Québec Construction Code, Chapter V – Electricity

Canadian Electrical Code, Part I, with Québec Amendments

2018
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Canadian Electrical Code, Part I

Safety Standard for Electrical Installations
(Twenty-third edition)

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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 this Code.

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Contents

Committee on Canadian Electrical Code, Part I  x
Regulatory Authority Committee  xii
Executive Committee  xiii
National Building Code/Canadian Electrical Code Liaison Committee  xiii
Section Subcommittees  xiii
Preface  xxvii
The history and operation of the Canadian Electrical Code, Part I  xxviii
Metric units  xxix
Reference publications  xxxi

Section 0 — Object, scope, and definitions   1
Object  1
Scope  1
Definitions  1

Section 2 — General Rules   12
Administrative  12
Technical  13
   General  13
      Protection of persons and property  16
      Maintenance and operation  16
   Enclosures  17

Section 4 — Conductors   19

Section 6 — Services and service equipment   26
Scope  26
General  26
Control and protective equipment  27
Wiring methods  29
Metering equipment  30

Section 8 — Circuit loading and demand factors   32
Scope  32
General  32
Services and feeders  34
Branch circuits  37
Automobile heater receptacles  37

Section 10 — Grounding and bonding   39
Scope and object  39
System and circuit grounding  39
Grounding connections for systems and circuits  40
Conductor enclosure bonding  41
Equipment bonding  42
Bonding methods  44
Grounding electrodes  47
Grounding and bonding conductors  48
Grounding and bonding conductor connections  50
Lightning arresters  51
Installation of neutral grounding devices  52

Section 12 — Wiring methods   54
Scope  54
General requirements  54
Conductors  55
   General  55
   Open wiring  58
Section 20 — Flammable liquid and gasoline dispensing, service stations, garages, bulk storage plants, finishing processes, and aircraft hangars

115

Gasoline dispensing and service stations 115
Propane dispensing, container filling, and storage 116
Compressed natural gas refuelling stations, compressors, and storage facilities 117
Commercial repair garages 118
Bulk storage plants 119
Finishing processes 120
Aircraft hangars 123

Section 22 — Locations in which corrosive liquids, vapours, or excessive moisture are likely to be present

126

General 126
Equipment 126
Wiring 127
Drainage, sealing, and exclusion of moisture and corrosive vapour 128
Circuit control 128
Materials 128
Bonding 128
Sewage lift and treatment plants 129

Section 24 — Patient care areas

131

Patient care areas 132
Isolated systems 134
Essential electrical systems 135

Section 26 — Installation of electrical equipment

137

General 137
Isolating switches 138
Circuit breakers 138
Fuses and fusible equipment 138
Capacitors 138
Transformers 140
Fences 144
Electrical equipment vaults 145
Cellulose nitrate film storage 145
Panelboards 146
Lightning arresters 146
Low-voltage surge protective devices 147
Storage batteries 147
Arc lamps 148
Resistance devices 148
Receptacles 149
Receptacles for residential occupancies 150
Branch circuits for residential occupancies 152
Electric heating and cooking appliances 153
Heating equipment 154
Pipe organs 155
Submersible pumps 155
Data processing 156

Section 28 — Motors and generators

157

Scope 157
General 157
Wiring methods and conductors 158
Overcurrent protection 159
Overload and overheating protection 161
Undervoltage protection 162
Control 162
Disconnecting means 163
Hermetic refrigerant motor-compressors 165
Multi-winding and part-winding-start motors 166
Protection and control of generators 167

Section 30 — Installation of lighting equipment 168
General 168
Location of lighting equipment 169
Installation of lighting equipment 169
Wiring of lighting equipment 171
Luminaires in buildings of residential occupancy 172
Lampholders 172
Electric-discharge lighting systems operating at 1000 V or less 173
Electric-discharge lighting systems operating at more than 1000 V 174
  Recessed luminaires 175
  Permanent outdoor floodlighting installations 176
  Exposed wiring for permanent outdoor lighting 179
Extra-low-voltage lighting systems 180

Section 32 — Fire alarm systems, fire pumps, and carbon monoxide alarms 181
Fire alarm systems 181
Fire pumps 182

Section 34 — Signs and outline lighting 184
General requirements 184
Enclosures 185
Neon supplies 185
Wiring methods 186

Section 36 — High-voltage installations 188
General 188
Wiring methods 189
Control and protective equipment 191
Grounding and bonding 192

Section 38 — Elevators, dumbwaiters, material lifts, escalators, moving walks, lifts for persons with physical disabilities, and similar equipment 196
Elevators 197
Escalators 199
Lifts for persons with physical disabilities 199

Section 40 — Electric cranes and hoists 204

Section 42 — Electric welders 206
General 206
Transformer arc welders 206
Motor-generator arc welders 207
Resistance welders 207

Section 44 — Theatre installations 209
Scope 209
General 209
Fixed stage switchboards 209
Portable switchboards on stage 210
Fixed stage equipment 210
Portable stage equipment 212
### Section 46 — Emergency power supply, unit equipment, exit signs, and life safety systems

**General** 213
- Emergency power supply 214
- Unit equipment 215
- Exit signs 215

**Section 48** Deleted

**Section 50** Deleted

**Section 52** — Diagnostic imaging installations 217

**Section 54** — Community antenna distribution and radio and television installations 219
- Community antenna distribution 219
- Protection 220
- Grounding 221
- Conductors within buildings 221
- Equipment 222
- Conductors outside of buildings 222
- Underground circuits 223
- Receiving equipment and amateur transmitting equipment 224
- Grounding for receiving equipment and amateur transmitting equipment 224
- Transmitting stations 225

**Section 56** — Optical fiber cables 226
- Scope 226
- General 226
- Installation methods 226

**Section 58** — Passenger ropeways and similar equipment 228
- Scope 228
- General 228
- General requirements 228
- Conductors 229
- Wiring methods 229
- Protection and control 230
- Branch circuits 231
- Regenerative power 231

**Section 60** — Electrical communication systems 232
- Scope 232
- General 232
- Protection 232
- Inside conductors 233
- Equipment 235
- Outside conductors 235
- Underground circuits 237
- Grounding 238

**Section 62** — Fixed electric heating systems 239
- Scope 239
- General 239
- Electric space-heating systems 243
- Electric surface heating systems 245
- Other heating systems 246

**Section 64** — Renewable energy systems 248
- General 251
- Inverters 254
- Solar photovoltaic systems 256
- Small wind systems 259
Large wind systems 261
Micro-hydropower systems 262
Hydrokinetic power systems 262
Stationary fuel cell systems 263
Storage batteries 264

Section 66 — Amusement parks, midways, carnivals, film and TV sets, TV remote broadcasting locations, and travelling shows 267
Scope and application 267
General 267
Grounding 267
Services and distribution 268
Wiring methods and equipment 268
Single-conductor cables 269
Motors 270

Section 68 — Pools, tubs, and spas 271
Scope 271
General 271
Permanently installed swimming pools 274
Storable swimming pools 275
Hydromassage bathtubs 275
Spas and hot tubs 275

Section 70 — Electrical requirements for factory-built relocatable structures and non-relocatable structures 277
Scope 277
Relocatable structures 277
Non-relocatable structures (factory-built) 281

Section 72 — Mobile home and recreational vehicle parks 282
Scope and application 282
General 282

Section 74 — Airport installations 284

Section 76 — Temporary wiring 286

Section 78 — Marinas, yacht clubs, marine wharves, structures, and fishing harbours 288
Marinas and yacht clubs 288
Marine wharves, structures, and fishing harbours 289

Section 80 — Cathodic protection 291

Section 82 — Closed-loop and pre-closed-loop power distribution 293

Section 84 — Interconnection of electric power production sources 295

Section 86 — Electric vehicle charging systems 297
Scope 297
General 297
Equipment 297
Control and protection 297
Electric vehicle supply equipment locations 298

Tables 299

Diagrams 375

Appendix A — Safety standards for electrical equipment 384
Appendix B — Notes on Rules 402
Appendix C — The Technical Committee on the Canadian Electrical Code, Part I — Organization and rules of procedure 511
Appendix D — Tabulated general information 529
Appendix E — Dust-free rooms  590
Appendix F — Recommended installation practice for intrinsically safe and non-incendive electrical equipment and wiring  593
Appendix G — Electrical installations of fire protection systems  601
Appendix H — Combustible gas detection instruments for use in Class I hazardous locations  605
Appendix I — Interpretations  608
Appendix J — Rules and Notes to Rules for installations using the Class and Division system of classification  609
Appendix K — Extract from IEC 60364-1  661
Appendix L — Engineering guidelines for determining hazardous area classifications  667
Index  673
Preface


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:

<table>
<thead>
<tr>
<th>00-000</th>
<th>Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Subrule</td>
</tr>
<tr>
<td>(a)</td>
<td>Item</td>
</tr>
<tr>
<td>(i)</td>
<td>Item</td>
</tr>
<tr>
<td>(A)</td>
<td>Item</td>
</tr>
</tbody>
</table>

(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.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>SI unit</th>
<th>Multiplying factor for conversion to previously used unit</th>
<th>Previously used unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ampere(s)</td>
<td>1</td>
<td>ampere(s)</td>
</tr>
<tr>
<td>cm³</td>
<td>cubic centimetre(s)</td>
<td>0.061</td>
<td>cubic inch(es)</td>
</tr>
<tr>
<td>°(s)</td>
<td>degree(s) (angle)</td>
<td>1</td>
<td>degree(s) (angle)</td>
</tr>
<tr>
<td>°C rise</td>
<td>degree(s) Celsius</td>
<td>1.8</td>
<td>degree(s) Fahrenheit</td>
</tr>
<tr>
<td>°C temperature</td>
<td>degree(s) Celsius</td>
<td>1.8 plus 32</td>
<td>degree(s) Fahrenheit</td>
</tr>
<tr>
<td>h</td>
<td>hour(s)</td>
<td>1</td>
<td>hour(s) (time)</td>
</tr>
<tr>
<td>Hz</td>
<td>hertz</td>
<td>1</td>
<td>cycles per second</td>
</tr>
<tr>
<td>J</td>
<td>joule(s)</td>
<td>0.7376</td>
<td>foot-pound(s)</td>
</tr>
<tr>
<td>kg</td>
<td>kilogram(s)</td>
<td>2.205</td>
<td>pound(s)</td>
</tr>
<tr>
<td>kJ</td>
<td>kilojoule(s)</td>
<td>737.6</td>
<td>foot-pound(s)</td>
</tr>
<tr>
<td>km</td>
<td>kilometre</td>
<td>0.621</td>
<td>mile(s)</td>
</tr>
<tr>
<td>kPa</td>
<td>kilopascal(s)</td>
<td>0.295</td>
<td>inch(es) of mercury</td>
</tr>
<tr>
<td>kW</td>
<td>kilowatt</td>
<td>0.334</td>
<td>feet of water</td>
</tr>
<tr>
<td>lx</td>
<td>lux</td>
<td>0.145</td>
<td>pound(s) per square inch (psi)</td>
</tr>
<tr>
<td>L</td>
<td>litre</td>
<td>3415.179</td>
<td>BTU/h</td>
</tr>
<tr>
<td>m</td>
<td>metre(s)</td>
<td>0.093</td>
<td>foot-candle(s)</td>
</tr>
<tr>
<td>m²</td>
<td>square metre(s)</td>
<td>3.281</td>
<td>feet</td>
</tr>
<tr>
<td>m³</td>
<td>cubic metre(s)</td>
<td>10.764</td>
<td>square feet</td>
</tr>
<tr>
<td>MHz</td>
<td>megahertz</td>
<td>35.315</td>
<td>cubic feet</td>
</tr>
<tr>
<td>min</td>
<td>minute(s)</td>
<td>1</td>
<td>megacycles per second</td>
</tr>
<tr>
<td>mL</td>
<td>millilitre(s)</td>
<td>1</td>
<td>minute(s)</td>
</tr>
<tr>
<td>mm</td>
<td>millimetre(s)</td>
<td>0.061</td>
<td>cubic inch(es)</td>
</tr>
<tr>
<td>mm²</td>
<td>square millimetre(s)</td>
<td>0.03937</td>
<td>inch(es)</td>
</tr>
<tr>
<td>N•m</td>
<td>newton•metre</td>
<td>0.00155</td>
<td>square inch(es)</td>
</tr>
<tr>
<td>Ω</td>
<td>ohm(s)</td>
<td>8.85</td>
<td>pound-force inches</td>
</tr>
<tr>
<td>Pa</td>
<td>pascal(s)</td>
<td>1</td>
<td>ohm(s)</td>
</tr>
<tr>
<td>V</td>
<td>volt(s)</td>
<td>1</td>
<td>inch(es) of mercury</td>
</tr>
<tr>
<td>W</td>
<td>watt(s)</td>
<td>0.000295</td>
<td>feet of water</td>
</tr>
<tr>
<td>μF</td>
<td>microfarad(s)</td>
<td>0.000334</td>
<td>pounds per square inch (psi)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.000145</td>
<td>volts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>watts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>microfarad(s)</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Inches</th>
<th>Metric designator</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>12</td>
</tr>
<tr>
<td>1/2</td>
<td>16</td>
</tr>
<tr>
<td>3/4</td>
<td>21</td>
</tr>
<tr>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>1-1/4</td>
<td>35</td>
</tr>
<tr>
<td>1-1/2</td>
<td>41</td>
</tr>
<tr>
<td>2</td>
<td>53</td>
</tr>
<tr>
<td>2-1/2</td>
<td>63</td>
</tr>
<tr>
<td>3</td>
<td>78</td>
</tr>
<tr>
<td>3-1/2</td>
<td>91</td>
</tr>
<tr>
<td>4</td>
<td>103</td>
</tr>
<tr>
<td>5</td>
<td>129</td>
</tr>
<tr>
<td>6</td>
<td>155</td>
</tr>
<tr>
<td>8</td>
<td>200</td>
</tr>
</tbody>
</table>
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*
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- 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*
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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
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CAN/CSA-C22.2 No. 60079-1:11, Explosive atmospheres — Part 1: Equipment protection by flameproof enclosures “d”
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91-2010, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids
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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.

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 also be 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.

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.