CAN/CSA-C22.2 No. 157-92

A National Standard of Canada

(reaffirmed 2016)

Intrinsically safe and non-incendive equipment for use in hazardous locations

Standards Council of Canada
Conseil canadien des normes

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Update No. 2
CAN/CSA-C22.2 No. 157-92
June 2003

Note: *General Instructions for CSA Standards are now called Updates. Please contact CSA Information Products Sales or visit* ***www.csa.ca*** *for information about the* ***CSA Standards Update Service****.*

Title: *Intrinsically Safe and Non-incendive Equipment for Use in Hazardous Locations* — published June 1992

The following amendments have been approved and are marked by the symbol delta (Δ) in the margin on the attached replacement pages:

Revised	Clause 4.2.5.2
New	Clause 4.2.5.3
Deleted	None

CAN/CSA-C22.2 No. 157-92 originally consisted of **55 pages**, each dated **June 1992**. It now consists of the following pages:

June 1992	3-16 and 19-55
June 2003	17 and 18

- Update your copy by inserting these revised pages.
- Keep the pages you remove for reference.

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C22.2 No. 25-1966,
Enclosures for Use in Class II Groups E, F, and G Hazardous Locations;

C22.2 No. 30-M1986,
Explosion-Proof Enclosures for Use in Class I Hazardous Locations;

CAN/CSA-C22.2 No. 94-M91,
Special Purpose Enclosures.

3.5.2
Where reference is made to the following publications such reference shall be considered to refer to that edition listed below.

CSA Standards
CAN3-C235-83,
Preferred Voltage Levels for AC Systems, 0 *to* 50 000 V;

CAN3-M421-M85,
Use of Electricity in Mines.

IEC* Publication
79-3-1972,
Electrical Apparatus for Explosive Gas Atmospheres.
Part 3: Spark Test Apparatus for Intrinsically-Safe Circuits.

NFPA† Standard
325M-1977,
Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids.

**International Electrotechnical Commission.*
†*National Fire Protection Association.*

4. Construction

4.1 General

4.1.1
Special care shall be exercised in the choice and layout of components affecting intrinsically safe circuits to ensure that such circuits are segregated from non-intrinsically safe circuits.

4.1.2
Component parts shall be specifically approved for the use intended or shall be investigated with and as an integral part of the equipment.

4.2 Enclosures

4.2.1 General
Enclosures for intrinsically safe equipment shall provide sufficient mechanical protection to prevent the deterioration of any wiring or components essential to the safety of the equipment.

4.2.2 Class I, Division 1

Associated safe-location equipment intended for use in Class I, Division 1 hazardous locations shall be housed in explosion-proof enclosures constructed in accordance with CSA Standard C22.2 No. 30, unless otherwise protected by another acceptable method as specified in the *Canadian Electrical Code, Part I.*

4.2.3 Intrinsically Safe Equipment in Wet or Dusty Environments

Intrinsically safe equipment intended for use in locations where it may be exposed to falling moisture, weather, streams of water, or dust (including Class II, Division 2, and Class III hazardous particles) shall comply with the requirements for CSA Enclosures 2, 3, 4, or 5, respectively, as outlined in CSA Standard C22.2 No. 94.

4.2.4 Class I, Division 2

Equipment intended for use in Class I, Division 2 hazardous locations may be housed in general-purpose enclosures where

(a) all normally arcing or sparking parts such as switches, slide wires, relays, etc, operate only in non-incendive circuits, or are capable of passing the non-incendive component test in Clause 6.6, or the sealed component test in Clause 6.9, or are otherwise protected by explosion-proof enclosures, oil-immersion, or hermetically sealed enclosures; and

(b) resistors, resistance devices, heaters, thermionic tubes, lamps, and any other devices that may operate with a normal surface temperature in excess of 85°C, or alternatively the lowest ignition temperature* for the explosive atmosphere, are provided with explosion-proof or sealed enclosures unless the maximum surface temperature of such components is below 450°C (as determined by Clause 6.3) and the equipment bears a temperature marking (see Clauses 5.1 and 5.3).

**See NFPA Standard 325M.*

4.2.5 Class II, Division 1

4.2.5.1

Associated safe-location equipment intended for use in Class II, Groups E, F, and G hazardous locations shall comply with CSA Standard C22.2 No. 25.

Δ

4.2.5.2

Except as allowed by Clause 4.2.5.3, intrinsically safe equipment for use in Class II, Division 1 hazardous locations shall be enclosed in a dust-tight enclosure meeting the dust-penetration test requirements of CSA Standard C22.2 No. 25.

Δ

4.2.5.3

Circuits (eg, antennas, electrodes, sensing elements, and associated simple circuits for signal conditioning, coding, and decoding, etc. of those exposed parts) of intrinsically safe equipment that are not enclosed in a dust-tight enclosure in compliance with Clause 4.2.5.2 shall meet the spark-ignition test of Clause 6.2. In this case, it shall be assumed that all spacings do not meet the creepage and clearance distance specified in Clause 4.3.9, and that all electric current-carrying parts (including grounded parts) can be connected together in the most unfavourable conditions.

Note: *There is no limit on the number of connections.*

4.2.6 Associated Equipment in Wet or Dusty Environments

Equipment associated with intrinsically safe equipment intended for use in locations where it may be exposed to falling moisture, weather, streams of water, or dust (including Class II, Division 2, and Class III hazardous particles) shall comply with the requirements of CSA Enclosures 2, 3, 4, or 5, respectively, as outlined in CSA Standard C22.2 No. 94.

General Instruction No. 1

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National Standard of Canada *CAN/CSA-C22.2 No. 157-92*

Intrinsically Safe and Non-incendive Equipment for Use in Hazardous Locations

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Preface

This is the third edition of C22.2 No. 157 (now CAN/CSA-C22.2 No. 157) of a series of Standards issued by the Canadian Standards Association under Part II of the *Canadian Electrical Code*. It supersedes the previous editions published in 1979 and 1987.

The major changes in this new edition include added definitions for stand-alone and non-stand-alone shunt diode barrier assemblies, control drawing, and entity evaluations; the reorganization of clauses covering stand-alone and non-stand-alone shunt diode barrier asemblies; and renumbering of the clauses covering spacings. Also added are new clauses under markings, associated and intrinsically safe apparatus and the spark ignition curves as well as a table for marking symbols.

For general information on the Standards of the *Canadian Electrical Code, Part II*, see the preface of the latest issue of CSA Standard C22.2 No. 0, *General Requirements--Canadian Electrical Code, Part II*.

This Standard was prepared by a Subcommittee of the Technical Committee on Consumer and Commercial Products under the jurisdiction of the Standards Steering Committee on Canadian Electrical Code, Part II and was formally approved by these Committees. It has been approved as a National Standard of Canada by the Standards Council of Canada.

June 1992

Notes:
(1) *Use of the singular in this Standard 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) *CSA Standards are subject to periodic review, and suggestions for their improvement will be referred to the appropriate committee.*
(4) *All enquiries regarding this Standard, including requests for interpretation, should be addressed to Canadian Standards Association, Standards Division, 178 Rexdale Boulevard, Rexdale, Ontario M9W 1R3.*

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.

Interpretations are published in CSA Information Update. *For subscription details and a free sample copy, write to CSA Sales Promotions or telephone (416) 747-4116.*

Foreword

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In performing its functions in accordance with its objectives, CSA does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of the Association represent its professional judgement given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed.

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Testing techniques, test procedures and instrumentation frequently must be prescribed by the CSA Certification Division in addition to the technical requirements contained in Standards of CSA. In addition to markings specified in the Standard the CSA Certification and Testing Division may require special cautions, markings and instructions that are not specified by the Standard.

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If this Standard is to be used in obtaining CSA Certification please remember, when making application for certification, to request all current Amendments, Bulletins, Notices and Technical Information Letters that may be applicable and for which there may be a nominal charge. For such information or for further information concerning details about CSA Certification please address your inquiry to the Applications and Records Section,

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CAN/CSA-C22.2 No. 157-92
Intrinsically Safe and Non-incendive Equipment for Use in Hazardous Locations

1. Scope

1.1
This Standard specifies tests for the testing of non-incendive electrical equipment and the details of construction and tests for intrinsically safe electrical equipment for use in the following hazardous locations in accordance with the Rules of the *Canadian Electrical Code, Part I*, and CSA Standard CAN3-M421:
(a) Class I, Groups A, B, C, and D;
(b) Class II, Groups E, F, and G;
(c) Class III; and
(d) gaseous mines.

1.2
This Standard specifies the design and constructional requirements and test procedures for equipment and parts of equipment intended for use in hazardous locations and also for associated equipment intended for use in safe locations.

1.3
This Standard applies to equipment for use in normal atmospheric conditions.

1.4
Equipment specified for use in other than normal atmospheric conditions may be subject to additional investigation.

2. Definitions

2.1
The following definitions apply in this Standard.

Auto-ignition temperature--the temperature at which a mixture of a specified gas or vapour in air will spontaneously ignite under specified test conditions, without any source of ignition.

Associated safe-location equipment--equipment designed to form part of an intrinsically safe system, in which not all the circuits are intrinsically safe, but which affects the safety of the intrinsically safe system of which it forms a part. Such equipment may not be installed in a hazardous location unless provided with appropriate protection.
Notes:
(1) *Examples of associated safe-location equipment are a line-connected power unit supplying power to intrinsically safe equipment in a hazardous location, and a recorder in a safe*