Bulletin 2-11-28
Plans and specifications
Rule 2-010

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1) Requirements for plans submission – general

Rule 2-010 of the Ontario Electrical Safety Code (OESC) contains the requirements for the submission of plans to Electrical Safety Authority's (ESA) Plan Review Department:

1) Electrical work on any electrical installation shall not commence until plans have been submitted and examined by the Electrical Safety Authority where the electrical installation involves:
    a) a three-phase consumer service or stand by generation, equal to or in excess of 400 A circuit capacity; (see **Note 1**);
    b) a single-phase consumer service or standby generation equal to or in excess of 600 A; (see **Note 1**);
    c) a feeder greater than 1000 A;
    d) an emergency power supply for life safety systems as per Section 46, excluding unit equipment;
    e) any installations within the scope of Section 64 or bi-directional electric vehicle supply equipment, with an output rating in excess of 10 kW;
    f) any installation of electric vehicle supply equipment, with the exception of a single dwelling unit, where the total nameplate rating(s) of the electric vehicle supply equipment including both existing and new is greater than 20% of the rating of the service equipment; or
    g) any installation operating in excess of 750 V, excluding
        i) installations of pole lines exclusively within the scope of Section 75;

or

ii) that portion of an underground installation between a supply authority-owned transformer and the related supply authority-owned switch; or

iii) replacement of electrical equipment as permitted by Subrule 2) c).

2) Plans need not be submitted for
   a) maintenance/repair work;
   b) temporary installations, and work within the scope of Section 76, for equipment operating at not more than 750 V phase-to-phase or not more than 1000 A; or
   c) the replacement of electrical equipment, provided that: [See **Topic 1(a)**]
      i) equipment electrical characteristics are the same as the existing equipment characteristics; and
      ii) the existing installation meets the requirements of this Code.

Note 1
When plans and specifications are required to be submitted for Single Family Dwellings and residential Installations:

i) Plans and specifications are required for the consumer's service and distribution equipment only.
ii) Information on branch circuits or utilization equipment is not required.

a) Electrical characteristics of equipment

Rule 2-010 2) c) refers to "electrical characteristics" of equipment. For high voltage equipment, the following questions and answers may be used as guidelines in assessing whether a plan review submission is required:

Question 1
When replacing a high voltage transformer, what electrical characteristics of the new transformer must be the same as the existing in order to be exempt from a Plan Review submission?

Answer 1
The kVA rating, primary and secondary voltages, transformer type (dry, ONAN, KNAF etc), impedance (*).

(*) If the impedance of the new transformer is the same or higher than the existing transformer and all other electrical characteristics are the same, Plan Review submission is not required.

Question 2
When replacing a high voltage switch, either pole-mounted or metal-enclosed, what electrical characteristics of the new switch must be the same as the existing in order to be exempt from a plan review submission?

Answer 2
Voltage, amperage, withstand rating (**), type (pole-mounted, open, metal-enclosed etc).

(**) If the withstand rating of the new switch is the same or higher than existing and all other electrical characteristics are the same, Plan Review submission is not required.

2) Requirements for plans submission for overhead systems that are outside the scope of Section 75

If a design exceeds the limitation of Section 75, plans are required to be submitted for review. The submitted design shall conform to the current edition of CSA C22.3 No. 1 "Overhead Systems", and be stamped and signed by a Professional Engineer (P.Eng), licensed to operate in the province of Ontario.

Section 75 is limited to:

- A maximum system voltage of 50,000 volts phase to phase.
- A maximum conductor size of No. 3/0 AWG ACSR. This is because related tables and specifications for the maximum sag, tension, span, framing and class of pole are calculated based on this conductor size.

Examples of when a plans submission is required for overhead systems
The following are just some examples of overhead system designs that are not within the scope of Section 75, and for which plans are therefore required to be submitted to the Plan Review department for review:

- The nominal voltage exceeds 50,000 volts
- The weight of installed equipment on a pole exceeds Table 103
- The ACSR conductor exceeds No. 3/0 AWG
- The conductor sags & tensions ruling span exceeds 75 m, as permitted by Table 112
- All conductor spans exceeding 90 m
- The neutral supported cable exceeds 2-No. 4/0 AWG Poly AL. & 1-No. 3/0 AWG Bare ACSR or 3-No. 3/0 AWG AL 600V & 1-No. 1/0 AWG Bare ACSR distribution circuits utilizing spun buss
- Platform mounted transformers

3) Plan Review requirements

a) For installations within the scope of Section 64 and bi-directional electric vehicle supply equipment (EVSE) installations

Background
Rule 2-010 1) e) states a Plan Review submission is required for all installations within the scope of Section 64 regardless if the installation is in parallel with a supply authority or "off-grid", or bi-directional EVSE, with a rating in excess of 10 kW.

In addition to the increased usage of ESS to provide supplementary power to buildings, homes or the grid, bi-directional EVSE is another solution to provide power back to the grid ("Vehicle-to-grid (V2G)"), buildings ("Vehicle-to-building (V2B)"), or homes ("Vehicle-to-home (V2H)"). Bi-directional EVSE is referenced in Rule 86-308 as being an "electric power production source."

As products and technology continue to evolve, ESA is seeing more hybrid inverters used in design and installations. Hybrid inverters allow for multiple source types (eg. PV, ESS, generator) to be connected to a single inverter. Therefore, a Plan Review submission is required for hybrid inverters with a nameplate output rating exceeding the 10 kW threshold.

For example, a hybrid inverter with a nameplate rating of 15 kW connected to a single source of 5 kW from PV is required to submit for a plan review.

The submission shall be based on the nameplate output kW rating of the inverter without consideration of source/input ratings or any field derating of the inverter output.

Question 3
Is a Plan Review submission required if the inverter nameplate capacity exceeds 10 kW although the inverter is programmed to export a maximum of 10 kW or less?

Answer 3
Yes.

Question 4
Does the inclusion of storage batteries with an electric-power-generator operating in parallel with the supply authority change the Plan Review submission requirements?

Answer 4
No.

Question 5
Is a Plan Review submission required for multiple sources of renewable energy and/or ESS installed at the same time that have a combined capacity exceeding 10 kW and operate in parallel with the supply authority?

Answer 5
Yes.

Direction
When multiple systems are installed at the same time, the combined size of the installation will determine if submission to Plan Review is required.

Example
An 8 kW solar and a 5 kW ESS installed at the same time would be required to be submitted as the combined total of 13 kW exceeds the exemption in Rule 2-010 1) e) of 10 kW.

Question 6
Is a Plan Review submission required for multiple sources of renewable energy and/or energy productions systems installed at the same time, that have a combined nameplate capacity exceeding 10 kW but feed into a single inverter with a nameplate rating of 10 kW or less?

Answer 6
No.

Rationale
Historically, PV arrays are overbuilt, resulting in a higher kW rating than the connected inverter. In these cases, Plan Review submission requirements are based on the lower kW rating of the inverter. The same rationale extends to multiple renewable energy and/or energy production systems supplying a single inverter.

b) For multiple EVSEs in other than dwelling units

Background
Rule 2-010 1) f) states a Plan Review submission is required for any installation of EVSEs, with the exception of a single dwelling unit, where the nameplate rating(s) of the EVSE, including both existing and new, is greater than 20% of the rating of the service equipment.

Table B1 provides an example of when a plan review submission is required based on a service size, single-phase, or three-phase systems, and the number of EVSEs. The example is based on a 1000 A service and EVSEs rated at 208-240 V at 32 A continuous.

Table B1 – Example of multiple EVSE submission requirements

	Single-phase system		**Three-phase system**	
Installation details:	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**
Rating of service	1000 A	1000 A	1000 A	1000 A
Nameplate rating of EVSE	32 A	32 A	32 A	32 A
Number of EVSE	5	11	10	17
Total additional load	160 A	352 A	320 A	544 A
Three-phase adjusted value	N/A	N/A	185 A	314 A
Precent of service rating	16%	35%	18%	31.40%
Plan review submission required? (greater than 20% of service)	**NO**	**YES**	**NO**	**YES**

4) Who is responsible for submitting plans?

The person responsible for the plan design shall file with the ESA complete wiring plans and specifications relating to the proposed work, and pay the prescribed Plan Review fees. If the plan designer is not the person who files an application for Plan Review, the person who files the plans will be responsible for all aspects of the Plan Review.

5) How to submit plans

ESA no longer accepts email, fax or paper Plan Review submissions. **All submissions must be made using the Electronic Plan Review (EPR) Portal.** To register to use the EPR portal, please contact the ESA Plan Review department at 1-800-746-6480.
Plans for multiple sites with different civic addresses cannot be grouped under a single submission.

The fee for plan review is as per ESA's fee guide.

The inspector in the field gives final approval of the installation.

6) Information required

The following information is required as a minimum for submission using the EPR portal (See Note 2):

- A completed "Plan Review Submittal Form". The two-page form can be downloaded from the EPR portal homepage and provides additional direction on the minimum information and supporting documents required.
- If the project involves a high voltage station ground electrode design that is not exempted from ESA review per Bulletin 36-10-*, a Grounding Study must be submitted. This document must be stamped and signed by a Professional Engineer. In addition, the Grounding Study Submittal Form must be completed and included. The Grounding Study Submittal Form can be downloaded from the EPR Portal homepage.

Note 2
If the Form is not complete or required information is missing, the submission will be rejected and the submitter will be given 10 business days to submit the required information. If the information is not received within this period, the submission will be marked as incomplete and cancelled.

(a) Information required for Ground Fault Protection

In addition to Section 1 "Ground Fault Protection Information" in Check List document, where Ground Fault Protection (GFP) is required and multiple sources of power exist, and to ensure the overall GFP scheme will meet OESC requirements, a ground fault

schematic shall be provided identifying the following information, as per Rule 14-102 and the Appendix B note:

- Where neutrals are installed
- Where the neutral is grounded and/or bonded to equipment enclosure
- Type of ground fault sensing methods utilized
- Where Ground Fault Current Transformers are located and how they are connected
- A brief description of how the design considers all sources (see Note 3)

Note 3
It is the responsibility of the Designer/ Installer to provide evidence to the Inspector that the GFP Scheme functions properly as per the OESC.

7) When a plans submission expires or becomes invalid

A completed Plan Review submission expires or is considered invalid when:

- The related electrical installation has not commenced and the Plan Review report is not based on the current or previous edition of the OESC; or
- There are major changes to the project scope and/or electrical design, at the discretion of the Inspector in consultation with the Technical Advisor or Plan Review.

8) Supply Authority/Local Distribution Company (LDC) Requirements

Prior to planning an installation, the supply authority should be consulted for their conditions of service and any special requirements for connection to their distribution system.

9) Supply Authority/LDC Equipment

The OESC does not apply to equipment and wiring that is part of the Supply Service (as defined in Section 0). Where the LDC has provided assurance that it owns and controls the equipment, the ESA will not apply the OESC to that equipment. This equipment is part of the LDC infrastructure, and subject to the Electrical Distribution Safety Regulation 22/04.