

**OTHER
RECOGNIZED
DOCUMENT**

ULC/ORD-C634:2016

**CONNECTORS AND SWITCHES FOR USE WITH BURGLAR
ALARM SYSTEMS**



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FOREWORD

Certification organizations are periodically requested to promptly provide certification services for devices, constructions, materials and systems where Canadian recognized Standards do not currently exist or are not entirely applicable. Accordingly, the certification organization utilizes its experience, existing specifications and requirements in related areas, together with assistance from its advisory councils to develop and prepare Other Recognized Documents (ORDs) for use in conducting the necessary tests and evaluation investigation.

Underwriters Laboratories of Canada has prepared many ORDs in response to requests from, and in conjunction with, industry, code writing bodies, regulatory agencies and others prior to promulgating a certification program. In many instances such documents have become published ULC Standards and subsequently National Standards of Canada. It is the intention of Underwriters Laboratories of Canada to continue this practice, as appropriate.

Comments on the content of this ORD should be directed to the Head Office of Underwriters Laboratories of Canada, 7 Underwriters Road, Toronto, Ontario, Canada, M1R 3A9.

NOTE: These Other Recognized Documents are accepted under the National Standards System of Canada. Reference may be made to the Document "Guidelines for the Development and Maintenance of Other Recognized Documents (ORDs)", published by the Standards Council of Canada located at 55 Metcalfe Street, Suite 600, Ottawa, Ontario, Canada, K1P 6L5.

CONNECTORS AND SWITCHES FOR USE WITH BURGLAR ALARM SYSTEMS

PREFACE

This is the Second Edition of the Other Recognized Document Connectors and Switches for Use with Burglar Alarm Systems, ULC-ORD-C634.

Only metric SI units of measurement are used in this ORD. If a value for measurement is followed by a value in other units in parentheses, the second value may be approximate. The first stated value is the requirement.

Appendix A, identified as informative, is for informational purposes only.

In Canada, there are two official languages, English and French. All safety warnings must be in French and English. Attention is drawn to the possibility that some Canadian authorities may require additional markings and/or installation instructions to be in both official languages.

This Second Edition ORD is based on, and now supersedes, the First Edition.

Attention is drawn to the possibility that some of the elements of this ORD may be the subject of patent rights. Neither Underwriters Laboratories of Canada, nor ULC Standards, shall be held responsible for identifying any or all such patent rights.

Requests for interpretation of this ORD should be sent to the ULC Mark Program Owner of Underwriters Laboratories of Canada. The requests should be worded in such a manner as to permit a “yes” or “no” answer based on the literal text of the requirement concerned.

ORDs are valid for use by Certification Bodies for certifications for up to 5 years from date of initial validation, or revalidation, unless superseded or withdrawn.

This ORD is intended to be used for conformity assessment.

1 SCOPE

1.1 These requirements cover connectors and switches for use with burglar-alarm systems in mercantile premises, mercantile safes and vaults, bank safes and vaults, government and corporate locations, and residences. They are intended to be used in circuits of limited energy, for these applications, in accordance with CSA C22.1, Canadian Electrical Code, Part I, Safety Standard for Electrical Installations.

1.2 The connectors and switches covered by these requirements include insulated contact springs and mating brackets; magnetically actuated and mercury switches; heat, smoke, and vibration detectors; floor mats; floor traps, special contacts for safes and vaults; flexible connectors; foil connectors; and shunting devices.

1.3 Switches covered by these requirements are intended for use in protective circuits to supervise doors, windows, hatches, vents, trap doors, and the like, to initiate an alarm signal when actuated.

1.4 Connectors covered by these requirements are intended to join various parts of protective circuit components and wiring.

1.5 The products covered by these requirements are intended to be installed in accordance with CAN/ULC-S302, Standard for the Installation, Inspection and Testing of Intrusion Alarm Systems.

2 REFERENCE PUBLICATIONS

The documents shown below are referenced in the text of this Other Recognized Document (ORD). Unless otherwise stated elsewhere in this ORD, such reference shall be considered to indicate the edition and/or revisions of the documents available at the date on which this ULC ORD is published.

Documents Published by CSA Group
178 Rexdale Blvd., Toronto, Ontario M9W 1R3 Canada
Telephone: 1-800-463-6727
www.csagroup.org

- CSA C22.1-15, Canadian Electrical Code, Part I, Safety Standard for Electrical Installations
- CSA C22.2, No. 0.17-00 (R2013), Evaluation of Properties of Polymeric Materials
- CSA C22.2, No. 65-13, Wire Connectors

Documents Published by ULC Standards (prior to May, 2010, identified as Underwriters Laboratories of Canada)
171 Nepean Street, Suite 400, Ottawa, ON K2P 0B4 Canada
Telephone: (416) 757-3611, ext. 61744; Fax (613) 231-5977, "ATTN: Publications"
E-mail: ulcstandards@ul.com
www.ulc.ca

- CAN/ULC-S302-14, Standard for the Installation, Inspection and Testing of Intrusion Alarm Systems
- CAN/ULC-S304:2016, Standard for Control Units, Accessories and Receiving Equipment for Intrusion Alarm Systems
- CAN/ULC-S527-11, Standard For Control Units For Fire Alarm Systems
- ULC-S328-98, Standard for Burglary Resistant Key Locks

3 GLOSSARY

3.1 For the purpose of this standard the following definitions apply.

3.2 **BALANCED MAGNETIC SWITCH (BMS)** – A switch that is constructed in such a manner or that includes additional components that increase resistance to magnetic, electrical and mechanical tampering or defeat.

3.3 **CIRCUITS, ELECTRICAL** –

- a) **Low Voltage** – A circuit involving a potential of not more than 600 V and having circuit characteristics in excess of those of a low-voltage power-limited circuit.
- b) **Extra-Low-Voltage** – A circuit involving a potential of not more than 30 V AC rms, 42.4 V DC or AC peak.
- c) **Power-Limited** – A circuit whose output is limited as specified in Power-Limited Circuits, Section 40.
- d) **Class 2** – A circuit in which the voltage and power limitations are in accordance with the requirements of Table 7 for AC circuits and Table 8 for DC circuits.

3.4 **LEVEL 1 HIGH SECURITY SWITCH** – In addition to complying with the applicable requirements specified in Sections 1 to 48, a High Security Level 1 Switch shall comply with the requirements specified in Sections 49 to 57.

3.5 **LEVEL 2 HIGH SECURITY SWITCH (BMS)** – A Level 2 High Security Switch is a Balance Magnet Switch including requirements specified for a Level 1 High Security Switch and additional requirements specified in Sections 58 to 64.

3.6 **SUPPLEMENTARY DEVICE** – An assembly of parts intended to provide a supplementary service or function as opposed to primary, required service.

4 GENERAL

4.1 COMPONENTS

4.1.1 The term “product” as used in this ORD refers to all types of connectors and switches.

4.1.2 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4.1.3 Unless otherwise indicated, all voltage and current values mentioned in this ORD are root-mean-square (rms).

4.1.4 A component of a product covered by this ORD shall comply with the requirements for that component and shall be used in accordance with its recognized rating and other limitations of use. A component need not comply with a specific requirement that:

- A Involves a feature or characteristic not needed in the application of the component in the product covered by this ORD; or
- B Is superseded by a requirement in this ORD.

PART I — CONSTRUCTION - ASSEMBLY

5 GENERAL

5.1 Unless specifically indicated otherwise, the construction requirements specified for a product shall apply also for any accessories or supplementary devices with which it is to be employed.

6 FRAME AND ENCLOSURE

6.1 GENERAL

6.1.1 The frame and enclosure of a product shall have strength and rigidity to resist total or partial collapse that may result in reduction of mechanical protection or electrical spacings (see Spacings, Section 16), loosening or displacement of parts, or other serious defects.

6.1.2 Electrical parts of a product shall be located or enclosed so that protection is provided against unintentional contact with uninsulated high-voltage live parts.

6.1.3 Operating parts, such as gear mechanisms, light-duty relays, and similar devices, shall be enclosed to protect against malfunction from dust or other material that may impair their intended operation.

6.1.4 An enclosure shall have means for mounting that shall be accessible without disassembling any operating part of the product. Removal of a completely assembled panel to mount the enclosure is not considered to be disassembly of an operating part.

6.2 CAST METAL

6.2.1 The minimum thickness of cast metal for an enclosure shall be as indicated in Table 1.

Exception: Cast metal of lesser thickness may be used if, upon investigation, the shape, size, and function of the enclosure provides equivalent mechanical strength. See the Impact Test, Section 33.

6.3 SHEET METAL

6.3.1 The thickness of sheet metal used for the enclosure of a product shall not be less than that indicated in Table 2 or Table 3, whichever applies.

Exception: Sheet metal of lesser thickness may be used if, upon investigation, the shape, size, and function of the enclosure provides equivalent mechanical strength. See the Impact Test, Section 33.

6.3.2 A sheet metal member to which a wiring system is to be connected in the field shall not be less than 0.81 mm thick if of uncoated steel, 0.86 mm if of galvanized steel, and 1.14 mm if of nonferrous metal.

6.4 NONMETALLIC

6.4.1 Nonmetallic material used for an enclosure shall have a wall thickness of not less than 1.6 mm.

6.4.2 Among the factors taken into consideration when determining the acceptability of a nonmetallic enclosure are:

- a) The mechanical strength;
- b) Resistance to impact;

- c) Moisture-absorptive properties;
- d) Flammability and resistance to ignition from electrical sources;
- e) Dielectric strength, insulation resistance, and resistance to arc tracking;
- f) Resistance to distortion and creeping at temperatures to which the material may be subjected under any conditions of use; and
- g) The effect of exposure to weathering if for outdoor use.

All these factors are to be considered with respect to aging in accordance with the Tests on Polymeric Materials, Section 39, and the Impact Test, Section 33.

6.4.3 Assembly screws that hold essential working parts and that must be loosened or removed in order to wire or install a connector or switch shall not thread into material other than metal.

7 CORROSION PROTECTION

7.1 Iron and steel parts, other than bearings, and the like, where such protection is impracticable, shall be protected against corrosion by enameling, galvanizing, sherardizing, plating, or other equivalent means, as determined by the requirements of the Corrosion Tests – Indoor Use, Section 27.

7.2 The requirement in 7.1 applies to all enclosures of sheet steel or cast iron, and to all springs and other parts upon which intended mechanical operation may depend.

Exception No. 1: This requirement does not apply to parts, such as washers, screws, bolts, and the like, if corrosion of such unprotected parts would not result in risk of electric shock or fire, or impair the operation of the product.

Exception No. 2: Parts made of stainless steel, polished or treated, if necessary, do not require additional protection against corrosion.

7.3 Bearing surfaces shall be of such materials and design as to resist binding due to corrosion.

7.4 Metals used in combination shall be galvanically compatible.

7.5 Enclosures of corrosion-resistant material may be used without special corrosion protection.

PART II — FIELD WIRING CONNECTIONS

8 GENERAL

8.1 COMMON REQUIREMENTS

8.1.1 Wiring terminals or leads shall be provided for connection of conductors of at least the size required by the CSA C22.1, Canadian Electrical Code, Part I, Safety Standard for Electrical Installations.

8.1.2 A field wiring terminal shall be prevented from turning or shifting in position. This may be accomplished by means such as two screws or rivets; by square shoulders or mortises; by a dowel pin, lug, or offset; or by a connecting strap or clip fitted into an adjacent part. Friction between surfaces shall not be used as a means for preventing movement of the terminals.

8.1.3 Field wiring terminals intended for connection of 10 AWG (5.3 mm²) and smaller wires may consist of terminal plates with wire binding screws.

8.1.4 A terminal plate tapped for a wire binding screw shall not have less than two full threads in the metal (the terminal plate metal may be extruded to provide the two full threads) and shall have upturned lugs, clamps, or the equivalent, to hold the wires in position. Other constructions may be used if they provide equivalent thread security of the wire binding screw.

Exception No. 1: Two full threads are not required if fewer threads will result in a secure connection in which the threads will not strip with tightening torque in accordance with the values indicated in CSA C22.2, No. 65, Wire Connectors.

Exception No. 2: Other constructions may be used if they provide equivalent ruggedness of the terminal plate and thread security of the wire binding screw.

8.1.5 A wire binding screw shall not be smaller than No. 8 (4.2 mm diameter).

Exception: A No. 6 (3.5 mm diameter) screw may be used for the connection of one 14 AWG (2.1 mm²) or smaller conductor and a No. 4 (2.8 mm diameter) screw may be used for the connection of one 19 AWG (0.65 mm²) or smaller conductor.

8.1.6 A terminal plate tapped for a wire binding screw shall be of nonferrous metal not less than 1.3 mm thick if used with a No. 8 (4.2 mm diameter) or larger screw, and not less than 0.76 mm thick if used with No. 6 (3.5 mm diameter) or smaller screw.

8.1.7 If two or more conductors are intended to be connected by wrapping under the same screw, a nonferrous intervening metal washer shall be used for each additional conductor. If the wires protrude above terminal barriers, the nonferrous separator shall include means, such as upturned tabs or sides, to retain the wire.

Exception: A separator washer is not required if two conductors are separated and intended to be secured under a common clamping plate.

8.2 TERMINALS – QUALIFIED APPLICATION

8.2.1 Any of the following terminal configurations may be used for connection of field wiring if the construction complies with all of the requirements of Clause 8.2.2.

- a) Push-In Terminals – Nonferrous (screwless) push-in terminals of the type used on some switches and receptacles wherein solid conductors may be pushed into slots containing spring-type retaining contacts. The leads can be removed by means of a tool inserted to relieve the spring tension on the conductor. Push-in terminals shall not be used with aluminum conductors. The marking adjacent to the terminal shall indicate that only copper conductors are to be used;
- b) Quick-Connect Terminals – Nonferrous quick-connect (push-type) terminals consisting of male posts permanently secured to the device and provided with compatible female connectors for connection to field wiring. Requires special tool for crimping of field wires. Mating terminals shall be shipped with the product, with instructions for their installation;
- c) Solder Terminals – Conventional nonferrous solder terminals;
- d) Solderless Wrapped Terminals – Nonferrous terminals requiring a special tool and terminal post design;
- e) Telephone Type Terminals – Nonferrous terminal plates using a narrow V-shaped slot for securing of a conductor in a special post design, and requiring a special tool for wire connection; or
- f) Other Terminals – Other terminal connections may be used if determined to be equivalent to those described in (a) to (e).

8.2.2 Any of the terminal configurations listed in Clause 8.2.1 may be used for connection of field wiring if the construction complies with all of the following:

- a) If a special tool is required for connection, its use shall be indicated on the installation wiring diagram and the name of the manufacturer and the model number, or equivalent shall also be indicated, along with information as to where the tool may be obtained;
- b) The range of wire sizes shall be indicated in the installation wiring diagram. The minimum permissible wire size to be used shall not be smaller than 22 AWG (0.32 mm²);
- c) The terminal shall permit the use of a conductor having sufficient ampacity for the circuit application; and
- d) A lead intended to be disconnected for testing or routine servicing shall comply with the requirements of Subsection 40.2, Disconnection and Reconnection.

8.3 LEADS

8.3.1 A lead provided in lieu of wiring terminals shall not be less than 150 mm long, and not smaller than 22 AWG (0.32 mm²).

Exception No. 1: A lead may be less than 150 mm long if it is evident that the use of a longer lead may result in damage to the lead insulation or impair the operation of the product.

Exception No. 2: Solid copper leads as small as 26 AWG (0.13 mm²) may be used if:

- a) *The current does not exceed 1 A for lengths up to 61 cm and the current does not exceed 0.4 A for lengths up to 3.05 m;*
- b) *There are two or more conductors and they are covered by a common jacket or the equivalent;*

- c) *The assembled conductors comply with the requirement of the Strain Relief Pull Test, Section 38; and*
- d) *The installation instructions shall indicate that the lead shall not be spliced to a conductor larger than 18 AWG (0.82 mm²).*

Exception No. 3: A lead intended for connection of a line-voltage source shall not be smaller than 18 AWG (0.82 mm²).

8.4 STRAIN RELIEF

8.4.1 A strain relief means shall be provided so that a mechanical stress on a flexible cord or cable will not be transmitted to terminals, splices, or interior wiring, as determined by the Strain Relief Pull Test, Section 38.

8.4.2 If a knot in a flexible cord serves as strain relief, a surface against which the knot may bear or with which it may come in contact shall be free from projections, sharp edges, burrs, fins, and the like, which may cause abrasion of the insulation on the conductors.

8.5 BUSHINGS

8.5.1 At a point where wiring passes through an opening in a wall, barrier, or enclosing case, there shall be a bushing, or the equivalent, that shall provide a smooth, rounded surface against which the cord may bear.

Exception: A bushing is not required if the hole provided for passage of wiring is in phenolic composition or other nonconducting material, or in metal not less than 1.07 mm thick, and the hole has smooth, rounded edges.

8.5.2 Ceramic materials and some moulded compositions that have been determined to be acceptable may be used for insulating bushings.

8.5.3 Fiber may be used where it will not be subjected to a temperature higher than 90 °C (194 °F) under intended operating conditions if the bushing is not less than 1.2 mm thick and will not be exposed to moisture.