C22.1HB-18

2018

CANADIAN ELECTRICAL CODE HANDBOOK

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

CSA GROUP™

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In addition to the *2018 Canadian Electrical Code, Part I*, CSA Group offers a variety of related publications and resources designed to help keep people safe and maximize productivity.

UPDATED

C22.1-18 – 2018 Canadian Electrical Code, Part I

Now in its 24th edition, the *CE Code, Part I* is the original, Canadian-based safety standard; developed and updated to better protect electrical workers and help make electrical installations and equipment safer. The 2018 edition features more than 260 updates and revisions.

NEW

2018 CE Code Integrated eBook Bundle

Combines the 2018 *CE Code* with the Handbook and Electrical Quick Reference guides in one powerful eBook bundle accessible on your tablet/mobile device, desktop and any web browser.

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Offered online, in-class or on-site at your location, this course is designed to help users understand and meet *CE Code* requirements in commercial, industrial and institutional construction projects.

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Revised and updated for 2018, *CSA Z462* provides guidance for best practices for safely working on and around electrical equipment, guidance on due diligence in prevention of electrical injuries, and more.

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From tools and practice exams, to in-depth training to get you up-to-speed on all the changes and revisions in the 2018 edition of the *Canadian Electrical Code, Part I*, CSA Group offers a comprehensive suite of solutions based on the 2018 edition and other related standards. Visit our website for the latest information on our training courses and learning tools available.

Training Courses

Detailed Overview of Changes – 2018 Canadian Electrical Code Update	Designed for *Canadian Electrical Code* users who need to know the latest changes to the newest version of the *CE Code, Part I*, this course provides a comprehensive and detailed review of key changes to the 2018 edition.
Commercial, Industrial & Institutional Construction – 2018 Canadian Electrical Code	Details *CE Code* requirements for commercial, industrial and institutional construction projects, and is ideal for *CE Code* users who use the code to install and assemble electrical equipment.
Non-Construction (Manufacturing, Design, Planning) **– 2018 Canadian Electrical Code**	Designed to help users understand and meet *CE Code* specifications related to designing, approving and planning electrical requirements.
Renewable Energy 2018 Canadian Electrical Code	Outlines the appropriate *CE Code* requirements for renewable energy, the different types of renewable energy systems, relevant system components, functions, maintenance, safety and operation.
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Grounding & Bonding 2018 Canadian Electrical Code	Provides detail on the grounding, bonding and equipotential bonding requirements of Section 10 of the *CE Code, Part I*.
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Alberta Online Updates – Changes 2018 CE Code	Provides an overview of the provincial amendments for applying the Code in Alberta.
2018 Online Pre-Master Electrician Course	Designed to help electricians in preparing for their Master Electrician Examination.
Workplace Electrical Safety based on CSA Z462	Updated to reflect numerous changes in the 2018 edition of *CSA Z462*, this course can help you and your business become better equipped to deal with electrical hazards.
Maintenance of Electrical Systems based on CSA Z463	This 1-day training course focuses on strategies that aid in establishing an electrical maintenance program under the framework of *CSA Z463*.

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Renewable Energy Guide – 2018 Canadian Electrical Code	This guide focuses on installation of renewable energy systems based on Section 64 of the *CE Code, Part I*. It explains Code requirements, how to apply them and interpret them.
2018 Canadian Electrical Practice Exam (CEPE)	Features nearly 1800 sample questions and covers each block, task and sub-task in the Red Seal Occupational Analysis to improve your chances of Red Seal exam success.

You Might Also Be Interested In

- Significant Changes – 2018 Canadian Electrical Code Update **WEBINAR**
- CE Code Part III Essentials – Guidelines for Overhead and Underground Systems
- Overview of SPE-1000 Model Code for the Field Evaluation of Electrical Equipment

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CE Code Handbook

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

- 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 Group 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 3 threads to be engaged when making a threaded connection, whereas Rule 18-102 requires 5 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 members of the Committee on *Canadian Electrical Code, Part I*. In that edition, additional information was provided 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 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 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. They 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 the eighth edition of the Handbook (2015), significant revisions were made to address extensive changes introduced in the 2015 edition of the Code, including the rewriting of Sections 18, 62, and 64. These revisions included changes in the calculation of ampacities, voltage drops, and conduit and tubing capacities; the use of meter bases and arc-fault and ground fault circuit interrupters; the selection of material for grounding conductors; and disconnecting requirements for generators.

In this, the ninth edition of the Handbook (2018), significant revisions have been made to many Sections, as follows:

- Section 0 clarifies the terms “jacketed”, “insulated”, and “covered”, as applied to conductors, by providing a new definition of the term “jacket” and a revision of the definition of the term “conductor” (as a result of the revision, the term “conductor” has been replaced with “insulated conductor” in many Sections of the Code);
- in many Sections, the redundant use of the term “approved” has been eliminated;
- Section 4 now requires that an identified conductor be provided for all devices controlling permanently installed luminaires;
- Section 8 now formally recognizes energy management systems as a method of reducing the load on building services;
- Section 10 has been updated, reorganized, and significantly reduced in length;
- Section 16 now has requirements for power over ethernet (POE) systems;
- Section 26:
  - now mandates the use of tamper-resistant receptacles in additional areas where children might be present;
  - has been reorganized and renumbered (from Rule 26-400 to Rule 26-726) in order to group related concepts together and provide a more logical flow for the requirements;
  - clarifies requirements for dining area and refrigerator circuits; and
  - clarifies requirements for receptacles exempted from arc-fault circuit interrupter protection;
- Section 32:
  - clarifies requirements for arc-fault circuit interrupter protection for bathrooms, washrooms, existing circuits, and circuits supplying carbon monoxide or smoke alarms; and
  - provides updated requirements for the feeders and circuits supplying fire pumps;
- Section 62 now requires ground fault circuit interrupter protection for heating devices and controls in proximity to tubs, sinks, and shower stalls;
- Section 78 provides substantially updated and reorganized requirements for marinas, wharves, and similar facilities; and
- Section 82 has been deleted as it covered a technology that is no longer in use.

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 Handbook is stated in its Introduction, it is important to note that it remains the responsibility of the users of this Handbook to judge its suitability for their particular purpose.*

3) *All enquiries regarding this Handbook 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-fourth 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 2017 meetings in Halifax, Nova Scotia. This twenty-fourth edition supersedes the previous editions, published in 2015, 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 26 now mandates the use of tamper-resistant receptacles in additional areas where children may be present. Section 62 now requires ground fault circuit interrupter protection for heating devices and controls in proximity to tubs, sinks, and shower stalls.

Section 10 has been updated, reorganized, and significantly reduced in length. Requirements for power over ethernet systems have been added to Section 16, and requirements for marine wharves and similar facilities have been substantially updated and reorganized in Section 78.

To address the increasing use of electric vehicles, Section 8 now formally recognizes energy management systems as a method of reducing the load on building services. Because lighting control devices associated with energy management or home automation require power to operate, Section 4 now requires that an identified conductor be provided for all devices controlling permanently installed luminaires.

Other revisions in this edition include the following:

- in Section 26, Rules 26-400 to 26-726 have been reorganized and renumbered in order to group related concepts together and provide a more logical flow for the requirements;
- in many Sections, the redundant use of the term “approved” has been eliminated;
- clarification has been provided on arc-fault circuit interrupter protection for bathrooms, washrooms, existing circuits, and circuits supplying carbon monoxide or smoke alarms;
- requirements for dining area and refrigerator circuits have been clarified;
- the terms “jacketed”, “insulated”, and “covered” as applied to conductors have been clarified through a new definition of the term “jacket” and a revised definition of the term “conductor” in Section 0. As a result, the term “conductor” has been replaced with “insulated conductor” in many Sections of the Code;
- Section 82 has been deleted as it covered a technology that is no longer in use; and
- a new Appendix M containing French translations of markings has been added.

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 10-206 3)" and not "Subrule 3) of Rule 10-206").

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 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)

Symbol	SI unit	Multiplying factor for conversion to previously used unit	Previously used unit
Pa	pascal(s)	0.000295	inch(es) of mercury
		0.000334	feet of water
		0.000145	pounds per square inch (psi)
s	second(s)	1	second(s)
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

6.19-17
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

B149.1-15
Natural gas and propane installation code

B149.2-15
Propane storage and handling code

B355-15
Lifts for persons with physical disabilities

CAN/CSA-B613-00 (withdrawn)
Private residence lifts for persons with physical disabilities

CAN/CSA-C22.2 No. 0-10 (R2015)
General requirements — Canadian Electrical Code, Part II

C22.2 No. 1-04 (withdrawn)
Audio, video, and similar electronic equipment

C22.2 No. 3-M1988 (withdrawn)
Electrical features of fuel-burning equipment

C22.2 No. 4-16
Enclosed and dead-front switches

C22.2 No. 5-16
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 (R2016)
Nonmetallic outlet boxes

C22.2 No. 18.3-12 (R2017)
Conduit, tubing, and cable fittings

C22.2 No. 18.4-15
Hardware for the support of conduit, tubing, and cable

C22.2 No. 29-15
Panelboards and enclosed panelboards

C22.2 No. 35-09 (R2014)
Extra-low-voltage control circuit cable, low-energy control cable, and extra-low-voltage control cable

C22.2 No. 38-14
Thermoset-insulated wires and cables

C22.2 No. 41-13
Grounding and bonding equipment

C22.2 No. 42-10 (R2015)
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 (R2017)
Electrical rigid metal conduit — Steel

C22.2 No. 46-13
Electric air-heaters

C22.2 No. 48-15
Nonmetallic sheathed cable

C22.2 No. 49-14
Flexible cords and cables

C22.2 No. 51-14
Armoured cables

C22.2 No. 52-15
Underground secondary and service-entrance cables

C22.2 No. 56-17
Flexible metal conduit and liquid-tight flexible metal conduit

C22.2 No. 64-10 (R2014)
Household cooking and liquid-heating appliances

C22.2 No. 65-13
Wire connectors

C22.2 No. 66.3-06 (R2015)
Low voltage transformers — Part 3: Class 2 and Class 3 transformers

C22.2 No. 75-17
Thermoplastic insulated wires and cables

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 (R2017)
Electrical metallic tubing

C22.2 No. 83.1-07 (R2017)
Electrical metallic tubing — Steel

C22.2 No. 85-14
Rigid PVC boxes and fittings

C22.2 No. 96-17
Portable power cables

C22.2 No. 100-14
Motors and generators

C22.2 No. 106-05 (R2014)
HRC-miscellaneous fuses

C22.2 No. 107.1-16
Power conversion equipment

C22.2 No. 111-10 (R2015)
General-use snap switches

C22.2 No. 123-16
Metal sheathed cables

C22.2 No. 124-16
Mineral-insulated cable

C22.2 No. 126.1-17
Metal cable tray systems

CAN/CSA-C22.2 No. 126.2-02 (R2017)
Nonmetallic cable tray systems

C22.2 No. 127-15
Equipment and lead wires

C22.2 No. 129-10 (R2014)
Neutral-supported cables

C22.2 No. 130-16
Requirements for electrical resistance trace heating and heating device sets

C22.2 No. 131-14
Type TECK 90 cable

C22.2 No. 141-15
Emergency lighting equipment

CAN/CSA-C22.2 No. 157-92 (R2016)
Intrinsically safe and non-incendive equipment for use in hazardous locations

C22.2 No. 174-M1984 (R2017)
Cables and cable glands for use in hazardous locations

C22.2 No. 178.1-14
Transfer switch equipment

C22.2 No. 179-09 (R2014)
Airport series lighting cables

C22.2 No. 208-14
Fire alarm and signal cable

C22.2 No. 211.0-03 (R2013)
General requirements and methods of testing for nonmetallic conduit

C22.2 No. 211.1-06 (R2016)
Rigid types EB1 and DB2/ES2 PVC conduit

C22.2 No. 211.2-06 (R2016)
Rigid PVC (unplasticized) conduit

C22.2 No. 211.3-96 (withdrawn)
Reinforced thermosetting resin conduit (RTRC) and fittings

C22.2 No. 213-16
Non-incendive electrical equipment for use in Class I and II, Division 2 and Class III, Divisions 1 and 2 hazardous (classified) locations

C22.2 No. 214-17
Communications cables

C22.2 No. 218.1-13
Spas, hot tubs, and associated equipment

C22.2 No. 223-15
Power supplies with extra-low-voltage Class 2 outputs

CAN/CSA-C22.2 No. 227.1-06 (R2016)
Electrical nonmetallic tubing

C22.2 No. 227.2.1-14
Liquid-tight flexible non-metallic conduit

C22.2 No. 239-17
Control and instrumentation cables

C22.2 No. 248 series
Low-voltage fuses

C22.2 No. 250.0-08 (R2013)
Luminaires

CAN/CSA-C22.2 No. 250.13-17
Light emitting diode (LED) equipment for lighting applications

CAN/CSA-C22.2 No. 257-06 (R2015)
Interconnecting inverter-based micro-distributed resources to distribution systems

C22.2 No. 269.1-17
Surge protective devices — Type 1 — Permanently connected

C22.2 No. 269.2-17
Surge protective devices — Type 2 — Permanently connected

C22.2 No. 269.3-17
Surge protective devices — Type 3 — Cord connected, direct plug-in, and receptacle type

C22.2 No. 269.4-17
Surge protective devices — Type 4 — Component assemblies

C22.2 No. 269.5-17
Surge protective devices — Type 5 — Components

C22.2 No. 271-11 (R2016)
Photovoltaic cables

C22.2 No. 272-14
Wind turbine electrical systems

C22.2 No. 273-14
Cablebus

C22.2 No. 327-16
HDPE conduit, conductors-in-conduit, and fittings

C22.2 No. 330-17
Photovoltaic rapid shutdown systems

CAN/CSA-C22.2 No. 60079-0:15
Explosive atmospheres — Part 0: Equipment — General requirements

CAN/CSA-C22.2 No. 60079-1:16
Explosive atmospheres — Part 1: Equipment protection by flameproof enclosures "d"

CAN/CSA-C22.2 No. 60079-2:16
Explosive atmospheres — Part 2: Equipment protection by pressurized enclosure "p"

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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 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 applies to 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.