Bulletin 64-8-1
Battery based ESS in residential occupancies
Rule 64-918

Issued May 2023
Supersedes Bulletin 64-8-0

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1) Background

The 2021 Ontario Electrical Safety Code (OESC) adopts a new set of Rules, 64-900's, which replace the 2018 Ontario Amendment, to address installation requirements for Energy Storage Systems (ESS). Some Rules and associated Appendix B notes are based on the requirements found in the product standard ANSI/CAN/UL 9540 for *Energy Storage Systems and Equipment* as well as those in the ANSI/CAN/UL 9540A, "*Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems*".

There have been some concerns raised from several stakeholders on how some of the new requirements are worded in the 2021 code. The Canadian Electrical code (CE Code) Section 64 Technical Subcommittee is working on a proposal to update ESS rules to address these concerns.

The directions specified in this bulletin are developed to harmonize with the proposed changes for CE Code 2024 and ANSI/CAN/UL 9540 standard. This Bulletin addresses battery based ESS in residential occupancies.

2) New definitions of ESS usage

The 2021 Code introduced two new definitions for Residential and Non-Residential Use ESS:

- **Residential use ESS** – an ESS marked as being suitable for residential use and conforming to the requirements of ANSI/CAN/UL 9540. Further, an Appendix B Note to Rule 64-918 1) clarifies that UL 9540 requires ESS intended for dwelling units to be marked "Suitable for Use in Residential Dwelling Units Where Permitted"

- **Non-residential use ESS** – an ESS not marked as being suitable for residential use

The newly introduced definitions do not fully align with the relevant product standards and as such, create some restrictions on installations of ESS that are not intended by the product standards.

The scope of 64-900 series of Rules is applicable only to self-contained (approved to ANSI/CAN/UL 9540) or field assembled (systems <= 1 kWh) ESS making the definitions for residential and non-residential ESS unnecessary.

The Canadian approval standard, ANSI/CAN/UL 9540, permits only ESS designed and marked as “Suitable For Use in Residential Dwelling Units Where Permitted ” in the living or habitable areas of a dwelling unit (where permitted by AHJ), and they are required to meet very rigorous testing requirements based on a cell level performance test as specified in ANSI/CAN/UL 9540A standard. ANSI/CAN/UL 9540A is a test method for evaluating thermal runaway fire propagation in battery ESS.

There is nothing in the product standards that prohibits ESS not marked as “Suitable For Use in Residential Dwelling Units Where Permitted ” to be installed in other than the living or habitable areas of a dwelling unit. UL 9540 allows certified ESS that meet the regular tests in the standard to be installed in non-living or non-habitable areas of a dwelling unit (e.g. utility closets, attached garages or storage spaces). This is evident in Table E.1 “Residential use ESS” where it is further clarified by showing the capacity limitations and separation requirements of ESS permitted in dwelling units.

Direction 1

Notwithstanding Rule 64-002:

- “Residential use energy storage system” definition - Not applicable in Ontario
- “Non-residential use Energy storage system” definition - Not applicable in Ontario

Rationale 1

Currently, there are no ESS we are aware of marked “Suitable For Use in Residential Dwelling Units Where Permitted” and “This equipment meets the cell level performance criteria of UL 9540A” available in the Ontario market.

3) ESS inside dwelling units and attached garages

Rule 64-918 2) prohibits installing ESS utilizing batteries below grade including basements of dwelling units.
Additionally, Rule 64-918 4) prohibits ESS with a storage capacity greater than 1 kWh or utilizing Li-Ion batteries from being installed in dwelling units, or any living space of a

residential occupancy including clothes closets, storage rooms, bathrooms, stairways, or in any similar undesirable places.

These Rules as written impose significant restrictions to the installation of ESS within a dwelling.

Direction 2 – ESS in dwelling units

ESA will consider **a deviation request** from the location and separation requirements specified in Rule 64-918 2) and 4), when ESS are installed in dwelling units and all of the following conditions are met:

a) ESS are located in a dedicated storage room, utility closet, service room, or similar area that does not open directly into sleeping areas;
b) The room or area has a fire rating not less than 1 h*, deemed to be in compliance with the Ontario Building Code (OBC) by a competent person;
c) The room or area is equipped with an interconnected smoke alarm or detector;
d) Individual ESS capacity does not exceed 20 kWh;
e) Multiple ESS aggregate capacity does not exceed 40 kWh;
f) ESS are spaced not less than 1 m apart from each other (or as per manufacturer's installation instructions, see *Topic 3) a)*; and
g) ESS are spaced not less than 1 m from doors and windows.

Note (*)
If the area within the dwelling unit where the ESS is located is an open area such as a full basement, then the entire area will need to be enclosed to meet the 1 h fire rating as indicated above.

- *The interconnected smoke alarm or detector shall be located adjacent to the ESS.*
- *There cannot be any living space within the enclosed area and the area cannot open directly into any sleeping area.*
- *The minimum size of the room shall include equipment depth plus 1 m in front of the equipment plus a minimum of 2 m height. The required clearance is similar to clearance around panelboard as shown in OESC Bulletin 2-9-*. Ventilation and clearances shall be in accordance with the manufacturers' installation instructions.*
- *Spacing requirements from windows and doors apply to all windows and doors within the fire rated space.*

Direction 3 – ESS in attached garages of dwelling units

In Ontario, Rule 64-918 6) shall apply only to garages that are considered as attached in accordance with OBC requirements. For example, as per OBC Article, 9.10.9.16, a garage is not considered attached if separated from a dwelling unit by a fire separation of not less than 1 h, or if it is a separate structure.

Notwithstanding Rule 64-918 6), ESS are permitted to be installed in attached garages of dwelling units provided that a separation of not less than 1 m from doors and windows are achieved as per UL 9540 requirements.

To summarize, for ESS inside a dwelling unit or attached garage:

Installation Location	**Energy Storage Capacity, kWh**		**Separation For Multiple ESS** Note a)	**Separation From Windows and Doors**
	Individual ESS	**Total Aggregate** Note b)	**Distance, m**	**Distance, m**
Dedicated utility closet, storage or service room Note c)	**20**	**40**	**1**	**1**
Attached garage	**20**	**40**	**1**	**1**

Notes:

a) ESS to be spaced not less than 1 m apart from each other, or as per manufacturer's installation instructions, *see Topic 3) a)*.
b) An acceptable tolerance of maximum 5% of the total aggregate storage capacity is permitted.
c) Dedicated utility closet, storage or service room that does not open directly into sleeping areas.

Rationale 2 & 3

These directions align with Table E.1 in the ANSI/CAN/UL 9540 Standard.

a) Separation requirements for ESS based on the installation instruction

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 when specified by the manufacturer and installed in accordance with the installation instructions.

Rationale 1:

ESS are required to be approved to ANSI/CAN/UL9540 which currently has two editions. While both 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 UL9540A as a means to ensure safety where separation less than 1m 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."

In both the first and second editions of the standard, the manufacturer's installation instructions are part of the approval process. Based on the requirements of the second 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.

Direction 4:

- *Where reduced separation is specified by the manufacturer's installation instructions and the installation is at a building of residential occupancy, a copy of the UL9540 2nd edition certification and installation instructions must be provided to ensure compliance.*
- *Both pieces of information from the installer at site are required to be provided to ESA.*

Note: Deviation requests in accordance with Direction 2 must still be submitted where applicable.

4) Detached garages, storage buildings or free standing structures associated with a dwelling unit

Rule 64-918 7) b) permits ESS to be installed in or on a detached garage, storage building, or free standing structure, with spacing and capacity limitations. Subrule 7) b), omits requirements to space ESS at least 1 m apart when there are multiple installed creating a potential safety hazard.

Direction 5

In addition to the requirements of 64-918 7) b) ESS shall be permitted to be installed in or on detached garages, storage buildings or free standing structures associated with a dwelling unit where spaced not less than 1 m apart from each other (or, as per manufacturer's installation instructions, *see Topic 3) a)*.

To summarize, ESS outside a dwelling unit:

Installation Location	**Energy Storage Capacity, kWh**		**Separation from Exposures**	
	Individual ESS	**Total Aggregate** Note e)	**Distance, m**	**Exposure**
Wall mounted, exterior	**20**	**40**	**1** Note d)	**Other ESS**
			1	**Doors, windows, or ventilation opening**
In or on a detached garage, storage building, or free standing structure associated with a dwelling unit	**20**	**80**	**1** Note d)	**Other ESS**
			1	**Doors, windows, or ventilation opening**
			1	**From a dwelling unit where the aggregate capacity >40 kWh**

Notes:

d) ESS to be spaced not less than 1 m apart from each other, or as per manufacturer's installation instruction, *see Topic 3) a)*.

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

In properties where there are multiple buildings and not all of them are residential, directions specified in this bulletin are not applicable to buildings not associated with the dwelling unit, such as a drive shed on a rural property that includes a single dwelling.

5) Clearance to egress paths and entrance/exit doors at dwelling units

The intent of Rule 64-918 9) is that batteries forming part of an ESS located outdoors not impede egress from a building and not be located closer than 3 m to a path of egress or entrance or exit doors of a building.

Note: This direction applies to all ESS installed outdoors (whether residential or other occupancies)

6) ESS meeting ANSI/CAN/UL 9540A

ESS using batteries that meet the additional testing requirements of ANSI/CAN/UL 9540A for evaluating thermal runaway fire propagation are required to be marked "Suitable For Use In Residential Dwelling Units Where Permitted" if intended for installation in the living or habitable spaces of residential occupancies and "This equipment meets the cell level performance criteria of 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 64-918 8) shall apply as written and equipment with appropriate markings shall be permitted to exceed the limitations in Rules 64-918 6) and 7).