

CAN/ULC-S572:2017

**STANDARD FOR PHOTOLUMINESCENT AND SELF-
LUMINOUS EXIT SIGNS AND PATH MARKING SYSTEMS**

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**STANDARD FOR PHOTOLUMINESCENT AND SELF-LUMINOUS EXIT
SIGNS AND PATH MARKING SYSTEMS**

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STANDARD FOR PHOTOLUMINESCENT AND SELF-LUMINOUS EXIT SIGNS AND PATH MARKINGS SYSTEMS

PREFACE

This is the Second Edition of CAN/ULC-S572, Standard For Photoluminescent and Self-Luminous Exit Signs and Path Marking Systems.

This Edition of the Standard was developed by the ULC Standards Working Group on CAN/ULC-SS572, reviewed by the ULC Standards Subcommittee on Accessory Devices, and was formally approved by the ULC Standards Committee on Fire Alarm and Life Safety 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 and B, identified as informative, are for information 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 markings and/or instructions to be in either or both official languages.

This Second Edition National Standard of Canada is based on, and now supersedes the First Edition.

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 requirements for *photoluminescent* and *self-luminous exit signs* and *path marking systems* intended for installation as required by applicable codes. Such equipment is intended to provide exit and directional information to assist occupants to evacuate a facility and/or building.

1.2 This Standard does not cover requirements for unit equipment or electrically-powered *exit signs*.

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.

Documents Published by CSA Group
178 Rexdale Blvd, Toronto, ON M9W 1R3 Canada
Telephone: 1-800-463-6727, Fax: (416) 747-2473
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- CSA C22.2 No. 0.15-15, Adhesive Labels
- CSA C22.2 No. 0.17-00 (R 2013), Evaluation of Properties of Polymeric Materials

Standards published by the International Organization for Standardization (ISO) Available from:
ISO Central Office
1, ch. de la Voie-Creuse, Case postale 56 Ch-1211 Geneva 20, Switzerland
Telephone: 41-22-734-0150
www.iso.ch

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- ISO 3864-1-2011, (Including Amendments 1-6:2014) Graphical Symbols – Safety Colours and Safety Signs – Part 1: Design principles for safety signs and safety markings
- ISO 7010-2011 (Amd6-02014), Graphical Symbols – Safety Colours and Safety Signs - Registered safety signs

Standard Published by the International Commission on Illumination (CIE) available from:
IEC Central Office
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- CIE 69-1987, Methods of Characterizing Illuminance Meters and Luminance Meters: Performance, Characteristics and Specifications

Document Published by the National Research Council of Canada
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www.nrc-cnrc.gc.ca

- National Building Code of Canada, 2015

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333 Pfingsten Road, Northbrook, IL 60062-2096 U.S.A.
Telephone: (847) 272-8800
www.ul.com

- UL 410-06, Slip Resistance of Floor Surface Materials

3 GLOSSARY

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

3.1 **AUTHORITY HAVING JURISDICTION** - The governing body responsible for the enforcement of any part of this Standard or the official or agency designated by that body to exercise such a function.

3.2 **DIRECTIONAL INDICATOR(S)** - A chevron on a text *exit sign* or an arrow on a graphical *exit sign* to identify direction of egress.

3.3 **DIRECTIONAL MARKER(S)** - A part of the *path marking system* that identifies the direction of egress.

3.4 **EXIT SIGN(S)** - A general term used to refer to an exit light, exit fixture, *self-luminous exit sign* or *photoluminescent exit sign*, depicted with a text or *graphical symbol*.

3.5 **FLOOR PROXIMITY EXIT SIGN** - An *exit sign* intended to be mounted with the bottom edge no less than 150 mm (6 in) and no more than 455 mm (18 in) above floor grade.

3.6 **GRAPHICAL SYMBOL** - A pictorial representation (also known as a pictogram) serving as a non-language based visual indicator of meaning.

3.7 **LEGEND** - text based or *graphical symbol exit signs*.

3.8 **PATH MARKER** - A luminous strip or sign intended only for use with a luminous *path marking system* designed to assist building occupants in finding an exit.

3.9 **PATH MARKER SIGN** - A *path marker* that includes text and/or one or more *graphical symbols* intended to provide information related to egress features or procedures.

3.10 **PATH MARKER STRIP** - A *path marker* without text or *graphical symbols*.

3.11 **PATH MARKING SYSTEM(S)** - An integrated collection of *path marker* strips and/or *path marker signs* intended to assist building occupants and/or first responders to deal effectively with evacuation scenarios.

3.12 **PHOTOLUMINESCENT SYSTEM(S)** - Having the property of emitting light that continues for a length of time after excitation by visible or invisible light has been removed.

3.13 **SELF-LUMINOUS** - Illuminated by a self-contained energy source other than a battery, such as radioactive tritium gas. Operation is independent of external power supplies or other external forms of energy.

4 EXIT SIGNS

4.1 GENERAL

4.1.1 These requirements apply to *exit signs* that illuminate an integral *legend* for installation in accordance with the applicable codes, including *floor proximity exit signs*.

4.1.2 A *graphical symbol exit sign* shall conform to Subsection 4.2.1, Graphical Symbol Exit Signs .

4.1.3 A text-based *exit sign* shall conform to Subsection 4.2.2, Text Based Exit Signs. For the purposes of this Standard, the word exit shall be either in English, "EXIT", and/or in French, "SORTIE".

NOTE: Refer to Table 5 for French equivalent to English marking used.

4.1.4 The colour scheme of an *exit sign* shall have a green graphical symbol with a white or lightly tinted background as shown in Figures 3 to 6.

NOTE: ISO 3864-1, Graphical symbols - Safety colours and Safety Signs - Part 4: Colorimetric and photometric properties of safety sign materials, provides guidance on the colour scheme.

4.1.5 Text based *exit signs* shall have distinctively contrasting colours (i.e., light vs. dark) between the *legend* (and *directional indicators*) and background. Where such contrast is not evident, a text based *exit sign* shall comply with either:

A Subsection 4.3.3, Contrast Measurement Test; or

B Subsection 4.3.2, Exit Sign Observation Visibility Test modified as follows:

i. The observers shall be as stated in Clause 4.3.2.2, except that four observers, regardless of age group, shall be used;

ii. The evaluation shall be as stated in Clause 4.3.2.3, except that only the *legend* shall be evaluated;

iii. The test setup shall be as stated in Clause 4.3.2.4, except that the test area shall maintain reasonably uniform, nominal 323 lux (lx) (30 foot-candle [ft-c]), ambient light conditions between the observers and the *exit signs*;

iv. The test shall be conducted as stated in Clause 4.3.2.5 except that the observers require no eye acclimation time prior to the test; and

v. In lieu of the calculations of Clause 4.3.2.7, 100% of the observations shall be correct.

4.1.6 *Exit signs* shall be provided with a means to permanently secure the sign to a mounting surface so it cannot be removed or repositioned without the use of a tool. Adhesive shall not be provided as the sole means for mounting.

4.2 EXIT SIGN LEGEND TYPES

4.2.1 Graphical Symbol Exit Signs

4.2.1.1 *Graphical symbols* for *exit signs* shall be in accordance with ISO 7010, Graphical Symbols Safety Colours and Safety Signs - Safety Signs Used in Workplaces and Public Areas, E001, E002, E005, E006. The minimum overall height of the *graphical symbol* shall be 150 mm (6 in). The proportions of the *graphical symbol* shall be as indicated in Figures 3 and 5.

NOTE: The running man graphic may be designed with or without an arrow.

4.2.1.2 Where a directional arrow is included (See Figures 7, 8, 9 and 10), it shall be located on the side of the sign toward which the running man is facing (i.e., for a running man facing towards the right - symbol E002 - the arrow shall be to the right of the running man). The arrow shall be oriented up, down, horizontally pointing away from the running man, or 45° from horizontal point away-and-up or away-and-down from the running man. The contrasting color space between the arrow and the inside of the running man symbol door frame shall be no less than 25.4 mm (1 in) measured at the closest point.

4.2.2 Text Based Exit Signs

4.2.2.1 The minimum overall height of all letters of the *legend* shall be 150 mm (6 in). The ratios of letter height to width, width to stroke width, and stroke width to inter-character spacing shall be as indicated in Table 1. Measurement of the overall dimensions is to include any illuminated borders of the letters.

4.2.2.2 Corners of the letters may be slightly rounded with a maximum radius of 2.5 mm (0.10 in). Letter dimension measurements, which include such rounded corners, may be extended to the point where the (non-rounded) intersecting lines would otherwise meet. The extrapolation of lines need not be considered when measuring distances between characters.

4.2.2.3 If a text based *exit sign* is provided with *directional indicators* and a means for selecting the proper direction(s) for an installation, the means provided shall conceal or otherwise make indistinguishable, under any condition of use, the *directional indicators* not intended to be used. If the means used to conceal (or otherwise make indistinguishable) an unused *directional indicator* has the shape of or can be confused with a *directional indicator*, the contrast ratio of the concealing means and the background shall not exceed 0.1 as determined in accordance with Subsection 4.3.3, Contrast Measurement Test, except that the luminance measurement points are to be on the means used to conceal unused *directional indicators* and the background. A measurement point on a screw, slot, or slit in the *directional indicator* cover is to be avoided if such points cannot be considered part of a *directional indicator*.

4.2.2.4 The overall sign height and width shall be such that an area of sign background exists, of minimum dimension no less than the required inter-character spacing, between the edges of the *legend* and *directional indicators*, if any, and the outside border or frame of the sign.

4.2.2.5 Dimensions of the letters shall be as specified in Table 2.

4.2.2.6 A *directional indicator* if provided, shall be of a shape and of the minimum dimensions as shown in Figure 1. An increase in any dimension of the *directional indicators* shall proportionally increase the other dimensions. Corners of the *directional indicator* may be slightly rounded with a maximum radius of 1.5 mm (0.060 in). *Directional indicator* dimension measurements, which include such rounded corners,

may be extended to the point where the (non-rounded) intersecting lines would otherwise meet. The extrapolation of lines shall not be considered when measuring the distance to the *legend* letters in accordance with Sub-clause 4.2.2.7 (A).

4.2.2.7 If a *directional indicator* is provided as part of an *exit sign*, the construction shall be such that:

- A It is located outside of the *legend* and no less than 9.5 mm (0.375 in) from any letter as shown in Figure 2;
- B It is located at the same end of the sign as the direction indicated; and
- C The direction indicated cannot readily be changed. A *directional indicator* attached with an adhesive is not considered to be readily changeable. This requirement does not preclude a *directional indicator*, the direction of which is determined at the time of installation, but does preclude constructions that allow inadvertent concealment or reversal during cleaning or concealment or reversal by unauthorized persons without the use of tools. The possibility that the faces of a double-faced *directional exit sign* will be inadvertently interchanged is not to be considered for the purpose of this requirement.

4.3 PERFORMANCE

4.3.1 General

4.3.1.1 All persons performing Subsection 4.3.2, Exit Sign Observation Visibility Test shall have a visual acuity of not less than 20/40 or corrected to not less than 20/40 as determined by using a standard eye chart or by other appropriate means, such as the Titmus Vision Test Series.

4.3.1.2 The *legend* and *directional indicator* of an *exit sign*, if provided, shall be visible as determined by the requirements in Subsection 4.3.2, Exit Sign Observation Visibility Test.

4.3.1.3 For illuminance measurements in lux (lx) or foot-candles (ft-c), the metering equipment shall:

- A Have an accuracy of $\pm 5\%$; and
- B Be cosine corrected.

4.3.1.4 For luminance measurements, the measurement equipment shall:

- A Have an accuracy of $\pm 5\%$;
- B Be colour corrected (f_1') to within 10% of the CIE relative photopic luminosity curve; and
- C Be rated no more than 5% susceptible to light outside the measurement area [$f_2(u)$], in accordance with CIE 69, Methods of Characterizing Illuminance Meters and Luminance Meters: Performance, Characteristics, and Specifications.

4.3.1.5 The visibility tests shall be conducted under each of the following conditions:

- A *Self-luminous exit signs* shall be tested with a luminance representative of the marked date of replacement; and
- B *Photoluminescent exit signs* shall be tested in accordance with Subsection 5.4, Performance.

4.3.2 Exit Sign Observation Visibility Test

4.3.2.1 When the Exit Sign Observation Visibility Test is used as indicated in Clause 4.3.1.2, the test shall be conducted as described in this Subsection.

4.3.2.2 Eight individuals, two each from the age groups 18 to 30, 31 to 40, 41 to 50, and 51 to 70 years, having a visual acuity as specified in Clause 4.3.1.1 shall make the observations as required in Clause 4.3.2.6.

4.3.2.3 *Exit sign* samples representative of production, shall be subjected to the following tests, where (A) and (B) apply to text, and (C) applies to *graphical symbols*:

- A To evaluate *directional indicators* for text based signs, four sample sets of two identical signs configured as follows:
 - i. Set 1 – *directional indicator* on the right, pointing right (out)
 - ii. Set 2 – *directional indicator* on the right, pointing left (in)
 - iii. Set 3 – *directional indicator* on the left, pointing left (out)
 - iv. Set 4 – *directional indicator* on the left, pointing right (in)
- B To evaluate a text *legend*, two sample sets of three identical signs each configured with between 10–15 % of the *legend* different between the two sets. For the *legend* “EXIT”, the lower horizontal element of the “E” and the lower right portion of the “X” shall be masked (so that the letters appear similar to “F” and “Y”). For other text *legends*, visual elements of comparable size and significance shall be altered to distinguish between the two sample sets.
- C To evaluate a *graphical symbol* (pictogram), two sample sets of three identical signs each configured with between 10 – 15% of a non-background visual element different between the two sets.

4.3.2.4 The samples are to be positioned above the floor against a flat black surface in a corridor or a similar test area in which the ambient illumination level can be eliminated. The distance between the sign and point of observation shall be measured along a line perpendicular to and through the center of the face of the sign as follows:

- A For a *directional indicator*, 12.2 m (40 ft); and
- B For a *legend*, either the viewing distance marked in accordance with Clause 4.7.1.3 or 30.5 m (100 ft), whichever is less.

4.3.2.5 The observers' eyes are to be acclimated for at least 5 min to normal ambient light conditions (538 lx or 50 ft-c) and then allowed to adapt to the dark condition in the viewing corridor for 5 min immediately prior to commencing each set of observations (a set of observations' consisting of either eight signs with *directional indicators* or six signs with *legends*). After each set of observations, the observers' eyes shall be re-adapted to the normal (538 lx or 50 ft-c) light condition for 5 min. The tested signs are to be presented to the observers in random order, with no more than two signs presented at any time. Each observer shall record the distinguishing characteristic of each sign (either the direction of the *directional indicator* or the altered and/or non-altered element of a *legend*) within 10 s of commencing the observation of that sign. If the visual element being observed cannot be distinguished, the observer shall record no observation.

4.3.2.6 The number of correct responses by each observer for each observation set is to be recorded. A correct response is one that correctly identifies the distinguishing element of the sign within 10 s from the beginning of the observation. Lack of a response at the end of 10 s is to be recorded as an incorrect response.

4.3.2.7 The mean (PC) of the correct number of responses is to be determined using Formula 1. If the mean is 80 % or more (6.4 out of 8 for a *directional indicator* observation set, or 4.8 out of 6 for a *legend* observation set), the results are acceptable. If the mean is less than 80 %, the standard deviation (S) and the lower cut-off limit (LCL) are to be determined using Formulas 2 and 3, respectively. Individual data points that fall below the LCL are to be discarded and a revised mean is to be determined. The results are acceptable if the revised mean is 80 % or more.

FORMULA 1:

$$\text{Mean, PC} = \frac{\sum pc(i)_s}{n}$$

FORMULA 2: Sample Standard Deviation

$$S = \left[\frac{\sum [pc(i) - PC]^2}{n - 1} \right]^{1/2}$$

FORMULA 3: Lower Cut-off Limit, LCL = PC – 0.896(S)

in which: pc (i) is the number of correct responses for each individual observer; and n is the number of observers.

4.3.2.8 For the purpose of illustration, consider the following example. The Observation Visibility Test data obtained on an *exit sign* is recorded in Table 3. Since the means was less than 6.4, the standard deviation (S) and the lower cut-off limit (LCL) were calculated using Formulas 2 and 3 given in Clause 4.3.2.7. Since the data for observer Nos. 2 and 3 were below their respective LCLs, they were discarded and revised means were calculated. Since the revised means is more than 6.4, the *exit sign* complies with the requirement stated in Clause 4.3.2.7.

4.3.3 Contrast Measurement Test

4.3.3.1 If required to determine compliance with Sub-clause 4.1.5 (A), a sample sign shall be mounted where subject to 323 lx (30 ft-c) illumination evenly imposed on the sign face. The reflected luminance from the sign face shall be measured at ten locations each on the *legend* and on the background, with the measurement points evenly distributed across each area. If *directional indicators* are provided, two measurements are to be made on each *directional indicator*. Background measurement points shall include two each above, below, to the right, to the left, and between the letters of the *legend*. Measurements shall be in accordance with Clause 4.3.3.2.

4.3.3.2 The reflected luminance of the letters and the background is to be measured in units of cd/m² (ft-lamberts) from circular areas not smaller than 0.8 mm (0.030 in) diameter and not larger than the area under test will permit, maintaining a minimum distance of 0.4 mm (0.015 in) between the perimeter of the circular target area and the surrounding edges of the letters, borders, and the sign frame at the selected