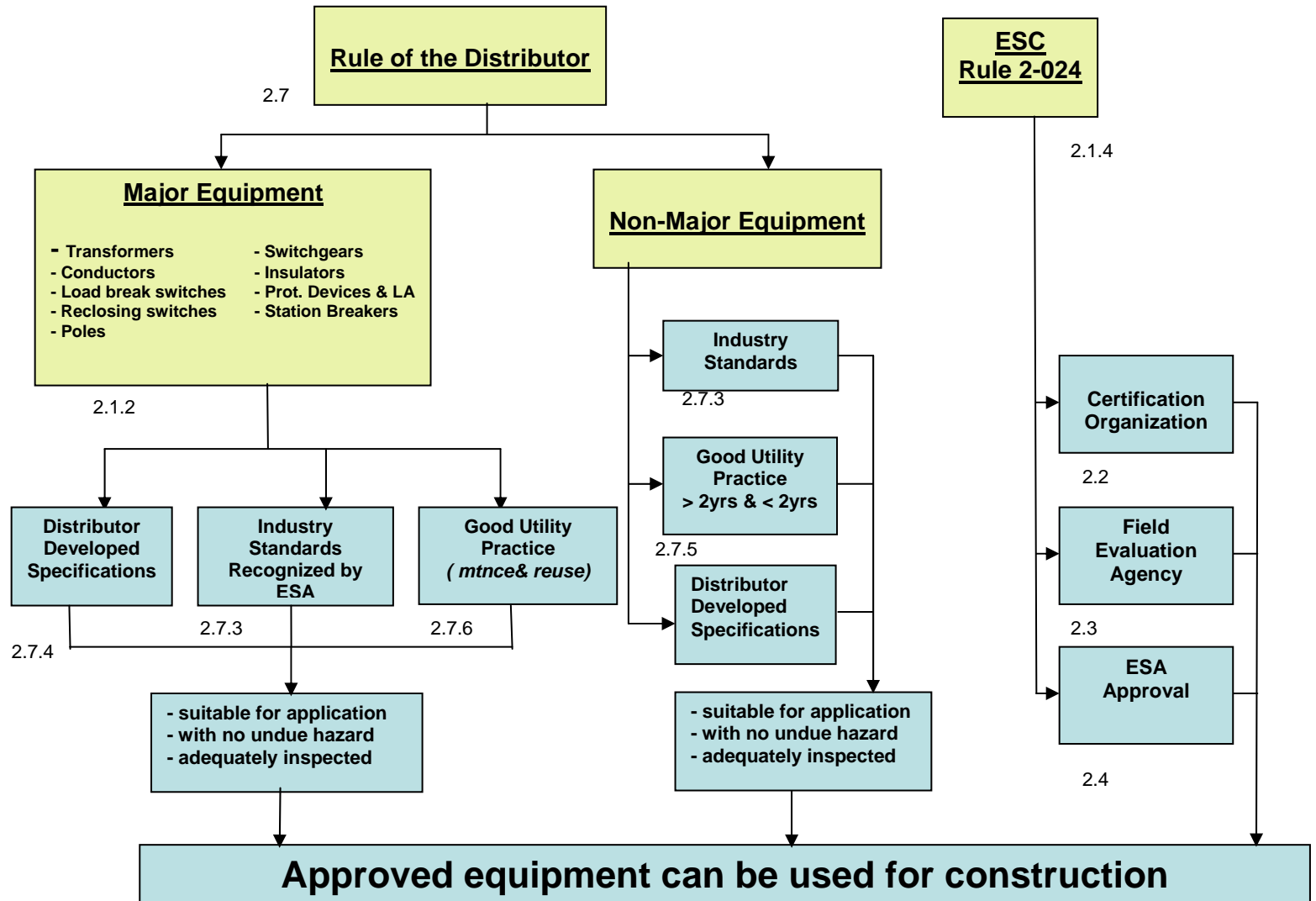
### **2.1.3 What are the choices available to *distributors* for *equipment* approval?**

Two avenues are available to *distributors* for the approval of *equipment* for use on *distribution systems*:

1. The *equipment* design and construction meets the conditions of Rule 2-024 of the *ESC* (*Regulation* Section 6(1)(a), see Appendix A for rule 2-024); or
2. The *equipment* has been purchased, tested and inspected under the Rule of the Distributor in accordance with standards, specification, or *Good Utility Practice* and procedures of the *distributor* and an assurance of safety of the *equipment* equivalent to rule 2-024 of the Electrical Safety Code is provided. (*Regulation* Section 6(1)(b), see Appendix A for rule 2-024).

The various options for approving *equipment* are illustrated below and are discussed in more details in this Guideline. It is expected that most *distributors* will follow the Rule of the Distributor. **The *distributor* may choose any combination of the following options for approving *equipment*.**

### 2.1.3 Equipment Approval



### **2.1.4 What are the three options offered by Rule 2-024 of the ESC?**

Rule 2-024 of the Electric Safety Code provides the following three options for approving *equipment* for use on *distribution systems*:

1. The *equipment* is certified by a *certification organization*; or
2. The *equipment* is field evaluated and approved by an accredited *field evaluation agency*; or
3. The *equipment* is field evaluated and approved by ESA.

## **2.2 Certification of Equipment**

### **What conditions must be met for *equipment* to be certified?**

Rule 2-024 (1) contains four conditions for *equipment* to be certified:

1. A *certification organization* has issued a report certifying that the *equipment* conforms to applicable standards;
2. The report is available to ESA from the *certification organization*;
3. The *equipment* purchased complies with all standards of design and construction and all terms and conditions set out in the report; and
4. The *equipment* bears the *certification organization's* mark for use in Canada.

### **2.2.1 To what standards does *equipment* need to be certified to?**

To certify *equipment* for use in Ontario, a recognized Canadian standard for the *equipment* must be utilized for the certification process. Appendix B lists the CSA standards for *electrical equipment*. As part of this option Standards prepared by other agencies and organizations for *electrical equipment* and adopted as Canadian standards can also be utilized for certification.

### **2.2.2 What organizations are recognized in Ontario for certifying *equipment*?**

*Electrical equipment* can only be approved by agencies that have been accredited by the Standards Council of Canada to approve and certify *electrical equipment*. A list of recognized *certification organizations* can be found on the ESA website and in ESA Bulletin 2-7-16 (Appendix C).

### **2.2.3 How does a *distributor* know that *equipment* is certified?**

Once the *certification organization* has tested and certified that the *equipment* meets the conditions of the appropriate Canadian standard, the *certification organization* prepares a report detailing compliance with the conditions of the standard and attaches a mark or label to the *equipment* indicating Canadian approval. ESA Bulletin 2-7-16 provides details of the appropriate certification marks (Appendix C)

## **2.3 Field Evaluation of Equipment**

### **What are the conditions associated with the use of field-evaluated *equipment*?**

Rule 2-024(2) allows a *field evaluation agency* to examine and approve *equipment*. Field evaluation of *equipment* is limited in scope to the essential safety considerations.

Under this sub-rule *equipment* is approved if:

- An accredited *field evaluation agency* has examined the *equipment* or a sample and found that it conforms to applicable standards and it presents *no undue hazard* to persons or property;
- A label is affixed to the *equipment* marking its approval for use in either Ontario or Canada; and
- Where the *field evaluation agency* has examined a sample, the *equipment* is of the same design and construction as that of the sample.

### **2.3.1 What organizations are recognized in Ontario for performing field evaluation and approval?**

Only agencies that have been accredited by the Standards Council of Canada to approve electrical *equipment* in the field and are recognized by ESA can be utilized. A list of recognized *field evaluation agencies* can be found on the ESA web site and is included in ESA Bulletin 2-7-16 (Appendix C).

### **2.3.2 Where does a field evaluation take place?**

Field evaluation is a term applied to the evaluation of the *equipment* outside of a certification program. Field evaluation can occur at the manufacturer's facilities, *distributor's* facilities or at the point of installation.

### **2.3.3 What standards are applied to complete field evaluations?**

Section 3 of ESC specifies that the *field evaluation agency* shall follow the conditions as outlined in Special Publication SPE 1000-99 prepared by the Canadian Standards Association and entitled "Model Code For the Field Evaluation of Electrical *Equipment*".

The Model Code requires that the field evaluation takes into account the safety requirements of any applicable standards that apply to the *electrical equipment* and that the *equipment* in the intended application, present *no undue hazard* to persons or property.

### **2.3.4 How does a *distributor* know that a piece of *equipment* has been field approved?**

A label indicating approval is attached to the *equipment* after the *field evaluation agency* has determined that the *equipment* meets the safety requirements for the *electrical equipment*. ESA Bulletin 2-7-16 provides details of the appropriate field evaluation marks (Appendix C).

## **2.4 ESA Approval of Equipment**

**What are the conditions associated with use of ESA for approval?**

Rule 2-024(3) allows for approval of the *equipment* by ESA.

Under this sub-rule *equipment* is approved if:

- ESA has examined it or a sample and found that it conforms to the Code and presents *no undue hazard* to persons or property;
- The *equipment* bears a label affixed by ESA;
- Any fees payable in respect to the examination has been paid;
- Where ESA has only examined a sample, the *equipment* is the same design and construction as the sample.

The examination of electrical *equipment* by ESA under sub-rule (3) is equivalent to approval by a *field evaluation agency*. The details included in the previous section for *field evaluation agencies* apply to approval by ESA.

**2.5 Qualifying Tests**

**When qualifying tests are required, what are the options for providing appropriate testing information?**

Where qualifying tests are required for *equipment* approval, the *field evaluation agency* or ESA may accept reports or other evidence of testing from:

- a certification organization;
- a testing organization;
- a *professional engineer*; or
- other responsible *competent person*.

At the time of performing the field evaluation the *field evaluation agency* will request the required test documentation. It will be the *distributor's* responsibility to provide the information requested. In many instances, the manufacturer will be able to provide the data without further testing being required.

**2.6 Sub-rule 2-024(5)**

**When does sub-rule 2-024(5) of the ESC apply to distribution *equipment*?**

In general this sub-rule does not apply to distribution *equipment*.

The intent of this rule is to provide ESA inspectors, inspecting installations under an “inspection permit”, with some latitude for *equipment* that may not be certified or field tested but that forms part of the installation. This rule allows inspectors the latitude to accept the *equipment* if they are able to determine that the device present *no undue hazard* to persons or property.

**2.7 Rule of the Distributor**

**2.7.1 What safety requirements are to be met for electrical *equipment* approved under a rule of the *distributor*?**

Section 6(1)(b) of *Regulation 22/04* allows for the *distributor* to utilize *equipment* on the *distribution system* that has been approved as part of a rule of the *distributor*. The rule is to provide assurance of the safety of the *equipment* equivalent to the requirements under rule 2-024 of the ESC.

Assurance equivalent to the requirements under rule 2-024 is achieved if the design and construction of the *equipment* meets the requirements of applicable standards and presents *no undue hazard* to persons or property.

### **2.7.2 Under the rule of the *distributor*, how can the *distributor* provide assurance of *equipment* safety equivalent to rule 2-024?**

The manner in which the *distributor* provides assurance of the *equipment* safety equivalent to rule 2-024 can vary depending on the *equipment* under consideration. The documentation associated with *equipment* approvals and internal processes along with the annual audit will help to demonstrate equivalency of the *equipment* approval process.

Assurance of safety equivalent to rule 2-024 can be achieved by using *equipment* that complies with one of the following:

- A review by a distributor's *competent person* of a *Certified Test Report* ensuring applicable industry standards are met or exceeded which are recognized by ESA, including an assurance that the *equipment* presents *no undue hazard* to persons or property; or
- A review by a distributor's *competent person* of a *Certified Test Report* ensuring *distributor* developed *equipment* specifications approved by a *professional engineer* for major equipment or a *competent person* for non-major equipment are met or exceeded for a specific use on the *distribution system* including an assurance that the *equipment* presents *no undue hazard* to persons or property; or
- A validation by a distributor's *competent person* of a good working history (minimum of 2 years worth of experience) of the *equipment* (other than **new** major *equipment*) under *Good Utility Practice* where *equipment* is for specific use on the *distribution system* including an assurance that the *equipment* presents *no undue hazard* to persons or property; or
- *professional engineer* provides an assurance that the *equipment* presents *no undue hazard* to persons or property.

### **2.7.3 Industry Standards - How are industry standards used under the Rule of the *Distributor*?**

Industry standards include *equipment* standards that are generally recognized as being appropriate for distribution *equipment*. *Equipment* standards recognized by ESA include those prepared by industry groups such as CSA, ASTM, NEMA, IEEE, ANSI, IEC, AEIC, CEA and others.

Where applicable industry standards exist, the *distributor* may use *equipment* that has been manufactured and tested in accordance to the applicable industry standards. Where

required, the *distributor* is to obtain the applicable *Certified Test Report* from the manufacturer and make them available to ESA upon request.

A list of most commonly used *equipment* standards is shown in Appendix D of this Guideline.

#### **2.7.4 Distributor Developed Specifications - What is required for *distributor-developed specifications* under the rule of the *distributor*?**

Where suitable industry standards do not exist, or where the *distributor* chooses to introduce variations to industry standards, the *distributor* may develop its own *equipment* specifications. Specifications developed by the *distributor* are to include the appropriate electrical and physical parameters and qualifying tests that the manufacturer must use to design and test the *equipment* for use on the *distribution system*.

When developing *equipment* specifications, the *distributor* should research available industry standards and consult with the *equipment* manufacturers to confirm the standards that are to be used to manufacture and test the *equipment*. This consultation may assist the *distributor* in finalizing the details and approval of the specifications.

Major *equipment* specifications developed by a *distributor* must be reviewed and approved by a *professional engineer*. *Equipment* specifications developed by the *distributor* for *equipment*, other than major *equipment* as listed in section 2.1.2 of this Guideline, may be developed and approved by a *competent person*.

When *equipment* is manufactured based on specifications developed by the *distributor*, the *distributor* is to obtain the applicable *Certified Test Report* from the manufacturer and make them available to ESA upon request.

#### **2.7.5 Good Utility Practice for Non-Major Equipment - How and when can *Good Utility Practice* be used to approve *equipment* under the rule of the *distributor*?**

For *equipment* other than the major *equipment* listed in Section 2.1.2 of this Guideline, the *distributor* may approve *equipment* under the *Good Utility Practice*. Examples of such *equipment* could be:

- parts to be used for repairs of existing *equipment*; or
- replacement of existing *equipment*.

Under *Good Utility Practice*, the *distributor* may approve non-major *equipment* with supporting documentation that it has been in use for at least two years in specific applications in existing, comparable distribution systems with good safety performance.

Other non-major *equipment* may be approved for use on a trial basis for less than 2 years when a *competent person* has provided a supporting documentation that the *equipment* is suitable for a specific application in the *distributor's distribution systems* and that the

*equipment* presents *no undue hazard* to persons or property. After two successful years, such new *equipment* may be approved under *Good Utility Practice*.

**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 major *equipment* the *distributor* may approve used or pre-regulation *equipment* under *Good Utility Practice*. Examples of such *equipment* could be:

- parts to be used for repairs of existing *equipment*; or
- replacement of existing *equipment*; or
- new installations

To ensure the safe performance of used equipment for maintenance or reuse the LDC shall implement a process for used equipment .

- For equipment to be returned to inventory the process shall include the inspection of used equipment. The inspection will be completed and documented by the *competent person* to confirm that there is *no undue hazard*.
- 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).

**2.7.7 How can a *distributor* integrate approved equipment with its Standard Designs?**

In most instances, the *equipment* used for construction of a *distribution system* is part of a list of standard stock items (or bill of material) that the *distributor* may have specified in its *Standard Designs*. To ensure that only *approved equipment* is used in construction, the *distributor* is encouraged to develop and maintain standard bills of material solely comprised of *approved equipment*, listing as a minimum the mechanical and electrical characteristics of *equipment* to be used for each *Standard Design*.

As a way of providing assurance that the *equipment* presents *no undue hazard* to persons or property, in approving *Standard Designs* the *distributor's professional engineer* or ESA may also certify that *equipment*, specified in the associated bills of materials, if formed solely of approved material, are approved for specific applications noted in the *Standard Designs* and present *no undue hazard* to persons or property.

**2.7.8 What elements could be included in a *distributor's equipment approval system*?**

The *distributor* could include the following elements in its *equipment* approval system:

- **outline of the *equipment* approval process** used by the *distributor* for the approval of *equipment*;
- **listing of all *equipment*** approved for use on the *distribution system*, including relevant parameters, industry standards or *distributor's* specifications (this could be a hard copy or part of a computerized system);
- **copy of major *equipment* specifications** developed or utilized by the *distributor* and used to manufacture *equipment* including testing requirements;
- **approval** documentation that states the method of approval (including but not limited to *Certified Test Reports*, Good Utility Practice, *certification organization*, etc...) and that the *equipment* is suitable for use on the *distribution system* and present *no undue hazard* to persons or property; and
- **inspection procedures** that are adequate for the purpose based on the quality assurance appropriate for the *distributor*; this quality assurance could range from a fully integrated quality assurance program or simple checklists for *equipment* received.

## 2.8 Documentation

### How long do records of *equipment* approval need to be kept?

The retention of *equipment* approval documentation is required while the *equipment* remains approved for use in new construction or for repairs to existing systems. Sufficient information is required to confirm that the *equipment* is approved and meets the safety requirements. Sample approval sheets are included in Appendix E.

## 2.9 Appendices for Equipment Approval

<b>Appendix A</b>	<b>Electrical Safety Code Rule 2-024</b>
<b>Appendix B</b>	<b>CSA Standards Related to Electricity Distribution</b>
<b>Appendix C</b>	<b>ESA Bulletin 2-7-16</b>
<b>Appendix D</b>	<b>Examples of common Industry Standards</b>
<b>Appendix E</b>	<b>Sample Equipment Approval Sheet</b>
<b>Appendix F</b>	<b>Equipment Approval Check List</b>

**Appendix A**  
**Electrical Safety Code Rule 2-024**

**2-024 Approval of Electrical Equipment**

(1) Subject to the other provisions of this Rule, electrical equipment is deemed to be approved if:

(a) A certification organization has issued a report certifying that the equipment conforms to the applicable standards for the equipment;

(b) The report referred to in clause (a) is available to the Inspection Department from the certification organization;

(c) The equipment complies with all standards of design and construction and all terms and conditions set out in the report; and

(d) The equipment bears the certification organization's mark, which identifies equipment, certified for use in Canada.

(2) As an alternative to Subrule (1) electrical equipment is deemed to be approved if:

(a) A field evaluation agency has examined the equipment or a sample and has found that it conforms to the applicable standards for the equipment and presents no undue hazard to persons or property;

(b) The equipment is within the scope of Section 3 of the Code, and within the field evaluation agency's accreditation under the *Standards Council of Canada Act* and recognized by the Inspection Department;

(c) The equipment bears a label approved for use in either Ontario or Canada affixed by the field evaluation agency, and

(d) Where the field evaluation agency has examined only a sample, the equipment is of the same design and construction as the sample.

(3) As an alternative to Subrule (1) electrical equipment is deemed to be approved if:

(a) The inspection department has examined the equipment or a sample, found that it conforms to this Code and presents no undue hazard to persons or property;

(b) The equipment bears a label affixed by the inspection department;

(c) Any fees payable to the inspection department in respect of the examination have been paid; and

(d) Where the examination and testing was of only a sample, the equipment is of the same design and construction as the sample.

(4) Where testing is required for the purposes of subrule (3), the inspection department may accept reports or other evidence of testing from a certification organization, a testing organization, a professional engineer, or other responsible qualified person.

(5) Electrical equipment that is used in or connected to an electrical installation may be inspected under Rule 2-004, and it shall be deemed to be approved if:

(a) the installation and equipment pass the inspection; and

(b) persons or property would be adequately protected from any undue electrical shock or fire hazard as a result of the inspection.

(6) No person shall affix to any electrical equipment an approval label that was not issued for that equipment.

### SECTION 3 - FIELD EVALUATION OF ELECTRICAL EQUIPMENT

**3-000 Scope.** This Section applies to the approvals of electrical equipment in accordance with Subrules (2) and (3) of Rule 2-024 and is supplementary to or amendatory of other requirements of this Code.

**3-002 Standards.** Sections 1 through 6 of Special Publication SPE 1000-99 prepared by the Canadian Standards Association and entitled "Model Code For the Field Evaluation of Electrical Equipment", is adopted as part of this regulation with the following amendments:

Delete clauses 4.27, 4.28.1, 4.29, and 4.30.

**Replace clause 1.7 (e) with:** Components that will require further evaluation as part of a complete assembly, such as switches, relays, and timers.

**Add clause 4.1.2.8:** Switches and controls shall comply with the requirements of CSA Standards CAN/CSA-C22.2 No. 14 and C22.2 No. 24, 55, 111, and 156, as applicable.

**Add clause 4.1.3.3:** Transformers shall comply with the requirements of CSA Standard C22.2 No. 66 and CAN/CSA-C22.2 No. 47, as applicable.

**Add clause 4.1.4.8:** Motors shall be of types suitable for the particular application of the equipment and shall comply with the applicable requirements of CSA Standard C22.2 No. 100.

**Add clause 4.1.6.3:** Receptacles for attachment plugs shall comply with the requirements of CSA Standard CAN/CSA-C22.2 No. 42 and the Canadian Electrical Code, Part I, as applicable.

**Replace clause 4.23.3 with:** Electrolytic or other special types of capacitors, and capacitors intended for connecting directly across the line, shall comply with the requirements for capacitors as specified in CSA Standard C22.2 No. 8.

**Appendix B**  
**CSA Standards Related to Electricity Distribution**

**Conductors**

CAN/CSA- C22.2 No. 38-05, Thermoset-Insulated Wires and Cables (Tri-National standard, with UL 44 and ANCE NMX-J-451)

C22.2 No. 52-96, Underground Service-Entrance Cables

CAN/CSA-C22.2 No. 75-08, Thermoplastic-Insulated Wires and Cables (Tri-National standard, with UL 83 and NMX-J-010-ANCE-2008)

C22.2 No. 123--08 Metal Sheathed Cables

C22.2 No. 124-04, Mineral-Insulated Cable

C22.2 No. 129-05 Neutral Supported Cable

CAN/CSA-C22.2 No. 131-07 Type TECK 90 Cable

CAN/CSA-C68.1-92, Specifications for Impregnated Paper-Insulated Metallic-Sheathed Cable, Solid Type (Adoption of AEIC Specification CS1-90)

CAN/CSA-C68.5-07, Primary Shielded and Concentric Neutral Cable for Distribution Utilities

C68.10-08, Shielded Power Cable for Commercial and Industrial Applications, 5-46 kV

**Bare Conductor**

C49.2-1975, Compact Aluminum Conductors Steel Reinforced (ACSR)

C49.3-1977, Aluminum Alloy 1350 Round Wire, All Tempers, for Electrical Purposes

C49.5-1978, Compact Round Concentric-Lay Aluminum Stranded Conductors (Compact ASC)

CAN/CSA-C60104-03, Aluminum-Magnesium-Silicon Alloy Wire for Overhead Line Conductors

CAN/CSA-C60888-03, Zinc-Coated Steel Wires for Stranded Conductors

CAN/CSA-C600889-03, Hard-Drawn Aluminum Wire for Overhead Line Conductors

CAN/CSA-C61089-03, Round Wire Concentric Lay, Overhead Electrical Stranded Conductors

CAN/CSA-C61232-03, Aluminum-Clad Steel Wires for Electrical Purposes

**Terminations & Splices**

CAN/CSA-C22.2 No. 198.2-05 Sealed Wire Connector Systems (Tri-National standard, with UL 486D and NMX-J-519-ANCE-05)

**Switches**

C22.2 No. 58-M1989 High-Voltage Isolating Switches

C22.2 No. 193-M1983 High Voltage Full-Load Interrupter Switches

**Switchgear**

C22.2 No. 31-04 Switchgear Assemblies

**Enclosures**

CAN/CSA-C50052-99 Cast Aluminum Alloy Enclosures for Gas-Filled High-Voltage Switchgear and Controlgear

CAN/CSA-C50064-99 Wrought Aluminum and Aluminum Alloy Enclosures for Gas-Filled High-Voltage Switchgear and Controlgear

CAN/CSA-C50068-99 Wrought Steel Enclosures for Gas-Filled High-Voltage Switchgear and Controlgear

CAN/CSA-C50069-99 Welded Composite Enclosures of Cast and Wrought Aluminum Alloys for Gas-Filled High-Voltage Switchgear and Controlgear

CAN/CSA-C50089-99 Cast Resin Partitions for Metal-Enclosed Gas-Filled High-Voltage Switchgear and Controlgear

**Insulators**

CAN/CSA-C156.1-M86, Ceramic and Glass Station Post Insulators

CAN/CSA-C156.3-M86, Test Methods for Station Post Insulators

CAN/CSA-C411.1-M89, AC Suspension Insulators

CAN/CSA-C411.4-98, Composite Suspension Insulators for Transmission Applications

CAN/CSA-C1325-99, Insulators for Overhead Lines with Nominal Voltage Above 1000V - Ceramic or Glass Insulator Units for D.C. Systems - Definitions, Test Methods Acceptance Criteria

CAN/CSA-C62155-06, Hollow Pressurized and Unpressurized Ceramic and Glass Insulators for Use in Electrical Equipment

**Connectors**

C57-98, Electric Power Connectors for Use in Overhead Line Conductors

**Lightning Arrestors**

CAN/CSA-C233.1-87, Gapless Metal Oxide Surge Arresters for Alternating Current Systems

**Transformers****Distribution**

CAN/CSA-C2.1-06, Single-Phase and Three-Phase Liquid-Filled Distribution Transformers

CAN/CSA-C2.2, Pole-Mounted, Single-Phase Distribution Transformers for Electric Utilities

C199-08, Three-Phase Network Distribution Transformers

CAN/CSA-C227.3-06, Low-Profile, Single-Phase, Pad-Mounted Distribution Transformers with Separable Insulated High-Voltage Connectors

CAN/CSA-C227.4-06, Three-Phase, Pad-Mounted Distribution Transformers with Separable Insulated High-Voltage Connectors

C301.1-06, Single-Phase Submersible Distribution Transformers

C301.2-06, Three-Phase Submersible Distribution Transformers

**Power**

CAN/CSA-C88-M90, Power Transformers and Reactors

CAN/CSA-C88.1-96, Power Transformer and Reactor Bushings

**Dry-Type**

CAN/CSA-C22.2 No. 47-M90 Air-Cooled Transformers (Dry-Type)

C9-02, Dry-Type Transformers

**Instrument**

CAN3-C13-M83, Instrument Transformers

CAN3-C13.1-M79, Capacitor Voltage Transformers

CAN/CSA-C60044-1-07, Instrument Transformers - Part 1: Current Transformers

CAN/CSA-C60044-2-07, Instrument Transformers - Part 2: Inductive Voltage Transformers

CAN/CSA-C60044-3-07, Instrument Transformers - Part 3: Combined Transformers

CAN/CSA-C60044-5-07, Instrument Transformers - Part 5: Capacitor Voltage Transformers

CAN/CSA-C60044-6-07, Instrument Transformers - Part 6: Requirements for Protective Current Transformers for Transient Performance

CAN/CSA-C60044-7-07, Instrument Transformers - Part 7: Electronic Voltage Transformers

CAN/CSA-C60044-8-07, Instrument Transformers - Part 8: Electronic Current Transformers

**Capacitors**

C22.2 No. 190-M1985, Capacitors for Power Factor Correction

CAN/CSA-C60871-1-03, Shunt Capacitors for A.C. Power Systems having a Rated Voltage above 1000 v - Part 1: General – Performance, Testing and Rating – Safety Requirements – Guide for Installation and Operation

CAN/CSA-C60871-2-03, Shunt Capacitors for A.C. Power Systems having a Rated Voltage above 1000 v -Part 2: Endurance Testing

**MISC.**

C22.2 No. 41-M1987 Grounding and Bonding Equipment

C22.2 No. 201-M1984 Metal-Enclosed High Voltage Busways

C22.2 No. 249-96 Standard Tests for Determining Compatibility of Cable -Pulling Lubricants with Wire and Cable

CAN/CSA-C50-97, Insulating Oil, Electrical for Transformers and Switches

C83-96, Communication and Power Line Hardware

CAN/CSA-C71-1-99, Insulation Coordination - Part 1: Definitions, Principles and Rules

CAN/CSA-C71-2-98, Insulation Coordination Part 2-Application Guide

CAN/CSA-O15-05, Utility Wood Poles & Reinforcing Stubs

CAN/CSA-A14-07 Concrete Poles

## Appendix C ESA Bulletin 2-7-20

### Approval of Electrical Equipment

#### *Rule 2-024*





















The Ontario Electrical Safety Code recognizes certification organizations accredited by the Standards Council of Canada to approve electrical equipment. Only equipment bearing one of the marks or labels shown in the drawings is approved.

Equipment to meet the requirements of the Ontario Electrical Safety Code must be approved to Canadian standards. This is signified by the "C" outside the Entela, ETL, MET, OMNI, QAI, TUV America, TUV Rheinland and UL marks. The "NRTL/C" shown with one Canadian Standards Association mark, and the "cULus" shown with one Underwriters Laboratories mark, indicate the equipment with those marks is also compliant with United States standards.

A Canadian Standards Association mark with "NRTL" only, and Underwriters Laboratories mark without the "c" at the eight o'clock position, indicates the equipment is compliant with United States standards.






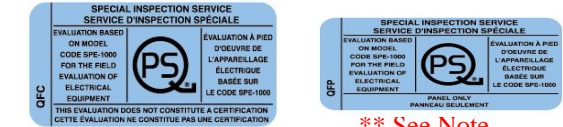

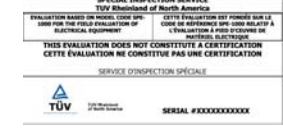
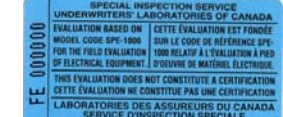
**CERTIFICATION MARKS ACCEPTABLE UNDER  
THE ELECTRICAL SAFETY CODE**

ESA Bulletin 2-7-20

<p>Canadian Standards Association (CSA)</p>	   			
<p><u>Entela</u></p>				
<p>Intertek Testing Services</p>				
<p>Met Laboratories Inc. (MET)</p>				
<p>OMNI Environmental Services Inc.</p>				
<p>Quality Auditing Institute</p>				
<p><i>QPS</i></p>				
<p><i>TUV America</i></p>				
<p>TUV Rheinland</p>				
<p>Underwriters Laboratories Inc. (UL)</p>				
<p><u>Underwriters'</u> Laboratories of Canada (ULC)</p>				

**FIELD EVALUATION MARKS ACCEPTABLE UNDER THE ELECTRICAL SAFETY CODE**

ESA Bulletin 2-7-20

<p>CANADIAN STANDARDS ASSOCIATION (CSA)</p>	
<p>ELECTRICAL SAFETY AUTHORITY (ESA)</p>	 <p style="text-align: center;">**See Note</p>
<p>ENTECLA</p>	 <p style="text-align: center;">** See Note</p>
<p>INTERTEK TESTING SERVICES</p>	
<p>QUALITY AUDITING INSTITUTE (QAI)</p>	
<p>QPS</p>	 <p style="text-align: center;">** See Note</p>
<p>TUV AMERICA</p>	
<p>TUV RHEINLAND (TUV)</p>	
<p>UNDERWRITERS LABORATORIES OF CANADA (ULC)</p>	

\*\* NOTE - "PANEL ONLY" label identifies that the panel has been evaluated to the SPE-1000. It does not cover equipment that is added or connected to the panel.

**Component Marks Acceptable under the Electrical Safety Code which are specifically used on component parts that are part of a larger product or system**

ESA Bulletin 2-7-20

Canadian Standard Association (CSA)	
Underwriters Laboratories Inc. (UL)	

Note: Electrical components bearing these marks may have restrictions on their performance or may be incomplete in construction, and are intended to be used as part of a larger approved product or system. The Component Recognition marking is found on a wide range of products, including some switches, power supplies, printed wiring boards, some kinds of industrial control equipment and thousands of other products.

**ESA Bulletin 2-7-20**

Certification Organization	Contact Information
CANADIAN STANDARDS ASSOCIATION (CSA)	Phone Number: 416-520-6442 E-mail: <a href="mailto:specialinspection@csa-international.org">specialinspection@csa-international.org</a> or <a href="mailto:jim.robinson@csa-international.org">jim.robinson@csa-international.org</a> Web address: <a href="http://www.csa-international.org">www.csa-international.org</a>
ELECTRICAL SAFETY AUTHORITY (ESA)	Phone Number: 613-271-1489 or 1-800-559-5356 Fax Number: 613-271-6441 or 1-800-559-5358 E-mail: <a href="mailto:field.evaluation@electricalsafety.on.ca">field.evaluation@electricalsafety.on.ca</a> Web address: <a href="http://www.esapa.biz">www.esapa.biz</a>
ENTECLA	Phone Number: 416-241-8427 Fax Number: 416-241-0682 E-mail: <a href="mailto:info@entela.com">info@entela.com</a> Web Address: <a href="http://www.entela.com">www.entela.com</a>
INTERTEK TESTING SERVICES	Phone Number: 905-678-7820 Fax Number: 905-678-7131 E-mail: <a href="mailto:wkole@etlsemko.com">wkole@etlsemko.com</a> Web Address: <a href="http://www.etlsemko.com">www.etlsemko.com</a>
QPS	Phone Number: 416-241-8857 or 1-877-746-4777 Fax Number: 416-241-0682 E-mail: <a href="mailto:info@qps.ca">info@qps.ca</a> Web Address: <a href="http://www.qps.ca">www.qps.ca</a>
QUALITY AUDITING INSTITUTE (QAI)	Phone Number: 416-707-1343 E-mail: <a href="mailto:sharris@qai.org">sharris@qai.org</a> Web Address: <a href="http://www.qai.org">www.qai.org</a>
TUV AMERICA	Phone Number : 303-696-1TUV (888) Fax Number: 303-696-3978 E-Mail: <a href="mailto:rludin@tuvam.com">rludin@tuvam.com</a>  Web Address: <a href="http://www.TUVamerica.com">www.TUVamerica.com</a>
TUV RHEINLAND (TUV)	Phone Number: 416-733-3677 Fax Number: 416-733-7781 E-Mail: <a href="mailto:skraemer@us.tuv.com">skraemer@us.tuv.com</a> Web Address: <a href="http://www.us.tuv.com">www.us.tuv.com</a>
UNDERWRITERS LABORATORIES OF CANADA (ULC)	Phone Number: 1-866-937-3852 Fax Number: 416-757-8727 E-Mail: <a href="mailto:customerservice@ulc.ca">customerservice@ulc.ca</a> Web Address: <a href="http://www.ulc.ca">www.ulc.ca</a>

**Appendix D**  
**Examples of common Industry Standards**

IEEE Std 386-1995, IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V

IEEE Std C62.11-1999, IEEE Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits

ANSI/IEEE Std C57.12.44-2000, IEEE Standard Requirements for Secondary Network Protectors

ANSI/IEEE Std C37.46-2001, American National Standard Specifications for Power Fuses and Fuse Disconnecting

ANSI/IEEE Std C57.12.40-2000 American National Standard for Secondary Network Transformers—Subway and Vault Types (Liquid Immersed)—Requirements

IEEE Std C37.71-2001 IEEE Standard for Three-Phase Manually Operated Subsurface and Vault Load Interrupting Switches for Alternating-Current Systems

IEEE Std C37.60-2003 IEEE Standard Requirements for Overhead, Pad Mounted, Dry Vault, and Submersible Automatic Circuit Reclosers and Fault Interrupters for alternating current systems up to 38 kV

NEMA Standards Publication No. WC 5-1992/ICEA S-61-402 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

NEMA Standards Publication No. WC 7-1988/ICEA S-66-524 Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

NEMA Standards Publication No. WC 8-1988/ICEA S-68-516 Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

ANSI/ICEA Publication No. S-70-547-2000 Standard for Weather-Resistant Polyethylene Covered Conductors

ANSI/ICEA Publication No. S-76-474-2000 Standard for Neutral-Supported Power Cable Assemblies With Weather-Resistant Extruded Insulation Rated 600 Volts

AEIC CS1-90 Specifications for Impregnated Paper-Insulated Metallic-Sheathed Cable, Solid Type

AEIC CS5-94 Specifications for Cross-linked Polyethylene Insulated Shielded Power Cables Rated 5 Through 46 kV

AEIC CS6-87 Specifications for Ethylene Propylene Rubber Insulated Shielded Power Cables Rated 5 Through 69 kV

ASTM B 2 –2000 Standard Specification for Medium-Hard-Drawn Copper Wire

ASTM B 3 –2001 Standard Specification for Soft or Annealed Copper Wire

ASTM B 8 –2004 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

ASTM B 230 –1999 Standard Specification for Aluminum 1350-H19 Wire for Electrical Purposes

ASTM B 231 –2004 Standard Specification for Concentric-Lay-Stranded Aluminum 1350 Conductors

ASTM B 232 –2001 Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Reinforced (ACSR)

ASTM B 400 –2004 Standard Specification for Compact Round Concentric-Lay-Stranded Aluminum 1350 Conductors

ASTM B 496 –2004 Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors

ASTM D 1248 –2004 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

IEEE Std 48-2003 IEEE Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV Through 765 kV

IEEE Std 404-1993 IEEE Standard for Cable Joints for Use With Extruded Dielectric Cable Rated 5000-138 000 V and Cable Joints for Use With Laminated Dielectric Cable Rated 2500-5000 000 V

ANSI C119.4-1991 American National Standard for Electric Connectors – Connectors for Use Between Aluminum-to-Aluminum or Aluminum-to-Copper Bare Overhead Conductors

CEA LWIWG-01 (96) "Dead-end/Suspension Composite Insulator for Overhead Distribution Lines"

CEA LWIWG-02 (96) "Line Post Composite Insulator For Overhead Distribution Lines"


CEA LWIWG-03 (96) "Guy Composite Insulator for Guy Wires" CEA DTWG-01 (99) "Pole Mounted Single Phase Distribution Transformers"

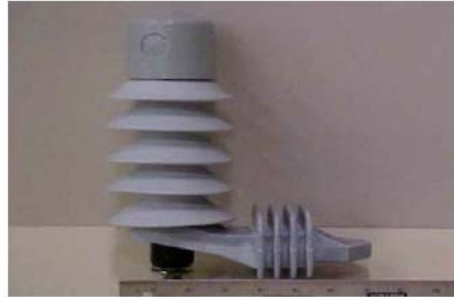
CEA DTWG-01 (99) "Pole Mounted Single Phase Distribution Transformers"

CEA DTWG-02 (99) "Low-Profile, Single Phase, Dead-Front Pad-Mounted Distribution Transformers"

CEA DTWG-03 (99) "Three Phase, Dead-Front Pad-Mounted Distribution Transformers"

**Appendix E  
Sample Equipment Approval Sheet**

	<p align="center"><b>Purchasing Specification Arrester-Dist Class 12KV</b></p>	<p align="center"><b>38A 055 001</b></p>
---	--	--



**KWHydro Inc. Information:**

New Part#	38A055001
Old Part#	38A5502
Category	Arrester
Description	Arrester-Dist Class 12KV
Unit of Measure	ea
Location	
GL Category	IN30
Stocking Type	S

**Supplier Information:**

<u>Vendor Number-Name</u>	<u>Manufacturer/ID#</u>	<u>Part Number</u>
5029 – Bel Volt		UHS12060A1A1A1A
5150 – Grafton		217610-7514

**Technical Information:**

- **Arrester, MOV Type, Heavy-duty Distribution Class, Polymer, 12 kV duty cycle, 10.2 kV MCOV**  
– used on O/H and U/G 13.8 kV distribution system for protection of transformers, pole mounted reclosers and load break switches. The arrester shall have the following properties:
  - Arrester class – heavy duty distribution
  - Non-fragmenting housing
  - Upper terminal hardware – c/w wire clamp, nut and protective cap
  - Mounting hardware - insulated base bracket with isolator
  - Lower terminal hardware – c/w ground lead isolator, nut and wire clamp
  - Wire clamps shall be suitable for No. 4 AWG stranded copper wire
- **Standards:** ANSI/IEEE C62.11-1999 **or** CSA C233.1-87
- **Approved Products:** [Joslyn cat# ZHP012-0000100](#), [Ohio Brass cat# PDV-100 213510-7314](#), [Cooper cat# UHS1206-0A1A-1A1A](#)
- **Approved Alternatives:**
- **Notes:**
  1. See [Surge Arrester](#) selection chart.
  2. *Type Test Report required for approval.*
    - [Joslyn ZHP Arresters](#) Type test report available in File# 6530-91-2
    - [Cooper Varistar Arresters](#) Type test report available in File# 6530-91-2
    - [Ohio Brass PDV Arresters](#) Type test report available in File# 6530-91-2
- **Current Status:**  CSA Certified     UL Listed     Other certification


Prepared by: K. Blakeman  
 Tech. Spec by: G. Cameron  
 Approved by: Larry Duthie \_\_\_\_\_  
 Approved by: Lloyd Frank \_\_\_\_\_  
 Signature on File

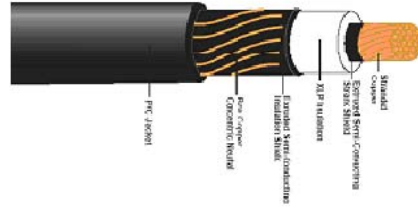
1 of 1

12/02/04

Rev Nbr-0

**Appendix E**  
**Sample Equipment Approval Sheet**

	<b>Purchasing Specification</b> <b>Wire-Primary #1 1/c 15kV XLPEI CN</b>	<b>38W 095 000</b>
---	---	--------------------



**KWHydro Inc. Information:**

New Part#	38W095000
Old Part#	38W8675
Category	Wire
Description	Wire-Primary #1 1/c 15kV XLPEI
Unit of Measure	Metre
Location	
GL Category	IN30
Stocking Type	S

**Supplier Information:**

<u>Vendor Number-Name</u>	<u>Manufacturer/ID#</u>	<u>Part Number</u>
5012 – Nexans	Nexans	567123

**Technical Information:**

- **Cable, PVC Jacketed, Concentric Neutral, TRXLPE Insulated, 100% Insulation Level, 1/C, #1 AWG Cu, 15 kV** – used for 13.8kV primary underground residential distribution. The cable shall be manufactured in accordance with [KWHydro spec C38](#).
- **Standards:** CSA C68.3-97
- **Approved Products:** Nexans 567123
- **Approved Alternatives:**
- **Notes:** 1. Cable must be CSA certified  
2. Reel measures 68"x32"x40" – Capacity 1500m
- **Current Status:** [ x ] CSA Certified [ ] UL Listed [ ] Other certification

Prepared by: K. Blakeman  
 Approved by: Larry Duthie \_\_\_\_\_  
 Approved by: Lloyd Frank \_\_\_\_\_  
 Tech Spec by: G. Cameron  
 Signature on File

1 of 1

12/02/04

Rev Nbr-0

**Appendix F  
Equipment Approval Check List**

Item	Comply		Comments
	Yes	No	
<b>Listing of all approved <i>equipment</i> is maintained and available</b>			
<b>Specifications for major <i>equipment</i> have been identified and approved by a <i>professional engineer</i>, if required, and copies are available</b>			
<b>Required test results are available</b>			
<b><i>Equipment</i> approval is documented with signature of a <i>competent person</i> confirming that there are <i>no undue hazards</i></b>			
<b>Quality Assurance is documented and followed</b>			
<b>Process exists for approval under <i>Good Utility Practice</i></b>			

## Summary of Revisions

### September 30, 2005

Section 2.9 Appendix C. Updated to reflect most current ESA Bulletin 2-7-20 Approval of Electrical Equipment Rule 2-024

### September 15, 2008

The following sections were revised.

1.3.9 Certified Test Report

2.1.2 Is it the expectation that all *equipment* must be formally approved?

2.7.2 Under the rule of the *distributor*, how can the *distributor* provide assurance of *equipment* safety equivalent to rule 2-024?

2.7.5 Good Utility Practice for Non-Major Equipment

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

2.7.8 What elements could be included in a distributor's equipment approval system?

Appendix B CSA Standards Related to Electricity Distribution

Minor spelling, grammatical and dated references were corrected or updated.