Bulletin 64-8-4
Battery based energy storage systems (ESS) at residential occupancies
Rules 64-1100 and 64-924

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1) Background

The 2024 Ontario Electrical Safety Code (OESC) adopted a new section “Installation of energy storage systems at residential occupancies” and modified several other related Rules. Rule 64-1100 provides the requirements for location and separation of ESS installed at residential occupancies either within a dwelling unit or other spaces of the residential occupancy including outdoors.

Rule 64-1100 is applicable to all ESS installed at residential occupancies including those utilizing batteries which shall be approved and be installed in accordance with the manufacturer’s installation instructions per Rule 64-1002 1).

2) Location

Rule 64-1100 10) prohibits ESS *from being* installed in sleeping areas, or rooms opening directly into sleeping areas

Rule 64-1100 11) requires a smoke alarm or smoke detector to be installed when an ESS is installed within a dwelling unit. The smoke alarm or detector shall be installed in the room where the ESS is located and shall be installed in accordance with Section 32. Notwithstanding Rule 64-1100 11), which is applicable to the ESS as a complete approved system, the installation of a smoke alarm/detector shall apply to the battery portion when installed in a separate location from the remainder of the equipment making up the ESS. The smoke alarm/detector is intended to be interconnected where required by the Ontario Building Code (OBC).

Based on Subrule 3) of Rule 64-1100, ESS in a dwelling unit or residential occupancy are permitted to be installed below the lowest level of egress with the conditions listed in Subrule 1) and 2) of Rule 64-1100 for a dedicated room or utility room.

ESS ventilation and clearance requirements shall be in accordance with the manufacturer's installation instructions. If not addressed by the manufacturer's installation instructions, ventilation of battery rooms or areas shall be in accordance with Rules 2-324 and 64-802.

In properties where there are multiple buildings and not all of them are residential, Rule 64-1100 requirements and this bulletin are not applicable to buildings not associated with the dwelling unit, such as a drive shed on a rural property, or a structure built for the sole purpose of housing ESS equipment. Minimum clearance of 3 m from a residential building is required based on the intent of Rule 64-926.

Properties that are zoned as mixed-use buildings such as buildings with street-level retail having a commercial shop front on the ground floor and residential dwelling(s) above, are subject to the requirements of Rule 64-1100 and this Bulletin.

Products evaluated to ANSI/CAN/UL 9540 3rd edition that are marked to indicate "Suitable for Use in Residential Non-Habitable Locations" have led to questions regarding installation locations other than those identified by the Ontario Electrical Safety Code (OESC). Manufacturers and installers refer to OESC Rule 64-1100 9) and manufacturer's instructions as permitting this, however, no criteria for acceptance are provided by the Code.

a) ESS at a dwelling unit or a building of residential occupancy

Subrule 1) of Rule 64-1100 provides location requirements for installation of ESS at a building of residential occupancy including within a dwelling unit. It requires ESS to be suitable for residential use and located:

- in an attached garage;
- in or on an associated detached garage, or other free standing structure;
- on the exterior surface of the building; or
- in a dedicated room or utility room having a door equipped with a self-closing device and enclosed with a minimum construction of
    - ceilings and walls finished with gypsum board; and
    - floors finished with lumber sheathing

Construction requirements are permitted to be met using materials with increased fire resistance ratings to those specified, such as concrete flooring in lieu of lumber sheathing.

Finished walls at a minimum require gypsum board that is complete with joints sealed.

Question:
Under what conditions will ESA accept installation locations other than those specifically identified in OESC Rule 64-1100 1)

Answer:

For ESS certified to ANSI/CAN/UL 9540 3rd edition, acceptance of alternative locations is only permitted where the ESS is marked "Suitable for use in residential habitable spaces" and "This equipment meets the cell level performance criteria of UL9540A".

For ESS certified to prior editions of ANSI/CAN/UL 9540 3rd edition:

Acceptance of alternative locations is only permitted where the ESS is marked "Suitable for use in residential dwelling units where permitted" and "This equipment meets the cell level performance criteria of UL9540A".
ESA is currently not aware of any systems meeting the cell level performance criteria of ANSI/CAN/UL 9540A.

Additional Information:

ANSI/CAN/UL 9540 3rd edition introduced new marking requirements for residential use ESS that indicate either "Suitable for use in residential non-habitable spaces" or "Suitable for use in residential habitable spaces". These markings, while not specifically referenced in the OESC, do indicate that the ESS has undergone ANSI/CAN/UL 9540A testing and the equipment is suitable for residential use. In Canada, residential non-habitable spaces are those identified specifically in Rule 64-1100 1) only. Units marked as suitable for use in residential habitable spaces must additionally be marked to indicate that they have met the cell level performance criteria of ANSI/CAN/UL 9540A in which case the installation location would be permitted to be in accordance with the manufacturer's instructions and not installed in sleeping areas or rooms opening directly into sleeping areas.

b) ESS in a building containing multiple dwelling units

Subrule 2) of Rule 64-1100 provides requirements for ESS located in a dedicated room or utility room in a building containing multiple dwelling units. The room may be within one of the dwellings or in a common area of a residential occupancy.

The room is required to have a door equipped with a self-closing device and be enclosed with a minimum construction of

- ceilings and walls finished with gypsum board; and
- floors finished with lumber sheathing

In addition, the room shall have a fire resistance rating of not less than 1 hour.

Appendix B Note to Rule 64-1100 2) provides clarification that the fire resistance rating of ceilings, floors, and walls constructed for the purposes of this rule should be verified

by a qualified individual in accordance with the requirements of the authority having jurisdiction prior to installation. It also provides examples of wall, floor and ceiling assemblies that provide a 1 h fire resistance rating.

Based on Subrule 4) of Rule 64-1100, batteries forming part of ESS and installed in a building of a residential occupancy containing multiple dwelling units, shall not be located directly beneath an exit required by the National Building Code of Canada.

3) Capacity

a) Capacity limitations at a dwelling unit or building of residential occupancy

The capacity limitations in an attached garage, or on the exterior surface of the building have increased, from 40 kWh to 80 kWh.

The capacity limitations in a dedicated room or utility room have not changed, and shall:

- have a storage capacity not exceeding 20 kWh for any single energy storage system, or
- where multiple energy storage systems are installed, have an aggregate capacity not exceeding 40 kWh

Notwithstanding Rule 64-1100 5) and 6), capacity limits shall be permitted to be based on a battery storage unit where that unit is assembled according to the manufacturer's installation instructions. For multi-part ESS, capacity limitations shall apply to the battery portion and not to the overall approved ESS which may include an inverter, charge controller, micro-grid interconnected device or other accessory equipment. Battery groupings shall not exceed 20 kWh and spacing between groupings shall be a minimum of 1 m or as per the manufacturer's instructions.

The following Table summarizes the capacity limitations at dwelling units or buildings of residential occupancy and highlights the change:

Area	Maximum Stored Energy
A dedicated room or utility room	40 kWh
Attached garage	80 kWh
An associated detached garage, or other free standing structure	80 kWh
On the exterior surface of the building	80 kWh

Note
An acceptable tolerance of maximum 5% of the total aggregate storage capacity is permitted.

Question:
In a dwelling unit, is it acceptable to install an ESS with a storage capacity of up to 40 kWh in a dedicated room or utility room (64-1100 1) d)) and additional storage capacity of up to 80 kWh in a garage or locations permitted by Rule 64-1100 1) excluding locations listed in subrule 1) d) of same dwelling unit or building of residential occupancy bringing the total aggregate capacity to 120 kWh +/- 5%

Note: ESS evaluated to ANSI/CAN/UL 9540A and meeting, at a minimum, the Unit Level test criteria are not in the scope of this question (see item 3 (b) of this Bulletin).

Answer: *No.*

Rational: *Rule 64-1100 5) b) limits aggregate capacity to 80 kWh installed at all locations referenced by Rule 64-1100 1) and subrule 6) b) further limits total installed capacity to 40 kWh in a dedicated room or utility room. In a situation where 40 kWh is installed at a location permitted by Rule 64-1100 1) d), an additional 40 kWh may be installed at other permitted locations excluding locations covered by Rule 64-1100 1) d) in the same dwelling unit, bringing aggregate installed capacity to 80 kWh within a dwelling.*

b) Capacity limitation for ESS evaluated to ANSI/CAN/UL 9540A

Residential use battery energy storage systems (BESS) are appearing on the market with instruction manuals that indicate a battery storage unit (stack) exceeding 20 kWh.

Based on Subrule 5) a) and Subrule 6) a) of Rule 64-1100, energy storage system installed in accordance with Subrule 1) shall not have a storage capacity exceeding 20 kWh for any single energy storage system.

Based on Subrule 9) of Rule 64-1100, ESS evaluated to ANSI/CAN/UL 9540A are permitted to be installed in accordance with the manufacturer's installation instructions.

The intent of this Rule is to recognize where such systems have undergone this testing, the requirements of Subrules 1) through 8) may be amended where the manufacturer's installation instructions provide other requirements that either ease or increase those of the Rule.

Question:
What are the requirements for acceptance of increased capacity for ESS installed at buildings of residential occupancy?

Answer:
ESA will accept a battery storage unit (stack) exceeding 20 kWh when the following criteria have been met:

- *The increased capacity rating is specified by the manufacturer and installed in accordance with the manufacturer's installation instructions for that specific BESS model number.*
- *Equipment must be permanently field labelled to indicate the ANSI/CAN/UL 9540A testing report number that details (at a minimum) that the unit level test criteria has been met. This label must state the maximum battery capacity permitted for the system.*

- *For ESS evaluated to 3rd edition ANSI/CAN/UL 9540, the installation manual must refer to the ANSI/CAN/UL 9540A testing report that demonstrates at a minimum that the criteria of the unit level test has been met.*

For BESS certified using prior editions of ANSI/CAN/UL9540 3rd edition:

- *For ESS evaluated to prior editions of ANSI/CAN/UL 9540, the installation manual must describe in detail what capacities are acceptable within dwelling units.*

  The installer must provide a copy of the ANSI/CAN/UL 9540A test report indicating, at a minimum, that the unit level test criteria has been met
  Note: ANSI/CAN/UL 9540A testing reports that indicate either module or cell level criteria have been met are also acceptable for application of this direction.

4) Separation requirements

Based on Subrule 7) of Rule 64-1100, batteries forming part of an ESS installed indoors or outdoors shall not be located within 1 m of any window or door, **other than a vehicular access door**, of a dwelling unit or residential occupancy.

Based on Subrule 8) of Rule 64-1100, where multiple ESS are installed, batteries forming part of each system shall be spaced not less than 1 m apart from each other.

Based on Subrule 9) of Rule 64-1100, ESS evaluated to ANSI/CAN/UL 9540A are permitted to be installed in accordance with the manufacturer's installation instructions. Based on the Appendix B Note, as part of the ESS certification process to ANSI/CAN/UL 9540, the testing data generated by ANSI/CAN/UL 9540A may be used **by the certification body** to determine acceptable installation practices such as but not

limited to, location of the ESS, aggregate capacity limitations, ventilation, and spacing requirements from other ESS.

The intent of this Rule is to recognize where such systems have undergone this testing that the requirements of Subrules 1) through 8) may be amended where the manufacturer's installation instructions provide other requirements that either ease or increase those of the Rule.

Separation requirements for *ANSI/CAN/UL 9540 certified* ESS

Question 1:

What are the requirements for acceptance of reduced separation between ESS installed at buildings of residential occupancy?

Answer 1:

ESA will accept separation less than 1 m between ESS *under the following conditions:*

- *Reduced separation* is specified by the manufacturer and installed in accordance with the manufacturer's installation instructions *for that specific ESS model number.*

- *For ESS evaluated to 3rd edition ANSI/CAN/UL 9540, the installation manual must refer to the ANSI/CAN/UL 9540A testing report that demonstrates at a minimum that the criteria of the unit level test has been met and the equipment must be permanently field labelled to indicate the report number referenced*

For BESS certified using prior editions of ANSI/CAN/UL9540 3rd edition:

- *For ESS evaluated to 2nd edition ANSI/CAN/UL 9540, the installation manual must describe in detail what configurations, spacings are acceptable within dwelling units and a copy of the ANSI/CAN/UL 9540 certification and installation instructions must be provided to ensure compliance.*

- *For ESS evaluated to 1st edition ANSI/CAN/UL 9540, spacing must meet the 1 m minimum requirement of the OESC.*

Rationale 1:

ESS are required to be approved to ANSI/CAN/UL 9540 which currently has three editions. While all editions are acceptable to ESA, the first edition of the standard does not have any requirements for separation between ESS, however, the installation must meet the 1 m minimum identified in both the OESC and this Bulletin.

The second edition of the standard introduced the requirement to space multiple ESS at least 1 m apart. It also recognizes optional large-scale fire testing in accordance with

ANSI/CAN/UL 9540A as a means to ensure safety where separation less than 1 m is specified between ESS. In this Bulletin, the additional testing option is recognized by permitting separation to be "as per the manufacturer's installation instructions."

The 3rd edition of the standard introduced the requirement to include the ANSI/CAN/UL 9540A test report number in the certified installation manual.

In all editions of the standard, the manufacturer's installation instructions *for that specific ESS model number* are part of the approval process. Based on the requirements of the second and third edition, where reduced separation is specified, the certification body would be required to review the testing performed and its results and ensure the installation instructions are supported by and in accordance with that optional testing.

5) Working space requirements

Rule 64-924 explains that working space requirements within ESS are permitted to be in accordance with the manufacturer's instructions. For example, for ESS installation in shipping containers or "sea cans", this Rule *amends* Rules 2-308, 2-310 and 2-312. The Appendix B Note explains that the intent of this rule is to acknowledge that the manufacturer's installation instructions may provide minimum working space requirements in or about equipment forming part of an energy storage system that are different than those required by other rules of this Code.

Working space requirements around self-contained and multi-part ESS that have serviceable parts are required to be in accordance with Rules 2-308, 2-310 and 2-312.

The minimum size of a room containing ESS shall include equipment depth plus 1 m in front of the equipment as well as be a minimum of 2 m in height. The required clearance is similar to clearance around panelboards as shown in OESC Bulletin 2-9-*. Ventilation and clearances shall be in accordance with the manufacturers' installation instructions.

6) ESS meeting ANSI/CAN/UL 9540A cell level testing

ANSI/CAN/UL UL 9540A has four levels of testing: cell, module, unit, and system installation level.

Based on Appendix B Note to Rule 64-1100 9) ANSI/CAN/UL 9540 requires energy storage systems intended for installation in the habitable or living space of dwelling units to meet the cell level performance criteria of ANSI/CAN/UL 9540A.

At this time, ESA is not aware of any products approved for use in Canada bearing these markings. When approved product becomes available, Rule 64-1100 9) shall apply as written and equipment with appropriate markings shall be permitted to exceed the limitations in Rules 64-1100 1) or 2).