

CAN/ULC-S304:2016

**STANDARD FOR CONTROL UNITS, ACCESSORIES AND
RECEIVING EQUIPMENT FOR INTRUSION ALARM SYSTEMS**

Prepared and Published by:



Approved by:



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STANDARD FOR CONTROL UNITS, ACCESSORIES AND RECEIVING
EQUIPMENT FOR INTRUSION ALARM SYSTEMS

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STANDARD FOR CONTROL UNITS, ACCESSORIES AND RECEIVING EQUIPMENT FOR INTRUSION ALARM SYSTEMS

PREFACE

This is the Third Edition of CAN/ULC-S304, Standard for Control Units, Accessories and Receiving Equipment for Intrusion Alarm Systems.

This Edition of the Standard has been formally approved by the ULC Standards Committee on Security and Burglar Alarm Equipment and Systems.

This Standard has been developed in compliance with the requirements of SCC for accreditation of a Standards Development Organization.

Only metric SI units of measurement are used in this Standard. 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.

Appendices A through E, identified as Informative, are 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 Third Edition National Standard of Canada is based on, and now supersedes, the Second Edition. This Edition consolidates the requirements of, and supersedes, CAN/ULC-S303-M91 (R1999), Standard for Local Burglar Alarm Units and Systems; and ULC/ORD-C1023-74, Preliminary Standard for Household Burglar Alarm System Units.

Attention is drawn to the possibility that some of the elements of this Canadian standard may be the subject of patent rights. ULC Standards shall not be held responsible for identifying any or all such patent rights.

Requests for interpretation of this Standard should be sent to ULC Standards. 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.

The review and action to revise or reaffirm this Standard will not exceed 5 years from the date of publication, unless the Standard is identified as fitting within a stabilized category, whereby the review will commence within the appropriate time frame set out by ULC Standards.

This Standard is intended to be used for conformity assessment.

1 SCOPE

1.1 This Standard covers construction and performance requirements for *control units* and accessories for intrusion alarm systems, including:

- A Protected *premises control units* and accessories for local or *signal receiving centre* connections; and
- B *Signal receiving centre* alarm receiving equipment including *recording* equipment.

1.2 The equipment covered by this standard is intended for use in *premises*, safes and vaults.

1.3 These requirements also serve as the basis of classification of *signal receiving centre* burglar alarm *control units*. Requirements covering complete *control units* are contained in CAN/ULC S301, Standard for Signal Receiving Centre Burglar Alarm Systems and Operations.

1.4 Rules covering installation and classification (of extent) of alarm protective equipment at individual locations are contained in CAN/ULC S302, Standard for the Installation, Inspection and Testing of Intrusion Alarm Systems, Standard for the Installation, Inspection and Testing of Intrusion Alarm Systems.

2 REFERENCE PUBLICATIONS

2.1 The documents shown below are referenced in the text of this Standard. Unless otherwise stated elsewhere in this Standard such reference shall be considered to indicate the edition and/or revisions of the document available at the date on which the Committee approved this ULC Standard. All undated references shall be interpreted as referring to the latest edition of that document.

Documents Published by the Institute of Electrical and Electronics Engineers (IEEE)
445 Hoes Lane, Piscataway, New Jersey, 08854-1331 USA
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- ANSI/ IEEE C63.4-2014, Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

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- CSA C22.1-15, Canadian Electrical Code, Part I, Safety Standard for Electrical Installations
- CSA C22.2 No. 0.1-M1985 (R2013), General Requirements for Double-Insulated Equipment- General Instruction No 1
- CAN/CSA C22.2 No. 0.15-15, Adhesive Labels
- CAN/CSA C22.2 No. 0.17-00 (R2009), Evaluation of Properties of Polymeric Materials
- CAN/CSA C22.2 No. 5-14, Molded-Case Circuit Breakers,, Molded-Case Switches, and Circuit-Breaker Enclosures
- CSA C22.2 No. 8-13, Electromagnetic Interference (EMI) Filters
- CAN/CSA C22.2 No. 18.1-04 (R2009), Metallic Outlet Boxes

- CAN/CSA C22.2 No. 18.2-06 (R2011), Nonmetallic Outlet Boxes
- CAN/CSA C22.2 No. 18.3-12, Conduit, Tubing and Cable Fittings
- CSA C22.2 No. 21-14, Cord Sets and Power-Supply Cords
- CSA C22.2 No. 38-14, Wires and Cables, Thermoset-Insulated
- CSA C22.2 No. 42-10, General Use Receptacles, Attachment Plugs and Similar Wiring Devices
- CAN/CSA C22.2 No. 43-08 (R2013), Lampholders
- CSA C22.2 No. 49-14, Flexible Cords and Cables
- CSA C22.2 No. 55-15, Switches, Special-Use
- CAN/CSA C22.2 No. 65-03, Wire Connectors
- CSA C22.2 No. 66.1-06 (R2011), Low Voltage Transformers - Part 1: General Requirements
- CSA C22.2 No. 66.2-06 (R2011), Low Voltage Transformers - Part 2: General Purpose Transformers
- CSA C22.2 No. 66.3-06 (R2011), Low Voltage Transformers - Part 3: Class 2 and Class 3 Transformers
- CSA C22.2 No. 75-14, Wires and Cables, Thermoplastic-Insulated
- CSA C22.2 No. 77-14, Motors with Inherent Overheating Protection
- CSA C22.2 No. 94.1-07 (R2012), Enclosures for Electrical Equipment, Non-Environmental Considerations
- CSA C22.2 No. 94.2-07 (R2012), Enclosures for Electrical Equipment, Environmental Considerations
- CAN/CSA C22.2 No. 96 -13, Portable Power Cables
- CSA C22.2 No. 100-14, Motors and Generators
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- CAN/CSA C22.2 No. 210-11, Appliance Wiring Material Products
- CSA C22.2 No. 223-M1991 (R2013), Power Supplies with Extra-Low-Voltage Class 2 Outputs
- CAN/CSA C22.2 No. 226-92 (R2011), Protectors in Telecommunication Networks

- CSA C22.2 No. 235-04 (R2013), Supplementary Protectors
- CSA C22.2 No. 248.1-11, Low-Voltage Fuses - Part 1: General Requirements
- CSA C22.2 No. 248.4-00 (R2015), Low-Voltage Fuses - Part 4: Class CC Fuses
- CSA C22.2 No. 248.5-00 (R2015), Low-Voltage Fuses - Part 5: Class G Fuses
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- CSA C22.2 No. 248.12 -11, Low-Voltage Fuses - Part 12: Class R Fuses
- CSA C22.2 No. 248.15-00 (R2015), Low-Voltage Fuses - Part 15: Class T Fuses
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- CSA C22.2 No. 4248.1-07, , Fuseholders - Part 1: General Requirements
- CSA C22.2 No. 4248.4-07, Fuseholders - Part 4: Class CC
- CSA C22.2 No. 4248.5-07, Fuseholders - Part 5: Class CC
- CSA C22.2 No. 4248.6-07, Fuseholders - Part 6: Class CC
- CSA C22.2 No. 4248.8-07, Fuseholders - Part 8: Class CC
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- CSA C22.2 No. 4248.15-07, Fuseholders - Part 15: Class T
- CAN/CSA C22.2 No. 60065, Audio, Video, and Similar Electronic Apparatus-Safety Requirements
- CAN/CSA C22.2 No. 60950-1, Information, Technology Equipment
- CAN/CSA C22.2 No. 61058-1-09, Switches for Appliances - Part 1: General Requirements
- CAN/CSA E60384-1-14, Fixed Capacitors for Use in Electronic Equipment- Part 1: Generic Specification
- CAN/CSA E60384-14:14, Fixed Capacitors for Use in Electronic Equipment - Part 14-1: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains
- CSA Certification Notice No. 516, Surge Suppressors, Transient Voltage
- CSA Certification Notice, Component Acceptance Service No. 5A Isolators, Optical

Documents published by the International Electrotechnical Commission (IEC)

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1 Antares Drive, Suite 200, Ottawa, ON, Canada, K2E 8C4
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- IEC 106-1983, Recommended Methods of Measurement of Radiated and Conducted Interference from Receivers for Amplitude-Modulation, Frequency Modulation, and Television Broadcast Transmissions

Documents Published by Industry Canada
Spectrum Management and Telecommunications
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- ICES-003, Digital Apparatus, Spectrum Management and Telecommunications Policy, Interference-Causing Equipment Standard

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- CAN/ULC-S301-09, Standard for Signal Receiving Centre Intrusion Alarm Systems and Operations
- CAN/ULC-S302-14, Standard for the Installation, Inspection and Testing of Intrusion Alarm Systems
- CAN/ULC-S306-03, Standard for Intrusion Detection Units
- CAN/ULC-S525:2016, Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories

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- UL 1642-2005, Lithium Batteries
- UL 1439-1998, Tests for Sharpness of Edges on Equipment

3 GLOSSARY

NOTE: Terms used in this Standard that are in *italic* print are defined as follows:

3.1 **ANNUNCIATION** – An audible and/or visual indication of the status of protected *points*. Typically located on the *protected premises*.

3.2 **AREA** – A section of the *protected premises* that can be independently *armed* and disarmed. Examples of an *area* may be the office, warehouse, safe, etc. These are frequently referred to as *partitions*.

3.3 **ARMED** – The state of a security *control unit* or *partition/area* where *points/zones* of the *partition/area* are fully protected and a transition on these points will result in an alarm from the *partition/area*.

3.4 **ARMING** – Activating a *partition* or all of the protection equipment at the protected *premises*.

3.5 **ARMING LEVEL** – The extent to which an *partition/area* or entire *control unit* is *armed* (protected). *Control units* may include a number of *arming levels*, such as off, stay, on, home, away, etc.

3.6 **AUDIBLE DEVICE** – Components of a security *control unit* such as piezo-electric buzzers, sirens or bells. While piezos are typically used to provide the user(s) with entry/exit tones and status information, sirens and bells are intended to deter and scare off potential criminals, in addition to alerting tenants/employees and the public with an audible indication of an emergency.

3.7 **AUTO ARMING** – The function of turning 'on' (*arming*) a security *control unit* or *partition/area* "on site" at a pre defined time, without *user* intervention.

3.8 **AUTHORIZED USER** A person that is authorized to perform certain functions. Typically such a person would be in the possession of a *user code*, key, card, other electronic token, or be authenticated by biometrics.

3.9 **AUXILIARY SUPPLY** – The amount of electrical energy available for powering devices such as *keypads*, sensors and other peripherals from the *control unit* power supply.

3.10 **CENTRE OPERATIONS AREA** – The *area* of the *signal receiving centre*, which is used for the receipt of and acting upon signals received from protected *premises*.

3.11 **CODE** – The portion of the electronic signal transmitted which identifies the nature of the message (e.g. alarm by *zonelpoint*, *users*, *arming level* transitions, etc.)

3.12 **COMMUNICATOR DELAY** – A time which elapses before a communicator transmits the signal to a *signal receiving centre*. Typically, this delay is associated with an audible alert from a piezo to give the *user(s)* the opportunity to abort *transmission*. This is not to be confused with the delay provided upon entry and exit.

3.13 **COMMUNICATION CHANNEL** – A circuit or path, over which signals are carried, connecting *control unit(s)* directly to an alarm *signal receiving centre* or by way of a *satellite centre* and/or a *signal processing centre* and/or bridging centre.

3.14 **COMPROMISE** – Any unauthorized action that prevents the normal operation of the *control unit*.

3.15 **CONTROL UNIT** – Device(s), which provide the control, logic processing, and the termination points for the protective wiring circuits of a burglar alarm system. These devices include, but are not limited to *zone expanders*, power supplies, communication devices, and *keypads*.

3.16 **DIGITAL ALARM COMMUNICATOR RECEIVER (DACR)** – A system component that accepts and displays signals from *digital alarm communicator transmitters (DACT)* sent over the public switched telephone network.

3.17 **DIGITAL ALARM COMMUNICATOR TRANSMITTER (DACT)** – A system component to which initiating devices or groups of devices are connected. The *digital alarm communicator transmitter* seizes the connected telephone line, dials a pre-selected number to connect to a *digital alarm communicator receiver*, and transmits signals indicating a status change of the initiating device.

3.18 **DIGITAL ALARM RADIO RECEIVER (DARR)** – A system component composed of two sub-components. One receives and decodes radio signals and another annunciates the decoded data. These two sub-components can be co-resident at the *signal receiving centre* or separated by means of one or more data *communication channels*.

3.19 **DIGITAL ALARM RADIO SYSTEM (DARS)** – A system in which signals are transmitted from a *digital alarm radio transmitter (DART)* located at a protected premise through a radio channel to a *digital alarm radio receiver (DARR)*.

3.20 **DIGITAL ALARM RADIO TRANSMITTER (DART)** – A system component that is connected to, or is an integral part of, a *digital alarm communicator transmitter* that is used to provide an alternate radio *transmission* channel.

3.21 **DISARMING** – Deactivating a *partition* or all of the protection equipment at the protected *premises*.

3.22 **DURESS** – The process of initiating an emergency alarm where one or more persons are trying to force a *user* to enter, re enter or disarm a protected *area/premises* against their will.

3.23 **ENTRY DELAY** – The amount of time to allow a *user* to disarm an *area* or system, once entering the protected *premises*, without initiating an alarm.

3.24 **EXIT DELAY** – The amount of time to allow a *user* to vacate an *area* or *premises*, upon *arming*, without initiating an alarm

3.25 **EXTRA LOW VOLTAGE** – Any voltage up to and including 30 V rms.

3.26 **FALSE ALARM** – An alarm indicating an emergency condition, when no emergency exists.

3.27 **HUNT GROUP** – A group of associated telephone lines within which an incoming call is automatically routed to an idle (not busy) telephone line for completion.

3.28 **KEYPAD** – The *user* interface which allows *users* to arm, disarm or perform other functions.

3.29 **LOCAL ALARM** – An alarm indication at the protected premises such as sirens, bells and annunciators.

3.30 **LOW VOLTAGE** – Any voltage exceeding 30 V rms and not exceeding 750 V rms.

3.31 **NORMAL STANDBY CONDITION** – The ready to operate condition of the product existing prior to its being tripped or operated by an intrusion.

3.32 **ONE-WAY RADIO ALARM SYSTEM (OWRAS)** – Consists of a *radio frequency* transmitter at the protected *premises* that connects to the protected premises *control unit*. This unit can transmit alarm, supervisory and *trouble signals* to at least two receivers. The receivers relay the received signal to the *signal receiving centre* by *radio frequency* or wired *transmission* means. This system allows the use of either a private system operated by a single alarm service provider, or a multi-user system operated by a one-way radio network provider.

3.33 **OPEN CIRCUIT** – A circuit impedance increase sufficient to prevent normal operation.

3.34 *OPTION*– A functional or performance feature that may or may not be used.

3.35 *PANIC BUTTON* – Alarm button installed on the *premises* and/or part of the *user* interface (e.g. *keypad*) that can be activated in case of an emergency.

3.36 *PARTITION* – A section of the protected *premises* that can be independently *armed* (protected) and disarmed. Examples of a *partition* may be the office *area*, warehouse, safe, etc. This is also frequently referred to as an *area*.

3.37 *POINT* – An independent alarm initiating circuit that provides the capability for distinct *annunciation* and alarm signals.

3.38 *PREMISES* – A facility which may or may not be protected by an intrusion alarm system.

3.39 *PRIMARY COMMUNICATION CHANNEL*– The first means of signal *transmission* circuit or path between the *premises control unit* and the signal receiving station.

3.40 *RADIO ALARM REPEATER STATION RECEIVER (RARSR)* – A system component, used in a *one-way radio alarm system* or *two-way radio alarm system*, consisting of a radio receiver and transmitter. This component receives radio signals from a *radio alarm transmitter* and re-transmits them to another *RARSR* or to a *RASSR* in a *one-way radio alarm system*, or relays signals between a *radio alarm transmitter* and a *RASSR* in a *two-way radio alarm system*.

3.41 *RADIO ALARM SUPERVISING STATION RECEIVER (RASSR)* – A system component that receives data and annunciates that data at the signal receiving station.

3.42 *RADIO ALARM TRANSMITTER (RAT)* – A system component at the protected *premises* to which initiating devices or groups of devices are connected. The RAT transmits signals indicating a status change of the initiating devices. A RAT may consist of a transmitter only (one-way) or transmitter/receiver (two-way). A RAT may be an integral part of the control or may be remote from the control panel.

3.43 *RADIO FREQUENCY* – Electro-magnetic radiation, nominally above 20 kHz.

3.44 *RECORDING*– Writing data onto disk, tape or other media.

3.45 *REPEATER STATION* – Equipment that receives and re-transmits signals without alteration of its contents.

3.46 *REMOTE ACCESS* - The process by which a *control unit* is accessed by means other than permanently installed local devices.

3.47 *REMOTE ARMING* – The function of turning on (*arming*) a security *control unit* or *partition/area* from an "off site" location. This may be via the up/downloading computer, a touch tone telephone or other means.

3.48 *SATELLITE CENTRE* – A normally unattended location that is remote from the *signal receiving centre* and linked by a *communication channel(s)* to the *signal receiving centre*.

3.49 *SECONDARY COMMUNICATION CHANNEL* – The alternate or back-up means of signal *transmission* circuit or path between the *premises control unit* and the signal receiving station.

3.50 *SHORT CIRCUIT* – A circuit impedance decrease sufficient to prevent normal operation.

3.51 **SIGNAL PROCESSING CENTRE** – A normally unattended physical location where signals are received, either directly from protected *premises* or by way of bridging centres, and where the signals are altered or processed prior to being transmitted to a *satellite centre* or a *signal receiving centre*

3.52 **SIGNAL RECEIVING CENTRE (SRC)** – The portion, or portions of a building, occupied by the alarm operating company which encompasses the *Centre Operations Area* and the facilities essential to the operation of monitoring, processing, and disposition of alarm signals.

3.53 **SIGNAL RECEIVING CENTRE AUTOMATION SYSTEM (SRCAS)** – A computer system that consists of hardware and software components. These components include the software supplied by the automation system developer, the operating system, and programming languages, required to make the system operational. An automated system may be configured as a computer system that is directly connected to hardware based *SRC* receivers, internal software based receivers, or is connected to remote receivers located in the *signal receiving centre* or *satellite centres* other than where the *SRCAS* is located. It is used to automatically process change-of-status signals such as alarm, *trouble*, supervisory, *disarmings* and *armings*, and similar signals that it receives from the *SRC* receiving equipment.

3.54 **SUBSCRIBER** – The recipient of contractual *signal receiving centre* service(s). In case of multiple, non-contiguous properties having single ownership, the term refers to each protected *premises* or its local management.

3.55 **TAMPERING** – Attempting to *compromise* the protection.

3.56 **TRANSMISSION** – The data sent to the *signal receiving centre*.

3.57 **TROUBLE** – An abnormal condition in the *control unit* such as power failure, cut telephone lines, loss of supervised lines or devices, etc.

3.58 **TROUBLE SIGNAL** – A visual and audible indication of equipment failure, circuit failure, fault condition or operational malfunction.

3.59 **TWO-WAY RADIO ALARM SYSTEM (TWRAS)** – Also known as a two-way *radio frequency* multiplex system. Consists of a traditional multiplex system that uses a licensed two-way radio system to transmit signals from the protected *premises* to the *signal receiving centre*

3.60 **USER** – A person that has been given a *code*, key or token that allows this individual to arm/disarm and perform other functions with a *control unit*.

3.61 **VIOLATED** – A transition of an input *point*, typically by an unauthorized person, that results in an alarm condition.

3.62 **ZONE** – An independent alarm initiating circuit that provides the capability for distinct *annunciation* and alarm signals.

4 GENERAL

4.1 GENERAL

4.1.1 The terms 'control unit' and 'product', as used in this Standard, refer to all types of *signal receiving centre* equipment and protected *premises control units* and accessories.

4.1.2 Unless otherwise indicated, all voltage and current values specified in this Standard are root mean square (rms).

4.2 COMPONENTS

4.2.1 Except as indicated in Clause 4.2.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A (Informative), Standards for Components, for a list of Standards covering components generally used in the products covered by this standard.

4.2.2 A component is not required to comply with a specific requirement that:

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

4.2.3 A component shall be used in accordance with its rating established for the intended conditions of use.

4.2.4 Specific components that are incomplete in construction features or restricted to be used only under limited conditions, such as certain temperatures not exceeding specified limits, shall be used only under those specific conditions.

5 INSTALLATION AND OPERATING INSTRUCTIONS

5.1 A copy of the installation and operating instructions intended to accompany each product as produced, the related wiring diagrams, and the installation drawings, is to be furnished with the sample submitted for investigation, to be used as a guide in the examination and testing of the product.

Note: In Canada, there are two official languages, French and English. Attention is drawn to the possibility that some Canadian authorities may require the installation and operating instructions to be in both official languages

5.2 The instructions and drawings shall include at least the following:

- A Typical installation drawing layouts and a complete representative installation wiring diagram(s) for the product(s) indicating recommended locations and wiring methods that shall be in accordance with CSA C22.1, Canadian Electrical Code, Part I, Safety Standard for Electrical Installations; CAN/ULC S302, Standard for the Installation, Inspection and Testing of Intrusion Alarm Systems; and CAN/ULC S301, Standard for Signal Receiving Centre Intrusion Alarm Systems and Operations. Locations where installations are not recommended shall also be included;
- B Concise description of the operation, testing, and maintenance procedures for the product(s), and recommended testing frequency that shall be at least once per year;
- C Identification of replacement parts, such as lamps or batteries, by a part number, manufacturer's model number, or the equivalent;
- D Identification of the conditions that might be expected to result in *false alarms* or impaired operation of the product(s); and
- E A description of any features provided to reduce the risk of fire, electric shock, or injury to persons and a warning against bypassing such features.

5.3 The instructions may be incorporated on the inside of the product, on a separate sheet, or as part of a manual. If not included directly on the product, the instructions or manual shall be referenced in the marking information on the product.

5.4 A user manual shall accompany each *control unit*. The user manual shall include at least the following information:

- A Index of functions;
- B *Control unit* information (configuration);
- C Graphics of *user* interfaces;
- D Description of warnings;
- E *Arming levels*;
- F Typical features;
- G Contact and account information for *signal receiving centre*;
- H Methods of avoiding *false alarms*; and
- I Recommendations for *false alarm* prevention.

Refer to Appendix B (Informative), Recommendation for Contents of User Manuals, for an example of a user manual.

5.5 Installation instructions, operating and test instructions shall be made available by printed hardcopy or by physical electronic media such as a CD, DVD, etc., or be posted on a website (or equivalent), and maintained by the manufacturer of the equipment. A copy may be supplied with each individual product or with each single shipment when multiples of the same products are shipped directly (to an end customer) in a single shipment.

6 CONSTRUCTION

6.1 GENERAL

6.1.1 A component of a device shall comply with the requirements for that component, except that such requirements may be modified if appropriate for the particular application.

6.1.2 Products that currently meet the requirements of CAN/CSA-C22.2 No. 60950-1, Information, Technology Equipment or CAN/CSA C22.2 No. 60065, Audio, Video, and Similar Electronic Apparatus-Safety Requirements, need only to be evaluated to the following Subsections with respect to the construction requirements:

- A Subsection 6.7, Installation Wiring Connections;
- B Subsection 6.8, Terminals;
- C Subsection 6.9, Leads;
- D Subsection 6.11, Termination of Raceways;

- E Subsection 6.18, Capacitors;
- F Subsection 6.20, Switches; and
- G Subsection 6.22, Semiconductors.

6.2 FRAME AND ENCLOSURE

6.2.1 General

6.2.1.1 A unit shall resist the abuses to which it is likely to be subjected without adversely affecting its performance and without increasing its fire and shock hazard due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts, or other serious defects.

6.2.1.2 Electrical parts of a unit shall be so located or enclosed that protection against accidental contact with un-insulated hazardous live parts will be provided.

6.2.1.3 Operating parts, such as gear mechanisms, light duty relays, and similar devices, shall be protected against fouling by dust or other material that may affect adversely their normal operation.

6.2.1.4 The thickness of cast metal for an enclosure shall be as indicated in Table 1, except that cast metal of lesser thickness may be employed if, upon investigation (consideration being given to the shape, size and function of the enclosure), it is found to have equivalent mechanical strength.

6.2.1.5 The thickness of sheet metal employed for an enclosure of a unit shall be not less than that indicated in Table 2 or Table 3, whichever is applicable; except that sheet metal of less thickness may be employed if, upon investigation (consideration being given to the shape, size and function of the enclosure), it is found to have equivalent mechanical strength. At any *point* where conduit or armoured cable is to be attached, sheet metal shall be of such thickness or shall be so formed or reinforced that it will have stiffness at least equivalent to that of an uncoated flat sheet of steel having a minimum thickness of 1.34 mm.

6.2.1.6 Among the factors which are taken into consideration when judging the suitability of a non-metallic enclosure with respect to aging are: mechanical strength; resistance to impact; moisture absorptive properties; flammability and resistance to ignition from electrical sources; resistance to distortion at temperatures to which the material may be subjected under conditions of normal or abnormal usage; and the effect of exposure to weathering if for outdoor use.

All these factors shall be considered with respect to aging in accordance with Subsection 6.2.2, Polymeric Materials Test, and the Subsection 6.2.3, Mechanical Strength Tests for Enclosures.

6.2.1.7 An enclosure shall have means for mounting, which shall be accessible without disassembling any operating part of the unit; unless the completely assembled panel can be removed from the enclosure as an assembly.

6.2.1.8 An enclosure cover shall be hinged, sliding, or similarly attached to prevent its being removed if:

- A It gives access to fuses or any other overcurrent protective device, the normal functioning of which requires renewal;
- B It is necessary to open the cover in connection with the normal operation of the unit; or
- C Its position is supervised by a tamper contact which is connected in the closed protective circuit.

6.2.1.9 An enclosure cover shall be provided with a supervisory contact, which is connected in the closed protective wiring circuit, if it gives access to any relays, terminals, controls, or related components that might be subject to *tampering*, without causing an alarm signal.

6.2.1.10 Ventilating openings in an enclosure, including perforated holes, louvers, and openings protected by means of wire screening, expanded metal, or perforated covers, shall be of such size or shape that no opening will permit passage of a rod having a diameter of 13 mm; except that if the distance between un-insulated live parts and the enclosure is greater than 100 mm, openings may be larger than those previously mentioned, provided no opening will permit passage of a rod having a diameter of 19 mm. An enclosure housing fuses or any other overload protective device, and provided with ventilating openings, shall afford protection against the emission of flame or molten metal.

6.2.1.11 Except as noted in Clause 6.2.1.12, perforated sheet metal and sheet metal employed for expanded metal mesh shall be not less than 1.07 mm in thickness (1.16 mm if zinc coated) if the mesh openings or perforations are 320 mm² or less in *area*, and shall be not less than 2.03 mm in thickness (2.13 mm if zinc coated) for larger openings.

6.2.1.12 If the indentation of guard or enclosure will not alter the clearance between un-insulated live metal parts and grounded metal so as to affect performance adversely or reduce spacing below the minimum values given in Clauses 6.23.1.2 through 6.23.1.5, 0.53 mm expanded metal mesh or perforated sheet metal (0.58 mm if zinc coated) may be employed, provided that:

- A The exposed mesh on any one side or surface of the device so protected has an *area* of not more than 465 cm² and has no dimension greater than 300 mm; or
- B The width of an opening so protected is not greater than 90 mm.

6.2.1.13 The wires of a screen shall not be smaller than 1.29 mm in diameter (16 AWG) if the screen openings are 320 mm² or less in *area*, and shall not be smaller than 2.05 mm in diameter (12 AWG) for larger screen openings.

6.2.1.14 Where installed at a *control unit's premises*, a compartment enclosing electrical parts shall not be open to the floor or other support on which the unit rests.

6.2.1.15 Openings in the enclosure shall not give access to any relays, terminals, controls, or related components that might be subject to *tampering* without causing an alarm signal.

6.2.1.16 Any part that is exposed only during operator servicing shall not present the risk of electric shock. See Subsection 8.11, Electric Shock Current Test.

6.2.1.17 The insertion in any socket of any component used in the product shall not result in a risk of electric shock.

6.2.1.18 All communicators shall be housed in tampered enclosures, compliant with the following clauses within this Standard: 6.2.1.6; 6.2.1.9; 6.2.1.10 and 6.2.1.15.

6.2.2 Polymeric Materials Test

6.2.2.1 Polymeric materials used as an enclosure, or for the support of current-carrying parts shall comply with the applicable requirements in CSA C22.2 No. 0.17, Evaluation of Properties of Polymeric Materials.

6.2.3 Mechanical Strength Tests for Enclosures

6.2.3.1 The external enclosure of a product containing high-voltage circuits or other than *extra low voltage* circuits shall withstand a force of 111 N (25 lbf) for 1 min without:

- A Permanent distortion to the extent that spacings are reduced below the values specified in Clauses 6.2.3.2 through 6.2.3.5;
- B Transient distortion that results in the enclosure contacting live part; and
- C Causing openings which expose uninsulated high- or low-voltage live parts.

6.2.3.2 The force is to be applied by the curved side of a 12.7 mm (1/2 in) diameter steel hemisphere. Any openings that occur during application of the force are to be evaluated according to the requirements specified in Clauses 6.2.3.1.2 and 6.2.3.1.5.

6.2.3.3 The external enclosure of a product containing only low-voltage power-limited circuits is to be subjected to the test in Clause 6.2.3.1, except that the enclosure shall withstand an applied force of 44.5 N (10 lbs).

6.2.3.4 The external enclosure of a product containing high-voltage circuits of other than power-limited circuits shall withstand an impact of 6.78 J (5 ft-lbs) without:

- A Permanent distortion to the extent that spacings are reduced below the values specified in Clauses 6.2.3.1.2 through 6.2.3.1.5;
- B Transient distortion that results in the enclosure contacting live parts; and
- C Causing openings that expose un-insulated high- or low-voltage live parts.

6.2.3.5 The impact is to be applied by means of a solid, smooth, steel sphere 50.8 mm (2 in) in diameter and weighing approximately 0.54 kg (1.18 pounds) falling freely from rest through a vertical distance of 1.30 m (51 in). Any openings resulting from the impact are to be evaluated according to the requirements in Clauses 6.2.3.1 and 6.2.3.5.

6.2.3.6 The external enclosure of a product containing only *extra low-voltage* circuits is to be subjected to the test described in Clause 6.2.3.4, except that the impact is to be 2.7 J and the sphere is to fall freely from rest through a vertical distance of 0.52 m.

6.3 CORROSION PROTECTION

6.3.1 Except as indicated in Clause 6.3.2, iron and steel parts, other than bearings, etc., where such protection is impracticable, shall be protected against corrosion by enamelling, galvanizing, sheardizing, plating, or other equivalent means.

6.3.2 The requirement of Clause 6.3.1 applies to all enclosing cases of sheet steel or cast iron, and to all springs and other parts upon which proper mechanical operation may depend. It does not apply to minor parts, such as washers, screws, bolts and the like, if failure of such unprotected parts would not be likely to result in a hazardous condition or in the equipment's operation being affected; but the protection of all such parts is recommended. Parts made of stainless steel (polished or treated, if necessary) do not require additional protection against corrosion. Bearing surfaces should be of such materials and design as to resist binding due to corrosion.

6.4 INSULATING MATERIAL

6.4.1 A base for the support of live metal parts shall be of a strong non-combustible, moisture resistant insulating material, such as porcelain, phenolic or cold moulded composition, or other material, which is recognized for the support of live metal parts.

6.4.2 A base mounted on a metal surface which may be grounded shall be provided with an insulating barrier between the mounting surface and all live metal parts on the underside of the base which are not staked, upset, sealed, or equivalently prevented from loosening so as to prevent such parts and the ends of replaceable terminal screws from coming in contact with the support surface.

6.4.3 Hard fibre may be used for insulating bushings, washers, separators, and barriers, but not for the sole support of live metal parts where shrinkage, current leakage, or warping of the fibre may introduce a hazard.

6.4.4 A countersunk sealed live part shall be covered with a waterproof insulating compound which will not melt at a temperature of 15 °C higher than the maximum normal operating temperature of the assembly, and at not less than 47 °C in any case. The depth or thickness of sealing compound shall be not less than 3 mm.

6.4.5 The thickness of a flat sheet of insulating material such as phenolic composition, or other recognized material, employed for panel mounting of parts, shall be not less than that indicated in Table 4.

6.5 MOUNTING OF PARTS

6.5.1 All parts shall be securely mounted in position and prevented from loosening or turning if such motion may affect the normal performance of the equipment or may affect the fire or accidental hazard incident to the operation of the equipment.

6.5.2 Un-insulated live metal parts shall be secured to their supporting surfaces so that they will be prevented from turning or shifting in position if such motion may result in a reduction of spacings to less than those indicated in Clauses 6.23.1.2 through 6.23.1.5.

6.5.3 Friction between surfaces is not acceptable as a means to prevent turning, loosening, or shifting of a part as required in Clauses 6.5.1 and 6.5.2, but suitable lock washer or equivalent means may be accepted.

6.6 CURRENT CARRYING PARTS

6.6.1 A current carrying part shall be of gold, silver, copper, or a copper alloy.

6.6.2 Bearings, hinges, etc. are not acceptable for carrying current between fixed and moving parts

6.7 INSTALLATION WIRING CONNECTIONS

6.7.1 *Signal receiving centre* equipment shall be permanently connected by fixed or flexible conduit or the equivalent means to prevent accidental disconnection.

6.7.2 Protected *premises* equipment may be powered from a Class 2 transformer, be cord connected to the alternating current line, or be permanently connected by fixed or other equivalent means to prevent accidental disconnection.

6.8 TERMINALS

6.8.1 For wires that are 4.11 mm in diameter 6 AWG and larger, soldering lugs or solderless (pressure) wire connectors shall be used. For 3.26 mm diameter (8 AWG) and smaller wires, the parts to which wiring connections are made may consist of clamps or binding screws with terminal plates having upturned lugs or the equivalent to hold the wires in position.

6.8.2 A wiring terminal shall be prevented from turning.

6.8.3 A wire binding screw, if employed at a wiring terminal, shall not be smaller than No. 8; except that a No. 6 screw may be used for the connection of a 1.63 mm diameter (14 AWG) or smaller conductor, and a No. 4 screw for a 0.91 mm diameter (19 AWG) or smaller conductor.

6.8.4 A wire binding screw shall thread into metal.

6.8.5 Except as noted in Clause 6.8.6, a terminal plate tapped for a wire binding screw shall be of metal not less than 1.27 mm in thickness for a No. 8 or larger screw, and not less than 0.76 mm in thickness for a No. 6 or a No. 4 screw, and shall have no fewer than two full threads in the metal.

6.8.6 A terminal plate may have the metal extruded at the tapped hole for the binding screw to provide two full threads. Other constructions may be employed if they provide equivalent ruggedness of the terminal plate and thread security of the wire binding screw.

6.9 LEADS

6.9.1 If leads are provided in lieu of wiring terminals, they shall be not less than 150 mm long and recognized for the purpose. No such lead shall be smaller than 0.65 mm in diameter (22 AWG), and if intended for connection to a commercial power source, the leads shall be not smaller than 1.02 mm (18 AWG).

6.10 POLARITY IDENTIFICATION

6.10.1 In a device intended to be connected to a grounded circuit, one terminal or lead shall be identified for the connection of the grounded conductor. The identified terminal or lead shall be the one which is connected to screw shells of lamp holders and to which no primary overcurrent protective devices of the single pole type are connected.

6.10.2 A terminal intended for the connection of a grounded supply conductor shall be composed of or plated with metal that is substantially white in colour and shall be readily distinguishable from the other terminals, or proper identification of the terminal shall be clearly shown in some other manner, such as on an attached wiring diagram. A lead intended for the connection of a grounded power supply conductor shall be finished to show a white or natural gray colour and shall be readily distinguishable from the other leads.

6.11 TERMINATION OF RACEWAYS

6.11.1 Except as indicated in Clause 6.11.2, an enclosure shall have provision for the connection of armoured cable or conduit.

6.11.2 An enclosure without provision for the connection of armoured cable or conduit may be acceptable if there are furnished with it definite instructions indicating the sections of the unit which are intended to be drilled in the field for the connection of raceways or; if the unit is a portable device, connected by a power supply cord; or an extra low energy device intended for connection by means of Class 2 wiring.

6.12 CORDS AND PLUGS

6.12.1 A device which is intended to be movable shall be provided with a recognized flexible cord and cord connector.

6.12.2 The investigation of such a device is to include consideration of the need and the desirability of its being readily movable.

6.13 STRAIN RELIEF

6.13.1 Strain relief shall be provided so that a mechanical stress on a flexible cord or cable will not be transmitted to terminals, splices, or interior wiring.

6.13.2 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, etc., which may cause abrasion of the insulation on the conductors.

6.14 BUSHINGS

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

6.14.2 If the cord hole is in phenolic composition or other suitable non conducting material, a smoothly rounded surface is considered the equivalent of a bushing.

6.14.3 Ceramic materials and some moulded compositions are considered to be acceptable for insulating bushings, but bushings of wood and of hot moulded shellac are not acceptable.

6.14.4 Fibre may be employed where it will not be subjected to a temperature higher than 88 °C under normal operating conditions if the bushing is not less than 1.6 mm in thickness (with a minus tolerance of 0.4 mm for manufacturing variations) and if it is so formed and secured in place that it will not be exposed to moisture.

6.14.5 A soft rubber bushing may be employed in a frame of a motor if the bushing is not less than 1.6 mm in thickness (with a minus tolerance of 0.4 mm for manufacturing variations) and if the bushing is so located that it will not be exposed to oil, grease, oily vapour, or other substance which may have a deleterious effect on rubber. If a soft rubber bushing is employed in a hole in metal, the hole shall be free from sharp edges, burrs, projections, etc., which would be likely to cut into the rubber.

6.14.6 An insulating metal grommet may be considered to be acceptable in lieu of an insulating bushing, provided that the insulating material used is not less than 0.8 mm in thickness and fills completely the space between the grommet and the metal in which it is mounted.

6.15 INTERNAL WIRING

6.15.1 Internal wiring shall have thermoplastic or rubber insulation not less than 0.4 mm thick for 0 to 300 V applications where power is less than 375 VA, current less than 5 A and no flexing or mechanical abuse is likely. Otherwise, thermoplastic or rubber insulation not less than 0.8 mm thick rated 600 V shall be used. Other insulating materials of less thickness may be used, if recognized as equivalent.

6.15.2 Leads shall be stranded if connected to parts mounted on a hinged cover, and shall be of sufficient length to permit the full opening of the cover without applying stress to the leads or their connections. The leads shall be secured or equivalently arranged to prevent abrasion of insulation and jamming between parts of the enclosure.

6.15.3 Insulation, such as coated fabric or extruded tubing, shall not be affected physically or electrically by the temperature or other environmental conditions to which it may be subjected in service.

6.15.4 Wire ways shall be smooth and entirely free from sharp edges, burrs, fins, moving parts, etc., which may cause abrasion of the conductor insulation. Holes in sheet metal walls through which insulated wires pass shall be provided with a bushing if the wall is 1.07 mm or less in thickness. Holes in walls thicker than 1.07 mm shall have smooth, well rounded edges.

6.15.5 All joints and connections shall be mechanically secure and electrically bonded.

6.15.6 Stranded conductors clamped under wire binding screws or similar parts shall have the individual strands soldered together or equivalently arranged.

6.15.7 A splice shall be provided with insulation equivalent to that of the wires involved.

6.15.8 A printed wiring assembly employing insulating coatings or encapsulation, the compound shall be investigated. Samples of the assembly shall be tested for dielectric strength before and after being treated, except that when it is impractical to use untreated samples, finished samples shall be tested for dielectric strength after they are subjected to humidity, temperature, and other applicable tests described in this Standard.

6.16 SEPARATION OF CIRCUITS

6.16.1 Internal wiring of circuits which operate at different potentials shall be separated by barriers, clamps, routing, or other equivalent means, unless all conductors are provided with insulation which is recognized for the highest potential involved.

6.16.2 If a barrier is used to provide separation between the wiring of different circuits, it shall be of metal or have recognized insulating material. A barrier of insulating material shall be not less than 0.8 mm in thickness (minimum 0.7 mm).

6.17 GROUNDING

6.17.1 Exposed dead metal parts, which are likely to become energized, shall be conductively connected to the part to which armoured cable or conduit is to be connected.

6.17.2 If a multiple conductor cord is employed, it shall be provided with a recognized means of grounding the grounding conductor where connection is made to an outlet. The grounding conductor shall be secured to the frame or enclosure of the device by means of a screw that is not likely to be removed during ordinary servicing, or by other reliable means. Solder alone shall not be used for securing the grounding conductor.

6.17.3 The surface of an insulated lead intended solely for the connection of an equipment grounding conductor shall be green, with or without one or more yellow strips, and no other lead visible to the installer shall be so identified.

6.17.4 A wire binding screw intended for the connection of an equipment grounding conductor shall have a green coloured head that is hexagonal shaped, slotted, or both. A pressure wire connector intended for connection of such a conductor shall be identified by being marked, "G", "GR", "GROUND"

"GROUNDING", or the equivalent, or by a marking on a wiring diagram provided on the unit. The wire binding screw or pressure wire connector shall be so located that it is unlikely to be removed during normal servicing of the equipment. At a wire binding screw, upturned lugs or the equivalent, shall be provided to retain the conductor. Where a pressure connector is used adjacent to the connectors intended for the supply conductors and where it could be mistaken for the neutral of a grounded supply, a marking shall be additionally provided indicating "EQUIPMENT GROUND" and/or identifying the connector by a green colour.

NOTE: In Canada, there are two official languages, French and English. Attention is drawn to the possibility that some Canadian authorities may require markings to be in both official languages.

6.17.5 A field wiring terminal intended solely for connection of an equipment grounding conductor shall be capable of securing a conductor of the size required based on the rating of the branch circuit overcurrent device to which the equipment will be connected. See Clause 6.17.4.

6.18 CAPACITORS

6.18.1 A capacitor shall not be affected by the temperatures to which it may be subjected under the most severe conditions of normal use. A paper capacitor shall be impregnated or otherwise enclosed to exclude moisture.

6.19 TRANSFORMERS, RELAYS, ETC.

6.19.1 Except as noted in Clause 6.19.2, a transformer shall be of the two coil or insulated type.

6.19.2 An autotransformer may be employed provided that the terminal or lead connected to the autotransformer winding which is common to both input and output circuit is identified and the output circuits are located only within the enclosure containing the autotransformer. See Clause 6.10.1.

6.19.3 Coils shall be treated with an insulating varnish, and baked or otherwise impregnated to exclude moisture.

6.19.4 Film coated wire is not required to be given additional treatment to prevent moisture absorption.

6.20 SWITCHES

6.20.1 A switch provided as part of a device shall have a current and voltage rating not less than that of the circuit which it controls when the device is operated under any condition of normal service. If the circuit controlled has a power factor less than 75%, the switch shall have:

- A A horse power rating (judged on the basis of the ampere equivalent); or
- B A rating of not less than 200% of the maximum load current.

6.21 OVERCURRENT PROTECTION

6.21.1 If a primary circuit breaker or fuses are provided, their rating shall be in accordance with the maximum input to the device.

6.22 SEMICONDUCTORS

6.22.1 Semiconductors shall be rated for the intended application under all environmental conditions to which they will be exposed in service.

6.22.2 The performance tests of the complete unit are intended to show the effects of these conditions. The prescribed tests may be supplemented where conditions exceeding those represented by the tests indicated in this Standard may be encountered.

6.23 SPACINGS

6.23.1 General

6.23.1.1 Spacings between un-insulated live parts and between un-insulated live parts and dead metal parts shall be not less than those indicated in Clauses 6.23.1.2 through 6.23.1.5.

6.23.1.2 The spacing between an un-insulated live part and a wall or cover of a metal enclosure, a fitting for conduit or metal clad cable, and a metal piece attached to a metal enclosure, where deformation of the enclosure is likely to reduce spacings, shall be not less than those indicated in Table 5. See Figure 1.

6.23.1.3 The spacings between an un-insulated live part and an un-insulated live part of opposite polarity, an un-insulated grounded dead-metal part other than the enclosure, and an exposed dead-metal part which is isolated (insulated) shall be not less than those indicated in Table 5. See also Clauses 6.23.2.1 and 6.23.2.2 and Figure 1.

6.23.1.4 If a *short circuit* between un-insulated live parts of the same polarity would prevent the intended operation of the product without simultaneously producing an alarm signal, the spacings between such parts shall be not less than those indicated for other parts in Table 5.

6.23.1.5 Film coated wire is considered an un-insulated live part in determining compliance of a product with the spacing requirements, but film coating is acceptable as turn to turn insulation in coils.

6.23.2 Components

6.23.2.1 A galvanometer type relay in which the spacings do not comply with Clause 6.23.1.2 may be employed if, upon investigation, it complies with the performance requirements in this Standard.

6.23.2.2 Minimum values of spacings are not specified for plug in sockets of component parts, used in electronic circuits. However, if the spacings in such components do not comply with the requirements of Clause 6.23.1.2 through 6.23.1.5, the spacings shall be such that the circuit complies with the requirement of Subsection 8.10, Dielectric Strength Test.

6.23.2.3 The spacings within snap switches, lamp holders, and similar wiring devices supplied as part of a unit are judged on the basis of the requirements for such devices.

7 MARKING

NOTE: In Canada, there are two official languages, French and English. Attention is drawn to the possibility that some Canadian authorities may require markings to be in both official languages.

7.1 A *control unit* shall be plainly and permanently marked where it will be readily visible after installation with the manufacturer's name or trade mark and a distinctive catalogue number or the equivalent.

7.2 The input rating shall be shown for all line connected equipment.

7.3 If information is necessary for the proper operation of any manually operated part, it shall be provided and shall be attached to the *control unit*.

7.4 Unless the proper wiring connections are plainly evident, installation wiring terminals or wire leads shall be marked to indicate the connections.

7.5 Special marking as to mounting, if equipment is required to be mounted in a definite position, shall be provided.

7.6 *Control units* shall include installation wiring label(s) that clearly identify termination points as inputs, power, ground, phone line, *keypad* wiring, etc. The label(s) shall be permanently affixed and readily visible within the *control unit*.

7.7 A unit intended for permanent connection only to a wiring system other than a metal enclosed system shall be marked to indicate the system or systems for which it is suitable. The marking shall be so located that it will be visible when power connections to the *control unit* are made.

7.8 The *control unit* design shall include a permanently affixed label that includes guidelines for maximum number of protection devices per *zone* and information on maximum *auxiliary supply* available. Where the *auxiliary supply* is reduced by the addition of further *keypads* or other expansion modules, it shall be so noted.

Exception: If it is not practical to include all guideline information, there shall be a reference in the marking on the control unit with the drawing number and issue and/or date.

7.9 Each *user* interface shall provide either hardcopy point labels (e.g. card behind *keypad*) or support alphanumeric descriptions of protective *points*.

8 PERFORMANCE

8.1 NORMAL OPERATION

8.1.1 If equipment must be mounted in a definite position in order to function properly, it shall be tested in that position.

8.1.2 A *control unit* shall be capable of performing its normal function when installed in accordance with Clauses 8.1.3 through 8.1.5.

8.1.3 The *control unit* is to be mounted in the intended manner and its terminals connected to circuits of related equipment as indicated by the installation wiring diagram to represent a typical system combination.

8.1.4 The devices employed for testing are to be those specified by the wiring diagram of the *control unit*, except that substitute devices may be used if they produce the functions and load conditions equivalent to those obtained with the devices intended to be used with the *control unit* in service.

8.1.5 Power input supply terminals are to be connected to supply circuits of rated voltage and frequency.

8.1.6 A *control unit* shall be in the normal circuit condition and ready for normal communications operation when it is connected to related devices and circuits as specified in Clauses 8.1.1 through 8.1.5.

8.1.7 *Signal receiving centre* equipment and *premises control units* shall be electrically supervised so that failure of the major components or of the power supply will result in an alarm or a *trouble signal*.

8.1.8 A product, which radiates or utilizes radio frequencies, shall be shown to comply with Industry Canada ICES-003, Digital Apparatus, Spectrum Management and Telecommunications Policy, Interference-Causing Equipment Standard, before it is submitted for test.

NOTE: In Canada the regulatory authority having jurisdiction requires products, which radiate or utilize radio frequencies, to comply with its regulations.

8.1.9 A *control unit* supporting multiple *partitions* shall be capable of sending separate *arming* and *disarming* (*opening/code*) signals per *partition*.

8.1.10 A *control unit* shall be designed such that no *false alarms* occur during the performance tests as described in Section 8, Performance.

8.1.11 Products that currently meet the requirements of CAN/CSA-C22.2 No. 60950-1, Information, Technology Equipment or CAN/CSA C22.2 No. 60065, Audio, Video, and Similar Electronic Apparatus-Safety Requirements, are not required to be evaluated to the :

- A Subsection 8.10, Dielectric Strength Test;
- B Subsection 8.11, Electric Shock Current Test; and
- C Subsection 8.14, Abnormal Operation Test.

8.2 POWER INPUT

8.2.1 The power input shall not exceed 110% of the marked rating during normal operation.

8.3 VOLTAGE VARIATIONS

8.3.1 The device shall function properly at 85 to 110% of rated voltage without readjustment. Tests shall be conducted at maximum, minimum, and intermediate input voltages.

8.4 TEMPERATURE VARIATIONS

8.4.1 A device for indoor use shall function properly at rated voltage with its related equipment when the temperature of the ambient air is 0 °C and when the temperature of the ambient air is 49 °C.

8.4.2 If the device is intended for outdoor use, the tests shall be made at temperatures of 66 °C and –40 °C.

8.4.3 The exposure to any of the above temperatures shall be 4 h or more.

8.5 HUMIDITY TEST

8.5.1 A device shall function properly during and after exposure for 24 h to air having a relative humidity of 93 ±2% at a temperature of 32 ±2 °C.

8.6 ENDURANCE TEST

8.6.1 A device shall be capable of operating at rated voltage and current for 6000 cycles of setting, tripping, and restoration to normal. There shall be no electrical or mechanical failure of the device, nor undue pitting, burning, or welding of contacts.

8.6.2 Current interrupting devices of a unit shall be capable, prior to the 6000 cycles, of withstanding 50 cycles of operation at an overload resulting from operation at 115% of the rated voltage of the system.