



CANADIAN ELECTRICAL CODE, PART I

Consolidated Memorandum of Revisions to the 2021 (25th) edition

Notes:

1. *This document contains the first, second, and third memorandum of revisions.*
2. *Revisions are identified by a corresponding subject number in the right-hand margin.
First memorandum revisions are identified by a **black** number.
Second memorandum revisions are identified by a **blue** number.
Third memorandum revisions are identified by a **red** number.*
3. *Unless specified otherwise, revisions are indicated only by strikeout and underline.
Revisions in this memorandum are subject to editing, formatting, and renumbering.
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4. *The revisions in this memorandum were approved by the Committee on the Canadian Electrical Code, Part I, and by the Regulatory Authority Committee as of the date below.
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January 2023

Revision history

Date	Change	Document
Aug 18 2021	MOR 25-1 Released	MOR 1-2021 CE Code
Nov 3 2021	Deleted change under SN4428-26	MOR 1-2021 CE Code
Aug 5 2022	MOR 25-2 Released	MOR 25-2-2021 CE Code
Feb 6 2023	MOR 25-3 Released	MOR 25-3-2021 CE Code
Feb 7 2023	Minor fixes and edits	MOR 25-3-2021 CE Code R1
Feb 15 2023	Corrections to Section 18	MOR 25-3-2021 CE Code R1.1

REFERENCE PUBLICATIONS	
<i>Add new entry to the reference publications:</i> NFPA 853 Standard for the Installation of Stationary Fuel Cell Power Systems	SN4610

SECTION 0

Revise definition of Cable to read:

SN4533

Cable —

1) a product identified as a cable in Table 19; or

2) where not listed in Table 19, a complete manufactured assembly consisting of one or more insulated conductors, optical fibers, or both, and which may include fillers, strength members, bonding conductors, and insulating and protective material, and may also include a continuous overall covering providing a degree of electrical, mechanical, and environmental protection to the assembly.

Delete definition of Non-incendive circuit and the associated cross reference:

SN4632
SN4565-0

Circuit (see Appendix B) —

~~**Non-incendive circuit** — a circuit in which any spark or thermal effect that may occur under normal operating conditions or due to opening, shorting, or grounding of field wiring is incapable of causing an ignition of the prescribed flammable gas or vapour.~~

Non-incendive circuit — see Circuit.

Revise definition for Dwelling unit to read:

SN4569

Dwelling unit — ~~one or more rooms for the use of one or more persons as a housekeeping unit with cooking, eating, living, and sleeping facilities.~~ a suite operated as a housekeeping unit, used or intended to be used by one or more persons and containing cooking, eating, living, sleeping and sanitary facilities. (see definition for Suite)

Revise definition of Identified to read:

SN4323-0

Identified —

- a) when applied to a conductor, signifies that the conductor has
 - i) a white ~~or grey~~ covering; or
 - ii) a raised longitudinal ridge (s) on the surface of the extruded covering on certain flexible cords, either of which indicates that the conductor is a grounded conductor or a neutral; and
- b) when applied to other electrical equipment, signifies that the terminals to which grounded or neutral conductors are to be connected have been distinguished for identification by being tinned, nickel-plated, or otherwise suitably marked.

<p><i>Revise definition of Industrial establishment to read:</i></p> <p>Industrial establishment — a building or part of a building (other than office or exhibit space) or a part of the premises outside the building where persons are employed <u>for the purpose of assembling, fabricating, manufacturing, processing, repairing or storing of goods and materials</u> in manufacturing processes or in the handling of material, as distinguished from dwellings, offices, and similar occupancies.</p>	SN4637
<p><i>Revise definition of Service, consumer's to read:</i></p> <p>Service, consumer's — all that portion of the consumer's installation from the service box or its equivalent up to and including the point at which connection is made to the supply service.</p>	SN4690
<p><i>Add definition for Suite to read:</i></p> <p>Suite — <u>a single room or series of rooms of complementary use, operated under a single tenancy, and includes dwelling units, individual guest rooms in motels, hotels, boarding houses, rooming houses and dormitories (see Appendix B)</u></p>	SN4569
<p><i>Revise definition of Voltage to read:</i></p> <p>Voltage (see Appendix B) —</p> <p>Extra-low voltage —</p> <ul style="list-style-type: none"> a) for ac circuits, any voltage not exceeding 30 V ac; or b) for dc circuits, any voltage not exceeding 42.4 <u>60</u> V dc. <p>Low voltage —</p> <ul style="list-style-type: none"> a) for ac circuits, any voltage exceeding 30 V ac but not exceeding 1000 V ac; or b) for dc circuits, any voltage exceeding 42.4 <u>60</u> V dc but not exceeding 1060 <u>1500</u> V dc. <p>High voltage —</p> <ul style="list-style-type: none"> a) for ac circuits, any voltage exceeding 1000 V ac; or b) for dc circuits, any voltage exceeding 1060 <u>1500</u> V dc. 	SN4555 SN4645
<p><i>Note: The original revision added a definition for "wire mesh cable tray", contingent on approval of Subject 4684. However, Subject 4684 did not result in any change therefore, the definition for "wire mesh cable tray" has been removed.</i></p>	SN4683

SECTION 2

Revise Subrule 2-116 1) to read:

SN4744

2-116 Corrosion protection for materials used in wiring

1) Metals used in wiring, such as raceways, [cable tray](#), cable sheaths and armour, boxes, and fittings, shall be suitably protected against corrosion for the environment in which they are to be used or shall be made of suitable corrosion-resistant material.

Add new Subrule 2-306 3) to read:

SN4623

2-306 Shock and arc flash protection (see Appendix B)

1) Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centres that are installed in other than dwelling units and are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn persons of potential electric shock and arc flash hazards.

2) The marking referred to in Subrule 1) shall be located so that it is clearly visible to persons before examination, adjustment, servicing, or maintenance of the equipment.

3) Where an overcurrent protective device is rated 1200 A or higher:

a) means shall be provided to reduce the arcing fault clearing time; and

b) documentation regarding such means shall be provided and readily available to personnel that install, operate, inspect and maintain electrical equipment protected by the overcurrent protective device(s).

Revise Rule 2-328 to read:

SN4505
SN4712

2-328 Electrical equipment near ~~combustible~~ [flammable](#) gas equipment (see Appendix B)

For locations that do not have a hazardous area classification in accordance with 18-004 or J18-004, tThe clearance distance between arc-producing electrical equipment and a ~~flammable~~ ~~combustible~~ gas relief device or vent shall be in accordance with the requirements of CSA B149.1 and CSA B149.2 as applicable.

SECTION 4

Revise Rule 4-000 to read:

SN4628-4
SN4701

4-000 Scope (see Appendix B)

1) This Section applies to conductors for services, feeders, branch circuits, and photovoltaic circuits with regard to

- a) the determination of ~~maximum allowable~~ conductor ampacity for specific conditions of use;
- b) the determination of maximum conductor termination temperature;
- c) the selection of neutral conductors; and
- ~~d) the selection of a conductor type for a specific condition of use; and~~
- ed) conductor identification.

2) This Section does not apply to other conductors except where specifically referenced in other Sections of this Code.

Revise Subrule 4-004 5) to read:

SN4628-4

4-004 Ampacity of wires and cables (see Appendix B)

5) The ~~maximum allowable~~ ampacity of neutral supported cable shall be as specified in Tables 36A and 36B.

Revise Subrule 4-004 21) to read:

SN4628-4

4-004 Ampacity of wires and cables (see Appendix B)

21) The ~~maximum allowable~~ ampacity of bare or covered conductors in free air shall be as specified in Table 66.

Revise Subrule 4-004 22) to read:

SN4509

4-004 Ampacity of wires and cables (see Appendix B)

22) In ventilated and ladder-type cable trays, where the air space between adjacent insulated conductors or cables or both is maintained at greater than 100% of the diameter of the largest conductor or cable, the ampacity of the conductors or cables shall be as follows:

a) for single insulated conductors, single-conductor cable, single-conductor metal-sheathed or armoured cable, and single-conductor mineral-insulated cable:

- i) the value as specified in Tables 1 and 3; and
- ii) the value as specified in Table 12E when Type DLO cable is marked Type TC and is used in accordance with Rule 4-034 2); and

b) for multi-conductor cables, the value as specified in Tables 2 and 4 multiplied by the correction factor from Table 5C for the number of conductors in each cable.

<p><i>Revise Subrule 4-004 26) to read:</i></p> <p>4-004 Ampacity of wires and cables (see Appendix B) 26) Where cablebus is installed in a location with an ambient temperature exceeding or anticipated to exceed 30 °C, the ampacity correction factors of Table 5A shall be applied to the cablebus allowable-conductor ampacities marked on the cablebus nameplate.</p>	SN4628-4
<p><i>Revise Subrule 4-006 1) to read:</i></p> <p>4-006 Temperature limitations (see Appendix B) 1) Where equipment is marked with a maximum conductor termination temperature, the minimum size of conductor used shall be based on the allowable-ampacity in the temperature column in Table 1, 2, 3, or 4, with all relevant correction factors being applied as required by Rule 4-004, corresponding to the maximum termination temperature marked on the equipment.</p>	SN4628-4

<h2>SECTION 6</h2>	
<p><i>Note: This revision is suspended until Standard ANSI/CAN UL1008M is listed in Appendix A of the CE Code, Part I.</i></p> <p><i>Add new terminology to Rule 6-100 to read:</i></p> <p>6-100 Special terminology (see Appendix B)</p> <p><u>Meter-mounted transfer switch</u> – a transfer switch that is mounted between the jaws of the meter mounting device and the supply authority meter.</p>	<p>SN4604</p>
<p><i>Revise Subrule 6-212 3) to read:</i></p> <p>6-212 Wiring space in enclosures</p> <p>3) Consumer's service conductors that enter a service box that is not equipped with a barrier between the line and load sides shall</p> <ul style="list-style-type: none"> a) enter the service box as close as possible practicable to the line terminals of the main switch or circuit breaker; and b) not come into contact with or cross conductors connected to the load terminals of the main switch or circuit breaker. 	<p>SN4661</p>
<p><i>Revise Subrule 6-302 1) to read:</i></p> <p>6-302 Installation of overhead consumer's service conductors</p> <p>1) Conductors of a consumer's service that are located above ground, at any point, on a building or other structure shall be installed in one of the following ways:</p> <ul style="list-style-type: none"> a) rigid conduit; b) busway; c) steel electrical metallic tubing; d) flexible metal conduit, with lead-sheathed conductors; e) mineral-insulated cable other than the lightweight type; f) aluminum-sheathed cable or copper-sheathed cable; g) Type ACWU75 or Type ACWU90 cable; h) Type AC90 cable; or i) Type TECK90 cable; or j) Type NS75 or NS90 cable. 	<p>SN4308</p>
<p><i>Note: This revision is suspended until Standard ANSI/CAN UL1008M is listed in Appendix A of the CE Code, Part I.</i></p> <p><i>Revise Rule 6-200 to read:</i></p> <p>6-200 Service equipment (see Appendix B)</p> <p>1) Except as provided in Subrule 2), each consumer's service shall be provided with a single service box.</p>	<p>SN4604</p>

<p>2) More than one service box shall be permitted to be connected to a single consumer's service, provided that</p> <ul style="list-style-type: none"> a) the subdivision is made in a multiple or dual lug meter mounting device rated at not more than 600 A and 150 volts-to-ground; and b) the meter mounting device is located outdoors. <p>3) For the application of Rule 6-104, each subdivision of the meter mounting device shall be considered a consumer's service.</p> <p><u>4) Meter-mounted transfer switches shall be permitted to be connected on the line side of the service box provided that the</u></p> <ul style="list-style-type: none"> <u>a) meter-mounted transfer switch is rated for the calculated load in accordance with Rule 8-104;</u> <u>b) meter mounting device is rated not more than 200 A and installed in accordance with Rule 6-402 2); and</u> <u>c) installation includes a caution label on the meter mounting device or the meter-mounted transfer switch indicating that the generator shall not contain a system bonding jumper.</u> 	
<p><i>Revise Rule 6-308 to read:</i></p> <p>6-308 Use of bare neutral <u>conductors</u> in consumer's services</p> <p><u>1) Where a neutral conductor is installed in a consumer's service raceway it shall be insulated.</u></p> <p><u>2) A bare neutral conductor shall be permitted to be installed in accordance with Rule 6-302, when such neutral conductor is used as a part of assembly of</u></p> <ul style="list-style-type: none"> <u>a) a busway; or</u> <u>b) neutral supported cables NS75 or NS90.</u> <p>The neutral conductor of a consumer's service shall be permitted to be bare if this conductor is</p> <ul style="list-style-type: none"> a) made of copper and is run in a raceway; b) made of aluminum and is run above ground in a non-metallic or an aluminum raceway; c) part of a busway or of a service entrance cable; or d) part of a neutral supported cable used in accordance with Rule 6-302 2). 	SN4308
<p><i>Revise Rule 6-400 to read:</i></p> <p>Rule 6-400 Metering equipment</p> <p>Metering equipment includes any current and potential <u>instrument</u> transformers <u>(current or voltage)</u> as well as the associated measuring instruments.</p>	SN4707
<p><i>Revise Subrule 6-402 2) to read:</i></p> <p>6-402 Method of installing meter loops (see Appendix B)</p> <p>2) Metering equipment shall be connected on the load side of the service box, except that it shall be permitted to be connected on the supply side where</p> <ul style="list-style-type: none"> a) no live parts or wiring are exposed, b) the supply is ac, and the voltage does not exceed 300 V between conductors, and c) the rating of the consumer's 	SN4512

<p>service does not exceed</p> <ul style="list-style-type: none"> i) 200 A for a meter mounting device; ii) 320 A for a meter mounting device equipped with a bypass means; or iii) 600 A for a transformer rated meter mounting device located outdoors; <p><u>or</u></p> <p><u>b) a single or multiple meter mounting device, rated 300 Volts or less between conductors is provided as an integral part of service equipment for use in nonhazardous locations.</u></p>	
<p><i>Revise Subrule 6-408 1) to read:</i></p> <p>6-408 Location of meters (See Appendix B)</p> <p>1) Meters and metering equipment shall be</p> <ul style="list-style-type: none"> a) located as near as practicable to the service box except as provided for in Subrule 2); b) grouped where practicable; c) readily accessible; d) not located in coal bins, clothes closets, bathrooms, stairways, high-ambient rooms <u>or spaces with high ambient temperatures</u>, dangerous or hazardous locations, nor in any similar undesirable places; e) if mounted outdoors, of weatherproof construction or in weatherproof enclosures; and f) in compliance with the requirements of the supply authority. 	SN4576

SECTION 8

Revise Subrules 8-104 5) and 6) to read:

SN4528-8

8-104 Maximum circuit loading (see Appendix B)

5) Where a fused switch or circuit breaker is marked for continuous operation at 100% of the ampere rating of its overcurrent devices, the continuous load as determined from the calculated load shall not exceed the continuous operation marking on the fused switch or circuit breaker and

- a) except as required by Item b), shall not exceed 100% of the ~~allowable~~ ampacities of conductors selected in accordance with Section 4; or
- b) shall not exceed 85% of the ~~allowable~~ ampacities of single conductors selected in accordance with Section 4.

6) Where a fused switch or circuit breaker is marked for continuous operation at 80% of the ampere rating of its overcurrent devices, the continuous load as determined from the calculated load shall not exceed the continuous operation marking on the fused switch or circuit breaker and

- a) except as required by Item b), shall not exceed 80% of the ~~allowable~~ ampacities of conductors selected in accordance with Section 4; or
- b) shall not exceed 70% of the ~~allowable~~ ampacities of single conductors selected in accordance with Section 4.

Revise Subrule 8-106 11) to read:

SN4519
SN4620-8

8-106 Use of demand factors (see Appendix B)

11) For the purposes of Rules 8-200 1) a) vi), 8-202 1) a) vii), 8-202 3) d), 8-204 1) d), 8-206 1) d), 8-208 1) d), and 8-210 c), where an electric vehicle energy management system as described in Subrule 10) performs the functions of

a) monitoring ~~monitors~~ the consumer's service, ~~and~~ feeders, and branch circuits and

b) controlling ~~controls~~ the electric vehicle supply equipment loads in accordance with Rule 8-500,

the demand load for the electric vehicle supply equipment shall not be required to be considered in the determination of the calculated load.

Revise Item 8-110 c) to read:

SN4353
SN4635

8-110 Determination of areas

The living area designated in Rules 8-200 and 8-202 shall be determined from inside dimensions and include the sum of

<p>a) 100% of the area on the ground floor;</p> <p>b) 100% of any areas above the ground floor used for living purposes; and</p> <p>c) 75% of the <u>only those</u> areas below the ground floor <u>that exceed 1.8 m in height, measured from the lowest part of the ceiling assembly to the ground or other surface below it.</u></p>	
<p><i>Revise Subrule 8-200 2) to read:</i></p> <p>8-200 Single dwellings (see Appendix B)</p> <p>2) The calculated load for the consumer's service or feeder conductors supplying two or more dwelling units of row housing shall be based on</p> <p>a) the calculated load in the dwelling unit, as determined in accordance with Subrule 1), excluding <u>electric vehicle supply equipment loads, described in paragraph 8-202(1)(a)(vii).</u> any electric space-heating loads, and any air-conditioning loads, with application of demand factors to the calculated loads as required by Rule 8-202 3) a) i) to v); plus</p> <p>b) the requirements of Rule 8-202 3) b) to e).</p>	SN4729
<p><i>Revise Rule 8-202 to read:</i></p> <p>8-202 Apartment and similar buildings (see Appendix B)</p> <p>1) The calculated load for the service or feeder from a main service supplying loads in dwelling units shall be the greater of Item a) or b):</p> <p>a)</p> <ul style="list-style-type: none"> i) a basic load of 3500 W for the first 45 m² of living area (see Rule 8-110); plus ii) an additional 1500 W for the second 45 m² or portion thereof; plus iii) an additional 1000 W for each additional 90 m² or portion thereof in excess of the initial 90 m²; plus iv) any electric space-heating loads provided for with demand factors as permitted in Section 62 plus any air-conditioning loads with a demand factor of 100%, subject to Rule 8-106 3); plus v) any electric range load provided for as follows: 6000 W for a single range plus 40% of any amount by which the rating of the range exceeds 12 kW; plus vi) any electric tankless water heaters or electric water heaters for steamers, swimming pools, hot tubs, or spas with a demand factor of 100%; plus <u>vii) any electrical vehicle supply equipment loads, if they are supplied from a panelboard installed in a dwelling unit, with a demand factor of 100%; plus</u> <u>viii) any loads provided for, in addition to those outlined in Items i) to vi), at</u> <ul style="list-style-type: none"> A) 25% of the rating of each load with a rating in excess of 1500 W, if an electric range has been provided for; or B) 25% of the rating of each load with a rating in excess of 1500 W plus 6000 W, if an electric range has not been provided for; or <p>b) 60 A.</p> <p>2) The total load calculated in accordance with Subrule 1) and Subrule 3) a), b), and</p>	<p>SN4519 SN4681</p>

<p>c) shall not be considered to be a continuous load for the application of Rule 8-104.</p> <p>3) The calculated load for the consumer's service or feeder supplying two or more dwelling units shall be based on the calculated load obtained from Subrule 1) a) and the following:</p> <ul style="list-style-type: none"> a) excluding any electric vehicle supply equipment loads, electric space-heating loads and any air-conditioning loads, the load shall be considered to be <ul style="list-style-type: none"> i) 100% of the calculated load in the unit having the heaviest load; plus ii) 65% of the sum of the calculated loads in the next 2 units having the same or next smaller loads to those specified in Item i); plus iii) 40% of the sum of the calculated loads in the next 2 units having the same or next smaller loads to those specified in Item ii); plus iv) 25% of the sum of the calculated loads in the next 15 units having the same or next smaller loads to those specified in Item iii); plus v) 10% of the sum of the calculated loads in the remaining units; b) if electric space heating is used, the sum of all the space-heating loads as determined in accordance with the requirements of Section 62 shall be added to the load determined in accordance with Item a), subject to Rule 8-106 3); c) if air conditioning is used, the sum of all the air-conditioning loads shall be added, with a demand factor of 100%, to the load determined in accordance with Items a) and b), subject to Rule 8-106 3); d) except as permitted by Rule 8-106 10) or Rule 8-106 11), any electric vehicle supply equipment loads not located in dwelling units not supplied from a panelboard installed in a dwelling unit in accordance with Rule 8-202(1)(a)(vii). shall be added with a demand factor of 100% as specified in Table 38; and e) in addition, any lighting, heating, and power loads not located in dwelling units shall be added with a demand factor of 75%. <p>4) The ampacity of feeder conductors from a service supplying loads not located in dwelling units shall be not less than the rating of the equipment installed with demand factors as permitted by this Code.</p>	
<p><i>Revise Item 8-204 1) d) to read:</i></p> <p>8-204 Schools</p> <p>1) The calculated load for the service or feeder shall be based on the following:</p> <ul style="list-style-type: none"> a) a basic load of 50 W/m² of classroom area; plus b) 10 W/m² of the remaining area of the building based on the outside dimensions; plus c) electric space-heating, air-conditioning, and total loads of other permanently connected equipment based on the rating of the equipment installed; plus d) except as permitted by Rule 8-106 10) or Rule 8-106 11), any electric vehicle supply equipment loads with a demand factor of 100% as specified in Table 38; plus e) cord-connected equipment intended for connection to receptacles rated more than 125 V or 20 A based on <ul style="list-style-type: none"> i) 80% of the rating of the receptacle; or 	<p>SN4681</p>

<p>ii) the rating of the equipment intended for connection to the receptacle.</p>	
<p><i>Revise Item 8-206 1) d) to read:</i></p> <p>8-206 Hospitals</p> <p>1) The calculated load for the service or feeder shall be based on the following:</p> <ul style="list-style-type: none"> a) a basic load of 20 W/m² of the area of the building based on the outside dimensions; plus b) 100 W/m² for high-intensity areas such as operating rooms; plus c) electric space-heating, air-conditioning, and total loads of other permanently connected equipment based on the rating of the equipment installed; plus d) except as permitted by Rule 8-106 10) or Rule 8-106 11), any electric vehicle supply equipment loads with a demand factor of 100%as specified in Table 38; plus e) cord-connected equipment intended for connection to receptacles rated more than 125 V or 20 A based on <ul style="list-style-type: none"> i) 80% of the rating of the receptacle; or ii) the rating of the equipment intended for connection to the receptacle. 	<p>SN4681</p>
<p><i>Revise Item 8-208 1) d) to read:</i></p> <p>8-208 Hotels, motels, dormitories, and buildings of similar occupancy (see Appendix B)</p> <p>1) The calculated load for the service or feeder shall be based on the following:</p> <ul style="list-style-type: none"> a) a basic load of 20 W/m² of the area of the building, based on the outside dimensions; plus b) lighting loads for special areas such as ballrooms, based on the rating of the equipment installed; plus c) electric space-heating, air-conditioning, and total loads of other permanently connected equipment based on the rating of the equipment installed; plus d) except as permitted by Rule 8-106 10) or Rule 8-106 11), any electric vehicle supply equipment loads with a demand factor of 100%as specified in Table 38; plus e) cord-connected equipment intended for connection to receptacles rated more than 125 V or 20 A based on <ul style="list-style-type: none"> i) 80% of the rating of the receptacle; or 	<p>SN4681</p>

ii) the rating of the equipment intended for connection to the receptacle.	
<p><i>Revise Item 8-210 c) to read:</i></p> <p>8-210 Other types of occupancy The calculated load for the service or feeder for the types of occupancies listed in Table 14 shall be based on</p> <p>a) a basic load in watts per square metre as required by Table 14 for the area of the occupancy served based on the outside dimensions of the occupancy, with application of demand factors as indicated in Table 14; plus</p> <p>b) special loads such as electric space-heating, air-conditioning, motor loads, show window lighting, stage lighting, etc., based on the rating of the equipment installed with demand factors permitted by this Code; plus</p> <p>c) except as permitted by Rule 8-106 10) or Rule 8-106 11), any electric vehicle supply equipment loads with a demand factor of 100%as specified in Table 38.</p>	SN4681

SECTION 10

Revise Rule 10-004 definition for Solidly grounded system to read:

SN4320

Solidly grounded system — an electrical system in which a point of that system is connected, without inserting an impedance grounding device,

- a) to a system bonding jumper; and
- b) ~~by a grounding conductor,~~ to a grounding electrode or to a conductive body that extends the ground connection.

Revise Rule 10-004 definition for System bonding jumper to read:

SN4320

System bonding jumper — a connection between the ~~system-grounded~~ point of an electrical system to be solidly grounded and the non-current carrying conductive parts of ~~an~~ that electrical system ~~to establish a solidly grounded system.~~

Revise Rule 10-206 to read:

SN4356

10-206 AC systems required to be solidly grounded

- 1) Except as permitted by Subrule 2), ac ~~AC~~ systems exceeding extra-low voltage shall be solidly grounded. ~~if~~
 - ~~a) by doing so, their maximum voltage to ground does not exceed 150 V; or~~
 - ~~b) the system incorporates a neutral conductor.~~
- 2) AC systems in other than dwelling units ~~exceeding the value prescribed by Subrule 1) a)~~ shall be permitted to be ungrounded or impedance grounded, ~~provided that they meet the requirements for~~
 - ~~a) ungrounded systems; or~~
 - ~~b) impedance grounded systems.~~
- 3) Extra-low-voltage ac systems shall be solidly grounded where
 - a) run overhead outside;
 - b) supplied by transformers energized from systems of more than 150 volts-to-ground; or
 - c) supplied by transformers energized from ungrounded systems.

Revise Rule 10-212 to read:

SN4319

10-212 Grounding connections for solidly grounded separately derived ac systems (see Appendix B)

- 1) Except as permitted by Subrule 23), the grounded conductor of a solidly grounded separately derived ac system shall
 - a) be connected to the equipment bonding terminal by a system bonding jumper
 - i) at the point of termination to each source;
 - ii) at the first switch controlling the system; or
 - iii) at the tie point, where two or more systems terminate at a tie point;
 - b) be connected to a grounding conductor at the same point on the separately derived system where the system bonding jumper is connected; and

<p>c) have no other connection to the non-current-carrying conductive parts of electrical equipment on the supply side or the load side of the grounding connection.</p> <p><u>2) Where more than one source of supply exists that are intended to be solidly grounded, the connection required by item 1) shall be permitted to be made to a single grounding conductor.</u></p> <p><u>32)</u> A separately derived ac system operating at 750 V or less shall be permitted to be grounded by the system bonding jumper that is connected to the bonding conductor included in the primary supply.</p>	
<p><i>Revise Subrule 10-308 1) to read:</i></p> <p>10-308 Conductors used with impedance grounding devices (see Appendix B)</p> <p>1) The conductor connecting the impedance grounding device to the system source shall</p> <ul style="list-style-type: none"> a) be insulated for the nominal system voltage; b) be identified white-or grey; c) be routed as directly as practicable; d) not be grounded; e) be sized to conduct the rated current of the impedance grounding device, and in no case less than <ul style="list-style-type: none"> i) No. 12 AWG if of copper; or ii) No. 10 AWG if of aluminum; and f) be protected from damage <ul style="list-style-type: none"> i) mechanically; or ii) by location. 	SN4323-10
<p><i>Revise Subrule 10-400 1) to read:</i></p> <p>10-400 Ungrounded systems (see Appendix B)</p> <p>1) DC or ac systems shall be permitted to be ungrounded, provided that the system is</p> <ul style="list-style-type: none"> a) <u>is</u> equipped with suitable ground fault detection; and <u>b) does not include a distributed neutral conductor; and</u> <u>c) b) is</u> maintained by qualified persons. 	SN4356
<p><i>Revise Rule 10-604 to read:</i></p> <p>10-604 Bonding continuity for service equipment (see Appendix B)</p> <p>1) The bonding continuity for service equipment, raceways, cable armour, cable sheaths, and all service equipment enclosures containing service conductors, including meter fittings, boxes, or the like, shall be assured by <u>bonding means prescribed in Rule 10-610.</u></p> <ul style="list-style-type: none"> a) threaded couplings and threaded connections to the conductive enclosures, with joints made up tight where rigid metal conduit is used; b) couplings and connectors made up tight where electrical metallic tubing is used; and c) bonding bushings supplemented with a bonding conductor where the connection to the enclosure is made using standard locknuts. 	SN4591

<p><u>2) Standard locknuts serving as the bonding means for metal raceway, metal sheath, or cable armour connecting to service equipment shall be supplemented by bonding bushings with a bonding conductor connecting to a bonding bus within the enclosure</u></p> <p><u>a) at both ends where the metal raceway, metal sheath, or cable armour serves as the bonding means between service equipment; or</u></p> <p><u>b) at one end where</u></p> <p><u>i) a bonding conductor is run with circuit conductors; or</u></p> <p><u>ii) the termination to service equipment is only at one end.</u></p> <p>2)3) Notwithstanding Subrule 2) 4)e), bonding bushings shall not be required for cable assemblies incorporating an internal bonding conductor in continuous contact with the cable armour, provided that the internal bonding conductor extends from the cable and connects to the service equipment.</p>	
<p><i>Add new Subrule 10-612 3) and renumber existing Subrules 10-612 3) to 7) as 4) to 8):</i></p> <p>10-612 Installation of bonding conductors <u>(see Appendix B)</u></p> <p>1) The bonding conductor shall be permitted to be spliced or tapped.</p> <p>2) Where more than one bonding conductor enters a box, all such conductors shall be in electrical contact with each other by one of the following means:</p> <p>a) securing all bonding conductors under bonding screws; or</p> <p>b) connecting all bonding conductors together with a solderless connector, and then connecting a minimum of one conductor, not smaller than the largest bonding conductor, to the box by a bonding screw or a bonding device.</p> <p>3) <u>Notwithstanding the requirements of Subrule 2) and Rule 10-614 (3), equipment shall be permitted to be connected to an isolated bonding conductor that extends directly back to its source of supply, or to the main system bonding jumper, provided that the separate bonding conductor is:</u></p> <p><u>a) enclosed in the same raceway or cable containing the circuit conductors throughout the length of that cable or raceway,</u></p> <p><u>b) sized not less than as required in Rule 10-616, and</u></p> <p><u>c) insulated.</u></p> <p>4) 3)</p> <p>5) 4)</p> <p>6) 5)</p> <p>7) 6)</p> <p>8) 7)</p>	<p>SN4655</p>
<p><i>Revise Rule 10-616 to read:</i></p> <p>10-616 Size of system bonding jumper or bonding conductor (see Appendix B)</p> <p>1) The size of a field-installed system bonding jumper shall not be less than that determined in accordance with Table 16 based on the ampere rating or setting of the overcurrent device protecting the ungrounded conductors.</p> <p>2) The size of a bonding conductor installed in accordance with Rule 10-604 at</p>	<p>SN4628-10</p>

<p>service equipment shall not be less than that determined in accordance with Table 16 based on the allowable ampacity of the largest ungrounded conductor.</p> <p>3) The size of a field-installed bonding conductor installed at other than service equipment shall not be less than that determined in accordance with Table 16 based on</p> <ul style="list-style-type: none"> a) the ampere rating or setting of the overcurrent device protecting the ungrounded conductors; or b) the allowable ampacity of the largest ungrounded conductor for installations where the size of the circuit conductors is increased to compensate for voltage drop. <p>4) The size of a field-installed bonding conductor installed with each group of parallel conductors run in separate raceways or cables shall be in accordance with Subrule 3) divided by the number of groups of parallel conductors.</p> <p>5) Notwithstanding Subrules 2), 3), and 4), the bonding conductor shall not be required to be larger than the current-carrying conductors.</p> <p>6) A metal raceway that is permitted to be used as a bonding conductor shall be considered to meet the requirements of this Rule.</p> <p>7) A bonding means that is integral to a cable assembly shall be considered to meet the requirements of this Rule.</p>	
<p><i>Revise Rule 10-702 to read:</i></p> <p>10-702 Installation (See Appendix B)</p> <ul style="list-style-type: none"> 1) Conductors for equipotential bonding shall be permitted to be installed as open wiring, provided that they are adequately secured. 2) Where installed in structural members, conductors for equipotential bonding shall be installed in the same manner as non-metallic sheathed cable, except that they do not require bushed holes where run through metal studs. 3) <u>Equipotential bonding of the non-electrical equipment referred to in Rule 10-700 shall be permitted to be made by a permanent conductive connection to the non-current carrying conductive parts of electrical equipment, provided the electrical equipment is</u> <ul style="list-style-type: none"> <u>a) supplied by a permanently connected circuit incorporating a bonding conductor; and</u> <u>b) associated with the non-electrical equipment that is being made equipotential.</u> 	SN4514
<p><i>Revise Rule 10-708 to read:</i></p> <p>10-708 Equipotential bonding conductor size</p> <p>10-708 Equipotential bonding conductor size</p> <ul style="list-style-type: none"> 1) Except as permitted by Subrule 2) <u>or 3)</u>, the size of an equipotential bonding conductor <u>installed as exposed wiring where not subject to mechanical damage</u> shall be not smaller than <ul style="list-style-type: none"> a) No. 6 AWG if of copper; or b) No. 4 AWG if of aluminum. 	SN4514 SN4725

<p>2) The size of an equipotential bonding conductor installed as concealed wiring and <u>or provided with</u> mechanically protected <u>protection</u> shall be permitted to be a minimum No. 10 AWG copper or No. 8 AWG aluminum</p> <p><u>a) No. 10 AWG if of copper; or</u> <u>b) No. 8 AWG if of aluminum.</u></p> <p>3) <u>The size of an equipotential bonding conductor shall be permitted to be as prescribed by Rule 10-616 when installed in accordance with Rule 10-702 3).</u></p>	
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SECTION 12

Add new Rule 12-002 to read:

SN4644

12-002 Special terminology

In this Section, the following definitions shall apply:

Grade level in-ground enclosure – a housing the top of which is installed flush with the ground, and which provides access to equipment located therein through a secured cover.

Revise Subrule 12-012 12), add new Subrules 13) and 14), and renumber Subrule 13) as 15):

SN4644

12-012 Underground installations (see Appendix B)

12) Where underground raceways, or cables, or grade level in-ground enclosures are subject to movement by settlement or frost, provision shall be made for the prevention of damage to the conductors, conductor insulation, or the electrical equipment.

13) Grade level in-ground enclosures shall be used in accordance with the manufacturers' design class (tier).

14) Except for splicing installed in accordance with Rule 12-112, devices such as receptacles and switches shall not be permitted in grade level in-ground enclosures.

~~13)~~ 15) For installations not covered by the foregoing requirements of this Rule, the requirements of CSA C22.3 No. 7, or the applicable standard, whichever is more stringent, shall apply.

Revise Rule 12-112 to read:

SN4644

12-112 Conductor joints and splices (see Appendix B)

1) Conductors shall be spliced or joined with splicing devices or by brazing, welding, or soldering with a fusible metal or alloy.

2) Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered.

3) Joints or splices shall be covered with an insulation equivalent to that on the conductors being joined.

4) Joints or splices in conductors and cables shall be accessible.

5) Joints or splices in conductors and cables in grade level in-ground enclosures shall be in accordance with Subrule 6) b) and suitable for wet locations.

~~5)~~ 6) Splices in underground runs of cable, if required due to damage to the original installation, shall be permitted to be made

a) in junction boxes suitably protected from mechanical damage that are located at least 1 m above grade and secured to buildings or to stub poles; or

b) notwithstanding the requirements of Subrule 4), by means of splicing devices or materials (kits) for direct earth burial; or

c) in grade level in-ground enclosures intended for the purpose and not subject to vehicular traffic, by means of splice connectors suitable for wet locations.

<p><i>Revise Rule 12-116 to read:</i></p> <p>12-116 Termination of conductors (see Appendix B)</p> <p>1) Connection of conductors to terminal parts shall be made by means of pressure connectors, solder lugs, or splices to flexible leads.</p> <p>2) The portion of stranded conductors to be held by binding-screw terminals or solderless wire connectors shall have the strands confined so that there will be no stray strands to cause either short-circuits or grounds.</p> <p>3) Stranded and solid conductors No. 10 AWG and smaller shall be permitted to be connected by means of binding-screw terminals or studs and nuts that have upturned lugs or the equivalent.</p> <p>4) Stranded and solid conductors larger than No. 10 AWG shall be terminated in solderless conductor connectors or shall be permitted to be soldered into conductor connectors suitable for the purpose, except where prohibited by Section 10.</p> <p><u>5) Fine-strand conductors shall terminate in</u> <u>a) connectors identified for use with fine-strand conductors; or</u> <u>b) standard connectors with the use of ferrules.</u></p> <p><u>6) Ferrules shall not be used on solid conductors.</u></p>	<p>SN4665</p>
<p>Note: This revision is contingent on approval of related changes to Section 76.</p> <p><i>Add new Rule 12-124 to read:</i></p> <p><u>12-124 Temporary Installation of Single Conductor Cables</u> <u>Except as provided for by other Rules of this Code, single conductor cables terminated into single-pole connectors for single-conductor cables shall only be installed in accordance with Rule 76-100.</u></p>	<p>SN4148-12</p>
<p><i>Revise Subrule 12-406 4) to read:</i></p> <p>12-406 Uses of portable power cable (see Appendix B)</p> <p>4) Notwithstanding Subrule 3) a), Type DLO cable in sizes 1/0 or larger shall be permitted to be used in permanent installations in cable tray, provided that the cable</p> <ul style="list-style-type: none"> a) is marked as Type TC cable; b) conforms with the conditions of use for Type TC cable in accordance with Rule 12-2202 and as listed in Table 19; c) terminates in <ul style="list-style-type: none"> <u>i) connectors marked for use with fine-strand conductorscables; or</u> <u>ii) standard connectors with the use of ferrules; and</u> d) has an ampacity rating as described in Table 12E and Rule 4-004. 	<p>SN4665</p>
<p><i>Revise Rule 12-608 to read:</i></p> <p>12-608 Continuity of armoured cable</p> <p><u>1) Armoured cable shall be run in a manner such that the mechanical and electrical continuity of the armour is maintained throughout the run, and the armour of cables shall be mechanically and electrically secured to all equipment to which it is attached.</u></p>	<p>SN4782</p>

<p><u>2) Notwithstanding Subrule 1), electrical continuity between the armour and the equipment shall not be required at the final point of termination of a feeder or branch circuit provided that</u></p> <p><u>a) the enclosure at the final point of termination is non-metallic;</u></p> <p><u>b) an electrical connection between the armour and the bonding system has been established at the supply end of the cable run; and</u></p> <p><u>c) the equipment at the final point of termination is bonded using the internal bonding conductor of the cable.</u></p>	
<p><i>Revise Subrule 12-930 1) to read:</i></p> <p>12-930 Raceways installed underground or where moisture may accumulate (see Appendix B)</p> <p>1) The requirements for Category 1 locations as specified in Section 22 shall be complied with where raceways are installed</p> <p>a) underground;</p> <p>b) in concrete slabs or other masonry in direct contact with the earth; or</p> <p><u>c) in the portion of masonry in direct contact with the earth; or</u></p> <p>e) d) in other locations where the conductors are subject to moisture.</p>	SN4274
<p><i>Revise Rule 12-2252 to read:</i></p> <p>12-2252 Use of cablebus (see Appendix B)</p> <p>1) Class A cablebus shall be permitted for installations</p> <p>a) accessible to the public; or</p> <p>b) where Class B cablebus is permitted.</p> <p>2) Class B cablebus shall be permitted only for installations <u>provided that</u></p> <p>a) <u>the installation is serviced</u> accessible <u>only to authorized</u> by qualified <u>persons; and</u></p> <p>b) <u>the installation is inaccessible to the public</u> isolated by elevation or by barriers;</p> <p>and</p> <p>c) serviced by qualified electrical maintenance personnel.</p>	SN4682
<p><i>Revise Subrule 12-2258 2) to read:</i></p> <p>12-2258 Provisions for bonding (see Appendix B)</p> <p>1) Where metal supports for metal cablebus are bolted to the cablebus enclosure and are in good electrical contact with the grounded structural metal frame of a building, the cablebus enclosure shall be deemed to be bonded to ground.</p> <p>2) Where the conditions of Subrule 1) do not apply, the metal cablebus shall be adequately bonded</p> <p>a) at intervals not exceeding 15 m, and the size of bonding conductors shall be based on the allowable ampacity as specified in Rule 10-616; or</p> <p>b) at both ends, where the cablebus enclosure is marked for use as a bonding conductor.</p>	SN4628-12

SECTION 14

Revise Subrule 14-104 1) to read:

SN4628-14

14-104 Rating of overcurrent devices (see Appendix B)

- 1) The rating or setting of overcurrent devices shall not exceed the allowable ampacity of the conductors that they protect, except
- a) where a fuse or circuit breaker having a rating or setting of the same value as the ampacity of the conductor is not available, and the maximum calculated or known load is in accordance with the Rules of Section 8, the ratings or settings given in Table 13 shall be permitted to be used within the maximum value of 800 A;
 - b) in the case of equipment wire, flexible cord in sizes Nos. 16, 18, and 20 AWG copper, and tinsel cord, which are considered protected by 15 A overcurrent devices; or
 - c) as provided for by other Rules of this Code.

SECTION 16

Revise Subrule 16-222 2) to read:

SN4630

16-222 Equipment located on the load side of overcurrent protection, transformers, or devices having class 2 outputs

2) Notwithstanding Subrule 1) a), lighting products, electromedical equipment, equipment for hazardous locations, ~~and~~ thermostats incorporating heat anticipators and the field installed insulated conductors and cables, connected to these products, shall comply with Rule 2-024(1).

Revise special terminology for Cable bundle to read:

SN4592

16-310 Special terminology (see Appendix B)

In this Subsection, the following definitions shall apply:

Cable bundle — two or more cables that are tied together or in contact with one another in a closely packed configuration, ~~for a length of at least 1 m.~~

Revise Rule 16-330 to read:

SN4592

16-330 Cables and conductor ampacity (see Appendix B)

1) Conductors for Class 2 power and data communication circuits shall be suitable for the application in accordance with Rule 12-102 3).

2) Where communication cable marked with the suffix “-LP” is used

- a) the maximum current that each insulated conductor is permitted to carry shall be limited to the current rating marked on the cable; and
- b) ampacities for conductors smaller than No. 26 AWG, or for conductors in cable bundles of a length of 1 m or more, and of more than 192 cables, shall be permitted to be determined by a qualified person, as recognized by the regulatory authority having jurisdiction, provided that a deviation has been allowed in accordance with Rule 2-030.

3) Where communication cable not marked with the suffix “-LP” is used

- a) the maximum current that each insulated conductor shall be permitted to carry shall be as specified in Table 60, based on
 - i) the size of the conductor;
 - ii) the cable temperature rating;
 - iii) the number of cables in a cable bundle in contact with each other of a length of 1 m or more; and
 - iv) the smallest conductor size and lowest temperature rating of any cable in the cable bundle of a length of 1 m or more;
- b) not more than 192 cables shall be permitted to be bundled together for a length of 1 m or more; and

<p>c) where not more than four conductors in each cable are used to transmit power, the maximum current that each conductor shall be permitted to carry shall be permitted to be calculated by multiplying the values listed in Table 60 multiplied by 1.4.</p> <p>4) The maximum current permitted in a Class 2 power and data communication circuit shall not exceed the rating of the connectors or components used in the circuit.</p> <p>5) The correction factors of Table 5A shall apply where Class 2 power and data communication circuit cables are installed in an ambient temperature exceeding 30 °C.</p> <p>6) Notwithstanding Rule 8-102 1), for Class 2 power and data communication circuits, the circuit length shall ensure that the voltage at the point of utilization is within the rating or voltage tolerance of the connected powered device(s).</p> <p>7) Where more than one cable bundle is installed in a ventilated and ladder-type cable tray, cable bundles of a length of 1 m or more shall be spaced at not less than 25 mm.</p>	
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SECTION 18

Revise Subrule 18-000 4) to read:

SN4736

18-000 Scope (see Appendices B and J)

4) Where the Division system of classification is used as permitted by Subrule 3), ~~the Rules for Class I, II, and III locations found in Annexes J18 and J20~~ of Appendix J shall apply.

Add new entries to Rule 18-002 to read:

SN4565-18
SN4745

18-002 Special terminology (see Appendix B)

In this Section, the following definitions shall apply:

Dust-protected enclosure – an enclosure where the ingress of dust is not totally excluded, but where dust is unlikely to enter in sufficient quantity to interfere with the safe operation of the equipment and does not accumulate within the enclosure where it is liable to cause an ignition hazard.

Non-incendive circuit — a circuit in which any spark or thermal effect that may occur under normal operating conditions or due to opening, shorting, or grounding of field wiring is incapable of causing an ignition of the prescribed flammable gas or vapour.

Uninterrupted conduit run - that portion of a conduit run which may only include couplings with NPT threads.

Revise Rule 18-004 to read:

SN4785

18-004 Classification of hazardous locations (see Appendices B, J, and L)

1) Hazardous locations shall be classified according to the nature of the hazard, as follows:

- a) explosive gas atmospheres; or
- b) explosive dust atmospheres.

2) The classification of hazardous locations required by Subrule 1 shall include the nature of the flammable or combustible materials, as follows:

- a) the Equipment Group designation; and
- b) the minimum ignition temperature

~~3~~2) Hazardous location classification shall be carried out and documented by qualified persons.

~~4~~3) The hazardous location classification required by Subrules ~~1) to 3)~~ 1) to 2) shall be authenticated by the person assuming responsibility for the classification.

~~5~~4) Notwithstanding Subrules ~~2) 3) and 3) 1) to 4)~~, installations within the Scope of Section 20 shall be permitted to be classified in accordance with Section 20.

<p><i>Revise Rule 18-052 to read:</i></p> <p>18-052 Marking (see Appendices B and J) Electrical equipment installed in hazardous locations shall have markings that are suitable for the Zone <u>or Zones</u> in which the equipment is installed.</p>	SN4687
<p><i>Revise Rule 18-074 to read:</i></p> <p>18-074 Bonding in hazardous locations</p> <ol style="list-style-type: none"> 1) Exposed non-current-carrying metal parts of electrical equipment, including the frames or metal exteriors of motors <u>and generators</u>, fixed or portable lamps or other utilization equipment, luminaires, cabinets, cases, and conduit, shall be bonded to ground using <ol style="list-style-type: none"> a) bonding conductors sized in accordance with Rule 10-616; or b) rigid metal conduit with threaded couplings and threaded bosses on enclosures with joints made up tight. 2) Notwithstanding Subrule 1), where raceways or cables incorporate an internal bonding conductor, box connectors with standard locknuts shall be permitted to bond the metallic armour or raceway. 	SN4791
<p><i>Add new Rule 18-078 to read:</i></p> <p>18-078 Threaded joints (see Appendix B)</p> <ol style="list-style-type: none"> 1) <u>Threaded joints that are required to be explosion-proof, flameproof “d”, or flameproof “db” shall be permitted to be either tapered or straight and shall comply with the following:</u> <ol style="list-style-type: none"> <u>a) tapered threads shall have at least 4-1/2 fully engaged threads, and running threads shall not be used; and</u> <u>b) metric straight threads shall have a class-of-fit 6g/6H or better and at least 5 fully engaged threads.</u> 2) <u>Where thread forms differ between the equipment and the wiring system, suitable adapters shall be used.</u> 	SN4760
<p><i>Revise Subrule 18-092 3) to read:</i></p> <p>18-092 Wiring methods, Zone 0 (see Appendix B)</p> <ol style="list-style-type: none"> 3) <u>Threaded</u> Rigid metal conduit containing one or more circuits that are not intrinsically safe shall be permitted to pass through a Zone 0 location, provided that it passes completely through the Zone 0 location with no fittings, couplings, or connections within the Zone 0 location. 	SN4760
<p><i>Revise Subrule 18-094 1) to read:</i></p> <p>18-094 Sealing, Zone 0</p> <ol style="list-style-type: none"> 1) Where a conduit run that contains circuits in accordance with Rule <u>18-092</u> 1) terminates in a Zone 0 location, a flammable fluid migration seal shall be installed with <u>an uninterrupted</u> no box, coupling, or fitting in the conduit run between the seal and the point at which the conduit crosses the Zone 0 boundary. 	SN4749

<p><i>Revise Rule 18-102 to read:</i></p> <p>18-102 Wiring methods, Zone 1 (see Appendix B)</p> <p>1) The wiring method shall be</p> <ul style="list-style-type: none"> a) threaded rigid metal conduit with explosion-proof, flameproof “d”, or flameproof “db” fittings; or b) hazardous location cables with associated cable glands suitable for the application. <p>2) Explosion-proof, flameproof “d”, or flameproof “db” boxes, fittings, and joints shall be threaded for connection to conduit and cable glands.</p> <p>3) Threaded joints that are required to be explosion-proof, flameproof “d”, or flameproof “db” shall be permitted to be either tapered or straight and shall comply with the following:</p> <ul style="list-style-type: none"> a) tapered threads shall have at least 4 1/2 fully engaged threads, and running threads shall not be used; and b) metric straight threads shall have a tolerance class 6g/6H and shall have at least 5 fully engaged threads. <p>4) Where thread forms differ between the equipment and the wiring system, suitable adapters shall be used.</p> <p>5) Conduit and cable entries into increased safety “e” enclosures shall be made so as to maintain the degree of protection provided by the enclosure.</p> <p>6) Cables shall be installed and supported so as to avoid tensile stress at the cable glands.</p> <p>7) Wiring methods for intrinsically safe equipment and associated circuits designed and installed as “ia”, “ib”, or intrinsically safe for Class I locations shall be permitted to be exempt from the requirements of Subrules 1) <u>and 2)</u> to 4).</p>	<p>SN4760</p>
<p><i>Revise Rule 18-104 to read:</i></p> <p>18-104 Sealing, Zone 1 (see Appendix B)</p> <p>1) Explosion seals shall be provided in conduit systems where the conduit <u>enters an explosion-proof, flameproof “d”, or flameproof “db” enclosure that</u></p> <ul style="list-style-type: none"> a) enters an explosion-proof, flameproof “d”, or flameproof “db” enclosure that contains devices which produce ignition-capable arcs or temperatures; or b) <u>the conduit</u> is 53 trade size or larger. <p><u>2) Notwithstanding Subrule 1), an explosion seal shall not be required for an explosion-proof, flameproof “d”, or flameproof “db” enclosure where</u></p> <ul style="list-style-type: none"> <u>a) the enclosure is marked “Factory Sealed” or “Seal Not Required”; and</u> <u>b) the conduit is smaller than 53 trade size.</u> <p>23) Where conduit explosion seals are required for an enclosure, they shall be located as close as practicable to the enclosure, or as marked on the enclosure, but not farther than</p> <ul style="list-style-type: none"> a) 450 mm from the an explosion-proof <u>an explosion-proof</u> enclosure; and b) <u>50 mm from an explosion-proof enclosure for field-drilled entries; and</u> c) 50 mm from <u>a flameproof “d” or flameproof “db”</u> the enclosure for field-drilled <u>entries.</u> 	<p>SN4749</p>

<p>34) Where a conduit run crosses a Zone 1 boundary and terminates in the Zone 1 area,</p> <ul style="list-style-type: none"> a) an explosion seal shall be installed in the conduit run <ul style="list-style-type: none"> i) within the Zone 1 location; or ii) no more than 1 m external to the Zone 1 boundary; and b) the conduit run there shall be <u>an</u> uninterrupted <u>conduit run</u> between the explosion seal and the point <ul style="list-style-type: none"> i) of termination within the Zone 1 location; and ii) at which the conduit crosses the Zone 1 boundary. <p>45) Where a conduit run passes through a Zone 1 area without termination, it shall not require an explosion <u>or flammable fluid migration</u> seal, provided that</p> <ul style="list-style-type: none"> a) the conduit run is <u>an</u> uninterrupted <u>conduit run</u> within the Zone 1 area; and b) the termination points of the conduit are in a <u>Zone 2 or</u> non-hazardous location. <p>5) In Subrules 3) and 4), an uninterrupted conduit run is that portion of a conduit run which</p> <ul style="list-style-type: none"> a) except as provided for in Item b), shall not have any equipment, box, fitting, union, tee, or similar device installed; and b) shall be permitted to have conduit couplings installed. <p>6) Only explosion-proof, flameproof “d”, or flameproof “db” unions, reducers, and elbows that are not larger than the trade size of the conduit shall be permitted between the explosion seal and an explosion-proof, flameproof “d”, or flameproof “db” enclosure.</p> <p>7) A flammable fluid migration seal shall be provided where a cable first terminates after entering the Zone 1 area.</p> <p>8) Explosion seals shall be provided in a cable system where the cable enters an enclosure that is required to be explosion-proof, flameproof “d”, or flameproof “db” <u>enclosure</u>.</p> <p>9) Runs of cables, each having a continuous sheath, either metal or non-metal, shall be permitted to pass through a Zone 1 location without seals.</p>	
<p><i>Revise Rule 18-106 to read:</i></p> <p>18-106 Motors and generators, Zone 1 (see Appendix B) Increased safety “eb” motor installations shall meet the requirement for thermal protection of motors given in IEC 60079-14.</p>	SN4791
<p><i>Revise Rule 18-150 to read:</i></p> <p>18-150 Equipment, Zone 2 locations (see Appendices B and F)</p> <ul style="list-style-type: none"> 1) Electrical equipment installed in a Zone 2 location shall be in accordance with Table 18. 2) Notwithstanding Subrule 1) and Rule 18-052, the following shall be permitted: <ul style="list-style-type: none"> a) transformers, solenoids, coils, and similar electromagnetic devices that comply <u>equipment that complies</u> with the requirements of Rule 18-054 <u>and is any of the</u> 	SN4638 SN4791

<p><u>following:</u></p> <ul style="list-style-type: none"> <u>i) inductive devices, including transformers, solenoids, coils and similar equipment;</u> <u>ii) capacitors that do not have integral fuses; or</u> <u>iii) devices used for instrumentation and measurement purposes, including thermocouples, resistance temperature detectors (RTDs), piezoelectric pressure transducers and accelerometers, resistive strain gauges, passive RFID (radio frequency identification) tags and similar equipment;</u> <p>b) conduit and cables as specified in Rule 18-152 1);</p> <p>c) equipment that is installed in a Type 4 or 4X enclosure, or an IP65 or higher enclosure, and is</p> <ul style="list-style-type: none"> i) non-sparking in normal operation; ii) not used for heating purposes; and iii) not otherwise provided for in Subrule 2); <p>d) fuses, where they are used for</p> <ul style="list-style-type: none"> i) the protection of equipment subject to overload during normal operation and are <ul style="list-style-type: none"> A) of the current-limiting, non-indicating, filled type; or B) of the current-limiting, indicating, filled type constructed in a manner such that the blown fuse indication does not cause the fuse body to be penetrated; or ii) short-circuit protection only; or <p>e) motors <u>and</u>, generators, and other rotating electrical machines of the open or non-explosion-proof type that</p> <ul style="list-style-type: none"> i) except as permitted by Subrule 3) or 4), do not incorporate arcing, sparking, or heat producing components; or ii) incorporate arcing, sparking, or heat-producing components that comply with the requirements of Rule 18-100. <p>3) The <u>motors and generators</u> machines referred to in Subrule 2) e) i) shall be permitted to contain anti-condensation heaters suitable for non-hazardous locations, provided that they</p> <ul style="list-style-type: none"> a) do not use arcing or sparking components; b) do not use temperature-limiting controls; c) comply with the requirements of Rule 18-054 under normal operating conditions; and d) are marked on a separate nameplate on the machine with <ul style="list-style-type: none"> i) the maximum surface temperature of the heater in degrees Celsius; or ii) a temperature code that indicates the maximum surface temperature. <p>4) Machines <u>Motors and Generators</u> referred to in Subrule 2) e) that contain a sliding contact shaft bonding device suitable for non-hazardous locations shall be permitted for use, provided that</p> <ul style="list-style-type: none"> a) the device is used for the purpose of maintaining the rotor at ground potential; b) the potential discharge energy is determined to be non-incendive for the application; and c) the potential discharge energy calculation is documented and authenticated by the person assuming responsibility for the calculation. 	
<p><i>Revise Rule 18-152 to read:</i></p> <p>18-152 Wiring methods, Zone 2 (see Appendix B)</p> <p>1) The wiring method shall be</p>	<p>SN4745 SN4760</p>

<p>a) threaded <u>rigid</u> metal conduit;</p> <p>b) hazardous location cables;</p> <p>c) <u>Tray cables in accordance with Rule 12-102 3)</u>; Type TC cable, installed in cable tray in accordance with Rule 12-2202</p> <p>d) armoured <u>and metallic sheathed</u> cables with <u>an</u> overall non-metallic jacket; <u>in accordance with Rule 12-102 3)</u>; such as TECK90, ACWU90, copper sheathed RC90, or aluminum sheathed RA90;</p> <p>e) Armoured fire alarm and signal cable, such as FAS, FAS90, FAS105, FAS150, and FAS200;</p> <p>f) control and instrumentation cables with an interlocking metallic armour and a continuous jacket in control circuits (Type ACIC);</p> <p>g) Type CIC cable (non-armoured control and instrumentation cable) installed in cable tray in accordance with the installation requirements of Rule 12-2202 3), where</p> <p style="padding-left: 40px;">i) the voltage rating of the cable is not less than 300 V;</p> <p style="padding-left: 40px;">ii) the circuit voltage is 150 V or less; and</p> <p style="padding-left: 40px;">iii) the circuit current is 5 A or less;</p> <p>e) <u>Non-armoured control and instrumentation cable (CIC), and non-armoured fire alarm and signal cables (FAS), provided that</u></p> <p style="padding-left: 40px;"><u>i) the installation is in cable tray in accordance with Rule 12-2202 3);</u></p> <p style="padding-left: 40px;"><u>ii) the voltage rating of the cable is not less than 300 V;</u></p> <p style="padding-left: 40px;"><u>iii) the circuit voltage is 150 V or less; and</u></p> <p style="padding-left: 40px;"><u>iv) the circuit current is 5 A or less;</u></p> <p>f) h) rigid RTRC conduit Type XW, provided that</p> <p style="padding-left: 40px;">i) boxes, fittings, and joints are marked with the suffix "-XW"; and</p> <p style="padding-left: 40px;">ii) installation is performed in industrial establishments that are not accessible to the public and where only qualified persons service the installation; or</p> <p>g) h) liquid-tight flexible metal conduit and connectors, marked for heavy duty.</p> <p>2) Explosion-proof, flameproof "d", or flameproof "db" boxes, fittings, and joints shall be threaded for connection to conduit and cable glands.</p> <p>3) Threaded joints that are required to be explosion-proof shall be permitted to be either tapered or straight and shall comply with the following:</p> <p style="padding-left: 40px;">a) tapered threads shall have at least 4 1/2 fully engaged threads, and running threads shall not be used; and</p> <p style="padding-left: 40px;">b) metric straight threads shall have a tolerance class 6g/6H and shall have at least 5 fully engaged threads.</p> <p>4) Where thread forms differ between the equipment and the wiring system, suitable adapters shall be used.</p> <p>35) Cables shall be installed and supported so as to avoid tensile stress at the cable glands.</p> <p>46) Boxes, fittings, and joints need not be explosion-proof or flameproof "d", except as required by the Rules in this Section.</p> <p>57) Cable glands shall be compatible with the degree of protection and explosion protection provided by the enclosure that the cable enters, where the area classification and environmental conditions require these degrees of protection.</p> <p>68) Wiring methods for intrinsically safe equipment and associated circuits designed and installed as "ia", "ib", "ic", intrinsically safe for Class I locations, or non-incendive shall be permitted to be exempt from the requirements of Subrules 1) <u>and 2)</u>; to 4).</p>	
<p><i>Revise Rule 18-154 to read:</i></p> <p>18-154 Sealing, Zone 2 (see Appendix <u>B</u>)</p>	<p>SN4749</p>

- 1) Explosion seals shall be provided in conduit systems where the conduit enters an ~~enclosure that is required to be~~ explosion-proof, flameproof "d", or flameproof "db" ~~enclosure that contains devices which produce ignition-capable arcs or temperatures in normal operation~~, and the seals shall be located as close as practicable to the enclosure, or as marked on the enclosure, but not farther than
 - a) 450 mm from ~~the~~ an explosion-proof enclosure; ~~and~~
 - b) 50 mm from an explosion-proof enclosure for field-drilled entries; and
 - c) 50 mm from a flameproof "d" or flameproof "db" ~~the enclosure for field-drilled entries.~~
- 2) Flammable fluid migration seals for conduit shall be installed where
 - a) the conduit leaves the Zone 2 location with an uninterrupted conduit ~~no box, coupling, or fitting in the conduit~~ run between the seal and the point at which the conduit leaves the location, except that a rigid uninterrupted unbroken conduit run that passes completely through a Zone 2 area, up to ~~with no fittings less than 300 mm~~ 1 m beyond each boundary, ~~need not~~ shall not be required to be sealed, provided that ~~the~~ all termination points of the ~~unbroken~~ conduit are in non-hazardous areas; or
 - b) the conduit leaves a Zone 2 location outdoors, in which case the seal shall be permitted to be located more than ~~300 mm~~ 1 m beyond the Zone 2 boundary, provided that
 - i) ~~it is located on the conduit before the conduit enters an enclosure or building~~ the seal and conduit are located outdoors; and
 - ii) an uninterrupted conduit run is used.
- 3) Only explosion-proof, flameproof "d", or flameproof "db" unions, couplings, reducers, and elbows that are not larger than the trade size of the conduit shall be permitted between the sealing fitting and an explosion-proof, flameproof "d", or flameproof "db" enclosure.
- 4) An explosion seal shall be provided in a cable or conduit system ~~where the cable that~~ enters an enclosure ~~that which~~
 - a) ~~is required to be~~ explosion-proof, flameproof "d", or flameproof "db";
 - b) contains devices which produce ignition-capable arcs or temperatures in normal operation; and
 - c) is not marked "Factory Sealed" or "Seal Not Required".
- 5) Where an explosion seal is installed in a conduit system to provide explosion protection, the wiring method between the seal and the enclosure shall be compatible with the degree of protection provided by the enclosure in accordance ~~run of conduit enters an enclosure that is required to be explosion-proof, flameproof "d", or flameproof "db", every part of the conduit from the explosion seal to that enclosure shall comply~~ with Rule 18-102.

6) Runs of cables, each having a continuous sheath, either metal or non-metal, shall be permitted to pass through a Zone 2 location without seals.	
<p><i>Revise Rule 18-250 to read:</i></p> <p>18-250 Equipment, Zone 22 locations</p> <p>1) Electrical equipment installed in a Zone 22 location shall be in accordance with Table 18.</p> <p>2) Where installed in Zone 22, Group IIIA locations, travelling cranes and hoists for material handling, travelling cleaners for textile machinery, and similar equipment shall conform to the following:</p> <ul style="list-style-type: none"> a) the power supply to contact conductors shall be isolated from all other systems, ungrounded, and equipped with <ul style="list-style-type: none"> i) recording ground detection that will give an alarm and will automatically de-energize the contact conductors in case of a fault to ground; or ii) ground fault detection that will give a visual and audible alarm and maintain the alarm as long as power is supplied to the system and the ground fault remains; b) contact conductors shall be located or guarded so as to be inaccessible to other than authorized persons and shall be protected against accidental contact with foreign objects; and c) current collectors shall conform to the following: <ul style="list-style-type: none"> i) they shall be arranged or guarded to confine normal sparking and to prevent escape of sparks or hot particles; ii) to reduce sparking, two or more separate surfaces of contact shall be provided for each contact conductor; <u>and</u> iii) reliable means shall be provided to keep contact conductors and current collectors free of accumulations of lint or flyings; and iv) control equipment shall be suitable for Zone 22. <p><u>3) Notwithstanding Subrule 1), totally enclosed pipe-ventilated (TEPV), totally enclosed nonventilated (TENV), and totally enclosed fan-cooled (TEFC) motors and generators shall be permitted to be installed in Zone 22 Group IIIA and IIIB locations provided</u></p> <ul style="list-style-type: none"> <u>a) they are equipped with integral overheating protection in accordance with Rule 28-314; and</u> <u>b) drain holes and other openings are suitably closed.</u> <p><u>4) Notwithstanding Subrule 1), where installed in dust-protected enclosures, the following equipment shall be permitted:</u></p> <ul style="list-style-type: none"> <u>a) Switches, motor controllers, circuit breakers, fuses, meters, instruments, relays, transformers, impedance coils, resistors; and</u> <u>b) Signal, alarm, remote control, and communications systems.</u> 	<p>SN4728 SN4787</p>
<p><i>Revise Rule 18-252 to read:</i></p> <p>18-252 Wiring methods, Zone 22 (see Appendix B)</p> <p>1)-The wiring method shall <u>conform to Rule 18-152 1).</u> be</p> <ul style="list-style-type: none"> a) threaded metal conduit; b) hazardous location cables; 	<p>SN4745 SN4760 SN4787</p>

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| <p>c) Type TC cable installed in cable tray in accordance with Rule 12-2202 and enclosed in rigid conduit or another acceptable wiring method wherever it leaves the cable tray;</p> <p>d) armoured cable with overall non-metallic jacket, such as TECK90, ACWU90, copper sheathed RC90, or aluminum sheathed RA90;</p> <p>e) armoured fire alarm and signal cable, such as FAS, FAS90, FAS105, FAS150, and FAS200;</p> <p>f) control and instrumentation cables with an interlocking metallic armour and a continuous jacket in control circuits (Type ACIC);</p> <p>g) Type CIC cable (non-armoured control and instrumentation cable) installed in cable tray in accordance with the installation requirements of Rule 12-2202-2), where</p> <p style="padding-left: 40px;">i) the voltage rating of the cable is not less than 300 V;</p> <p style="padding-left: 40px;">ii) the circuit voltage is 150 V or less; and</p> <p style="padding-left: 40px;">iii) the circuit current is 5 A or less;</p> <p>h) rigid RTRC conduit Type XW, provided that</p> <p style="padding-left: 40px;">i) boxes, fittings, and joints are marked with the suffix "XW"; and</p> <p style="padding-left: 40px;">ii) installation is performed in industrial establishments that are not accessible to the public and where only qualified persons service the installation; or</p> <p>i) liquid-tight flexible metal conduit and connectors, marked for heavy duty.</p> <p>2) Boxes and fittings in which taps, joints, or terminal connections are made shall be <u>dust-protected</u>, either an Enclosure Type 4 or 5, or</p> <p>a) be provided with telescoping or close-fitting covers or other effective means to prevent the escape of sparks or burning material; and</p> <p>b) have no openings, such as holes for attachment screws, through which, after installation, sparks or burning material might escape, or through which exterior accumulations of dust or adjacent combustible material might be ignited.</p> <p>3) Cables shall be installed and supported so as to avoid tensile stress at the cable glands.</p> <p>4) Where it is necessary to use flexible connections, the provisions of Rule 18-202 4) b) and 5) shall apply.</p> <p>5) Wiring methods for intrinsically safe equipment and associated circuits designed and installed as "ia", "ib", "ic", intrinsically safe for Class II or Class III locations, or non-incendive shall be permitted to be exempt from the requirements of Subrules 1) and 2).</p> | |
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SECTION 20

Revise Subrule 20-004 8) and add new Subrule 11) to read:

SN4693

20-004 Hazardous areas (see Appendix B)

8) Except as permitted by Subrule 11), ~~E~~lectrical wiring and equipment, any portion of which is below the surface of areas defined as Zone 1 or Zone 2 in Subrule 1), 4), 6), or 7), shall ~~be considered~~ conform to the requirements for ~~to be within~~ a Zone 1 location that extends at least to the point of emergence above grade.

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11) Non-metallic conduit shall be permitted where at least 600mm below the surface areas defined as Zone 1 or Zone 2 in Subrule 1), 4), 6), or 7) provided:

- a) The last 600mm to the point of emergence above grade or finished floor is threaded rigid metal conduit; and
- b) A Flammable fluid migration seal is located above grade or finished floor with no box, coupling, or fitting in the conduit run between the seal and non-metallic conduit

SECTION 24

Add new Rule 24-101 to read:

SN4571

24-101 Panelboards supplying circuits in patient care areas (see Appendix B)

- 1) Panelboards supplying circuits in patient care areas, shall be
 - a) secured;
 - b) accessible only to authorized personnel; and
 - c) except as provided by Subrule 2), outside patient care areas.
- 2) Panelboards supplying circuits described in Subrule 24-302 1), shall be permitted to be located in patient care areas.
- 3) Panelboards installed in basic or intermediate care areas in accordance with Subrule 2), shall supply only circuits located within those patient care areas.
- 4) Panelboards installed in critical care areas in accordance with Subrule 2), shall supply only circuits intended for, and dedicated to, the critical care area where they are located.

Add new Subrule 24-102 9) to read:

SN4633

- 9) all branch circuits supplying loads within patient care environments, other than those supplying multi-phase equipment, shall be 2-wire circuits.

Revise Rule 24-104 to read:

SN4494

24-104 Bonding to ground in basic care areas (see Appendix B)

- 1) Bonding conductors shall be insulated unless they are
 - a) installed in non-metallic conduit; or
 - b) incorporated into a cable that is constructed in such a manner that contact between any metal shield or armour, if it is present, and a bare bonding conductor is not possible.
- 2) All receptacles and other permanently connected equipment shall be bonded to ground by copper equipment bonding conductors, sized in accordance with Table 16 but in no case smaller than No. 12 AWG, installed in accordance with Rule 10-614 and run with the circuit conductors in accordance with the following:
 - a) each multi-wire branch circuit shall be provided with its own equipment bonding conductor;
 - b) except as permitted by Items c) and d), each 2-wire branch circuit supplying a receptacle in a patient care environment shall be provided with its own equipment bonding conductor;
 - c) when the receptacles in a patient care environment are supplied from two 2-wire branch circuits in the same raceway, a single equipment bonding conductor shall be permitted to be shared by the two circuits; or
 - d) when receptacles intended for a pair of adjacent patient care environments are supplied by three 2-wire branch circuits and one of the circuits is intended to

<p>be shared by both environments, the three circuits shall be permitted to share two equipment bonding conductors.</p> <p>3) Utilization equipment bonding conductors required by Subrules 2), 6), and 7) shall terminate either at the panelboard supplying the branch circuits to the patient care environment from which they arise or on a separately installed busbar that is bonded to that panelboard.</p> <p>4) Where branch circuits for a patient care environment are supplied from more than one panelboard, the panelboards shall be bonded together with a single copper equipment bonding conductor sized in accordance with Rule 10-616 Table 16, but in no case smaller than a No. 6 AWG.</p> <p>5) Each panelboard supplying branch circuits as described in Rule 24-102 3) and located in a basic care area shall be bonded to ground by a copper utilization equipment bonding conductor that is</p> <ul style="list-style-type: none"> a) installed in the same raceway as the circuit conductors supplying that panelboard or installed in accordance with Rule 10-614, and sized in accordance with Rule 10-616 Table 16; or b) incorporated into the assembly of the cable supplying that panelboard. <p>6) Each panelboard supplying branch circuits as described in Rule 24-102 3) and located outside a basic care area shall be bonded to ground in accordance with Rule 10-610.</p> <p>7)6) Each item of three-phase equipment shall be bonded to ground with a copper equipment bonding conductor that is</p> <ul style="list-style-type: none"> a) sized in accordance with Rule 10-616 Table 16, but is in no case smaller than No. 12 AWG; and b) connected to its own terminal at the equipment and the panelboard. <p>8)7) If they could become energized, exposed non-current-carrying metal parts of communication, radio, or television equipment, other than telephone sets, in a patient care environment shall be bonded to ground using a copper equipment bonding conductor sized in accordance with Subrule 7)6), by</p> <ul style="list-style-type: none"> a) connection to the bonding screw in the communication section of a barriered and ganged metal outlet box that serves a patient care environment; or b) connection to an equipment bonding conductor or bonding busbar for that patient care environment as identified in Subrule 3). <p>9)8) If they could become energized, exposed non-current-carrying metal parts of non-electrical equipment, in a patient care environment, shall be bonded to ground using a copper equipment bonding conductor sized in accordance with Subrule 7)6) by connection to an equipment bonding conductor or bonding busbar for that patient care environment as identified in Subrule 3).</p> <p>10)9) Notwithstanding Subrules 1) and 2), recessed and surface-mounted luminaires located more than 2.3 m above floor level, and their associated switches located outside a patient care environment, shall be permitted to be bonded in accordance with Section 10.</p>	
<p><i>Add new Subrule 24-106 8) to read:</i></p> <p>24-106 Receptacles in basic care areas (see Appendix B)</p> <p>8) All receptacles of CSA configuration 5-15R and 5-20R installed in areas designated by the health care facility administration as being intended primarily for the provision of diagnosis, therapy, or care to children, other than receptacles dedicated for stationary appliances such that the receptacle is rendered inaccessible, and receptacles located above 2 m from the floor, shall be tamper-</p>	SN4572

<u>resistant receptacles and shall be so marked.</u>	
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SECTION 26

Revise Rule 26-100 to read:

SN4710

26-100 Location and marking of isolating switches (See Appendix B)

~~1) Isolating switches shall be permitted to be located so that a hook stick is required to operate them.~~

2) Isolating switches shall be plainly marked to minimize the chance that they will be opened under load, unless

- a) they are located or guarded so that they are inaccessible to unauthorized persons; or
- b) they are interlocked so that they cannot normally be opened under load.

Revise Subrule 26-246 3) to read:

SN4732

26-246 Dry-core, open-ventilated-type transformers

3) Notwithstanding Subrule 1), where the adjacent surface is the wall on which the transformer is mounted, the minimum permissible separation between the enclosure and the mounting wall shall be 6.5 mm if the adjacent surface is made of

- a) non-combustible material;
- b) combustible material adequately protected by non-combustible heat insulating material other than sheet metal; or
- c) combustible material shielded by grounded sheet metal with an air space of not less than 50 mm between the sheet metal and the combustible material.

Revise Rule 26-256 to read:

SN4628-26

26-256 Conductor size for transformers (see Appendix B)

1) The conductors supplying transformers shall have an ampacity ~~rating~~

- a) not less than 125% of the rated primary current of the transformer for a single transformer; or

- b) not less than the sum of the rated primary currents of all transformers plus 25% of the rated primary current of the largest transformer for a group of transformers operated in parallel or on a common feeder.

2) The secondary conductors connected to transformers shall have an ampacity ~~rating~~

- a) not less than 125% of the rated secondary current of the transformer for a single transformer; or
- b) not less than 125% of the sum of the rated secondary currents of all the transformers operated in parallel.

3) Notwithstanding Subrules 1) and 2), primary and secondary conductors shall be permitted to have an ampacity ~~rating~~ not less than that required by the demand load, provided that they are protected in accordance with Rules 14-100 and 14-104.

4) Where the transformer overcurrent protection is more than 125% of the rated primary or secondary current in accordance with Rule 26-250 1) or 2) or 26-254 3),

<p>the primary and secondary conductors connected to the transformer shall be protected in accordance with Rules 14-100 and 14-104.</p> <p>5) Where multi-rating transformers are used, the primary and secondary conductors shall have an ampacity rating not less than 125% of the rated primary and secondary current of the transformer at the utilization voltage.</p>	
<p><i>Revised Subrule 26-600 1) to read:</i></p> <p>26-600 Location of panelboards (see Appendix <u>Appendices B and G</u>)</p> <p>1) Panelboards shall not be located in coal bins, clothes closets, bathrooms, stairways, high-ambient <u>rooms or spaces with high ambient temperatures</u>, dangerous or hazardous locations, nor in any similar undesirable places.</p>	<p>SN4575 SN4705</p>
<p><i>Revise Rule 26-724 to read:</i></p> <p>26-724 <u>Outdoor and garage</u> R<u>eceptacles</u> for single dwellings (see Appendices B and G)</p> <p>Receptacles for single dwellings only shall meet the following requirements:</p> <p>a1) Except as permitted by Subrule 2), for each single dwelling, at least one two duplex receptacles, <u>readily accessible from ground or grade level</u> shall be installed outdoors so as to be readily accessible from ground or grade level for the use of appliances that need to be used outdoors;</p> <p><u>a) on two opposite sides of the single dwelling; or</u></p> <p><u>b) where the single dwelling configuration does not have opposite sides, installed on adjacent sides of the single dwelling and separated from each other by no less than one half of the width of the longest side.</u></p> <p><u>2) At least one duplex receptacle shall be installed on single dwellings having a continuous perimeter at grade level of 20 m or less.</u></p> <p>b3) aAt least one duplex receptacle readily accessible from floor or grade level shall be provided for each car space in a garage or carport of a single dwelling. and</p> <p>e4) eOne receptacle shall be provided in a garage for each cord-connected overhead garage door opener and shall be located within 1 m of the overhead door opener.</p>	<p>SN4602</p>

SECTION 28	
<i>Revise Rule 28-706 to read:</i> 28-706 Insulated conductor ampacity The allowable ampacity of insulated conductors of a branch circuit supplying a motor-compressor, or equipment consisting of one or more motor-compressors and other loads, shall be based on the marked rated load current of the motor-compressor or equipment and shall comply with the general requirements of this Section.	SN4628-28

SECTION 30

Revise Rule 30-310 to read:

SN4659

30-310 Luminaire as a raceway

- 1) Insulated branch circuit conductors run through a luminaire shall be contained in a raceway that is an integral part of the luminaire and that meets the requirements for a surface raceway, except that the insulated conductors of a 2-wire, 3-wire, or 4-wire branch circuit supplying the luminaires shall be permitted to be carried through luminaires marked as suitable for continuous row mounting.
- 2) Ballasts located within the luminaires referred to in Subrule 1) shall be deemed to be sources of heat and the conductors supplying the luminaires shall
 - a) have a voltage rating not less than 600 V;
 - b) have an insulation temperature rating not less than 90 °C; and
 - c) be ~~either of a type~~
 - i) a type selected in accordance with Rule 12-102 3) as being suitable for use in raceways; or
 - ii) ~~selected in accordance with Rule 12-402 1) as being suitable for use in accordance with this Rule,~~ Type GTF, REW, TEW, TBS, SIS, SEW-2, or SEWF-2 equipment wire installed in a raceway, provided that the insulated conductors are not smaller than No. 14 AWG and do not extend beyond the luminaires through raceways more than 2 m long.
- 3) Notwithstanding Subrule 2), non-metallic-sheathed cable shall be permitted to be used for supplying the luminaires, provided that it has a temperature rating of 90 °C.

Revise Subrule 30-1006 1) to read:

SN4563

30-1006 Wiring methods on poles

- 1) A disconnecting means shall be provided for Aall electrical equipment on the pole ~~shall be controlled by a switch that can be locked in the OFF position~~, and each pole shall be provided with a prominent sign warning against climbing the pole if the disconnecting means ~~switch~~ is not in the open ~~OFF~~ position, unless all conductors and live parts other than those used for pole-top wiring are guarded against accidental contact in one of the following ways:
 - a) the insulated conductors are run in rigid or flexible metal conduit, as mineral-insulated cable, or up the centre of steel, aluminum, or hollow concrete poles;
 - b) the insulated conductors, cables, and live parts are kept at least 1 m from the climbing ladder or climbing steps; or
 - c) barriers are provided between insulated conductors or live parts, or both, and the climbing ladder to reduce the likelihood of contact by the climber.

Revise Rule 30-1116 to read:

SN4660

30-1116 Use of messenger cables

- 1) Messenger cables shall be used to support the insulated conductors
 - a) if lampholders having permanently attached leads are used, and the span exceeds 12 m; and

<p>b) in all cases where lampholders having terminals that puncture the insulation are used.</p> <p><u>2) Messenger cable shall be installed in accordance with Rule 12-320.</u></p> <p>2) Messenger cables shall be securely attached at each end of the run and shall be grounded in accordance with Section 10.</p> <p>3) Insulated conductors shall be permanently attached to the messenger.</p>	
<p><i>Delete Rule 30-1118:</i></p> <p>30-1118 Construction of messenger cables</p> <p>1) Messenger cables shall be of galvanized steel, copper coated steel, or stainless steel, and shall be of stranded construction with not less than seven strands.</p> <p>2) Galvanized steel shall have a coating of not less than 45 g/m².</p> <p>3) The effective ultimate strength of a messenger cable shall be not less than three times the calculated maximum working load, including loading due to ice loads and wind loads, and the individual strands shall in no case be less than</p> <p>a) 1.17 mm in diameter in the case of galvanized or copper coated wire; or</p> <p>b) 1.11 mm in diameter in the case of stainless steel wire.</p>	SN4660

SECTION 38

Revise Subrule 38-021 2) to read:

SN4532

38-021 Wiring methods (see Appendix B)

Escalators

2) Insulated conductors and optical fiber cables in escalator and moving walk wellways shall be installed in rigid metal conduit, flexible metal conduit, liquid-tight flexible conduit, electrical metallic tubing, rigid PVC conduit, or wireways or shall be mineral-insulated cable, aluminum-sheathed cable, copper-sheathed cable, or armoured cable, if not subject to physical damage, unless otherwise permitted in Items a) and b):

a) cables used in Class 1 extra-low-voltage and Class 2 low-energy circuits, including extra-low-voltage cable, extra-low-voltage control cable, communication cable, fire alarm and signal cable, multi-conductor jacketed thermoplastic-insulated cable, and hard-usage and extra-hard-usage cables shall be permitted to be installed between risers and signal equipment and operating devices, provided that the cables are supported and protected from physical damage and are of a jacketed and flame-tested type; ~~and~~

b) flexible cords and cables that are components of equipment and used in extra-low-voltage circuits (30 V or less) shall be permitted in lengths not exceeding 2 m, provided that the cords and cables are supported and protected from physical damage and are of a jacketed and flame-tested type; and

c) extra-hard usage flexible cords as listed in Table 11 shall be permitted as flexible connections on escalator or moving walk controllers and disconnecting means installed in conformance with Rules 38-005 2)a).

SECTION 42

Revise Subrules 42-008 2) and 3) to read:

SN4628-42
SN4723

42-008 Overcurrent protection for transformer arc welders and inverter welders

- 2) Each ungrounded conductor supplying a transformer arc welder and inverter welder shall have overcurrent protection rated or set at not more than 200% of the ~~allowable~~ ampacity of the insulated conductor as specified in Table 1, 2, 3, or 4, except that the next higher rating or setting shall be permitted to be used where
- a) the nearest standard rating of the overcurrent device is less than the rating or setting otherwise required by this Rule; or
 - b) the rating or setting otherwise required by this Rule results in too frequent opening of the overcurrent device.
- 3) The maximum rating or setting of an overcurrent device protecting a feeder supplying a group of transformer arc welders shall not exceed a value calculated by determining the maximum rating or setting of overcurrent device permitted by Subrules 1) and 2) for the welder allowed the highest overcurrent protection and adding to this value the sum of ampacities as calculated by Rule 42-006 [1\)](#) for all other welders in the group.

Revise Subrule 42-016 2) to read:

SN4628-42

42-016 Overcurrent protection

- 2) Every ungrounded conductor of a resistance welder shall have overcurrent protection rated or set at not more than 300% of the ~~allowable~~ ampacity of the insulated conductor as specified in Table 1, 2, 3, or 4, except that the next higher rating or setting shall be permitted to be used where
- a) the nearest standard rating of the overcurrent device is less than the rating or setting required by this Rule; or
 - b) the rating or setting required by this Rule results in too frequent opening of the overcurrent device.

SECTION 58

Revise Rule 58-012 to read:

SN4646

58-012 Grounding of circuits ~~of less than 50 V~~

Circuits ~~of less than 50 volts to ground~~ shall be grounded ~~in accordance with Rule 10-206 3)~~, except that

- a) ungrounded isolated haul ropes shall be permitted to be used for safety, communication, control, remote control, monitoring, supervision, and signal circuits; and
- b) extra-low-voltage safety, communication, control, remote control, monitoring, supervision, and signal circuits shall be permitted to be ~~isolated, ungrounded~~ provided that they are grounded in accordance with Rule ~~10-212 10-400 4)~~.

Revise Rule 58-014 to read:

SN4574
SN4666

58-014 Voltage limitations

1) Voltages for safety, communication, control, remote control, monitoring, supervision, and signal circuits shall not exceed 48 V ~~volts to ground (nominal)~~, ~~with the exception of~~ except circuits for hand-crank-type telephone signal bells.

2) Only safety, communication, control, remote control, monitoring, supervision and signal circuits shall be carried between towers that support the passenger ropeway.

3)2) Voltages for motors, motor controllers, machine brakes, motor-generator sets, floodlighting, ~~and~~ heaters, and air conditioners shall not exceed 750 V ac or 1060 V dc ~~volts to ground~~.

4)3) Voltages for ~~motor~~-control circuits of motor controllers shall not exceed 120 V ~~nominal volts to ground (nominal)~~.

~~4) Voltages for aerial conductors or cables carried between towers that support the passenger ropeway shall not exceed 30 volts to ground or 42 volts to ground peak, with the exception of circuits for hand-crank-type telephone signal bells.~~

5) Voltages for all other circuits shall not exceed 300 V ~~volts to ground~~.

SECTION 60

Revise Rule 60-104 to read:

SN3961-60

60-104 Circuits in communication cables (see Appendix B)

Radio and television circuits, remote control circuits, and fire alarm circuits or parts of this equipment shall be

- a) permitted to use insulated conductors in a communication building entrance cable ~~assembly~~ having other insulated conductors used as communication circuits;
- b) deemed to be communication circuits for those portions of circuits that use insulated conductors within the communication building entrance cable ~~assembly~~; and
- c) suitably protected at the point of interface connection with the communication cable ~~conductors~~.

Revise Rule 60-200 to read:

SN3961-60

60-200 Provision of primary protectors (see Appendix B)

- 1) A primary protector shall be provided on each electrical communication circuit, except as permitted in Subrule 4).
- 2) The primary protector shall be located in, on, or immediately adjacent to the structure or building served and as close as practicable to the point at which the ~~conductors~~ cables enter or attach to the structure or building.
- 3) The primary protector shall not be located in any hazardous location as defined in Sections 18, 20, and 24, nor in the immediate vicinity of flammable or explosive materials.
- 4) A primary protector need not be provided if no portion of the circuit is considered exposed plant.

Revise Rule 60-202 to read:

SN3961-60

60-202 Primary protector requirements

- 1) The primary protector shall connect between each line conductor and ground and, when required by Subrule 3), have a fuse connected in series in each line conductor.
- 2) Fuseless primary protectors shall be permitted
 - a) on circuits that enter a building in a cable with a grounded metal sheath or shield, provided that the insulated conductors in the cable safely fuse at currents less than the ampacity of the primary protector and the primary protector grounding conductor;
 - b) on circuits served by ~~insulated conductors~~ cable extending to a building from a grounded metal-sheathed or shielded cable, provided that the insulated conductors in the cable safely fuse at currents less than the ampacity of the primary protector, the associated insulated conductors, and the primary protector grounding conductor;
 - c) on circuits served by ~~insulated conductors~~ cable, extending to a building from other than grounded metal-sheathed or shielded cable, provided that
 - i) the primary protector grounding conductor is grounded in conformance with Rule 60-704; and

<p>ii) the connections of the insulated conductors <u>cable</u> extending from the building to the exposed plant, or the conductors of the exposed plant, safely fuse at currents less than the ampacity of the primary protector, the associated insulated conductors, and the primary protector grounding conductor; or</p> <p>d) on circuits in a cable with a grounded metal sheath or shield that are subject to lightning strikes but are otherwise not exposed plant.</p> <p>3) Where the requirements of Subrule 2) are not met, fused primary protectors shall be used.</p> <p>4) Primary protectors having exposed live parts shall be located in a suitable room or similar area as required by Rule 2-202, separate from electrical light or power installations, except where it is necessary to place them in a joint-use room, in which case a minimum separation of 900 mm from electrical equipment requiring adjustment and maintenance shall be provided and maintained.</p>	
<p><i>Revise Subsection title and Rule 60-300 to read:</i></p> <p style="text-align: center;">Inside conductors <u>and cables</u></p> <p>60-300 <u>Installation of conductor and cables</u> installations Rules 60-302 to 60-334 apply to the installation of inside communication conductors <u>and cables</u>.</p>	SN3961-60
<p><i>Revise Rule 60-302 to read:</i></p> <p>60-302 Raceways Raceways for <u>insulated</u> communication <u>cable</u> conductors shall be installed in accordance with the requirements of Section 12 and, if metal, shall be grounded in accordance with Section 10.</p>	SN3961-60
<p><i>Revise Rule 60-306 to read:</i></p> <p>60-306 <u>Grounding Bonding of</u> conductors cables with an outer metal covering Where a conductor or cable is equipped with an outer metal covering, the covering shall be <u>bonded to ground in accordance with Section 10</u> grounded.</p>	SN3961-60
<p><i>Revise Rule 60-308 to read:</i></p> <p>60-308 Separation from other <u>insulated</u> conductors</p> <p>1) The conductors <u>cables</u> of an electrical communication system in a building shall be separated at least 50 mm from any insulated conductor of a Class 1 circuit or an electric light<u>ing</u> or power system operating at 300 V or less, and shall be separated at least 600 mm from any insulated conductor or a <u>an electric</u> light<u>ing</u> or power system operating at more than 300 V, unless</p> <p>a) one system is in grounded metal raceways, metal-sheathed cable, or grounded armoured cable <u>bonded to ground in accordance with Section 10</u>;</p> <p>b) the Class 1 circuit or <u>circuits of</u> electric light<u>ing</u> or power <u>in electrical</u> system operating at 300 V or less uses a hard-usage or extra-hard-usage flexible cord selected in accordance with Rule 12-402 1); or</p> <p>c) both systems are permanently separated by a continuous, firmly fixed <u>non-</u></p>	SN3961-60

<p>metallic non-metal raceway in addition to the insulation of the conductors <u>or cables</u>.</p> <p>2) Where the light or power conductors are bare, all communication conductors <u>cables</u> in the same room or space shall be enclosed in a grounded metal raceway, and no opening, such as an outlet box, shall be permitted to be located within 2 m of bare conductors if up to and including 15 kV or within 3 m of bare conductors above 15 kV.</p> <p>3) The conductors <u>cables</u> of an electrical communication system shall not be placed in any outlet box, junction box, raceway, or similar fitting or compartment that contains <u>insulated</u> conductors of electric light<u>ing</u> or power systems or of Class 1 circuits (as defined in Rule 16-002), unless</p> <p>a) the communication conductors <u>cables</u> are separated from the other conductors by a suitable partition; or</p> <p>b) the power or Class 1 <u>insulated</u> conductors are placed solely for the purpose of supplying power to the communication system or for connection to remote control equipment, except that no communication conductors <u>cables</u> installed in an outlet box, junction box, raceway, or similar fitting or compartment that contains such <u>insulated</u> conductors of power or Class 1 circuits shall show a green-coloured insulation, unless such a <u>the insulated</u> communication conductor is completely contained within a sheathed or jacketed cable assembly throughout the length that is present in such raceways or enclosures.</p> <p>4) The conductors <u>cables</u> of an electrical communication system in a building shall not be placed in a shaft with the <u>insulated</u> conductors of an electric light<u>ing</u> or power system, unless</p> <p>a) the conductors of all systems are insulated and are separated by at least 50 mm; or</p> <p>b) the conductors of either system are encased in non-combustible tubing.</p>	
<p><i>Revise Rule 60-310 to read:</i></p> <p>60-310 Penetration of a fire separation Conductors <u>Cables</u> of communication circuits extending through a fire separation shall be installed to limit fire spread in accordance with Rule 2-128.</p>	SN3961-60
<p><i>Revise Rule 60-312 to read:</i></p> <p>60-312 Communication cables in hoistways</p> <p>1) Special permission shall be required to install communication conductors <u>cables</u> in hoistways.</p> <p>2) All conductors <u>cables</u>, except travelling cables, shall be totally enclosed in continuous metal raceway.</p> <p>3) Pullboxes required for communication interconnection shall be located outside the hoistway.</p>	SN3961-60
<p><i>Revise Rule 60-314 to read:</i></p> <p>60-314 Communication conductors <u>cables</u> in ducts and plenum chambers Communication conductors <u>cables</u> shall not be placed in ducts or plenum chambers except as permitted by Rules 2-130 and 12-010.</p>	SN3961-60

<p><i>Revise Rule 60-316 to read:</i></p> <p>60-316 Data processing systems The interconnecting cables used in data processing systems shall be permitted to contain power and communication <u>insulated communication</u> conductors where such cables are specifically approved for the purpose.</p>	SN3961-60
<p><i>Revise Rule 60-318 to read:</i></p> <p>60-318 Conductors <u>Cables</u> under raised floors Conductors <u>Cables</u> of communication circuits shall be permitted to be installed without additional mechanical protection under a raised floor, provided that</p> <ul style="list-style-type: none"> a) the raised floor is of suitable non-combustible construction; b) a minimum separation of 50 mm is provided and maintained where the conductors <u>cables</u> are used to serve data processing systems and are placed parallel to any other <u>insulated</u> power supply conductors <u>wiring</u>; and c) the conductors <u>cables</u> serve the equipment located only on the floor above the raised floor, where the space under the raised floor is used as an air plenum. 	SN3961-60
<p><i>Revise Rule 60-320 to read:</i></p> <p>60-320 Conductors <u>Cables</u> in concealed installations Where the ends of cables or conductors are not terminated on a device, they shall be capped or taped.</p>	SN3961-60
<p><i>Revise Subsection title and Rule 60-500 to read:</i></p> <p style="text-align: center;">Outside conductors <u>cables</u></p> <p>60-500 Overhead conductors <u>cables</u> on poles The installation of overhead communication conductors <u>cables</u> on poles in proximity with power conductors shall be established in accordance with the Canadian Electrical Code, Part III.</p>	SN3961-60
<p><i>Revise Rule 60-502 to read:</i></p> <p>60-502 Overhead conductors <u>cables</u> on roofs</p> <ul style="list-style-type: none"> 1) Communication conductors <u>cables</u> passing over buildings shall be kept at least 2.5 m above any roof that can be readily walked upon. 2) Communication conductors <u>cables</u> shall not be attached to the upper surfaces of roofs or be run within 2 m, measured vertically, of a roof unless a deviation has been allowed in accordance with Rule 2-030. 3) A deviation in accordance with Rule 2-030 shall not be necessary where the building is a garage or other auxiliary building of one storey. 	SN3961-60
<p><i>Revise Rule 60-506 to read:</i></p> <p>60-506 Wire <u>Conductor</u> insulation</p>	SN3961-60

<p>In a communication circuit requiring a primary protector, each wire <u>conductor</u> shall have rubber or thermoplastic insulation and shall</p> <ol style="list-style-type: none"> have a protective jacket placed over individual or groups of wires <u>insulated conductors</u>, which shall be permitted to be integral with the insulation; and be suitable for the application and in accordance with the manufacturer's recommendations. 	
<p><i>Revise Rule 60-508 to read:</i></p> <p>60-508 Cable insulation</p> <ol style="list-style-type: none"> Wires <u>Conductors</u> within a cable used for communication circuits requiring primary protectors shall be permitted to have paper, thermoplastic, or other suitable insulation. The cable shall be of a type suitable for the application and in accordance with the manufacturer's recommendations, with <ol style="list-style-type: none"> a metal sheath; a composite sheath having a metal shield and overall outer protective rubber or thermoplastic jacket; or a protective rubber or thermoplastic jacket without a metal shield. 	SN3961-60
<p><i>Revise Rule 60-510 to read:</i></p> <p>60-510 Communication conductors <u>cables</u> on buildings</p> <ol style="list-style-type: none"> Communication conductors <u>cables</u> on buildings shall be separated from insulated light or power conductors not in conduit by at least 300 mm unless permanently separated by a continuously and firmly fixed non-metal raceway, in addition to the insulation on the conductors. Where the light or power conductors are bare, the communication conductors <u>cables</u> shall be in the lower position and, in order to provide adequate working space, the clearance given in Subrule 1) shall be increased to a minimum of 600 mm from a conductor operating at 750 V or less. Communication conductors <u>cables</u> subject to accidental contact with light or power conductors operating at voltages exceeding 300 V, and attached exposed to buildings, shall be separated from combustible material by being supported on glass, porcelain, or other suitable insulating material, except that such separation is not required where fuses are omitted as provided for in Rule 60-202 2), or where conductors <u>cables</u> are used to extend circuits to a building from a cable having a grounded metal sheath or shield. 	SN3961-60
<p><i>Revise Rule 60-512 to read:</i></p> <p>60-512 Communication conductors <u>cables</u> entering buildings</p> <p>Where a primary protector is installed inside the building, the communication conductors <u>cables</u> shall enter the building either through a non-combustible, non-absorptive insulating bushing, or through a metal raceway, except that the insulating bushing shall be permitted to be omitted where the entering conductors <u>cables</u></p> <ol style="list-style-type: none"> are in metal-sheathed or shielded cable; pass through masonry; are without fuses in the primary protectors as provided for in Rule 60-202 2); or are used to extend circuits to a building from a cable having a grounded metal 	SN3961-60

sheath or shield.	
<p><i>Revise Rule 60-514 to read:</i></p> <p>60-514 Communication conductors <u>cables</u> entering mobile homes Communication conductors <u>cables</u> shall enter the mobile home using the facility provided by Rule 70-106.</p>	SN3961-60
<p><i>Revise Rule 60-516 to read:</i></p> <p>60-516 Lightning conductors A separation of at least 2 m shall, where practicable, be maintained between conductors <u>cables</u> of communication circuits on buildings and lightning <u>down</u> conductors.</p>	SN3961-60
<p><i>Revise Rule 60-518 to read:</i></p> <p>60-518 Swimming pools Where wires or cables are installed over or adjacent to swimming pools, they shall be placed in accordance with Rules 68-054 and 68-056.</p>	SN3961-60
<p><i>Revise Rule 60-600 to read:</i></p> <p>60-600 Direct buried systems Where communication conductors or cables assemblies are direct buried, they shall be suitable for direct burial and the conductor or cable assembly shall</p> <ul style="list-style-type: none"> a) not be installed in the same vertical plane with other underground systems, except when installed in accordance with Item g); b) maintain a minimum horizontal separation of 300 mm from other underground systems, except when installed in accordance with Item g); c) be not less than 600 mm deep, unless rock bottom is encountered at a lesser depth, in which case a minimum depth of 450 mm shall be permitted, except that for service wires <u>cables</u> under parkways and lawns the depth shall be permitted to be reduced to 450 mm; d) be placed with a layer of sand 75 mm deep, both above and below the cable, if in rocky or stony ground; e) be not less than 900 mm deep under an area that is subject to vehicular traffic, except that the depth shall be permitted to be reduced to 600 mm if mechanical protection is provided that consists of <ul style="list-style-type: none"> i) treated plank at least 38 mm thick or other suitable material, which shall be placed over the conductor or cable after first backfilling with 75 mm of sand or earth containing no rocks or stones; or ii) a conduit suitable for earth burial placed to facilitate cable replacement and to minimize traffic vibration damage; f) not be placed in a common trench involving random separation with power supply cables or conductors operating at over 750 V, except when the applicable requirements of CAN/CSA-C22.3 No. 7 are adhered to and the power supply cables or conductors operating voltage does not exceed 22 kV line to ground; and g) have a metal sheath when placed in a common trench involving random 	SN3961-60

separation with power supply cables or conductors , in which case the communication conductor or cables <u>assemblies</u> shall not cross under the supply cables.	
<p><i>Revise Rule 60-602 to read:</i></p> <p>60-602 Underground raceway Where communication conductors or cables <u>assemblies</u> are placed in underground raceway systems</p> <ul style="list-style-type: none"> a) the raceway, including laterals, shall be separated from those used for the electric power system by not less than 50 mm of concrete or 300 mm of well-tamped earth; b) the raceway shall be located to maintain a minimum depth of 600 mm in areas subject to vehicular traffic and 450 mm in all other areas, except that where rock bottom is encountered at a lesser depth the raceway shall be encased in concrete; c) the raceway shall not terminate in the same maintenance hole, and the conductors or cables <u>assembly</u> shall not be placed in the same maintenance hole, used for the electric power system, unless all requirements of Clause 6 of CAN/CSA-C22.3 No. 7 are adhered to; d) the cables shall not be placed in the same raceway containing electric lighting or power supply cables; e) the cables shall be suitable for wet locations; and f) raceways entering a building and forming part of an underground installation shall be sealed with a suitable compound in such a way that moisture and gas will not enter the building and shall <ul style="list-style-type: none"> i) enter the building above ground where practicable; or ii) be suitably drained. 	SN3961-60
<p><i>Revise Rule 60-604 to read:</i></p> <p>60-604 Underground block distribution Where the entire street circuit is run underground and the part of the circuit within the block is placed so that it is not liable to contact with electric lighting or power circuits of more than 300 V</p> <ul style="list-style-type: none"> a) no primary protector is required as specified in Rule 60-200; b) the insulation requirements of Rules 60-506 and 60-508 shall not apply; c) conductors <u>cables</u> need not be placed on insulating supports as specified in Rule 60-510 3); and d) where the conductors <u>cables</u> enter the building, no bushings are required as specified in Rule 60-512. 	SN3961-60
<p><i>Revise Rule 60-706 to read:</i></p> <p>60-706 Grounding electrode (see Appendix B)</p> <ul style="list-style-type: none"> 1) The grounding conductor shall preferably be connected to a water pipe grounding electrode, as close to the point of entrance as possible. 2) Where the water pipe is not readily available and the grounding conductor of the power consumer's service is connected to the water pipe at the building, the primary protector grounding conductor shall be permitted to be connected to the metal conduit, service equipment enclosures, or to the grounding conductor of the power 	SN3961-60

<p>consumer's service.</p> <p>3) In the absence of a water pipe, the communication primary protector grounding conductor shall be permitted to be connected to an effectively grounded metal structure, or to a ground rod or pipe driven into permanently damp earth, but</p> <p>a) steam, gas, and hot water pipes and lightning red <u>down</u> conductors shall not be used as grounding electrodes; and</p> <p>b) a driven rod or pipe used for grounding power circuits shall not be used as a communication primary protector grounding electrode unless it is connected to the grounded conductor of a multi-grounded power neutral.</p> <p>4) Where a driven ground rod or pipe is used as a grounding electrode for an electrical communication system, it shall be separated by at least 2 m from any other electrode, including those used for power circuits, radio, lightning rods, or any other purpose, and shall be connected only to that of the power circuits in accordance with Rule 10-104.</p> <p>5) The normal length of a driven ground rod used as the grounding electrode for a communication station primary protector is 1.5 m, but where the normal rod would not reach moist soil when installed, a rod of suitable additional length shall be used.</p>	
<p><i>Revise Rule 60-708 to read:</i></p> <p>60-708 Grounding electrode connection</p> <p>The grounding conductor shall be attached to the grounding electrode as required in Rule 10-118</p> <p>a) directly; or</p> <p>b) to a <u>conductor</u> wire lead permanently connected to the ground rod electrode in a manner specified in CSA C83.</p>	<p>SN3961-60</p>

SECTION 62

Revise Rule 62-102 definition of Heating device to read:

SN4691-R

Heating device – any form of electrical heater, including trace heaters, fixtures, [water heaters](#), and panels

Revise Subrules 62-114 2), 3), and 8) to read:

SN4621
SN4628-62

62-114 Overcurrent protection and grouping (see Appendix B)

- 2) [For dwelling units](#) ~~In buildings for residential occupancy~~, two or more heating fixtures, trace heater sets, or heating panel sets shall be permitted to be connected to a branch circuit used for space heating, provided that the branch circuit overcurrent devices are rated or set at not more than 30 A.
- 3) ~~For~~ [In other than dwelling units](#) ~~buildings for residential occupancy~~,
 - a) two or more heating fixtures, trace heater sets, or heating panel sets shall be permitted to be grouped on a branch circuit, and the branch circuit overcurrent devices shall not be set or rated in excess of 60 A unless a deviation has been allowed in accordance with Rule 2-030 to use overcurrent devices having a higher setting or rating; and
 - b) where three heating fixtures, trace heater sets, or heating panel sets are grouped on a branch circuit in a balanced three-phase arrangement, the branch circuit overcurrent devices shall be permitted to be set or rated in excess of 60 A.
- 8) Notwithstanding Subrule 7) b), where 125% of the ~~allowable~~ ampacity of an insulated conductor does not correspond to a standard rating of the overcurrent device, the next higher standard rating shall be permitted.

Revise Rule 62-124 to read:

SN4607

62-124 Installation of series trace heater sets

- 1) The heating portion of a series trace heater set shall not be shortened, and any trace heater set that does not bear its original markings shall be considered to have been shortened unless the installer can demonstrate, by instrument measurements, that the characteristics of the series trace heater set have not been altered.
- 2) [Except as provided for in Subrule 3\)](#), ~~the~~ the entire length of the heating portion, including connections to non-heating leads, shall be installed within the heating area.
- 3) [Where a series trace heater set is designed for installation without non-heating leads, the transition of the trace heater from the heating area shall be through a suitable fitting and junction box assembly.](#)

<p><i>Revise Rule 62-130 to read:</i></p> <p>62-130 Heater controls installed in proximity to sinks, tubs, or shower stalls (see Appendix B)</p> <p>1) A manually operated control for a heating device shall be located not less than 1 m from a sink (a wash basin complete with a drainpipe), tub, or shower stall entrance, this distance being measured horizontally between the control and the sink, tub, or shower stall entrance without piercing a wall, partition, or similar obstacle.</p> <p>2) Notwithstanding Subrule 1), a manually operated control shall be permitted to be located less than 1 m from a sink (a wash basin complete with a drainpipe) and not less than 500 mm from a tub or shower stall entrance, provided that it is</p> <p>a) protected by a ground fault circuit interrupter of the Class A type; or</p> <p>b) supplied by an extra-low-voltage Class 2 circuit.</p>	<p>SN4567 SN4773</p>
<p><i>Revise Rule 62-132 to read:</i></p> <p>62-132 Heating devices installed in proximity to sinks, tubs, or shower stalls (see Appendix B)</p> <p>1) A heating device installed less than 1.8 m above the floor shall not be installed less than 1 m horizontally from a sink (a wash basin complete with a drainpipe), tub, or shower stall entrance, this distance being measured horizontally between the heating device and the sink, tub, or shower stall entrance without piercing a wall, partition, or similar obstacle.</p> <p>2) Notwithstanding Subrule 1), a heating device shall be permitted to be installed less than 1.8 m above the floor and less than 1 m from a sink (a wash basin complete with a drainpipe), tub, or shower stall entrance, provided that it is protected by a ground fault circuit interrupter of the Class A type.</p>	<p>SN4567</p>
<p><i>Revise Rule 62-216 to read:</i></p> <p>62-216 Trace heater sets and heating panel sets in gypsum board and other cementitious for ceiling and wall installations (see Appendix B)</p> <p>1) Trace heater 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.</p> <p>2) After the trace heater sets and heating panel sets are installed, the heater surface facing the space to be heated entire ceiling below the installed trace heater set or heating panel set shall be covered with gypsum board or acceptable cementitious materials not exceeding 13 mm in thickness.</p> <p>3) Trace heater sets shall be permitted to cross at the ends of the joists and studs, no further than 150 mm from the ends of the joists or studs.</p> <p>4) Notwithstanding Subrule 1), trace heater sets and heating panel sets shall be permitted for installation up to, and over the face of joists and studs</p> <p>a) for walls, provided they are</p> <p>i) mechanically protected;</p> <p>ii) installed up to a maximum height of 1.2 m above the finished floor; and</p>	<p>SN4568 SN4803</p>

<p><u>iii) protected by a ground fault circuit interrupter of the Class A type; and</u></p> <p><u>b) for ceilings, provided they are</u></p> <p><u>i) mechanically protected; or</u></p> <p><u>ii) protected by a ground fault circuit interrupter of the Class A type.</u></p> <p><u>5) Notwithstanding Subrule 2), trace heater sets and heating panel sets shall be permitted to be installed without gypsum board or cementitious materials when provided with mechanical protection.</u></p>	
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<h1>SECTION 64</h1>	
<p><i>Revise Section title to read:</i></p> <p>Section 64 — Renewable energy systems, energy production systems, and energy storage systems, <u>and batteries</u></p>	SN4758
<p><i>Revise Rule 64-000 to read:</i></p> <p>64-000 Scope (see Appendix B)</p> <p>1) This Section applies to the installation of renewable energy systems, energy production systems, and energy storage systems <u>and batteries</u> except where the voltage and current are limited in accordance with Rule 16-200 1) a) and b).</p> <p>2) This Section supplements or amends the general requirements of this Code.</p>	SN4758
<p><i>Revise Rule 64-002 entry for “Energy storage system” to read:</i></p> <p>Energy storage system — a system capable of <u>storing energy</u>, and supplying electrical energy to local power loads, or operating in parallel with a supply authority system or any other power sources.</p> <p>Field-assembled energy storage system — a system with storage capacity not exceeding 1 kWh (3.6 MJ) that has not been evaluated in accordance with UL 9540. <u>Equipment assembled in the field to form an energy storage system.</u></p> <p>Non-residential use energy storage system — an energy storage system that is not marked as being suitable for residential use.</p> <p>Residential use energy storage system — an energy storage system that</p> <p>a) is marked as being suitable for residential use <u>conforms to the requirements of UL 9540</u>; and</p> <p>b) conforms to the requirements of UL 9540. <u>has a capacity not exceeding 20 kWh for any single energy storage unit.</u></p> <p>Self-contained energy storage system — a system that conforms to the requirements of UL 9540 <u>equipment manufactured as a single unit to form an energy storage system.</u></p>	SN4758
<p><i>Revise Rule 64-104 to read:</i></p> <p>64-104 <u>Location of</u> interactive inverters <u>(See Appendix B)</u> mounted in locations that are not readily accessible</p> <p>Interactive inverters shall be permitted to be mounted on roofs or other exterior areas that are not readily accessible, provided that</p>	SN4411

<p>a) a dc and ac disconnecting means is provided in accordance with Rule 64-060 2);</p> <p>b) an additional ac disconnecting means for the inverter is provided in accordance with Rule 84-020; and</p> <p>c) a diagram is installed in accordance with Rule 84-030 2).</p> <p><u>1) Interactive inverters shall not be located in clothes closets, bathrooms, stairways or in any similar undesirable places.</u></p> <p><u>2) Except as permitted by Subrule 3), interactive inverters shall be readily accessible and installed in accordance with Rules 2-308 and 2-310.</u></p> <p><u>3) Interactive inverters shall be permitted to be mounted on roofs or in other exterior locations that are not readily accessible provided the inverter:</u></p> <p style="padding-left: 40px;"><u>a) is an integral part of an ac module or equivalent; or</u></p> <p style="padding-left: 40px;"><u>b) has a minimum of 1m working space maintained on the sides of the inverter that provide access to conductor connections or other parts requiring service.</u></p> <p><u>4) Permanent secure footing prescribed by Rule 2-308 shall not be required for interactive inverters installed in accordance with Subrule 3).</u></p> <p><u>5) Where an interactive inverter is installed as permitted by Subrule 3), the location of the inverter shall be indicated on the diagram required by Rule 84-030 2).</u></p>	
<p><i>Revise Rule 64-112 to read:</i></p> <p>64-112 Interactive point of connection (see Appendix B)</p> <p>1) The output of an interactive inverter or power conditioning unit shall be connected to the supply authority system in accordance with Section 84.</p> <p>2) Except as provided for in Subrule 3), the output of an interactive inverter described in this Section shall be connected to the supply side of the service disconnecting means.</p> <p>3) The output of an interactive inverter shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises under the provisions of Subrule 4).</p> <p>4) Where distribution equipment <u>or conductors</u> such as switchboards or panelboards located on the premises is <u>are</u> supplied simultaneously by a primary power source and one or more interactive inverters and where the distribution equipment connected as permitted by Subrule 3) is capable of supplying multiple branch circuits or feeders, or both, provisions for interconnection between the primary power supply source and the interactive inverter(s) shall comply with the following conditions:</p> <p style="padding-left: 40px;">a) <u>have</u> each source interconnection shall be made at a dedicated circuit breaker or fusible disconnecting means;</p> <p style="padding-left: 40px;">b) each panelboard, busbar, or conductor supplied by the multiple sources in the interactive system shall be provided with</p>	SN4759

~~i) suitable warning signs adjacent to each source disconnecting means to indicate that all of the disconnecting means must be opened to ensure complete de-energization of the equipment in accordance with Rule 14-414;~~

ii) have the point of connection positioned at the opposite (load) end from the input feeder ~~location~~ or main circuit location, except as provided in Item g), where the ~~panelboard equipment~~ is rated less than the sum of the ampere ratings of all overcurrent devices in source circuits supplying the ~~panelboard equipment~~; and

c) ~~iii)~~ have a permanent warning label installed at the ~~distribution~~ equipment referred to in item b) to indicate that the overcurrent device shall not be relocated;

d) have suitable warning signs installed on the equipment, and adjacent to each source disconnecting means to indicate that all of the disconnecting means must be opened to ensure complete de-energization of the equipment in accordance with Rule 14-414;

~~ee)~~ notwithstanding Section 14, the sum of the ampere ratings of the overcurrent devices ~~in source circuits~~ supplying power to ~~equipment a busbar~~ or conductor shall be permitted to exceed the equipment the busbar or conductor ratings to a maximum of 120% ~~of the rating of the busbar or conductor~~;

~~df)~~ notwithstanding Section 14, for a dwelling unit, the sum of the ampere ratings of the overcurrent devices ~~in source circuits~~ supplying power to ~~a busbar or equipment or~~ conductor s shall be permitted to exceed the equipment the busbar or conductor ratings to a maximum of 125% ~~of the rating of the busbar or conductor~~;

~~eg)~~ notwithstanding Items ~~ee)~~ and ~~df)~~, the sum of the ampere rating of the overcurrent devices shall be permitted to exceed the rating of the ~~busbar equipment~~ or conductor where:

i) ~~means equipment are~~ is provided to limit the input and output current of the interconnected systems to ensure the ~~busbar equipment~~ or conductor cannot be overloaded; or

ii) the equipment is used to combine ac supply circuits only, and a
A) single output circuit overcurrent device is installed that does not exceed the equipment rating; and
B) label is installed to indicate no other loads are permitted; and

~~fh)~~ except as provided in Subrule 5), the interconnection point shall be made on the line side of all ground fault protection equipment.

- 5) The interconnection point described in Subrule 4) e) shall be permitted to be made on the load side of ground fault protection equipment, provided that
- there is ground fault protection for equipment from all ground fault current sources; and
 - ground fault protection devices used with supplies connected to the load side terminals are suitable for back-feeding.

<p><i>Revise Subrule 64-202 5) to read:</i></p> <p>64-202 Voltage of solar photovoltaic systems (see Appendix B)</p> <p>5) Photovoltaic source and output circuits, and equipment connected to or within those <u>these</u> circuits, with maximum voltages higher than 750 V dc but not exceeding 1500 V dc shall not be required to comply with Rules 36-204, 36-208, and 36-214, provided that</p> <ul style="list-style-type: none"> a) the installation is serviced only by qualified persons; b) the part of the installation <u>where high voltage is present</u> exceeding 750 V dc is inaccessible to the public; and c) enclosures in which photovoltaic source and output circuits exceeding 750 V dc are present are marked with the word "DANGER" followed by the maximum rated photovoltaic circuit voltage of the equipment. 	SN4668
<p><i>Revise Rule 64-210 5) to read:</i></p> <p>64-210 Wiring method (see Appendix B)</p> <p>5) Where the dc arc-fault protection referred to in Rule 64-216 is not located at an <u>integral part of</u> the module, photovoltaic source <u>and output</u> circuit insulated conductors and cables installed on or above a building and installed in accordance with Subrules 1), 2), and 3) shall be provided with mechanical protection in the form of an enclosed raceway or other acceptable material to protect against damage from rodents.</p>	SN4587
<p><i>Revise Subrules 64-214 1) and 2) to read:</i></p> <p>64-214 Overcurrent protection for apparatus and conductors (see Appendix B)</p> <p>1) Notwithstanding Rules 64-058 1) and 64-066 1) a), individual overcurrent protection devices shall not be required where the sum of the available short-circuit currents from all photovoltaic source circuits connected to the same power conditioning unit is not greater than the rated ampacity of the apparatus or conductors.</p> <p>2) Where overcurrent protection is required by Rule 64-058 1) for a photovoltaic source circuit, each photovoltaic source circuit shall be protected by an individual overcurrent device rated or set at not more than the allowable ampacity of the conductors of the photovoltaic source circuit or the maximum overcurrent protection indicated on the photovoltaic module nameplate, whichever is less.</p>	SN4628-64
<p><i>Revise Subrules 64-308 1) and 3) to read:</i></p> <p>64-308 Overcurrent protection for apparatus and insulated conductors (see Appendix B)</p> <p>1) Notwithstanding Rules 64-058 1) and 64-066 1) a), individual overcurrent protection devices shall not be required where the available steady-state short-circuit current is not greater than the rated ampacity of the apparatus or insulated conductor.</p>	SN4628-64

<p>3) Notwithstanding Subrule 2), an overcurrent device shall not be required for insulated circuit conductors sized in accordance with this Rule and when the maximum currents from all sources do not exceed the allowable ampacity of the insulated conductors.</p>	
<p><i>Revise Subrule 64-506 1) to read:</i></p> <p>64-506 Overcurrent protection for apparatus and insulated conductors 1) Notwithstanding Rules 64-058 1) and 64-066 1) a), individual overcurrent protection devices shall not be required where the available short-circuit current is not greater than the rated ampacity of the equipment or insulated conductor.</p>	SN4628-64
<p><i>Revise Subrule 64-606 1) to read:</i></p> <p>64-606 Overcurrent protection for apparatus and insulated conductors 1) Notwithstanding Rules 64-058 1) and 64-066 1) a), individual overcurrent protection devices shall not be required where the available steady-state short-circuit current is not greater than the rated ampacity of the apparatus or insulated conductor.</p>	SN4628-64
<p><i>Revise Item 64-710 c) to read:</i></p> <p>64-710 Location of fuel cells (see Appendix B) A fuel cell system(s) and associated equipment, components, and controls shall meet the following requirements:</p> <p>c) stationary fuel cell systems shall not be located in: clothes closets, bathrooms, stairways, i) <u>spaces with</u> high ambient rooms <u>temperatures;</u> ii) <u>storage areas for flammable, combustible, or hazardous materials;</u> iii) <u>hazardous, corrosive or wet</u> locations, <u>unless suitably rated;</u> or iv) <u>any similar undesirable places; and</u></p>	SN4610
<p><i>Revise Rule 64-800 to read:</i></p> <p>64-800 Scope (see Appendix B) 1) Batteries shall be installed in accordance with the provisions of Rules 64-8002 to 64-814, except as otherwise required by the manufacturer. 2) <u>Electrical equipment associated with batteries shall be installed in accordance with the provisions of</u> Rules 64-816 to 64-820 apply to the installation of electrical equipment, other than batteries, in a battery room.</p>	SN4758
<p>Revise Rule 64-812 to read</p> <p>64-812 Battery interconnections (see Appendix B) 1) Insulated conductors and cables used to terminate to battery terminals shall be of a fine strand <u>the flexible fine strand</u> type.</p>	SN4626

<p>2) The connection method between batteries shall be permitted to be insulated or bare busbars.</p> <p>3) Flexible metal raceways shall not be permitted for battery interconnections.</p> <p>4) Conductors shall have sufficient ampacity for the maximum load.</p> <p><u>5) Insulated flexible conductor and cable terminations to a battery terminal or associated equipment, as well as interconnections between battery strings, shall be secured to minimize the movement of cables due to short-circuit forces and at intervals of not more than 1.5 m throughout the run.</u></p>	
<p><i>Revise Subsection heading for Energy storage systems to read:</i></p> <p>Energy storage systems <u>(general)</u></p>	SN4758
<p><i>Revise Rule 64-902 to read:</i></p> <p>64-902 Marking <u>(see Appendix B)</u></p> <p>1) In addition to the requirements in Rule 64-074, a plaque or directory shall be provided to indicate the building or structure contains an energy storage system and the location of all energy storage system disconnecting means.</p> <p>2) <u>Energy storage systems with a storage capacity of 1 kWh or less, Field-assembled energy storage systems</u> shall include permanent markings, <u>as applicable to the system</u>, in accordance with Rule 2-100 at a readily accessible location at the disconnecting means for the energy storage system.</p> <p><u>3) Energy storage systems meeting the requirements of Rule 2-024 shall be deemed to meet the requirements of Subrule 2).</u></p>	SN4758
<p><i>Revise Rule 64-904 to read:</i></p> <p>64-904 Voltage of energy storage systems</p> <p>1) Batteries forming part of a field-assembled energy storage system installed in or on a dwelling unit shall be connected so as not to exceed 50 V dc.</p> <p>2) 1) Self-contained Eenergy storage systems <u>installed in accordance with Rule 64-1100 output circuits for installations in or on a dwelling unit</u> shall be permitted to have a voltage not exceeding 600 V, provided that all energized parts in the energy storage system circuits over 150 volts-to-ground are accessible only to qualified persons:</p> <p><u>a) not exceed 600 V; and</u></p> <p><u>b) have all energized parts over 150 volts-to-ground accessible only to qualified persons.</u></p> <p>3) 2) The dc portion of energy storage systems with maximum voltages higher than 750 V dc but not exceeding 1500 V dc shall not be required to comply with Rules 36-</p>	SN4758

<p>204, 36-208, and 36-214 provided that</p> <ul style="list-style-type: none"> a) the installation is serviced only by qualified persons; b) the part of the installation exceeding 750 V dc is inaccessible to the public; and c) enclosures in which circuits exceeding 750 V dc are present are marked with the word "DANGER" followed by the maximum rated circuit voltage of the equipment. 	
<p><i>Revise Rule 64-910 to read:</i></p> <p>64-910 Installations <u>and maintenance</u></p> <ul style="list-style-type: none"> 1) Self-contained <u>Energy storage systems</u> equipment shall be installed <u>and maintained</u> in accordance with the manufacturer's installation instructions. 2) Mechanical protection shall be provided where an energy storage system is subject to the risk of vehicular impact or other physical damage. 	SN4758
<p><i>Revise Rule 64-914 to read:</i></p> <p>64-914 Disconnecting means for energy storage systems (see Appendix B)</p> <ul style="list-style-type: none"> 1) Disconnecting means for energy storage systems shall be in accordance with Subrules 2) to <u>8) 9)</u>. 2) A disconnecting means shall be provided to disconnect simultaneously all ungrounded conductors supplied from an energy storage system. <u>Where an energy storage system does not include an integral output disconnecting means, a disconnecting means shall be installed in accordance with Subrule 3).</u> 3) The disconnecting means for a field-assembled energy storage system <u>referenced in Subrule 2)</u> shall <ul style="list-style-type: none"> a) be capable of being energized from both sides; b) indicate whether it is in the open or closed position; c) have provision for being locked in the open position; d) be in accordance with Section 14; e) be capable of being opened at rated load; f) be capable of being closed with a fault on the system; and g) be located within sight of and within 9 m of the <u>energy storage system</u> equipment or be integral to the equipment. 4) Where a self-contained energy storage system does not include an integral output disconnecting means, a disconnecting means shall be installed in accordance with Subrule 3). 5) <u>4)</u> The disconnecting means required by this Rule shall not be connected in any grounded conductor if operation of that disconnecting means would cause the grounded conductor to be in an ungrounded and energized state. 6) <u>5)</u> The disconnecting means shall comply with Rules 14-414 and 14-700. 7) <u>6)</u> As required by Rule 14-402, disconnecting means shall be provided to disconnect a fuse from all sources of supply if the fuse is energized from both 	SN4758

<p>directions, unless the fuse can be readily and safely de-energized.</p> <p>8) 7) Disconnecting means provided on dc circuits shall be rated for dc applications.</p> <p>9) 8) The disconnecting means shall bear a warning to the effect that the terminals on both the line and load sides could be energized when the disconnecting means is open.</p>	
<p><i>Delete Rule 64-918:</i></p> <p>64-918 Location and separation requirements for energy storage systems (see Appendix B)</p> <p>1) Self-contained energy storage systems shall be installed in accordance with the manufacturer's installation instructions.</p> <p>2) Energy storage systems utilizing batteries shall not be installed where the floor is</p> <p>a) higher than 23 m above grade; or</p> <p>b) below grade.</p> <p>3) Notwithstanding Subrule 2), energy storage systems utilizing batteries shall be permitted to be installed in an electrical equipment vault.</p> <p>4) Energy storage systems with a storage capacity greater than 1 kWh or utilizing lithium-ion batteries shall not be installed in</p> <p>a) dwelling units; and</p> <p>b) any living space of a residential occupancy including clothes closets, storage rooms, bathrooms, stairways, or any other similar undesirable places.</p> <p>5) Energy storage systems installed outside of a dwelling unit shall not be installed within 1 m of any window, door, or ventilation opening.</p> <p>6) Notwithstanding Subrule 4), residential use energy storage systems shall be permitted to be installed in garages of dwelling units, provided that the</p> <p>a) storage capacity of any single energy storage system does not exceed 20 kWh; or</p> <p>b) aggregate storage capacity of multiple energy storage systems does not exceed 40 kWh and the energy storage systems are spaced not less than 1 m apart.</p> <p>7) Energy storage systems</p> <p>a) directly mounted to a building surface shall have</p> <p>i) for a single energy storage system, a storage capacity not exceeding 20 kWh; and</p> <p>ii) for multiple energy storage systems, a spacing of not less than 1 m apart and an aggregate storage capacity not exceeding 40 kWh; or</p> <p>b) installed in or on a detached garage, storage building, or free-standing structure, shall have</p> <p>i) for a single energy storage system, a storage capacity not exceeding 20 kWh; and</p> <p>ii) for multiple energy storage systems, a spacing of not less than 1 m from a dwelling unit and an aggregate storage capacity not exceeding 80 kWh.</p> <p>8) Energy storage systems marked with "THIS EQUIPMENT MEETS THE CELL LEVEL PERFORMANCE CRITERIA OF UL 9540A" shall be permitted to exceed the limitations of Subrules 6) and 7).</p> <p>9) The location of energy storage systems shall not impede egress from a building and shall not be located closer than 3 m from</p> <p>a) a path of egress; and</p> <p>b) entrance or exit doors.</p> <p>10) Energy storage systems shall be installed in accordance with Rule 2-328.</p>	<p>SN4758</p>

<p><i>Delete Rule 64-920:</i></p> <p><u>64-920 Battery installations</u> 1) Batteries installed as part of self-contained energy storage systems shall be installed in accordance with the manufacturer's installation instructions. 2) Batteries installed as part of field-assembled energy storage systems shall be installed in accordance with Rules 64-800 to 64-820.</p>	SN4758
<p><i>Renumber Rule 64-922 to read:</i></p> <p><u>64-91822</u> Diversion load controllers A diversion load controller used as the primary means of regulating the stored kinetic energy of an energy storage system shall not use the supply authority system as a diversion load.</p>	SN4758
<p><i>Revise Rule 64-924 to read:</i></p> <p><u>64-92024</u> Ampere rating of energy storage system circuits 1) The maximum-current <u>rating</u> for energy storage system circuits shall be determined as follows: <u>a) the rated current indicated on the energy storage system nameplate(s).</u> ab) for an inverter output circuit, the inverter continuous output current rating; bc) for an inverter input circuit, the continuous inverter input current rating when the inverter is producing rated power at the lowest input voltage; cd) for the output of a dc-to-dc converter, the dc-to-dc converter continuous output current rating; <u>and</u> de) for a charge controller, the input current <u>rating</u> while charging; <u>and</u> e) for a self-contained system, the rated current indicated on the energy storage system nameplate(s). 2) Where interconnected with the supply authority system, the current <u>rating</u> referred to in Subrule 1) shall be considered a continuous load for the application of Rule 8-104. 3) Where the output supplies dedicated loads or other power systems, the continuous load shall be determined in accordance with Rule 8-104 3).</p>	SN4758
<p><i>Revise Rule 64-926 to read:</i></p> <p><u>64-92226</u> System charge control (see Appendix B) 1) Equipment shall be provided to control the charging process of an energy storage system. 2) Adjustable settings for control of the charging process shall be accessible only to qualified personnel. 3) A diversion charge controller installed as part of an energy storage system shall be in accordance with the requirements of Rule 64-820. 4) A self-contained energy storage system shall be deemed to meet the requirements of this Rule.</p>	SN4758

<p><i>Revise Rule 64-928 to read:</i></p> <p>64-928 Working space and accessibility to energized parts (See Appendix B)</p> <p>1) Self-contained energy storage systems shall be a) installed in accordance with the manufacturer's installation instructions; and b) permitted to have working space within the energy storage system equipment in accordance with the manufacturer's recommendation.</p> <p>1) Notwithstanding Rule 2-308, 2-310 and 2-312, working space requirements within energy storage systems complying with Rule 2-024 1) shall be permitted to be in accordance with the manufacturers instructions.</p> <p>2) Field-assembled Energy storage systems installed in dwelling units shall have no exposed energized parts.</p> <p>3) Energy storage systems shall be installed in accordance with Rules 2-202, 2-308, 2-310, and 2-312.</p>	SN4758
<p><i>Add new Rule 64-926 to read:</i></p> <p>64-926 Egress from buildings</p> <p>Except as provided for by other rules of this Code, batteries forming part of an energy storage system located outdoors shall not impede egress from a building and shall not be located closer than 3 m from</p> <p>a) a means of egress; and b) entrance or exit doors.</p>	SN4758
<p><i>Add new Subsection to read:</i></p> <p>Energy storage systems utilizing batteries (General)</p> <p>64-1000 Scope</p> <p>Rules 64-1002 to 64-1004 apply to the installation of energy storage systems utilizing batteries with a storage capacity exceeding 1 kWh.</p> <p>64-1002 Installation requirements of energy storage systems</p> <p>1) Energy storage systems utilizing batteries shall comply with Rule 2-024 1), and be installed and assembled in accordance with the manufacturer's instructions.</p> <p>2) Except where installed in an electrical equipment vault, energy storage systems utilizing batteries shall not be installed where the floor is</p> <p>a) higher than 23 m above grade; or b) below the lowest level of egress from the occupancy.</p> <p>3) Energy storage systems shall be installed in accordance with Rule 2-328</p> <p>64-1004 Installation requirements of batteries forming part of an energy storage system</p>	SN4758

<p><u>1) Batteries forming part of an energy storage system shall</u> <u>a) be installed in accordance with the manufacturer's installation instructions where provided; or</u> <u>b) be installed in accordance with Rules 64-800 to 64-820.</u></p> <p><u>2) Notwithstanding Rule 64-804 3), where indicated in the manufacturers installation instructions, batteries forming part of energy storage system installed in a dwelling unit, shall be permitted to be connected to exceed 50 V dc.</u></p>	
<p><i>Add new Subsection to read:</i></p> <p><u>Installation of energy storage systems at residential occupancies</u></p> <p><u>64-1100 Location and separation requirements (See Appendix B)</u></p> <p><u>1) Energy storage systems installed at a dwelling unit or residential occupancy shall be suitable for residential use, and be located.</u> <u>a) in an attached garage,</u> <u>b) in or on an associated detached garage, or other free standing structure,</u> <u>c) on the exterior surface of a dwelling unit or residential occupancy,</u> <u>d) in a dedicated room with a fire resistance rating of not less than 1 h when installed in a dwelling unit or residential occupancy, or</u> <u>e) in other locations where permitted</u></p> <p><u>2) Notwithstanding Rule 64-1002 2) b), energy storage systems in a dwelling unit or residential occupancy shall be permitted to be installed below the lowest level of egress when located in accordance with Subrule 1) d) or e).</u></p> <p><u>3) Energy storage systems shall not be installed in sleeping areas, or rooms opening directly into sleeping areas.</u></p> <p><u>4) Except as required by Subrule 5), energy storage systems installed in accordance with Subrule 1), shall</u> <u>a) have a storage capacity not exceeding 20 kWh for any single energy storage system, or</u> <u>b) where multiple energy storage systems are installed, have an aggregate capacity not exceeding 80 kWh.</u></p> <p><u>5) Energy storage systems installed in accordance with Subrule 1) d) shall</u> <u>a) have a storage capacity not exceeding 20 kWh for any single energy storage system, or</u> <u>b) where multiple energy storage systems are installed, have an aggregate capacity not exceeding 40 kWh.</u></p> <p><u>6) Batteries forming part of an energy storage system installed outdoors shall not be located within 1 m of any window or door of a dwelling unit or residential occupancy.</u></p> <p><u>7) Where multiple energy storage systems are installed, batteries forming part of each system shall be spaced not less than 1 m apart from each other.</u></p> <p><u>8) Notwithstanding Subrules 1) through 7), energy storage systems evaluated to UL9540A shall be permitted to be installed in accordance with the manufacturer's</u></p>	<p>SN4758</p>

<u>installation instructions.</u>	
<u>9) Where an energy storage system is installed in a dwelling unit or residential occupancy, a smoke alarm or smoke detector shall be installed,</u>	
<u>a) in the area or room where the energy storage system is located, and,</u>	
<u>b) be connected in accordance with Section 32.</u>	

SECTION 68

Add new rule 68-072 to read:

SN3864

68-072 Disconnecting means for pool pumps, spas, and hot tubs

A disconnecting means rated to interrupt the connected load shall be provided for each permanently connected pool pump, spa, and hot tub, and shall be

- a) located not closer than 1.5 m to the inside walls of a pool, spa and hot tub unless behind a permanent barrier that will prevent the occupant of the pool, spa, or hot tub from contacting the device;
- b) located outside when the equipment is located outside at a dwelling unit;
- c) readily accessible; and
- d) lockable when not within sight of the pool pump, spa, and hot tub.

SECTION 86

Revise Rule 86-102 to read:

SN4477

86-102 Voltages in electric vehicle supply equipment installations

~~The nominal ac system voltages used to supply equipment covered in this Section shall not exceed 750 V.~~

1) The nominal ac system voltages used to supply equipment covered in this section shall not exceed 1000 V.

2) The maximum voltage in electric vehicle supply equipment circuits shall not exceed 1060 V dc.

3) The maximum voltage in electric vehicle supply equipment circuits installed in a dwelling unit shall comply with Rule 2-110.

4) Notwithstanding Subrule 2), the maximum voltage in electric vehicle supply equipment circuits shall be permitted to be higher than 1060 V dc but not exceeding 1500 Vdc, provided that

a) the installation is serviced only by qualified persons;

b) the part of the installation exceeding 1060 V dc is inaccessible to the public; and

c) enclosures in which electric vehicle supply equipment and output circuits exceeding 1060 V dc are present are marked with the word "DANGER" followed by the maximum rated electric vehicle supply equipment circuit voltage of the equipment.

5) The installations described in Subrule 4), shall not be required to comply with Section 36.

<h1>Tables</h1>	
<p><i>Revise Title of Table 1 to read:</i></p> <p style="text-align: center;">Table 1 Allowable Ampacities for... [no change to remainder of title]</p>	SN4628-4
<p><i>Revise Table 1, header for temperature columns, to read:</i></p> <p style="text-align: center;">Allowable-a Ampacity †</p>	SN4628-4
<p><i>Revise Title of Table 2 to read:</i></p> <p style="text-align: center;">Table 2 Allowable Ampacities for... [no change to remainder of title]</p>	SN4628-4
<p><i>Revise Table 2, header for temperature columns, to read:</i></p> <p style="text-align: center;">Allowable-a Ampacity †,††</p>	SN4628-4
<p><i>Revise Title of Table 3 to read:</i></p> <p style="text-align: center;">Table 3 Allowable Ampacities for... [no change to remainder of title]</p>	SN4628-4
<p><i>Revise Table 3, header for temperature columns, to read:</i></p> <p style="text-align: center;">Allowable-a Ampacity †</p>	SN4628-4
<p><i>Revise Title of Table 4 to read:</i></p> <p style="text-align: center;">Table 4 Allowable Ampacities for... [no change to remainder of title]</p>	SN4628-4
<p><i>Revise Table 4, header for temperature columns, to read:</i></p> <p style="text-align: center;">Allowable-a Ampacity †§</p>	SN4628-4

Revise Title of Table 12 to read:	SN4628-4																								
<div>Table 12</div> <div>Allowable Ampacity of... [no change to remainder of title]</div>																									
Revise Table 12, first column header for temperature columns, to read:	SN4628-4																								
<div>Allowable-aAmpacity</div>																									
Revise Title of Table 12A to read:	SN4628-4																								
<div>Allowable-aAmpacities for... [no change to remainder of title]</div>																									
Revise Title of Table 12E to read:	SN4628-4																								
<div>Allowable-aAmpacities for... [no change to remainder of title]</div>																									
Revise Table 16, header for column 2, to read:	SN4628-10																								
<div>Table 16</div> <div>Minimum size of field-installed system bonding jumpers and bonding conductors</div> <div>(See Rule 10-616.)</div> <table><tr><td rowspan="4">Ampere rating or setting of overcurrent device protecting conductor (s), equipment, etc.</td><td rowspan="4">Allowable Ampacity of largest ungrounded conductor or group of conductors</td><td colspan="4">Minimum size of system bonding jumper and bonding conductor</td></tr><tr><td colspan="2">Wire</td><td colspan="2">Bus</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td>Copper, AWG or kcmil</td><td>Aluminum, AWG or kcmil</td><td>Copper, mm²</td><td>Aluminum, mm²</td></tr><tr><td colspan="2">Not exceeding</td><td></td><td></td><td></td><td></td></tr></table> <div>No change to content of Table 16</div>	Ampere rating or setting of overcurrent device protecting conductor (s), equipment, etc.	Allowable Ampacity of largest ungrounded conductor or group of conductors	Minimum size of system bonding jumper and bonding conductor				Wire		Bus						Copper, AWG or kcmil	Aluminum, AWG or kcmil	Copper, mm²	Aluminum, mm²	Not exceeding						
Ampere rating or setting of overcurrent device protecting conductor (s), equipment, etc.			Allowable Ampacity of largest ungrounded conductor or group of conductors	Minimum size of system bonding jumper and bonding conductor																					
				Wire		Bus																			
	Copper, AWG or kcmil	Aluminum, AWG or kcmil		Copper, mm²	Aluminum, mm²																				
Not exceeding																									

Revise Table 18 to read:

SN4640
SN4677

Table 18
Equipment suitable for explosive atmospheres

(See Rules 18-090, 18-100, 18-150, 18-190, 18-200, 18-250, J18-100, J18-150, J18-200, J18-250, J18-300, and J18-350.)

Area classification	Type (Level) of protection	
	Description	Marking
Zone 0	Intrinsic safety (Group II)	ia
	Encapsulation (Group II)	ma
	Flameproof (Group II)	da*
	Equipment assemblies	60079-46, with EPL Ga**
	Inherently safe optical radiation	op is, with EPL Ga**
	Optical system with interlock	op sh, with EPL Ga**
	Intrinsically safe	Intrinsically safe, IS, I.S., Exi, Exia, for Class I
	EPL††	Ga
Zone 1	Equipment suitable for use in Zone 0	
	Equipment suitable for use in Class I, Division 1	
	Flameproof (Group II)	d, db
	Intrinsic safety (Group II)	ib
	Increased safety (Group II)	e, eb
	Pressurized enclosure (Group II)	p, px, pxb, py, pyb
	Encapsulation (Group II)	m, mb
	Powder filling (Group II)	q, qb
	Liquid immersion (Group II)	o, ob
	Electrical resistance trace heating	60079-30-1, with EPL Gb**
	Skin effect trace heating	CSA C22.2 No. 293.1, with EPL Gb**
	Equipment Assemblies	60079-46, with EPL Gb**
	Inherently safe optical radiation	op is, with EPL Gb**
	Optical system with interlock	op sh, with EPL Gb**
	Protected optical radiation	op pr, with EPL Gb**
	EPL††	Gb
Zone 2	Equipment suitable for use in Zone 0	
	Equipment suitable for use in Zone 1	
	Equipment suitable for use in Class I, Division 1	
	Equipment suitable for use in Class I, Division 2	
	Type of Protection “n” (Group II)	nA, nC, nL, nR
	Pressurized enclosure (Group II)	pz, pzc
	Intrinsic safety (Group II)	ic
	Flameproof (Group II)	dc
	Increased safety (Group II)	ec

	Liquid immersion (Group II) Encapsulation (Group II) Electrical resistance trace heating Skin effect trace heating Impedance heating Equipment assemblies Inherently safe optical radiation Optical system with interlock Protected optical radiation EPL†† Other electrical apparatus‡	oc mc 60079-30-1, <i>with EPL Gc**</i> CSA C22.2 No. 293.1, <i>with EPL Gc**</i> CSA C22.2 No. 293.3, <i>with EPL Gc**</i> 60079-46, with EPL Gc** op is, <i>with EPL Gc**</i> op sh, <i>with EPL Gc**</i> op pr, <i>with EPL Gc**</i> Gc
Zone 20	Equipment suitable for use in Class II, Division 1 Intrinsic safety (Group III) Intrinsically safe Protection by enclosure (Group III) Encapsulation (Group III) Equipment assemblies Inherently safe optical radiation Optical system with interlock EPL††	ia Intrinsically safe, IS, I.S., Exi, Exia, <i>for Class II</i> ta ma 60079-46, with EPL Da** op is, <i>with EPL Da**</i> op sh, <i>with EPL Da**</i> Da
Group IIIA only	Equipment suitable for use in Class III, Division 1	
Zone 21	Equipment suitable for use in Zone 20 Equipment suitable for use in Class II, Division 1 Intrinsic safety (Group III) Protection by enclosure (Group III) Pressurized enclosure (Group III) Encapsulation (Group III) Electrical resistance trace heating Skin effect trace heating Equipment assemblies Inherently safe optical radiation Optical system with interlock Protected optical radiation EPL††	ib tb p, px, pxb, py, pyb mb 60079-30-1, <i>with EPL Db**</i> CSA C22.2 No. 293.1, <i>with EPL Db**</i> 60079-46, with EPL Db** op is, <i>with EPL Db**</i> op sh, <i>with EPL Db**</i> op pr, <i>with EPL Db**</i> Db
Group IIIA only	Equipment suitable for use in Class III, Division 1	
Zone 22	Equipment suitable for use in Zone 20 Equipment suitable for use in Zone 21 Equipment suitable for use in Class II, Division 1 Equipment suitable for use in Class II, Division 2 Intrinsic safety (Group III)	ic

	Protection by enclosure (Group III)	tc
	Pressurized enclosure (Group III)	pz, pzc
	Encapsulation (Group III)	mc
	Electrical resistance trace heating	60079-30-1, with EPL Dc**
	Skin effect trace heating	CSA C22.2 No. 293.1, with EPL Dc**
	Impedance heating	CSA C22.2 No. 293.3, with EPL Dc**
	<u>Equipment assemblies</u>	<u>60079-46, with EPL Dc**</u>
	Inherently safe optical radiation	op is, with EPL Dc**
	Optical system with interlock	op sh, with EPL Dc**
	Protected optical radiation	op pr, with EPL Dc**
	EPL††	Dc
	Other electrical apparatus‡	
Group IIIA only	Equipment suitable for use in Class III, Division 2	
Class I, Division 1	Equipment marked for use in Class I, Division 1†	Intrinsically safe, IS, I.S., Exi, Exia, for Class I
	Intrinsically safe	Class I
	Purged equipment to NFPA 496	Type X, <u>Type Y</u> , for Class I
	Purged equipment to NFPA 496	Type Y, for Class I
	Equipment suitable for use in Zone 0	
	Intrinsic safety (Group II)	ia
	Encapsulation (Group II)	ma
	Flameproof (Group II)	da*
	Inherently safe optical radiation	op is, with EPL Ga**
	Optical system with interlock	op sh, with EPL Ga**
	<u>Equipment assemblies</u>	<u>60079-46, with EPL Ga**</u>
Class I, Division 2	Equipment suitable for use in Class I, Division 1	
	Equipment marked for use in Class I, Division 2†	Type Z, for Class I
	Purged equipment to NFPA 496	
	Equipment suitable for use in Zone 0, Zone 1, or Zone 2	
	Type of Protection “n” (Group II)	nA, nC, nL, nR
	Pressurized enclosure (Group II)	px, pxb, py, pyb, pz, pzc
	Intrinsic safety (Group II)	ia, ib, ic
	Flameproof (Group II)	da, db, dc
	Increased safety (Group II)	eb, ec
	Liquid immersion (Group II)	ob, oc
	Encapsulation (Group II)	ma, mb, mc
	Electrical resistance trace heating	60079-30-1, with EPL Gb or Gc**
	Skin effect trace heating	CSA C22.2 No. 293.1, with EPL Gb or Gc**
	Impedance heating	CSA C22.2 No. 293.3, with EPL Gb or Gc**
	Inherently safe optical radiation	op is, with EPL Ga, Gb, or Gc**

	Optical system with interlock Protected optical radiation Equipment assemblies Other electrical apparatus†	op sh, <i>with EPL Ga, Gb, or Gc**</i> op pr, <i>with EPL Gb or Gc**</i> 60079-46, with EPL Ga, Gb, or Gc**
Class II, Division 1	Equipment marked for use in Class II, Division 1† Intrinsically safe Purged equipment to NFPA 496 Purged equipment to NFPA 496 Equipment suitable for use in Zone 20§ Intrinsic safety (Group III) Protection by enclosure (Group III) Encapsulation (Group III) Inherently safe optical radiation Optical system with interlock Equipment assemblies	Intrinsically safe, IS, I.S., Exi, Exia, <i>for Class II</i> Type X, Type Y , <i>for Class II</i> Type Y, for Class II ia ta ma op is, <i>with EPL Da**</i> op sh, <i>with EPL Da**</i> 60079-46, with EPL Da**
Class II, Division 2	Equipment suitable for use in Class II, Division 1 Equipment marked for use in Class II, Division 2† Purged equipment to NFPA 496 Equipment suitable for use in Zone 20, Zone 21, or Zone 22§ Intrinsic safety (Group III) Protection by enclosure (Group III) Pressurized enclosure (Group III) Encapsulation (Group III) Electrical resistance trace heating Skin effect trace heating Impedance heating Inherently safe optical radiation Optical system with interlock Protected optical radiation Equipment assemblies Other electrical apparatus†	Type Z, <i>for Class II</i> ia, ib, ic ta, tb, tc px, pxb, py, pyb, pz, pzc ma, mb, mc 60079-30-1, <i>with EPL Db or Dc**</i> CSA C22.2 No. 293.1, <i>with EPL Db or Dc**</i> CSA C22.2 No. 293.3, <i>with EPL Db or Dc**</i> op is, <i>with EPL Da, Db, or Dc**</i> op sh, <i>with EPL Da, Db, or Dc**</i> op pr, <i>with EPL Db or Dc**</i> 60079-46, with EPL Da, Db, or Dc**
Class III, Division 1	Equipment suitable for use in Class II, Division 1 Equipment marked for use in Class III, Division 1† Intrinsically safe Enclosure Equipment suitable for use in Zone 20 or Zone	Intrinsically safe, IS, I.S., Exi, Exia, <i>for Class II or Class III</i> Type 5††

	21 [§]	ia, ib ta, tb ma, mb op is, with EPL Da or Db** op sh, with EPL Da or Db** 60079-46, with EPL Da or Db**
	Intrinsic safety (Group III) Protection by enclosure (Group III) Encapsulation (Group III) Inherently safe optical radiation Optical system with interlock Equipment assemblies	
Class III, Division 2	Equipment suitable for use in Class II, Division 1 Equipment suitable for use in Class II, Division 2 Equipment suitable for use in Class III, Division 1 Equipment marked for use in Class III, Division 2† Equipment suitable for use in Zone 20, Zone 21, or Zone 22 [§] Intrinsic safety (Group III) Protection by enclosure (Group III) Pressurized enclosure (Group III) Encapsulation (Group III) Electrical resistance trace heating Skin effect trace heating Impedance heating Inherently safe optical radiation Optical system with interlock Protected optical radiation Equipment assemblies Other electrical apparatus‡	ia, ib, ic ta, tb, tc px, pxb, py, pyb, pz, pzc ma, mb, mc 60079-30-1, with EPL Db or Dc** CSA C22.2 No. 293.1, with EPL Db or Dc** CSA C22.2 No. 293.3, with EPL Db or Dc** op is, with EPL Da, Db, or Dc** op sh, with EPL Da, Db, or Dc** op pr, with EPL Db or Dc** 60079-46, with EPL Da, Db, or Dc**

* "da" is limited to sensors of portable combustible gas detectors.

† With the exception of intrinsically safe equipment, equipment for use in a Class XX, Division XX location is not required to be marked with a type of protection — only the location where that equipment is permitted to be installed.

‡ "Other electrical apparatus" means electrical apparatus complying with the requirements of a recognized Standard for industrial electrical apparatus that does not in normal service

a) have ignition-capable hot surfaces; or

b) produce incendive arcs or sparks.

See Rules 18-150 2), 18-250 2), J18-150 2) and 3), J18-252, J18-254, and J18-262. "Other electrical apparatus" also makes reference to equipment or systems currently acceptable as alternative means of protection (see Rules 18-066, 18-070, J18-066, and J18-068).

§ For use in Class II and Class III, such (Zone acceptable) equipment is subject to the limitation of

a) Rules J18-054 2) and J18-054 3) for Class II; and

b) Rule J18-054 4) for Class III.

Group IIIA equipment is not suitable for use in Class II locations.

** Equipment marked with these types of protection is available in multiple levels of protection that are not specifically identified within the Ex marking.

†† The EPL takes precedence over the type of protection; for example, "Ex ia Gb" is suitable for Zone 1 (not Zone 0), "Ex op is Db" is suitable for Zone 21 (not Zone 20), and "Ex 60079-30-1 Gc" is suitable for Zone 2 (not Zone 1). Selection according to the marked EPL is critical to the safe application of this equipment.

‡‡ In Class III, Division 1, switches, controllers, circuit breakers, fuses, control transformers, resistors, utilization equipment (fixed and portable), electric cranes, hoists, and similar equipment may be housed in Enclosure Type 5.

Note: This Table is structured to show the area classification on the left side and the permitted equipment on the right side. Zone equipment is suitable for use in some Class/Division locations and vice versa. This is indicated by the phrase "Equipment suitable for use in...". For example, in Class I, Division 1 locations, "Equipment suitable for use in Zone 0" means all equipment listed under Zone 0 can be used.

Revise Title of Table 36A to read: Maximum allowable A mpacity for... [no change to remainder of title]	SN4628-4
Revise Title of Table 36B to read: Maximum allowable A mpacity for... [no change to remainder of title]	SN4628-4

Delete Table 38:

SN4681

Table 38
Electric vehicle supply equipment demand factors
(See Rules 8-202 to 8-210.)

Number of automobile spaces or stalls per feeder	Maximum load per space or stall, W	Demand factor, %
1 to 4	2000	100
	4000	100
	6000	100
	8000 or more	100
5 to 8	2000	100
	4000	100
	6000	90
	8000 or more	90
9 to 12	2000	100
	4000	90
	6000	90
	8000 or more	80
13 to 16	2000	100
	4000	90
	6000	80
	8000 or more	80
17 to 24	2000	100
	4000	90
	6000	80
	8000 or more	70
25 and over	2000	100
	4000	90
	6000	70
	8000 or more	70

Revise title of Table 43 to read:

SN4502

Table 43
Minimum conductor size for field-assembled grounding concrete-encased electrodes
 (See Rule 10-102.)

Ampacity of largest service conductor or equivalent for multiple conductors, A	Size of bare copper conductor, AWG
165 or less	4
166–200	3
201–260	2
261–355	0
356–475	00
Over 475	000

Revise title of Table 57 to read:

SN4628-16

Table 57
~~Allowable a~~**Ampacities for insulated copper conductors of Class 2 circuits**
(based on an ambient temperature of 30 °C†)
 [See Rule 16-210 6) and Table 5A.]

Revise Table 60 to read:

SN4590
SN4594
SN4628-16
SN4608

Table 60
Allowable ampacities for copper, eight-conductor, Class 2 power and data communication circuit cables
(based on an ambient temperature of 30 °C)
(See Rule 16-330 and Table 5A.)

Size, AWG	Allowable ampacity																				
	Number of cables in one cable bundle																				
	-1			-2-7			8-19			20-37			38-61			62-91			92-192		
	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C
26	1.0	1.0	1.0	1.0	1.0	1.0	0.7	0.8	1.0	0.5	0.6	0.7	0.4	0.5	0.6	0.4	0.5	0.6			
				1.00	1.23	1.42	0.71	0.87	1.02	0.55	0.68	0.78	0.46	0.57	0.67	0.45	0.55	0.64			
24	2.0	2.0	2.0	1.0	1.4	1.6	0.8	1.0	1.1	0.6	0.7	0.9	0.5	0.6	0.7	0.4	0.5	0.6	0.3	0.4	0.5
				1.19	1.46	1.69	0.81	1.01	1.17	0.63	0.78	0.91	0.55	0.67	0.78	0.46	0.56	0.65	0.40	0.48	0.55
23	2.5	2.5	2.5	1.2	1.5	1.7	0.8	1.1	1.2	0.6	0.8	0.9	0.5	0.7	0.8	0.5	0.7	0.8	0.4	0.5	0.6
				1.24	1.53	1.78	0.89	1.11	1.28	0.77	0.95	1.10	0.66	0.80	0.93	0.58	0.71	0.82	0.45	0.55	0.63
22	3.0	3.0	3.0	1.4	1.8	2.1	1.0	1.2	1.4	0.7	0.9	1.1	0.6	0.8	0.9	0.6	0.8	0.9	0.5	0.6	0.7
				1.50	1.86	2.16	1.04	1.28	1.49	0.77	0.95	1.11	0.66	0.82	0.96	0.62	0.77	0.89	0.53	0.63	0.72

Notes:

- 1) Ampacities shown are for each conductor of the eight-conductor cable.
- 2) The per-contact current rating of connectors can limit the maximum allowable current below the ampacity shown in the Table. When cable connectors operate at elevated temperatures near 90°C, their ampacity limitations may render the cable installation inoperable.

Revise Table 61 to read:

SN4430

Table 61
Minimum horizontal separations from pools for Direct Buried Underground Cables, and Insulated Conductors in Raceways
 (See Rule 68-056.)

Type of installation	Minimum horizontal separation, m	
	Direct buried unjacketed cables with a bare neutral or cables with a semi-conducting jacket	Cables with a non-conducting jacket or insulated conductors in non-conducting raceways
Communication conductors	1.5	1.0
Power cables and insulated conductors		
0–750 V	1.5	1.0
751–15 000 V	3.0	1.5
15 001–28 000 V	6.0	2.0

Notes:

- 1) Voltages are phase-to-phase.
- 2) This Table is derived from CEA 266 D 991.
- 3) The separation from non-conducting raceways is measured from the nearest edge of the raceway to the inside wall of the pool.

Revise Table 65 as shown:

Note: All “x” entries are replaced with “✓”.

SN4624

Table 65
Enclosure selection table for non-hazardous locations
(See Rules 2-400 and 2-402.)

Provides a degree of protection against the following environmental conditions	Enclosure type													
	Indoor use						Indoor/outdoor use							
	1	2	5	12*	12K†	13	3	3X	3R	3RX	3S	3SX	4	4X
Accidental contact with live parts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Falling dirt	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dripping and light splashing of non-corrosive liquids	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Circulating dust, lint, fibres, and flyings	—	—	—	✓	✓	✓	✓	✓	—	—	✓	✓	✓	✓
Settling airborne dust, lint, fibres, and flyings	—	—	✓	✓	✓	✓	✓	✓	—	—	✓	✓	✓	✓
Hosedown and splashing water	—	—	—	—	—	—	—	—	—	—	—	—	✓	✓
Corrosion Corrosive agents	—	—	—	—	—	—	—	✓	—	✓	—	✓	—	✓
Occasional temporary submersion	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Occasional prolonged submersion	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Oil and coolant seepage	—	—	—	✓	✓	✓	—	—	—	—	—	—	—	—
Oil and/or coolant seepage , spraying and splashing	—	—	—	—	—	✓	—	—	—	—	—	—	—	—
Rain, snow and sleet , and external formation of ice‡	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓
Rain, snow and sleet and E -external formation of ice§	—	—	—	—	—	—	—	—	—	—	✓	✓	—	—
Wind-blown dust	—	—	—	—	—	—	✓	✓	—	—	✓	✓	✓	✓

* Without knockouts.

† With knockouts.

‡ The external operating mechanism(s) is not required to operate when the enclosure is ice covered.

§ The external operating mechanism(s) shall be operable when the enclosure is ice covered.

Appendix A

Appendix A is periodically updated in accordance with Appendix C. The latest version of Appendix A is available on the [CE Code, Part I Portal](#).

The June 2023 version of Appendix A will appear in the next published edition of the Code

Appendix B

Add Appendix B Note for definition of Suite to read:

SN4569

Suite

Refer to note A-1.4.1.2 (1) in the National Building Code of Canada for additional explanatory material concerning the definition of suite.

Add Appendix B Note for Rule 2-100 1)n) to read:

SN4611

Rule 2-100 1) n)

Altitude is an example of other markings that may be necessary on some equipment. Installation of electrical equipment at altitudes exceeding 1000 m may need to have reduced voltage and current ratings. Correction factors or tables are provided by the equipment manufacturer for equipment that may be affected.

Revise Appendix B Note for Rule 2-306 to read:

SN4623

Rule 2-306

CSA Z462 provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment to protect against shock and arc flash hazards.
ANSI/NEMA Z535.4 provides guidelines for the design of safety signs and labels for application to products.

IEEE 1584 provides assistance in determining the arcing fault current, the arc flash ~~hazard distance~~ boundary and the incident energy that workers may be exposed to from electrical equipment.

The applicable documentation could include manufacturer's instructions, schematics and single line drawings.

See CSA Z462 Annex O Safety-related design for methods of reducing the arcing fault duration.

Revise Appendix B Note for Rules 2-328 and 64-918 7) to read:

SN4505
SN4712

Rules 2-328 and ~~64-918 7)~~ 64-1002 3)

The clearance distances specified in CSA B149.1 and CSA B149.2 between a source of ignition and a flammable ~~combustible~~ gas relief discharge device or vent are as follows:

- a) 1 m for natural gas as specified in CSA B149.1; ~~and~~
- b) 0.3 m for natural gas if an ANSI Z21.80/CSA 6.22 certified overpressure protection device is used as specified in CSA B149.1; and

<p>c) 3 m for propane gas as specified in CSA B149.2.</p> <p>Arc-producing electrical equipment that is considered a source of ignition includes, but is not limited to: receptacles, switches, meter base plug in transfer devices, meter base plug in devices with an internal service disconnecting feature, electric metering equipment with an internal service disconnecting feature, air conditioning units, and related disconnecting means.</p>	
<p><i>Revise Appendix B Note for Rule 4-004 to read:</i></p> <p>Rule 4-004 The allowable ampacities of Tables 1, 2, 3, and 4 are based on temperature alone and do not take voltage drop into consideration (see Table D3).</p>	SN4628-4
<p><i>Revise Appendix B Note for Rule</i></p> <p>Rule 4-006 In accordance with CSA product Standards (e.g., CSA C22.2 No. 4 or CSA C22.2 No. 5), when equipment of 600 V or less is evaluated relative to the appropriate temperature characteristics of the terminations, conductors sized similar to those in the 75 °C column of Table 2 or 4 are used.</p> <p>It is intended by this Rule that the size of conductors terminating on equipment described in Subrules 1), 2), 3), and 4) be not less than the conductor size selected for the maximum insulated conductor ampacity in the corresponding temperature column of Table 1, 2, 3, or 4.</p> <p>This Rule is not intended to address conductor allowable ampacity (see Rule 4-004).</p> <p>Regardless of conductor allowable ampacities determined by other Rules in this Code (for underground conductors, cables, flexible cords, portable power cables, DLO cables, and conductors with higher temperature ratings, etc.), it is intended that the minimum conductor size be based on the requirements of this Rule.</p>	SN4628-4
<p><i>Note: This revision is suspended until Standard ANSI/CAN UL1008M is listed in Appendix A of the CE Code, Part I.</i></p> <p><i>Add Appendix B Note for Rule 6-100 to read:</i></p> <p>Rule 6-100 Meter-mounted transfer switches are covered by ANSI/CAN UL1008M, Transfer Switch Equipment, Meter Mounted.</p>	SN4604
<p><i>Note: This revision is suspended until Standard ANSI/CAN UL1008M is listed in Appendix A of the CE Code, Part I.</i></p> <p><i>Add Appendix B Note for Rule 6-200 4) to read:</i></p>	SN4604

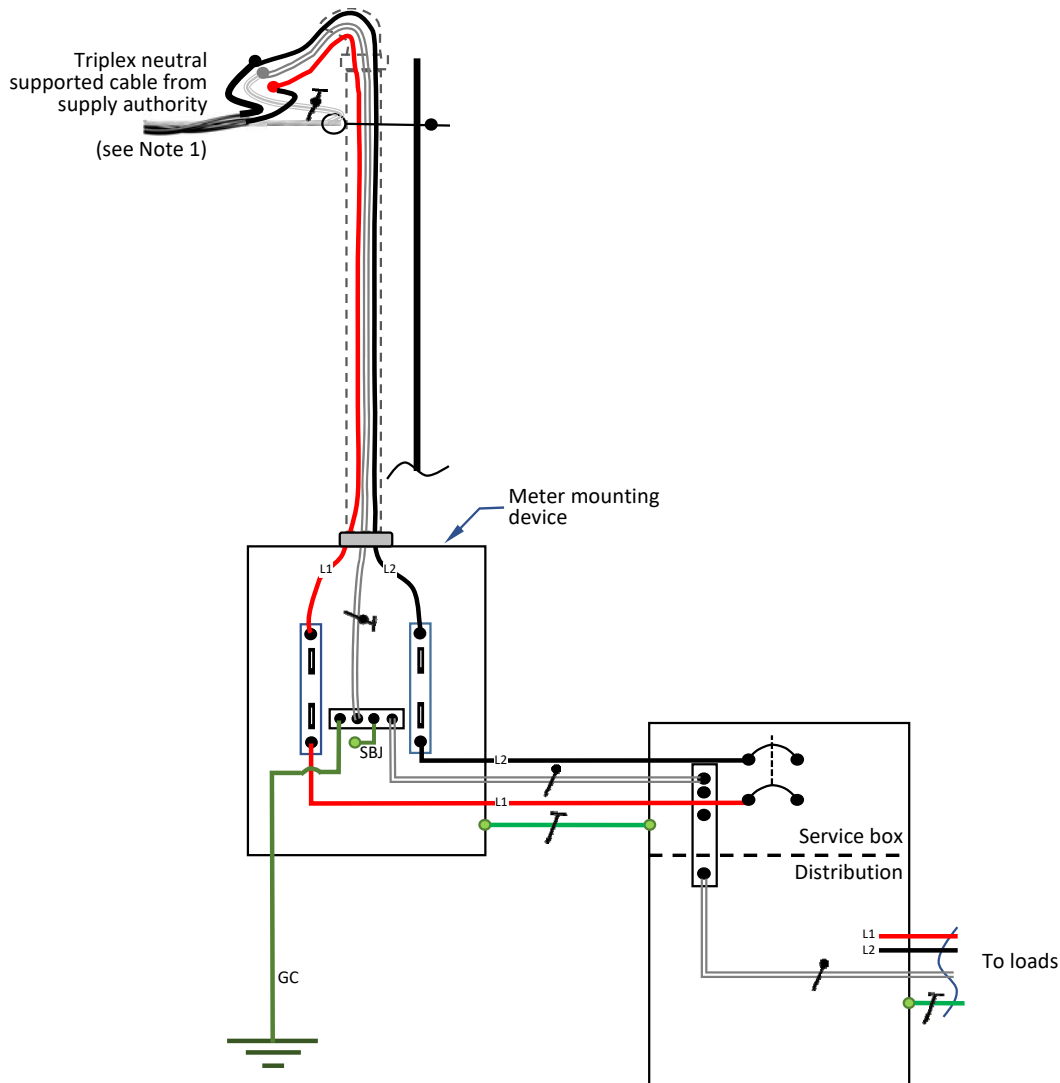
<p><u>Rule 6-200 4)</u> <u>The grounding and bonding requirements for the installation of a meter-mounted transfer switch are covered in Section 10. Subrule 4) requires a caution label located on the meter mounting device or the meter-mounted transfer switch, using the following or equivalent wording:</u> <u>CAUTION: The generator neutral shall not be connected to the generator frame. CSA Standard C22.2 No 100 requires generators without the neutral bonded to the frame are marked as “NEUTRAL FLOATING”.</u></p>	
<p><i>Add Appendix B Note for Rule 6-402 2)b) to read:</i></p> <p><u>Rule 6-402 2) b)</u> <u>This Subrule refers to equipment conforming to CSA C22.2 No. 115.</u></p>	SN4512
<p><i>Add Appendix B Note for Rule 6-408 1)d) to read:</i></p> <p><u>Rule 6-408 1) d)</u> <u>It should be noted that in accordance with C22.2 No. 115, meter-mounting devices are tested at temperatures up to 35C.</u></p>	SN4576
<p><i>Revise Appendix B Note for Rule 8-002 to read:</i></p> <p>Rule 8-002</p> <p>Basic load It is intended by this definition that only a typical lighting loads and those receptacle loads that are connected to receptacles having CSA configuration 5-15R or 5-20R, as described in Rule 8-304, that are within an area bound by the outside dimensions of that area signifies “basic load”. Such loads as outside lighting, specialty lighting (i.e., stage, show window lighting, etc.), electric space heating, or air-conditioning loads are not intended to be part of the basic load. Code users should be aware that the value of basic load for each particular building occupancy is different and is dependent on the type of occupancy from Table 14 and on load calculation requirements for residential occupancies.</p>	SN4496
<p><i>Revise Appendix B Note for Rules 8-104 5)b) and 6)b) to read:</i></p> <p>Rules 8-104 5) b) and 6) b) It is intended that Subrule 5) b) or 6) b) be applied when the allowable ampacity of conductors is obtained from tables such as Table 1, 3, 12E, D8A, D8B, D9A, D9B, D17A, D17B, D17C, D17D, D17I, D17J, or D17M in accordance with Section 4.</p>	SN4628-8
<p><i>Revise Appendix B Note for Rule 10-004, definition for System bonding jumper, to read:</i></p> <p>System bonding jumper This term describes the connection between the point of an electrical system to be solidly grounded and the non-current-carrying conductive parts of the electrical</p>	SN4320

<p>equipment supplied by that system to establish a complete circuit for ground fault currents. The system bonding jumper establishes a solidly grounded system and extends the bonding conductor to the grounded point of the system. See Figure B10-3 showing the point of an electrical system to be solidly grounded.</p>									
<p><i>Add legend for Appendix B Figures B10-4 through B10-13</i></p> <p>The symbols in the legend below apply to Figures B10-4 to B10-13</p> <p><u>LEGEND</u></p> <hr/> <table border="0"> <tr> <td> - Bonding conductor</td><td> - Termination point to conductive enclosure</td></tr> <tr> <td> - Combined bonding & neutral conductor</td><td> - Neutral conductor</td></tr> <tr> <td>SBJ- System bonding jumper *</td><td> - Neutral bus</td></tr> <tr> <td>GC- Grounding conductor</td><td> - Grounding Electrode</td></tr> </table> <hr/> <p><i>* The system bonding jumper may be field-installed or factory-installed</i></p>	 - Bonding conductor	 - Termination point to conductive enclosure	 - Combined bonding & neutral conductor	 - Neutral conductor	SBJ- System bonding jumper *	 - Neutral bus	GC- Grounding conductor	 - Grounding Electrode	<p>SN4321</p>
 - Bonding conductor	 - Termination point to conductive enclosure								
 - Combined bonding & neutral conductor	 - Neutral conductor								
SBJ- System bonding jumper *	 - Neutral bus								
GC- Grounding conductor	 - Grounding Electrode								

Delete Appendix B Figure B10-4 and replace with the Figure below:

SN4321

Figure B10-4
Consumer's service grounded at the meter mounting device



Notes:

1) When the bare neutral of the triplex neutral supported cable is used as a neutral conductor, it is attached to an insulator at the point of support and terminations. It should not be in contact with any grounded surface [see Rule 12-318 e)].

2) ~~The neutral bus in the meter mounting device may be isolated from, or solidly connected to, the enclosure, as follows:~~

a) ~~when it is isolated from the meter enclosure, either a factory installed or a field-installed system bonding jumper is acceptable; or~~

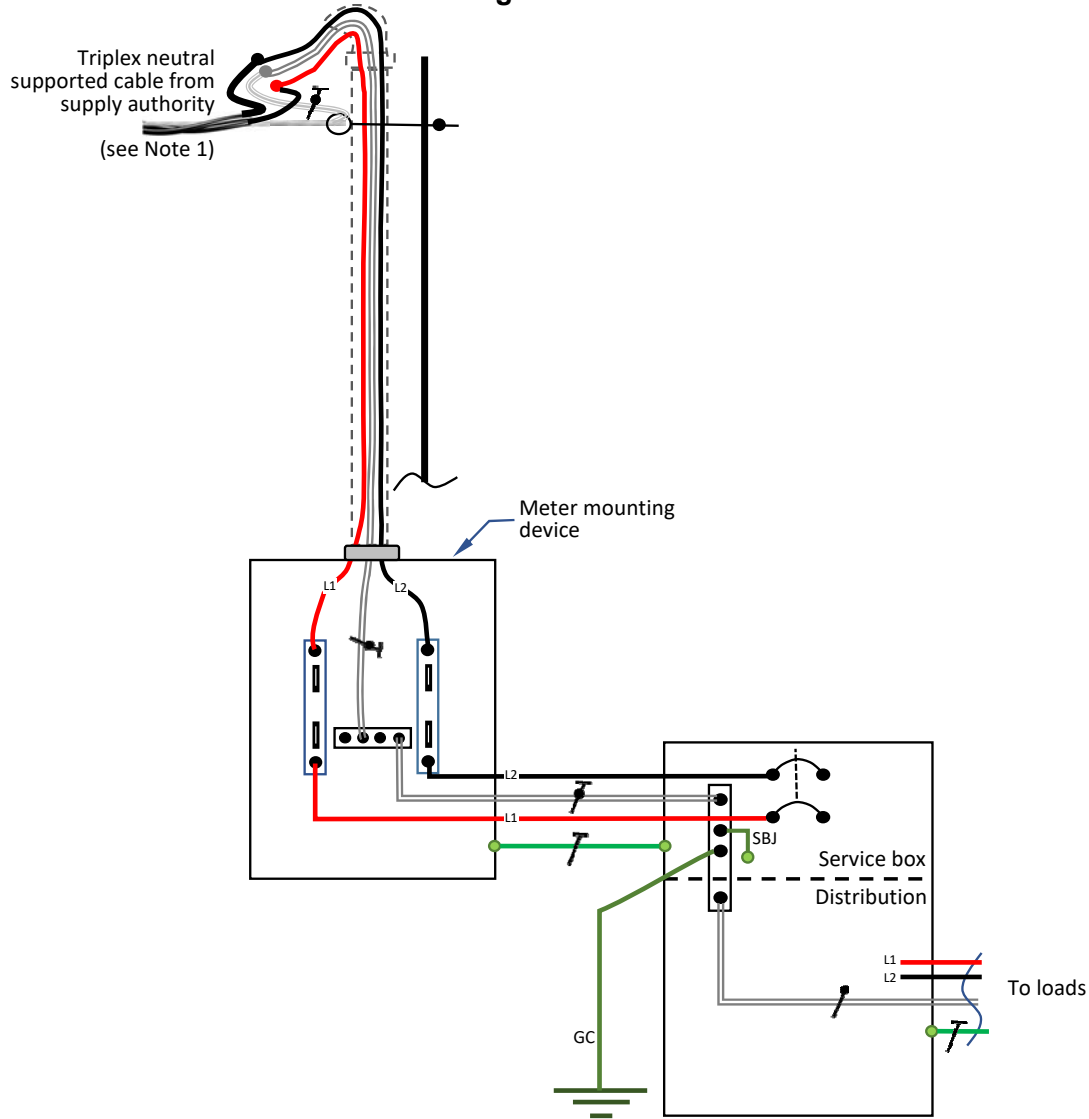
b) ~~when it is solidly connected to the meter enclosure, the manufacturer's instructions should be consulted to determine if the solid connection to the meter enclosure is suitable as the system bonding jumper or if a field-installed system bonding jumper is required.~~

3) ~~The system bonding jumper may be field-installed (a conductor) or factory-installed (a screw or strap).~~

Delete Appendix B Figure B10-5 and replace with the Figure below:

SN4321

Figure B10-5
Consumer's service grounded at the service box



Notes:

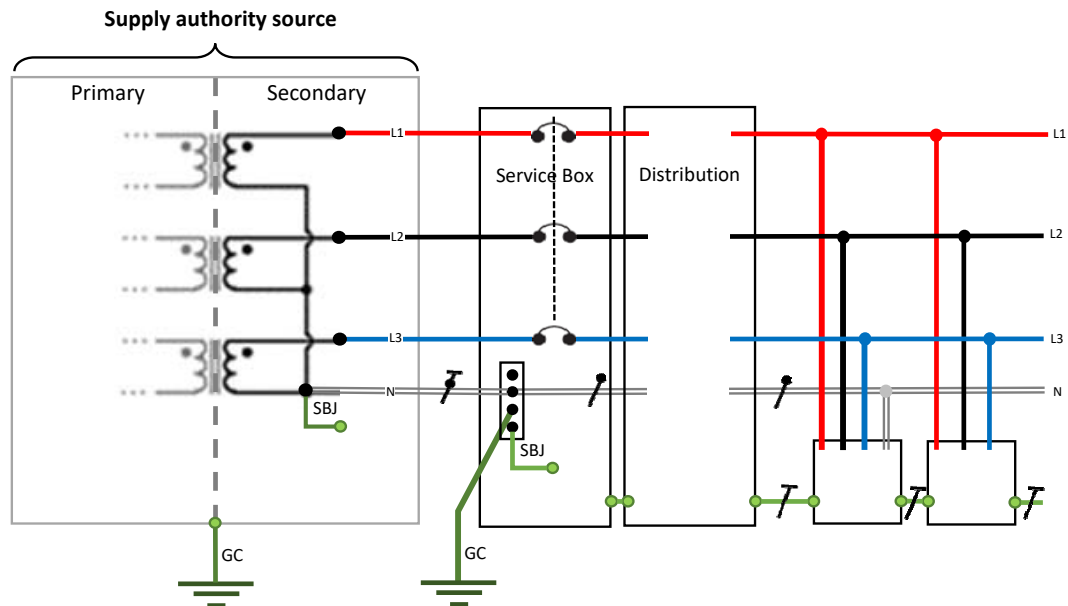
1) When the bare neutral of the triplex neutral supported cable is used as a neutral conductor, it is attached to an insulator at the point of support and terminations. It should not be in contact with any grounded surface [see Rule 12-318 e)].

2) ~~The system bonding jumper may be field-installed (a conductor) or factory-installed (a screw or strap).~~

Delete Appendix B Figure B10-6 and replace with the Figure below:

SN4321

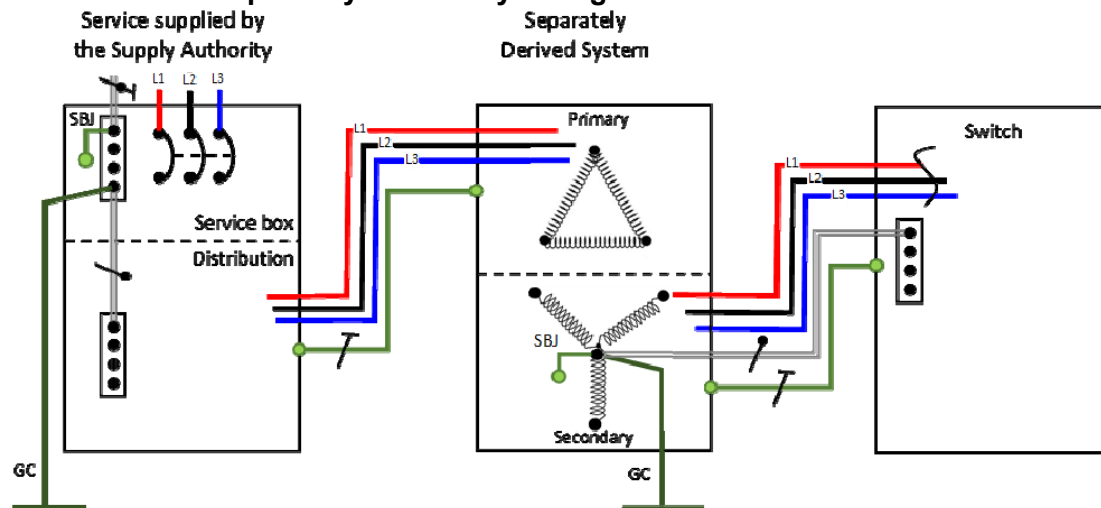
Figure B10-6
Three-phase, 4-wire solidly grounded system, without a bonding conductor, supplied from the supply authority



Delete Appendix B Figure B10-7 and replace with the Figure below:

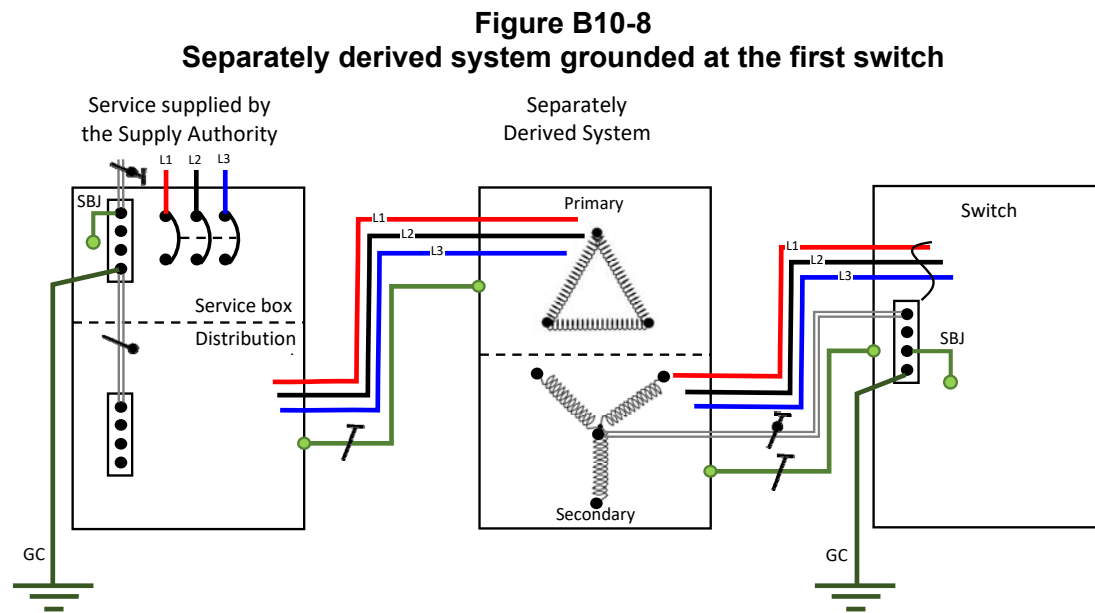
SN4321

Figure B10-7
Separately derived system grounded at the source



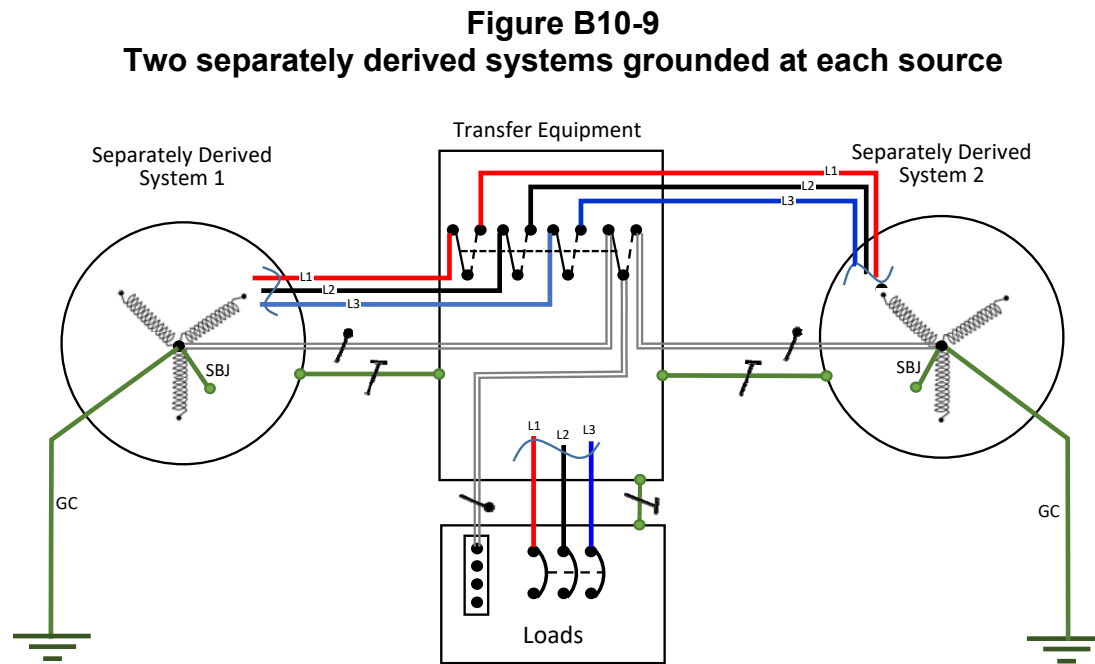
Delete Appendix B Figure B10-8 and replace with the Figure below:

SN4321



Delete Appendix B Figure B10-9 and replace with the Figure below:

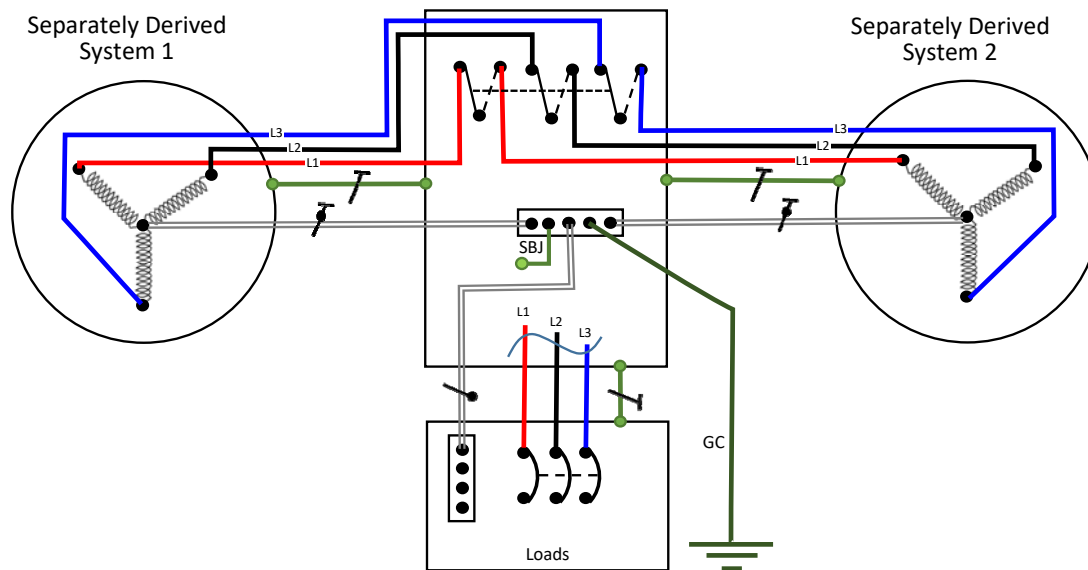
SN4321



Delete Appendix B Figure B10-10 and replace with the Figure below:

SN4321

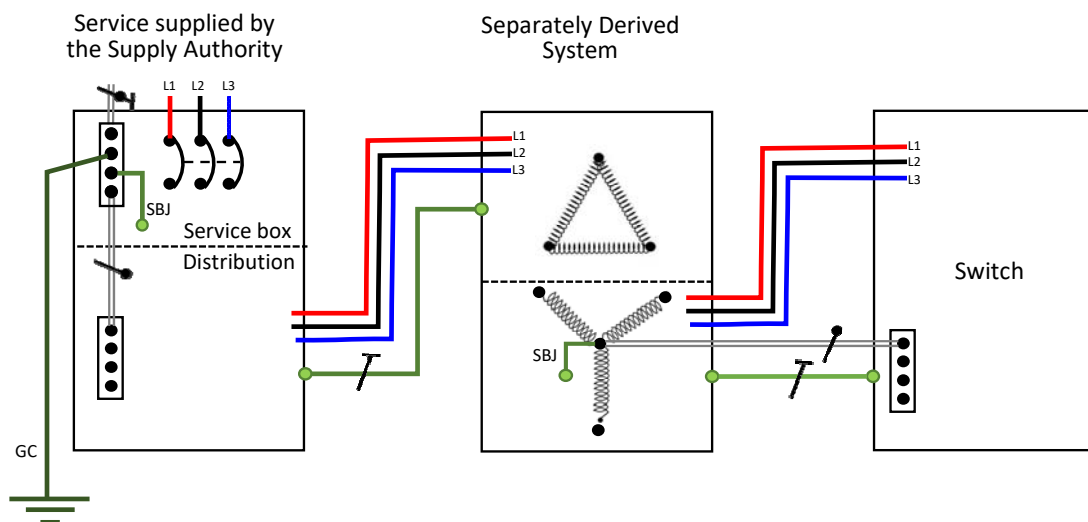
Figure B10-10
Two separately derived systems grounded at the transfer equipment tie point



Delete Appendix B Figure B10-11 and replace with the Figure below:

SN4321

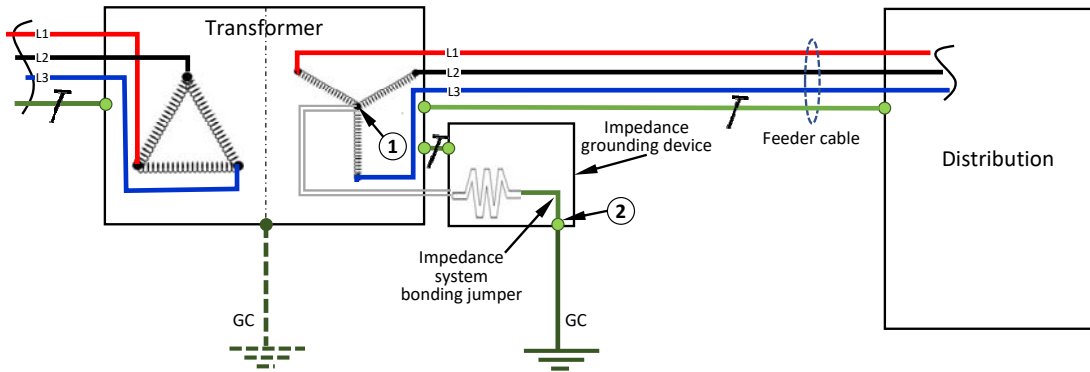
Figure B10-11
Grounding alternative for a separately derived system operating at 750 V or less



Delete Appendix B Figure B10-12 and replace with the Figure below:

SN4321

Figure B10-12
Impedance grounded system



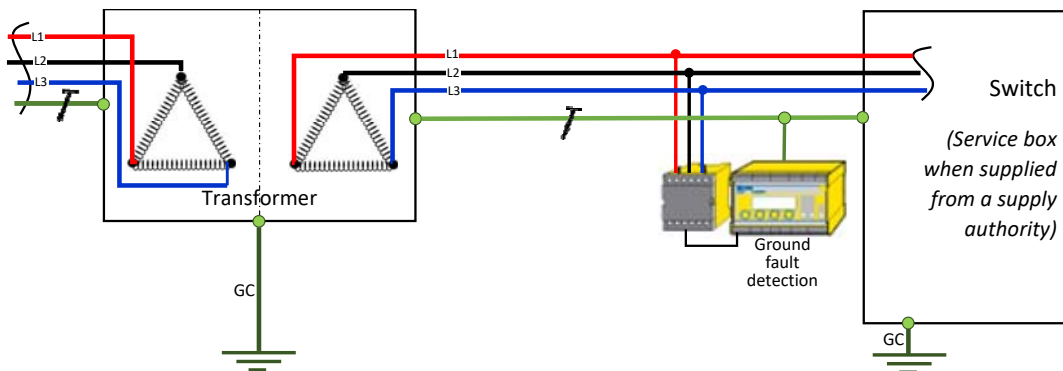
Legend: Notes

- 1) ① ② points between which continuity of the impedance grounding circuit is monitored [Rule 10-302 2) ⚡]
 2) - - - - - transformer equipment grounded where required (e.g., where high voltage is involved)

Delete Appendix B Figure B10-13 and replace with the Figure below:

SN4321

Figure B10-13
Ungrounded system



Add new Appendix B Note for Rule 10-612 3) to read:

SN4655

Rule 10-612 3)

NEMA WD-AG 1-2019 CAN, titled “Application Guide for Isolated Ground Wiring Devices, Canadian Version” describes the intent and purpose of isolated ground circuits and the proper installation steps of isolated ground receptacles.

The isolated bonding conductor referred to in this Rule is intended to be connected to the isolated ground terminal of these devices.

<p><i>Revise Appendix B Note for Rule 10-614 3)b) to read:</i></p> <p>Rule 10-616 3) b) When the size of a circuit conductor is increased to compensate for voltage drop due to circuit length, the ampacity of that conductor exceeds that required for the connected load and the rating of the overcurrent protective device. The bonding conductor needs to be increased proportionately to minimize the impedance of the bonding path and facilitate the operation of the overcurrent device. The size of the bonding conductor is based on the circuit conductor allowable ampacity given in Column 2 of Table 16 to compensate for conductor length.</p>	SN4628-10
<p><i>Revise Appendix B Note for Rule 10-700 to read:</i></p> <p>Rule 10-700 This Rule applies to equipotential bonding of the conductive surfaces of non-electrical equipment, devices, and structures where the control of voltage rise is required or desired. The equipotential bonding of these conductive pipes and systems is provided to prevent them from carrying a voltage different from the electrical system in order to control potential differences that may cause unwanted circulating currents, galvanic corrosion, or tingle voltages. Continuous water and waste water systems can, under certain circumstances, carry impressed currents from lightning strikes or faults in neighbouring buildings where conductive piping may interconnect the electrical systems of other structures that share the same water supply. Waste water systems constructed of cast iron and rubber couplings are not considered continuous. Metallic waste water systems that used solder joints are considered continuous. The installer should verify that the system is metallic and continuous. In relation to 10-700 c), to provide equipotential bonding to a metal gas piping system, CSA B149.1-2020 Natural Gas and Propane Installation Code defines “gas piping system” as “all components that convey gas or liquids, such as piping, tubing, valves, hoses, and fittings from the point of delivery to the inlet of an appliance.” CSA B149.1 also requires that all metallic gas piping systems are to be made electrically continuous. It should be noted that exterior gas piping systems may be required to be isolated from interior gas piping to prevent the introduction of current as well as to preserve any cathodic protection of the gas piping system. In general, this is accomplished using dielectric fittings at the demarcation between the interior and exterior gas piping system. Any conditions limiting the equipotential bonding of the exterior gas system should be verified with the local gas inspection authority. It should also be noted that the requirement in Rule 10-700 c) to provide equipotential bonding to a metal gas piping system is not intended to apply to metal gas tubing. Attempts to bond metal gas tubing with conventional bonding means can create a hazardous situation where the tubing can be punctured by installation of the bonding means or by arcing between improperly secured bonding means during faults or lightning strikes. When bonding a corrugated stainless steel tubing (CSST) component of a gas piping system, refer to the manufacturer’s instructions. Livestock are particularly sensitive to the effects of step and touch voltages. For this reason, equipotential bonding is prescribed for all conductive metal parts (e.g., metal</p>	SN4605

<p>water pipes, stanchions, water bowls or troughs, vacuum lines, and other metal objects that could become energized) accessible by livestock in a building housing livestock.</p> <p>Methods to establish equipotentiality at buildings housing livestock are described in ASABE EP473.2-2001.</p> <p>Low grounding electrode system resistances may reduce potential differences in livestock facilities.</p> <p>Conductive materials used for equipotential bonding need not be wires and can take the form of structural steel, bus, metallic framing and support structures, conductive static mats, or the support structure of a computer room floor. Each of these materials, when adequately interconnected, form an effective equipotential plane. The user should be aware of the effects of galvanic corrosion where dissimilar metals are joined together and ensure that the materials used are compatible or appropriately protected from corrosion at joints and connections.</p>	
<p><i>Add New Appendix B Note for Rule 10-702 3) to read:</i></p> <p><u>Rule 10-702 3)</u> <u>An example of an application of this Rule is when gas piping is solidly connected to a fuel burning appliance. The appliance is supplied by a circuit incorporating a bonding conductor and the gas piping is made equipotential by its electrically conductive connection to the electrical equipment.</u></p>	SN4514
<p><i>Revise Appendix B Note for Rules 12-100, 12-102 4), 5), and 6), 12-122, 12-402, and 12-406</i></p> <p>Rules 12-100, 12-102 4), 5), and 6), 12-122, 12-402, and 12-406</p> <p>When a conductor, cable, flexible cord, equipment wire, or portable power cable is being selected, it is important that it be designed for the specific application and conditions of intended use. Rule 2-024 requires conductors, cables, flexible cords, equipment wire, or portable power cables to be approved and installed for use within the design parameters for which they were manufactured and certified.</p> <p>Consult Table 11 or 19 as applicable and the cable manufacturer to ensure that the proper conductor, cable, flexible cord, equipment wire, or portable power cable is selected for the specific application. Limitations on the use of certain product types may be specified in other Rules of this Code.</p> <p><u>Extra Low Voltage cable types are in CSA C22.2 No. 35, and include the following:</u></p> <ul style="list-style-type: none"> <u>Low-energy control cables;</u> <u>Type LVT extra-low-voltage control circuit cables;</u> <u>Type ELC extra-low-voltage control cables;</u> <u>Type GCS golf course;</u> <u>Type LSS lawn sprinkler;</u> <u>Type LVLL low-voltage landscape lighting; and</u> <u>Type ULEC underground low-energy circuit cables.</u> 	SN4627
<p><i>Revise Appendix B Note for Rule 12-102 3) to read:</i></p> <p>Rule 12-102 3) <u>Insulated conductors and cables could be marked with multiple CSA Type</u></p>	SN4702

designations, therefore, when selecting insulated conductors and cables using Table 19 it is important that they are marked with the designations indicating suitability for the particular application and conditions of use.

For example:

TC/DLO
TC-ER/DLO
R90/DLO
T90 Nylon/TWN75

The examples above are not an exhaustive list of all possibilities and are provided for illustrative purposes only.

Note that insulated conductors and cables may be marked with product types and other markings not recognized in this Code.

Acceptable insulated conductor and cable markings are associated with the applicable recognized approval prescribed by Rule 2-024.

The “Maximum conductor temperature (unless otherwise marked)” row in Table 19 is the maximum operating temperature of the insulated conductor or cable permitted by the manufacturer. The operating temperature of an insulated conductor or cable can be affected by the current of the circuit, the ambient temperature, the proximity of the conductor to other conductors, where the conductor is installed, and how the conductor is installed.

Add Appendix B Note for Rule 12-112 13) to read:

SN4644

Rule 12-112 13)

Grade level in-ground enclosures may be square, rectangular or cylindrical in shape. The intent of this subrule is that these enclosures be used within the manufacturer’s specified load design classes as indicated in Table B12-X. Applications listed are for guidance only and may include other applications not indicated, at the discretion of authority having jurisdiction.

Table B12-X

<u>Class (tier)</u>	<u>Typical Application</u>	<u>Design Load - Vertical</u>	
		<u>kN</u>	<u>Lbf</u>
<u>2</u>	<u>Light duty (i.e. pedestrian traffic)</u>	<u>8.9</u>	<u>2000</u>
<u>5</u>	<u>Light duty with a safety factor for occasional, non-deliberate vehicular traffic</u>	<u>22.2</u>	<u>5000</u>

<u>8</u>	<u>Medium duty with a safety factor for non-deliberate vehicular traffic</u>	<u>35.6</u>	<u>8000</u>	
<u>15</u>	<u>Medium duty, driveway, parking lot, and off-roadway applications subject to occasional non-deliberate vehicular traffic</u>	<u>66.7</u>	<u>15000</u>	
<u>22</u>	<u>Heavy duty, driveway, parking lot, and off-roadway applications subject to non-deliberate heavy vehicular traffic</u>	<u>100.1</u>	<u>22500</u>	
<p><i>Add Appendix B Note for Rule 12-116 5) to read:</i></p> <p><u>Rules 12-116 5) and 12-406 4)</u> <u>Ferrules described in these subrules are certified to CSA Standards C22.2 No. 291 and C22.2 No. 342.</u></p> <p><u>Examples of fine strand conductors are Class G, H, M, I, and K</u></p>				SN4665
<p><i>Add an Appendix B Note for Rule 12-402 1) to read:</i></p> <p><u>Rule 12-402 1)</u> <u>The CSA type designation of certain flexible cords may be followed by a “-B” suffix indicating that a decorative braid has been applied over the cord.</u></p>				SN4656
<p><i>Add Appendix B Note for Rule 12-406 4) to read:</i></p> <p><u>Rule 12-406 4)</u> <u>See note to Rule 12-116 5)</u></p>				SN4665
<p><i>Add Appendix B Note for Rule 12-608 2) to read:</i></p> <p><u>Rule 12-608 2)</u> <u>When installing armoured cables between non-metallic enclosures, bonding continuity of the armour is often maintained through the use of bonding bushings. The purpose of this rule is to allow installers to omit the bonding bushing at the final point of termination, if an electrical connection between the armour and the bonding system has been established at the supply end of the cable, maintained throughout</u></p>				SN4782

the remainder of the run, and the equipment is bonded using the internal bonding conductor of the cable.	
<p><i>Add Appendix B Note for Rule 12-930 1)b) and c) to read:</i></p> <p><u>Rule 12-930 1) b) and c)</u> The intent of Items b) and c) is to ensure the integrity of the installation is maintained where raceways are installed in concrete slabs or masonry construction that are in direct contact with the earth. It is not intended that these items apply to raceways installed in concrete and masonry construction that is above grade and not in contact with the earth.</p>	SN4274
<p><i>Revise Appendix B Note for Rule 12-2252 to read:</i></p> <p>Rule 12-2252 CSA C22.2 No. 273 defines Class A and Class B cablebus as follows:</p> <p>Class A cablebus — cablebus that provides protection from contact with [insulated] conductors [or cables] by design and construction of the enclosure.</p> <p>Class B cablebus — cablebus that does not provides limited protection from contact with [insulated] conductors [or cables] by design and construction of the enclosure.</p> <p>Cablebus not marked as Class A is considered to be Class B.</p> <p>Cablebus can be made inaccessible to the public by use of barrier (such as fencing) around the area of the cablebus, or by elevation from the ground.</p>	SN4682
<p><i>Revise Appendix B Note for Rule 14-104 to read:</i></p> <p>Rule 14-104 When conductors are selected based on a calculated load or a known load, Table 13 is useful in selecting the appropriate rating of overcurrent device based on the installed ampacity of the conductor for the installation. Code users are reminded that the circuit loading requirements of Rule 8-104 apply. It is intended that the conductor ampacity values used in Table 13 can refer to single or multiple conductors. Table 13 is also useful in determining standard overcurrent ratings for Rules such as 14-212 b) or 26-254 3).</p>	SN4628-14
<p><i>Add an Appendix B Note for Rule 16-330 3)a) to read:</i></p> <p><u>Rule 16-330 3)a)</u> Elevated cable temperatures can reduce a cable's data transmission performance. For information on practices for 4-pair balanced twisted pair cabling, see TIA-TSB-184-A and 6.6.8, 6.8.3, and Annex I of ANSI/TIA-568.2-D, which provide guidance on adjustments for operating temperatures between 20°C and 60°C.</p>	SN4593
<p><i>In Appendix B Note for Rule 18-002, revise entry for Single or dual process seal</i></p>	SN4749

<p><i>equipment to read:</i></p> <p>Rule 18-002</p> <p>Single or dual process seal equipment — an electrical device can be marked with either designation to indicate that it incorporates into its construction and certification, primary or primary and secondary process seals that will prevent the migration of flammable fluids into the wiring system, as specified in UL 122701 or IEC TS CSA C22.2 No. 60079-40.</p>	
<p><i>In Appendix B Note for Rule 18-002, add new entries to read:</i></p> <p>Rule 18-002</p> <p>Dust-protected enclosure - Enclosures that would meet or exceed this definition are Types 3, 3X, 3S, 3SX, 4, 4X, 5, 6, 6P, 12, 12K, or 13, and those with degrees of protection IP5X or IP6X. Entries and openings would be closed off so that dust cannot enter through them.</p> <p>Uninterrupted conduit run – the only devices allowed in an uninterrupted conduit run are NPT conduit couplings. Other devices, such as boxes, unions, tees, NPS couplings, and other fittings would not be acceptable, so as to provide a higher level of conduit system integrity. Conduit that includes straight runs or formed bends are all considered conduit.</p>	<p>SN4749 SN4787</p>
<p><i>Revise Appendix B Note for Rule 18-004 2) to read:</i></p> <p>Rule 18-004 2)</p> <p>If a hazard assessment determines that an area is a hazardous location, an area classification is performed. Due to the nature of hazardous locations and the risk of fire and explosions associated with them, involvement by various individuals who understand the relevance and significance of the properties of the hazardous locations identified in Subrule 1), are knowledgeable in the appropriate classification Standards/guidelines, and who are familiar with the process and equipment, is essential to ensure that appropriate measures are taken to mitigate the hazard. For a small or simple facility, this may involve a single discipline, whereas for a large or complex facility, it may involve more than one discipline, such as electrical, mechanical, process, safety, and operations specialists.</p> <p>Documentation is an essential element in area classifications and may include items such as drawings, studies and calculations, reports, and operating descriptions. In addition to the classification of hazardous locations into Zones, it is important that the Group designation and minimum ignition temperature of the flammable or combustible materials handled, be included in the documentation. The minimum ignition temperature should be stated in degrees Celsius. Temperature Codes have often been used in hazardous area classification documentation, however this is not accurate as temperature codes are intended to indicate the maximum surface temperature of electrical equipment. Flammable materials are listed with auto-ignition temperatures (AIT), not temperature codes (T-codes), and the hazardous area classification documentation should list the minimum ignition temperatures rather than T-codes.</p>	<p>SN4785</p>

This documentation should be maintained and updated over the life of the facility. Appendix L contains more details on area classification guidelines.	
<p><i>Renumber Appendix B Note for Rule 18-004 3) to read:</i></p> <p>Rule 18-004 4)3) Hazardous location classification documentation is authenticated by the person taking responsibility for the classification. The person taking responsibility is normally an engineering professional or other individual permitted to practise engineering.</p>	SN4785
<p><i>Revise third paragraph of Appendix B note for Rules 18-090, 18-100 and 18-150 to read:</i></p> <p>Rules 18-090, 18-100, and 18-150 “ “ In some cases, equipment may be installed on the boundary of Zone 0 and Zone 1 (as provided for by Rule 18-052) and may have two types of protection, with the appropriate type of protection for each side of the boundary identified and connected by a “/”. For example, an intrinsic safety device installed on the wall of a flammable liquid storage tank (Zone 0 inside) having a flameproof “d” or flameproof “db” termination compartment on the tank exterior (Zone 1) would be marked Ex ia/db IIB T4 Ga/Gb. Equipment with a “/” marking accompanied by instructions for the user, specifying features and limitations of the separation element between the Ga and Gb equipment sections. “ “</p>	SN4687
<p><i>Revise Appendix B Note for Rules 18-054 and 18-150 to read:</i></p> <p>Rules 18-054, and 18-150 Equipment of the heat-producing type is currently required by product Standards to have a temperature code (T-Code) or maximum temperature marking if its temperature exceeds 100 °C. However, for equipment manufactured prior to the T-Code requirement (prior to 1972) and electrical equipment such as motors and generators applied in accordance with Rule 18-150, there may be no such marking. Therefore, the suitability of older hazardous locations equipment of the heat-producing type and motors and generators applied in accordance with Rule 18-150 should be reviewed in the context of Rule 18-054 before such equipment is installed in a hazardous location. For the purpose of Rule 18-150, equipment such as boxes, terminals, fittings, and resistance temperature detectors (RTDs) are not considered to be heat-producing devices.</p>	SN4791
<p><i>Revise Appendix B Note for Rule 18-072 to read:</i></p> <p>Rule 18-072 See Figures B18-2 and B18-3 Table B18-6A and B18-6B for a flow chart detailing where explosion, flammable fluid migration, or and process seals should be selected for installations using cables and conduits.</p>	SN4740 SN4749

UL 122701 and ~~IEC TS~~ [CSA C22.2 No. 60079-40](#) provide construction, performance, and marking requirements for process seals incorporated into process-connected electrical equipment. Equipment containing a primary or a primary and secondary process seal that complies with these Standards is eligible to include either the “Single Seal” or “Dual Seal” designation in the nameplate markings. These markings indicate that the electrical equipment is designed to prevent the migration of flammable fluid through the equipment into the wiring system when the equipment is operated at or lower than its rated pressure. Devices certified as conforming to UL 122701 or ~~IEC TS~~ [CSA C22.2 No. 60079-40](#) and marked either “Single Seal” or “Dual Seal” meet the intent of Subrule 1) a). See Figure B18-1 for typical configurations of process seals.

Where devices containing primary process seals are not marked to indicate conformance with UL 122701 or ~~IEC TS~~ [CSA C22.2 No. 60079-40](#), other means may be used to prevent fluid migration through the wiring system.

“
“

After the 6th paragraph:

..... in case there is a leak under pressure from sources of release within the enclosure.

Where a secondary process seal is employed, the selection of the seal should be such so as to be chemically (corrosion) resistant to the process fluid it would be exposed to if the primary process seal fails.

Downstream of the process seal, any fluids entering the wiring system will be at or near atmospheric pressure. For example, if there is a major release of natural gas into a process building, it is not possible for significant pressure to develop in the building because the walls and windows will burst at a relatively low pressure.

There is no need to seal conduit against significant pressure in Zone 1. However, the conduit itself is required to be ~~in~~ an explosion-proof enclosure; therefore, seals at the boundary of Zone 1 locations are required to be explosion-proof to maintain the explosion-proof rating of the conduit.

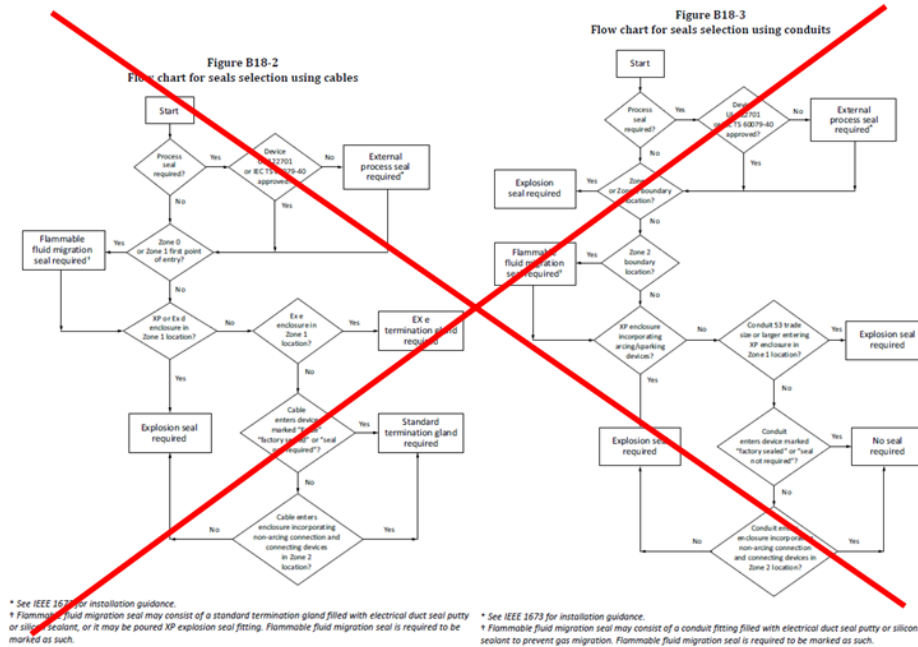
In Zone 2, conduit is not required to be explosion-proof and, therefore, the boundary seals are not required to be explosion-proof. They need only be flammable fluid migration seals, i.e., seals for fluids that are not under pressure. A flammable fluid migration seal can be made using any suitable fitting that has been filled with a material capable of sufficiently preventing the transmission of the flammable fluid at or near atmospheric pressure. The sealing material should be selected to be compatible with the flammable fluid that can be anticipated to be exposed to the seal. Properly installed explosion seals or increased safety (Ex e) cable glands are ~~one possible~~ a means of providing a flammable fluid migration seal.

Cables with continuous sheaths will admit fluids only at the point where they terminate in hazardous areas. Therefore, except in enclosures containing

equipment with fluids under pressure, the probability of flammable fluids entering cables after the process seals is low enough that only a flammable fluid migration seal is required. In many situations, filling the end of the cable connector where the conductors exit the connector (or where the conductors exit the cable when the jacket extends beyond the connector) with silicone or other suitable material will provide an effective flammable fluid migration seal in Zones 0, 1, and 2. Properly installed explosion-proof, flameproof “d”, ~~or~~ flameproof “db”, or increased safety “e” cable glands are also a ~~possible~~ means of providing a flammable fluid migration seal. As flammable fluid migration seals are often not visible once they are installed, they are required to be identified. This can be done with a label or tag located near the seals, identifying them as a “flammable fluid migration seal” and indicating their location if it is not readily apparent.

Delete Appendix B Figures B18-2 and B18-3:

SN4740



Add new Appendix B Table B18-6A:

SN4740

Table B18-6A
Process Seal Requirements*
 (see Rule 18-072)

PROCESS	Applies to all process systems in Hazardous and Non-Hazardous Locations which <ul style="list-style-type: none"> • contain flammable fluids (liquid or gas); and • operate above normal atmospheric pressure. 	
	EQUIPMENT CERTIFICATION AND MARKING	SEALING REQUIREMENT
	Marked "Single Seal" or "Dual Seal", AND certified to UL 122701 or CSA C22.2 No. 60079-40	None
	Not Marked "Single Seal" or "Dual Seal", OR <u>Not</u> certified to UL 122701 or CSA C22.2 No. 60079-40	"Primary Process Seal", plus <ul style="list-style-type: none"> • Stand-alone "Secondary Process Seal"; or • Engineered solution

◆ This table does not set the requirements; it only summarizes the requirements in the Code Rules

Add new Appendix B Table B18-6B:

SN4740

Table B18-6B
Hazardous Location Sealing Summary* (Not Process Connected Equipment)
 (see Rules 18-072, 18-094, 18-104, and 18-154)

LEGEND		FFMS = Flammable Fluid Migration Seal	XP Seal = Explosion Seal	
		Ex e or eb Gland = Increased Safety Gland	No Seal = No Sealing requirements	
Note - XP Seal and Ex e or eb Gland meets the requirements for a FFMS				
	EQUIPMENT TYPE	ZONE 0	ZONE 1	ZONE 2
CABLE	INTRINSICALLY SAFE WIRING SYSTEMS OR EQUIPMENT (IS)*			
	First point of termination	FFMS	FFMS	No Seal
	Interconnection of IS equipment within same hazardous area	No Seal	No Seal	
	EXPLOSION-PROOF ENCLOSURES			
	Contains arcing or heat producing equipment	Equipment not permitted	XP Seal	XP Seal
	Equipment marked "Factory Sealed" or "Seals not Required"			No Seal
	Contains wiring terminals or non-ignition capable equipment			No Seal
	FLAMEPROOF ENCLOSURES (Ex d or Ex db)			
	Contains arcing or heat producing equipment	Equipment not permitted	XP Seal	XP Seal
	Contains wiring terminals or non-ignition capable equipment			No Seal
	INCREASED SAFETY ENCLOSURES (Ex e or Ex eb)			
	Contains terminals and/or equipment with an acceptable Type of Protection (for Zone 1 or Zone 2 as appropriate, see Table 18)	Equipment not permitted	Ex e or eb Gland	No Seal
	INCREASED SAFETY/FLAMEPROOF ENCLOSURES (Ex e d or Ex eb db)***			
	Factory seal between Increased Safety (Ex e or eb) termination and Flameproof (Ex d or db) sections	Equipment not permitted	Ex e or eb Gland	No Seal
NON-HAZARDOUS ENCLOSURES (i.e., CSA Type 4, 4X, IP65, or IP66)				
Containing equipment with no arcing or heat producing devices, that are acceptable for use in Zone 2 locations	Equipment not permitted	Equipment not permitted	No Seal	

CONDUIT

INTRINSICALLY SAFE WIRING SYSTEMS OR EQUIPMENT (IS)*			
First point of termination	FFMS	FFMS	No Seal
Interconnection of IS equipment within same hazardous area	No Seal	No Seal	
EXPLOSION-PROOF ENCLOSURES			
Contains arcing or heat producing equipment	Equipment not permitted	XP Seal	XP Seal
Equipment marked "Factory Sealed" or "Seals not Required"		No Seal	No Seal
Contains wiring terminals or non-ignition capable equipment, and the conduit is smaller than 53 trade size (2 inches)		No Seal	No Seal
Conduit is 53 trade size (2 inches) or larger		XP Seal	
Note: Where seals are required, they are to be installed within 450 mm (18 inches) or as marked. If wire entries are "field drilled", seals are to be within 50 mm (2 inches).			
FLAMEPROOF ENCLOSURES (Ex d or Ex db)			
Contains arcing or heat producing equipment	Equipment not permitted	XP Seal	XP Seal
Contains wiring terminals or non-ignition capable equipment, and the conduit is smaller than 53 trade size (2 inches)		No Seal	No Seal
Conduit is 53 trade size (2 inches) or larger		XP Seal	
Note: Where seals are required, they are to be installed within 50 mm (2 inches)			
INCREASED SAFETY ENCLOSURES (Ex e or Ex eb)			
Contains terminals and/or equipment with an acceptable Type of Protection (for Zone 1 or Zone 2 as appropriate, see Table 18)	Equipment not permitted	FFMS	No Seal
INCREASED SAFETY/FLAMEPROOF ENCLOSURES (Ex e d or Ex eb db)***			
Factory seal between Increased Safety (Ex e or eb) termination and Flameproof (Ex d or db) sections	Equipment not permitted	FFMS	No Seal
NON-HAZARDOUS ENCLOSURES (i.e. CSA Type 4, 4X, IP65, or IP66)			
Containing equipment with no arcing or heat producing devices acceptable for use in Zone 2 locations	Equipment not permitted	Equipment not permitted	No Seal
BOUNDARY SEALS REQUIREMENTS			
Between Zone 1 and non-hazardous location	If it is an uninterrupted conduit run** to the non-hazardous location and enters a terminal enclosure, no other seal is required		
Between Zone 1 and Zone 2	XP Seal	XP Seal	XP Seal
Between Zone 2 and non-hazardous	FFMS	FFMS	FFMS

♦ This table does not set the requirements; it only summarizes the requirements in the Code Rules

• IS refers to Intrinsically Safe or Non-Incendive wiring and equipment, and Intrinsic Safety equipment (Ex ia, Ex ib or Ex ic)

** "Uninterrupted conduit run" is one that contains no boxes or fittings other than NPT couplings

*** Can be a single enclosure with 2 sections or 2 enclosures, having factory seal between the Ex e and Ex d sections

Add new Appendix B Note for Rule 18-078 to read:

SN4760

Rule 18-078

Explosion-proof or flameproof threaded connections are not required for Zone 20, 21, or 22 locations.

In Zone 2, explosion-proof or flameproof threaded connections are required when entering an enclosure that is required to be explosion-proof or flameproof, and for those installations, the conduit is also considered to be part of the explosion-proof or flameproof system to which it is connected. However, if entries are to an enclosure with non-arcing or non-heat-producing components such as terminals, then explosion-proof or flameproof threaded connections and conduit would not be required, unless part of an "uninterrupted conduit run".

Running threads, which are not allowed for NPT threaded connections where explosion protection is required, are created when a wire entry or length of conduit is

Add new Appendix B Note for Rule 18-078 to read:

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Running threads, which are not allowed for NPT threaded connections where explosion protection is required, are created when a wire entry or length of conduit is

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threaded beyond the length of the tap resulting in a section of straight threads at the minimum or maximum diameter of the taper. Running threads are not capable of meeting the requirements for explosion protection in hazardous locations.

Where threaded connections are used for explosion protection, the requirement to have 4-1/2 tapered and 5 straight fully engaged threads (i.e., threads done up tight) is critical for the following reasons:

- ☐ When the threads are not fully engaged, the flame path is compromised, making it possible for an explosion occurring within the flameproof or explosion-proof system to be transmitted to the surrounding atmosphere.
- ☐ Because metal conduit forms a bonding path to ground, not making the conduit tight will introduce resistance into the flame path and, if a fault occurs, arcing at the interface may result.

While it may not always be possible to install certain fittings without backing off, it is important to ensure that the connection is made tight. Properly made threaded connections are critical to the safety of hazardous location wiring systems.

The metric thread tolerances are defined in ISO standard 965-1. Class-of-fit (tolerance) for internal (female) threads is defined by 6H and for external (male) threads by 6g. Better (tighter) tolerances will have lower numbers. Class-of-fit is measured prior to assembly using commercially/readily available screw plug gauges for interior threads and ring gauges for external threads.

Revise Appendix B Note for Rules 18-102, 18-104, 18-152 1) b), 18-192 1) b), 18-202 1) b), and 18-252 1) b) to read:

Rules 18-102, 18-104, 18-152 1) b), 18-192 1) b), 18-202 1) b), and 18-252 1) b)
Cables meeting the requirements of CSA C22.2 No. 174 that are marked "HL" are acceptable for use in all hazardous locations [with some restrictions in 18-092 2) for Zone 0] and are marked "HL".

~~Cables marked for use in hazardous locations are suitable for all locations, but the termination fittings must be suitable for the particular hazardous location. For example, in a Zone 1 or Zone 2 hazardous location, a termination fitting entering an enclosure required to be explosion-proof, flameproof "d", or flameproof "db" must be a sealing-type termination fitting, whereas a termination fitting entering an enclosure not required to be explosion-proof, flameproof "d", or flameproof "db" in a Zone 2 hazardous location is not required to be marked for use in Zone 2 hazardous locations.~~ In Zone 1 hazardous locations, cables marked "HL" are acceptable and all cable glands are required to be suitable for the location and the equipment's Type of Protection that it is connected to. For example, in a Zone 1 hazardous location, cables entering an explosion-proof or flameproof ("d" or "db") enclosure are required to have an explosion seal. Explosion-proof enclosures require a Class I, Division 1 cable gland whereas flameproof ("d" or "db") enclosures require either a Class I, Division 1 or flameproof ("d" or "db") cable gland. Explosion seals are also required to be installed on cables entering enclosures marked as "Factory Sealed" or "Seals not Required" since cables are not tested to determine their ability to contain internal explosions to enclosures. For Increased Safety ("e" or "eb") enclosures, the use of Increased Safety ("e" or "eb") glands is required (see Rule 18-102 5)), which are not the same as explosion seals.

In Zone 2 hazardous locations, there are several cable types identified in Rule 18-152 and other similar constructions, that are acceptable for use, and all cable glands are required to be suitable for the location and the equipment's Type of Protection that it is connected to. For example, in a Zone 2 hazardous location, cables entering an enclosure required to be explosion-proof or flameproof ("d" or "db") are required to follow the same Rules as Zone 1 (see previous paragraph). However, cables entering enclosures marked as "Factory Sealed" or "Seals not Required" do not require an explosion seal. Cables entering an enclosure not required to be explosion-proof or flameproof ("d" or "db") in a Zone 2 location are permitted to use ordinary location cable glands. Cable glands marked Class I, Division 2 are not considered explosion seals.

The requirements for cable glands also apply to cable transit devices.

A Flammable Fluid Migration Seal is required at the first point of termination of a cable in Zone 1 or Zone 0 locations. Since Class I, Division 1, flameproof ("d" or "db") and Increased Safety ("e" or "eb") cable glands also meet the requirements of a flammable fluid migration seal, a separate fitting is not required where those glands are installed.

It is intended that cable glands ~~termination fittings~~ in all hazardous locations be compatible with the degree of protection and the ~~explosion type of~~ protection provided by the enclosure they enter. In general, the minimum requirement will be weatherproof cable glands ~~termination fittings~~.

For the application of Section 18, rigid metal couplings are not considered fittings. The CSA Standard for rigid metal conduit and couplings is CSA C22.2 No. 45.1. This Standard does not require hazardous location markings. Certified rigid metal conduit

and couplings are suitable for hazardous locations without specific area classification marking.	
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<p><i>Delete Appendix B Notes for 18-102 3) a) and 18-152 3) a), and 18-102 3) a) and 18-152 3) b)</i></p> <p>Rules 18-102 3) a) and 18-152 3) a) Where tapered threads are used, the requirement to have 4 1/2 fully engaged threads (i.e., threads done up tight) is critical for the following reasons: a) When the threads are not fully engaged, the flame path is compromised, making it possible for an explosion occurring within the conduit system to be transmitted to the area outside the conduit. b) If there are not 4 1/2 fully engaged threads, the flame path may be too short to cool the gases resulting from an internal explosion to a temperature below that which could ignite gas in the surrounding area. c) Because the conduit forms a bonding path to ground, not making the conduit tight introduces resistance into the flame path and, if a fault occurs, arcing at the interface may result. While it may not always be possible to install certain fittings without backing off, it is important to ensure that the connection is as tight as possible. Properly made conduit connections are critical to the safety of hazardous location wiring systems.</p> <p>Rules 18-102 3) b) and 18-152 3) b) Tolerance 6g/6H is defined by ISO 965-1.</p>	SN4760
<p><i>Revise Appendix B Note for Rules 18-104 and 18-154 to read:</i></p> <p>Rules 18-104 and 18-154 Seals are provided in conduit or cable systems to prevent the passage of gases, vapours, or flames from one portion of the electrical installation to another through the system. Some equipment may include markings such as “FACTORY SEALED” or “SEAL NOT REQUIRED” as permitted by CSA C22.2 No. 30. These terms apply to conduit installations only. The markings “FACTORY SEALED” and “SEAL NOT REQUIRED” are used interchangeably and indicate that the termination enclosure for the equipment is isolated from ignition-capable components by an internal factory seal, or that the equipment incorporates devices that have been assessed as not producing arcs, sparks, or high temperatures. For equipment marked “FACTORY SEALED” or “SEAL NOT REQUIRED”, the following applies:</p> <p>a) In Zone 1 applications:</p> <ul style="list-style-type: none"> i) For conduit installations, an explosion seal is not required <u>as the conduit system is explosion-proof and will contain an explosion if something were to happen inside the enclosure, such as a wire coming out of a terminal.</u> ii) For cable installations, an explosion seal is required <u>as the cable cannot contain an explosion in the enclosure if something happened, such as a wire coming off a terminal. Therefore, an explosion seal is needed to contain the explosion to the enclosure.</u> <p>b) In Zone 2 applications, because equipment that is not ignition capable [see Rule <u>18-150 2) a)</u>] and terminations housed in non-hazardous location enclosures</p>	SN4749

[see Rule 18-150 2) c)] are permitted in Zone 2 locations, an explosion seal for conduit or cable is not required in accordance with Rules 18-154 1) and 4) , respectively.	
<p><i>Revise Appendix B Note for Rule 18-106 to read:</i></p> <p>Rule 18-106 Increased safety motors can only be safely installed and used in Zone 1 hazardous locations when specific protection requirements for their thermal and fault protection are met. This ensures the likelihood of a winding failure resulting in incendive arcing, or that an overload or a fault resulting in high temperatures is unlikely to occur. These protection requirements are outlined in standard IEC 60079-14.</p> <p>IEC 60079-14 contains the requirements for designers and users to apply when Ex eb motors are used in Zone 1. Requirements include the following:</p> <ul style="list-style-type: none"> a) protection from overload and short-circuits to prevent inadmissible heating; b) application of cage induction motors; c) operation, starting, and automatic reclosing (i.e., restarting after power failure); d) use of winding temperature sensors; e) operation of high-voltage motors machines; f) operation of motors from a frequency converter; and g) operation of motors using reduced-voltage (soft) starting. 	SN4791
<p><i>Add new Appendix B Note for Rule 18-150 2)a)ii) to read:</i></p> <p>Rule 18-150 2) a) ii) This subrule is intended to allow for capacitors to be installed in Zone 2 such as are used for partial discharge monitoring, power factor correction, and harmonic reduction.</p>	SN4638
<p><i>Add new Appendix B Note for Rule 18-150 2)a)iii) to read:</i></p> <p>Rule 18-150 2) a) iii) This type of equipment operates at such extremely low power levels that any operating temperature rise is negligible, and is thereby in compliance with Rule 18-054. All are non-sparking, and do not incorporate inductors, capacitors or other internal components capable of storing or producing significant amounts of electrical energy. For additional information, refer to the description of “simple apparatus” in CSA Standard C22.2 No. 60079-11. RFID tag Readers are not included in this allowance and they would need to be certified for the areas in which they are used.</p>	SN4638
<p><i>Revise the Appendix B Note for Rule 18-150 2)e) to read:</i></p> <p>Rule 18-150 2) e) Rule 18-150 does not require motors and generators of the open or non-explosion proof type to be certified for Zone 2 locations unless the machines incorporate ignition capable components or heat-producing components that exceed the minimum ignition temperature defined for the hazardous location. This Subrule</p>	SN4522

provides the criteria for applying motors and generators in Zone 2 locations that do not have a certification suitable for Zone 2 or Division 2. Refer to IEEE 1349 for more detailed information on applying these motors and generators in Zone 2 locations.

There is no Class I, Division 2 certification standard for motors and generators
~~rotating electrical machines, of the open or non-explosion-proof type do not have a certification Standard for Class I, Division 2;~~ however, there are types of protection that can be used for certifying these machines for use in Zone 2 locations. . In addition, these machines can be evaluated for use in Zone 2 locations in accordance with UL1836 "Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations". ~~This Subrule provides the criteria for applying, in Zone 2, rotating electrical machines that do not have a certification suitable for Zone 2 or Division 2. Refer to IEEE 1349 for more detailed information on applying these rotating electrical machines in Zone 2 locations.~~

Revise Appendix B Note for Rule 18-150 4) to read:

SN4688

Rule 18-150 4)

The evaluation process to determine if the sliding contact shaft bonding device is non-incendive is the "motor bearing sparking – discharge energy calculation" found in ~~Annex H of~~ CSA C22.2 No. 60079-0, UL 1836, or IEEE 1349. The potential energy calculation should be retained and available for review. The person taking responsibility for the calculation is normally an engineering professional or other individual permitted to practice engineering.

Add the following entry to Appendix B, Table B18-1:

SN4640

[Full table not shown]

Equipment, equipment selection (Products)+	<u>UL</u>	<u>1836 Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations</u>
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Delete reference to IEC TS 60079-40 from Table B18-1:

SN4715

[Full table not shown]

Table B18-1

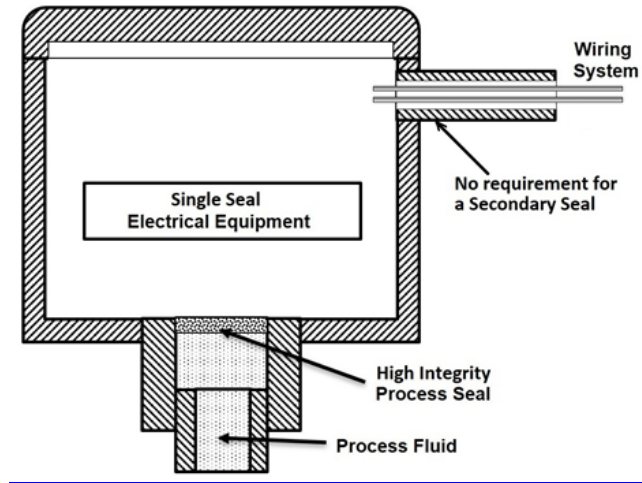
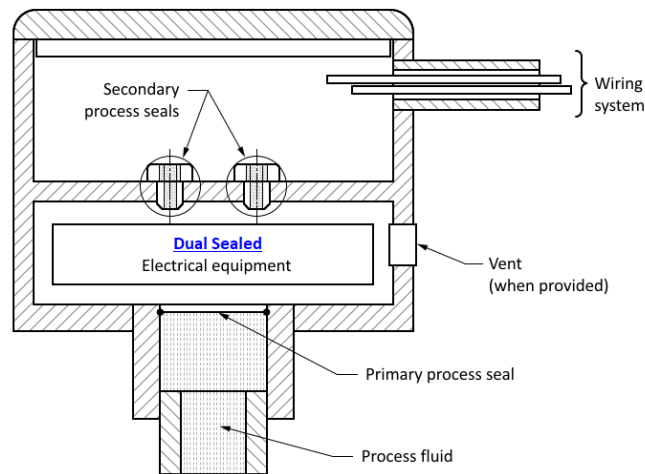
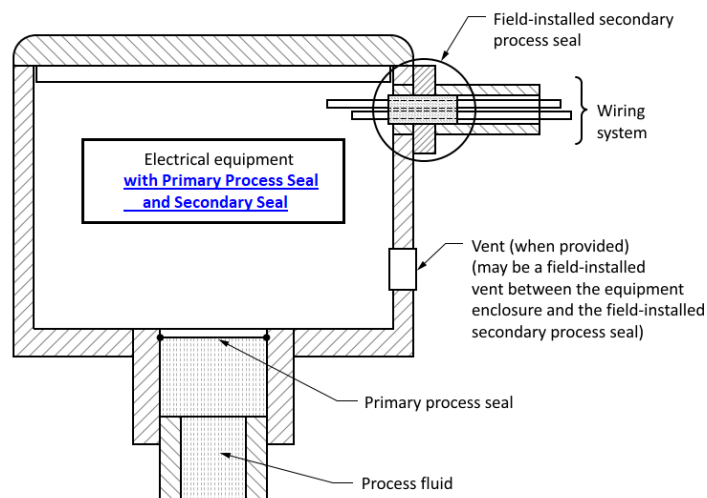
“

Equipment , equipment selection (products) †	IEC	TS 60079-40, Explosive atmospheres — Part 40: Requirements for process sealing between flammable process fluids and electrical systems
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”

Add new diagram to Figure B18-1 and modify the two existing diagrams:

SN4715

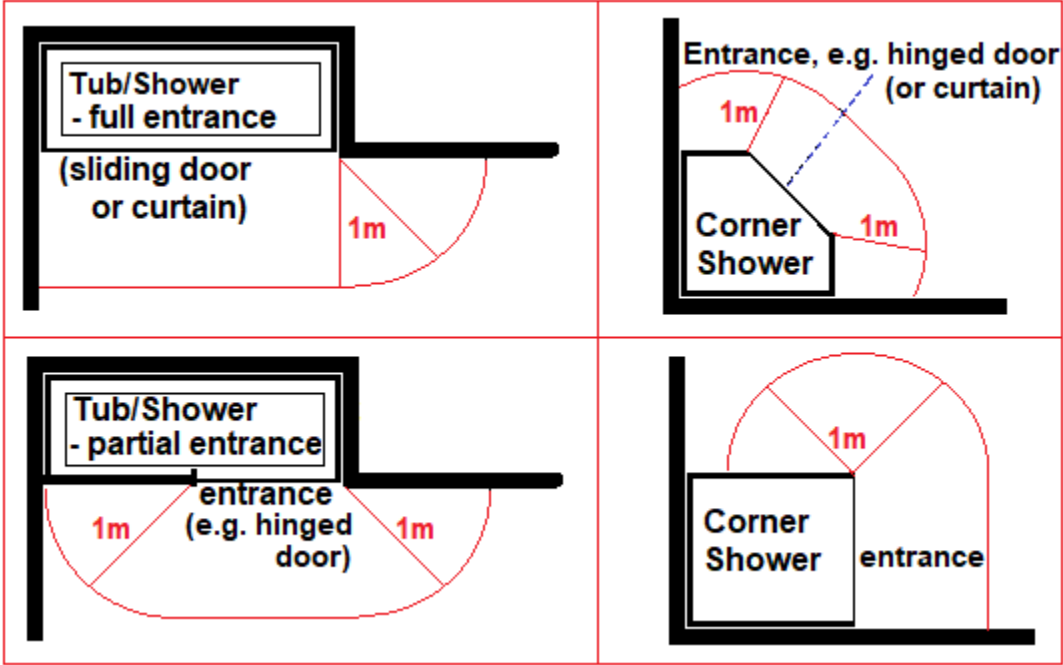


<p><i>Add Appendix B Note for Rule 18-152 1) d) to read:</i></p> <p><u>Rule 18-152 1) d)</u> <u>Examples of acceptable armoured and metallic sheathed cables are TECK90, ACWU90, copper-sheathed RC90, aluminum-sheathed RA90, armoured fire alarm and signal (FAS) cable, and armoured control and instrumentation cable (ACIC).</u></p>	SN4745
<p><i>Add new Appendix B Note for Rule 18-250 to read:</i></p> <p><u>Rule 18-250</u> <u>In addition to certifying motors and generators with “types of protection”, these machines can be evaluated for use in Zone 22 locations in accordance with UL1836 “Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations”.</u></p>	SN4522
<p><i>Revise Appendix B Note for Rule 20-004 to read:</i></p> <p>Rule 20-004 For the purposes of Subrules 6) and 7), buildings such as kiosks, in which electrical equipment such as cash registers and/or self-service console controls are located, are considered to be buildings not suitably cut off.</p> <p><u>For the purposes of Subrule 11), if the threaded rigid metal conduit emerges in a Zone 1 location, Explosion seals required by section 18 will meet the requirements of a flammable fluid migration seal.</u></p>	SN4693
<p><i>Add new Appendix B Note for Rule 24-101 to read:</i></p> <p><u>Rule 24-101</u> <u>It is intended by this Rule that panelboards supplying circuits in patient care areas, should be located in service rooms or service spaces, readily accessible to authorized personnel only.</u></p> <p><u>It is also intended by this Rule to permit the installation of panelboards supplying circuits of the essential electrical system in basic or intermediate care areas, within those care areas, when access by authorized personnel to these patient care areas is allowed by the health care facility administration.</u></p> <p><u>The intent of this Rule is also to ensure that when a panelboard is permitted to be located in a critical care area, such panelboard is dedicated to only supplying loads serving the critical care area where it is located, and as such, access by authorized personnel to that particular critical care areas is allowed by the health care facility administration when required.</u></p> <p><u>It should be noted that when panelboards are permitted to be installed in patient care areas in accordance with Subrule (2), access to those patient care areas for control</u></p>	SN4571

<p><u>of the circuits located outside of the patient care area, may not be granted by the health care facility administration to all maintenance personnel.</u></p>	
<p><i>Revise Appendix B Note for Rule 24-108 8) to read:</i></p> <p>Rule 24-104 8) This Subrule is intended to require that all exposed metal parts of non-electrical equipment located within a patient care environment that could become energized during a single fault condition be bonded to ground. Examples of such equipment are metal parts of medical gas equipment, metal parts of support arms or consoles installed in a patient care environment, etc. It is not intended by this Subrule that metal parts of portable non-electrical equipment or metal parts of the building structure and miscellaneous small conductive parts (e.g., <u>metal sinks not provided with line-connected equipment such as electrically operated faucets</u>, metal door frames, window frames, and soap dishes) be bonded to ground.</p>	<p>SN4606 SN4634</p>
<p><i>Add new Appendix B Note for Rule 24-106 8) to read:</i></p> <p>Rule 24-106(8) <u>It is intended that Subrule 8) supplement the general provisions of Rule 26-706 for tamper-resistant receptacles for those areas in health care facilities covered by the scope of Section 24. Examples of areas designated by the health care facility administration as being intended primarily for the provision of diagnosis, therapy, or care to children would include but are not limited to pediatric units and examination rooms intended for children.</u></p>	<p>SN4572</p>
<p><i>Add new Appendix B Note for Rule 26-100 to read:</i></p> <p>Rule 26-100 <u>Pullout switches are a type of isolating switch covered by Standard CSA C22.2 No. 335.</u></p>	<p>SN4710</p>
<p><i>Add new Appendix B Note for Subrule 26-600 1) to read:</i></p> <p>Rule 26-600 1) <u>It should be noted that in accordance with C22.2 No. 29, panelboards are tested to operate normally at ambient temperatures up to 40C.</u></p>	<p>SN4575</p>
<p><i>Revise Appendix B Note for Rule 26-724 a) to read:</i></p> <p>Rule 26-724-a) <u>It is intended by this Rule to ensure sufficient availability and ready access to outdoor receptacles.</u> <u>Generally, single dwellings have two or more sides exposed to and accessible from the outdoors. It is intended that by having receptacles installed on opposite sides of</u></p>	<p>SN4602</p>

<p><u>a single dwelling, ready access to the outdoor receptacles is maximized. In rare occasions where a single dwelling does not have opposite sides, item 26-724 1) b) provides for alternate means to accommodate the two outdoor receptacles.</u></p> <p><u>For smaller single dwellings, having a perimeter of 20m or less, a minimum of one receptacle is deemed sufficient.</u></p> <p>For single dwellings of the detached, semi-detached, and row housing types, it is recommended that outdoor receptacle be placed at both the front and rear of the house and that these be controlled by a switch located inside the house.</p>	
<p><i>Revise portions of the Appendix B Section 28 “Example to determine motor insulated conductors and protection” where indicated:</i></p> <p style="text-align: center;">Section 28</p> <p>Example to determine motor insulated conductors and protection</p> <p>The following is an example calculation for determining copper conductor size, and overcurrent <u>rating</u>, and overload protection for one 100 hp, one 30 hp, and two 7 ½ hp motors , 575V, three phase, at full-voltage start.</p> <p>“</p> <p>“</p> <p>“</p> <p>Overcurrent protection</p> <p>Branch circuit overcurrent protection for each motor is determined by using Rule 28-200. For the purpose of the motors described, use Rule 28-200 a) and Table 29. Listed below are the actual currents with the standard size of protector <u>rating of overcurrent device</u> shown in brackets.</p> <p>“</p> <p>“</p> <p>“</p> <p>Note that Table D16 may be used to select the size <u>maximum rating</u> of the overcurrent devices in accordance with Rule 28-200, where the full load current rating of the motor is shown in the Table</p> <p>Feeder over current protection</p> <p>The maximum allowable feeder overcurrent protection for motors is determined from Rule 28-204.</p> <p>Using Rule 28-204 1) the ratings are as shown below with the standard size <u>rating</u> shown in parentheses:</p>	SN4733
<p><i>Revise Appendix B Note for Rule 28-308 c) to read:</i></p> <p>Rule 28-308 c)</p> <p>The intent of this Item is to allow motors that are designed, constructed, <u>and</u> certified to CSA C22.2 No. 77, and marked as impedance “ZP” and thermally “TP” protected as motors to that can be installed without the overload protection that is required by Rule 28-300.</p> <p><u>Such motors have inherent overheating protection and are identified with one of the following markings:</u></p>	SN4595

<p>a) <u>"THERMALLY PROTECTED", or "TP"</u></p> <p>b) <u>"IMPEDANCE PROTECTED", or "ZP"</u></p> <p>c) <u>"ELECTRONICALLY PROTECTED", or "EP"</u></p>	
<p><i>Revise Appendix B Note for Rule 46-306 1) to read:</i></p> <p>Rule 46-306 1) Where approved unit equipment includes a list of lamps suitable for remote installations, the requirements of CSA C22.2 No. 141 take into account a voltage drop of 5% in the remote lamp's circuit unless the list specifies that certain lamps conform to the requirements with a greater voltage drop.</p> <p><u>Note 4 of Table D4-D3</u> can be used to determine approximate permissible circuit lengths.</p>	SN4748-46
<p><i>Revise Appendix B note for Ruler 60-200 2) to read:</i></p> <p>Rule 60-200 2) The point at which the exposed conductors <u>cables</u> enter a building is considered to be the point of emergence through an exterior wall, through a concrete floor slab, or from a totally enclosed non-combustible entrance raceway.</p>	SN3961-60
<p><i>Revise Appendix B Note for Rule 62-116 1) to read:</i></p> <p>Rule 62-116 1) The intent of the "ground fault setting sufficient to allow normal operation of the heater" is that the setting should be as low as practical to allow start-up and running of the heater without nuisance trips, yet still providing ground fault protection for the equipment and insulated supply conductors. For many systems, this would be a fixed trip 30 mA ground fault protection device. For higher leakage current circuits, the trip level for adjustable devices is typically set at 30 mA above any inherent capacitive leakage current. If a fixed trip ground fault protection device is to be used, it should be selected to meet this intent.</p>	SN4773
<p><i>Add new Appendix B Note for Rules 62-124 2) and 3) to read:</i></p> <p><u>Rules 62-124 2) and 3)</u> <u>This Rule addresses installation requirements for series trace heater sets. Subrule 2) currently addresses the need to maintain the trace heater set and its connection to a non-heating lead within the heating area, typically beneath the thermal insulation. The non-heating lead may then pass through the thermal insulation and be connected within a junction box. Trace heating systems can be designed to allow the trace heater to pass through a heating surface mounted fitting assembly and transition directly into close-coupled power and termination junction boxes. A non-heating lead is not required in this case and the trace heater can be connected directly into the junction box terminal block. Subrule 62-108 3) addresses requirements when temperatures at the point of connection for branch circuit wiring exceeds 60 °C.</u></p>	SN4607

<p>Add new Appendix B Note for Tule 62-130 to read:</p> <p>Rule 62-130 2) <u>Thermostats that have integral Class A GFCI functionality, may only protect the outgoing load conductors. This Rule requires the thermostat itself to have Class A GFCI protection, therefore a separate Class A GFCI would be required to protect the thermostat if the integral Class A GFCI function does not protect it.</u></p>	SN4773
<p>Add new Appendix B Note for Rules 62-130 and 62-132 to read:</p> <p>Rule 62-130 and 62-132 <u>What is meant by “tub or shower stall entrance” is wherever a person can stand (or sit) and reach from the tub or shower. It does not matter what type of entrance it is, open, curtained, hinged, sliding or similar, the distance would be measured from the entire entrance. Figure B62-1.5 shows a few examples:</u></p> <p style="text-align: center;">Figure B62-1.5</p> 	SN4567
<p>Revise Appendix B Note for Rule 62-216 1) to read:</p> <p>Rule 62-216 4) <u>In Subrule 1), the 13 mm clearance is to prevent mechanical damage of the heating device during installation of the gypsum board and other cementitious material.</u></p> <p><u>Subrule 3) is intended to allow for a trace heater to transition from one ceiling or wall cavity to another by crossing the stud or joist within 150mm of the end, for example in a notch, or through a hole, or around the end of the stud or joist if available.</u></p>	SN4568 SN4803

<p><u>Subrule 4) is intended to allow for trace heaters and panels to cross over the face of studs or joists without making a notch. For ceiling installations, GFCI-A or mechanical protection would be needed. For wall installations, they are limited to 1.2m above the floor and both GFCI-A and mechanical protection is needed.</u></p> <p><u>Subrule 5) is intended to allow for alternative methods of installing trace heaters or panels without gypsum board when mechanical protection is provided.</u></p> <p><u>Mechanical protection referred to in Subrules 4) and 5) can be provided by the requirements of the safety standard for a manufactured product or by field installation. In either case, manufacturer's instructions are provided and need to be followed. One example would be a manufactured panel with the trace heater or heating panel set embedded in it, and integral mechanical protection, which is then attached to the studs or joists. Another example would be the trace heater or heating panel set installed on the face of the studs or joists, with the mechanical protection installed on top of that, and optionally gypsum board installed on top of the mechanical protection, or vice versa, as would be detailed in the manufacturer's instructions.</u></p> <p><u>Standard C22.2 No. 130 contains the details for certifying products for installations requiring mechanical protection.</u></p>	
<p><i>Revise part of Appendix B Note for Rule 64-002) to read:</i></p> <p>Energy storage system Additional information regarding energy storage systems is located in UL 9540. The Standard does not include other storage systems, such as an <u>This definition is not intended to include an</u> uninterruptible power system (UPS) which is covered by CSA C22.2 No. 107.3.</p> <p>CSA C22.2 No. 107.3 defines an uninterruptible power system as follows:</p> <p>Uninterruptible power system (UPS) — combination of converters, switches, and energy storage devices (such as batteries), constituting a power system for maintaining continuity of power to a load in case of input power failure.</p> <p>Field-assembled energy storage systems Field-assembled energy storage systems are not approved to UL 9540. These systems involve interconnection of separate components <u>pieces of equipment</u> forming an <u>overall</u> energy storage system. <u>This equipment may include batteries, protection, control, power conversion, charge control, and fire detection.</u></p> <p>Self-contained energy storage systems Self-contained energy storage systems are approved to UL 9540. These systems may involve populating and interconnection of batteries and associated equipment at the final installation site.</p>	SN4758
<p><i>Add new Appendix B Note for Rule 64-104 3) a) to read:</i></p> <p><u>Rule 64-104 3) a)</u> <u>For application of this item, the combination of a micro-inverter and photovoltaic module is considered to be equivalent to an ac module.</u></p>	SN4411
<p><i>Revise Appendix B Note for Rule 64-106 to read:</i></p>	SN4717

Rule 64-106

~~An inverter or an ac module in an interactive renewable energy system should automatically de-energize its output to the connected electrical production and distribution network upon loss of voltage in that system and should remain in that state until the electrical production and distribution network voltage has been restored.~~

Interconnection requirements:

An inverter or an ac module in an interactive renewable energy system plays a key role in satisfying the interconnection requirements of the supply authority. Those requirements have typically included protection functions, such as abnormal voltage and frequency trip, and anti-islanding. Those requirements are now progressing to include grid-support functions to assist in grid voltage and frequency regulation, fault recovery, ride through, communications, and remote-control requirements. CSA C22.3 No. 9, added many of these requirements in a new version dated 2020. CSA C22.3 No. 9 also provides two levels of grid support features, identified as “basic” and “supplemental” to distinguish between these levels of capability.

An Amendment to the inverter standard CSA C22.2 No. 107.1 refers to inverters that are within the scope of C22.3 No. 9. Other interconnection requirements are allowed to be used for inverters outside that scope of C22.3 No. 9. Markings requirements for inverters and ac modules clearly identify when C22.3 No. 9 has been applied and when it has not.

For products that comply with the amendment to C22.2 No. 107.1, the following markings are required:

a) Interactive inverters or power conversion equipment tested for compliance with the C22.3 No. 9 baseline requirements are marked:

“GRID SUPPORT INTERACTIVE INVERTER - C22.3 NO. 9 - BASIC”

b) Interactive inverters or power conversion equipment tested for compliance with the C22.3 No. 9 supplemental requirements are marked:

“GRID SUPPORT INTERACTIVE INVERTER - C22.3 NO. 9 - SUPPLEMENTAL”

c) Interactive inverters or power conversion equipment not tested in accordance with C22.3 No. 9 are marked:

“NOT EVALUATED TO C22.3 NO. 9. REFER TO MANUAL. PROVIDED WITH ANTI-ISLANDING PROTECTION.”

The intent of the marking in c) is to make stakeholders in the interconnection process aware that they need to consult the documentation for the inverter or ac module, to determine what interconnection requirements were applied, if any. The marking also points out that anti-islanding protection has been evaluated, regardless of whether or not C22.3 No. 9 was applied. This information is needed during the interconnection assessment to determine if the supply authority’s requirements will be satisfied.

Multi-mode systems:

A renewable energy system that is normally interactive may be permitted to operate

as a stand-alone system to supply loads that have been disconnected from an electrical production and distribution network source.

~~Marking requirements for interactive inverters are given in CSA C22.2 No. 107.1 and CAN/CSA C22.2 No. 62109.~~

Add new Appendix B Note for Rule 64-112 to read:

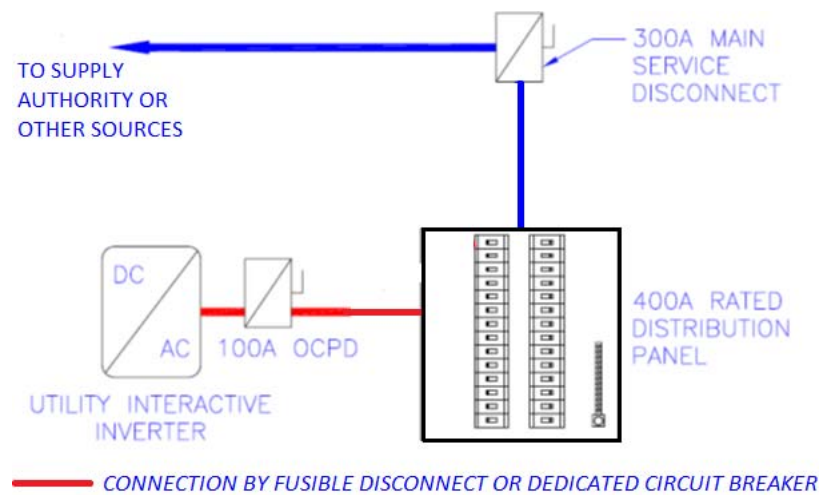
SN4759

Rule 64-112

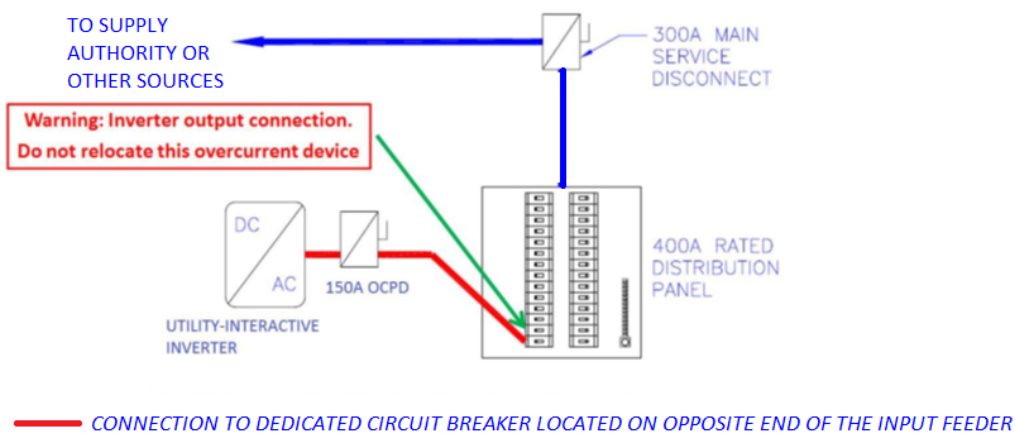
See Figure B64-8

Figure B64-8
Interactive Point of Connection

(A) Sum of supply sources does not exceed equipment rating



(B) Sum of supply sources exceed equipment rating



Renumber Appendix B Note for Rule 64-112 4) b) iii) to read:

SN4759

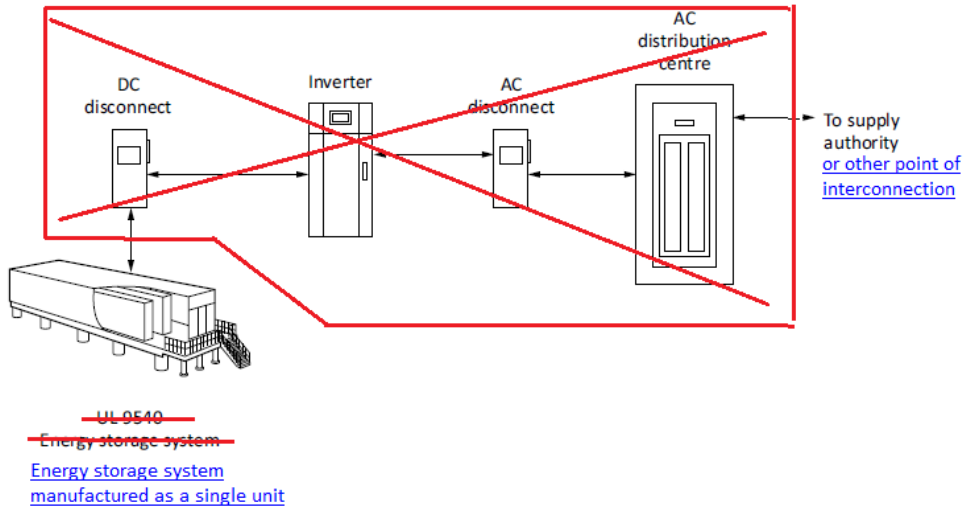
Rule 64-112 4) ~~b) iii)~~ c)

<p><i>Renumber Appendix B Note for Rule 64-112 e) to read:</i></p> <p>Rule 64-112 4) e) g)</p>	SN4759
<p><i>Renumber Appendix B Figures B64-8, B64-9 and B64-10 and associated cross references to read:</i></p> <p style="text-align: center;">Figure B64-89 Label for photovoltaic systems that shut down the conductors leaving the array only</p> <p style="text-align: center;">Figure B64-910 Self-contained energy storage</p> <p style="text-align: center;">Figure B64-1011 Field-assembled energy storage</p>	SN4759
<p><i>Revise Appendix B Note for Rule 64-210 5) to read:</i></p> <p>Rule 64-210 5) The intent of this Subrule is to provide protection against damage from rodents by enclosing the photovoltaic source <u>and output</u> circuit insulated conductors and cables in material such as expanded metal, solid metal, and screening.</p>	SN4587
<p><i>Revise Appendix B Note for Rule 64-710 to read:</i></p> <p>Rule 64-710 Fuel cells should be considered fuel-burning equipment and be installed in accordance with the National Building Code of Canada. Hydrogen-fuelled systems should be installed in accordance with CAN/BNQ 1784-000. <u>Other considerations for siting and location may be found in NFPA 853.</u></p>	SN4610
<p><i>Delete Appendix B Note for Rule 64-800:</i></p> <p>Rule 64-800 The intent of this Rule is to provide direction to Code users when components, such as batteries, inverters, converters, and controls, are interconnected in the field to create an energy storage system and have not been evaluated together as an assembly in accordance with UL 9540.</p>	SN4758

Revise Appendix B Figure B64-9 to read:

SN4758

Figure B64-9
Self-contained energy storage

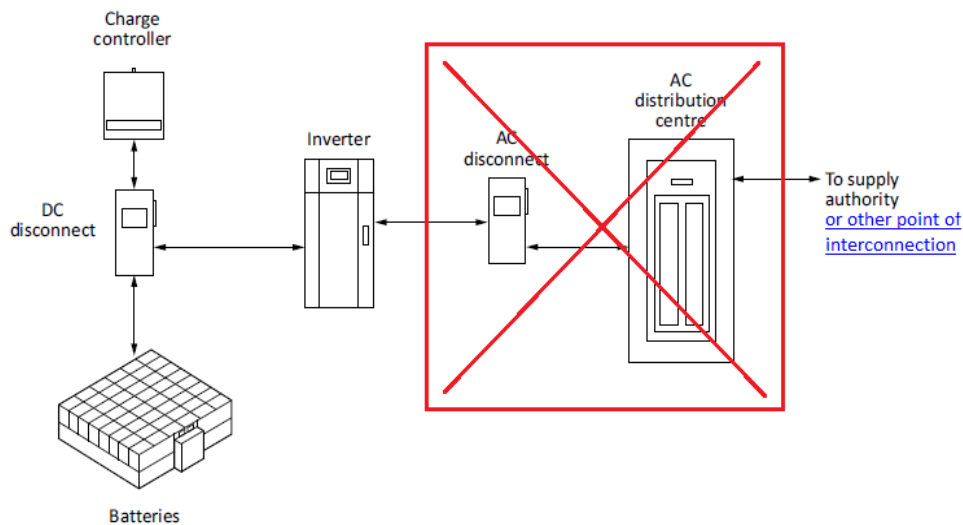


Note: Self-contained energy storage systems may include such equipment as inverters and disconnects.

Revise Appendix B Figure B64-10 to read:

SN4758

Figure B64-10
Field-assembled energy storage



Note: Field assembled energy storage systems may be multi-part assemblies that have been evaluated to UL9540, or an assembly of equipment on site that has not been evaluated to UL9540.

<p>Add new Appendix B Note for Rule 64-902 and 64-910 to read:</p> <p><u>Rules 64-902 3) and 64-910 1)</u> <u>Requirements for marking, installation and maintenance of energy storage systems are found in CAN/UL 9540.</u></p>	SN4758
<p>Delete Appendix B Note for Rule 64-914</p> <p>Rule 64-914 Disconnecting means for self-contained energy storage systems may be provided as part of the energy storage systems or may be required to be installed in accordance with the manufacturer's installation instructions.</p>	SN4758
<p>Delete Appendix B Note for Rule 64-918 1)</p> <p>Rule 64-918 1) UL 9540 requires energy storage systems intended for dwelling units to be marked "Suitable for Use in Residential Dwelling Units Where Permitted".</p>	SN4758
<p>Delete Appendix B Note for Rule 64-918 2)</p> <p>Rule 64-918 2) Alternative locations may be considered, subject to discussions with the local building, fire, or appropriate authority having jurisdiction.</p>	SN4758
<p>Delete Appendix B Note for Rule 64-918 7)</p> <p>Rule 64-918 7) See the Note to Rules 2-328 and 64-918 7).</p>	SN4758
<p>Delete Appendix B Note for Rule 64-918 8)</p> <p>Rule 64-918 8) UL 9540A defines a thermal runaway as "The incident when an electrochemical cell increases its temperature through self-heating in an uncontrollable fashion. The thermal runaway progresses when the cell's generation of heat is at a higher rate than the heat it can dissipate. This may lead to fire, explosion and gas evolution".</p>	SN4758
<p>Revise Appendix B Note for Rule 64-926 4) to read:</p> <p>Rule 64-922 4) UL 9540 requires charge controllers to be part of the self-contained energy storage systems.</p>	SN4758

<p><i>Add new Appendix B Note for Rule 64-924 2) to read:</i></p> <p><u>Rule 64-924 2)</u></p> <p><u>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.</u></p>	SN4758
<p><i>Add new Appendix B Note for Rule 64-1002 3) to read:</i></p> <p><u>Rule 64-1002 3)</u></p> <p><u>See the Note to Rule 2-328.</u></p>	SN4758
<p><i>Add new Appendix B Note for Rule 64-1100 1) to read:</i></p> <p><u>Rule 64-1100 1)</u></p> <p><u>The acceptability of the fire resistance rating of a dedicated room 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.</u></p> <p><u>Additional information regarding the Standard Methods of Fire Endurance Tests of Building Construction And Materials is found in CAN/ULC-S101. This standard covers fire endurance tests applicable to walls, partitions, floors, roofs, ceilings, columns, beams, and girders, as well as to some components of these building sub-assemblies.</u></p> <p><u>Alternative locations may be considered, subject to acceptance from the local building, fire, or other appropriate authority having jurisdiction.</u></p>	SN4758
<p><i>Add new Appendix B Note for Rule 64-1100 8) to read:</i></p> <p><u>Rule 64-1100 8)</u></p> <p><u>The test methodology in the UL9540A standard determines the capability of a battery technology to undergo thermal runaway.</u></p> <p><u>Thermal runaway is defined as "The incident when an electrochemical cell increases its temperature through self-heating in an uncontrollable fashion. The thermal runaway progresses when the cell's generation of heat is at a higher rate than the heat it can dissipate. This may lead to fire, explosion and gas evolution".</u></p> <p><u>As part of the energy storage system certification process to UL9540, the testing data generated by UL9540A may be used to determine acceptable installation practices such as but not limited to location of the energy storage system, aggregate capacity limitations, ventilation, and spacing requirements from other energy storage systems.</u></p> <p><u>The intent of this rule is to recognize where such systems have undergone this testing that the requirements of Subrules 1) through 7) may not be required</u></p>	SN4758

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 UL9540A	
<p><i>Add Appendix B Note for Table D3 to read:</i></p> <p><u>Table D3</u> <u>The K value multiplier of Note 4 is based on a 30 °C ambient with a maximum 10 °C temperature rise. As the operating temperature of a conductor increases so too does its resistance, which increases voltage drop. Conductors loaded to their ampacity will exceed the 40 °C operating temperature assumed by the note, resulting in an underestimation of voltage drop, which has a marked adverse effect on extra-low voltage circuits.</u> <u>To limit the conductor operating temperature of extra-low voltage power circuits to approximately 40 °C, Note 4 restricts load current to no more than two-thirds of the ampacity of copper conductors at 60 °C in Table 2.</u></p>	<p>SN4748-8</p>

Appendix C

Add new Clauses C5.5.1 to C5.5.5 to read:

SN4377

C5.5.1

Where it is intended to make parallel changes to Section 18 and Annex J18, separate companion proposals shall be submitted concurrently

C5.5.2

Where a proposal is intended to change either Section 18 or Annex J18, but not both, the Section 18 subcommittee shall, prior to or in parallel with the deliberations, review the proposal for its suitability as a stand-alone proposal.

C5.5.3

Where, in accordance with Clause C5.5.2, the Subcommittee determines that a companion proposal is required, a concurrent proposal shall be prepared by the submitter or by a Section 18 subcommittee member.

C5.5.4

Where, in accordance with Clause C5.5.2, the Subcommittee determines that a companion proposal is not required, this finding shall be documented by the Subcommittee and included with the recommendation submitted to the Committee on Part I for ballot approval.

C5.5.5

Each proposal shall be processed in accordance with Clause C5.4.

Revise Clause C9.9 to read:

SN4625

C9.9

When ~~the~~ Section Subcommittee ~~shall present a~~

a) achieves consensus on an interpretation, the recommended interpretation shall be presented to the Committee on Part I for vote. ~~Voting shall be~~ in accordance with Clause C7.1. ~~or~~

b) cannot achieve consensus on an interpretation, the subcommittee shall, in consultation with the submitter and in accordance with Clause C6, create a request for amendment to address the ambiguity of the subject Rule.

Revise Annex C to read:

SN4398

Annex C

Guide to Subcommittee chairs for evaluation of proposals submitted in accordance with Clause C5.4.1 and for evaluation of Subcommittee reports required in accordance with Clause C5.4.5

Note: *This Annex contains the suggested criteria for evaluating the feasibility of proposals for Code amendments and of reports provided by the Subcommittee on these proposals.*

1) The following are the basic principles for evaluating the submitted proposals. When a request is made to amend the Code, the following general criteria should be considered:

- a) improvements to safety;
- b) clarification of the existing wording;
- c) correlation with product Standards requirements;
- d) technological changes; and
- e) ~~correlation with the National Electrical Code, National Building Code of Canada, and other relevant CSA, NFPA, or ULC Standards (CAN/CSA-B72, CSA C22.3 No. 1, CSA C22.3 No. 7, CSA C282, CSA Z32, NFPA 20, CAN/ULC-S524, etc.)~~ correlation with other relevant CSA, NFPA, NRC, IEC, UL, or ULC Codes and Standards

2) The Section Subcommittee that will be deliberating the proposed Code amendment should consider the following measurement points before accepting the submission for deliberation by the Subcommittee:

- a) Does the subject have relevance to the Code?
- b) Are the reasons and supporting information that are required to be submitted with the proposal deemed sufficient to meet all applied measurement points? (Frivolous proposals should not be accepted.)
- c) Does the subject try to do what has already been attempted? It may be necessary to research the topic to find out if it has been dealt with in previous years. If the issue was dealt with at a previous time, it should not be handled again unless there is reason to do so.
- d) For a proposed definition, does the term actually appear in the Code? Is a definition really required or is the terminology used in a dictionary sufficient? Is the definition necessary only in one Section of the Code or should it be in Section 0 (General Section)?
- e) Is it a safety issue? The CE Code is a safety Standard for installation and maintenance only, so convenience or other issues should not qualify for inclusion.
- f) Is the proposal technically sound?
- g) Is the proposal dealing with a very prescriptive method that would exclude other methods of achieving the same desired goal?
- h) Is it consistent with the language of the Code?
- i) Is this Rule enforceable (i.e., it is written in unambiguous language, using indisputable criteria)?

Note: *The Code user must also be able to determine compliance from a visual inspection of the installation on site and without the use of supplementary information or judgment. Rules that, in their wording, require a great deal of judgment on the part of the reader may not be consistently enforced and are a source of conflict and frustration to users of the Code.*

~~j) Is this proposal consistent with the National Electrical Code? If it is not, there should be sufficient reasons provided by the submitter.~~

~~k) i)~~ Is the proposal in conflict with other CSA Standards (i.e., the CE Code, Part II Standards) or other Canadian safety Standards for electrical equipment?

Note: *The CE Code, Part I is not supposed to include CE Code, Part II (product design and construction) or other Canadian safety Standards for electrical equipment requirements, unless it is as an interim measure and is substantiated*

accordingly.

h) ~~k~~ Is the proposal in conflict with other relevant Codes, such as the *National Building Code of Canada*? Is the proposal in conflict with industry-specific Codes such as NFPA Codes that deal with specific occupancies, hazardous locations, Codes of practice (e.g., API), *CE Code, Part III* Standards, etc.?

~~m~~ ~~l~~ If accepted, would this proposal have an impact on already certified products (i.e., would the existing products have to be recertified to meet this new requirement, and is such an approach justifiable)?

~~n~~ ~~m~~ Does the subject impact on other Sections, Tables, and Appendices of the Code? If so, have the potential consequences been reviewed?

~~o~~ ~~n~~ Does the document style conform with CSA editorial requirements (CSA Guidelines)?

~~p~~ ~~o~~ Does the proposal introduce amendments that will require new product Standards or changes to existing product Standards? If so, consideration should be given to including a statement in the proposal that the amendments, if approved, should be suspended until such time that the product requirements are in effect.

3) The following are the basic principles for evaluating the Subcommittee recommendation before reporting it to the Committee on Part I:

a) Is the Subcommittee recommendation understandable and readable?

b) Has the length of the Subcommittee recommendation been reduced to the absolute minimum necessary to convey the intent? It should be noted that the members of the Committee on Part I may not have the time to review long subjects when they come in the form of the Subcommittee recommendation. A suitable one-page summary should be made, especially for lengthy proposals. This would enable members of the Committee on Part I (who are not necessarily technical experts in the specific subject area) to understand the key issues, recommendations, and impacts of the proposal.

c) Has the Subcommittee recommendation expanded to include issues other than that which the original proposal intended to cover? If so, is this expansion of the subject matter justifiable (i.e., it was discussed with the submitter and it is accepted by the submitter) or should it be more appropriately covered by a new subject?

d) Does the Subcommittee recommendation address the issues of the original proposal and satisfy the submitter's intent or does it digress?

Appendix D

Delete Table D3 and replace with new Table:

SN4582
SN4748-8

Table D3

K values* for calculating voltage drop in an installation of 2, 3 or 4 insulated conductors in a cable or raceway based on a conductor operating temperature of 75 °C
(See Appendix B Note to Rule 8-102.)

Size, AWG or kcmil	Copper						Aluminum					
	Cable or Raceway		Cable†		Raceway‡		Cable or Raceway		Cable†		Raceway‡	
	DC	100% pf	90% pf	80% pf	90% pf	80% pf	DC	100% pf	90% pf	80% pf	90% pf	80% pf
14	10.2	10.2	9.92	9.67	10.0	9.67	—	—	—	—	—	—
12	6.38	6.38	6.25	6.10	6.26	6.11	10.5	10.5	10.3	10.0	10.3	9.99
10	4.03	4.03	3.96	3.87	3.96	3.87	6.58	6.58	6.44	6.28	6.45	6.29
8	2.54	2.54	2.50	2.45	2.51	2.45	4.14	4.14	4.07	3.97	4.07	3.98
6	1.59	1.59	1.58	1.55	1.58	1.55	2.62	2.62	2.58	2.52	2.58	2.53
4	1.01	1.01	1.01	0.987	1.01	1.00	1.65	1.65	1.63	1.60	1.64	1.61
3	0.792	0.792	0.797	0.787	0.801	0.792	1.30	1.31	1.30	1.27	1.30	1.28
2	0.626	0.627	0.636	0.629	0.639	0.635	1.04	1.04	1.04	1.02	1.04	1.03
1	0.500	0.500	0.512	0.509	0.516	0.515	0.820	0.820	0.823	0.812	0.827	0.818
1/0	0.395	0.396	0.410	0.409	0.414	0.415	0.651	0.652	0.659	0.652	0.663	0.657
2/0	0.314	0.316	0.331	0.332	0.335	0.338	0.516	0.517	0.526	0.522	0.530	0.528
3/0	0.249	0.251	0.267	0.270	0.271	0.275	0.408	0.409	0.420	0.419	0.424	0.425
4/0	0.197	0.200	0.217	0.221	0.221	0.226	0.326	0.327	0.341	0.341	0.345	0.347
250	0.167	0.171	0.188	0.193	0.192	0.198	0.275	0.277	0.291	0.293	0.295	0.299
300	0.140	0.144	0.162	0.167	0.166	0.172	0.229	0.231	0.247	0.249	0.250	0.255
350	0.120	0.125	0.143	0.148	0.147	0.154	0.196	0.199	0.215	0.218	0.219	0.224
400	0.105	0.111	0.129	0.135	0.133	0.140	0.172	0.175	0.191	0.195	0.195	0.201
500	0.0836	0.0912	0.110	0.116	0.114	0.121	0.138	0.141	0.158	0.163	0.162	0.168
600	0.0697	0.0785	0.0969	0.104	0.101	0.109	0.115	0.119	0.136	0.142	0.140	0.147
750	0.0558	0.0668	0.0850	0.0915	0.0889	0.0970	0.0916	0.0968	0.115	0.121	0.119	0.126
1000	0.0417	0.0558	0.0739	0.0805	0.0778	0.0860	0.0686	0.0758	0.0933	0.0994	0.0973	0.105

* K values in this Table are based on IEC 60287-1-1:2006, Electric cables – Calculation of the current rating – Part 1-1: Current rating equations (100 % load factor) and calculation of losses – General, and IEEE 141-1993, Recommended Practice for Electric Power Distribution for Industrial Plants, pp. 69-100.

† Includes manufactured multi-conductor assemblies.

‡ Random single conductors pulled in raceway or laid flat and touching.

Notes:

- 1) Voltage drop for a known conductor size may be calculated from the Table using the following formula:

$$VD = \frac{K \times I \times L}{1000};$$

When the conductor size is not known, the maximum K factor may be calculated using the following formula:

$$K \leq \frac{VD \times 1000}{I \times L \times f};$$

When the conductor size is known, the maximum cable length may be calculated using the following formula:

$$L \leq \frac{VD \times 1000}{I \times K \times f};$$

The percent voltage drop (VD%) is:

$$VD\% = \frac{VD}{V} \times 100;$$

Where:

V is the connected load voltage at the source;
 VD is the voltage difference between the source and the load expressed in volts;
 K is the Table voltage drop factor in Ohms per circuit kilometre;
 f is the voltage drop factor based on the electrical system and circuit identified in the Voltage Drop Factor Table;
 I is the circuit conductor ampacity in Amperes; and
 L is the length of the circuit conductors in metres.

2) The voltage drop factor (f) shall be determined from the following table*:

Type of electrical system	Type of circuit for electrical load (number of circuit conductors)	Voltage drop factor (f)	Voltage (V)
DC	2-wire, positive-to-negative	2	Positive-to-negative
	2-wire, positive-to-grounded conductor	2	Positive-to-grounded conductor
	2-wire, negative-to-grounded conductor	2	Negative-to-grounded conductor
	3-wire, line-to-line with grounded conductor	2	Line-to-line
1-phase AC	2-wire, line-to-grounded conductor	2	Line-to-grounded conductor
	2-wire, line-to-line	2	Line-to-line
	3-wire, line-to-line, with grounded conductor	2	Line-to-line
3-phase AC	2-wire, line-to-grounded conductor	2	Line-to-grounded conductor
	2-wire, line-to-line, no grounded conductor	2	Line-to-line
	3-wire, line-to-line, with grounded conductor	2	Line-to-line
	3-wire, line-to-grounded conductor	2	Line-to-grounded conductor
	3-wire, line-to-line, no grounded conductor	1.73	Line-to-line
	4-wire, line-to-line, with grounded conductor	1.73	Line-to-line

* Note that the grounded conductor referred to in this table is a circuit grounded conductor (neutral or identified conductor).

3) To determine the voltage drop for conductors having 60 °C and 90 °C operating temperatures, multiply the K value by 0.95 and 1.05, respectively.

4) Notwithstanding Note 3, to determine the voltage drop for extra-low voltage power circuits in which the load does not exceed two-thirds of the ampacity of copper conductors in the 60 °C column of Table 2, multiply the K value by 0.86.

Delete Table D4:

SN4748-46

Table D4
Copper conductor sizes for 5% drop in voltage on 6 V — Two conductors
[See Appendix B Note to Rule 46-306 1].]

Current, A	One-way distance from power source measured along the conductor, m (calculated for conductor temperature of 20 °C)				
	No. 12 AWG	No. 10 AWG	No. 8 AWG	No. 6 AWG	No. 4 AWG
2-1/2	11.5	18.3	28.5	49.4	72.2
4-1/4	6.8	10.8	16.8	26.7	42.5
7	4.1	6.5	10.2	16.2	25.8
10	2.9	4.6	7.1	11.3	18.0
12	2.4	3.8	5.9	9.5	15.0
15	1.9	3.1	4.8	7.6	12.0
20	1.4	2.3	3.6	5.7	9.0

Note: Acceptable one-way distance in metres (L) for a selected conductor wire size may be calculated using the following formula where one or all of the actual current (I), the actual voltage (V), and the actual voltage drop permitted (P) differ from Table D4:

$$L = \frac{V}{6} \times \frac{P}{5} \times \frac{I_t}{I} \times L_t$$

where

I_t = current shown in Table D4 closest to the actual current (I)

L_t = one-way distance in metres shown in Table D4 corresponding to the conductor size used for the value I_t selected

Example: System characteristics

$V = 12 \text{ V}$

$P = 7\%$

$I = 3 \text{ A}$

Wire size = No. 12 AWG

Values of I_t and L_t to be used in the calculation are

$I_t = 2.5 \text{ A}$

$L_t = 11.5 \text{ m}$

$$L = \frac{12}{6} \times \frac{7}{5} \times \frac{2.5}{3} \times 11.5 = 26.8 \text{ m}$$

Delete all occurrences of the word "allowable" in Tables D3, D8A, D8B, D9A, D9B, D10A, D10B, D11A, and D11B.

SN4628-4

Revise heading of Table D16, column 2 to read:

SN4628-28

Minimum ~~allowable~~ ampacity of insulated conductor, A

Revise Item 8 and dagger note in Table D17 as shown:

SN4601

Table D17
Conditions of use for Tables D17A to D17N*††
(See Rule 4-004.)

Item	Characteristic	Condition
"	No change to items 1 to 7	
"		
8	Insulated conductor or cable shield, ground <u>bonding</u> and armour bonding†	Both ends of e
"	No change to items 9 to 18	
"		

"

"

† It is assumed that insulated conductor shields, ~~ground~~ bonding conductors, and armour (present) are grounded at more than one point. The ampacities in the D17 series of Table have been adjusted to take into consideration the heating due to shield, ~~ground~~ bonding conductors and armour circulating currents.

"

"

"

Notes not shown are unchanged

Delete all occurrences of the phrase "maximum insulated conductor" in Table D17.

SN4628-4

Delete all occurrences of the word "Allowable" in Tables D17A through D17N.

SN4628-4

Appendix I

Add the following entry to Appendix I:

SN4713

Rule 4-004 7)b)iii)

Question: Does the requirement of paragraph 4-004 7)b)iii) apply to 4 conductors described in Subrule 4-004 3)?

Answer: No

Add the following entry to Appendix I:

SN4734

Rule 8-106 11)

Question: Do conditions listed in Subrule 8-106 11), allow to disregard electrical vehicle supply equipment loads connected to the distribution system panelboards, including the consumer's service, if an electric vehicle energy management system, described in Subrule 10) performs the functions of

(a) monitoring the consumer's service, feeders, and branch circuits; and

(b) controlling these electric vehicle supply equipment loads in accordance with Rule 8-500?

Answer: Yes

Add the following entry to Appendix I:

SN4767

Rule 8-200 1) a) vii)

Question: Is calculation of an electric storage tank water heater load included in Rule 8-200(1)(a)(vii) of the CE Code?

Answer: Yes

Add the following entry to Appendix I:

SN4768

Rule 8-202 1) a) viii)

Question: Is calculation of an electric storage tank water heater load included in Rule 8-202(1)(a)(viii) of the CE Code?

Answer: Yes

Add the following entry to Appendix I:

SN4727

<p><u>Rule 10-118</u></p> <p><u>Question:</u> Where the consumer service conductors incorporate a bonding conductor, and the supply authority has made provision for termination of this bonding conductor, is a grounding conductor connection, to the grounded conductor supplied by the supply authority, as described in Rule 10-210 required?</p> <p><u>Answer:</u> Yes</p>	
<p><i>Add the following entry to Appendix I:</i></p> <p><u>Rule 10-210</u></p> <p><u>Question:</u> Based on the definition of consumers service in Section 0, is it permissible to connect the grounding conductor required by Rule 10-210 a) at the point where connection is made between the supply service and consumer service?</p> <p><u>Answer:</u> Yes</p>	SN4726
<p><i>Add the following entry to Appendix I:</i></p> <p><u>Rule 10-210 c)</u></p> <p><u>Question:</u> Is it permissible to connect the grounded conductor of a solidly grounded ac system supplied by the supply authority, to the grounding conductor required by Rule 10-210 a) within the transition box that is permissible by Rule 6-310 a)?</p> <p><u>Answer:</u> Yes</p>	SN4721
<p><i>Add the following entry to Appendix I:</i></p> <p><u>Rule 10-708 2)</u></p> <p><u>Question:</u> With regards to Rule 10-708 2), can a person run a #10AWG equipotential bonding conductor in the walls where it is concealed and has mechanical protection provided by location?</p> <p><u>Answer:</u> Yes</p>	SN4676
<p><i>Add the following entry to Appendix I:</i></p> <p><u>Rule 62-102</u></p> <p><u>Question:</u> Is a storage-tank water heater considered a heating device?</p> <p><u>Answer:</u> Yes</p>	SN4691

<p><i>Add the following entry to Appendix I:</i></p> <p><u>Rule 68-058</u></p> <p><u>Question:</u> Does the rebar for a small pad on which a moveable Hot Tub is intended to be set and connected require bonding in accordance with Rule 68-058?</p> <p><u>Answer:</u> No</p>	SN4614A
<p><i>Add the following entry to Appendix I:</i></p> <p><u>Rule 68-058</u></p> <p><u>Question:</u> Does the rebar for a large pad/patio on which a moveable Hot Tub is intended to be set and connected require bonding in accordance with Rule 68-058?</p> <p><u>Answer:</u> No</p>	SN4614B
<p><i>Add the following entry to Appendix I:</i></p> <p><u>Rule 68-058</u></p> <p><u>Question:</u> Does the rebar for a patio from which people access a moveable Hot Tub located on the adjacent earth require bonding in accordance with Rule 68-058?</p> <p><u>Answer:</u> No</p>	SN4614C

Appendix J, Annex J18

Add new entries to Rule J18-002 to read:

J18-002 Special terminology (see Annex JB)

In this Section, the following definitions shall apply:

Dust-protected enclosure – an enclosure where the ingress of dust is not totally excluded, but where dust is unlikely to enter in sufficient quantity to interfere with the safe operation of the equipment and does not accumulate within the enclosure where it is liable to cause an ignition hazard.

Non-incendive circuit — a circuit in which any spark or thermal effect that may occur under normal operating conditions or due to opening, shorting, or grounding of field wiring is incapable of causing an ignition of the prescribed flammable gas or vapour.

Uninterrupted conduit run - that portion of a conduit run which may only include couplings with NPT threads.

SN4565-J18
SN4749-J18
SN4787-J18

Revise Rule J18-072 to read:

J18-072 Bonding in hazardous locations

- 1) Exposed non-current-carrying metal parts of electrical equipment, including the frames or metal exteriors of motors and generators, fixed or portable luminaires or other utilization equipment, luminaires, cabinets, cases, and conduit, shall be bonded to ground using
 - a) bonding conductors sized in accordance with Rule 10-616; or
 - b) rigid metal conduit with threaded couplings and threaded bosses on enclosures with joints made up tight.
- 2) Notwithstanding Subrule 1), where raceways or cables incorporate an internal bonding conductor, box connectors with standard locknuts shall be permitted to bond the metallic armour or raceway.

SN4791-J18

Add new Rule J18-076 to read:

J18-076 Threaded joints (see Annex JB)

- 1) Threaded joints that are required to be explosion-proof, flameproof “d”, or flameproof “db” shall be permitted to be either tapered or straight and shall comply with the following:
 - a) tapered threads shall have at least 4-1/2 fully engaged threads, and running threads shall not be used; and
 - b) metric straight threads shall have a class-of-fit 6g/6H or better and at least 5 fully engaged threads.
- 2) Where thread forms differ between the equipment and the wiring system, suitable adapters shall be used.

SN4760-J18

<p><i>Revise Rule J18-106 to read:</i></p> <p>J18-106 Wiring methods, Class I, Division 1 (see Annex JB)</p> <p>1) The wiring method shall be</p> <p>a) threaded rigid metal conduit with explosion-proof fittings; or</p> <p>b) hazardous location cables with associated cable glands suitable for the application.</p> <p>2) Explosion-proof boxes, fittings, and joints shall be threaded for connection to conduit and cable glands.</p> <p>3) Threaded joints shall have at least 5 fully engaged threads, and running threads shall not be used.</p> <p>3)4 Cables shall be installed and supported so as to avoid tensile stress at the cable glands.</p> <p>4)5 Where it is necessary to use flexible connections at motor <u>and generator</u> terminals and similar places, flexible fittings of the explosion-proof type shall be used.</p> <p>5)6 Notwithstanding Subrules 1) to 5), intrinsically safe equipment and associated circuits designed and installed as intrinsically safe “i” or “ia” shall be permitted as specified in Rule J18-066.</p>	<p>SN4760-J18 SN4791-J18</p>
<p><i>Revise Rule J18-108 to read:</i></p> <p>J18-108 Sealing, Class I, Division 1 (see Annex JB)</p> <p>1) Explosion seals shall be provided in conduit systems where the conduit <u>enters an explosion-proof enclosure that</u></p> <p>a) enters an explosion-proof enclosure that contains devices which produce ignition-capable arcs or temperatures; or</p> <p>b) <u>the conduit</u> is 53 trade size or larger.</p> <p><u>2) Notwithstanding Subrule 1), an explosion seal shall not be required for an explosion-proof enclosure where</u></p> <p><u>a) the enclosure is marked “Factory Sealed” or “Seal Not Required”; and</u></p> <p><u>b) the conduit is smaller than 53 trade size.</u></p> <p>23 Where conduit explosion seals are required for an enclosure, they shall be located as close as practicable to the enclosure, or as marked on the enclosure, but not farther than</p> <p>a) 450 mm from the enclosure; and</p> <p>b) 50 mm from the enclosure for field drilled entries.</p> <p>34 Where a conduit run crosses a Class I, Division 1 boundary and terminates in the Division 1 area,</p> <p>a) an explosion seal shall be installed in the conduit run</p> <p>i) within the Division 1 location; or</p> <p>ii) no more than 1 m external to the Division 1 boundary; and</p> <p>b) the conduit run there shall be <u>an</u> uninterrupted <u>conduit run</u> between the explosion seal and the point</p> <p>i) of termination within the Division 1 location; and</p> <p>ii) at which the conduit crosses the Division 1 boundary.</p>	<p>SN4749-J18</p>

<p>45) Where a conduit run passes through a Class I, Division 1 area without termination, it shall not require an explosion <u>or flammable fluid migration</u> seal, provided that</p> <p>a) the conduit run is <u>an</u> uninterrupted <u>conduit run</u> within the Division 1 area; and</p> <p>b) the termination points of the conduit are in a non-hazardous location.</p> <p>5) In Subrules 3) and 4), an uninterrupted conduit run is that portion of a conduit run which</p> <p>a) except as provided for in Item b), shall not have any equipment, box, fitting, union, tee, or similar device installed; and</p> <p>b) shall be permitted to have conduit couplings with NPT threads installed.</p> <p>6) Only explosion-proof unions, reducers, and elbows that are not larger than the trade size of the conduit shall be permitted between the explosion seal and an explosion-proof enclosure.</p> <p>7) A flammable fluid migration seal shall be provided where a cable first terminates after entering the Division 1 area.</p> <p>8) Explosion seals shall be provided in a cable system where the cable enters an enclosure that is required to be explosion-proof <u>enclosure</u>.</p> <p>9) Runs of cables, each having a continuous sheath, either metal or non-metal, shall be permitted to pass through a Class I, Division 1 location without seals.</p>	
<p><i>Revise Rule J18-114 to read:</i></p> <p>J18-114 Motors and generators, Class I, Division 1</p> <p>Motors <u>and</u>, generators, and other rotating electrical machines shall comply with the requirements of Rule J18-100.</p>	SN4791-J18
<p><i>Revise Subrules J18-150 1) and 2) to read:</i></p> <p>J18-150 Equipment in Class I, Division 2 locations (see Annex JB)</p> <p>1) <u>Electrical</u> Equipment installed in a Class I, Division 2 location shall be in accordance with Table 18.</p> <p>2) Notwithstanding Subrule 1) and Rule J18-052, the following shall be permitted:</p> <p>a) transformers, solenoids, coils, and similar electromagnetic devices <u>equipment that complies</u> comply with the requirements of Rule J18-054 <u>and is any of the following:</u></p> <p>i) <u>inductive devices, including transformers, solenoids, coils and similar equipment;</u></p> <p>ii) <u>capacitors that do not have integral fuses; or</u></p> <p>iii) <u>devices used for instrumentation and measurement purposes, including thermocouples, resistance temperature detectors (RTDs), piezoelectric pressure transducers and accelerometers, resistive strain gauges, passive RFID (radio frequency identification) tags and similar equipment;</u></p> <p>b) conduit and cables as specified in Rule J18-152 1);</p> <p>c) equipment that is installed in a Type 4 or 4X enclosure, or an IP65 or higher enclosure, and is</p> <p>i) non-sparking in normal operation;</p>	SN4638-J18 SN4791-J18

<ul style="list-style-type: none"> ii) not used for heating purposes; and iii) not otherwise provided for in Subrule 2); d) fuses, where they are used for <ul style="list-style-type: none"> i) the protection of equipment subject to overload during normal operation and are <ul style="list-style-type: none"> A) of the current-limiting, non-indicating, filled type; or B) of the current-limiting, indicating, filled type constructed in a manner such that the blown fuse indication does not cause the fuse body to be penetrated; or ii) short-circuit protection only; or e) motors, <u>and</u> generators, and other rotating electrical machines of the open or non-explosion-proof type that <ul style="list-style-type: none"> i) except as permitted by Subrule 3) or 4), do not incorporate arcing, sparking, or heat producing components; or ii) incorporate arcing, sparking, or heat-producing components that comply with the requirements of Rule J18-100. 	
<p><i>Revise Subrule J18-152 to read:</i></p> <p>J18-152 Wiring methods, Class I, Division 2 (see Annex JB)</p> <p>1) The wiring method shall be</p> <ul style="list-style-type: none"> a) threaded <u>rigid</u> metal conduit; b) hazardous location cables; c) <u>Tray cables in accordance with Rule 12-102 3);</u> Type TC cable, installed in cable tray in accordance with Rule 12-2202; d) <u>armoured and metallic sheathed cables with an overall jacket in accordance with Rule 12-102 3);</u> armoured cable with overall non-metallic jacket, such as TECK90, ACWU90, copper sheathed RC90, or aluminum sheath RA90; e) armoured fire alarm and signal cable, such as FAS, FAS90, FAS105, FAS150, and FAS200; <u>e) Non-armoured control and instrumentation cable (CIC), and non-armoured fire alarm and signal cables (FAS), provided that</u> <ul style="list-style-type: none"> <u>i) the installation is in cable tray in accordance with Rule 12-2202 3);</u> <u>ii) the voltage rating of the cable is not less than 300 V;</u> <u>iii) the circuit voltage is 150 V or less; and</u> <u>iv) the circuit current is 5 A or less;</u> f) control and instrumentation cables with an interlocking metallic armour and a continuous jacket in control circuits (Type ACIC); g) Type CIC cable (non-armoured control and instrumentation cable) installed in cable tray in accordance with the installation requirements of Rule 12-2202 2), where <ul style="list-style-type: none"> i) the voltage rating of the cable is not less than 300 V; ii) the circuit voltage is 150 V or less; and iii) the circuit current is 5 A or less; 	<p>SN4745-J18 SN4760-J18</p>

<p>f)h) rigid RTRC conduit Type XW, provided that</p> <ul style="list-style-type: none"> i) associated boxes, fittings, and joints are marked with the suffix “-XW”; and ii) installation is performed in industrial establishments that are not accessible to the public and where only qualified persons service the installation; <p>g)h) intrinsically safe or non-incendive wiring circuits installed in accordance with Rule J18-066; or</p> <p>h)j) liquid-tight flexible metal conduit and connectors, marked for heavy duty.</p> <p>2) Explosion-proof, flameproof “d”, or flameproof “db” boxes, fittings, and joints shall be threaded for connection to conduit and cable glands.</p> <p>3) Threaded joints that are required to be explosion-proof, flameproof “d”, or flameproof “db” shall be permitted to be either tapered or straight and shall comply with the following:</p> <ul style="list-style-type: none"> a) tapered threads shall have at least 5 fully engaged threads, and running threads shall not be used; b) where straight threads are used in Groups IIA and IIB atmospheres, they shall have at least 5 fully engaged threads; and c) where straight threads are used in Group IIC atmospheres, they shall have at least 8 fully engaged threads. <p>4) Where thread forms differ between the equipment and the wiring system, adapters in accordance with Rule J18-150 shall be used.</p> <p>3)5) Cables shall be installed and supported so as to avoid tensile stress at the cable glands.</p> <p>4)6) Boxes, fittings, and joints need not be explosion-proof, flameproof “d”, or flameproof “db”, except as required by the Rules in this Section.</p> <p>5)7) Cable glands shall be compatible with the degree of ingress protection and explosion protection provided by the enclosure that the cable enters, where the area classification and environmental conditions require these degrees of protection.</p>	
<p><i>Revise Subrule J18-154 to read:</i></p> <p>J18-154 Sealing, Class I, Division 2 (see Annex JB)</p> <p>1) Explosion seals shall be provided in conduit systems where the conduit enters an enclosure that is required to be explosion-proof, flameproof “d”, or flameproof “db” <u>enclosure that contains devices which produce ignition-capable arcs or temperatures</u>, and the seals shall be located as close as practicable to the enclosure, or as marked on the enclosure, but not farther than</p> <ul style="list-style-type: none"> a) 450 mm from the enclosure; and b) 50 mm from the enclosure for field-drilled entries. <p>2) Flammable fluid migration seals for conduit shall be installed where</p> <ul style="list-style-type: none"> a) the conduit leaves the Class I, Division 2 location with <u>an uninterrupted conduit</u> no box, coupling, or fitting in the conduit run between the seal and the point at which the conduit leaves the location, except that a rigid <u>uninterrupted</u> 	<p>SN4749-J18</p>

<p>unbroken conduit <u>run</u> that passes completely through a Class I, Division 2 area, <u>up to with no fittings less than 300 mm 1 m</u> beyond each boundary, need not <u>shall not be required to</u> be sealed, provided that the <u>all</u> termination points of the unbroken conduit are in non-hazardous areas; or</p> <p>b) the conduit leaves a Class I, Division 2 location outdoors, in which case the seal shall be permitted to be located more than 300 mm <u>1 m</u> beyond the Class I, Division 2 boundary, provided that</p> <p>i) it is located on the conduit before the conduit enters an enclosure or building<u>the seal and conduit are located outdoors; and</u></p> <p>ii) an uninterrupted conduit run is used.</p> <p>3) Only explosion-proof, <u>flameproof “d”, or flameproof “db”</u> unions, couplings, reducers, and elbows that are not larger than the trade size of the conduit shall be permitted between the sealing fitting and an explosion-proof, <u>flameproof “d”, or flameproof “db”</u> enclosure.</p> <p>4) An explosion seal shall be provided in a cable <u>or conduit</u> system where the cable that enters an enclosure that which</p> <p><u>a) is required to be explosion-proof, flameproof “d”, or flameproof “db”;</u></p> <p><u>b) contains devices which produce ignition-capable arcs or temperatures in normal operation; and</u></p> <p><u>c) is not marked “Factory Sealed” or “Seal Not Required”.</u></p> <p>5) Where <u>an explosion seal is installed in a conduit system to provide explosion protection, the wiring method between the seal and the enclosure shall be compatible with the degree of protection provided by the enclosure in accordance</u> run of conduit enters an enclosure that is required to be explosion-proof, flameproof “d”, or flameproof “db”, every part of the conduit from the explosion seal to that enclosure shall comply with Rule J18-106.</p> <p>6) Runs of cables, each having a continuous sheath, either metal or non-metal, shall be permitted to pass through a Class I, Division 2 location without seals.</p>	
<p><i>Delete Rule J18-208:</i></p> <p>J18-208 Switches, controllers, circuit breakers and fuses, Class II, Division 1 Switches, controllers, circuit breakers, and fuses, including pushbuttons, relays, and similar devices, shall be provided with a dust tight enclosure marked for use in Class II locations.</p>	SN4788-J18
<p><i>Delete Rule J18-210:</i></p> <p>J18-210 Control transformers and resistors, Class II, Division 1 Transformers, impedance coils, and resistors used as or or in conjunction with control equipment for motors, generators, or electric appliances, and the overcurrent devices or switching mechanisms, if any, associated with them, shall be provided in dust tight enclosures marked for use in Class II locations.</p>	SN4788-J18
<p><i>Delete Rule J18-212:</i></p>	SN4788-J18 SN4791-J18

<p>J18-212 Motors and generators, Class II, Division 1 (see Annex JB) Motors, generators, and other rotating electrical machines shall be marked for use in Class II locations.</p>	
<p><i>Revise Rule J18-214 to read:</i></p> <p>J18-214 Ventilating pipes, Class II, Division 1 (see Annex JB) 1) Every vent pipe for a motor <u>and</u>, generator, or other rotating electrical machine or for enclosures for electrical apparatus or equipment shall a) be of metal not less than 0.52 mm (No. 24 MSG) thick or of an equally substantial non-combustible material; b) lead directly to a source of clean air outside a building; c) be screened at the outer end to prevent the entrance of small animals or birds; and d) be protected against mechanical damage and corrosion. 2) Every vent pipe and its connection to a motor, <u>generator</u> or to an <u>dust-tight</u> enclosure for other equipment or apparatus shall be dust-tight <u>dust tight</u> throughout its entire length. 3) The seams and joints of every metal vent pipe shall be a) riveted and soldered; b) bolted and soldered; c) welded; or d) rendered dust-tight by some other equally effective means. <u>34)</u> No exhaust pipe shall discharge inside a building.</p>	<p>SN4788-J18 SN4791-J18</p>
<p><i>Delete Rule J18-216:</i></p> <p>J18-216 Utilization equipment, fixed and portable, Class II, Division 1 Utilization equipment, fixed and portable, including electrically heated and motor-driven equipment shall be marked for use in Class II locations.</p>	<p>SN4788-J18</p>
<p><i>Delete Rule J18-222:</i></p> <p>J18-222 Receptacle and attachment plugs, Class II, Division 1 Receptacles and attachment plugs shall be approved for Class II locations.</p>	<p>SN4788-J18</p>
<p><i>Delete Rule J18-224:</i></p> <p>J18-224 Signal, alarm, remote control, and communication systems, meters, instruments and relays, Class II Division 1 Signal, alarm, remote control, and communication systems, meters, instruments, and relays shall conform to the following: a) All apparatus and equipment shall be provided with enclosures marked for use in Class II locations, except that i. Devices that carry or interrupt only a voice current shall not be required to be provided with such enclosures; and ii. Current-breaking contacts that are immersed in oil or enclosed in a chamber sealed against the entrance of dust shall be permitted to be</p>	<p>SN4788-J18</p>

<p>provided with a general-purpose enclosure if the prevailing dust is electrically non-conductive; and</p> <p>b) All wiring shall comply with Rules J18-204 and J18-206</p>	
<p><i>Revise Rule J18-250 to read:</i></p> <p>J18-250 Equipment in Class II, Division 2 hazardous locations</p> <p><u>1) Equipment installed in a Class II, Division 2 location shall be in accordance with Table 18.</u></p> <p><u>2) Notwithstanding Subrule 1, where installed in dust-protected enclosures, the following equipment shall be permitted:</u></p> <p><u>a) Switches, motor controllers, circuit breakers, fuses, meters, instruments, relays, transformers, impedance coils, resistors; and</u></p> <p><u>b) Signal, alarm, remote control, and communications systems.</u></p>	SN4787-J18
<p><i>Revise Rule J18-254 to read:</i></p> <p>J18-254 Wiring methods, Class II, Division 2 (see Annex JB)</p> <p>1) The wiring method shall be</p> <p>a) threaded <u>rigid</u> metal conduit;</p> <p>b) hazardous location cables;</p> <p>c) <u>Tray cables in accordance with Rule 12-102 3);</u> Type TC cable installed in cable tray in accordance with Rule 12-2202 and enclosed in rigid conduit or another acceptable wiring method wherever it leaves the cable tray;</p> <p>d) <u>armoured and metallic sheathed cables with an overall jacket in accordance with Rule 12-102 3);</u> armoured cable with overall non-metallic jacket, such as TECK90, ACWU90, copper sheathed RC90, or aluminum sheathed RA90;</p> <p>e) armoured fire alarm and signal cable, such as FAS, FAS90, FAS105, FAS150, and FAS200;</p> <p>e) <u>Non-armoured control and instrumentation cable (CIC), and non-armoured fire alarm and signal cables (FAS), provided that</u></p> <p><u>i) the installation is in cable tray in accordance with 12-2202 3);</u></p> <p><u>ii) the voltage rating of the cable is not less than 300 V;</u></p> <p><u>iii) the circuit voltage is 150 V or less; and</u></p> <p><u>iv) the circuit current is 5 A or less;</u></p> <p>f) control and instrumentation cables with an interlocking metallic armour and a continuous jacket in control circuits (Type ACIC);</p> <p>g) Type CIC cable (non-armoured control and instrumentation cable) installed in cable tray in accordance with the installation requirements of Rule 12-2202 2), where</p> <p>i) the voltage rating of the cable is not less than 300 V;</p> <p>ii) the circuit voltage is 150 V or less; and</p> <p>iii) the circuit current is 5 A or less;</p>	SN4745-J18 SN4760-J18 SN4787-J18

<p>f)h) rigid RTRC conduit Type XW, provided that</p> <ul style="list-style-type: none"> i) associated boxes, fittings, and joints are marked with the suffix “-XW”; and ii) installation is performed in industrial establishments that are not accessible to the public and where only qualified persons service the installation; or <p>g)h) liquid-tight flexible metal conduit and connectors, marked for heavy duty.</p> <p>2) Boxes and fittings in which taps, joints, or terminal connections are made shall be <u>dust-protected</u>. either an Enclosure Type 4 or 5, or</p> <ul style="list-style-type: none"> a) be provided with telescoping or close-fitting covers or with other effective means to prevent the escape of sparks or burning material; and b) have no openings, such as holes for attachment screws, through which, after installation, sparks or burning material might escape, or through which exterior accumulations of dust or adjacent combustible material might be ignited. <p>3) Cables shall be installed and supported so as to avoid tensile stress at the cable glands.</p> <p>4) Where it is necessary to use flexible connections, the provisions of Rule J18-204</p> <p>4) a) and c) and 5) shall apply.</p>	
<p><i>Delete Rule J18-258:</i></p> <p>J18-258 Switches, controllers, circuit breakers, and fuses, Class II, Division 2</p> <p>Enclosures for switches, motor controllers, circuit breakers, and fuses, including push buttons, relays, and similar devices, shall be either an Enclosure Type 4 or 5, or</p> <ul style="list-style-type: none"> a) be provided with telescoping or close-fitting covers or with other effective means to prevent the escape of sparks or burning material; and b) have no openings, such as holes for attachment screws, through which, after installation, sparks or burning material might escape, or through which exterior accumulations of dust or adjacent combustible material might be ignited. 	<p>SN4787-J18 SN4788-J18</p>
<p><i>Delete Rule J18-260:</i></p> <p>J18-260 Control transformers and resistors, Class II, Division 2</p> <ul style="list-style-type: none"> 1) Switching mechanisms, including overcurrent devices, used in conjunction with control transformers, impedance coils, and resistors shall be provided with enclosures conforming to Rule J18-258. 2) Where not located in the same enclosure with switching mechanisms, control transformers and impedance coils shall be provided with tight housings without ventilating openings. 3) Resistors and resistance devices shall have dust-tight enclosures marked for use in Class II locations, except that where the maximum normal operating temperature of the resistor will not exceed 120 °C, non-adjustable resistors and resistors that are part of an automatically timed starting sequence may have enclosures conforming to Subrule 2). 	<p>SN4787-J18 SN4788-J18</p>
<p><i>Revise Rule J18-262 to read:</i></p>	<p>SN4791-J18</p>

<p>J18-262 Motors and generators, Class II, Division 2 (see Annex JB)</p> <p>1) Except as provided for in Subrule 2), motors <u>and</u>, generators, and other rotating electrical machinery shall be</p> <ul style="list-style-type: none"> a) marked for use in Class II or Class II, Division 2 locations; or b) ordinary totally enclosed pipe-ventilated or totally enclosed fan-cooled, subject to the following: <ul style="list-style-type: none"> i) equipped with integral overheating protection in accordance with Rule 28-314; and ii) if drain holes or other openings are provided, they shall be closed with threaded plugs. <p>2) Where accumulations of non-conductive, non-abrasive combustible dust are or will be moderate and if machines can be easily reached for routine cleaning and maintenance, the following shall be permitted to be installed:</p> <ul style="list-style-type: none"> a) standard open-type <u>motors and generators</u> without sliding contacts, centrifugal or other types of switching mechanisms (including motor overcurrent, overload, and overtemperature devices), or integral resistance devices; b) standard open-type machines with such contacts, switching mechanisms, or resistance devices enclosed within dust-tight housings without ventilating or other openings; and c) self-cleaning textile motors of the squirrel-cage type. 	
<p><i>Revise Rule J18-264 to read:</i></p> <p>J18-264 Ventilation pipes, Class II, Division 2 (see Annex JB)</p> <p>1) Vent pipes for motors <u>and</u>, generators, or other rotating electrical machinery, or for enclosures for electrical apparatus or equipment, shall conform to Rule J18-214 1).</p> <p>2) Vent pipes and their connections shall be sufficiently tight to prevent the entrance of appreciable quantities of dust into the ventilated equipment or enclosure, and to prevent the escape of sparks, flame, or burning material that might ignite accumulations of dust or combustible material in the vicinity.</p> <p>3) Where metal vent pipes are used, lock seams and riveted or welded joints shall be permitted to be used and, where some flexibility is necessary, for example at connections to motors, tight-fitting slip joints shall be permitted to be used.</p>	SN4791-J18
<p><i>Delete Rule J18-266:</i></p> <p>J18-266 Utilization equipment, fixed and portable, Class II, Division 2</p> <p>1) Electrically heated utilization equipment, whether fixed or portable, shall be marked for use in Class II locations.</p> <p>2) Motors of motor-driven utilization equipment shall conform to Rule J18-262.</p> <p>3) The enclosure for switches, circuit breakers, and fuses shall conform to Rule J18-258.</p> <p>4) Transformers, impedance coils, and resistors forming part of or used in connection with utilization equipment shall conform to Rule J18-260 2) and 3).</p>	SN4788-J18
<p><i>Delete Rule J18-274:</i></p>	SN4787-J18 SN4788-J18

<p>J18-274 Signal, alarm, remote control, and communication systems, meters, instruments, and relays, Class II, Division 2 Signal, alarm, remote control, and communications systems, meters, instruments, and relays shall conform to the following: a) contacts that interrupt other than voice currents shall be enclosed in conformity with Rule J18-258; b) the windings and terminal connections of transformers and choke coils that may carry other than voice currents shall be provided with tight enclosures without ventilating openings; and c) resistors, resistance devices, thermionic tubes, and rectifiers that may carry other than voice currents shall be provided with Class II dust-tight enclosures, except that where the maximum normal operating temperature of thermionic tubes, non-adjustable resistors, or rectifiers will not exceed 120 °C, such devices shall be permitted to have tight enclosures without ventilating openings.</p>	
<p><i>Revise Rule J18-300 to read:</i></p> <p>J18-300 Equipment in Class III, Division 1 hazardous locations <u>1) Equipment installed in a Class III, Division 1 location shall be in accordance with Table 18.</u> <u>2) Notwithstanding Subrule 1), where installed in dust-protected enclosures, the following equipment shall be permitted:</u> a) <u>Switches, motor controllers, circuit breakers, fuses, meters, instruments, relays, transformers, impedance coils, resistors; and</u> b) <u>Signal, alarm, remote control, and communications systems.</u></p>	SN4787-J18
<p><i>Revise Subrule J18-304 1) to read:</i></p> <p>J18-304 Wiring methods, Class III, Division 1 (see Annex JB) 1) The wiring method shall be a) threaded rigid metal conduit; b) hazardous location cables; c) electrical metallic tubing; <u>d) armoured and metallic sheathed cables with an overall jacket in accordance with Rule 12-102 3); or</u> d) armoured cable with overall non-metallic jacket, such as TECK90, ACWU90, copper-sheathed RC90, or aluminum-sheathed RA90; e) armoured fire alarm and signal cable, such as FAS, FAS90, FAS105, FAS150, and FAS200; f) control and instrumentation cables with an interlocking metallic armour and a continuous jacket in control circuits (Type ACIC); or <u>e)g) liquid-tight flexible metal conduit and connectors, marked for heavy duty.</u></p>	SN4745-J18 SN4787-J18

<p>2) Boxes and fittings in which taps, joints, or terminal connections are made shall be <u>dust-protected</u>, either an Enclosure Type 5 or shall a) be provided with telescoping or close-fitting covers or with other effective means to prevent the escape of sparks or burning material; and b) have no openings, such as holes for attachment screws, through which, after installation, sparks or burning material might escape, or through which adjacent combustible material might be ignited.</p> <p>3) Cables shall be installed and supported so as to avoid tensile stress at the cable glands.</p> <p>4) Where it is necessary to use flexible connections, the provisions of Rule J18-204 4) a) and c) and 5) shall apply.</p>	
<p><i>Delete Rule J18-306:</i></p> <p>J18-306 Switches, controllers, circuit breakers, and fuses, Class III, Division 4 Enclosures for switches, motor controllers, circuit breakers, and fuses, including push buttons, relays, and similar devices, shall be either an Enclosure Type 5 or shall be tight enclosures designed to minimize entrance of fibres and flyings, and shall a) be provided with telescoping or close-fitting covers or with other effective means to prevent the escape of sparks or burning material; and b) have no openings, such as holes for attachment screws, through which, after installation, sparks or burning material might escape, or through which exterior accumulations of fibres or flyings or adjacent combustible material might be ignited.</p>	<p>SN4787-J18 SN4788-J18</p>
<p><i>Delete Rule J18-308:</i></p> <p>J18-308 Control transformers and resistors, Class III, Division 4 Transformers, impedance coils, and resistors used as or in conjunction with control equipment for motors, generators, and appliances shall conform to Rule J18-260, with the exception that, when these devices are in the same enclosure with switching devices of such control equipment and are used only for starting or short-time duty, the enclosure shall conform to the requirements of Rule J18-306.</p>	<p>SN4787-J18 SN4788-J18</p>
<p><i>Revise Rule J18-310 to read:</i></p> <p>J18-310 Motors and generators, Class III, Division 1 1) Except as provided for in Subrule 2), motors, <u>and</u> generators, and other rotating electrical machinery shall be a) totally enclosed non-ventilated; b) totally enclosed pipe-ventilated; or c) totally enclosed fan-cooled.</p> <p>2) Where only moderate accumulations of lint and flyings are likely to collect on, or in the vicinity of, a rotating electrical machine and the machine is readily accessible for routine cleaning and maintenance, it shall be permissible to install the following in the location: a) standard open-type machines without sliding contacts or centrifugal or other</p>	<p>SN4791-J18</p>

<p>types of switching mechanisms, including motor overload devices;</p> <p>b) standard open-type machines that have contacts, switching mechanisms, or resistance devices enclosed within tight housings without ventilating or other openings; or</p> <p>c) self-cleaning textile motors of the squirrel-cage type.</p> <p>3) Motors <u>and</u>, generators, or other rotating electrical machinery of the partially enclosed or splash-proof type shall not be installed in Class III locations.</p>	
<p><i>Revise Subrule J18-312 1) to read:</i></p> <p>J18-312 Ventilating pipes, Class III, Division 1 (see Annex JB)</p> <p>1) Vent pipes for motors <u>and</u>, generators, or other rotating electrical machinery or for enclosures for electrical apparatus or equipment shall conform to Rule J18-214 1).</p>	SN4791-J18
<p><i>Delete Rule J18-314:</i></p> <p>J18-314 Utilization equipment, fixed and portable, Class III, Division 1</p> <p>1) Electrically heated utilization equipment, whether fixed or portable, shall be marked for use in Class III locations.</p> <p>2) Motors of motor-driven utilization equipment shall conform to Rule J18-310.</p> <p>3) The enclosures for switches, motor controllers, circuit breakers, and fuses shall conform to Rule J18-306.</p>	SN4787-J18 SN4788-J18
<p><i>Delete Rule J18-322:</i></p> <p>J18-322 Signal, alarm, remote control, and communication systems, Class III, Division 1</p> <p>Signal, alarm, remote control, and communication systems shall comply with Rule J18-274.</p>	SN4787-J18
<p><i>Delete Item J18-324 d) to read:</i></p> <p>J18-324 Electric cranes, hoists, and similar equipment, Class III, Division 1</p> <p>Where installed for operation over combustible fibres or accumulations of flyings, travelling cranes and hoists for material handling, travelling cleaners for textile machinery, and similar equipment shall conform to the following:</p> <p>a) the power supply to contact conductors shall be isolated from all other systems, ungrounded, and equipped with</p> <p>i) recording ground detection that will give an alarm and will automatically de-energize the contact conductors in case of a fault to ground; or</p> <p>ii) ground fault detection that will give a visual and audible alarm and maintain the alarm as long as power is supplied to the system and the ground fault remains;</p> <p>b) contact conductors shall be located or guarded so as to be inaccessible to other than authorized persons and shall be protected against accidental contact with foreign objects; <u>and</u></p> <p>c) current collectors shall conform to the following:</p> <p>i) they shall be arranged or guarded to confine normal sparking and to prevent escape of sparks or hot particles;</p>	SN4787-J18 SN4788-J18

<p>ii) to reduce sparking, two or more separate surfaces of contact shall be provided for each contact conductor; and</p> <p>iii) reliable means shall be provided to keep contact conductors and current collectors free of accumulations of lint or flyings; and</p> <p>d) control equipment shall comply with Rules J18-306 and J18-308.</p>	
<p><i>Revise Rule J18-350 to read:</i></p> <p>J18-350 Equipment in Class III, Division 2 hazardous locations</p> <p><u>1) Electrical equipment installed in a Class III, Division 2 location shall be in accordance with Table 18.</u></p> <p><u>2) Notwithstanding Subrule 1), where installed in dust-protected enclosures, the following equipment shall be permitted:</u></p> <p><u>a) Switches, motor controllers, circuit breakers, fuses, meters, instruments, relays, transformers, impedance coils, resistors; and</u></p> <p><u>b) Signal, alarm, remote control, and communications systems.</u></p>	SN4787-J18
<p><i>Revise Rule J18-354 to read:</i></p> <p>J18-354 Wiring method, Class III, Division 2 (see Annex JB)</p> <p>The wiring method shall be</p> <p>a) threaded rigid metal conduit;</p> <p>b) hazardous location cables;</p> <p>c) electrical metallic tubing;</p> <p>d) armoured cable with overall non-metallic jacket, such as TECK90, ACWU90, copper sheathed RC90, or aluminum sheathed RA90;</p> <p>e) armoured fire alarm and signal cable, such as FAS, FAS90, FAS105, FAS150, and FAS200;</p> <p><u>d) armoured and metallic sheathed cables with an overall jacket in accordance with Rule 12-102 3);</u></p> <p><u>e) Tray cables in accordance with Rule 12-102 3);</u></p> <p><u>f) Non-armoured control and instrumentation cable (CIC), and non-armoured fire alarm and signal cables (FAS), provided that</u></p> <p><u>i) the installation is in cable tray in accordance with Rule 12-2202 3);</u></p> <p><u>ii) the voltage rating of the cable is not less than 300 V;</u></p> <p><u>iii) the circuit voltage is 150 V or less; and</u></p> <p><u>iv) the circuit current is 5 A or less; or</u></p> <p>f) control and instrumentation cables with an interlocking metallic armour and a continuous jacket in control circuits (Type AGIC);</p> <p>g) Type TC cable installed in cable tray in accordance with Rule 12-2202;</p>	SN4745-J18

<p>h) Type C/C cable (non-armoured control and instrumentation cable) installed in cable tray in accordance with the installation requirements of Rule 12-2202-2), where</p> <ul style="list-style-type: none"> i) the voltage rating of the cable is not less than 300 V; ii) the circuit voltage is 150 V or less; and iii) the circuit current is 5 A or less; or <p>g) i) liquid-tight flexible metal conduit and connectors, marked for heavy duty.</p>	
<p><i>Delete Rule J18-356 to read:</i></p> <p>J18-356 Switches, controllers, circuit breakers, and fuses, Class III, Division 2 Enclosures for switches, motor controllers, circuit breakers, and fuses shall conform to Rule J18-306.</p>	<p>SN4787-J18 SN4788-J18</p>
<p><i>Delete Rule J18-358 to read:</i></p> <p>J18-358 Control transformers and resistors, Class III, Division 2 Transformers, impedance coils, and resistors used as or in conjunction with control equipment for motors, generators, and appliances shall conform to Rule J18-308.</p>	<p>SN4787-J18 SN4788-J18</p>
<p><i>Revise Rule J18-360 to read:</i></p> <p>J18-360 Motors and generators, Class III, Division 2 (see Annex JB) Motors <u>and</u>, generators, or other rotating electrical machinery shall conform to Rule J18-310.</p>	<p>SN4791-J18</p>
<p><i>Delete Rule J18-364 to read:</i></p> <p>J18-364 Utilization equipment, fixed and portable, Class III, Division 2 Fixed or portable utilization equipment shall conform to Rule <u>J18-314</u>.</p>	<p>SN4787-J18 SN4788-J18</p>
<p><i>Delete Rule J18-372 to read:</i></p> <p>J18-372 Signal, alarm, remote control, and communication systems, Class III, Division 2 Signal, alarm, remote control, and communication systems shall conform to Rule <u>J18-274</u>.</p>	<p>SN4787-J18 SN4788-J18</p>

Appendix J, Annex JB

In Annex JB Note for Rule J18-002, revise entry for Single or dual process seal equipment to read:

SN4749-J18

Single or dual process seal equipment — an electrical device can be marked with either designation to indicate that it incorporates into its construction and certification, primary or primary and secondary process seals that will prevent the migration of flammable fluids into the wiring system, as specified in UL 122701 or ~~IEC TS~~ [CSA C22.2 No. 60079-40](#).

Add new entries to Annex JB Note for Rule J18-002 to read:

SN4749-J18
SN4787-J18

Dust-protected enclosure - Enclosures that would meet or exceed this definition are Types 3, 3X, 3S, 3SX, 4, 4X, 5, 6, 6P, 12, 12K, or 13, and those with degrees of protection IP5X or IP6X. Entries and openings would be closed off so that dust cannot enter through them.

Uninterrupted conduit run – the only devices allowed in an uninterrupted conduit run are NPT conduit couplings. Other devices, such as boxes, unions, tees, NPS couplings, and other fittings would not be acceptable, so as to provide a higher level of conduit system integrity. Conduit that includes straight runs or formed bends are all considered conduit.

Revise Annex JB Note for Rules J18-054 and J18-150 to read:

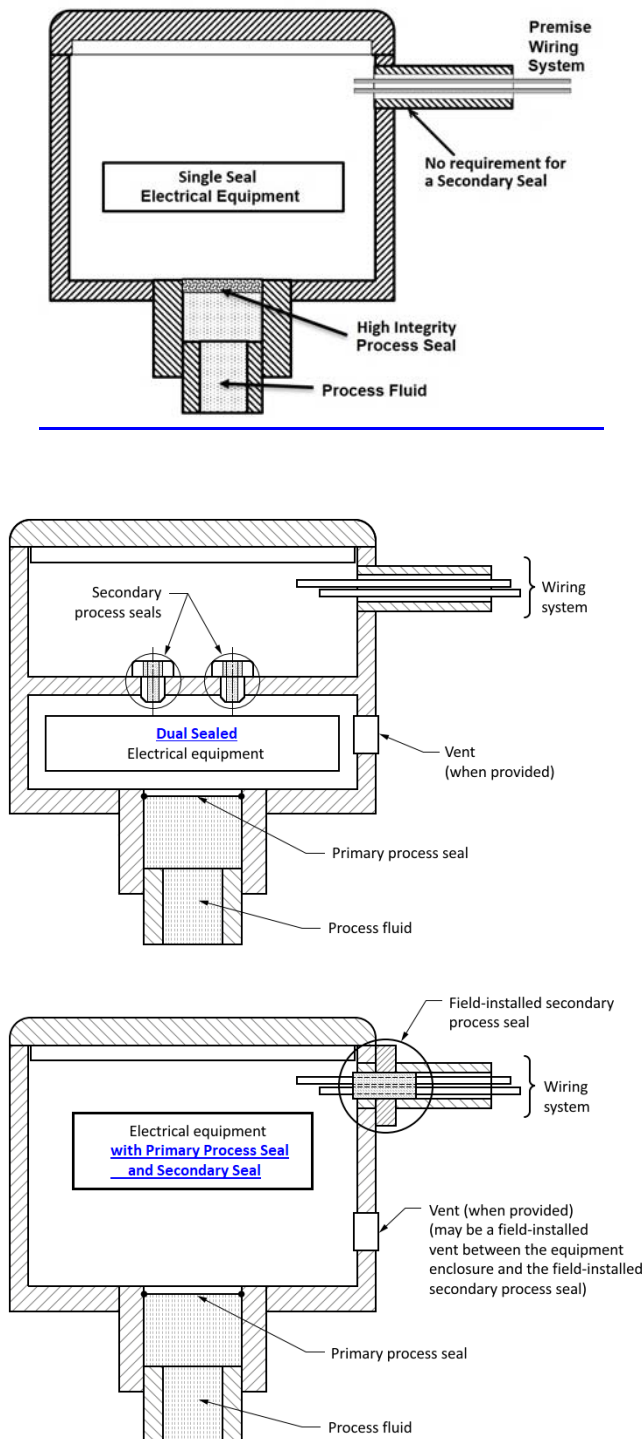
SN4791-J18

Rules J18-054 and J18-150

Equipment of the heat-producing type is currently required by product Standards to have a temperature code (T-Code) marking if its temperature exceeds 100 °C. However, for equipment manufactured prior to the T-Code requirement and motors and generators applied in accordance with Rule J18-150, there may be no such marking. Therefore, the suitability of older hazardous locations equipment of the heat-producing type and motors and generators applied in accordance with Rule J18-150 should be reviewed prior to being installed in a hazardous location to ensure compliance with Rule J18-054. For the purpose of these Rules, equipment such as boxes, terminals, fittings, and resistance temperature detectors (RTDs) are not considered to be heat-producing devices.

Revise Figure JB18-1 to read:

SN4715-J18



Revise Annex JB Note for Rule J18-070 to read:

SN4740-J18
SN4749-J18

Rule J18-070

See [Figures JB18-2 and JB18-3](#) [Table JB18-4A and JB18-4B](#) for a flow chart detailing where explosion, flammable fluid migration, ~~or~~ and process seals should

be selected for installations using cables and conduits.

UL 122701 and ~~IEC TS~~ [CSA C22.2 No. 60079-40](#) provide construction, performance, and marking requirements for process seals incorporated into process-connected electrical equipment. Equipment containing a primary or a primary and secondary process seal that complies with these Standards is eligible to include either the “Single Seal” or “Dual Seal” designation in the nameplate markings. These markings indicate that the electrical equipment is designed to prevent the migration of flammable fluid through the equipment into the wiring system when the equipment is operated at or lower than its rated pressure. Devices certified as conforming to UL 122701 or ~~IEC TS~~ [CSA C22.2 No. 60079-40](#) and marked either “Single Seal” or “Dual Seal” meet the intent of Subrule 1) a). See Figure B18-1 for typical configurations of process seals.

Where devices containing primary process seals are not marked to indicate conformance with UL 122701 or ~~IEC TS~~ [CSA C22.2 No. 60079-40](#), other means may be used to prevent fluid migration through the wiring system. *[no change to remainder of paragraph]*

After the 6th paragraph:

..... in case there is a leak under pressure from sources of release within the enclosure.

Where a secondary process seal is employed, the selection of the seal should be such so as to be chemically (corrosion) resistant to the process fluid it would be exposed to if the primary process seal fails.

Downstream of the process seal, any fluids entering the wiring system will be at or near atmospheric pressure. For example, if there is a major release of natural gas into a process building, it is not possible for significant pressure to develop in the building because the walls and windows will burst at a relatively low pressure.

There is no need to seal conduit against significant pressure in Class I, Division 1. However, the conduit itself is required to be ~~in~~ an explosion-proof enclosure; therefore, seals at the boundary of Class I, Division 1 locations are required to be explosion-proof to maintain the explosion-proof rating of the conduit.

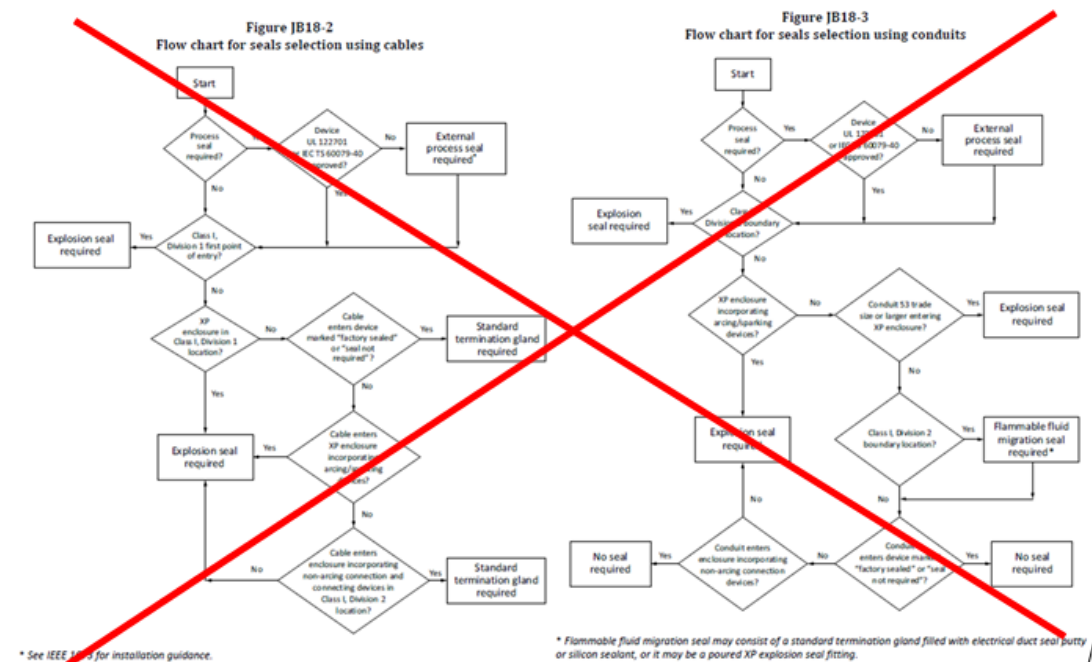
In Class I, Division 2, conduit is not required to be explosion-proof and, therefore, the boundary seals are not required to be explosion-proof. They need only be flammable fluid migration seals, i.e., seals for fluids that are not under pressure. A flammable fluid migration seal can be made using any suitable fitting that has been filled with a material capable of sufficiently preventing the transmission of the flammable fluid at or near atmospheric pressure. The sealing material should be selected to be compatible with the flammable fluid that can be anticipated to be exposed to the seal. Properly installed explosion seals or increased safety (Ex e) cable glands are ~~one possible a~~ means of providing a flammable fluid migration seal.

Cables with continuous sheaths will admit fluids only at the point where they terminate in hazardous areas. Therefore, except in enclosures containing equipment with fluids under pressure, the probability of flammable fluids entering cables after the process seals is low enough that only a flammable fluid migration seal is required. In many situations, filling the end of the cable connector where the conductors exit the connector (or where the conductors exit the cable when the

jacket extends beyond the connector) with silicone or other suitable material will provide an effective flammable fluid migration seal in Class I, Division 1 and Class I, Division 2. Properly installed explosion-proof, flameproof “d”, ~~or~~ flameproof “db”, or increased safety “e” cable glands are also a ~~possible~~ means of providing a flammable fluid migration seal. As flammable fluid migration seals are often not visible once they are installed, they are required to be identified. This can be done with a label or tag located near the seals, identifying them as a “flammable fluid migration seal” and indicating their location if it is not readily apparent.

Delete Figures JB18-2 and JB18-3:

SN4740-J18



Add new Annex JB Table JB18-4A to read:

SN4740-J18

Table JB18-4A
Process Seal Requirements*
(see Rule J18-070)

PROCESS	Applies to all process systems in Hazardous and Non-Hazardous Locations which	
	<ul style="list-style-type: none"> contain flammable fluids (liquid or gas); and operate above normal atmospheric pressure. 	
	EQUIPMENT CERTIFICATION AND MARKING	SEALING REQUIREMENT
	Marked “Single Seal” or “Dual Seal”, AND certified to UL 122701 or CSA C22.2 No. 60079-40	None
	Not Marked “Single Seal” or “Dual Seal”, OR <u>Not</u> certified to UL 122701 or CSA C22.2 No. 60079-40	“Primary Process Seal”, plus <ul style="list-style-type: none"> Stand-alone “Secondary Process Seal”; or Engineered solution

* This table does not set the requirements; it only summarizes the requirements in the Code Rules

Add new Annex JB Table JB18-4B to read:

SN4740-J18

Table JB18-4B

Hazardous Location Sealing Summary* (Not Process Connected Equipment)

(see Rules J18-070, J18-108, and J18-154)

LEGEND	FFMS = Flammable Fluid Migration Seal	XP Seal = Explosion Seal
	Ex e or eb Gland = Increased Safety Gland	No Seal = No Sealing requirements

Note - XP Seal and Ex e or eb Gland meets the requirements for a FFMS

	EQUIPMENT TYPE	CLASS I, DIV. 1	CLASS I, DIV. 2
CABLE	INTRINSICALLY SAFE WIRING SYSTEMS OR EQUIPMENT (IS)*		
	First point of termination	FFMS	No Seal
	Interconnection of IS equipment within same hazardous area	No Seal	
	EXPLOSION-PROOF ENCLOSURES		
	Contains arcing or heat producing equipment	XP Seal	XP Seal
	Equipment marked "Factory Sealed" or "Seals not Required"		No Seal
	Contains wiring terminals or non-ignition capable equipment		
	FLAMEPROOF ENCLOSURES (Ex d or Ex db)		
	Contains arcing or heat producing equipment	Equipment not permitted	XP Seal
	Contains wiring terminals or non-ignition capable equipment		No Seal
	INCREASED SAFETY ENCLOSURES (Ex e or Ex eb)		
	Contains terminals and/or equipment with an acceptable Type of Protection (for Class I, Div. 2, see Table 18)	Equipment not permitted	No Seal
	INCREASED SAFETY/FLAMEPROOF ENCLOSURES (Ex e d or Ex eb db)***		
	Factory seal between Increased Safety (Ex e or eb) termination and Flameproof (Ex d or db) sections	Equipment not permitted	No Seal
	NON-HAZARDOUS ENCLOSURES (i.e. CSA Type 4, 4X, IP65, or IP66)		
	Containing equipment with no arcing or heat producing devices, that are acceptable for use in Class I, Div.2 locations	Equipment not permitted	No Seal

CONDUIT	INTRINSICALLY SAFE WIRING SYSTEMS OR EQUIPMENT (IS)*		
	First point of termination	FFMS	No Seal
	Interconnection of IS equipment within same hazardous area	No Seal	
	EXPLOSION-PROOF ENCLOSURES		
	Contains arcing or heat producing equipment	XP Seal	XP Seal
	Equipment marked "Factory Sealed" or "Seals not Required"	No Seal	No Seal
	Contains wiring terminals or non-ignition capable equipment, and the conduit is <u>smaller</u> than 53 <u>trade size</u> (2 inches)		
	Conduit is 53 <u>trade size</u> (2 inches) <u>or larger</u>	XP Seal	
	<i>Note: Where seals are required, they are to be installed within 450 mm (18 inches) or as marked. If wire entries are "field drilled" seals are to be within 50 mm (2 inches).</i>		
	FLAMEPROOF ENCLOSURES (Ex d or Ex db)		
	Contains arcing or heat producing equipment	Equipment not permitted	XP Seal
	Contains wiring terminals or non-ignition capable equipment, and the conduit is <u>smaller</u> than 53 <u>trade size</u> (2 inches)		No Seal
	Conduit is 53 <u>trade size</u> (2 inches) <u>or larger</u>		
	<i>Note: Where seals are required, they are to be installed within 50 mm (2 inches)</i>		
	INCREASED SAFETY ENCLOSURES (Ex e or Ex eb)		
	Contains terminals and/or equipment with an acceptable Type of Protection (for Class I, Div. 2, see Table 18)	Equipment not permitted	No Seal
	INCREASED SAFETY/FLAMEPROOF ENCLOSURES (Ex e d or Ex eb db)***		
	Factory seal between Increased Safety (Ex e or eb) termination and Flameproof (Ex d or db) sections	Equipment not permitted	No Seal
	NON-HAZARDOUS ENCLOSURES (i.e. CSA Type 4, 4X, IP65, or IP66)		
	Containing equipment with no arcing or heat producing devices acceptable for use in Class I, Division 2 locations	Equipment not permitted	No Seal
	BOUNDARY SEALS REQUIREMENTS		
	Between Class I, Division 1 and non-hazardous locations	If it is an uninterrupted conduit run** to the non-hazardous location and enters a terminal enclosure, no other seal is required	
	Between Class I, Division 1 and Class I, Division 2	XP Seal	XP Seal
	Between Class I, Division 2 and non-hazardous	FFMS	FFMS

- ♦ This table does not set the requirements; it only summarizes the requirements in the Code Rules
- IS refers to Intrinsically Safe or Non-~~Incendive~~ wiring and equipment, and Intrinsic Safety equipment (Ex ~~ig~~, Ex ~~ib~~ or Ex ~~ic~~)
- ** "Uninterrupted conduit run" is one that contains no boxes or fittings other than NPT couplings
- *** Can be a single enclosure with 2 sections or 2 enclosures, having factory seal between the Ex e and Ex d sections

Add Annex JB Noted for Rule J18-076 to read:

SN4760-J18

Rule J18-076
Explosion-proof or flameproof threaded connections are not required for Class II or Class III locations.
In Class I, Division 2 locations, explosion-proof or flameproof threaded connections are required when entering an enclosure that is required to be explosion-proof or flameproof, and for those installations, the conduit is also considered to be part of the explosion-proof or flameproof system to which it is connected. However, if entries are to an enclosure with non-arcing or non-heat-producing components such as terminals, then explosion-proof or flameproof threaded connections and conduit are not required, unless part of an "uninterrupted conduit run".
Running threads, which are not allowed for NPT threaded connections where explosion protection is required, are created when a wire entry or length of conduit is threaded beyond the length of the tap resulting in a section of straight threads at the minimum or maximum diameter of the taper. Running threads are not capable of meeting the requirements for explosion protection in hazardous locations.

Add Annex JB Noted for Rule J18-076 to read:

SN4760-J18

Rule J18-076

Explosion-proof or flameproof threaded connections are not required for Class II or Class III locations.

In Class I, Division 2 locations, explosion-proof or flameproof threaded connections are required when entering an enclosure that is required to be explosion-proof or flameproof, and for those installations, the conduit is also considered to be part of the explosion-proof or flameproof system to which it is connected. However, if entries are to an enclosure with non-arcing or non-heat-producing components such as terminals, then explosion-proof or flameproof threaded connections and conduit are not required, unless part of an "uninterrupted conduit run".

Running threads, which are not allowed for NPT threaded connections where explosion protection is required, are created when a wire entry or length of conduit is threaded beyond the length of the tap resulting in a section of straight threads at the minimum or maximum diameter of the taper. Running threads are not capable of meeting the requirements for explosion protection in hazardous locations.

<p><u>Where threaded connections are used for explosion protection, the requirement to have 4-1/2 tapered and 5 straight fully engaged threads (i.e., threads done up tight) is critical for the following reasons:</u></p> <p><u>When the threads are not fully engaged, the flame path is compromised, making it possible for an explosion occurring within the flameproof or explosion-proof system to be transmitted to the surrounding atmosphere.</u></p> <p><u>Because metal conduit forms a bonding path to ground, not making the conduit tight will introduce resistance into the flame path and, if a fault occurs, arcing at the interface may result.</u></p> <p><u>While it may not always be possible to install certain fittings without backing off, it is important to ensure that the connection is made tight. Properly made threaded connections are critical to the safety of hazardous location wiring systems.</u></p> <p><u>The metric thread tolerances are defined in ISO standard 965-1. Class-of-fit (tolerance) for internal threads is defined by 6g and for external threads by 6H. Better (tighter) tolerances will have lower numbers. Class-of-fit is measured prior to assembly using commercially available screw plug gauges for interior threads and ring gauges for external threads.</u></p>	
<p><i>Delete Annex JB Note for Rule J18-106 3)</i></p> <p>Rule J18-106 3)</p> <p>Where tapered threads are used, the requirement to have 5 fully engaged threads (i.e., threads done up tight) is critical for the following reasons:</p> <p>a) When the threads are not fully engaged, the flame path is compromised, making it possible for an explosion occurring within the conduit system to be transmitted to the area outside the conduit.</p> <p>b) If there are not 5 fully engaged threads, the flame path may be too short to cool the gases resulting from an internal explosion to a temperature below that which could ignite gas in the surrounding area.</p> <p>c) Because the conduit forms a bonding path to ground, not making the conduit tight will introduce resistance into the flame path and, if a fault occurs, arcing at the interface may result.</p> <p>While it may not always be possible to install certain fittings without backing off, it is important to ensure that the connection is as tight as possible. Properly made conduit connections are critical to the safety of hazardous location wiring systems.</p>	SN4760-J18
<p><i>Revise Annex JB Note for Rules J18-106, J18-108, J18-152, J18-204 1) b), J18-254 1) b), J18-304, and J18-354 to read:</i></p> <p>Rules J18-106, J18-108, J18-152, J18-204 1) b), J18-254 1) b), J18-304, and J18-354</p> <p>Cables meeting the requirements of CSA C22.2 No. 174 <u>that are marked "HL"</u> are acceptable for use in <u>all</u> hazardous locations and are marked "HL".</p> <p>Cables marked for use in hazardous locations are suitable for all locations, but the termination fittings must be suitable for the particular hazardous location. For example, in a Zone 1 or Zone 2 hazardous location, a termination fitting entering an enclosure required to be explosion-proof, flameproof "d", or flameproof "db" must be a sealing-type termination fitting, whereas a termination fitting entering an enclosure not required to be explosion-proof, flameproof "d", or flameproof "db" in a Zone 2</p>	SN4669-J18

~~hazardous location is not required to be marked for use in Zone 2 hazardous locations.~~ In Class I, Division 1 hazardous locations, explosion-proof enclosures require a Class I, Division 1 cable gland, which is an explosion seal. These seals are also required to be installed on cables entering enclosures marked as "Factory Sealed" or "Seals not Required" since cables are not tested to determine their ability to contain internal explosions to enclosures. Flameproof ("d" or "db") glands are not acceptable for use with explosion-proof enclosures.

In Class I, Division 2 hazardous locations, several cable types identified in Rule J18-152, and other similar constructions, are acceptable for use. Cable glands are required to be suitable for the equipment's Type of Protection. For example, in a Class I, Division 2 hazardous location, cables entering an enclosure required to be explosion-proof are required to use Class I, Division 1 cable glands whereas cables entering a flameproof ("d" or "db") enclosure, may use either Class I, Division 1 or flameproof ("d" or "db") cable glands. However, cables entering enclosures marked as "Factory Sealed" or "Seals not Required" do not require an explosion seal. Cables entering an enclosure not required to be explosion-proof or flameproof ("d" or "db") in a Division 2 location are permitted to use ordinary location cable glands.

C22.2 No. 174 no longer permits Cable Glands to be marked with Class I Division 2. Cable Glands certified to earlier editions of CSA C22.2 No. 174 and marked Class I Division 2 do not meet the requirements for explosion seals.

A Flammable Fluid Migration Seal is required at the first point of termination of a cable in Class I, Division 1 locations. Since Class I, Division 1 cable glands also meet the requirements of a flammable fluid migration seal, a separate fitting is not required where those glands are installed.

It is intended that cable glands ~~termination fittings~~ in all hazardous locations be compatible with the degree of protection and the type of explosion protection provided by the enclosure they enter. In general, the minimum requirement will be weatherproof cable glands ~~termination fittings~~.

For the application of Annex J18, rigid metal couplings are not considered fittings. The CSA Standard for rigid metal conduit and couplings is CSA C22.2 No. 45.1. This Standard does not require hazardous location markings. Certified rigid metal conduit and couplings are suitable for hazardous locations without specific area classification marking.

Revise Annex JB Note for Rules J18-108 and J18-154 to read:

Rules J18-108 and J18-154

Seals are provided in conduit or cable systems to prevent the passage of gases, vapours, or flames from one portion of the electrical installation to another through the system.

Some equipment may include markings such as "FACTORY SEALED" or "SEAL NOT REQUIRED" as permitted by CSA C22.2 No. 30. These terms apply to conduit installations only.

The markings "FACTORY SEALED" and "SEAL NOT REQUIRED" are used interchangeably and indicate that the termination enclosure for the equipment is isolated from ignition-capable components by an internal factory seal, or that the equipment incorporates device s that have been assessed as not producing arcs, sparks, or high temperatures.

SN4749-J18

<p>For equipment marked “FACTORY SEALED” or “SEAL NOT REQUIRED”, the following applies:</p> <p>a) In Class I, Division 1 applications:</p> <p>i) For conduit installations, an explosion seal is not required <u>as the conduit system is explosion-proof and will contain an explosion if something were to happen inside the enclosure, such as a wire coming out of a terminal.</u></p> <p>ii) For cable installations, an explosion seal is required, <u>as the cable cannot contain an explosion in the enclosure if something happened, such as a wire coming off a terminal. Therefore, an explosion seal is needed to contain the explosion to the enclosure.</u></p> <p>b) In Class I, Division 2 applications, because equipment that is not ignition capable [see Rule J18-150 2) a)] and terminations housed in non-hazardous location enclosures [see Rule J18-150 2) c)] are permitted in Zone 2 locations, an explosion seal for conduit or cable is not required in accordance with Rules J18-154 1) and 4), respectively. [remainder of note unchanged]</p>	
<p>Add new Annex JB Note for Rule J18-150 2)a)ii) to read:</p> <p>Rule J18-150 2) a) ii) <u>This subrule is intended to allow for capacitors to be installed in Division 2 such as are used for partial discharge monitoring, power factor correction, and harmonic reduction.</u></p>	SN4638-J18
<p>Add new Annex JB Note for Rule J18-150 2)a)iii) to read:</p> <p>Rule J18-150 2) a) iii) <u>This type of equipment operates at such extremely low power levels that any operating temperature rise is negligible, and is thereby in compliance with Rule J18-054. All are non-sparking, and do not incorporate inductors, capacitors or other internal components capable of storing or producing significant amounts of electrical energy. For additional information, refer to the description of “simple apparatus” in CSA Standard C22.2 No. 60079-11. RFID tag Readers are not included in this allowance and they would need to be certified for the areas in which they are used.</u></p>	SN4638-J18
<p>Revise Annex JB Note for Rule J18-150 2)e) to read:</p> <p>Rule J18-150 2) e) See the Note to Rules J18-114 and J18-150. <u>Rule J18-150 does not require motors and generators of the open or non-explosion proof type to be certified for Class I, Division 2 locations unless the machines incorporate ignition capable components or heat-producing components that exceed the minimum ignition temperature defined for the hazardous location. Rotating electrical machines of the open or non-explosion-proof type do not have a certification Standard for Class I, Division 2.</u> This Subrule provides the criteria for applying, in Division 2, <u>motors and generators</u> rotating electrical machines that do not have a certification suitable for Division 2. Refer to IEEE 1349 for more detailed information on applying these <u>motors and generators</u> rotating electrical machines in</p>	SN4522-J18

<p>Class I, Division 2 locations.</p> <p><u>Motors and generators do not have a certification Standard for Class I, Division 2. However, these machines can be evaluated for use in Class I, Division 2 locations in accordance with UL1836 "Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations".</u></p>	
<p><i>Revise Annex JB Note for Rule J18-150 4) to read:</i></p> <p>Rule J18-150 4) The evaluation process to determine if the sliding contact shaft bonding device is non-incendive is <u>the "motor bearing sparking – discharge energy calculation"</u> found in Appendix A of CSA C22.2 No. 60079-0, UL 1836, <u>or IEEE 1349</u>. The potential energy calculation should be retained and available for review. The person taking responsibility for the calculation is normally an engineering professional or other individual permitted to practice engineering.</p>	SN4688-J18
<p><i>Add new Annex JB Note for Rules J18-152 1) d), J18-254 1) d), J18-304 1) d), and J18-354 1) d) to read:</i></p> <p><u>Rules J18-152 1) d), J18-254 1) d), J18-304 1) d), and J18-354 1) d)</u> <u>Examples of acceptable armoured and metallic sheathed cables are TECK90, ACWU90, copper-sheathed RC90, aluminum-sheathed RA90, armoured fire alarm and signal (FAS) cable, and armoured control and instrumentation cable (ACIC).</u></p>	SN4745-J18
<p><i>Add new Annex JB Note for Rule J18-250 to read:</i></p> <p><u>Rule J18-250</u> <u>Motors and generators can be evaluated for use in Class II, Division 2 locations in accordance with UL1836 "Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations".</u></p>	SN4522-J18

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