C22.1-15

CANADIAN ELECTRICAL CODE, PART I

SAFETY STANDARD FOR ELECTRICAL INSTALLATIONS

2015

23RD EDITION

CSA Group

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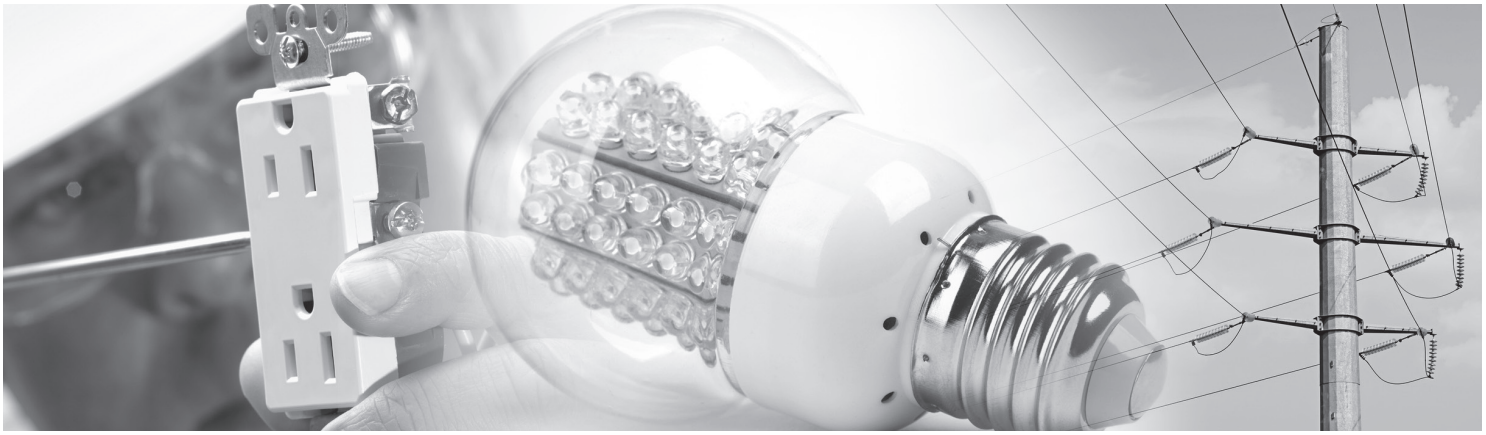

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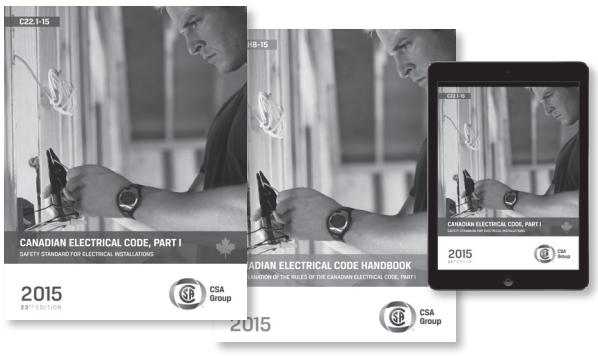

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Safety Standard for Electrical Installations

(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.
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R.J. Kelly	Government of Nunavut Community & Government Services, Iqaluit, Nunavut
M. Khalid	R.V. Anderson Associates Limited, Toronto, Ontario
R.R. Langlois	Stantec Consulting Ltd., Kitchener, Ontario
R. Ouellette	Electrical Inspector Edmundston Region, Edmundston, New Brunswick *(Representing International Association of Electrical Inspectors)*
S. Paulsen	CSA Group, Toronto, Ontario
G.T. Walker	Emery Electric, Shawnigan Lake, British Columbia
D. Wilson	Accredited Testing Services, Brandon, Manitoba

Section 24 — Patient care areas

L. Ferchoff *(Chair)*	Manitoba Hydro, Winnipeg, Manitoba
A.Z. Tsisserev *(Vice-Chair)*	Applied Engineering Solutions Ltd., Vancouver, British Columbia
M.S. Anderson	SaskPower, Regina, Saskatchewan
M. Brossoit	CSA Group, Pointe-Claire, Québec
C.A. Brown	SMS Engineering Ltd., Winnipeg, Manitoba
R. Dodds	Vancouver General Hospital, Vancouver, British Columbia
A.M. Dolan	University of Toronto, Toronto, Ontario
P.M. Gelinas	Hôpital du Sacré-Cœur de Montréal, Montréal, Québec
N. Hanna	Electrical Safety Authority, Mississauga, Ontario
G. Hughes	University of New Brunswick Department of Health, Fredericton, New Brunswick
D.T. Roberts	Schneider Electric, Mississauga, Ontario

E. Smeltzer	Nova Scotia Power Inc., Lower Sackville, Nova Scotia *(Representing International Association of Electrical Inspectors)*

Section 26 — Installation of electrical equipment

T. Simmons *(Chair)*	British Columbia Institute of Technology, Burnaby, British Columbia
R. Leduc *(Vice-Chair)*	Marex Canada Limited, Calgary, Alberta
M. Brown	Electrical Safety Authority, Cambridge, Ontario
L. Coulombe	Régie du bâtiment du Québec, Québec, Québec
P. Desilets	Leviton Manufacturing of Canada Limited, Pointe-Claire, Québec
M.W. Earley	National Fire Protection Association, Quincy, Massachusetts, USA
V.V. Gagachev	Eaton, Burlington, Ontario
R.C. Gilmour	Ancaster, Ontario
M. Mihaluk	Corporation des maîtres électriciens du Québec, Montréal, Quebec
R.A. Nelson	CSA Group, Mississauga, Ontario
S. Paulsen	CSA Group, Toronto, Ontario
G.D. Sharp	Canadian Home Builders' Association, Ottawa, Ontario
T.R. Titus	Electrical Safety Authority, New Hamburg, Ontario *(Representing International Association of Electrical Inspectors)*
A.Z. Tsisserev	Applied Engineering Solutions Ltd., Vancouver, British Columbia

Section 28 — Motors and generators

M. Smith *(Chair)*	Rockwell Automation Canada Inc. Control Systems, Cambridge, Ontario
M.S. Anderson	SaskPower, Regina, Saskatchewan
P. Baltazart	CIMA+, Edmonton, Alberta
D. Beattie	Dan Beattie Electrical Inc., Spencerville, Ontario
J.P. Boivin	CSA Group, Pointe-Claire, Québec
R. Borris	Axium Inc., Anjou, Québec
T. Branch	PDR Technologies, Oakville, Ontario
S.G. Davies	KD Projects, DeWinton, Alberta
R.P. de Lhorbe	Schneider Electric Canada, Inc., Richmond, British Columbia
C. Fallon	City of St. John's Electrical Inspections, St. John's, Newfoundland and Labrador
S. Finnagan	Algonquin College, Ottawa, Ontario
E.J. Friesen	E.J. Friesen and Associates Incorporated, Calgary, Alberta
V.V. Gagachev	Eaton, Burlington, Ontario
L.G. Silecky	Mersen Canada Toronto Inc., Toronto, Ontario *(Representing International Association of Electrical Inspectors)*

Section 30 — Installation of lighting equipment

P. Desilets *(Chair)*	Leviton Manufacturing of Canada Limited, Pointe-Claire, Québec
T. Dinic *(Vice-Chair)*	Electrical Safety Authority, Mississauga, Ontario
J.A. Davidson	Manitoba Hydro, Virden, Manitoba *(Representing International Association of Electrical Inspectors)*
Q.Y. Li	Stantec Consulting Ltd., Vancouver, British Columbia
S. Michaud	Thomas & Betts Limited, Dorval, Québec
M. Mihaluk	Corporation des maîtres électriciens du Québec, Montréal, Québec
A. Milne	21st Olympiad Sales, Burlington, Ontario
D. Rittenhouse	Maple Ridge, British Columbia
M.K. Timmings	Studio Four Technical Lighting Services, Oakville, Ontario

A.C. Yearwood	CSA Group, Toronto, Ontario

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

M.S. Anderson *(Chair)*	SaskPower, Regina, Saskatchewan
A.Z. Tsisserev *(Vice-Chair)*	Applied Engineering Solutions Ltd., Vancouver, British Columbia
A.N. Cavers	Underwriters' Laboratories of Canada, Toronto, Ontario
R. Dodds	Vancouver General Hospital, Vancouver, British Columbia
N. Hanna	Electrical Safety Authority, Mississauga, Ontario
R. MacKenzie	CSA Group, Toronto, Ontario
M. Paiement	SaskPower, Regina, Saskatchewan *(Representing International Association of Electrical Inspectors)*
V.R. Rochon	Fore Bears Forensic Science, King City, Ontario
D. Weber	Canadian Fire Alarm Association, Markham, Ontario

Section 34 — Signs and outline lighting

R. Pack *(Chair)*	SaskPower, Saskatoon, Saskatchewan
L. Catton	Acme Design Service Ltd., Belle River, Ontario
F. Dabiet	Allanson International Inc., Toronto, Ontario
J.A. Davidson	Manitoba Hydro, Virden, Manitoba *(Representing International Association of Electrical Inspectors)*
E.J. Power	E.J. Power Engineering, Stanhope, Prince Edward Island
S. Scarrow	ProSign Manufacturing, Division of Pelican Signs & Decals Inc., Saskatoon, Saskatchewan
A.C. Yearwood	CSA Group, Toronto, Ontario

Section 36 — High-voltage installations

J. Côté *(Chair)*	Hydro-Québec-Distribution, Montréal, Québec
R.M. Bartholomew	Electric Power Equipment Ltd., Vancouver, British Columbia
L. Coulombe	Régie du bâtiment du Québec, Québec, Québec
E.P. Dick	Electric Power Diagnostics, Toronto, Ontario
T. Evans	CSA Group, Toronto, Ontario
B.R. Hamilton	Bruce Hamilton Engineering Inc., Calgary, Alberta
R. Head	Electrical Safety Authority, Cambridge, Ontario *(Representing International Association of Electrical Inspectors)*
D.J. Heron	Electrical Safety Authority, Sudbury, Ontario
A.C. Lawrence	Scarborough, Ontario
B. Lipson	Applied Engineering Solutions Ltd., Vancouver, British Columbia
A.N. Sunley	Voltech Engineering Ltd., Calgary, Alberta

Section 38 — Elevators, dumbwaiters, material lifts, escalators, moving walks, lifts for persons with physical disabilities, and similar equipment

D. McColl *(Chair)*	Otis Canada Inc., Mississauga, Ontario
K. Cheong	Applied Engineering Solutions Ltd., Vancouver, British Columbia
R.M. Kennedy	Department of Labour and Advanced Education, Halifax, Nova Scotia
D. McLellan	Technical Standards & Safety Authority, Toronto, Ontario
S. Mercier	Régie du bâtiment du Québec, Montréal, Québec
M. Mihai	Technical Standards & Safety Authority, Toronto, Ontario
R. Mitchell	Electrical Safety Authority, Central Region, Meaford, Ontario *(Representing International Association of Electrical Inspectors)*
D. Parkes	KONE Elevators, Mississauga, Ontario

M. Pedram	ThyssenKrupp Northern Elevator Corp., Scarborough, Ontario
I. Pye	BC Safety Authority (BCSA), Nanaimo, British Columbia
A. Rehman	Schindler Elevator Corporation, Morristown, New Jersey, USA
A. Zemanek	CSA Group, Toronto, Ontario

Section 40 — Electric cranes and hoists

M.S. Anderson *(Chair)*	SaskPower, Regina, Saskatchewan
B.A. Biglow	WINELCON, Edmonton, Alberta
S. Bollito	RUETGERS Canada Inc., Hamilton, Ontario
M. Chumkovski	QPS Evaluation Services Inc., Toronto, Ontario *(Representing International Association of Electrical Inspectors)*
S.W. Douglas	International Association of Electrical Inspectors, Toronto, Ontario
L. McQuerry	Demag Cranes & Components Corp., Cleveland, Ohio, USA
J. Salisbury	ArcelorMittal Dofasco, Hamilton, Ontario
L. Uruski	Manitoba Labour, Winnipeg, Manitoba
A. Zemanek	CSA Group, Toronto, Ontario

Section 42 — Electric welders

A. Pottier *(Chair)*	Nova Scotia Power Inc., Halifax, Nova Scotia
J.P. Boivin	CSA Group, Pointe-Claire, Québec
F. Hegholz	Rostec Enterprises Inc., Rosalind, Alberta
D.A. Hisey	Canadian Welding Bureau, Fort Saskatchewan, Alberta
R. May	Surrey, British Columbia
M. Mihaluk	Corporation des maîtres électriciens du Québec, Montréal, Quebec
L.G. Silecky	Mersen Canada Toronto Inc., Mississauga, Ontario *(Representing International Association of Electrical Inspectors)*

Section 44 — Theatre installations

G. Montminy *(Chair)*	Régie du bâtiment du Québec, Québec, Québec
B. Bennett	Entertainment Electrical Safety Committee of Ontario (EESCO), Scarborough, Ontario
J. Calabrese	Electrical Safety Authority, Scarborough, Ontario
M. Mihaluk	Corporation des maîtres électriciens du Québec, Montréal, Quebec
R. Ouellette	Electrical Inspector, Edmundston Region, Edmundston, New Brunswick *(Representing International Association of Electrical Inspectors)*
G.K. Rose	Pefferlaw, Ontario
K.E. Vannice	Portland, Oregon, USA
A.C. Yearwood	CSA Group, Toronto, Ontario

Section 46 — Emergency power supply, unit equipment, exit signs, and life safety systems

A.Z. Tsisserev *(Chair)*	Applied Engineering Solutions Ltd., Vancouver, British Columbia
M.S. Anderson *(Vice-Chair)*	SaskPower, Regina, Saskatchewan
S. Aspinwall	Smith & Andersen, Toronto, Ontario
R.M. Bartholomew	Electric Power Equipment Ltd., Vancouver, British Columbia
S.C. Bygrave	Stantec, Dartmouth, Nova Scotia
P. Corby	City of Victoria, British Columbia *(Representing International Association of Electrical Inspectors)*
T. Fazzari	Mohawk College, Stoney Creek, Ontario
N. Hanna	Electrical Safety Authority, Mississauga, Ontario

W.L. McAllister	City of Camrose, Alberta
R.A. Nelson	CSA Group, Mississauga, Ontario
B. Parent	Cummins Est du Canada SEC, Cummins Eastern Canada L.P., Candiac, Québec
M. Rendulic	Winnipeg School Division, Winnipeg, Manitoba
P. Rizcallah	National Research Council Canada, Canadian Codes Centre, Ottawa, Ontario
A.C. Yearwood	CSA Group, Toronto, Ontario

Section 52 — Diagnostic imaging installations

D.R. MacLeod *(Chair)*	Department of Labour and Advanced Education, Halifax, Nova Scotia
M.B. Raber *(Vice-Chair)*	Winnipeg, Manitoba
M. Brossoit	CSA Group, Pointe-Claire, Québec
J.C. Einarson	Whitehorse, Yukon
W. Wetmore	QPS Evaluation Services Inc., Toronto, Ontario *(Representing International Association of Electrical Inspectors)*

Section 54 — Community antenna distribution and radio and television installations

E. Low *(Chair)*	TELUS, Burnaby, British Columbia
E. Chantigny	General Electric Canada, Saint-Joseph-du-Lac, Québec
T. Chiu	Stantec Consulting Ltd., Vancouver, British Columbia
P. Olders	Ontario Electrical Industry Training Trust, Toronto, Ontario *(Representing International Association of Electrical Inspectors)*
S.M. Turcot	Bell Canada, Montréal, Québec
T. Walker	TELUS, Calgary, Alberta
E. Yap	CSA Group, Richmond, British Columbia

Section 56 — Optical fiber cables

E. Low *(Chair)*	TELUS, Burnaby, British Columbia
C.B. Chan	Coquitlam, British Columbia
S. Finnagan	Algonquin College, Ottawa, Ontario
T. Hamden	CSA Group, Toronto, Ontario
P. Olders	Ontario Electrical Industry Training Trust, Toronto, Ontario *(Representing International Association of Electrical Inspectors)*
V.G. Rowe	Marex Canada Limited, Nanaimo, British Columbia
A.Z. Tsisserev	Applied Engineering Solutions Ltd., Vancouver, British Columbia
S. Turcot	Bell Canada, Montréal, Québec

Section 58 — Passenger ropeways and similar equipment

W.L. Sparks *(Chair)*	Doppelmayr Canada Ltd., Kelowna, British Columbia
L. Brown	Whistler Blackcomb, Whistler, British Columbia
D. Bruce	Alberta Municipal Affairs, Edmonton, Alberta
L. Burk	Pilz Automation Safety LP, Canton, Michigan, USA
M. Chumkovski	QPS Evaluation Services Inc., Toronto, Ontario *(Representing International Association of Electrical Inspectors)*
P. McDermott	Technical Standards & Safety Authority, Toronto, Ontario
S. Paulsen	CSA Group, Toronto, Ontario

Section 60 — Electrical communication systems

E. Low *(Chair)*	TELUS, Burnaby, British Columbia
D.J. Andrews	DJA Engineering Services, Calgary, Alberta

S. Bent	Nova Scotia Power Inc., Kingston, Nova Scotia *(Representing International Association of Electrical Inspectors)*
C.B. Chan	Coquitlam, British Columbia
E. Chantigny	General Electric Canada, Saint-Joseph-du-Lac, Québec
P. Desilets	Leviton Manufacturing of Canada Limited, Pointe-Claire, Québec
S. Finnagan	Algonquin College, Ottawa, Ontario
W. Kwan	Industry Canada, Ottawa, Ontario
B.K. Lowe	CSA Group, Richmond, British Columbia
D. Schultz	TELUS Access Technologies & Outside Plant Support, Edmonton, Alberta
R.S. Smith	Riverview, New Brunswick
A.Z. Tsisserev	Applied Engineering Solutions Ltd., Vancouver, British Columbia
S.M. Turcot	Bell Canada, Montréal, Québec
T. Walker	TELUS, Calgary, Alberta

Section 62 — Fixed electric heating systems

T.S. Driscoll *(Chair)*	OBIEC Consulting Ltd., Calgary, Alberta
J. Turner *(Vice-Chair)*	Swansea Consulting, Toronto, Ontario
R. Barth	Thermon Manufacturing Company, San Marcos, Texas, USA
J. Calabrese	Electrical Safety Authority, Mississauga, Ontario
T. De Francesco	Aeromation Inc., Vancouver, British Columbia
P. den Bakker	Shell Global Solutions Canada, Calgary, Alberta
T. Hamden	CSA Group, Toronto, Ontario
D.G. Lee	CSA Group, Toronto, Ontario
R. Loiselle	Suncor Energy Inc., Calgary, Alberta
D.W. McCallum	Pinnacle, Vanscoy, Saskatchewan
R. Pack	SaskPower, Saskatoon, Saskatchewan *(Representing International Association of Electrical Inspectors)*
S. Pouliot	Stelpro Design Inc., St-Bruno, Quebec
V. Rowe	Marex Canada Limited, Nanaimo, British Columbia
R. Stromer	RS Engineering Ltd., Calgary, Alberta
W.A. Williams	W A Williams Consulting, Redwood City, California, USA

Section 64 — Renewable energy systems

T. Simmons *(Chair)*	British Columbia Institute of Technology, Burnaby, British Columbia
S.W. Douglas *(Vice-Chair)*	International Association of Electrical Inspectors, Toronto, Ontario
T. Buchal	Intertek, Cortland, New York, USA
S. Eng	Enviro-Energy Technologies Inc., Markham, Ontario
N. Hanna	Electrical Safety Authority, Mississauga, Ontario
S. Paulsen	CSA Group, Toronto, Ontario
J. Pinter	BluEarth Renewables Inc., Calgary, Alberta
D.B. Pollock	Electrical Safety Authority, Ilderton, Ontario *(Representing International Association of Electrical Inspectors)*
A. Pottier	Nova Scotia Power Inc., Halifax, Nova Scotia
J. Rostek	GE Energy, Greenville, South Carolina, USA

Section 66 — Amusement parks, midways, carnivals, film and TV sets, TV remote broadcasting locations, and travelling shows

G. Montminy *(Chair)*	Régie du bâtiment du Québec, Québec, Québec
S. Mercier *(Vice-Chair)*	Régie du bâtiment du Québec, Montréal, Québec

J. Calabrese	Electrical Safety Authority, Scarborough, Ontario
R. Harris	Skookumchuck Electrics Ltd., Vancouver, British Columbia
R. Holden	PS Production Services Ltd., Burnaby, British Columbia
R. Ouellette	Electrical Inspector, Edmundston Region, Edmundston, New Brunswick *(Representing International Association of Electrical Inspectors)*
S. Paulsen	CSA Group, Toronto, Ontario
J. Porter	Westbury National Show Systems Ltd., Scarborough, Ontario
A. Wanuch	KRE Electric Ltd., Mississauga, Ontario
W. White	City of Vancouver Community Service Administration, Vancouver, British Columbia

Section 68 — Pools, tubs, and spas

M.S. Anderson *(Chair)*	SaskPower, Regina, Saskatchewan
T. Dinic	Electrical Safety Authority, Mississauga, Ontario
S.W. Douglas	International Association of Electrical Inspectors, Toronto, Ontario
W. Humphrey	Hayward Pool Products Canada Inc., Oakville, Ontario
D. Letcher	Don Letcher (E.S.C.O.) Enterprises, Sherwood Park, Alberta *(Representing International Association of Electrical Inspectors)*
T. Minna	EPI Electrical Contractors, Brampton, Ontario
L.B. Ross	Newmarket, Ontario
W.R. Wood	Pool & Hot Tub Council of Canada, Brampton, Ontario
A. Yearwood	CSA Group, Toronto, Ontario

Section 70 — Electrical requirements for factory-built relocatable structures and non-relocatable structures

J. LeBlanc *(Chair)*	Province of New Brunswick Dept. of Public Safety, Moncton, New Brunswick
M.S. Anderson	SaskPower, Regina, Saskatchewan
B. Barker	Quality Auditing Institute Ltd., Coquitlam, British Columbia
A. Chown	Canadian Manufactured Housing Institute, Ottawa, Ontario
J.C. Einarson	Whitehorse, Yukon
K. Maynard	Canadian Manufactured Housing Institute, Ottawa, Ontario
R.W. Morin	Grafton, Ontario *(Representing International Association of Electrical Inspectors)*
I. Pye	BC Safety Authority (BCSA), Nanaimo, British Columbia

Section 72 — Mobile home and recreational vehicle parks

E. Sapnu *(Chair)*	City of Winnipeg, Winnipeg, Manitoba
D. Hallock *(Vice-Chair)*	City of Winnipeg, Winnipeg, Manitoba
M.S. Anderson	SaskPower, Regina, Saskatchewan
J. Baker	OPCA, Embro, Ontario
B. Barker	Quality Auditing Institute Ltd., Coquitlam, British Columbia
L. Coulombe	Régie du bâtiment du Québec, Québec, Québec
B. Cowley	Electrical Safety Authority, Mississauga, Ontario
J.C. Einarson	Whitehorse, Yukon
D. Letcher	Don Letcher (E.S.C.O.) Enterprises, Sherwood Park, Alberta *(Representing International Association of Electrical Inspectors)*
I. Pye	BC Safety Authority (BCSA), Nanaimo, British Columbia

Section 74 — Airport installations

E. Sapnu *(Chair)*	City of Winnipeg, Winnipeg, Manitoba

D. Hallock *(Vice-Chair)*	City of Winnipeg, Manitoba
E.J. Alf	Transport Canada — AARTAE, Ottawa, Ontario
G.W. Bradbury	B.T.E. Engineering Technology Services, St. Petersburg, Florida, USA *(Representing International Association of Electrical Inspectors)*
R. Chernish	National Defence, Winnipeg, Manitoba
G.T. Gingara	Mosaic Potash Esterhazy, Esterhazy, Saskatchewan
R. Kowalik	Alberta Transportation, Sherwood Park, Alberta
R. Larivée	Avia Rupta Solutions Inc., Montréal, Québec
I. Pye	BC Safety Authority (BCSA), Nanaimo, British Columbia

Section 76 — Temporary wiring

D.R. MacLeod *(Chair)*	Department of Labour and Advanced Education, Halifax, Nova Scotia
S.W. Douglas *(Vice-Chair)*	International Association of Electrical Inspectors, Toronto, Ontario *(Representing International Association of Electrical Inspectors)*
J. Calabrese	Electrical Safety Authority, Scarborough, Ontario
B. Doan	Sumner Electric London Ltd., Komoka, Ontario
S. Hinde	BC Safety Authority (BCSA), Nanaimo, British Columbia
T.K. Kjartanson	Manitoba Hydro, Winnipeg, Manitoba
S. Nair	WorkSafe BC, Richmond, British Columbia
B. O'Donnell	AC Powerline Construction, Pickering, Ontario
S. Paulsen	CSA Group, Toronto, Ontario

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

J. LeBlanc *(Chair)*	Province of New Brunswick Department of Public Safety, Moncton, New Brunswick
R.M. Branch	Province of New Brunswick Department of Public Safety, Bathurst, New Brunswick
W.J. Burr	Burr and Associates, Campbell River, British Columbia
A. Donaldson	Boating Ontario Association, Penetanguishene, Ontario
D. Keats	City of St. John's City Hall, St. John's, Newfoundland and Labrador *(Representing International Association of Electrical Inspectors)*
M. Vollmer	Michael Vollmer Yacht Design Inc., Burlington, Ontario

Section 80 — Cathodic protection

D.R. MacLeod *(Chair)*	Department of Labour and Advanced Education, Halifax, Nova Scotia
R.J. Maynard	Aurora Corrosion Control, Calgary, Alberta
W.G. McMullan	Winnipeg, Manitoba
S. Paulsen	CSA Group, Toronto, Ontario
D. Schill	SaskPower, Yorkton, Saskatchewan *(Representing International Association of Electrical Inspectors)*
R. Stromer	RS Engineering Ltd., Calgary, Alberta
A.Z. Tsisserev	Applied Engineering Solutions Ltd., Vancouver, British Columbia
R.G. Wakelin	Gull River Engineering Inc., Brooklin, Ontario

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

J. Zulak *(Chair)*	Department of National Defence, Ottawa, Ontario
P. Desilets	Leviton Manufacturing of Canada Limited, Pointe-Claire, Québec
D. Juden	C.C.G., Ottawa, Ontario

S. Paulsen	CSA Group, Toronto, Ontario
D. Pilon	SaskPower Electrical Inspections, Saskatoon, Saskatchewan *(Representing International Association of Electrical Inspectors)*

Section 84 — Interconnection of electric power production sources

A. Pottier *(Chair)*	Nova Scotia Power Inc., Halifax, Nova Scotia
M.S. Anderson	SaskPower, Regina, Saskatchewan
D. Desrosiers	CYME International T&D, Saint-Bruno, Québec
E.P. Dick	Electric Power Diagnostics, Toronto, Ontario
D.J. Heron	Electrical Safety Authority, Sudbury, Ontario
B. Lipson	Applied Engineering Solutions Ltd., Vancouver, British Columbia
A. Mak	WorleyParsons Canada, Edmonton, Alberta
S. Martel	Natural Resources Canada, Varennes, Québec
D. Mascarenhas	Independent, Brampton, Ontario
S. Paulsen	CSA Group, Toronto, Ontario
J.C. Potts	QPS Evaluation Services Inc., Toronto, Ontario *(Representing International Association of Electrical Inspectors)*
V. Rowe	Marex Canada Limited, Nanaimo, British Columbia
T. Simmons	British Columbia Institute of Technology, Burnaby, British Columbia

Section 86 — Electric vehicle charging systems

P. Desilets *(Chair)*	Leviton Manufacturing of Canada Limited, Pointe-Claire, Quebec
D. Mascarenhas *(Vice-Chair)*	Independent, Brampton, Ontario
D. Chandler	Vancouver Electric Vehicle Association, Vancouver, British Columbia
S. Dallas	Toronto Electric — Electric Mobility Canada, Toronto, Ontario
P.R. Hinse	University of Ontario Institute of Technology, Oshawa, Ontario
M. Mihaluk	Corporation des maîtres électriciens du Québec, Montréal, Québec
T.W. Odell	Toronto Hydro-Electric System LTD, Toronto, Ontario
S. Paulsen	CSA Group, Toronto, Ontario
J.C. Potts	QPS Evaluation Services Inc., Toronto, Ontario *(Representing International Association of Electrical Inspectors)*
C. Schlotzhauer	General Motors of Canada Limited, Oshawa, Ontario
A.Z. Tsisserev	Applied Engineering Solutions Ltd., Vancouver, British Columbia
R. Yousef	Electrical Safety Authority, Mississauga, Ontario

Appendix C

A.Z. Tsisserev *(Chair)*	Applied Engineering Solutions Ltd., Vancouver, British Columbia

Appendix D

I. Muller *(Chair)*	Nexans Canada Inc., Markham, Ontario

Appendix E

D.G. Morlidge *(Chair)*	Fluor Canada Ltd., Calgary, Alberta

Appendix F

D.G. Morlidge *(Chair)*	Fluor Canada Ltd., Calgary, Alberta

Appendix G

A.Z. Tsisserev *(Chair)*	Applied Engineering Solutions Ltd., Vancouver, British Columbia

Appendix J

Annex J18

D.G. Morlidge *(Chair)*	Fluor Canada Ltd., Calgary, Alberta

Annex J20

M.K. Shea *(Chair)*	City of Victoria, British Columbia

Appendix K

A.Z. Tsisserev *(Chair)*	Applied Engineering Solutions Ltd., Vancouver, British Columbia

Appendix L

D.G. Morlidge *(Chair)*	Fluor Canada Ltd., Calgary, Alberta

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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 2012 edition 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.

January 2015

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.

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.

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.

Accredited certification organization — an organization that has been accredited by the Standards Council of Canada, in accordance with specific criteria, procedures, and requirements, to operate, on a continuing basis, a certification program for electrical equipment.

Alive or **live** — electrically connected to a source of voltage difference, or electrically charged to have a voltage different from that of the earth; the term may be used in place of the term "current-carrying", where the intent is clear, to avoid repetition of the longer term.

Aluminum-sheathed cable — a cable consisting of one or more conductors of approved type assembled into a core and covered with a liquid- and gas-tight sheath of aluminum or aluminum alloy.

Ampacity — the current-carrying capacity of electric conductors expressed in amperes.

Approved (as applied to electrical equipment) —

Δ (1) equipment that has been certified by a certification organization accredited by the Standards Council of Canada in accordance with the requirements of
   (a) CSA Group Standards; or
   (b) other standards that have been developed by a standards development organization accredited by the Standards Council of Canada, or other recognized documents, where CSA Group Standards do not exist or are not applicable, provided that such other standards or other recognized documents
      (i) are correlated with provisions of the *CE Code, Part I*; and
      (ii) do not create duplication with standards already listed in Appendix A; or

(2) equipment that conforms to the requirements of the regulatory authority (see Appendix B).

Authorized person — a qualified person who, in his or her duties or occupation, is obliged to approach or handle electrical equipment; or a person who, having been warned of the hazards involved, has been instructed or authorized to do so by someone having authority to give the instruction or authorization.

Auxiliary gutter — a raceway consisting of a sheet metal enclosure used to supplement the wiring space of electrical equipment and to enclose interconnecting conductors.

AWG — the American (or Brown and Sharpe) Wire Gauge as applied to non-ferrous conductors and non-ferrous sheet metal.

Bathroom — a room containing bathing or showering facilities and that may also contain a wash basin(s) and/or water closet(s).

Bonding — a low impedance path obtained by permanently joining all non-current-carrying metal parts to ensure electrical continuity and having the capacity to conduct safely any current likely to be imposed on it.

Bonding conductor — a conductor that connects the non-current-carrying parts of electrical equipment, raceways, or enclosures to the service equipment or system grounding conductor.

Box connector — see **Connector**.

Branch circuit — see **Circuit**.

Building — a structure that stands alone or that is cut off from adjoining structures by firewalls, unpierced or with openings, protected by approved fire doors.

Bus — a conductor that serves as a common connection for the corresponding conductors of two or more circuits.

Busway — a raceway consisting of metal troughing (including elbows, tees, and crosses, in addition to straight runs) containing conductors that are supported on insulators.

Cabinet — an enclosure of adequate mechanical strength, composed entirely of non-combustible and absorption-resistant material, designed either for surface or flush mounting, and provided with a frame, mat, or trim, in which swinging doors are hung.

Cable tray — a raceway consisting of troughing and fittings formed and constructed so that insulated conductors and cables may be readily installed or removed after the cable tray has been completely installed, without damage either to conductors or their covering.

Ladder cable tray — a prefabricated structure consisting of two longitudinal side rails connected by individual transverse members, with openings exceeding 50 mm in a longitudinal direction (see Appendix B).

Non-ventilated cable tray — a prefabricated structure without openings within the integral or separate longitudinal side rails.

Ventilated cable tray — a prefabricated structure consisting of a ventilated bottom within integral longitudinal side rails, with no openings exceeding 50 mm in a longitudinal direction (see Appendix B).

Cablebus — an assembly of insulated conductors with fittings and conductor terminations in a completely enclosed, ventilated, or non-ventilated protective metal housing (see Appendix B).

Cell — one of the hollow spaces, suitable for use as a raceway, of a cellular metal or cellular concrete floor, the axis of the cell being parallel to the longitudinal axis of the floor members.

Cellular floor — an assembly of cellular metal or cellular concrete floor members, consisting of units with hollow spaces (cells) suitable for use as raceways and, in some cases, non-cellular units.

Circuit (see Appendix B) —

Branch circuit — that portion of the wiring installation between the final overcurrent device protecting the circuit and the outlet(s).

Communication circuit — a circuit that is part of a communication system.

Control circuit — the circuit that carries the electric signals directing the performance of a control device, but that does not carry the power that the device controls.

Extra-low-voltage power circuit — a circuit, such as a valve operator and similar circuits, that is neither a remote control circuit nor a signal circuit, but that operates at not more than 30 V and that is supplied from a transformer or other device restricted in its rated output to 1000 V•A and approved for the purpose, but in which the current is not limited in accordance with the requirements for a Class 2 circuit.

Low-energy power circuit — a circuit other than a remote control or signal circuit that has the power supply limited in accordance with the requirements for Class 2 remote control circuits.

Multi-wire branch circuit — a branch circuit consisting of two or more ungrounded conductors having a voltage difference between them and an identified grounded conductor having equal voltage between it and each ungrounded conductor, with this grounded conductor connected to the neutral conductor.

Non-incendive circuit — a circuit in which any spark or thermal effect that may occur under normal operating conditions or due to opening, shorting, or grounding of field wiring is incapable of causing an ignition of the prescribed flammable gas or vapour.

Remote control circuit — any electrical circuit that controls any other circuit through a relay or an equivalent device.

Signal circuit — any electrical circuit, other than a communication circuit, that supplies energy to a device that gives a recognizable signal, such as circuits for doorbells, buzzers, code-calling systems, signal lights, etc.

Circuit breaker — a device designed to open and close a circuit by non-automatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its ratings.

Instantaneous-trip circuit breaker — a circuit breaker designed to trip only under short-circuit conditions.

Communication circuit — see **Circuit**.

Communication system — see **System**.

Community antenna distribution system — see **System**.

Concealed — rendered permanently inaccessible by the structure or finish of the building.

Conductor — a wire or cable, or other form of metal, installed for the purpose of conveying electric current from one piece of electrical equipment to another or to ground.

Conduit — a raceway of circular cross-section, other than electrical metallic tubing and electrical non-metallic tubing, into which it is intended that conductors be drawn.

Flexible metal conduit — a metal conduit that may be easily bent without the use of tools.

Liquid-tight flexible conduit —
(a) a flexible metal conduit having an outer liquid-tight jacket; or
(b) a flexible liquid-tight non-metallic conduit.

Rigid conduit — a rigid conduit of metal or a non-metallic material.

Rigid metal conduit — a rigid conduit of metal made to the same dimensions as standard pipe and suitable for threading with standard pipe threads.

Rigid non-metallic conduit — a rigid conduit of non-metallic material that is not permitted to be threaded.

Rigid PVC conduit — a rigid non-metallic conduit of unplasticized polyvinyl chloride.

Rigid RTRC conduit Type AG — a rigid non-metallic conduit of reinforced thermoset material suitable for direct burial or encasement in concrete and for exposed or concealed work.

Rigid RTRC conduit Type BG — a rigid non-metallic conduit of reinforced thermoset material suitable for direct burial or encasement in concrete.

Rigid Type DB2/ES2 PVC conduit — a rigid non-metallic conduit of PVC for direct burial or encasement in concrete or masonry.

Rigid Type EB1 PVC conduit — a rigid non-metallic conduit of PVC for encasement in concrete or masonry.

Connector —

Box connector — a device for securing a cable, via its sheath or armour, where it enters an enclosure such as an outlet box.

Wire connector — a device that connects two or more conductors together or one or more conductors to a terminal point for the purpose of connecting electrical circuits.

Continuous duty — see **Duty**.

Control circuit — see **Circuit**.

Controller — a device or a group of devices for controlling in some predetermined manner the electric power delivered to the apparatus to which it is connected.

Cord set — an assembly consisting of a suitable length of flexible cord or power supply cable provided with an attachment plug at one end and a cord connector at the other end.

Current-permit — written permission from the inspection department to a supply authority stating that electric energy may be supplied to a particular installation.

Cut-out box — an enclosure of adequate mechanical strength, composed entirely of non-combustible and absorption-resistant material, designed for surface mounting, and having swinging doors or covers secured directly to, and telescoping with, the walls of the box proper.

Damp location — see **Location**.

Dead (as applied to electrical equipment) — the current-carrying parts of electrical equipment are free from any electrical connection to a source of voltage and from electrical charge and do not have a voltage different from that of earth.

Dead front — without live parts exposed to a person on the operating side of the equipment.

Different systems — see **System**.

Disconnecting means — a device, group of devices, or other means whereby the conductors of a circuit can be disconnected from their source of supply.

Dry location — see **Location**.

Duplex receptacle — see **Receptacle**.

Dust-tight — an enclosure constructed so that dust cannot enter it.

Duty — a requirement of service that demands the degree of regularity of the load.

Continuous duty — a requirement of service that demands operation at a substantially constant load for an indefinitely long time.

Intermittent duty — a requirement of service that demands operation for definitely specified alternate intervals of

(a) load and no-load;
(b) load and rest; or
(c) load, no-load, and rest.

Periodic duty — a type of intermittent duty in which the load conditions are regularly recurrent.

Short-time duty — a requirement of service that demands operation at a substantially constant load for a short and definitely specified time.

Varying duty — a requirement of service that demands operation at loads and for intervals of time, both of which may be subject to wide variation.

Dwelling unit — one or more rooms for the use of one or more persons as a housekeeping unit with cooking, eating, living, and sleeping facilities.

Electrical contractor — any person, corporation, company, firm, organization, or partnership performing or engaging to perform, either for their or its own use or benefit, or for that of another, and with or without remuneration or gain, any work with respect to an electrical installation or any other work to which this Code applies.

Electrical equipment — any apparatus, appliance, device, instrument, fitting, fixture, luminaire, machinery, material, or thing used in or for, or capable of being used in or for, the generation, transformation, transmission, distribution, supply, or utilization of electric power or energy, and, without restricting the generality of the foregoing, includes any assemblage or combination of materials or things that is used, or is capable of being used or adapted, to serve or perform any particular purpose or function when connected to an electrical installation, notwithstanding that any of such materials or things may be mechanical, metallic, or non-electric in origin.

Electrical installation — the installation of any wiring in or upon any land, building, or premises from the point(s) where electric power or energy is delivered by the supply authority or from any other source of supply, to the point(s) where such power or energy can be used by any electrical equipment, and the installation includes the connection of any such wiring with any of the electrical equipment and any part of the wiring and also includes the maintenance, alteration, extension, and repair of such wiring.

Electrical metallic tubing — a raceway of metal having circular cross-section into which it is intended that conductors be drawn and that has a wall thinner than that of rigid metal conduit and an outside diameter sufficiently different from that of rigid conduit to render it impracticable for anyone to thread it with standard pipe thread.

Electrical non-metallic tubing — a pliable non-metallic corrugated raceway having a circular cross-section.

Elevator — a hoisting and lowering mechanism equipped with a car or platform that moves in guides in a substantially vertical direction but not including tiering or piling machines that operate within one storey, or endless belts, conveyors, chains, buckets, or similar devices used for the purpose of elevating materials.

Electric elevator — an elevator in which the motion of the car is obtained through an electric motor directly applied to the elevator machinery.

Elevator machinery — the machinery and its equipment used in raising and lowering the elevator car or platform.

Emergency lighting — lighting required by the provisions of the *National Building Code of Canada* for the purpose of facilitating safe exit and access to exit in the event of fire or other emergency.

Δ **Energized** — electrically connected to, or is, a source of voltage.

Δ **Energized part** — an energized conductive component.

Explosion-proof — enclosed in a case that is capable of withstanding without damage any explosion that may occur within it of a specified gas or vapour and capable of preventing the ignition of a specified gas or vapour surrounding the enclosure from sparks, flashes, or explosion of the specified gas or vapour within the enclosure.

Exposed (as applied to live parts) — live parts that can be inadvertently touched or approached nearer than a safe distance by a person, and the term is applied to parts not suitably guarded, isolated, or insulated.

Exposed (as applied to wiring methods) — not concealed.

Extra-low voltage — see **Voltage**.

Extra-low-voltage power circuit — see **Circuit**.

Feeder — any portion of an electrical circuit between the service box or other source of supply and the branch circuit overcurrent devices.

Fire-resisting (when applied to a building) — constructed of masonry, reinforced concrete, or equivalent materials.

General-use switch — see **Switch**.

Ground — a connection to earth obtained by a grounding electrode.

Ground fault — an unintentional electrical path between a part operating normally at some potential to ground, and ground.

Ground fault circuit interrupter (GFCI) — a device that functions to interrupt a circuit or portion of a circuit, within a predetermined time, when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

Ground fault circuit interrupter, Class A (Class A GFCI) — a ground fault circuit interrupter that will interrupt the circuit to the load, within a predetermined time, when the ground fault current is 6 mA or more but not when the ground fault current is 4 mA or less (see Appendix B).

Ground fault detection — a means of detecting a ground fault (see Appendix B).

Ground fault protection — a means of detecting and interrupting a ground fault current at a level less than the current required to operate the circuit overcurrent device (see Appendix B).

Grounded — connected effectively with the general mass of the earth through a grounding path of sufficiently low impedance and having an ampacity sufficient at all times, under the most severe conditions liable to arise in practice, to prevent any current in the grounding conductor from causing a harmful voltage to exist

(a) between the grounding conductors and neighbouring exposed conducting surfaces that are in good contact with the earth; or

(b) between the grounding conductors and neighbouring surfaces of the earth itself.

Grounding — a permanent and continuous conductive path to the earth with sufficient ampacity to carry any fault current liable to be imposed on it, and of a sufficiently low impedance to limit the voltage rise above ground and to facilitate the operation of the protective devices in the circuit.

Grounding conductor — the conductor used to connect the service equipment or system to the grounding electrode (see Appendix B).

Grounding electrode — a buried metal water-piping system or metal object or device buried in, or driven into, the ground to which a grounding conductor is electrically and mechanically connected.

Grounding system — see **System**.

Guarded — covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers or casings, barriers, rails or screens, or mats or platforms to remove the liability of dangerous contact or approach by persons or objects.

Hazardous location — see **Location**.

Header — a raceway for electrical conductors, associated with an underfloor raceway or cellular floor system, that provides access to predetermined raceways or cells.

High-voltage — see **Voltage**.

Hoistway — any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator, escalator, or dumbwaiter operates or is intended to operate.

Identified —

(a) when applied to a conductor, signifies that the conductor has
   (i) a white or grey covering; or
   (ii) a raised longitudinal ridge(s) on the surface of the extruded covering on certain flexible cords, either of which indicates that the conductor is a grounded conductor or a neutral; and

(b) when applied to other electrical equipment, signifies that the terminals to which grounded or neutral conductors are to be connected have been distinguished for identification by being tinned, nickel-plated, or otherwise suitably marked.

Inaccessible —

(a) when applied to a room or compartment, signifies that the room or compartment is sufficiently remote from access or placed or guarded so that unauthorized persons cannot inadvertently enter the room or compartment; and

(b) when applied to electrical equipment, signifies that the electrical equipment is covered by the structure or finish of the building in which it is installed or maintained, or is sufficiently remote from access or placed so that unauthorized persons cannot inadvertently touch or interfere with the equipment.

Indicating switch — see **Switch**.

Industrial establishment — a building or part of a building (other than office or exhibit space) or a part of the premises outside the building where persons are employed in manufacturing processes or in the handling of material, as distinguished from dwellings, offices, and similar occupancies.

Inspection department — an organization legally authorized to enforce this Code and having jurisdiction over specified territory.

Inspector — any person duly appointed by the inspection department for the purpose of enforcing this Code.

Insulated — separated from other conducting surfaces by a dielectric material or air space having a degree of resistance to the passage of current and to disruptive discharge sufficiently high for the condition of use.

Insulating (as applied to non-conducting substances) — capable of bringing about the condition defined as insulated.

Intermittent duty — see **Duty**.

Intrinsically safe — that any spark or thermal effect that may occur in normal use, or under any conditions of fault likely to occur in practice, is incapable of causing an ignition of the prescribed flammable gas, vapour, or dust.

Isolating switch — see **Switch**.

Ladder cable tray — see **Cable tray**.

Lampholder — a device constructed for the mechanical support of lamps and for connecting them to circuit conductors.

Liquid-tight flexible conduit — see **Conduit**.

Location —

Damp location — an exterior or interior location that is normally or periodically subject to condensation of moisture in, on, or adjacent to electrical equipment and includes partially protected locations under canopies, marquees, roofed open porches, and similar locations.

Dry location — a location not normally subject to dampness, but that may include a location subject to temporary dampness as in the case of a building under construction, provided that ventilation is adequate to prevent an accumulation of moisture.

Hazardous location (see Appendix B) — premises, buildings, or parts thereof in which

(a) an explosive gas atmosphere is present, or may be present, in the air in quantities that require special precautions for the construction, installation, and use of electrical equipment;

(b) combustible dusts are present, or may be present, in the form of clouds or layers in quantities to require special precautions for the construction, installation, and operation of electrical equipment; or

(c) combustible fibres or flyings are manufactured, handled, or stored in a manner that will require special precautions for the construction, installation, and operation of electrical equipment.

Ordinary location — a dry location in which, at normal atmospheric pressure and under normal conditions or use, electrical equipment is not unduly exposed to damage from mechanical causes, excessive dust, moisture or extreme temperatures, and in which electrical equipment is entirely free from the possibility of damage through corrosive, flammable, or explosive atmospheres.

Outdoor location — any location exposed to the weather (see Appendix B).

Wet location — a location in which liquids may drip, splash, or flow on or against electrical equipment.

Low-energy power circuit — see **Circuit**.

Low-voltage — see **Voltage**.

Low-voltage protection — a device that operates on the reduction or failure of voltage to cause and maintain the interruption of power to the main circuit.

Low-voltage release — a device that operates on the reduction or failure of voltage to cause interruption of power to the main circuit, but not to prevent its re-establishment on the return of voltage to a safe operating value.

Luminaire — a complete lighting unit designed to accommodate the lamp(s) and to connect the lamp(s) to circuit conductors.

Machine tool, metal cutting — a power-driven machine, not portable by hand, used to remove metal in the form of chips.

Machine tool, metal forming — a power-driven machine, not portable by hand, used to press, forge, emboss, hammer, blank, or shear metals.

Manufactured wiring system — a wiring system containing component parts that are assembled in the process of manufacture and cannot be disassembled at the building site without damage to or destruction of the assembly.

Mineral-insulated cable — a cable having a bare solid conductor(s) supported and insulated by a highly compressed refractory material enclosed in a liquid- and gas-tight metal tube sheathing; the term includes both the regular type (MI) and the lightweight type (LWMI) unless otherwise qualified.

Mobile home — a transportable dwelling unit constructed to be towed on its own chassis (see Appendix B).

Mobile industrial or commercial structure — a transportable structure, other than a mobile home, constructed to be towed on its own chassis (see Appendix B).

Δ **Motor-circuit switch** — see **Switch**.

MSG — the Manufacturer's Standard Gauge for uncoated steel.

Multi-outlet assembly — a surface or flush enclosure carrying conductors for extending one 2-wire or multi-wire branch circuit to two or more receptacles of the grounding type that are attached to the enclosure.

Multiple section mobile unit — a single structure composed of separate mobile units, each towable on its own chassis, which, when towed to the site, are coupled together mechanically and electrically to form a single structure.

Multi-winding motor — a motor having multiple and/or tapped windings, intended to be connected or reconnected in two or more configurations, for operation at any one of two or more speeds and/or voltages.

Multi-wire branch circuit — see **Circuit**.

Neutral — the conductor (when one exists) of a polyphase circuit or single-phase, 3-wire circuit that is intended to have a voltage such that the voltage differences between it and each of the other conductors are approximately equal in magnitude and are equally spaced in phase (see Appendix B).

Non-combustible construction — the type of construction in which a degree of fire safety is attained by the use of non-combustible materials for structural members and other building assemblies (see Appendix B).

Non-incendive circuit — see **Circuit**.

Non-relocatable structure — a factory-built unit for use on permanent foundations.

Non-ventilated cable tray — see **Cable tray**.

Open (as applied to electrical equipment) — moving parts, windings, or live parts are exposed to accidental contact.

Outdoor location — see **Location**.

Outlet — a point in the wiring installation at which current is taken to supply utilization equipment.

Outline lighting — an arrangement of incandescent lamps or electric-discharge tubing to outline or call attention to certain features such as the shape of a building or the decoration of a window.

Overcurrent device — any device capable of automatically opening an electric circuit, under both predetermined overload and short-circuit conditions, either by fusing of metal or by electromechanical means.

Overload device — a device affording protection from excess current, but not necessarily short-circuit protection, and capable of automatically opening an electric circuit.

Panelboard — an assembly of buses and connections, overcurrent devices and control apparatus with or without switches, or other equipment constructed for installation as a complete unit in a cabinet.

Panelboard, enclosed — an assembly of buses and connections, overcurrent devices and control apparatus with or without switches, or other equipment installed in a cabinet.

Park model trailer — a recreational vehicle having a gross floor area not exceeding 50 m^2 when set up (see Appendix B).

Part-winding start motor — a motor arranged for starting by first energizing part of its primary winding and, subsequently, energizing the remainder of this winding in one or more steps, both parts then carrying current.

Periodic duty — see **Duty**.

Permanently connected equipment — equipment that is electrically connected to the supply by means of connectors that can be accessed, loosened, or tightened only with the aid of a tool.

Permit — the official written permission of the inspection department, on a form provided for the purpose, authorizing work to be commenced on any electrical installation.

Plenum — a chamber associated with air-handling apparatus for distributing the processed air from the apparatus (supply plenum) to the supply ducts or for receiving air to be processed by the apparatus (return plenum).

Portable (as applied to electrical equipment) — the equipment is specifically designed not to be used in a fixed position and receives current through the medium of a flexible cord or cable and usually an attachment plug.

Portable ground fault circuit interrupter — a ground fault circuit interrupter that is either of the direct plug-in type or specifically designed to receive current by means of a flexible cord or cable and an attachment plug and that incorporates one or more receptacles for the connection of equipment that is provided with a flexible cord or cable and an attachment plug.

Power supply cord — an assembly consisting of a suitable length of flexible cord or power supply cable provided with an attachment plug at one end.

Protected (as applied mainly to electrical equipment) — such equipment is constructed so that the electrical parts are protected against damage from foreign objects entering the enclosure.

PVC conduit — see **Conduit**.

Qualified person — one familiar with the construction and operation of the apparatus and the hazards involved.

Raceway — any channel designed for holding wires, cables, or busbars, and, unless otherwise qualified in the Rules of this Code, the term includes conduit (rigid and flexible, metal and non-metallic), electrical metallic and non-metallic tubing, underfloor raceways, cellular floors, surface raceways, wireways, cable trays, busways, and auxiliary gutters.

Readily accessible — capable of being reached quickly for operation, renewal, or inspection, without requiring those to whom ready access is a requisite to climb over or remove obstacles or to resort to portable ladders, chairs, etc.

Δ **Receptacle** — one or more groups of female contacts, each group arranged in a configuration, all groups mounted on the same yoke and in the same housing, installed at an outlet and intended for the connection of one or more attachment plugs of a mating configuration.

Duplex receptacle — a receptacle with two groups of female contacts.

Single receptacle — a receptacle with one group of female contacts.

Split receptacle — a receptacle with two or more groups of female contacts, having terminals adapted for connection to one or more multi-wire branch circuits.

Recreational vehicle — a portable structure intended as a temporary accommodation for travel, vacation, or recreational use (see Appendix B).

Recreational vehicle park — an area of land designed to accommodate recreational vehicles and park model trailers.

Relocatable structure — a factory-built unit for use without a permanent foundation.

Remote control circuit — see **Circuit**.

Residential occupancy — the occupancy or use of a building or part of a building by persons for whom sleeping accommodation is provided but who are not harboured or detained to receive medical care or treatment or are not involuntarily detained.

Resistant [used as a suffix (e.g., absorption-resistant, moisture-resistant, etc.)] — material constructed, protected, or treated so that it will not be readily damaged when subjected to the specific material or condition.

Separate built-in cooking unit — a stationary cooking appliance, including its integral supply leads or terminals and consisting of one or more surface elements or ovens, or a combination of these, constructed so that the unit is permanently built into a counter or wall.

Service, consumer's — all that portion of the consumer's installation from the service box or its equivalent up to and including the point at which the supply authority makes connection.

Service, supply — any one set of conductors run by a supply authority from its mains to a consumer's service.

Service box — an approved assembly consisting of an enclosure that can be locked or sealed, containing either fuses and a switch, or a circuit breaker, and of such design that it is possible to operate either the switch or circuit breaker to the open position by manual means when the box is closed (see Appendix B).

Service room — a room or space provided in a building to accommodate building service equipment and constructed in accordance with the *National Building Code of Canada* or applicable local legislation (see Appendix B, Note to Rule 26-012).

Shockproof (as applied to X-ray and high-frequency equipment) — such equipment is guarded with grounded metal so that no person can come into contact with any live part.

Short-time duty — see **Duty**.

Signal circuit — see **Circuit**.

Single dwelling — a dwelling unit consisting of a detached house, one unit of row housing, or one unit of a semi-detached, duplex, triplex, or quadruplex house.

Single receptacle — see **Receptacle**.

Slow-burning (as applied to conductor insulation) — insulation with flame-retardant properties.

Soldered — a union of metal surfaces by the fusion of a metal alloy, usually of lead and tin.

Special permission — the written authority of the inspection department.

Split receptacle — see **Receptacle**.

Splitter — an enclosure containing terminal plates or busbars having main and branch connectors.

Starter — a controller for accelerating a motor from rest to normal speed and for stopping the motor; the term usually implies inclusion of overload protection.

Supply authority — any person, firm, corporation, company, commission, or other organization responsible for an electrical power distribution network that connects to a consumer's service (see Appendix B).

Surface raceway — a surface-mounted or pendant enclosure, consisting of one or more channels for the purpose of containing and protecting conductors and intended to accommodate associated fittings, wiring devices, luminaires, and accessories.

Switch — a device for making, breaking, or changing connection in a circuit.

General-use switch — a switch intended for use in general distribution and branch circuits and that is rated in amperes and is capable of interrupting its rated current at rated voltage.

Indicating switch — a switch of such design or marked so that whether it is on or off may be readily determined by inspection.

Isolating switch — a switch intended for isolating either a circuit or some equipment from its source of supply and that is not intended either for establishing or interrupting the flow of current in any circuit.

Δ **Motor-circuit switch** — a fused or unfused switch, rated in horsepower or kilowatts, capable of interrupting the maximum operating overload current of a motor of the same horsepower or kilowatt rating as the switch at the rated voltage.

Switchboard — a panel or assembly of panels on which is mounted any combination of switching, measuring, controlling, and protective devices, buses, and connections, designed to successfully carry and rupture the maximum fault current encountered when controlling incoming and outgoing feeders.

System (see Appendix B) —

Communication system — an electrical system whereby voice, sound, or data may be received and/or transmitted and that includes telephone, telegraph, data communications, intercommunications, paging systems, wired music systems, and other systems of similar nature, but excludes alarm systems such as fire, smoke, or intrusion, radio and television broadcast communication equipment, closed circuit television, or community antenna television systems.

Community antenna distribution system — a distribution system of coaxial cable, together with any necessary amplifiers or other equipment, that is used to transmit television or radio frequency signals typical of a community antenna television (CATV) system.

Different systems — those that derive their energy from different transformers or from different banks of transformers, or from different generators or other sources.

Grounding system — all conductors, clamps, ground clips, ground plates or pipes, and ground electrodes by means of which the electrical installation is grounded.

Theatre — a building, or any portion of a building, that is used for public, dramatic, operatic, motion-picture, or other performances.

Thermal cut-out — a device affording protection from excessive current, but not necessarily short-circuit protection, and containing a heating element in addition to, and affecting, a fusible member that opens the circuit.

Underfloor raceway — a raceway suitable for use in the floor.

Utilization equipment — equipment that utilizes electrical energy for mechanical, chemical, heating, lighting, or similar useful purposes.

Varying duty — see **Duty**.

Vault (transformer vault or **electrical equipment vault)** — an isolated enclosure, either above or below ground, with fire-resisting walls, ceilings, and floors for the purpose of housing transformers and other electrical equipment.

Ventilated cable tray — see **Cable tray**.

Vessel — any ship or boat or any other description of vessel used or designed to be used in navigation.

Voltage —

Extra-low voltage — any voltage not exceeding 30 V.

High voltage — any voltage exceeding 750 V.

Low voltage — any voltage exceeding 30 V but not exceeding 750 V.

Voltage of a circuit — the greatest root-mean-square (effective) voltage between any two conductors of the circuit.

Voltage-to-ground — the voltage between any given live ungrounded part and any grounded part in the case of grounded circuits, or the greatest voltage existing in the circuit in the case of ungrounded circuits.

Washroom — a room that contains a wash basin(s) and that may contain a water closet(s) but without bathing or showering facilities.

Wet location — see **Location**.

Wire connector — see **Connector**.

Wireway — a raceway consisting of a completely enclosing arrangement of metal troughing and fittings formed and constructed so that insulated conductors may be readily drawn in and withdrawn, or laid in and removed, after the wireway has been completely installed, without damage either to conductors or to their covering.

Section 2 — General Rules

Administrative

2-000 Authority for Rules
By virtue of the authority vested in the inspection department, this Code has been adopted and the inspection department hereby orders and directs its observance.

2-002 Special requirements
Sections devoted to Rules governing particular types of installations are not intended to embody all Rules governing these particular types of installations, but cover only those special Rules or regulations that add to or amend those prescribed in other sections covering installations under ordinary conditions.

2-004 Permit
Electrical contractors or others responsible for carrying out the work shall obtain a permit from the inspection department before commencing work with respect to installation, alteration, repair, or extension of any electrical equipment.

2-006 Application for inspection
An application for inspection shall be filed with the inspection department on a form provided by the latter at the time the permit is obtained.

2-008 Fees
Fees for the permit and inspection in accordance with the schedule prescribed by the inspection department shall be paid at the time the permit is obtained.

2-010 Posting of permit
A copy of the permit shall be posted in a conspicuous place at the work site and shall not be removed until the inspection is completed.

2-012 Notification of inspection
The inspection department shall be notified in writing by the electrical contractor that work is ready for inspection at such time(s) allowing inspection before any work or portion of work is concealed.

2-014 Plans and specifications
Plans and specifications in duplicate, or in greater number if required by the inspection department (one copy to be retained by the inspection department), shall be submitted by the owner or an agent to, and acceptance obtained from, the inspection department before work is commenced on

(a) wiring installations of public buildings, industrial establishments, factories, and other buildings in which public safety is involved;
(b) large light and power installations and the installation of apparatus such as generators, transformers, switchboards, large storage batteries, etc.; or
(c) such other installations as may be prescribed by the inspection department.

2-016 Current-permits
Except as provided in Rule 2-018, no reconnection, installation, alteration, or addition shall be connected to any service or other source of electric energy by a supply authority, electrical contractor, or other person, until a current-permit authorizing the supply of electric energy has been obtained from the inspection department.

2-018 Reconnection
A supply authority shall not require a current-permit for reconnection in cases where the service has been cut off for non-payment of bills or a change of occupant, provided that there have been no alterations or additions subsequent to the issuance of the last current-permit.

2-020 Reinspection
The inspection department reserves the right to reinspect any installation if and when it considers such action to be necessary.

2-022 Renovation of existing installations
The inspection department may require such changes as may be necessary to be made to existing installations where, through hard usage, wear and tear, or as a result of alterations or extensions, dangerous conditions have developed.