



Key 2024 CE Code Changes Impacting Wire & Cable

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HOUSEKEEPING

- Questions can be asked at any time using the chat function on the webinar screen
- Any unanswered questions will be followed up through email
- This presentation, a recording of the webinar and a brief survey will be emailed to all registrants

ABOUT MYSELF



Wissam Geahchan
Applications Engineer

- Experience applying the CE Code in a variety of applications
- Active member on several industry standards committees at CSA, UL, and ICEA.
- Licensed soccer coach

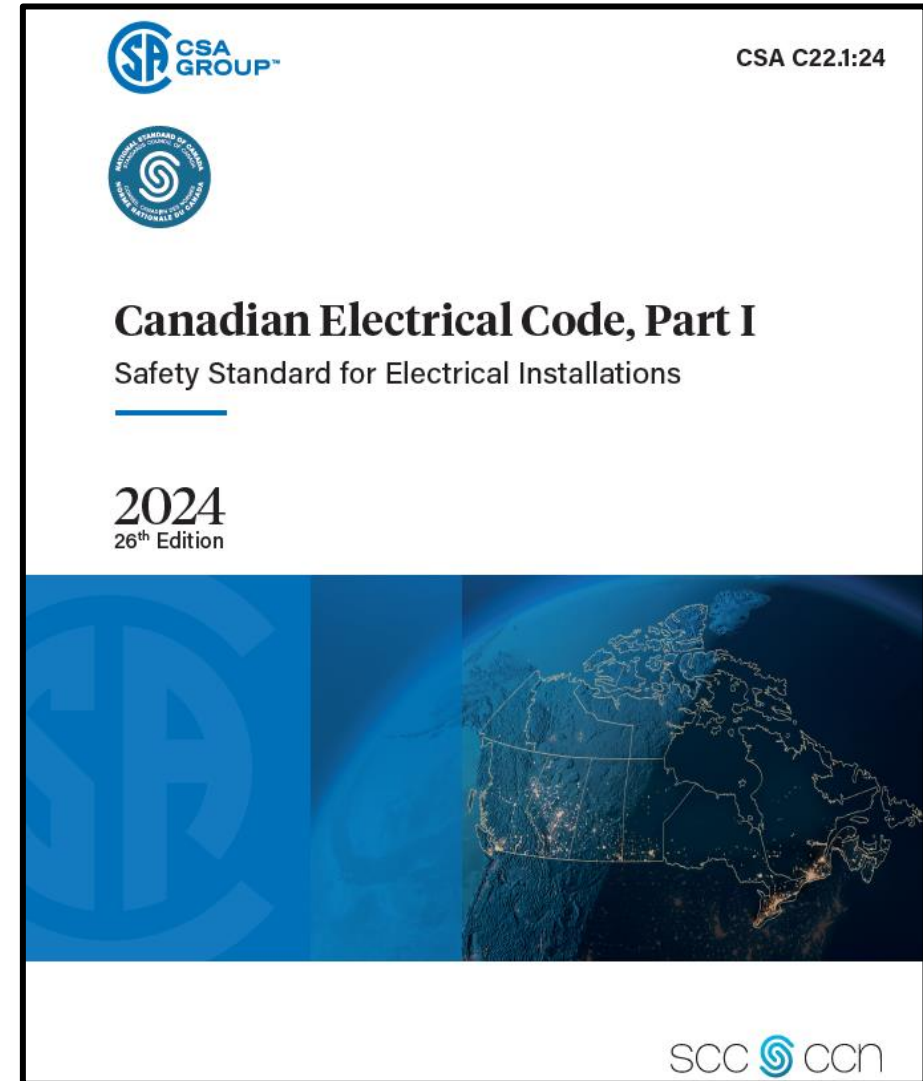
Agenda

- | | | | | | | | | |
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1. INTRODUCTION

This 26th edition of the Canadian Electrical Code, Part I, was approved by the CE Code, Part I committees and the Regulatory Authority Committee at their June 2023 meetings and published on March 4, 2024.

Note - this presentation is NOT all-inclusive. It is also not meant to replace the Rules in the Code, nor does it intend to make any claims on how you should install your electrical system. If there is any doubt about any of these new changes and how they may impact your specific installation, it is your responsibility to reach out to your local inspection authority for further guidance.



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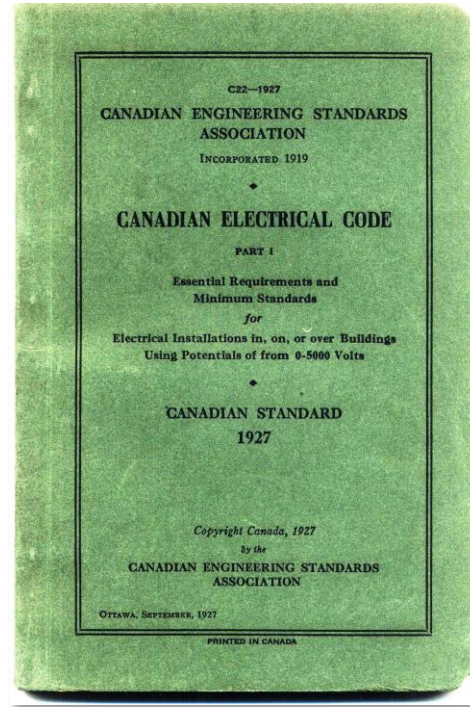
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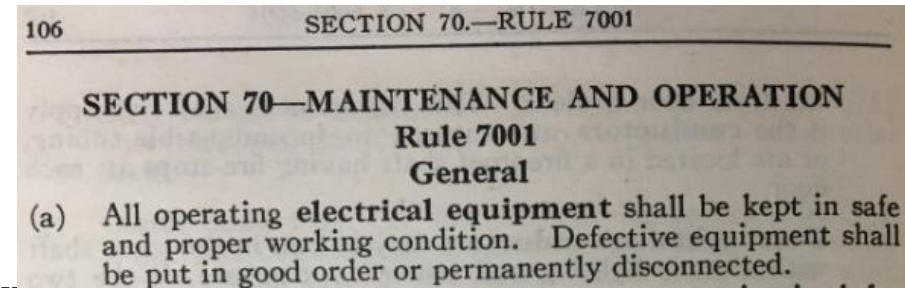
1. INTRODUCTION

Back to 1927 and the Roaring '20s.



There is ONE rule in the code that hasn't changed!

Rule 7001, Subrule (a) in the 1927 Code is now Rule 2-300, Subrules 1) and 4) in the 2024 Code



1927 Code, 1st Edition
Total number of pages = 139
Number of Sections = 24
Number of Tables = 13

2024 Code, 26th Edition
Total number of pages = 972
Number of Sections = 41
Number of Tables = 93

2-300 General requirements for maintenance and operation
1) All operating electrical equipment shall be kept in safe and proper working condition.
...
4) Defective equipment shall either be put in good order or permanently disconnected.

2. SECTION 0 – OBJECT, SCOPE, AND DEFINITIONS

REVISED DEFINITIONS

Cable –

- a) a product identified as a cable in Table 19; or
- b) 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.



WHAT THIS MEANS

By mentioning Table 19 in the revised definition for a “cable”, Code users are directed to the main reference in the Code listing the primary types of CSA-recognized cables used in installations covered in the scope of the Code.

Table 19 is a good starting point to finding out where and how a CSA-designated cable can be installed.



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.

WHAT THIS MEANS



Identified conductors must have either a white covering or a raised longitudinal ridge on its surface to indicate that the conductor is a grounded conductor or a neutral. Grey is no longer permitted.

2. SECTION 0 – OBJECT, SCOPE, AND DEFINITIONS

REVISED DEFINITIONS

Voltage –

Extra-low voltage –

- a) for ac circuits, any voltage not exceeding 30 V ac; or
- b) for dc circuits, any voltage not exceeding ~~42.4~~60 V dc.

Low voltage –

- 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~~60 V dc but not exceeding ~~1060~~1500 V dc.

High voltage –

- a) for ac circuits, any voltage exceeding 1000 V ac; or
- b) for dc circuits, any voltage exceeding ~~1060~~1500 V dc.

DC



AC



WHAT THIS MEANS



New DC voltage definitions!

3. SECTION 2 – GENERAL RULES

2-034 Application of Code requirements (see Appendix B) – NEW RULE

Electrical equipment forming part of an electrical installation that is not covered by the scope of this Code, shall not be used to meet the requirements of this Code.

Appendix B Note to Rule 2-034 – NEW APPENDX B NOTE

The objective of this Rule is to ensure that the requirements of Canadian Electrical Code, Part I are met only by electrical equipment that is part of an electrical installation covered by the Scope of Part I. For example, electrical equipment located in electrical installations “employed by an electric distribution system utility in the exercise of its function as a utility” cannot be used to meet Part I bonding and grounding, overcurrent, or disconnecting means requirements.



WHAT THIS MEANS

This new Rule is added to emphasize that CE Code Part I requirements are permitted to be met only by electrical equipment that is part of an electrical installation covered by the scope of Part I. Equipment located in installations that are excluded from the scope of CE Code Part I cannot be used to meet the requirements of Part I.

3. SECTION 2 – GENERAL RULES

2-100 Marking of equipment – NEW SUBRULES 4) and 5)

4) Where feeders or branch circuits are added, removed, or modified at an existing panelboard, the markings required by Subrule 3) shall be updated.

6) Where the ampacity of conductors for a service or feeder are based on loads calculated in accordance with Rule 8-200 or 8-202 are less than the rating of the fuse or circuit breaker, a permanent, legible caution marking shall be field-applied adjacent to the fused-switch or circuit breaker nameplate to indicate maximum load permitted.

WHAT THIS MEANS



An electrician performing any change to a panelboard is now responsible for the marking of the entire panelboard. Previously, an electrician making a change to a panelboard was only responsible for marking the circuit that they are changing. Now, any change makes that electrician responsible for marking the entire panelboard as required by Subrule 3).



Appendix B Note to Subrule 2-100 1) Item n) – NEW APPENDIX B NOTE

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



4. SECTION 4 – CONDUCTORS

4-000 Scope – REVISED SUBRULE 1)

- 1) This Section applies to conductors ~~for services, feeders, branch circuits, and photovoltaic circuits~~ in ac and dc systems 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;
 - ~~d) the selection of a conductor type for a specific condition of use; and~~
 - ed) conductor identification.



WHAT THIS MEANS

The scope was revised to apply to conductors in ac and dc systems in general. The removal of item d) was necessary since this section does not deal with selecting a *type* of conductor. Instead, it deals with determining conductor ampacity based on the specific conditions of use of that conductor.

TAKE NOTE

This specific revision is the first instance of many throughout this 26th edition of the Code...

“Maximum Allowable Ampacities” has been replaced with “Ampacities” everywhere!

APPLICABLE TO THE ENTIRE CODE

4. SECTION 4 – CONDUCTORS

4-002 Size of conductors – NEW SUBRULE 2)

2) Use of conductors in IEC (mm²) sizes listed in Table D18 shall be permitted provided

- a) the ampacity and corresponding AWG or kcmil size is selected in accordance with Rule 4–004; and
- b) the cross-sectional area of the listed IEC (mm²) conductor is not less than the cross-sectional area of the AWG or kcmil conductor selected in Subrule 2) a).

Table D18
Standard conductor sizes (cross-sectional area)

AWG or kcmil	circular mil	mm ²	IEC (mm ²)*
14	4110	2.08	
	4934		2.5
12	6530	3.31	
	7894		4
10	10 380	5.26	
	11 841		6
8	16 510	8.37	
	19 735		10
6	26 240	13.3	
	31 576		16
4	41 740	21.2	
	49 338		25
3	52 620	26.7	
2	66 360	33.6	
	69 073		35
1	83 690	42.4	
	98 676		50
0	105 600	53.5	
00	133 100	67.4	
	138 146		70
000	167 800	85	
	187 484		95
0000	211 600	107	
	236 823		120

250	250 000	127	
	296 028		150
300	300 000	152	
350	350 000	177	
	365 102		185
400	400 000	203	
	473 646		240
500	500 000	253	
	592 057		300
600	600 000	304	
700	700 000	355	
750	750 000	380	
	789 410		400
800	800 000	405	
900	900 000	456	
1000	1 000 000	507	
	1 233 453		625
1250	1 249 241	633	
1500	1 499 879	760	
	1 578 820		800
1750	1 750 516	887	
	1 973 525		1000
2000	1 993 260	1010	

* This table illustrates the relationship between standard AWG or kcmil conductor cross sectional areas to standard IEC (mm²) conductor cross-sectional areas as referenced in IEC 60228.

WHAT THIS MEANS



Currently, there are two types of conductor sizes (cross-sectional areas) being produced:

1. American Wire Gauge (AWG) or kcmil for North America; and
2. IEC 60228, which uses the SI units (mm²) for the rest of the world.

This new table is an informative reference (not mandatory) and is used to illustrate the relationship between the standard AWG or kcmil conductor cross-sectional areas to standard IEC (mm²) conductor cross-sectional areas.

By using this table, Code users will be able to select appropriate AWG or kcmil conductor sizes.

This new subrule and Table is considered a step towards harmonizing with IEC standards.

New Table D18

4. SECTION 4 – CONDUCTORS

4-004 Ampacity of wires and cables – REVISED SUBRULE 22)

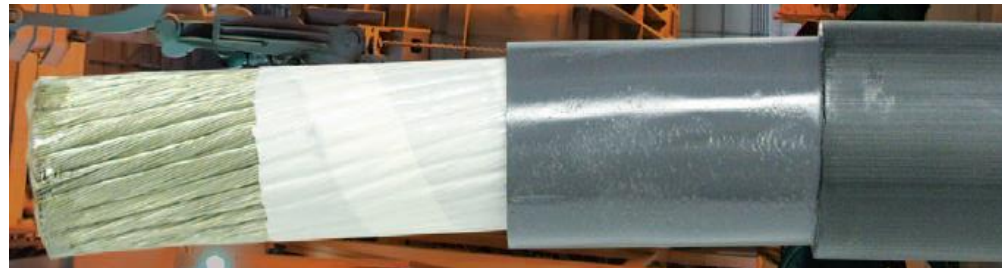
22) In ventilated and ladder-type cable trays, where the air space between adjacent insulated conductors or cables or both is maintained at greater than 100% of the diameter of the largest conductor or cable, the ampacity of the conductors or cables shall be as follows:

- a) for single insulated conductors, single-conductor cable, single-conductor metal-sheathed or armoured cable, and single-conductor mineral-insulated cable, ~~the value as specified in Tables 1 and 3; and~~
 - 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.



WHAT THIS MEANS

Table 12E receives its first mention in Rule 4-004.



5. SECTION 6 – SERVICES AND SERVICE EQUIPMENT

6-302 Installation of overhead consumer's service conductors – REVISED SUBRULE 1)

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:

- 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;
- i) Type TECK90 cable; or
- j) Type NS75 or NS90 cable.



WHAT THIS MEANS



The inclusion of Type NS75 and NS90 cables to this Subrule clarifies that these cable types are permitted to be installed as overhead consumer's service conductors.

5. SECTION 6 – SERVICES AND SERVICE EQUIPMENT

6-308 Use of neutral conductors in consumer's service – REVISED RULE

- 1) Where a neutral conductor is installed in a consumer's service raceway, it shall be insulated.
- 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
 - a) a busway; or
 - b) neutral-supported cables NS75 or NS90.



WHAT THIS MEANS

This Subrule is reworded in a way to remove ambiguity and provide more concise requirements for the use of neutral conductors in consumer's service.

6. SECTION 8 – CIRCUIT LOADING AND DEMAND FACTORS

8-106 Use of demand factors – REVISED SUBRULE 11)

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) monitors the consumer's service and feeders and 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: ~~where an electric vehicle energy management system as described in Subrule 10) performs the function of~~

- a) monitoring the consumer's service, feeders, and branch circuits; and
- b) controlling the electric vehicle supply equipment loads in accordance with Rule 8-500.

WHAT THIS MEANS



When an electric vehicle energy management system (EVEMS) is installed to help manage the loading and adjust capacity requirements of EV supply equipment, a larger number of chargers are allowed to be installed on a circuit. This makes it easier to install multiple EV chargers without having to draw as much electrical energy.



6. SECTION 8 – CIRCUIT LOADING AND DEMAND FACTORS

REVISED SUBRULES FOR ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) IN THE FOLLOWING RULES:

- 8-200 Single dwellings
- 8-202 Apartment and similar buildings
- 8-204 Schools
- 8-206 Hospital
- 8-208 Hotels, motels, dormitories, and buildings of similar occupancy
- 8-210 Other types of occupancy

Table 38 - Electric vehicle supply equipment demand factors has been deleted and EVSE shall now be assumed to have 100% demand factor.



WHAT THIS MEANS

When calculating loading for a project, EV supply equipment shall be assumed to have 100% demand factor which means conductor sizing may be affected. You may be required to upsize conductors accordingly and overcurrent protection when installing multiple EVSE in a condo or commercial building, unless you are using an EVEMS.

DELETED TABLE 38

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

7. SECTION 10 – GROUNDING AND BONDING

10-308 Conductors used with impedance grounding devices – REVISED SUBRULE 1)

- 1) The conductor connecting the impedance grounding device to the system source shall
 - 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
 - i) No. 12 AWG if of copper; or
 - ii) No. 10 AWG if of aluminum; and
 - f) be protected from damage
 - i) mechanically; or
 - ii) by location.



WHAT THIS MEANS



This revision is in-line with the revised definition in Section 0 for “Identified”

7. SECTION 10 – GROUNDING AND BONDING

10-604 Bonding continuity for service equipment - REVISED RULE

- 1) The bonding continuity for service equipment shall be assured by bonding means prescribed in Rule 10-610.
- 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
 - a) at both ends where the metal raceway, metal sheath, or cable armour serves as the bonding means between service equipment; or
 - b) at one end where
 - i) a bonding conductor is run with circuit conductors; or
 - ii) the termination to service equipment is only at one end.
- 23) Notwithstanding Subrule ~~1) e) 2)~~, a bonding bushing 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.



WHAT THIS MEANS

This revision removes redundancy with Rule 10-610 and provides additional rules for standard locknuts serving as bonding means.



7. SECTION 10 – GROUNDING AND BONDING

10-612 Installation of bonding conductors – NEW SUBRULE 3)

3) 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 the separate bonding conductor is

- a) enclosed in the same raceway or cable containing the circuit conductors throughout the length of that cable or raceway;
- b) sized not less than as required in Rule 10-616; and
- c) insulated.

WHAT THIS MEANS



This new Subrule provides additional rules for equipment to be connected to an isolated bonding conductor extending directly back to its source of supply or to the main system bonding jumper.



7. SECTION 10 – GROUNDING AND BONDING

10-702 Installation – NEW SUBRULE 3)

- 3) 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
- a) supplied by a permanently connected circuit incorporating a bonding conductor; and
 - b) associated with the non-electrical equipment that is being made equipotential.



WHAT THIS MEANS

This new Subrule provides additional rules for installing equipotential bonding connection.

8. SECTION 12 – WIRING METHODS

12-002 Special Terminology – NEW DEFINITION

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

12-012 Underground installations – NEW SUBRULES 14) AND 15)

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

15) 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.

WHAT THIS MEANS



The new definition and Subrules for grade level in-ground enclosures provides language and rules for these types of enclosures.

8. SECTION 12 – WIRING METHODS

12-102 Installation of insulated conductors and cables – NEW SUBRULES 4) AND 5)

4) Except as permitted by other Rules of this Code, flexible cords, portable power cables, and equipment wire shall be of the types specified in Table 11A for the specific condition of use.

5) Flexible cords, heater cords, tinsel cords, equipment wires, appliance wiring materials, Christmas tree cords, wind turbine cables, electric vehicle supply equipment cables, and dryer and range cables of the types specified in Table 11B shall not be used for general-purpose wiring

New Table 11A

Δ

Table 11A
Conditions of use, voltage, and temperature ratings of flexible cords, heater cords, equipment wire, portable power cables, elevator cables, stage lighting, and festoon cables
(See Rule [12-102](#).)

Group or Classification (kind)		Equipment wire								
CSA Type designation		TEW	TEWN	REW (XLPVC)	REW (CPE)	SEWF-1	SEW-1	SEWF-2	SEW-2	GTF
Voltage ratings, V		300, 600	600	300, 600	300, 600	300	300	600	600	600
Temperature ratings, °C		105, 150, 200	105	105	105	150, 200, 250	200, 250	150, 200, 250	200, 250	125
Temperature ratings when exposed to oil, °C		60	60	60	60	—	—	—	—	—
Location	Dry	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Damp	✓	✓	✓	✓	✓	✓	✓	✓	—
	Wet	—	—	—	—	—	—	—	—	—
	Exposed to oil	✓	✓	✓	✓	—	—	—	—	—
Where used	Not for hard usage	✓	✓	✓	✓	✓	✓	✓	✓	✓
	For hard usage	—	—	—	—	—	—	—	—	—
	For extra hard usage	—	—	—	—	—	—	—	—	—
When	In a raceway Class 1 circuit (Section 16)	✓	✓	✓	✓	✓	✓	—	—	—
	Exposed to sunlight	—	—	—	—	—	—	—	—	—

New Table 11B

Δ

Table 11B
Conditions of use in product manufacturing, voltage, and temperature ratings of flexible cords, heater cords, tinsel cords, equipment wires, appliance wiring materials, Christmas- tree cords, wind turbine cables, electric vehicle supply equipment cables, and dryer and range cable
(See Rule [12-102](#).)

Group or Classification (kind)		Flexible cords										
CSA Type designation		SV	SVO, SVOO	SVT	SVTO, SVTOO	SPT-1, NISPT-1, NISP-1	SPT-2, NISPT-2, NISP-2	SPT-3	SPT-1W, SPT-2W	SVEO, SVEOO	SPE-1, SPE-2, SPE-3, SVE	NISPE-1, NISPE-2
Voltage ratings, V		300	300	300	300	300	300	300	300	300	300	300
Temperature ratings, °C		60, 75, 90	60, 75, 90	60, 75, 90, 105	60, 75, 90, 105	60, 75, 90, 105	60, 75, 90, 105	105	105	90, 105	90, 105	90, 105
Temperature ratings when exposed to oil, °C		—	60	—	60	—	—	—	—	60	—	—
Location	Dry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Damp	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Wet	—	—	—	—	—	—	—	✓	—	—	—
	Exposed to oil	—	✓	—	✓	—	—	—	—	✓	—	—
Where used	Not for hard usage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	For hard usage	—	—	—	—	—	—	—	—	—	—	—
	For extra hard usage	—	—	—	—	—	—	—	—	—	—	—
When	In a raceway Class 1 circuit (Section 16)	—	—	—	—	—	—	—	—	—	—	—
	Exposed to sunlight	—	—	—	—	—	—	—	✓	—	—	—

WHAT THIS MEANS



TABLE 11 IS REPLACED WITH TABLES 11A AND 11B
(notes from Table 11 have been either deleted due to being outdated, incorporated into Tables 11A and 11B, or incorporated in other Rules in the Code)

8. SECTION 12 – WIRING METHODS

12-112 Conductor joints and splices – NEW SUBRULE 5)

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

12-112 Conductor joints and splices – ADDITION TO SUBRULE 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;
- 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.



WHAT THIS MEANS

These new additions to the rules address joints and splices in grade level in-ground enclosures.

8. SECTION 12 – WIRING METHODS

12-116 Termination of conductors – NEW SUBRULES 5) AND 6)

- 5) Fine-strand conductors shall terminate in
- connectors identified for use with fine-strand conductors; or
 - standard connectors with the use of ferrules.
- 6) Ferrules shall not be used on solid conductors.

NEW Appendix B Note for 12-116 5)

Ferrules described in Subrules 12-116 5) and 12-406 4) are certified to CSA C22.2 No. 291 and CSA C22.2 No. 342. Examples of fine strand conductors are Class G, H, M, I, K, and DLO (see Table B12-2).

New Table B12-2 →

WHAT THIS MEANS



The new Subrules in 12-116 clarify how fine-stranded and solid conductors shall be terminated. New Table B12-2 is informative and meant to help Code users better understand what the conductor stranding class means. It does not override CSA Part 2 standards, nor does it override ASTM standards.

Table B12-2 from CAN/CSA-C22.2 No. 65
Stranding for North American class copper conductors

Class	Class AA	Class A	Class B	Class C	Class D	Class G	Class H	Class I	Class K	Class M	DLO cable	
Application	Power cables					Cords and cables						
	Utility grade wire (Bare conductors)	Building wire		Extra flexible strand- ing	Portable use	Extreme flexible strand- ing	Motor leads (24 AWG strands)	(30 AWG strands)	(34 AWG strands)	Diesel electric locomotives, telecom power, oil and gas drilling, mining, etc. (24 AWG strands)		
		More flexible than Class B										
Lay type	Concentric strand				Rope lay concentric strand	Rope lay bunch strand			Locomotive/ mining			
Wire gauge, AWG/ kcmil	Number of strands										Wire gauge, AWG/ kcmil	Number of strands
24-30			Number of strands vary	—								
24												
22												
20												
18												
16												
14												
12			7	19								
10												
8												
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8. SECTION 12 – WIRING METHODS

12-304 Location of insulated conductors and cables – REVISED RULE

Insulated conductors and cables supported on or in close proximity to the exterior surfaces of buildings shall

- a) be installed not less than
 - i. 4 m above finished grade across driveways to residential garages;
 - ii. 5 m above finished grade across driveways to commercial and industrial premises; and
 - iii. 3.5 m above finished grade normally accessible to pedestrians only;
 - iv. have a clearance of not less than 1 m from windows, doors, balconies, or porches;
- b) not pose a hazard to persons; and
- c) be suitably protected where exposed to mechanical damage.



WHAT THIS MEANS

Rule 12-304 is revised to provide clarity and more refined rules on the installation of insulated conductors in close proximity to exterior surfaces of buildings.



8. SECTION 12 – WIRING METHODS

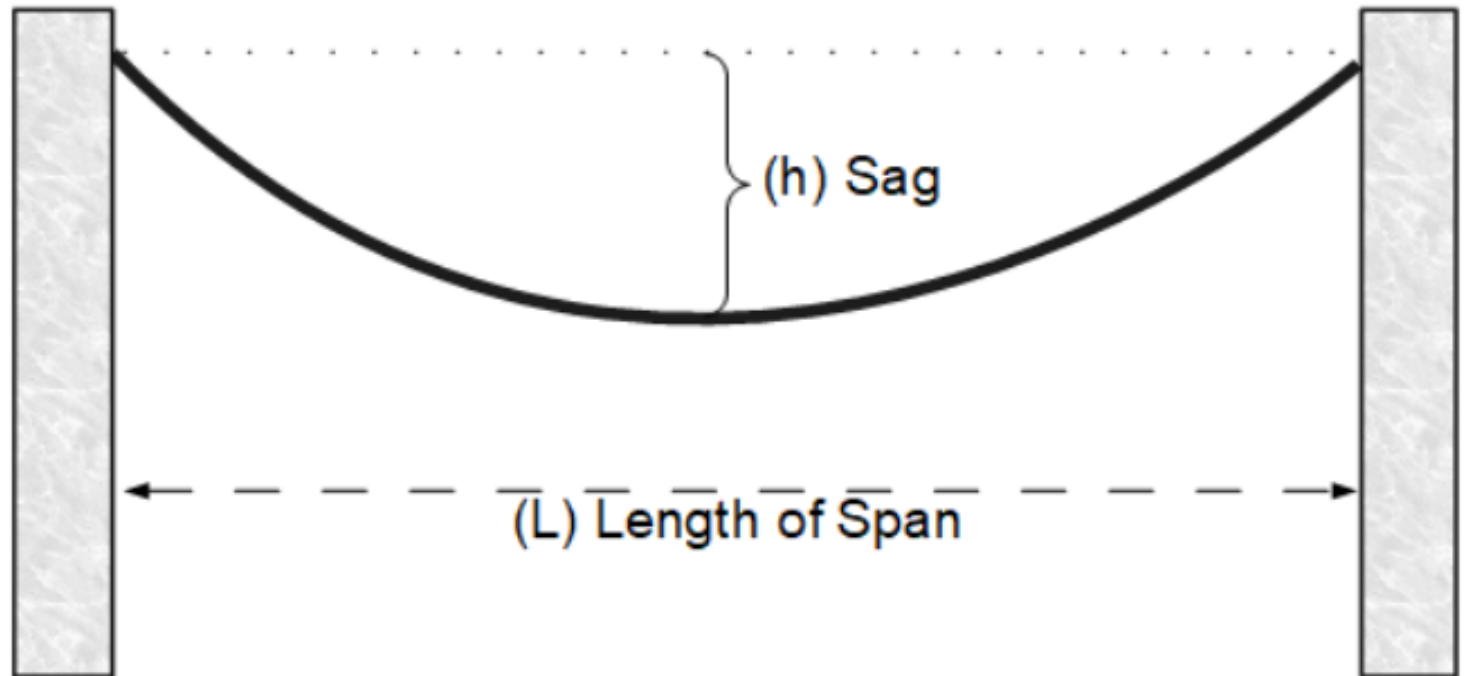
12-308 Maximum span of overhead conductors – NEW SUBRULE 3)

3) Poles used for supporting neutral supported cables shall be placed not more than 40 m apart.

WHAT THIS MEANS



This new Subrule limits the maximum span for neutral supported cables installed within the scope of the Code.



8. SECTION 12 – WIRING METHODS

12-318 Overhead installations – REMOVED SUBRULE ITEM AND ADDED SUBRULE ITEMS

- 1) When neutral supported cables are used, the following requirements shall apply:
 - ~~e) they shall be supported in spans of not more than 38 m in length;~~
 - e) they shall be supported in spans of not more than
 - i. 40 m in length when attached to other than a mobile home, relocatable structure, or similar structure; or
 - ii. 10 m in length when the final point of attachment is to a mobile home, relocatable structure, or similar structure;
 - f) the sag shall not be less than the minimum sag detailed in Table 72; and
 - g) notwithstanding Item f), the minimum sag shall be permitted to be calculated in accordance with the manufacturer's recommendations and as acceptable to the regulatory authority having jurisdiction.

NEW TABLE 72 →

WHAT THIS MEANS



This new Table provides the minimum sags for duplex, triplex, and quadruplex neutral supported cables:

1. sized 6 AWG to 336.4 kcmil;
2. with or without a bonding conductor;
3. with a full or reduced ACSR neutral, and
4. with or without a PVC jacket on the phase conductors.

See Appendix B notes for more information on how this new Table was assembled.

Table 72
Minimum sag for neutral supported cables (based on a ruling span of 40.0 m*)
 (See Rule 12-318 and Appendix B.)

		Maximum span, (m)						
Loading	Seg-ment	10.0	15.0	20.0	25.0	30.0	35.0	40.0
		Minimum sag, (m)						
Heavy	Pole to pole	0.2	0.4	0.7	1.0	1.5	2.0	2.6
	Pole to mast	0.3	0.7	1.3	2.0	See Note 1		
Severe	Pole to pole	0.2	0.6	1.0	1.6	2.3	3.1	4.1
	Pole to mast	0.4	0.9	1.7	2.7	See Note 1		

* Ruling span formula:

$Ruling\ span = average\ span + 2/3 (maximum\ span - average\ span)$

Notes:

- 1) For these installations, a calculation for minimum sag is required.
- 2) This table applies to duplex, triplex, and quadruplex neutral supported cables sized from No. 6 AWG to 336.4 kcmil with or without a bonding conductor, with a full or reduced ACSR neutral, and with or without a PVC jacket on the phase conductors.
- 3) These minimum sag values are based on a temperature range of -30 °C to 30 °C.

8. SECTION 12 – WIRING METHODS

12-320 Messenger cables – REVISED SUBRULE 4)

- 4) Messenger cables shall be **stranded construction with not less than seven strands** and be of
- a) **galvanized steel having a coating of not less than 45 g/m²**, ~~of copper-coated steel, or of stainless steel; and;~~
 - ~~b) of stranded construction with not less than seven strands.~~
 - b) **copper-coated steel;**
 - c) **all aluminum alloy 6201 conductor (AAAC);**
 - d) **aluminum conductor steel-reinforced (ACSR); or**
 - e) **stainless steel.**

WHAT THIS MEANS



This revised Subrule expands on the allowable materials to be used as messenger cables.

Messenger cable



8. SECTION 12 – WIRING METHODS

12-406 Uses of portable power cable – REVISED SUBRULE 4) ITEM c)

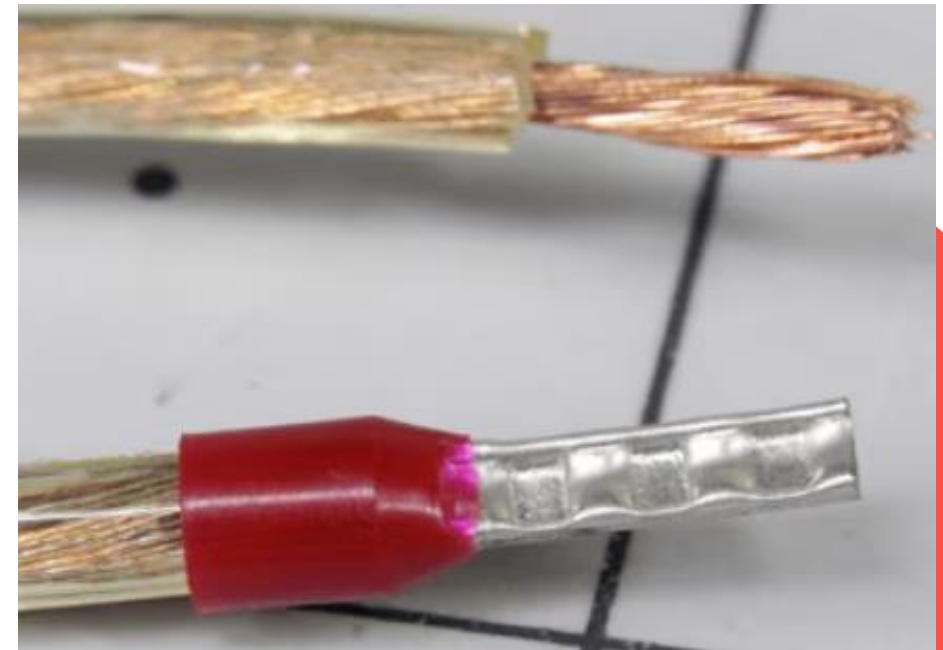
4) Notwithstanding Subrule 3) a), Type DLO cable in sizes 1/0 or larger shall be permitted to be used in permanent installations in cable tray, provided that the cable

- 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
 - i. connectors marked for use with fine-strand conductors; or
 - ii. standard connectors with the use of ferrules; and
- d) has an ampacity rating as described in Table 12E and Rule 4-004.

WHAT THIS MEANS



The revision clarifies and explicitly states that DLO cables in sizes 1/0 AWG and larger can be used in cable trays if they, along with the other items in this Subrule, terminate in either connectors marked for use with fine-strand conductors, or *ferrules*.



8. SECTION 12 – WIRING METHODS

12-406 Uses of portable power cable - NEW SUBRULE 7)

7) Portable power cables with natural rubber jackets marked “NR FOR SURFACE MINES ONLY” or “NATURAL RUBBER FOR SURFACE MINES ONLY” shall not be used where exposed to oil.



WHAT THIS MEANS

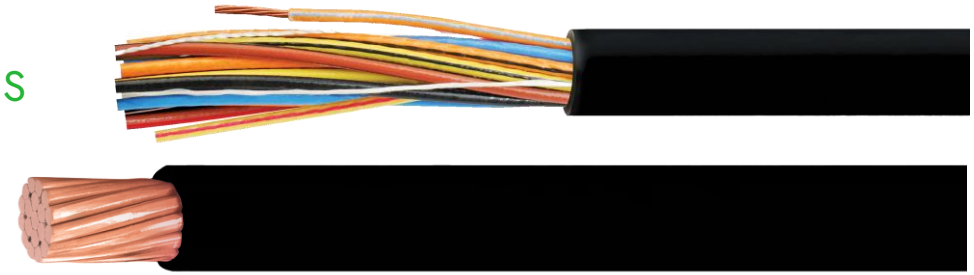
This new subrule used to be Note 12) in Table 11 and was relocated to Rule 12-406 as part of the CE Code subcommittee’s efforts to eliminate all notes in the Tables. It was also reworded to apply only to cables with natural rubber jackets marked for surface mines only.

8. SECTION 12 – WIRING METHODS

12-500 to 12-524 – NEW RULES FOR NON-METALLIC-JACKETED CABLES

12-500 Non-metallic-jacketed cable

- 1) Rules 12-500 to 12-524 apply to non-metallic-jacketed
 - a) cables other than Types NMD90 and NMWU; and
 - b) Type FAS cables installed as part of a fire alarm system in accordance with Section 32.
- 2) Rules 12-500 to 12-524 do not apply to
 - a) non-metallic-jacketed cables including Types NMD90 and NMWU that are used in Class 2 applications and are installed in accordance with Section 16;
 - b) cables and flexible cords used in accordance with Rule 12-102 4); and
 - c) mineral-insulated cable, aluminum-sheathed cable, copper-sheathed cable, and armoured cables with or without a jacket covered by Rules 12-600 and 12-700.



WHAT THIS MEANS



The 2021 CE Code Rules 12-500 to 12-526 are limited to NMD90 and NMWU. As such, it was determined that additional Rules are required for the installation of non-metallic-jacketed cables that are not NMD90 or NMWU types, such as RWU90, TWU, TWU75, TC, TC-ER, FAS, CIC, LVT, CM, CMP, CMR, CMG, CMX, CMH, CMUC, CMP-LP, CMR-LP, CMG-LP, CM-LP, CMX-LP, CMUC-LP, and CMH-LP.

Current Rules 12-500 to 12-526 have been renumbered to Rules 12-550 to 12-576 for the Types NMD90 and NMWU. New Rules 12-500 to 12-524 are added for installation of non-metallic-jacketed cables that are not NMD90 or NMWU.

8. SECTION 12 – WIRING METHODS

12-552 to 12-576 – SHIFTED RULES FOR NON-METALLIC-SHEATHED CABLE TYPES NMD90 AND NMWU

~~12-500 Non-metallic-sheathed cable Rules~~

~~Rules 12-502 to 12-526 apply only to non-metallic-sheathed cable Types NMD90 and NMWU.~~

12-550 Rules for cable Types NMD90 and NMWU

Rules 12-500 to 12-524 apply to cable Types NMD90 and NMWU.



8. SECTION 12 – WIRING METHODS

Armoured cable

12-602 Use & 12-616 Concealed armoured cable installation

Relocated details on underground and concealed installations from 12-602 to 12-616

RELOCATED/REVISED SUBRULES FROM 12-602 TO 12-616 3), 4) AND 5) :

- 3) Armoured cable without an overall jacket in which the armouring is made wholly or in part of aluminum shall not be embedded in concrete containing reinforcing steel unless
 - a) the concrete is known to contain no chloride additives; or
 - b) the armour has been treated with a bituminous base of paint or other means to prevent galvanic corrosion of the aluminum.
- 4) Where armoured cable is used in concrete or masonry, the cable shall be encased or embedded in at least 50 mm of the masonry or concrete.
- 5) Where armoured cables are laid in or under cinders or cinder concrete, they shall be protected from corrosive action by a grouting of non-cinder concrete at least 25 mm thick entirely surrounding them unless they are 450 mm or more under the cinders or cinder concrete.

WHAT THIS MEANS



These relocated and reworded Subrules provide requirements for how armoured cables shall be concealed or embedded in concrete.



8. SECTION 12 – WIRING METHODS

12-608 Continuity of armoured cable – NEW SUBRULE 2)

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

- a) the enclosure at the final point of termination is non-metallic;
- b) an electrical connection between the armour and the bonding system has been established at the supply end of the cable run; and
- c) the equipment at the final point of termination is bonded using the internal bonding conductor of the cable.



WHAT THIS MEANS

This new Subrule clarifies when the electrical continuity between a cable's armour and the equipment need not be maintained at the final point of termination.



8. SECTION 12 – WIRING METHODS

12-910 Conductors and cables in conduit and tubing – REVISED SUBRULE 4) ITEMS c) AND d) AND ADDED ITEM e)

4) The maximum number of insulated conductors or multi-conductor cables in one conduit or tubing shall be such that the insulated conductors or cables and their coverings will not result in a greater fill than that specified in Table 8, and in this determination,

...

c) the diameters and cross-sectional areas of insulated single conductors and cables shall be as indicated in Tables 6A to 6K, or as obtained by field measurement for the constructions identified in table 6A to 6K; and

d) ~~notwithstanding Item c)~~, the dimensions of uninsulated single conductors and cables shall be permitted to be obtained from ~~Tables 10A to 10D and~~ Table D5, or from field measurement ~~for the constructions identified in Tables 6A to 6K.~~; and

e) the diameters and cross-sectional areas of Type DLO cables shall be as indicated in Table 10D or as obtained by field measurement.

WHAT THIS MEANS



These revisions to 12-910 Subrule items clarify how diameters and cross-sectional areas shall be determined. Reference to Tables 10A to 10D removed for good reason, which will be reviewed in the coming slides.

Additionally, where previously absent, requirements for determining dimensions and cross-sectional areas for Type DLO cables have been included in this Subrule.



8. SECTION 12 – WIRING METHODS

12-3030 Insulated conductors in boxes, cabinets, or fittings – REVISED AND EXPANDED RULE

1) Insulated conductors that are connected to different power or distribution transformers or other different sources of voltage shall not be installed in the same box, cabinet, or fitting **unless**

a) **unless** a barrier of sheet steel not less than 1.3 mm thick or a flame-retardant, non-metallic insulating material not less than 1.6 mm in thickness is used to divide the space into separate compartments for the insulated conductors of each system;

b) **unless the insulated conductors**

- i. ~~the insulated conductors~~ are used for the supply and/or control of devices and equipment that are interconnected or dependent upon each other for proper operation and functionality;
- ii. ~~the insulated conductors~~ are insulated for at least the same voltage as that of the circuit having the highest voltage; and
- iii. ~~none of the insulated conductors~~ of the circuits of lower voltages ~~is~~ **are not** directly connected to a lighting branch circuit;

c) **unless** the insulated conductors are used for the supply of a double-throw switch in an emergency lighting system; **or**

d) **the insulated conductors are being added to an enclosure forming part of an existing installation to facilitate the installation of an alternate power supply, and the voltage of the alternate supply is equivalent to the voltage of the existing installation.**

3) **Where insulated conductors within an enclosure are connected to different sources of voltage as permitted in Item 1) d), a warning label shall be placed on the enclosure to warn persons that more than one source of supply might be present.**



WHAT THIS MEANS

Insulated conductors connected to different power transformers or having different sources of voltage may be installed in the same box or fitting as long as the installation meets the requirements of Subrule 12-3030 1) Item d) and a warning label is installed per Subrule 12-3030 3)

9. SECTION 14 – PROTECTION AND CONTROL

14-104 Rating of overcurrent devices – REVISED SUBRULE 1) ITEM 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 or 20 A overcurrent devices; or
 - c) as provided for by other Rules of this Code.

WHAT THIS MEANS



This revision clarifies that equipment wire, flexible cord in sizes 16, 18, and 20 AWG copper, and tinsel cord, may be considered protected by either a 15 A or 20 A overcurrent device.



10. SECTION 16 – CLASS 1 AND CLASS 2 CIRCUITS

16-222 Equipment located on the load side of overcurrent protection, transformers, or devices having Class 2 outputs – **REVISED TERMINOLOGY IN SUBRULE 2)**

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



WHAT THIS MEANS

This change makes the terminology consistent with the CSA Z32-21 “Electrical safety and essential electrical systems in health care facilities” standard and the terminology used in the CSA 60601/80601 family of health care standards specified in Appendix A of the Canadian Electrical Code.

10. SECTION 16 – CLASS 1 AND CLASS 2 CIRCUITS

16-310 Special Terminology **REVISED DEFINITION**

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.**

16-330 Cables and conductor ampacity

REVISED SUBRULES TO CLARIFY THAT THE AMPACITY RULES FOR COMMUNICATION CABLE BUNDLES APPLY WHEN THE BUNDLE LENGTH IS 1 M OR MORE.



WHAT THIS MEANS



With this revised definition, for two or more cables tied together or in contact with each other in a bundle to be considered a “cable bundle”, the cable lengths needs to be at least 1 m.

11. SECTION 24 – PATIENT CARE AREAS

24-102 Panelboards supplying circuits in patient care areas – NEW RULE

- 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.



WHAT THIS MEANS

This new Rule adds language and requirements for panelboards supplying circuits patient care areas.

*Note - all Rules following this new 24-102 are now pushed down in number by 2.

11. SECTION 24 – PATIENT CARE AREAS

24-104 Circuits in basic care areas – REVISED SUBRULE 8) AND ADDED 9)

8) A circuit consisting of conductors connected to communication or nurse call equipment that is installed within a patient care area shall be deemed a Class 1 circuit ~~in accordance with the applicable Rules of Section 16~~ but shall have its voltage and power limited in accordance with Rule 16–222 3).

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



WHAT THIS MEANS



Circuits in basic care areas, with the exception of those supplying multi-phase equipment, are now required to be 2-wire circuits, similar to the existing rule for intermediate and critical care areas (Rule 24-112).

11. SECTION 24 – PATIENT CARE AREAS

24-108 Receptacles in basic care areas – **REVISED SUBRULE 5)** AND **ADDED SUBRULE 8)**

5) Except for receptacles as described in Subrule 3), all ~~15-A and 20-A non-locking~~ CSA configuration 5-15R, 5-20R, 5-20RA, 6-15R, 6-20R, and 6-20RA receptacles shall be hospital grade.

8) All receptacles of CSA configuration 5-15R and 5-20R installed in areas designated by the healthcare facility administration as being intended primarily for the provision of diagnosis, therapy, or care to children shall be tamper-resistant and marked as such, except for

- a) receptacles dedicated for stationary appliances such that the receptacle is rendered inaccessible; and
- b) receptacles located above 2 m from the floor.



WHAT THIS MEANS

This addition provides more information and rules on how CSA-configuration receptacles in basic care areas in healthcare facilities shall be installed.

Receptacles installed in basic care areas designated for diagnosis, therapy, or care to children, shall now be tamper-resistant, subject to some exceptions.



12. SECTION 28 – MOTORS AND GENERATORS

Generators

28-900 – 28-904 NEW RULES

28-900 Rules for generators

Rules 28-902 to 28-914 apply to the installation of generators.

28-902 Working space

1) If the generator is provided with a generator enclosure and the working space required by Rules 2-310 and 2-308 Subrule 1) cannot be provided within the enclosure, the enclosure is permitted to be used when it is equipped with access doors where the working space is required, so that working space provisions are met.

2) Generators shall not be installed where the working space required by Subrule 1) can be obstructed by storage or vehicle parking when located in a public area.

28-904 Conductor size

1) Where the generator is designed to prevent being overloaded, the conductors from the generator output terminals to the first overcurrent protection device shall have an ampacity of not less than 100% of the nameplate current rating of the generator.

2) Where the generator is not factory-supplied with overcurrent protection, the conductors from the generator output terminals to the first overcurrent protection device shall have an ampacity of not less than 115% of the generator of the nameplate current rating.

WHAT THIS MEANS



These new Rules must be followed when installing generators within the scope of the CE Code.



13. SECTION 30 – INSTALLATION OF LIGHTING EQUIPMENT

30-310 Luminaire as a raceway – REVISED SUBRULE 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
 - 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 the insulated conductors are not smaller than No. 14 AWG and do not extend beyond the luminaires through raceways more than 2 m long.



WHAT THIS MEANS

This revision clarifies the exact equipment wire types that may be used to supply luminaires.

14. SECTION 64 – RENEWABLE ENERGY SYSTEMS, ENERGY PRODUCTION SYSTEMS, AND ENERGY STORAGE SYSTEMS

64-000 Scope – REVISED SUBRULE 1)

- 1) This Section applies to the installation of renewable energy systems, energy production systems, ~~and~~ energy storage systems ~~except where the voltage and current are limited in accordance with Rule 16-200 1) a) and b).~~, and batteries.
- 2) This Section supplements or amends the general requirements of this Code.

WHAT THIS MEANS



This revision refines the scope for this Section and adds batteries into the scope.

64-002 Special Terminology – REVISED DEFINITION

Energy storage system – a system capable of **storing energy and** supplying electrical energy to local power loads, or operating in parallel with a supply authority system or any other power sources.



WHAT THIS MEANS

Revised definition to clarify that an energy storage system does not only supply electrical energy but is also capable of storing it (who would have thought?!)

14. SECTION 64 – RENEWABLE ENERGY SYSTEMS, ENERGY PRODUCTION SYSTEMS, AND ENERGY STORAGE SYSTEMS

64-218 Photovoltaic rapid shutdown – NEW SUBRULE 5)

- 5) Rapid shutdown of a photovoltaic system shall be permitted to be automatically initiated by a building fire alarm system provided
- a) the fire alarm system is installed in a building in accordance with the National Building Code of Canada; and
 - b) a label is installed at the fire alarm annunciator panel and at the fire alarm control panel indicating that rapid shutdown of the photovoltaic system is initiated by the fire alarm system.

WHAT THIS MEANS



There is now an option for initiating rapid shutdown of a photovoltaic system by using a building's fire alarm system.



14. SECTION 64 – RENEWABLE ENERGY SYSTEMS, ENERGY PRODUCTION SYSTEMS, AND ENERGY STORAGE SYSTEMS

64-812 Battery interconnections – NEW SUBRULE 5)

- 1) Insulated conductors and cables used to terminate to battery terminals shall be of the **flexible** fine strand type.
- 2) The connection method between batteries shall be permitted to be insulated or bare busbars.
- 3) Flexible metal raceways shall not be permitted for battery interconnections.
- 4) Conductors shall have sufficient ampacity for the maximum load.
- 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.



WHAT THIS MEANS

The revision to Subrule 1) clarifies that *flexible* fine stranded conductors are required for terminating to battery terminals. The new Subrule 5) provides requirements for securing these insulated flexible conductor and cable terminations to minimize movement due to short circuits.

14. SECTION 64 – RENEWABLE ENERGY SYSTEMS, ENERGY PRODUCTION SYSTEMS, AND ENERGY STORAGE SYSTEMS

Energy storage systems – General

64-902 - 64-926 – REVISED RULES TO BE GENERAL IN NATURE COVERING SELF-CONTAINED AND FIELD-ASSEMBLED ENERGY STORAGE SYSTEMS

Energy storage systems utilizing batteries – General

64-1000 - 64-1004 – NEW RULES COVERING ENERGY STORAGE SYSTEMS USING BATTERIES

Installation of energy storage systems at residential occupancies

64-1100 - NEW RULES COVERING ENERGY STORAGE SYSTEMS AT RESIDENTIAL OCCUPANCIES !

WHAT THIS MEANS



Large batteries may now be installed indoors if they meet certain performance requirements and are in rooms that adhere to fire safety guidelines.



15. SECTION 66 – AMUSEMENT PARKS, MIDWAYS, CARNIVALS, FILM AND TV SETS, TV REMOTE BROADCASTING LOCATIONS, AND TRAVELLING SHOWS

66-400 Wiring methods – REVISED SUBRULE 3)

- 3) Cords shall be of the hard-usage type, in good repair, and
- a) provided with strain relief where they enter into enclosures and plug-in connectors;
 - b) if exposed to the weather, be of a type suitable for outdoor use; and
 - c) where plug-in connections are used,
 - i) have connectors and receptacles that are rated in amperes and designed so that differently rated devices cannot be connected together;
 - ii) have the female connector attached to the load end of the cord; ~~and~~
 - iii) be polarized if an ac multi-conductor connector is used; ~~and~~
 - iv) be protected by a ground fault circuit interrupter of the Class A type where utilized outdoors or in damp locations at itinerant midways, carnivals, fairs, and festivals, and connected to a receptacle of CSA configuration 5-15R or 5-20R.



WHAT THIS MEANS

Where plug-in connections are used, cords of the hard-usage type installed outdoors shall be protected by a Class A GFCI.

15. SECTION 66 – AMUSEMENT PARKS, MIDWAYS, CARNIVALS, FILM AND TV SETS, TV REMOTE BROADCASTING LOCATIONS, AND TRAVELLING SHOWS

Single-conductor cables

66-456 Single-conductor cables connections – REVISED RULE AND SUBRULES



- 1) Connections to single-conductor cables shall not be accessible to unqualified persons.
- 2) Plug-in connectors for single-conductor cables shall
 - a) be of a locking type;
 - b) incorporate a mechanical interlock to prevent wrong connections or be colour-coded in accordance with Subrule 3);
 - c) be fully engaged when connected; and
 - ~~e)~~d) have all connections that are not in use covered with a seal or cap that is acceptable.
- 3) When colour coding is required by Subrule 2) b),
 - a) bonding connectors shall be identified with green colouring;
 - b) neutral connectors shall be identified with white colouring;
 - c) phase connectors shall be identified with
 - i) red, black, blue colouring; or
 - ii) orange, brown, yellow colouring which shall be permitted only on systems greater than 150 V to ground;
 - d) circuits shall be identified with
 - i) any phase colour for 2 wire phase to neutral circuits;
 - ii) any two phase colours for single phase circuits on single or 3-phase systems; and
 - iii) any two phase colours for phase to phase-to-phase individual loads; and
 - e) colour coding shall be accomplished by
 - i) manufactured coloured connectors; or
 - ii) connectors that are tape coloured for their entire length except for 30 mm from the mating end.

15. SECTION 66 – AMUSEMENT PARKS, MIDWAYS, CARNIVALS, FILM AND TV SETS, TV REMOTE BROADCASTING LOCATIONS, AND TRAVELLING SHOWS

Single-conductor cables

66-456 Single-conductor cables connections – REVISED RULE

4) Where single conductor cables utilizing plug-in connectors are connected to circuits with voltages greater than 150 V to ground, the circuit voltage shall be identified with a label that is

- a) securely attached to each connector or connection point; and
- b) resistant to damage from the environment in which it is placed.



~~3~~5) Single-conductor cables shall not be connected in parallel except as a means of reducing voltage drop, and cables so connected shall have overcurrent protection sized to protect the cable having the smallest ampacity as though it were used alone.

~~4~~ 6) Tapping tees, paralleling tees, or rigid turnarounds shall

- a) not be directly connected to any single-pin plug or connector rigidly housed or mounted in a multiple-connection device;
- b) not be directly connected to a panel mount inlet or outlet or to a multiple-connection device with a cable less than 2 m in length; and
- c) be arranged so that no mechanical strain is imposed on the connection.

~~5~~7) In-line single-conductor cable connections forming part of a circuit of more than 150 volts-to-ground shall be mechanically protected by enclosing the connector(s) in a lockable, non-conductive box or similar enclosure.

~~6~~ 8) The lockable enclosure referred to in Subrule 7) shall

- a) be labelled on the outside, in a conspicuous, legible, and permanent manner, identifying the supply voltage of the circuit; and
- b) be acceptable.

16. SECTION 68 – POOLS, TUBS, AND SPAS

General

68-050 Special terminology – NEW DEFINITION

Conductive pool shell – a rigid encasing structure that is made of metal, concrete, or other conductive material and that contains the pool water.

68-058 Pool Bonding – REVISED SUBRULES

WHAT THIS MEANS



Utilities and customers within Canada are constantly experiencing challenges due to the change in construction methods of pools. These problems include differences in potential between the various areas around the pool leading to stray voltage issues, shock risks and enforcement challenges with the new constructions. The new requirements in 68-058 help address some of these concerns.



16. SECTION 68 – POOLS, TUBS, AND SPAS

General

68-072 Disconnecting means for pool pumps, spas, and hot tubs – **NEW RULE**

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

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



WHAT THIS MEANS

When installing pool equipment, make sure you review these new rules for disconnecting means.



17. SECTION 86 – ELECTRIC VEHICLE CHARGING SYSTEMS

General

86-102 Voltages in electric vehicle supply equipment installations – REVISED RULE

~~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 V dc, provided
 - 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.

WHAT THIS MEANS



This rule has been revised to reflect the new voltage definitions in Section 0 for both ac and dc systems along with additional requirements specific to EVSE.

18. TABLE REVISIONS/ADDITIONS/DELETIONS

Tables 6A though 6K – REVISED

Tables	Changes
Table 6A	Dimensions of single Class B R90XLPE, RW75XLPE, RW90XLPE, and RPV90 unjacketed 600 V insulated conductors and cables for calculating conduit and tubing fill
Table 6B	Dimensions of single Class B R90XLPE, RW75XLPE, RW90XLPE, and RPV90 unjacketed 1000 V insulated conductors and cables for calculating conduit and tubing fill
Table 6C	Dimensions of single Class B R90XLPE, RW75XLPE, R90EP, RW75EP, RW90XLPE, RW90EP, and RPV90 jacketed 600 V insulated conductors and cables for calculating conduit and tubing fill
Table 6D	Dimensions of single Class B TWU, TWU75, RWU90XLPE unjacketed, and RPVU90 jacketed 1000V conductors and cables for calculating conduit and tubing fill
Table 6E	Dimensions of single Class B RPVU90 unjacketed 1000 V and 2000 V conductors and cables for calculating conduit and tubing fill
Table 6F	Dimensions of single Class B RPVU90 jacketed 1000 V and 2000 V conductors and cables for calculating conduit and tubing fill
Table 6G	Dimensions of single Class B RPV90 unjacketed 2000 V insulated conductors and cables for calculating conduit and tubing fill
Table 6H	Dimensions of single Class B RPV90 jacketed 1000 V insulated conductors and cables for calculating conduit and tubing fill
Table 6I	Dimensions of single Class B RPV90 jacketed 2000 V insulated conductors and cables for calculating conduit and tubing fill
Table 6J	Dimensions of single Class B TW, TW75 insulated conductors and cables for calculating conduit and tubing fill
Table 6K	Dimensions of single Class C TWN75, T90 NYLON insulated conductors and cables for calculating conduit and tubing fill

WHAT ARE SOME THINGS THAT CHANGED?

1. Included cable type in Table name
2. Corrected the use of words “insulated conductors” and “cables” as defined in Section 0
3. Increased font size & removed 30 – 100 # of conductors columns
4. Corrected Class designation in Table 6K
5. Add RPV 600V jacketed and unjacketed, and RPV 1000V unjacketed
6. Appendix B notes for Table 6A to 6K have been revised.

18. TABLE REVISIONS/ADDITIONS/DELETIONS

Tables 9A through 9G – REVISED

Table	Changes
Table 9A	Internal diameter and cross-sectional areas of various trade conduit and tubing
Table 9C	Internal diameter and maximum conductor cross-sectional areas allowable fill at 53% for various trade conduit and tubing used for one conductor or multi-conductor cable (not lead-sheathed)
Table 9E	Internal diameter and maximum conductor cross-sectional areas allowable fill at 31% for various trade conduit and tubing used for two conductors or multi-conductor cables (not lead-sheathed)
Table 9G	Internal diameter and maximum conductor cross-sectional areas allowable fill at 40% for various trade conduit and tubing used for three or more conductors or multi-conductor cables (not lead-sheathed)

Tables 10A, 10B, and 10C – DELETED



WHAT CHANGED?

1. Information from Tables 10A, 10B, and 10C have been incorporated into the Table 6 series removing ambiguity and redundancy
2. Appendix B note for Tables 10A, 10B, 10C and 10D have been revised and moved to Tables 6A to 6K.

WHAT CHANGED?

Added additional dimensions for EMT trade sizes 129 and 155.



18. TABLE REVISIONS/ADDITIONS/DELETIONS

Table 19 – REVISED

Table 19

Conditions of use for insulated conductors and cables other than flexible cords, portable power cables, and equipment wires

OVERVIEW OF REVISIONS



Item	Changes
1	Recognize non-metallic jacketed cables and align with changes to Rule 12-500.
2	The heading “Maximum conductor temperature (unless otherwise marked)” was revised to read “Maximum conductor temperatures, °C” and all possible temperature ratings for each product type were added.
3	Revised conditions for installation for a few cable types including TC and TC-ER.
4	Replaced term “unarmoured” to align with Code language
5	Corrected Code references for FAS cables
6	Aligned term “metal sheathed cables” with existing standards
7	For communication cables, reference to Rule 12-2202 is no longer needed with new Rule 12-504.

18. TABLE REVISIONS/ADDITIONS/DELETIONS

Table 53 – Minimum cover requirements for direct buried cables or insulated conductors in raceways... **REVISED VOLTAGE TERMINOLOGY**

OLD TABLE

Table 53
Minimum cover requirements for direct buried cables or insulated conductors in raceways
(See Rule 12-012.)

Wiring method	Minimum cover, mm			
	Non-vehicular areas		Vehicular areas	
	750 V or less	Over 750 V	750 V or less	Over 750 V
Cable not having a metal sheath or armour	600	750	900	1000
Cable having a metal sheath or armour	450	750	600	1000
Raceway	450	750	600	1000

Note: Minimum cover means the distance between the top surface of the conductor, cable, or raceway and the finished grade.

REVISED TABLE

Table 53
Minimum cover requirements for direct buried cables or insulated conductors in raceways
(See Rule 12-012.)

Wiring method	Minimum cover, mm			
	Non-vehicular areas		Vehicular areas	
	Low voltage and extra-low voltage	High voltage	Low voltage and extra-low voltage	High voltage
Cable not having a metal sheath or armour	600	750	900	1000
Cable having a metal sheath or armour	450	750	600	1000
Raceway	450	750	600	1000

Note: Minimum cover means the distance between the top surface of the conductor, cable, or raceway and the finished grade.

18. TABLE REVISIONS/ADDITIONS/DELETIONS

Table 61 - REVISED TITLE AND VOLTAGE TERMINOLOGY

OLD TABLE

Table 61 Minimum buried cable horizontal separations from pools (See Rule 68-056.)		
Type of installation	Minimum horizontal separation, m	
	Direct buried unjacketed cable with 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

REVISED TABLE

Table 61 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	
	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		
0-1000 V	1.5	1.0
1001-15 000 V	3.0	1.5
15 001-28 000 V	6.0	2.0

18. TABLE REVISIONS/ADDITIONS/DELETIONS

Table 67 – Clearance requirements for installed space heating systems – **REVISED TABLE AND ADDED NEW NOTE**

Revised wording to provide clarification on minimum clearance distance and added minimum clearance requirements for floor, wall and ceiling installations of space heating systems.

A **NEW NOTE** addressing receptacles above surface-mounted heaters is included reading:

Surface-mounted electric heaters (e.g., baseboard heaters) shall have a minimum clearance of 1.2 m below receptacles. However, if the heaters are guarded to prevent direct contact with hot surfaces, then only the 200 mm clearance is required.

Heating system type and location	Minimum clearance distance, mm	Clearance details
All systems, including heating fixtures; trace heater sets; heating panel sets; heating device sets	100	From protrusions such as pipes and ducts.
	200	From electrical outlets to which a luminaire or other heat-producing equipment is liable to be connected. From receptacles and switches (see note). From other heating devices, unless otherwise rated.
Floor systems above subfloors, for trace heater sets or heating panel sets	50	From walls, partitions, and permanently fixed cabinetry.
Floor systems under subfloors, for trace heater sets or heating panel sets	50	Air gap between bottom of subfloor and heating device sets, unless otherwise rated.

Wall systems for trace heater sets or heating panel sets	0	From the finished wall surface if located not more than 1.2 m above the floor, provided it is marked "Mechanically Protected" and protected by a Class A GFCI.
	50	From the top and side surfaces of permanently fixed cabinetry. From the finished wall surface (both sides of wall).
	150	From ceiling, floor, and other wall corners. From partitions, bottom surfaces of permanently fixed cabinetry, door and window frames, or other thermal obstructions, unless otherwise rated.
Ceiling systems for trace heater sets or heating panel sets	0	From the finished ceiling surface, provided it is marked "mechanically protected" or protected by a Class A GFCI.
	50	From glass walls and window walls. From the finished ceiling surface.
	150	From corners, partitions, and adjacent surfaces, and not overlapping permanently fixed cabinetry or other thermal obstructions, unless otherwise rated.

Note: Surface-mounted electric heaters (e.g., baseboard heaters) shall have a minimum clearance of 1.2 m below receptacles. However, if the heaters are guarded to prevent direct contact with hot surfaces, then only the 200 mm clearance is required.

18. TABLE REVISIONS/ADDITIONS/DELETIONS

Appendix D

Table D3 – **REVISED TABLE**

Table D4 – **DELETED TABLE**

This newly revised table creates a more precise voltage drop factor.

It clarifies the application of Table D3 for 3-phase and dc systems as well as loads with less than unity power factor and conductor arrangement.

- A voltage drop formula is included under Note 1).
- A voltage drop factor Table has been developed and included under Note 2) to clearly identify the system and circuits for which a voltage drop calculation is being performed.
- New Notes 3) – 6)

It addresses technical issues such as the use of percentage of allowable ampacity in calculating voltage drop. It uses conductor resistance under operating conditions to calculate voltage drop. It also addresses the revised ampacity Tables 1 - 4 (Particularly the 90C ampacities which changed in the 2012 Code and created discrepancies with Table D3).

This new Table D3 addresses both copper and aluminum conductors and a wider conductor size range.

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.)

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	9.67	—	—	—	—	—	—
12	6.38	6.38	6.25	6.1	6.26	6.11	10.5	10.5	10.3	10	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	2.5	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	1.65	1.65	1.63	1.6	1.64	1.61
3	0.792	0.792	0.797	0.787	0.801	0.792	1.3	1.31	1.3	1.27	1.3	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	0.5	0.5	0.512	0.509	0.516	0.515	0.82	0.82	0.823	0.812	0.827	0.818
1/0	0.395	0.396	0.41	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	0.53	0.528
3/0	0.249	0.251	0.267	0.27	0.271	0.275	0.408	0.409	0.42	0.419	0.424	0.425
4/0	0.197	0.2	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	0.14	0.144	0.162	0.167	0.166	0.172	0.229	0.231	0.247	0.249	0.25	0.255
350	0.12	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	0.14	0.172	0.175	0.191	0.195	0.195	0.201
500	0.0836	0.0912	0.11	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	0.14	0.147
750	0.0558	0.0668	0.085	0.0915	0.0889	0.097	0.0916	0.0968	0.115	0.121	0.119	0.126
1000	0.0417	0.0558	0.0739	0.0805	0.0778	0.086	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.

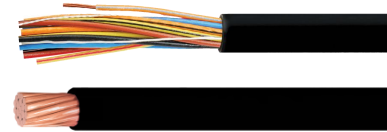
‡ Random single conductors pulled in raceway or laid flat and touching.

TAKEAWAYS

Key changes in this edition of the Code include (but are not limited to) –



New requirements for marking of panelboards when a change is made



New requirements dedicated for non-metallic jacketed cables



New rules for bonding and grounding of equipment to improve safety



New requirements for EVSE load calculations, demand factors, and EVEMS to help prepare buildings for more electric vehicles

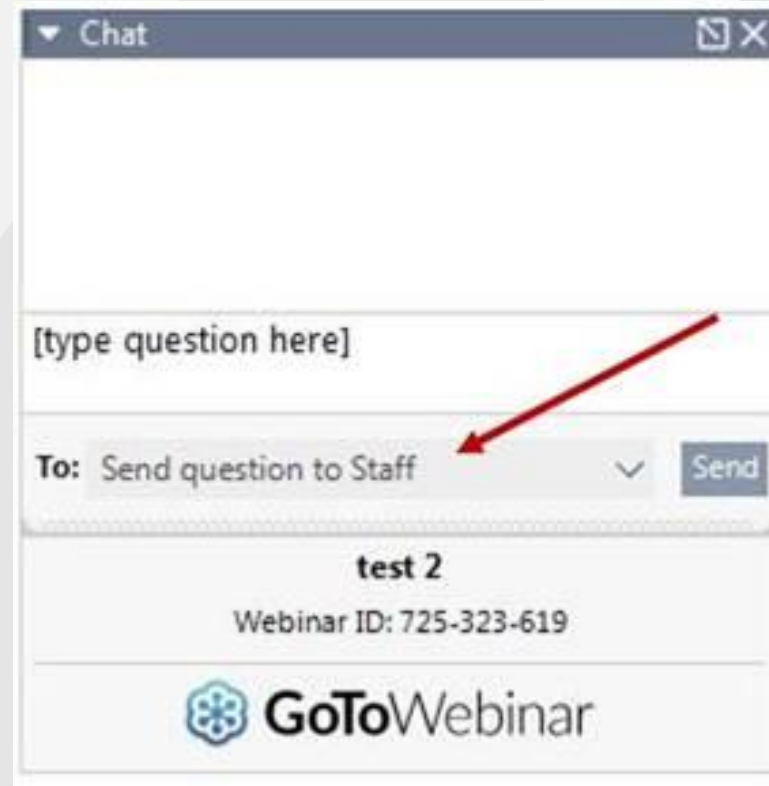


New electrical safety requirements for healthcare facilities extended to basic care areas



New requirements for larger batteries permitting installation in homes

Q&A



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