CANADIAN STANDARDS ASSOCIATION

C22.2 No. 35-09

Extra-low-voltage control circuit cable, low-energy control cable, and extra-low-voltage control cable

Contents

Technical Committee on Wiring Products *v*

Integrated Committee on Control, Instrument, Communication, and Marine Cables *vi*

Preface *ix*

1 Scope *1*

2 Reference publications *1*

3 General requirements *2*

4 Type LVT cables *2*
4.1 General *2*
4.2 Construction *2*
4.2.1 Conductors *2*
4.2.2 Insulation *3*
4.2.3 Conductor assembly *3*
4.2.4 Outer covering *4*
4.2.5 Coding of conductors *4*
4.2.6 Armour *4*
4.3 Marking *4*
4.3.1 Marking on cable *4*
4.3.2 Marking on tags, reels, and spools *5*
4.4 Tests *5*
4.4.1 Conductors *5*
4.4.2 Insulation *5*
4.4.3 Jacket *6*
4.4.4 Finished cable — Jacketed construction *7*

5 Low-energy control cable *8*
5.1 General *8*
5.2 Construction *8*
5.2.1 Conductors *8*
5.2.2 Insulation *9*
5.2.3 Polarity identification *9*
5.3 Marking *9*
5.3.1 Marking on cable *9*
5.3.2 Marking on tags, reels, or spools *9*
5.4 Tests *10*
5.4.1 Conductors *10*
5.4.2 Insulation *10*

6 Type ELC extra-low-voltage control cable *12*
6.1 General *12*
6.2 Construction *12*
6.2.1 Conductors *12*
6.2.2 Insulation *13*
6.2.3 Conductor assembly *13*
6.2.4 Coding of conductors *13*
6.3 Marking *13*

6.3.1 Marking on cable *13*
6.3.2 Marking on tags, reels, and spools *14*
6.4 Tests *14*
6.4.1 Conductors *14*
6.4.2 Insulation *14*

7 Golf course and lawn sprinkler wire, low-voltage landscape lighting, and underground low-energy circuit cables *15*
7.1 General *15*
7.2 Construction *16*
7.2.1 Conductors *16*
7.2.2 Insulation *16*
7.2.3 Conductor assembly *17*
7.2.4 Jackets — Other than PE (optional) *17*
7.2.5 PE jackets (optional) *17*
7.3 Marking *17*
7.3.1 Marking on cable *17*
7.3.2 Marking on coils, spools, and reels *18*
7.4 Tests *18*
7.4.1 Dielectric strength — PVC insulated types *18*
7.4.2 Insulation resistance in water at 15 °C — PVC insulated types *18*
7.4.3 Flame tests *19*
7.4.4 Weather resistance — (Optional) *19*
7.4.5 Low temperature impact test — (Optional) *19*
7.4.6 Additional tests — PVC insulated types *20*

Tables

1 — Partial summary of construction and dimension requirements *20*
2 — Diameters of solid conductors and cross-sectional areas of stranded conductors *21*
3 — Maximum DC resistance of conductors at 25 °C — W/km *21*
4 — Elongation of insulation on Type LVT and ELC cables *22*
5 — Physical properties of jacket on Type LVT cables *22*
6 — Mandrel diameter for heat shock test *22*
7 — Mandrel diameter for cold bend test *23*
8 — Thickness of insulation and web on low-energy control cable *23*
9 — Physical properties of insulation on low-energy control cables *23*
10 — Construction *24*
11 — Physical properties of insulation *25*
12 — Physical properties of jackets *25*
13 — Additional requirements for PVC insulated types *25*

Preface

This is the sixth edition of CSA C22.2 No. 35, *Extra-low-voltage control circuit cable, low-energy control cable, and extra-low-voltage control cable*, one of a series of Standards issued by the Canadian Standards Association under the *Canadian Electrical Code, Part II*. It supersedes the previous editions, published in 1987, 1963, 1947, 1940, and 1937.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This Standard was prepared by the Integrated Committee on Control, Instrument, Communication, and Marine Cables, under the jurisdiction of the Technical Committee on Wiring Products and the Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the Technical Committee.

Interpretations: The Strategic Steering Committee on Requirements for Electrical Safety has provided the following direction for the interpretation of standards under its jurisdiction: "The literal text shall be used in judging compliance of products with the safety requirements of this Standard. When the literal text cannot be applied to the product, such as for new materials or construction, and when a relevant committee interpretation has not already been published, CSA's procedures for interpretation shall be followed to determine the intended safety principle".

September 2009

Notes:

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

(2) *Although the intended primary application of this 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.*

(3) *This publication was developed by consensus, which is defined by* CSA Policy governing standardization — Code of good practice for standardization *as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this publication.*

(4) *CSA Standards are subject to periodic review, and suggestions for their improvement will be referred to the appropriate committee.*

(5) *All enquiries regarding this Standard, including requests for interpretation, should be addressed to Canadian Standards Association, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6.*

Requests for interpretation should

(a) define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;

(b) provide an explanation of circumstances surrounding the actual field condition; and

(c) be phrased where possible to permit a specific "yes" or "no" answer.

Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization *and are published in CSA's periodical* Info Update*, which is available on the CSA Web site at www.csa.ca.*

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

1 Scope

1.1
This Standard specifies requirements for the following types of control cables, rated 30 V maximum, intended for use in extra-low-voltage control circuits in accordance with the rules of the *Canadian Electrical Code, Part I*:

(a) Type LVT extra-low-voltage control circuit cables, rated 60 °C maximum;
(b) low-energy control cable, rated 105 °C maximum;
(c) Type ELC extra-low-voltage control cable, rated 60 °C maximum; and
(d) golf course and lawn sprinkler wire, low-voltage, and low-energy circuit cables, rated 60 °C maximum.

1.2
Tables 1 and 10 provide summaries of the types of cables covered by this Standard.

1.3
In CSA Standards, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; "should" is used to express a recommendation or that which is advised but not required; "may" is used to express an option or that which is permissible within the limits of the standard; and "can" is used to express possibility or capability. Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material. Notes to tables and figures are considered part of the table or figure and may be written as requirements. Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

2 Reference publications
This Standard makes reference to the following publications, and where such reference is made, it shall be to the edition listed below, including all amendments published thereto.

CSA (Canadian Standards Association)
C22.1-09
Canadian Electrical Code, Part I

CAN/CSA-C22.2 No. 0-M91 (R2006)
General Requirements — Canadian Electrical Code, Part II

C22.2 No. 0.3 (under development)
Test methods for electrical wires and cables