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An American National Standard

Standard Specification for Photoluminescent (Phosphorescent) Safety Markings[1]

This standard is issued under the fixed designation E2072; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers minimum performance requirements for newly applied photoluminescent (phosphorescent) safety materials used to provide supplemental markings of escape routes, emergency equipment, and obstructions along the escape route. (see also Test Method E2073 and Guide E2030).

1.2 This specification establishes minimum luminance values for photoluminescent (phosphorescent) markings.

1.3 This specification applies to all types of photoluminescent (phosphorescent) markings, including but not limited to plastics, coatings, ceramics, films, etc.

1.4 This specification does not cover potentially diminished performance due to wear and tear and aging.

1.5 This specification applies only to photoluminescent (phosphorescent) markings emitting the majority of spectral energy within the 515 to 535 nanometer range.

1.6 When reference is made regarding photoluminescence in the text of this standard, it implies phosphorescence.

1.7 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E284 Terminology of Appearance

E1316 Terminology for Nondestructive Examinations

E2030 Guide for Recommended Uses of Photoluminescent (Phosphorescent) Safety Markings

E2073 Test Method for Photopic Luminance of Photoluminescent (Phosphorescent) Markings

3. Terminology

3.1 Definitions of terms in Terminology E284 and Terminology E1316 are applicable to this specification.

4. Performance Requirements

4.1 *Optical Requirements:*

4.1.1 *Luminance in a Test Laboratory*—The photopic luminance of all three specimens of the photoluminescent marking, measured in compliance with Test Method E2073, shall be not less than: 30 mcd/m^2 at 10 min after activation has ceased; and 5 mcd/m^2 at 90 min after activation has ceased.

4.2 *Walking Surfaces Materials:*

4.2.1 Photoluminescent safety markings intended to be installed on walking surfaces of the means of egress shall have a slip-resistant surface and be securely attached.

5. Installation Site

5.1 *On-Site Luminance*—The photopic luminance of on-site installed photoluminescent markings shall be measured in compliance with Test Method E2073. The on-site lighting shall be used as activation. Markings must be a minimum of 1-in. (25.4-mm) width. The required photopic luminance shall, at all times, be not less than:

30 mcd/m^2 at 10 min after activation has ceased;

and 5 mcd/m^2 at 90 min after activation has ceased.

5.2 *Activation*—The required recharging activation level for photoluminescent safety markings depends on the ambient luminance level, the type of light source utilized, and the duration of exposure to the activating light source. Consult manufacturers for performance levels under various lighting conditions.

6. Installation Instructions

6.1 When this standard is used to show compliance with codes or standards, installation instructions shall be provided.

6.1.1 The installation instructions shall outline:

[1] This specification is under the jurisdiction of ASTM Committee E12 on Color and Appearance and is the direct responsibility of Subcommittee E12.13 on Photoluminescent Safety Markings.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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(1) Information on installation surface treatments necessary prior to installation;

(2) That a floor surface material successfully passed the Slip Resistance Test;

(3) Mounting instructions;

(4) The amount of activating light for proper activation and the type of light the product was tested in accordance with Test Method E2073;

(5) A warning that should any changes in activating lighting occur, to ensure that sufficient activation is still guaranteed;

(6) Maintenance instructions;

(7) Periodic inspection procedures, especially if marking is intended for use in compliance with applicable local or national model codes, to ensure compliant activation by proper ambient lighting.

7. Keywords

7.1 escape routes; luminance; photoluminescent safety markings

APPENDIXES

(Nonmandatory Information)

X1. CODE COMPLIANCE

X1.1 When this standard is used to show compliance with codes or standards, the manufacturer should have an agreement with an organization that is acceptable to the Authority Having Jurisdiction for follow-up factory inspection services.

X2. LUMINANCE COMPARISON FOLLOWING DIFFERENT ILLUMINATION CONDITIONS

X2.1 In 5.1, On-Site Luminance, Specification E2072 requires luminance values at 10 and 60 min. after on-site activation has ceased. These values are to be measured at the installation site, following Test Method E2073.

X2.2 Accomplishing the required luminance values depends on a variety of factors, including but not limited to, the type of activating light source, the intensity of illumination (lx/fc) on the marking surface, the color temperature of illumination (K, Kelvin), the length of illumination and the ambient temperature, to mention a few factors.

X2.3 How different the luminance results may be, depending on changing illumination conditions, is shown in Table X2.1. The luminance values in the table are averages for randomly selected products. Results will vary for other samples and other activation conditions.

TABLE X2.1 Influence of Different Illumination Conditions on the Luminance

Activation Conditions		Xenon 1000 lx (92.9 fc); 5 min; approx. 6500 K	Fluorescent 21.6 lx (2 fc); 120 min; 4000 K – 4500 K	Fluorescent 10.8 lx (1 fc); 60 min; 4000 K – 4500 K
	Following Activation	Luminance in mcd/m^2		
Sample A	10 min	604.0	77.1	29.3
	60 min	88.3	25.1	9.7
	90 min	55.0	17.7	6.9
Sample B	10 min	194.7	37.9	17.2
	60 min	26.6	9.8	4.8
	90 min	16.3	6.6	3.2
Sample C	10 min	43.3	14.4	8.2
	60 min	6.0	3.2	2.0
	90 min	3.7	2.1	1.4
Sample D	10 min	53.6	15.7	8.5
	60 min	7.1	3.7	2.1
	90 min	4.3	2.4	1.4
	10 min	284.5	62.2	29.3
Sample E	60 min	37.2	15.5	8.3
	90 min	22.3	10.8	5.5
Sample F	10 min	137.7	40.8	22.5
	60 min	19.1	9.4	5.4
	90 min	11.9	6.5	3.7
Sample G	10 min	168.7	53.0	29.9
	60 min	24.7	12.4	7.3
	90 min	15.3	8.1	4.9

Note: Testing was performed by one laboratory. This laboratory measured each sample thrice with the 3 different activation conditions. The 3 results obtained per activation condition were added, then divided by 3 and the resulting average is given above.

X3. SUMMARY OF CHANGES

X3.1 This specification was originally published in 2000 with luminance values of 20.0 mcd/m^2 at 10 min after activation has ceased and 2.8 mcd/m^2 at 60 min after activation has ceased. These values stayed through the 2010 edition and were updated to harmonize with U. S. Code requirements in the 2014 edition.

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