

Number of vehicle spaces or stalls	Demand load per space or stall (W) 15 A circuit	Demand load per space or stall (W) 20 A circuit
First 30	1200	1800
Next 30	1000	1500
All over 60	800	1200

(4) Where branch circuits are provided for parking spaces or stalls in which the loading is restricted or controlled, the feeder or service conductors shall be considered as having a demand load as follows:

Number of vehicle spaces or stalls	Demand load per space or stall (W) 15 A circuit	Demand load per space or stall (W) 20 A circuit
First 30	650	975
Next 30	550	825
All over 60	450	675

(5) Parking lots that may be fully occupied under normal usage shall be assigned a greater demand load per space or stall.

## Δ ELECTRIC VEHICLE ENERGY MANAGEMENT SYSTEMS

### 8-500 Electric vehicle energy management systems

- (1) Electric vehicle energy management systems shall be permitted to monitor electrical loads and to control electric vehicle supply equipment loads.
- (2) An electric vehicle energy management system shall not cause the load of a branch circuit, feeder, or service to exceed the requirements of Rule 8-104 5) or 6).
- (3) An electric vehicle energy management system shall be permitted to control electrical power by remote means.

## Section 10 — Grounding and bonding

*There is substantial reorganization within Section 10. Legislative text within Section 10 has been significantly altered from the 2015 edition, leaving only 23% of original text unaltered. Over the course of several Code cycles, Section 10 had become a muddle of needlessly complicated legislative text. The changes to Section 10 in this edition were intended to simplify the text*

*without affecting its conceptual integrity. The text has been tightened for clarity and brevity. In this, the scale of change to Section 10 does not reflect equivalent material change to the intent or application of the legislation.*

## SCOPE, OBJECT, AND SPECIAL TERMINOLOGY

### 10-000 Scope (see Appendix B)

This Section applies to

- (a) grounding, as follows:
  - (i) solidly grounded systems;
  - (ii) impedance grounded systems; and
  - (iii) ungrounded systems;
- (b) bonding; and
- (c) equipotential bonding.

### 10-002 Object (see Appendix B)

The overall objective for grounding and bonding is to minimize the likelihood and severity of electric shock by establishing equipotentiality between exposed non-current-carrying conductive surfaces and nearby surfaces of the earth and to prevent damage to property during a fault, as follows:

- (a) the objective of solidly grounding an electrical system and bonding its associated equipment is to establish a low impedance connection between the grounded conductor and the non-current-carrying conductive parts of the system to stabilize system voltage;
- (b) the objective of grounding an electrical system through an impedance is to
  - (i) limit the magnitude of ground fault currents;
  - (ii) minimize the damage to equipment resulting from a single ground fault; and
  - (iii) stabilize system voltage;
- (c) the objective of an ungrounded system is to
  - (i) limit the magnitude of ground fault currents resulting from a single ground fault; and
  - (ii) minimize the damage to equipment on the occurrence of a single ground fault;
- (d) the objective of bonding is to interconnect the non-current-carrying conductive parts of electrical equipment and the system grounded point, where one exists, with sufficiently low impedance to
  - (i) facilitate the operation of protective devices; and
  - (ii) establish equipotentiality; and
- (e) the objective of equipotential bonding is to establish equipotentiality.

### 10-004 Special terminology (see Appendix B)

In this section, the following definitions shall apply:

**Equipotentiality** — the state in which conductive parts are at a substantially equal electric potential.

connectors and enclosures are part of the heating panel sets.

- 2) Cutting, nailing, or stapling of the heating panels and heating panel sets shall be done only through the area(s) provided for this purpose.
- 3) Branch circuits supplying heating cable sets and heating panel sets shall be marked with a warning label supplied by the manufacturer and affixed to the panelboard by the installer, stating that the applicable surface and location supplied by the branch circuit contains energized wiring and must not be penetrated by nails, screws, or similar devices.

#### **62-214 Installation of heating cable sets in plaster or other cementitious material**

- (1) Heating cable sets installed in plaster or other cementitious material shall be secured in place by fastening devices that are suitable for the temperature involved and not likely to damage the heating cable.
- (2) The entire length of the heating portion, including the connections to the non-heating leads, shall be completely embedded in non-combustible material.

#### **62-216 Heating cable sets and heating panel sets in gypsum board and other cementitious ceiling and wall installations** (see Appendix B)

- (1) Heating cable sets and heating panel sets shall be installed parallel to the joists, studs, or nailing strips, with clearance not less than 13 mm on each side of the joist, stud, or nailing strip.
- (2) After the heating cable sets and heating panel sets are installed, the entire ceiling below the installed heating cable set or heating panel set shall be covered with gypsum board or acceptable cementitious materials not exceeding 13 mm in thickness.

#### **Δ 62-218 Installation of heating cable sets and heating panel sets under floor coverings**

- 1) Heating panel sets and heating cable sets shall be
  - a) installed on floor surfaces that are smooth and flat; and
  - b) completely covered by floor coverings for which the heating device is intended.
- 2) Type FCC non-heating leads shall be permitted to be used in dwelling units for connecting underfloor-covering heating cable sets and heating panel sets to the branch circuit.

#### **62-220 Infrared radiant heaters of the metal-sheath glowing element type**

Where multiple heaters are used on the same branch circuit, a single means of ground fault protection as described in Rule 62-116 shall be permitted to be used in the branch circuit.

#### **62-222 Heaters for sauna rooms** (see Appendix B)

- (1) Heaters for sauna rooms shall be marked as being suitable for the purpose.

- (2) Sauna heaters shall be installed in rooms that are built in accordance with the nameplate size specifications and shall be fastened securely in place to ensure that the minimum safe clearances indicated on the nameplate are not reduced.
- (3) Sauna heaters shall not be installed below shower heads or water spray devices.
- (4) Each sauna heater shall be controlled by a timed cut-off switch having a maximum time setting of 1 h, with no override feature, that, if not forming part of the sauna heater or cabinet, shall be mounted on the outside wall of the room containing the sauna heater and shall disconnect all ungrounded conductors in the circuit supplying the heater.

## **ELECTRIC SURFACE HEATING SYSTEMS**

**62-300 Electric surface heating** (see Appendix B) **Δ**  
Rules 62-302 to 62-316 apply to fixed surface heating systems for pipe heating, melting of snow or ice on roofs or concrete or asphalt surfaces, soil heating, and similar applications.

#### **62-302 Installation of fixtures**

If located where they will be exposed to rainfall, fixtures shall be provided with a weatherproof enclosure.

#### **62-304 Heating cables and heating panels installed below the heated surface**

(see Appendix B)

- (1) Heating cables and heating panels installed outdoors under the surface of driveways, sidewalks, and similar locations shall
  - (a) be surrounded by non-combustible material throughout their length, including the point of connection to the non-heating leads; and
  - (b) be embedded or covered to a depth of 50 mm minimum below the finished surface.
- (2) Non-metallic heating cables or heating panels installed indoors shall be not less than 25 mm from any uninsulated metal bodies located below the surface to be heated.

#### **62-306 Heating cable sets installed on or wrapped around surfaces**

- (1) Heating cable sets installed on or wrapped around surfaces shall be secured in place by suitable fastening devices that will not damage the heating unit and that are suitable for the temperature involved.
- (2) Heating cable sets wrapped over valves, equipment, or expansion joints in piping systems shall be installed in such a manner as to avoid damage when movement occurs at these areas.

## Δ **TABLE 13** Rating or setting of overcurrent devices protecting conductors\*

(See Rules 14-104 and 28-204.)

Ampacity of conductor, A	Rating or setting permitted, A	Ampacity of conductor, A	Rating or setting permitted, A
0-15	15	111-125	125
16-20	20	126-150	150
21-25	25	151-175	175
26-30	30	176-200	200
31-35	35	201-225	225
36-40	40	226-250	250
41-45	45	251-300	300
46-50	50	301-350	350
51-60	60	351-400	400
61-70	70	401-450	450
71-80	80	451-500	500
81-90	90	501-600	600
91-100	100	601-700	700
101-110	110	701-800	800

\*For general use where not otherwise specifically provided for.

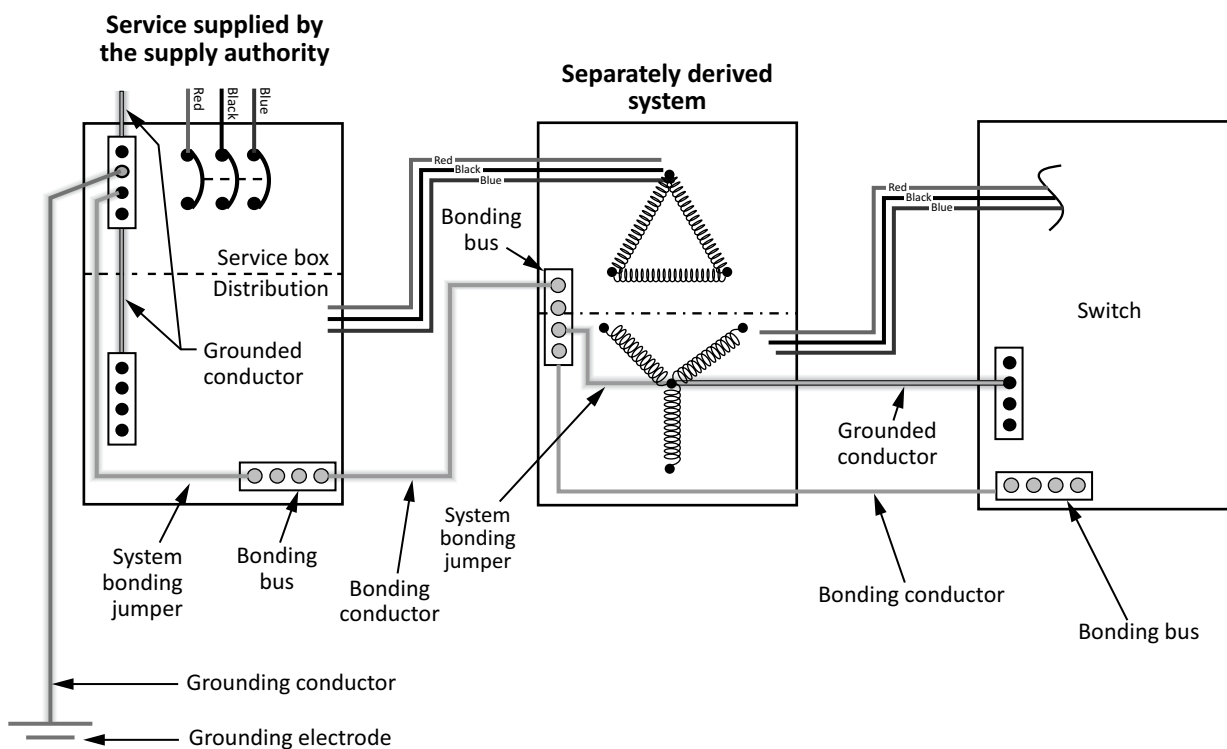
## **TABLE 14** Watts per square metre and demand factors for services and feeders for various types of occupancy

(See Rules 8-002 and 8-210.)

Type of occupancy	Watts per square metre	Demand factor, %	
		Insulated service conductors or cables	Feeders
Store, restaurant	30	100	100
Office			
First 930 m <sup>2</sup>	50	90	100
All in excess of 930 m <sup>2</sup>	50	70	90
Industrial and commercial	25	100	100
Church	10	100	100
Garage	10	100	100
Storage warehouse	5	70	90
Theatre	30	75	95
Armouries and auditoriums	10	80	100
Banks	50	100	100
Barbershops and beauty parlours	30	90	100
Clubs	20	80	100
Courthouses	20	100	100
Lodges	15	80	100

**Figure B10-11**

**Grounding alternative for a separately derived system operating at 750 V or less**



**Rule 10-214 1)**

CSA C22.2 No. 100 specifies the construction requirements for generators, including portable generator assemblies.

A portable generator assembly

- a) consists of a prime mover, a generator, overcurrent devices, and output receptacles that are assembled and connected on a common machine frame; and
- b) is capable of being carried or moved about by personnel.

A portable generator assembly is rated at not more than 12 kW and not more than 240 V and is intended to be used as an isolated system for the supply of cord-connected electrical equipment.

As a condition of approval of certain types of electrical equipment, such as portable generators, the manufacturer supplies instructions pertaining to its installation and operation. It is important that the end-users closely follow the instructions supplied by the manufacturer to fulfill the terms of the approval agreement.

**Δ Rule 10-214 2)**

A mobile or vehicle-mounted generator that exceeds the rating of a portable generator given in CSA C22.2 No.

100 is a power source that may be connected to a fixed electrical installation

- a) to act as a stand-alone power system;
- b) to act as a standby power source via a transfer means, in parallel with one or more other power sources; or
- c) to power only equipment mounted on the vehicle.

It may be configured as a solidly grounded system, impedance grounded system, or ungrounded system. The applicable grounding requirements of Section 10 apply in each case.

When only equipment mounted on the vehicle or vehicle-mounted receptacles for accommodating attachment plugs are being powered, the generator frame or system neutral need not be connected to a grounding electrode.

**Rule 10-300**

Impedance grounded systems have characteristics that can be of benefit to facility owners; however, these systems rely on technology for safe and reliable operation. Special training is required to maintain these systems and, when installed, it is important that they be kept up to date.

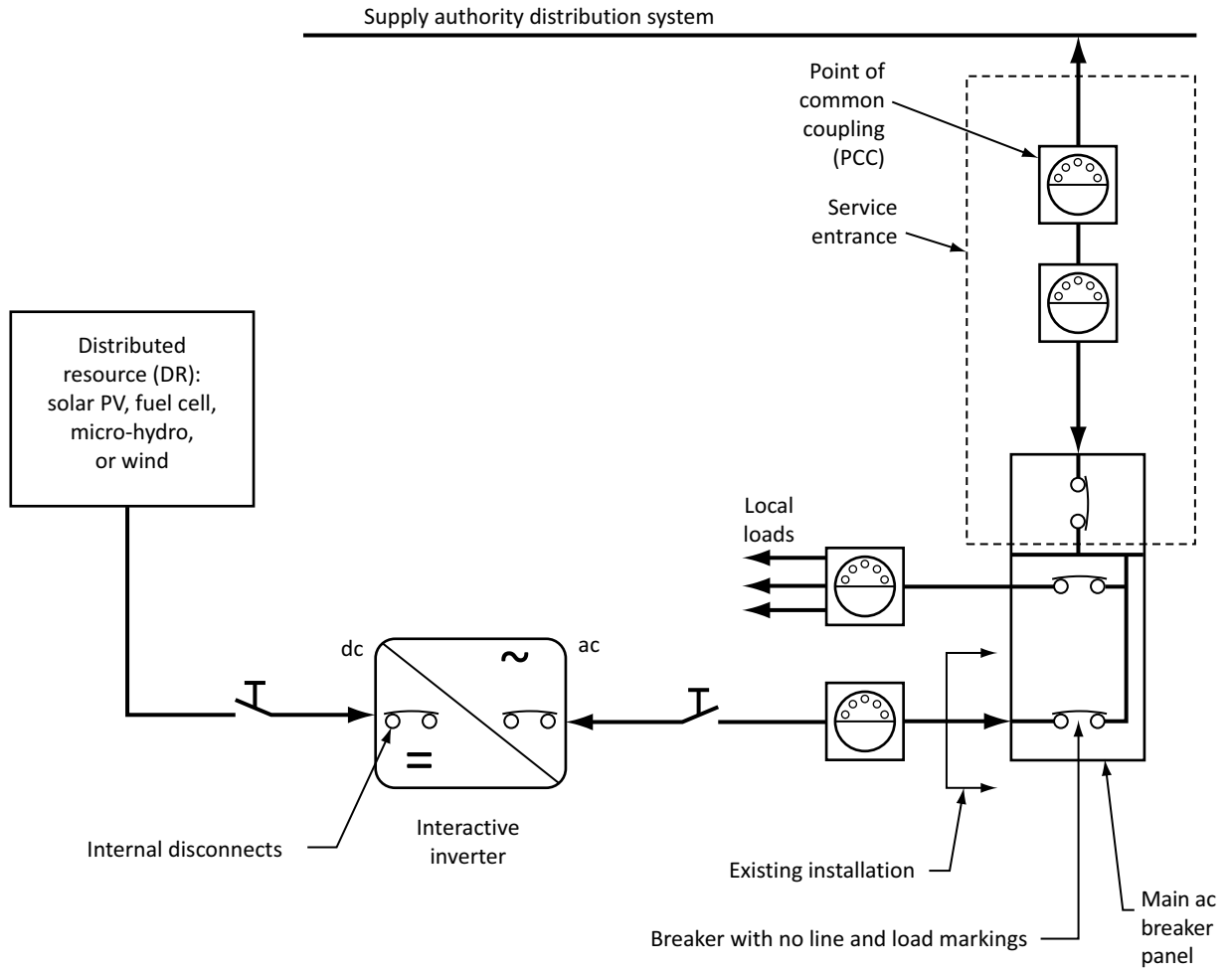
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# SECTION 64

## Δ Rule 64-000

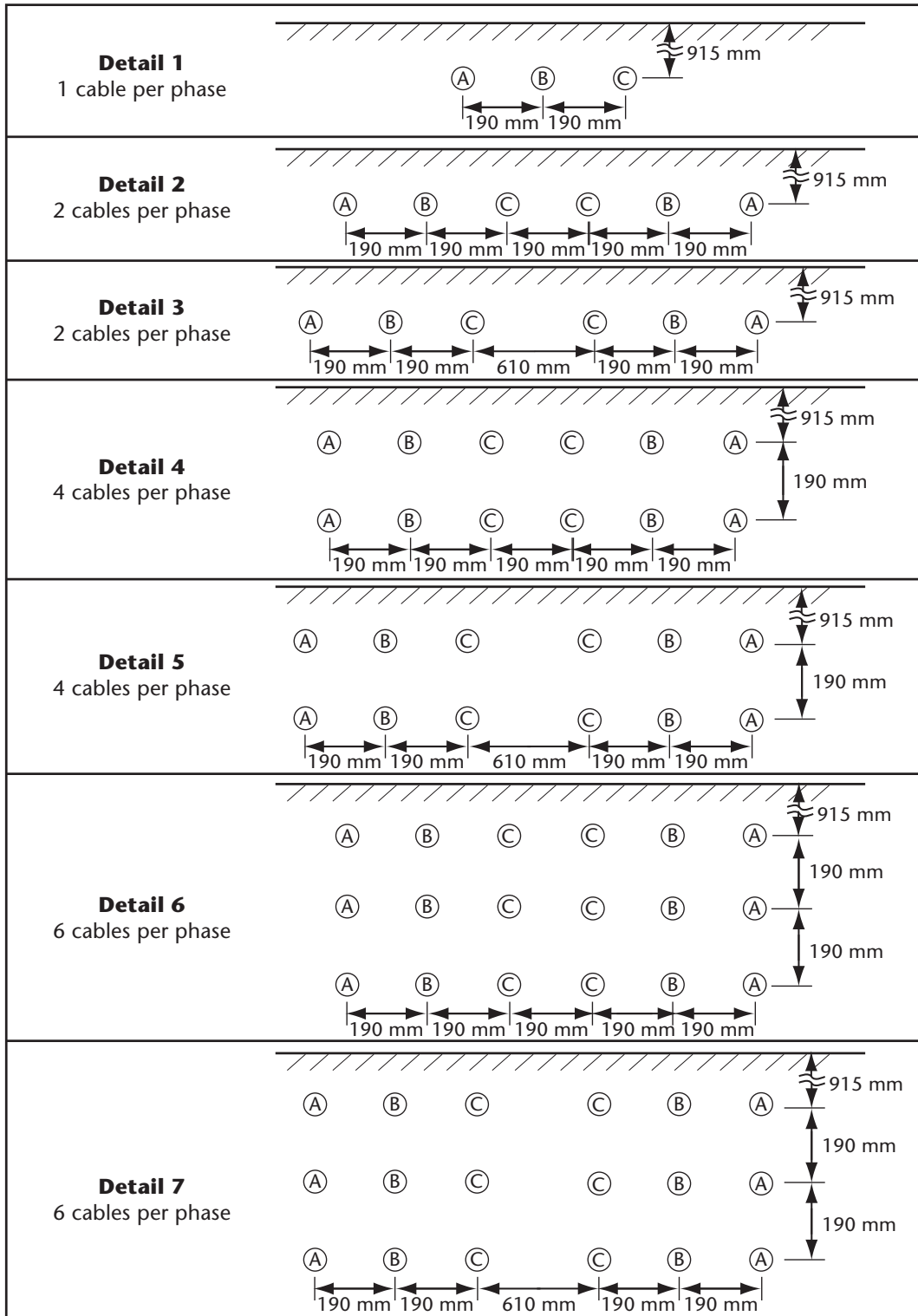
Figures B64-1 and B64-2 illustrate typical renewable energy systems and the various terms and circuits referenced in this Section.

### Figure B64-1 Typical renewable energy system



# DIAGRAM D8

## Installation configurations – Direct buried



# Annex JT

## Tables for Annex J20

**TABLE JT-63**

**Hazardous areas for propane dispensing, container filling, and storage** (See Rule J20-034.)

Part	Location	Extent of hazardous locations*	Division of Class I, Group D hazardous location
A	Storage containers other than CTC/DOT cylinders and ASME vertical containers of less than 454 kg water capacity	Within 4.5 m in all directions from connections, except connections otherwise covered in this Table	Division 2
B	Tank vehicle and tank car loading and unloading†	Within 3 m in all directions from connections regularly made or disconnected from product transfer	Division 1
		Beyond 3 m but within 7.5 m in all directions from a point where connections are regularly made or disconnected and within the cylindrical volume between the horizontal equator of the sphere and grade (see Diagram JD-7)	Division 2
C	Gauge vent openings other than those on CTC/DOT cylinders and ASME vertical containers of less than 454 kg water capacity	Within 1.5 m in all directions from point of discharge	Division 1
		Beyond 1.5 m but within 4.5 m in all directions from point of discharge	Division 2
D	Relief device discharge other than those on CTC/DOT cylinders and ASME vertical containers of less than 454 kg water capacity	Within direct path of discharge‡	Division 1
		Within 1.5 m in all directions from point of discharge	Division 1
		Beyond 1.5 m but within 4.5 m in all directions from point of discharge, except within the direct path of discharge	Division 2
E	<ul style="list-style-type: none"> <li>• Pumps, vapour compressors, gas-air mixers, and vaporizers (other than direct-fired or indirect-fired with an attached or adjacent gas-fired heat source)</li> <li>• Indoors without ventilation</li> </ul>	Entire room and any adjacent room not separated by a gas-tight partition	Division 1
		Within 4.5 m of the exterior side of any exterior wall or roof that is not vapour-tight or within 4.5 m of any exterior opening	Division 1 / Division 2
	Indoors with adequate ventilation	Entire room and any adjacent room not separated by a gas-tight partition	Division 2
	Outdoors in open air at or above grade	Within 4.5 m in all directions from this equipment and within the cylindrical volume between the horizontal equator of the sphere and grade (see Diagram JD-8)	Division 2
F	Service station dispensing units	Entire space within dispenser's enclosure, or up to a solid partition within the enclosure at any height above the base. The space within 450 mm horizontally from the dispenser enclosure up to 1.2 m above the base or to the height of a solid partition within the enclosure. Entire pit or open space beneath the dispenser	Division 1
		The space above a solid partition within the dispenser enclosure. The space up to 450 mm above grade within 6 m horizontally from any edge of the dispenser enclosure§	Division 2