Proposal Number: 2018-OA-010

Rule 16-222 and Appendix B Note
Description of Change: Amend requirements for equipment connected to Class 2 circuits
Proposed by: Electrical Safety Authority

Background:
In OESC 2015, 26th Edition, there is an Ontario amendment to CE Rule 16-222. In CE Code 2018, C22.1-18, Rule 16-222 is amended and it is therefore required to update the Ontario amendment. Below is the amended CE Code Rule 16-222 and associated Appendix B Notes:

Δ **16-222 Equipment located on the load side of overcurrent protection, transformers, or devices having Class 2 outputs** (see Appendix B)

1) Equipment located on the load side of overcurrent protection, transformers, or devices having Class 2 outputs shall
   a) for Class 2 circuits operating at not more than 42.4 V peak, be acceptable for the particular application; and
   b) for Class 2 circuits operating at more than 42.4 V peak, comply with Rule 2-024 1).
2) Notwithstanding Subrule 1) a), lighting products, electromedical equipment, equipment for hazardous locations, and thermostats incorporating heat anticipators shall comply with Rule 2-024 1).
3) The operating voltage of the equipment referred to in Subrule 1) shall not exceed
   a) for dry or damp locations
      i) 30 V rms for sinusoidal ac;
      ii) 42.4 V peak for other waveforms (nonsinusoidal ac);
      iii) 60 V continuous dc; and
      iv) 24.8 V peak for interrupted dc (square wave dc at a rate of 10 to 200 Hz); and
   b) for wet locations (not including immersion)
      i) 15 V rms for sinusoidal ac;
      ii) 21.2 V peak for nonsinusoidal ac;
      iii) 30 V for continuous dc; and
      iv) 12.4 V peak for interrupted dc (square wave dc at a rate of 10 to 200 Hz).

Rule 16-222 1) a)
With respect to the acceptance of equipment for connection to Class 2 circuits operating at not more than 42.4 V peak or dc, consideration should be given to the fact that while Class 2 circuits limit the power that can be dissipated in the circuit continuously, this power is more than sufficient to be a fire hazard if dissipated in a fault within improperly designed equipment, e.g., shorted turns in a coil.

Rule 16-222 2)
Examples of lighting products include the following:
a) luminaires;
b) signs;
c) rope lights;
d) decorative strings and outfits;
e) illuminated novelty items; and
f) lighting devices that incorporate light-emitting diodes (LEDs).

Δ **Rule 16-222 3) a) i), ii), and iii)**
The maximum voltage between any two output terminals under any load condition, including no load, for Subrule 3), a) i), ii), and iii) is 42.4 V peak or (33 + 0.45 × the dc component voltage), up to a maximum of 60 V. This corresponds to a limit of 30 V rms for sinusoidal ac waveforms, 42.4 V peak for other waveforms, and 60 V continuous dc.

Rationale:

CE Code 2018, C22.1-18, Rule16-222 (1)(b) and (2) that deal with product approval requirements are deleted since we have Ontario rules, Rule 2-022 and 2-024, that covers approval requirements, including approval of Class 2 devices.

CE Code 2018, C22.1-18, Rule (3) is added to clarify maximum operating voltages based on the equipment location. The values are based on CSA standard, C22.2 No. 250.13 Light emitting diode (LED) equipment for lighting application. This standard specifies that the risk of electric shock exists if the open circuit voltage exceeds the voltages specified in the revised CEC Rule 16-222(3) as per the table below:

	Maximum voltage	
Waveform type*	**Dry and damp locations**	**Wet locations**
Sinusoidal ac	30 V rms	15 V rms
Non-sinusoidal ac	42.4 V peak	21.2 V peak
dc †‡	60 V	30 V

This standard requires a unit suitable for wet locations that excides the maximum voltage specified in the table above to meet the environmental tests, be provided with a suitable enclosure and be marked as such.

Since this Canadian standard is for LED lighting equipment and supersedes all other lighting standards, Ontario amendment Rule 2-022 is amended to require all LED lighting equipment to be approved (even connected to Class 2 power supply).

Rule 16-222 (3) is confusing and could be interpreted that all equipment in a wet location is required to be approved if connected to a Class 2 power supply that exceeds 15 V rms, 21.2 V peak, or 30 V dc. This is only intended by CSA standard C22.2 No. 250.13 for lighting equipment. The intent of Subrule (3) is to specify the voltages where no live parts should be accessible.

Proposed Change:

Amend Ontario Amendment Rule 16-222:

16-222 Equipment located on the load side of overcurrent protection, transformers, or current-limiting devices for Class 2 circuits (see Appendix B)

~~Equipment located on the load side of overcurrent protection, transformers, or current-limiting devices for Class 2 circuits shall~~

~~(a) for Class 2 circuits operating at not more than 42.4 V peak or dc, be acceptable for the particular application; and~~

~~(b) for~~ Class 2 circuits ~~operating at more than 42.4 V peak or dc,~~ shall be arranged so that no live parts are accessible ~~to unauthorized persons.~~ when the operating voltage exceeds

a) for dry or damp locations
- i) 30 V rms for sinusoidal ac;
- ii) 42.4 V peak for other waveforms (nonsinusoidal ac);
- iii) 60 V continuous dc; and
- iv) 24.8 V peak for interrupted dc (square wave dc at a rate of 10 to 200 Hz); and

b) for wet locations (not including immersion)
- i) 15 V rms for sinusoidal ac;
- ii) 21.2 V peak for nonsinusoidal ac;
- iii) 30 V for continuous dc; and
- iv) 12.4 V peak for interrupted dc (square wave dc at a rate of 10 to 200 Hz).

Amend Ontario Amendment Appendix B Note to Rule 16-222

Rule 16-222 ~~1) a)~~

With respect to the acceptance of equipment for connection to Class 2 circuits operating at not more than limits specified by the Rule ~~42.4 V peak or dc~~, consideration should be given to the fact that while Class 2 circuits limit the power that can be dissipated in the circuit continuously, this power is more than sufficient to be a fire hazard if dissipated in a fault within improperly designed equipment, e.g., shorted turns in a coil or too many decorative light strings connected to exceed the circuit rating.

Delete the new Appendix B Note to CE Code Rule 16-222(3)

~~A **Appendix B Rule 16-222 3) a) i), ii), and iii)**~~

~~The maximum voltage between any two output terminals under any load condition, including no-load, for Subrule 3), a) i), ii), and iii) is 42.4 V peak or (33 + 0.45 × the dc component voltage), up to a maximum of 60 V. This corresponds to a limit of 30 V rms for sinusoidal ac waveforms, 42.4 V peak for other waveforms, and 60 V continuous dc.~~