C22.1HB-15

CANADIAN ELECTRICAL CODE HANDBOOK

AN EXPLANATION OF THE RULES OF THE CANADIAN ELECTRICAL CODE, PART I

2015

CSA Group

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CE Code Handbook

An Explanation of Rules of the Canadian Electrical Code, Part I

CSA Group

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- *The* Canadian Electrical Code, Part I*, is a voluntary code for adoption and enforcement by regulatory authorities.*
- *The* Canadian Electrical Code, Part I, *meets the fundamental safety principles of International Standard IEC 60364-1,* Low-voltage electrical installations.
- *Consult with local authorities regarding regulations that adopt and/or amend the Code.*

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Contents

Introduction to the *CE Code Handbook*

This Handbook provides background information on the reasons behind the requirements in the *Canadian Electrical Code, Part I*, and gives an explanation of the Rules in plain, easy-to-understand language. The Handbook is intended to provide a clearer understanding of the safety requirements of the Code.

The content of this Handbook is not meant to form a code of mandatory requirements. The mandatory language ("shall") that is used in the *CE Code, Part I*, has not been used here. Care has been taken to ensure that the intent of the Code Rules is clear to the users of the Handbook. However, users of the Handbook must not under any circumstances rely on it to determine the current requirements of the Code. As always, reference must be made to the Code itself and any local amendments. CSA does not assume responsibility for any errors or omissions resulting from the information contained in this Handbook.

The Rules in the *CE Code, Part I*, are divided into two groups. Sections 0 to 16 and 26 are considered General Sections, and the other Sections supplement or amend those General Sections. Therefore a requirement in the supplementary Sections takes precedence over a general requirement. For example,

- Rule 12-1008 requires three threads to be engaged when making a threaded connection, whereas Rule 18-102 requires five threads to be engaged when making a threaded connection in a Zone 1 area.
- Section 4 permits the use of aluminum conductors, but Rule 32-100 does not allow aluminum conductors to be used in fire alarm systems.

About the development of the *CE Code Handbook*

The Rationale and Intent for the first edition of this Handbook (1990) were researched and written by technical experts selected for their experience and knowledge of the subject. Their contributions were reviewed by a panel consisting of experienced inspection authorities, manufacturers, and educators responsible for teaching the *CE Code, Part I*. Technical experts developed the figures and schematics for each Section.

In the second edition of the Handbook (1994), changes were made to the Rationale and Intent, based on the deliberations of technical experts, members of the Subcommittees, and the members of the Committee on *Canadian Electrical Code, Part I*. In that edition, additional information was added in some areas under the heading "Field Considerations". Field considerations consisted of nonmandatory information to consider in the field, to ensure safe installation.

In the third edition of the Handbook (1998), changes were made to the Rationale and Intent, based on the deliberations of technical experts, members of the Subcommittees, and the members of the Committee on *Canadian Electrical Code, Part I*. Supplementary information was added in some areas under the heading "Field Considerations".

In the fourth edition of the Handbook (2002), similar changes were made to the Rationale and Intent, based on the deliberations of technical experts, members of the Subcommittees, and the members of the Committee on *Canadian Electrical Code, Part I*. Many detailed figures were added; the General Sections were rewritten in a simpler format; and other information was added under the heading "Field Considerations".

In the fifth edition of the Handbook (2006), the Rationale, Intent, and Field Considerations were consolidated to provide a more user-friendly explanation of the Code Rules. Additional figures were provided, as well as more examples and calculations to help the user put the Code into practice.

In the sixth edition of the Handbook (2009), the content was reviewed to ensure that it was both useful and accessible to the reader. Where the Handbook commentary on a specific Code Rule in previous editions provided little or no information beyond what was given in the Code itself, the Handbook commentary was deleted. Therefore, the sixth edition of the Handbook, unlike its predecessors, did not contain commentary on every Code Rule.

In the seventh edition of the Handbook (2012), significant revisions were made to address the extensive changes introduced in the 2012 edition of the Code. These changes affected most areas of the electrical industry. The changes included major updates to Section 50 on solar photovoltaic systems; a new Section 64 on

renewable energy systems; several new conductor types and wiring methods; changes in ampacity calculations; revised and clarified grounding and bonding requirements; new requirements for receptacles; and new and revised requirements for electric vehicle charging infrastructure, hazardous locations, and electric heating.

In this, the eighth edition of the Handbook (2015), significant revisions have been made to address the extensive changes and the rewrite of Sections 18, 62, and 64 in the 2015 edition of the Code. These include changes in

- calculating conductor ampacity;
- voltage drop calculations;
- the sizing of bonding conductors;
- the selection of material for grounding conductors;
- the use of arc-fault circuit interrupters in dwelling units;
- the use of demonstrated loads in calculating the minimum ampere rating of services and feeders in occupancies other than dwelling units and apartment buildings;
- the use of ground fault circuit interrupters in marinas;
- the use of 320 A meter bases;
- determining the maximum number of conductors in conduit and tubing; and
- the disconnecting requirements for generators.

January 2015

Notes:

(1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*

(2) *Although the intended primary application of this Special Publication is stated in its Introduction, it is important to note that it remains the responsibility of the users of this Special Publication to judge its suitability for their particular purpose.*

(3) *All enquiries regarding this Special Publication should be addressed to CSA Group, 178 Rexdale Blvd., Toronto, Ontario, Canada M9W 1R3.*

Excerpt from the Preface to the *CE Code, Part I*

This twenty-third edition of the *Canadian Electrical Code, Part I,* was approved by the Committee on the *Canadian Electrical Code, Part I*, and by the Regulatory Authority Committee at their June 2014 meetings in Charlottetown, Prince Edward Island. This twenty-third edition supersedes the previous editions, published in 2012, 2009, 2006, 2002, 1998, 1994, 1990, 1986, 1982, 1978, 1975, 1972, 1969, 1966, 1962, 1958, 1953, 1947, 1939, 1935, 1930, and 1927.

This edition features important revisions to many Sections. Section 4 now contains requirements for high-voltage cable ampacities and clarified Rules for conductor termination temperature. In addition, a new table (Table 39) simplifies residential service and feeder conductor selection. More options are provided for load and voltage drop calculations.

Bonding conductor selection has been clarified through the addition of the new Tables 16A and 16B. In addition, Section 12 contains many new and revised requirements for wiring methods, and the conduit fill tables have been expanded.

Section 18 has undergone major revisions. Requirements for Class II and Class III locations have been relocated to Appendix J, and requirements for explosive dust atmospheres based on IEC Zone 20, Zone 21, and Zone 22 have been added to Section 18. The requirements are now located as follows:

Zones 0, 1, 2, 20, 21, and 22	Section 18
Classes I, II, and III and associated Divisions	Appendix J

Note: *References to Class I alone are intended as general references to all classifications of explosive gas atmospheres, Zone 0, Zone 1, and Zone 2.*

References to Class II alone or to Class III alone are intended as general references to all classifications of explosive dust atmospheres, Zone 20, Zone 21, and Zone 22.

Specific references to a Zone of a Class I location are references to that Zone.

There are currently no references to Zones or Divisions of Class II or Class III locations in the body of the Rules of this Code (i.e., Sections 0 to 86).

Other revisions in this edition include the following:

- requirements for arc-fault protection have been expanded and clarified;
- Section 50 has been merged with Section 64;
- Section 62 has been completely rewritten; and
- the term "injury" has been replaced with "damage" throughout the Code.

Many of the changes in this edition were developed by cross-functional working groups. Their work is gratefully acknowledged.

General arrangement

The Code is divided into numbered Sections, each covering some main division of the work. Sections 0 to 16 and 26 are considered general Sections, and the other Sections supplement or amend the general Sections. The Sections are divided into numbered Rules, with captions for easy reference, as follows:

(a) **Numbering system** — With the exception of Section 38, even numbers have been used throughout to identify Sections and Rules. Rule numbers consist of the Section number separated by a hyphen from the 3- or 4-digit figure. The intention in general is that odd numbers may be used for new Rules required by interim revisions. Due to the introduction of some new Rules and the deletion of some existing Rules during the revision of each edition, the Rule numbers for any particular requirement are not always the same in successive editions.

(b) **Subdivision of Rules** — Rules are subdivided in the manner illustrated by Rules 8-204 and 8-206, and the subdivisions are identified as follows:

00-000	Rule
(1)	Subrule
(a)	Item
(i)	Item
(A)	Item

(c) **Reference to other Rules, etc.** — Where reference is made to two or more Rules (e.g., Rules 10-200 to 10-206), the first and last Rules mentioned are included in the reference. Where reference is made to a Subrule or Item in the same Rule, only the Subrule number and/or Item letter and the word "Subrule" or "Item" need be mentioned. If the reference is to another Rule or Section, then the Rule number and the word "Rule" shall be stated (e.g., "Rule 10-200(3)" and not "Subrule (3) of Rule 10-200").

The history and operation of the *Canadian Electrical Code, Part I*

The preliminary work in preparing the Canadian Electrical Code began in 1920 when a special committee, appointed by the main Committee of the Canadian Engineering Standards Association, recommended its development. A third meeting of this Committee was held in June 1927 with representatives from Nova Scotia, Québec, Ontario, Manitoba, Saskatchewan, and British Columbia in attendance. At this meeting, the revised draft, which had been discussed at the previous two meetings, was formally approved and it was resolved that it be printed as Part I of the *Canadian Electrical Code*.

The Committee on the *CE Code, Part I*, is composed of 41 members, with representation from inspection authorities, industry, utilities, and allied interests. The main Committee meets once a year and deals with reports that have been submitted by the Section Subcommittees, which work under the jurisdiction of the main Committee. Suggestions for changes to the Code may be made by any member of the Committee or anyone outside the Committee as outlined in Clause C6.

Metric units

Symbols and conversion factors for SI units

Recognized symbols for SI units are used in the *Canadian Electrical Code, Part I*. For the convenience of the user, these symbols and the units they represent have been listed in the following table; the table also gives a multiplying factor that may be used to convert the SI unit to the previously used unit.

Symbol	SI unit	Multiplying factor for conversion to previously used unit	Previously used unit
A	ampere(s)	1	ampere(s)
cm^3	cubic centimetre(s)	0.061	cubic inch(es)
°(s)	degree(s) (angle)	1	degree(s) (angle)
°C rise	degree(s) Celsius	1.8	degree(s) Fahrenheit
°C temperature	degree(s) Celsius	1.8 plus 32	degree(s) Fahrenheit
h	hour(s)	1	hour(s) (time)
Hz	hertz	1	cycles per second
J	joule(s)	0.7376	foot-pound(s)
kg	kilogram(s)	2.205	pound(s)
kJ	kilojoule(s)	737.6	foot-pound(s)
km	kilometre	0.621	mile(s)
kPa	kilopascal(s)	0.295	inch(es) of mercury
		0.334	feet of water
		0.145	pound(s) per square inch (psi)
kW	kilowatt	3415.179	BTU/h
lx	lux	0.093	foot-candle(s)
L	litre	0.220	gallon(s)
m	metre(s)	3.281	feet
m^2	square metre(s)	10.764	square feet
m^3	cubic metre(s)	35.315	cubic feet
MHz	megahertz	1	megacycles per second
min	minute(s)	1	minute(s)
mL	millilitre(s)	0.061	cubic inch(es)
mm	millimetre(s)	0.03937	inch(es)
mm^2	square millimetre(s)	0.00155	square inch(es)
N•m	newton•metre	8.85	pound-force inches
Ω	ohm(s)	1	ohm(s)
Pa	pascal(s)	0.000295	inch(es) of mercury
		0.000334	feet of water
		0.000145	pounds per square inch (psi)
V	volt(s)	1	volt(s)
W	watt(s)	1	watt(s)
μF	microfarad(s)	1	microfarad(s)

Conduit sizes

Starting in the 2006 edition of the Code, the metric trade designator has been used exclusively to identify conduit size. The following table is provided for convenience only.

Conduit trade sizes

Inches	Metric designator
3/8	12
1/2	16
3/4	21
1	27
1-1/4	35
1-1/2	41
2	53
2-1/2	63
3	78
3-1/2	91
4	103
5	129
6	155
8	200

Reference publications

The *Canadian Electrical Code, Part I* refers to the following publications, and the year dates shown indicate the latest editions available at the time the Code was approved:

CSA Group
6.19-01 (R2011), *Residential carbon monoxide alarming devices*
ASME A17.1-2013/CSA B44-13, *Safety code for elevators and escalators*
CSA B44.1-14/ASME A17.5-2014, *Elevator and escalator electrical equipment*
B52-13, *Mechanical refrigeration code*
CAN/CSA-B72-M87 (R2013), *Installation code for lightning protection systems*
B108-14, *Compressed natural gas fuelling stations installation code*
B137 Series-13, *Thermoplastic pressure piping compendium*
B149.1-10, *Natural gas and propane installation code*
B149.2-10, *Propane storage and handling code*
B355-09 (R2013), *Lifts for persons with physical disabilities*
CAN/CSA-B613-00 (R2012), *Private residence lifts for persons with physical disabilities*
CAN/CSA-C22.2 No. 0-10, *General requirements — Canadian Electrical Code, Part II*
C22.2 No. 1-04, *Audio, video, and similar electronic equipment* (withdrawn)
C22.2 No. 3-M1988 (R2014), *Electrical features of fuel-burning equipment*
CAN/CSA-C22.2 No. 4-04 (R2014), *Enclosed and dead-front switches*
C22.2 No. 5-13, *Molded-case circuit breakers, molded-case switches, and circuit-breaker enclosures*
C22.2 No. 14-13, *Industrial control equipment*
C22.2 No. 18.1-13, *Metallic outlet boxes*
C22.2 No. 18.2-06 (R2011), *Nonmetallic outlet boxes*
C22.2 No. 22-M1986 (R2013), *Electrical equipment for flammable and combustible fuel dispensers*
C22.2 No. 25-1966 (R2014), *Enclosures for use in Class II Groups E, F, and G hazardous locations*
C22.2 No. 29-11, *Panelboards and enclosed panelboards*
C22.2 No. 30-M1986 (R2012), *Explosion-proof enclosures for use in Class I hazardous locations*
C22.2 No. 41-13, *Grounding and bonding equipment*
C22.2 No. 42-10, *General use receptacles, attachment plugs, and similar wiring devices*
C22.2 No. 42.1-13, *Cover plates for flush-mounted wiring devices*
C22.2 No. 45.1-07 (R2012), *Electrical rigid metal conduit — Steel*
C22.2 No. 46-13, *Electric air-heaters*
C22.2 No. 56-13, *Flexible metal conduit and liquid-tight flexible metal conduit*
C22.2 No. 64-10, *Household cooking and liquid-heating appliances*
C22.2 No. 65-13, *Wire connectors*
C22.2 No. 77-14, *Motors with inherent overheating protection*
C22.2 No. 82-1969 (R2013), *Tubular support members and associated fittings for domestic and commercial service masts*
C22.2 No. 83-M1985 (R2013), *Electrical metallic tubing*
C22.2 No. 83.1-07 (R2012), *Electrical metallic tubing — Steel*
C22.2 No. 85-14, *Rigid PVC boxes and fittings*
C22.2 No. 100-14, *Motors and generators*
C22.2 No. 106-05 (R2010), *HRC-miscellaneous fuses*
C22.2 No. 107.1-01 (R2011), *General use power supplies*
C22.2 No. 111-10, *General-use snap switches*
C22.2 No. 124-04 (R2014), *Mineral-insulated cable*
C22.2 No. 126.1-09 (R2014), *Metal cable tray systems*
CAN/CSA-C22.2 No. 126.2-02 (R2012), *Nonmetallic cable tray systems*
CAN/CSA-C22.2 No. 130-03 (R2013), *Requirements for electrical resistance heating cables and heating device sets*
CAN/CSA-C22.2 No. 130.1-M90 (R1996), *Heat-tracing cable systems for use in industrial locations* (withdrawn)

C22.2 No. 137-M1981 (R2014), *Electric luminaires for use in hazardous locations*
C22.2 No. 141-10, *Emergency lighting equipment*
C22.2 No. 145-11, *Electric motors and generators for use in hazardous (classified) locations*
C22.2 No. 152-M1984 (R2011), *Combustible gas detection instruments*
CAN/CSA-C22.2 No. 157-92 (R2012), *Intrinsically safe and non-incendive equipment for use in hazardous locations*
C22.2 No. 159-M1987 (R2014), *Attachment plugs, receptacles, and similar wiring devices for use in hazardous locations: Class I, Groups A, B, C, and D; Class II, Group G, in coal or coke dust, and in gaseous mines*
C22.2 No. 174-M1984 (R2012), *Cables and cable glands for use in hazardous locations*
C22.2 No. 178.1-12, *Transfer switch equipment*
C22.2 No. 211.0-03 (R2013), *General requirements and methods of testing for nonmetallic conduit*
C22.2 No. 211.1-06 (R2011), *Rigid types EB1 and DB2/ES2 PVC conduit*
C22.2 No. 211.2-06 (R2011), *Rigid PVC (unplasticized) conduit*
C22.2 No. 211.3-96 (R2007), *Reinforced thermosetting resin conduit (RTRC) and fittings* (withdrawn)
C22.2 No. 213-M1987 (R2013), *Non-incendive electrical equipment for use in Class I, Division 2 hazardous locations*
C22.2 No. 218.1-13, *Spas, hot tubs, and associated equipment*
CAN/CSA-C22.2 No. 227.1-06 (R2011), *Electrical nonmetallic tubing*
C22.2 No. 227.2.1-14, *Liquid-tight flexible non-metallic conduit*
C22.2 No. 248 series, *Low-voltage fuses*
C22.2 No. 250.0-08 (R2013), *Luminaires*
CAN/CSA-C22.2 No. 257-06 (R2011), *Interconnecting inverter-based micro-distributed resources to distribution systems*
C22.2 No. 269.1-14, *Surge protective devices — Type 1 — Permanently connected*
C22.2 No. 269.2-13, *Surge protective devices — Type 2 — Permanently connected*
C22.2 No. 269.3-14, *Surge protective devices — Type 3 — Cord connected, direct plug-in, and receptacle type*
C22.2 No. 271-11, *Photovoltaic cables*
C22.2 No. 272-14, *Wind turbine electrical systems*
C22.2 No. 273-14, *Cablebus*
CAN/CSA-C22.2 No. 60079-0:11, *Explosive atmospheres — Part 0: Equipment — General requirements*
CAN/CSA-C22.2 No. 60079-1:11, *Explosive atmospheres — Part 1: Equipment protection by flameproof enclosures "d"*
CAN/CSA-C22.2 No. 60079-2:12, *Explosive atmospheres — Part 2: Equipment protection by pressurized enclosure "p"*
CAN/CSA-C22.2 No. 60079-5:11, *Explosive atmospheres — Part 5: Equipment protection by powder filling "q"*
CAN/CSA-C22.2 No. 60079-6:11, *Explosive atmospheres — Part 6: Equipment protection by oil immersion "o"*
CAN/CSA-C22.2 No.60079- 7:12, *Explosive atmospheres — Part 7: Equipment protection by increased safety "e"*
CAN/CSA-C22.2 No. 60079-11:11, *Explosive atmospheres — Part 11: Equipment protection by intrinsic safety "i"*
CAN/CSA-C22.2 No. 60079-15:12, *Electrical apparatus for explosive gas atmospheres — Part 15: Construction, test and marking of type of protection "n" electrical apparatus*
CAN/CSA-C22.2 No. 60079-18:12, *Explosive atmospheres — Part 18: Equipment protection by encapsulation "m"*
CAN/CSA-C22.2 No. 60079-29-1:12, *Explosive atmospheres — Part 29-1: Gas detectors — Performance requirements of detectors for flammable gases*
CAN/CSA-C22.2 No. 60079-31:12, *Explosive atmospheres — Part 31: Equipment dust ignition protection by enclosure "t"*
CAN/CSA-C22.2 No. 60529:05 (R2010), *Degrees of protection provided by enclosures (IP Code)*
CAN/CSA-C22.2 No. 60601 series, *Medical electrical equipment*

CAN/CSA-C22.2 No. 61241-4:12, *Electrical apparatus for use in the presence of combustible dust — Part 4: Type of protection "pD"*
CAN/CSA-C22.2 No. 61730-1:11, *Photovoltaic (PV) module safety qualification — Part 1: Requirements for construction*
CAN/CSA-C22.2 No. 61730-2:11, *Photovoltaic (PV) module safety qualification — Part 2: Requirements for testing*
CAN/CSA-C22.2 No. 62275-10, *Cable management systems — Cable ties for electrical installations*
CAN/CSA-C22.3 No. 1-10, *Overhead systems*
CAN/CSA-C22.3 No. 7-10, *Underground systems*
CAN/CSA-C68.5-13, *Shielded and concentric neutral power cable for distribution utilities*
C68.10-14, *Shielded power cable for commercial and industrial applications,* 5–46 kV
C83-96 (R2011), *Communication and power line hardware*
CAN3-C235-83 (R2010), *Preferred voltage levels for ac systems,* 0 *to* 50 000 V
C282-09, *Emergency electrical power supply for buildings*
CAN/CSA-C50052-99 (R2012), *Cast aluminium alloy enclosures for gas-filled high-voltage switchgear and controlgear*
CAN/CSA-C50064-99 (R2012), *Wrought aluminium and aluminium alloy enclosures for gas-filled high-voltage switchgear and controlgear*
CAN/CSA-C50068-99 (R2012), *Wrought steel enclosures for gas-filled high-voltage switchgear and controlgear*
CAN/CSA-C50069-99 (R2012), *Welded composite enclosures of cast and wrought aluminium alloys for gas-filled high-voltage switchgear and controlgear*
CAN/CSA-C50089-99 (R2012), *Cast resin partitions for metal-enclosed gas-filled high-voltage switchgear and controlgear*
CAN/CSA-C62155:06 (R2011), *Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than* 1000 V
CAN/CSA-IEC 61400-24:12, *Wind turbines — Part 24: Lightning protection*
M421-11, *Use of electricity in mines*
S413-14, *Parking structures*
SPE-1000-13, *Model code for the field evaluation of electrical equipment*
Z32-09 (R2014), *Electrical safety and essential electrical systems in health care facilities*
Z98-14, *Passenger ropeways and passenger conveyors*
CAN/CSA-Z240 MH Series-92 (R2005), *Mobile homes* (withdrawn)
CAN/CSA-Z240 RV Series-08 (R2013), *Recreational vehicles*
CAN/CSA-Z241 Series-03 (R2013), *Park model trailers*
CAN/CSA-Z267-00 (R2011), *Safety code for amusement rides and devices*
Z462-12, *Workplace electrical safety*
CAN/CSA-Z662-11 (R2013), *Oil and gas pipeline systems*

ANSI (American National Standards Institute)
B77.1-2011, *Passenger Ropeways — Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors — Safety Requirements*

ANSI/ASME (American National Standards Institute/American Society of Mechanical Engineers)
B1.20.1-2013, *Pipe Threads, General Purpose (Inch)*

ANSI/IEEE (American National Standards Institute/Institute of Electrical and Electronics Engineers)
487-2007, *Recommended Practice for the Protection of Wire-Line Communication Facilities Serving Electric Power Locations*

ANSI/ISA (American National Standards Institute/International Society of Automation)
RP 12.06.01-2003, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations — Instrumentation — Part 1: Intrinsic Safety*
12.27.01-2011, *Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids*

ANSI/NEMA (American National Standards Institute/National Electrical Manufacturers Association)
WD 6-2012, *Wiring Devices — Dimensional Specifications*
Z535.4-2011, *Product Safety Signs and Labels*

API (American Petroleum Institute)
RP 500 (2012), *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2*
RP 505 (1997; R2013), *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2*
RP 2216 (2003; R2010), *Ignition Risk of Hydrocarbon Liquids and Vapors by Hot Surfaces in the Open Air*
PUBL 4615 (1995), *Emission Factors for Oil and Gas Production Operations*
PUBL 4638 (1996), *Calculation Workbook for Oil and Gas Production Equipment Fugitive Emissions*

ASTM International
C1055-03 (2014), *Standard Guide for Heated System Surface Conditions that Produce Contact Burn Injuries*
D2487-11, *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)*
E11-13, *Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves*
E1226-12a, *Standard Test Method for Explosibility of Dust Clouds*

BNQ (Bureau de normalisation du Québec)
CAN/BNQ 1784-000, *Canadian Hydrogen Installation Code*

CEA (Canadian Electricity Association)*
249 D 541 (1989), *Simplified Rules for Grounding Customer-Owned High Voltage Substations*
266 D 991 (1995), *Clearance Distances Between Swimming Pools and Underground Electrical Cables*
**CEA Standards are available through CEATI International (Centre for Energy Advancement through Technological Innovation).*

Energy Institute
EI 15, *Model code of safe practice Part 15: Area classification code for installations handling flammable fluids,* 2005

IEC (International Electrotechnical Commission)
60079-10-1:2008, *Explosive atmospheres — Part 10-1: Classification of areas — Explosive gas atmospheres*
60079-10-2:2009, *Explosive atmospheres — Part 10-2: Classification of areas — Combustible dust atmospheres*
60079-13:2010, *Explosive atmospheres — Part 13: Equipment protection by pressurized room "p"*
60079-14:2007, *Explosive atmospheres — Part 14: Electrical installations design, selection and erection*
60079-17:2013, *Explosive atmospheres — Part 17: Electrical installations inspection and maintenance*
60079-19:2010, *Explosive atmospheres — Part 19: Equipment repair, overhaul and reclamation*
60079-20-1:2010, *Explosive atmospheres — Part 20-1: Material characteristics for gas and vapour classification — Test methods and data*
60079-25:2010, *Explosive atmospheres — Part 25: Intrinsically safe electrical systems*
60079-26:2006 *Explosive atmospheres — Part 26: Equipment with equipment protection level (EPL) Ga*
60079-30-2:2007, *Explosive atmospheres — Part 30-2: Electrical resistance trace heating — Application guide for design, installation and maintenance*

60300 Series, *Dependability management*
60364-1:2005, *Low-voltage electrical installations — Part 1: Fundamental principles, assessment of general characteristics, definitions*
60781:1989, *Application guide for calculation of short-circuit currents in low-voltage radial systems* (withdrawn)
61010-1:2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 1: General requirements*
61241-2-1:1994, *Electrical apparatus for use in the presence of combustible dust — Part 2: Test methods — Section 1: Methods for determining the minimum ignition temperatures of dust*
61241-2-2:1993, *Electrical apparatus for use in the presence of combustible dust — Part 2: Test methods — Section 2: Method for determining the electrical resistivity of dust in layers*
61241-2-3:1994, *Electrical apparatus for use in the presence of combustible dust — Part 2: Test methods — Section 3: Method for determining minimum ignition energy of dust/air mixtures*
GUIDE 117 (edition 1.0, 2010-10-13), *Electrotechnical equipment — Temperatures of touchable hot surfaces*

IEEE (Institute of Electrical and Electronics Engineers)
45-2002, *IEEE Recommended Practice for Electrical Installations on Shipboard*
80-2000, *IEEE Guide for Safety in AC Substation Grounding*
446-1995, *IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications*
484-2002, *IEEE Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications*
835-1994, *IEEE Standard Power Cable Ampacity Tables*
837-2014, *IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding*
844-2000, *Recommended Practice for Electrical Impedance, Induction, and Skin Effect Heating of Pipelines and Vessels*
902-1998, *IEEE Guide for Maintenance, Operation, and Safety of Industrial and Commercial Power Systems (Yellow Book)*
IEEE 1202-2006, *IEEE Standard for Flame-Propagation Testing of Wire and Cable*
1584-2002, *IEEE Guide for Performing Arc Flash Hazard Calculations*
C62.41.1-2002, *IEEE Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits*
C62.41.2-2002, *IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits*
IEEE P1020/D12 (October 2011), *IEEE Draft Guide for Control of Small (100 kVA to 5 MVA) Hydroelectric Power Plants*
PCIC-97-04, P.S. Hamer; B.M. Wood; R.L. Doughty; R.L. Gravell; R.C. Hasty; S.E. Wallace; J.P. Tsao; and Chevron Res. & Technol. Co., "Flammable vapor ignition initiated by hot rotor surfaces within an induction motor — reality or not?" in *Petroleum and Chemical Industry Conference*, Record of Conference Papers. 1997; 2002.

ISO (International Organization for Standardization)
965-1:2013, *ISO general-purpose metric screw threads — Tolerances — Part 1: Principles and basic data*
965-3:1998, *ISO general purpose metric screw threads —Tolerances — Part 3: Deviations for constructional screw threads*
4225:1994, *Air quality — General aspects — Vocabulary*
6184-1:1985, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*

NEMA (National Electrical Manufacturers Association)
VE 1-2009, *Metal Cable Tray Systems*

NFPA (National Fire Protection Association)
20-2013, *Standard for the Installation of Stationary Pumps for Fire Protection*
30-2012, *Flammable and Combustible Liquids Code*

40-2011, *Standard for the Storage and Handling of Cellulose Nitrate Film*
51A-2012, *Standard for Acetylene Cylinder Charging Plants*
70-2014, *National Electrical Code*
70B-2013, *Recommended Practice for Electrical Equipment Maintenance*
72-2013, *National Fire Alarm and Signaling Code*
91-2010, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids*
96-2014, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*
496-2013, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*
497-2012, *Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*
505-2013, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operation*
655-2012, *Standard for Prevention of Sulfur Fires and Explosions*
820-2012, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities*
HAZ 10, *Fire Protection Guide to Hazardous Materials*, 2010

NRCC (National Research Council Canada)
National Building Code of Canada, 2010

National Farm Building Code of Canada, 1995

National Fire Code of Canada, 2010

ULC (Underwriters Laboratories of Canada)
S139-12, *Standard Method of Fire Test for Evaluation of Integrity of Electrical Power, Data, and Optical Fibre Cables*
CAN/ULC-S524-06, *Installation of Fire Alarm Systems*
CAN/ULC-S531-14, *Standard for Smoke Alarms*

Other publications
Canada — *Navigation Protection Act*, R.S.C. 1985, c. N-22
Environment Canada, *Canadian Climate Normals*
Natural Resources Canada, *Atlas of Canada*
Natural Resources Canada, *Micro-Hydropower Systems: A Buyer's Guide*, 2004

Section 0 — Object, scope, and definitions

Object

The object of the Code is to specify requirements for the installation and maintenance of electrical equipment to help ensure electrical safety. Electrical safety is also ensured through compliance with the objective-based fundamental safety principles of IEC 60364-1 and through the implementation of a quality management or equivalent program acceptable to the authorities having jurisdiction over the adoption and enforcement of the Code.

In the preparation of the Code, consideration has been given to the following four major areas:

- the prevention of fire hazards by
  - using overcurrent protection for
    - short-circuits; and
    - excessive current (overload);
  - providing clearances from combustible materials; and
  - preventing ignition of hazardous and combustible materials;
- the prevention of shock hazards by
  - grounding and bonding to
    - establish an equipotential plane so that the possibility of a potential difference between metal parts is minimized;
    - connect to earth the equipotential plane, thereby minimizing any potential difference to earth; and
    - provide a low impedance path for fault current to flow back to the source; or
  - using insulation to separate conducting surfaces. Insulation can consist of a dielectric material or an air space that has high enough resistance to prevent the flow of current and/or the discharge of disruptive voltage spikes (e.g., from lightning or transients) from causing damage to the installation and/or endangering personnel (electric shock);
- the installation and maintenance requirements for electrical equipment to ensure essentially safe installation and operation; and
- the proper operation of electrical installations and electrical equipment by ensuring that they are
  - installed to meet the conditions of use/applications; and
  - certified/approved to
    - a CSA Group Standard
    - other recognized documents, where such CSA Group Standards do not exist or are not applicable; or
    - the requirements of the authority having jurisdiction.

Safe installations may also be achieved by alternatives to the Code provided that such alternatives meet the fundamental safety principles of IEC 60364-1 (see Appendix K).

The Code recommends that, when considering new installations, designers and field personnel make provision for wiring changes that might be required as a result of future load growth. If future growth is not taken into consideration, electrical installations can become overloaded, resulting in hazardous conditions.

Scope

The Code covers all electrical installations for buildings, structures, and premises and is intended to apply to all voltages. Although low voltages might not pose a shock hazard, various conditions can lead to physical injury and damage to equipment, even at seemingly harmless voltage levels.

The Scope specifies the subjects that the Code covers. In addition, it lists subjects not covered so that the reader can determine what other requirements apply, as determined by the authority having jurisdiction. For example, the requirements for electrical systems on aircraft and ships are not covered in the Code but are regulated by Transport Canada. If an application is excluded from the Scope of the Code, the authority having jurisdiction should be contacted to determine the requirements that do apply.

Definitions

The definitions in the Code help to clarify the intent of the requirements and should be consulted regularly. Terms defined in Section 0 apply equally throughout the Code, while terms defined in an individual Section apply only to that Section. Where a defined term is used, the Code definition and not the dictionary definition should be used. For terms not specifically defined in the Code, the conventional (trade) meaning or dictionary definition should be used.

Although not defined within the Code, the following terms are commonly used in the electrical trade and are provided here for information purposes.

Across-the-line motor controller — a full voltage motor controller.

Alu-sheath — cable that is aluminum-sheathed.

Antishort — the insulated bushing required where armoured cable is terminated.

Appliance — a portable unit or a group of units assembled to form a complete unit.

Backfeeding — electric power flowing in the opposite direction from its usual flow. For cost reasons, many of the circuit (overcurrent) protection and power quality control (voltage regulation) devices used by electric utility companies are designed based on the assumption that power always flows in one direction. For additional information, see Rule 84-004 as well as other Rules in Section 84.

Burndy® connector — a split-bolt-type connector for splicing conductors.

Bus duct (or **busway**) — a prefabricated electrical distribution system consisting of busbars (high current conductors used to make a common connection between several circuits in a system) in a protective enclosure, including straight lengths, fittings, devices, and accessories.

BX — a type of armoured cable.

Cab tire — flexible cord with a CSA Group letter designation beginning with the letter "S".
Note: *Cab tire is usually hard usage or extra-hard usage.*

Chico — a sealing compound used in explosion-proof seals.
Note: *See Sections 18 and 20.*

Code fuse — a standard certified fuse.

Condulet® — an electrical box used to provide access to wires placed within conduit. It differs from a junction box, which is larger, providing space for pulling wires and making splices.

Coreflex (RA90 and RC90) — single or multiple copper or aluminum conductors with cross-linked polyethylene insulation (RW90 XLPE) enclosed in a continuously welded and corrugated solid aluminum or copper sheath.

Corona — ionization that occurs in an insulating system when the potential gradient exceeds a certain value and that may lead to insulation failure. Visible corona effects may appear as a luminous discharge on the surface of a conductor due to ionization of air.

Corona effect — the effect produced when two wires or other conductors having a difference of voltage are placed in close proximity to one another.

> **Problems caused by corona discharges** — Coronas can generate audible and radio-frequency noise, particularly near electric power transmission lines. They also represent a power loss, and their action on atmospheric particulates, along with associated ozone and nitrogen oxide (NOx) production, can be disadvantageous to human health where power lines run through built-up areas. Therefore, power transmission equipment is designed to minimize the formation of corona discharge.
>
> Corona discharge is generally undesirable in
>
> - electric power transmission, where it causes
>   - power loss;

  - audible noise;
  - electromagnetic interference;
  - purple glow;
  - ozone production; and
  - insulation damage;
- electrical components such as transformers, capacitors, electric motors, and generators. Corona discharge progressively damages the insulation inside these devices, leading to premature equipment failure. An example of this type of damage is ozone cracking of elastomer items such as O-rings; and
- situations where high voltages are in use, but ozone production is to be minimized.

Coronas can be suppressed by corona rings, toroidal devices that serve to spread the electric field over larger areas and decrease the field gradient below the corona threshold.

Corrosion — a process in which a solid, most commonly a metal, is changed by a chemical reaction.

Device box — a box that holds a device (e.g., a switch, receptacle, or cover) by means of No. 6-32 machine screws. The following are types of device boxes:
- No. 1100 — 3 × 2 × 1-1/2 inch device box
- No. 1102 — 3 × 2 × 2 inch device box
- No. 1104 — 3 × 2 × 2-1/2 inch device box
- No. 1004 — 3 × 2 × 3 inch device box

Electro-strip® — a multi-outlet assembly.

Enclosure — an enclosed space that provides mechanical, electrical, and/or environmental protection for a control device.

Equipotential surface/plane — a surface having all areas/parts at a single potential to ground.

EYS — an explosion-proof, Y-shaped sealing fitting used to prevent passage of gases, vapour, or flames from one portion of a conduit system to another.
Note: *See Sections 18 and 20.*

Functionally associated — the direct relation of the optical fiber cables to the control or signalling of the electrical circuit involved.

Grounded conductor — a conductor that is bonded to ground.
Note: *A grounded conductor is often confused with a neutral.*

Harmonics — integer multiples of the fundamental frequency (50 or 60 Hz) caused by non-linear loads.

Heater (in a thermal overload device) — a field-replaceable component of a thermal overload device that provides the heat that is necessary for the thermal overload device to function.

Hickey —
- a manual bending device used to bend rigid metal conduit; or
- a coupling used to connect a luminaire to its supporting device.

Loomex — cable that is non-metallic-sheathed.

Neutral conductor — the conductor connected to the neutral point of a system and intended to carry current under normal conditions.

Neutral point — the common point on a wye-connection in a polyphase system; the midpoint on a single-phase, 3-wire system; the midpoint of a single-phase portion of a 3-phase delta system; or the midpoint of a 3-wire, direct-current system.
Notes:
(1) *At the neutral point of the system, the vectorial sum of the nominal voltages from all other phases within the system that utilize the neutral, with respect to the neutral point, is zero potential.*
(2) *A 3-phase, 4-wire, wye-connected power system used to supply power to nonlinear loads may necessitate that the power system design allow for the possibility of high harmonic currents on the neutral conductor.*

Neutral supported cable (Type NS) — an assembly of one, two, or three insulated phase conductors and an optional insulated control/supply conductor factory-cabled around a neutral conductor. The neutral conductor is the supporting member.

Nipple — a short section of conduit between fittings, between fittings and enclosures, or between enclosures.

Nolox® — a joint compound that is used to prevent oxide film from forming or reforming on the termination or splice of stranded aluminum conductors.

Open-circuit voltage — the voltage when no appreciable current is flowing.

Open wiring — where single conductors with no protective covering are run exposed (i.e., not concealed) and supported on insulators.

Outlet box — a box that uses No. 8-32 machine screws for the attachment of fixtures (e.g., luminaires, ceiling fans, covers, plaster rings, extension rings). The following are types of outlet boxes:
- Pancake — 1/2 inch deep round box
- Octagonal — 4 × 4 × 1-1/2 inch deep
- Square — 4 × 4 × 1-1/2 inch deep
- Square — 4-11/16 × 4-11/16 × 2-1/8 inch deep

Plugmold® — a surface raceway system.

Pot light — a recessed luminaire.

Pyrotenax cable® — a type of mineral-insulated cable.

Quadruplex — neutral supported cable that has three insulated conductors.
Note: *A quadruplex is also known as a phaseplex.*

Romex — cable that is non-metallic-sheathed.

Rosette — a device that is used for supporting and connecting the circuit, cord, and sockets of flexible drop cords.

Running board — a piece of material at least 19 mm thick that is used to protect conductors or cables from mechanical damage.

Running thread — the length of external thread on a rigid conduit that exceeds the maximum length stated in Table 40 of the Code. A characteristic of running threads is that they are not tapered. As the conduit runs through the die, the smallest diameter is met and more threads are added. The loss of taper at one end reduces the wedge that would make the coupling or hub tight to the raceway and loss of bonding and structural integrity can result. In hazardous locations, the flame path required by the threaded connection could be compromised, creating a potential for atmospheric explosion.

Seal-tight flex — liquid-tight flexible conduit.

Shielding — a grounded conductive medium that prevents undesirable influence of electromagnetic fields, pick-up of signals, induction, stray currents, ac hum, radiation of an electrical signal, etc. Shielding confines the magnetic field of an electric cable to the inside of the cable installation or insulated conductor assembly by surrounding the insulation or assembly with a grounded conductive medium called a shield.

Standard fuse — a certified code fuse.

Strain-relief device — a device that is designed to prevent tension or twisting forces from being transmitted to conductors and conductor terminations.

Stud (with respect to a luminaire) — a conduit that is run between a luminaire and the fixture hickey (coupling) or between the fixture hickey (coupling) and the outlet box supporting the luminaire.

Tap conductor — a conductor that has an ampacity rating less than the ampacity of the conductor or busbar that is feeding it.

Tracking (surface tracking/leakage) — the formation of a conducting path, usually caused by solid materials (e.g., carbon) or moisture being deposited on the surface of an insulating material between two parts of different polarity. The tracking/creepage distance is the shortest distance measured along the surface of an electrically insulating material between two conductive parts of different polarity. The length of tracking or creepage distance depends on the working voltage between the two conductive parts and the electrical insulating material's resistance to the buildup of foreign conductive materials or moisture.

Transient voltage — a momentary abnormally high voltage on a signal or power line.
Note: *Transient voltage can produce false signals or triggering impulses and can cause insulation or component breakdowns and failures.*

Triplex — neutral supported cable that has two insulated conductors.

Wiremould® — a surface raceway.

Section 2 — General rule

Section 2 is a general Section of the Code that incorporates certain administrative provisions (intended to assist regulators in adopting the Code for regulatory purposes) and general, all-encompassing technical requirements. These general requirements apply to all Sections, unless amended within a specific Section.

Administrative

Rules 2-000 to 2-032 are administrative requirements that may vary from one administrative authority (city, province, or territory) to another. They have been included in the Code as a guide to help the jurisdictions standardize the administrative requirements related to enforcing the Code.

Rule 2-024 Use of approved equipment

Rule 2-024 has two requirements: equipment must be "approved" and be "approved for the specific purpose". "Approved" equipment is

- electrical equipment that has been certified by a certification organization accredited by the Standards Council of Canada to be in accordance with the requirements (i.e., having passed the required construction requirements and testing) outlined in
  - CSA Standards;
  - standards that have been developed by the Standards Council of Canada (SCC) accredited Standards Development Organization; or
  - other recognized documents (ORDs) where CSA Standards do not exist or are not applicable, provided they
    - are correlated with provisions of the Code, Part I, and
    - do not create duplication with existing CSA Part II Standards listed in Appendix A; or
- equipment that conforms to the requirements of the regulatory authority (see Appendix B).

When equipment has met the requirements of the certification process, CSA or another accreditation certification body grants a licence to apply the CSA mark (sometimes called a monogram or logo) or the certification mark of the other body to a product, indicating that it complies with applicable requirements.

The certification process is based on written requirements (in applicable Standards) and a documented certification program. Certification addresses a product's safety and its compliance with applicable written requirements.

A typical certification process is as follows:

- A manufacturer/organization submits a Request for Quotation to CSA.
- After the quotation is accepted and agreed to, CSA determines the location for testing.
- CSA evaluates the product according to program criteria.
- CSA prepares a summary report.
- If a product complies with the Standards, the CSA mark is issued.

The certification organization's certification mark (usually located on the equipment's nameplate) indicates that the equipment/product is certified. Note that the authority having jurisdiction (AHJ) has the final say on which certification organization approvals it will accept. Therefore, although a certification organization is accredited by the SCC, a certified product might not be approved by the authority having jurisdiction.

Figure 2-1 shows the CSA certification marks for products certified for Canada only, Canada and the US, and the US only.