



Member of the FM Global Group

Approval Standard for Public Mode Visible Signaling Appliances for Automatic Fire Alarm Signaling

Class Number 3155

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Foreword

The FM Approvals certification mark is intended to verify that the products and services described will meet FM Approvals' stated conditions of performance, safety and quality useful to the ends of property conservation. The purpose of Approval Standards is to present the criteria for FM Approval of various types of products and services, as guidance for FM Approvals personnel, manufacturers, users and authorities having jurisdiction.

Products submitted for certification by FM Approvals shall demonstrate that they meet the intent of the Approval Standard, and that quality control in manufacturing shall ensure a consistently uniform and reliable product. Approval Standards strive to be performance-oriented. They are intended to facilitate technological development.

For examining equipment, materials and services, Approval Standards:

- a) must be useful to the ends of property conservation by preventing, limiting or not causing damage under the conditions stated by the Approval listing; and
- b) must be readily identifiable.

Continuance of Approval and listing depends on compliance with the Approval Agreement, satisfactory performance in the field, on successful re-examinations of equipment, materials, and services as appropriate, and on periodic follow-up audits of the manufacturing facility.

FM Approvals LLC reserves the right in its sole judgment to change or revise its standards, criteria, methods, or procedures.

TABLE OF CONTENTS

1 INTRODUCTION	1
1.1 Purpose	1
1.2 Scope	1
1.3 Basis for Requirements	1
1.4 Basis for Approval	2
1.5 Basis for Continued Approval	2
1.6 Effective Date	2
1.7 System of Units	2
1.8 Normative References	3
1.9 Definitions	3
2. GENERAL INFORMATION.....	4
2.1 Product Information	4
2.2 Approval Application Requirements	4
2.3 Requirements for Samples for Examination	4
3. GENERAL REQUIREMENTS	5
3.1 Review of Documentation	5
3.2 Physical or Structural Features	5
3.3 Markings	6
3.4 Manufacturer's Installation and Operation Instructions	6
3.5 Calibration	6
4. PERFORMANCE REQUIREMENTS.....	8
4.1 General Measurement Tests	8
4.2 Light Pulse Measurements	8
4.3 Voltage Variations	9
4.4 Continued Operation	9
4.5 Temperature and Humidity Extremes	9
4.6 Jarring	10
4.7 Dielectric Strength	10
4.8 Bonding	10
4.9 Surge Transient Tests	11
4.10 Enclosure Requirements (including plastic housings)	11
5. OPERATIONS REQUIREMENTS.....	12
5.1 Demonstrated Quality Control Program	12
5.2 Surveillance Audit	12
5.3 Installation Inspections	13
5.4 Manufacturer's Responsibilities	13
6. BIBLIOGRAPHY	14

1 INTRODUCTION

1.1 Purpose

1.1.1 This standard states Approval requirements for public mode visible signaling appliances for automatic fire alarm signaling.

1.1.2 Approval criteria may include, but are not limited to, performance requirements, marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures, and a follow-up program.

1.2 Scope

1.2.1 This standard describes performance requirements for public mode visible signaling appliances (hereafter referred to as appliances), such as high intensity strobes, used for automatic fire alarm signaling for the visible notification of indoor building occupants by the distribution of light by indirect visible signaling.

1.2.2 FM Approval criteria may include, but are not limited to, performance requirements, marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures, and a follow-up program. Evaluation for environmental or hazardous location ratings will require additional examination per other standards such as FM Approval Standard 3600 — *Electrical Equipment for Use in Hazardous (Classified) Locations*.

1.2.3 Other types of commercially available appliances (such as outdoor direct viewing strobes) may not be applicable to the test protocol described in this document.

1.2.4 These appliances are intended to be installed in accordance with the manufacturer's installation instructions and in accordance with ANSI/NFPA 72 *The National Fire Alarm Code* and in a manner acceptable to the local Authority Having Jurisdiction.

1.2.5 These requirements cover visual emergency-signaling devices (notification appliances), which can be used with or without audible emergency-signaling devices (notification appliances). These devices are to be used in accordance with the requirements of the National Fire Alarm Code, NFPA 72.

1.2.6 This standard evaluates visible signaling appliances for public mode operation. These appliances are designed to alert occupants or inhabitants within the protected area. The requirements in this standard do not cover appliances intended for private mode fire alarm signaling, lights intended for non-fire-alarm signaling applications, manual boxes, automatic fire detectors, or other initiating devices; nor do they cover audible notification appliances such as bells, horns and speakers.

1.3 Basis for Requirements

1.3.1 The requirements of this standard are based on field experience, research and testing. Additionally, guidance from manufacturers, users, trade associations, jurisdictions and/or loss control specialists was also taken into consideration.

1.3.2 The requirements of this Standard reflect tests and practices used to examine characteristics of electrically powered high intensity strobes for the purpose of obtaining FM Approval. Meeting these requirements alone does not assure Approval; other factors may dominate. Appliances having characteristics not anticipated by this standard may be Approved if performance equal or superior to that required by this standard is demonstrated, or if the intent of the standard is met. These requirements are intended primarily as guides, and strict conformity is not always mandatory. Alternatively, appliances which do meet all the requirements identified in this standard may

not be Approved if other conditions which adversely affect performance, safety and quality exist or if the intent of this standard is not met.

1.4 Basis for Approval

Approval is based upon satisfactory evaluation of the product and the manufacturer in the following major areas:

1.4.1 Examination and tests on production samples shall be performed to evaluate

- the suitability of the product;
- the performance of the product as specified by the manufacturer and required by FM Approvals; and as far as practical,
- the durability and reliability of the product.

1.4.2 An examination of the manufacturing facilities and audit of quality control procedures is made to evaluate the manufacturer's ability to consistently produce the product which is examined and tested, and the marking procedures used to identify the product. These examinations may be repeated as part of FM Approvals' product follow-up program.

1.5 Basis for Continued Approval

Continued Approval is based upon:

- production or availability of the product as currently FM Approved;
- the continued use of acceptable quality assurance procedures;
- satisfactory field experience;
- compliance with the terms stipulated in the Approval report;
- satisfactory re-examination of production samples for continued conformity to requirements; and
- satisfactory Surveillance Audits conducted as part of FM Approvals' product Follow-up program.

Also, as a condition of retaining Approval, manufacturers may not change a product or service without prior authorization by FM Approvals.

1.6 Effective Date

The effective date of an Approval standard mandates that all products tested for Approval after the effective date shall satisfy the requirements of that standard. Products FM Approved under a previous edition shall comply with the new version by the effective date or else forfeit Approval.

The effective date of this Standard is **January 1, 2019** for compliance with all requirements

1.7 System of Units

Units of measurement used in this Standard are United States (U.S.) customary units. These are followed by their arithmetic equivalents in International System (SI) units, enclosed in parentheses. The first value stated shall be regarded as the requirement. The converted equivalent value may be approximate. Conversion of U.S. customary units is in accordance with ANSI/ IEEE/ ASTM SI 10.

1.8 Normative References

The following referenced documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For undated references, the latest edition of the referenced document (including any amendments) applies. For dated references, only the cited edition applies.

ANSI/IEEE/ASTM SI 10 *American National Standard for Metric Practice*
 NEMA 250 *Enclosures for Electrical Equipment*
 ANSI/IEC 60529 *Degrees of Protection provided by Enclosures (IP Code)*
 ANSI/NFPA 72 *National Fire Alarm & Signaling Code*
 ANSI/UL 1971-2013 *Signaling Devices for Hearing Impaired*
 ANSI/UL 864, 10th Edition *Control Units and Accessories for Fire Alarm Systems*

1.9 Definitions

1.9.1 CANDELA – For the purpose of this Standard, the light output of a flashing strobe is measured with an integration radiometer and the summation of light intensity over time (I_{dt}) is used in the following equation to determine the effective light intensity. The candela (Cd) value assigned to a flashing light is calculated and corresponds to the same value of candela of a fixed light operating under identical conditions of observation, color, size, and shape:

$$Cd = (I_{dt}) / (0.2 + t_2 - t_1)$$

in which:

I_{dt} is the measured lumens recorded by the radiometer over time for ten consecutive pulses;

0.2 is two-tenths of one second, the value which represents nighttime threshold effective illumination as specified in the Illuminating Engineering Society Handbook, 5th Edition; and

$t_2 - t_1$ represents the time period of the light pulse.

1.9.2 CRITICAL ANGLE – The five-degree (5°) dispersion angle that has the lowest ratio of measured light output to minimum required light output for all five-degree increments within the plane of measurement. This angle is identified by comparison of all ratios of measurements obtained within the plane during the Signal Strength and Field of View Test, Section 4.1. All ratios of measured light to required minimum light shall be equal to or greater than 1. For example:

$$\text{Ratio} = \text{Measured light} / \text{Minimum required light}$$

$$15 \text{ Cd} / 12 \text{ Cd}$$

$$5/4 = 1.25$$

1.9.3 REGULATED APPLIANCE – is an appliance of which an operational range and limits were verified and defined.

1.9.4 SPECIAL APPLICATION APPLIANCE – is an appliance of which its tested operational range does not meet the limitation of a regulated appliance.

1.9.5 DUTY CYCLE - is the percentage of time within a light source's flash cycle that the light can be 10% of the maximum light output. The NFPA (2014) requirements for visual alarms stipulate a maximum pulse duration of 0.2 s; in conjunction with a maximum allowable frequency of 2 Hz, this means that the duty cycle can be as high as 40%.