C22.10-18

QUÉBEC CONSTRUCTION CODE, CHAPTER V – ELECTRICITY

CANADIAN ELECTRICAL CODE, PART I, WITH QUÉBEC AMENDMENTS

2018

CSA Group

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C22.1-15
Canadian Electrical Code, Part I

Safety Standard for Electrical Installations

(Twenty-third edition)

- *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 this Code.*

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Contents

Preface

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 principal changes that have been made between the 2009 and 2012 editions of the *Canadian Electrical Code, Part I*, and this new edition, published in 2015, are marked in the text of the Code by the symbol delta (Δ) in the margin. Users of the Code are advised that the change markers in the text are not intended to be all-inclusive and are provided as a convenience only; such markers cannot constitute a comprehensive guide to the reorganization or revision of the Code. Care must therefore be taken not to rely on the change markers to determine the current requirements of the Code. As always, users of the Code must consider the entire Code and any local amendments or interpretations.

Acknowledgement

The use of material contained in the *National Electrical Code* is acknowledged.

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.

Notes:

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

(2) *This Standard is subject to periodic review, and suggestions for its improvement will be referred to the appropriate committee.*

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

Requests for interpretation should be worded in such a manner as to permit a specific "yes" or "no" answer based on the literal text of the requirement concerned.

Interpretations are available on the Current Standards Activities *page at* ***standardsactivities.csa.ca****.*

Metric units

Symbols and conversion factors for SI units

Recognized symbols for SI units have been 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

This Standard refers to the following publications, and the year dates shown indicate the latest editions available at the time the Standard 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
(See Appendix G)

Object (see Appendix B)

The object of this Code is to establish safety standards for the installation and maintenance of electrical equipment. In its preparation, consideration has been given to the prevention of fire and shock hazards, as well as proper maintenance and operation.

Amended

The requirements in this Code address the fundamental principles of protection for safety contained in Section 131 of International Electrotechnical Commission Standard 60364-1, *Low-voltage electrical installations*. IEC 60364-1, Section 131, contains fundamental principles of protection for safety that encompass protection against electric shock, thermal effects, overcurrent, fault currents, and overvoltage. Therefore, compliance with the requirements of this Code and proper maintenance will ensure an essentially safe installation. Safe installations may be also achieved by alternatives to this Code, when such alternatives meet the fundamental safety principles of IEC 60364-1 (see Appendix K). These alternatives are intended to be used only in conjunction with acceptable means to assess compliance of these alternatives with the fundamental safety principles of IEC 60364-1 by the authorities enforcing this Code.

Wiring installations that do not make provision for the increasing use of electricity may be overloaded in the future, resulting in a hazardous condition. It is recommended that the initial installation have sufficient wiring capacity and that there be some provision made for wiring changes that might be required as a result of future load growth.

This Code is not intended as a design specification nor as an instruction manual for untrained persons.

Deleted

Scope

This Code covers all electrical work and electrical equipment operating or intended to operate at all voltages in electrical installations for buildings, structures, and premises, including factory-built relocatable and non-relocatable structures, and self-propelled marine vessels stationary for periods exceeding five months and connected to a shore supply of electricity continuously or from time to time, with the following exceptions:

(a) installations or equipment employed by an electric, communication, or community antenna distribution system utility in the exercise of its function as a utility, as recognized by the regulatory authority having jurisdiction, and located outdoors or in buildings or sections of buildings used for that purpose;
(b) equipment and facilities that are used in the operation of an electric railway and are supplied exclusively from circuits that supply the motive power;
(c) installations or equipment used for railway signalling and railway communication purposes, and located outdoors or in buildings or sections of buildings used exclusively for such installations;
(d) aircraft; and
(e) electrical systems in ships that are regulated under Transport Canada.

For mines and quarry applications, see also CSA M421.

This Code and any standards referenced in it do not make or imply any assurance or guarantee by the authority adopting this Code with respect to life expectancy, durability, or operating performance of equipment and materials so referenced.

Definitions

For the purpose of correct interpretation, certain terms have been defined and where such terms or their derivatives appear throughout this Code they shall be understood to have the following meanings. The ordinary or dictionary meaning of terms shall be used for terms not specifically defined in this Code.

Acceptable — acceptable to the authority enforcing this Code.

Accessible (as applied to equipment) — admitting close approach because the equipment is not guarded by locked doors, elevation, or other effective means.

Accessible (as applied to wiring methods) —

(a) not permanently closed in by the structure or finish of the building; and
(b) capable of being removed without disturbing the building structure or finish.