



Member of the FM Global Group

Approval Standard for Fire Alarm Signaling Systems

Class Number 3010

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Foreword

The FM Approvals certification mark is intended to verify that the products and services described will meet 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 Master 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.

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1 INTRODUCTION

1.1 Purpose

This standard states Approval requirements for Fire Alarm Signaling Systems and is largely based on NFPA 72® National Fire Alarm and Signaling Code 2013 Edition and other applicable Approval Standards.

- 1.1.1 Reference[s] to the appropriate [NFPA] paragraph[s] describing the specific requirement pertaining to a Fire Alarm Signaling System is for additional information on a specific requirement.
- 1.1.2 This standard provides a guideline for typical tests that are required by FM Approvals. FM Approvals reserves the right to modify any test program as required to suit the specific tests needs of a given piece of equipment.
- 1.1.3 Approval criteria may include, but are not limited to, performance requirements, critical documentation including 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 applies to design, construction, operation, maintenance, and testing of permanently connected and permanently installed fire alarm signaling systems and associated components intended for indoor use in ordinary electrical locations. The functionality of a complete fire alarm or signaling system shall comply with the requirements of this standard.
- 1.2.2 The equipment covered by this standard [inter]connects to other peripheral equipment (initiating, notification and off-premises) to provide indicating and control functions associated with a commercial fire alarm system in accordance with NFPA 72.
- 1.2.3 Components comprising an FM Approved fire alarm system and intended to provide a particular capability or feature, e.g. auxiliary power supplies, digital alarm communicator transmitters, will be examined including for compatibility with the particular systems with which they are to be used.
- 1.2.4 This standard provides the operating basis for alarm signaling and does not cover initiating devices and notification appliances as well as the use in damp, wet or hazardous (classified) locations (other standards apply).
- 1.2.5 Equipment covered by this standard may be combined with additional standards for use in other areas.
- 1.2.6 The requirements of this standard shall apply to systems, equipment, and components addressed in this standard and NFPA 72 [Chapters 7, 10, 12, 14, 17, 18, 21, 23, 24, 26 and 27].
- 1.2.7 The fire alarm and signaling system[s] purpose is [are] to provide: notification and location of alarm, supervisory, and trouble conditions; to alert the occupants; to summon aid; and to control emergency control functions such as releasing function.

1.3 Basis for Requirements

- 1.3.1 The requirements in this standard are based on experience, research and testing, and/or the standards of other organizations.
- 1.3.2 The requirements in this standard reflect tests and practices used to examine characteristics of Fire Alarm Signaling Systems for the purpose of obtaining Approval. Equipment having characteristics

not anticipated by this standard may be FM Approved if performance equal, or superior, to that required by this Standard is demonstrated, or if the intent of the standard is met. Alternatively, equipment which meets all of the requirements identified in this Standard may not be FM Approved if other conditions which adversely affect performance exist or if the intent of this standard is not met.

1.4 Basis for Approval

Approval is based on 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' Surveillance Audit 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 19, 2018 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.

Two units (liter and bar), outside of but recognized by SI, are commonly used in international fire protection and are used in this Standard.

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.

FM 3810 *Electrical Equipment for Measurement, Control and Laboratory Use*
ANSI/NFPA 101 *Life Safety Code*
ANSI/NFPA 92 *Standard for Smoke Control Systems*
ANSI/NFPA 72: 2013 *National Fire Alarm and Signaling Code*
ANSI/NFPA 70 *National Electrical Code*
NEMA 250 *Enclosures for Electrical Equipment*
ANSI/IEC 60529 *Degrees of Protection provided by Enclosures (IP Code)*
ANSI/IEEE/ASTM SI 10 *American National Standard for Metric Practice*

1.9 Applicability of Other Standards

Except where modified by the requirements of the standards listed in 1.8, electrical equipment shall also comply with the applicable American National Standards Institute (ANSI) requirements for ordinary locations. In the event that no ANSI Standard exists for the category of equipment, then Approval Standard FM 3810 *Electrical Equipment for Measurement, Control and Laboratory Use* shall be used as the source document for basic safety requirements.

1.10 Terms and Definitions

For purposes of this standard, the following terms apply:

Acknowledge - To confirm that a message or signal has been received, such as by the pressing of a button or the selection of a software command [NFPA 72, Chapter 3.3.5].

Acoustically Distinguishable Space (ADS) - An emergency communications system notification zone, or subdivision thereof, that might be an enclosed or otherwise physically defined space, or that might be distinguished from other spaces because of different acoustical, environmental, or use characteristics, such as reverberation time and ambient sound pressure level [NFPA 72, Chapter 3.3.6].

Active Multiplex System - A multiplexing system in which signaling devices such as transponders are employed to transmit status signals of each initiating device or initiating device circuit within a prescribed time interval so that the lack of receipt of such a signal can be interpreted as a trouble signal [NFPA 72, Chapter 3.3.7].

Addressable Device - A fire alarm system component with discrete identification that can have its status individually identified or that is used to individually control other functions [NFPA 72, Chapter 3.3.48].

Alarm Signal - A signal indicating an emergency condition or an alert that requires action [NFPA 72, Chapter 3.3.132.2].

Alarm Verification Feature - A feature of automatic fire detection and alarm systems to reduce unwanted alarms wherein smoke detectors report alarm conditions for a minimum period of time, or confirm alarm conditions within a given time period after being reset, in order to be accepted as a valid alarm initiation signal [NFPA 72, Chapter 3.3.126].

Analog Initiating Device (Sensor) - An initiating device that transmits a signal indicating varying degrees of condition as contrasted with a conventional initiating device, which can only indicate an on-off condition [NFPA 72, Chapter 3.3.122.1].

Annunciator - A unit containing one or more indicator lamps, alphanumeric displays, or other equivalent means in which each indication provides status information about a circuit, condition, or location [NFPA 72, Chapter 3.3.20].

Authority Having Jurisdiction [AHJ] - An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure [NFPA 72, Chapter 3.2.2].

Communications Circuit - Any signaling path of an emergency communications system that carries voice, audio, data or other signals [NFPA 72, Chapter 3.3.55].

Compatibility - A process where the equipment (controls & peripherals) are verified as suitably rated to operate and/or communicate properly as a system and as intended. Equipment can specifically be tested for compatibility and often applies to initiating devices, two-wire and digital communication type to designate operation with certain control equipment. The compatibility of four-wire type devices is often determined through electrical rating comparisons.

All devices and appliances that receive their power from the initiating device circuit or signaling line circuit of a control unit shall be listed for use with the control unit [NFPA 72, Chapter 10.3.3.]

Control Unit - A system component that monitors inputs and controls outputs through various types of circuits [NFPA 72, Chapter 3.3.59].

- **Autonomous Control Unit (ACU)** - The primary control unit for an in-building mass notification system [NFPA 72, Chapter 3.3.59.1].
- **Emergency Communications Control Unit (ECCU)** - A system capable of sending mass notification messages to individual buildings, zones of buildings, individual outdoor speaker arrays, zones of outdoor speaker arrays or; a building, multiple buildings, outside areas, or a combination of these [NFPA 72, Chapter 3.3.59.2].
- **Fire Alarm Control Unit (FACU)** - See Fire Alarm System definition.
- **Wireless Control Unit** - A component that transmits/receives and processes wireless signals [NFPA 72, Chapter 3.3.59.4].

Cross-Zone - A detection application where the operation of two detectors within a single zone or area of protection is needed to complete an operation or output. In cross zone applications, the activation of the first device causes a normal alarm notification. This application can also be accomplished via virtual or counting group or zones on addressable/intelligent systems.

Digital Alarm Communicator System (DACS) - A system in which signals are transmitted from a digital alarm communicator transmitter (DACT) located at the protected premises through the public switched telephone network to a digital alarm communicator receiver (DACR) [NFPA 72, Chapter 3.3.68].

- **Digital Alarm Communicator Transmitter (DACT)** - A system component at the protected premises to which initiating devices or groups of devices are connected. The DACT seizes the connected telephone line, dials a preselected number to connect to a DACR, and transmits signals indicating a status change of the initiating device [NFPA 72, Chapter 3.3.69].
- **Digital Alarm Radio Receiver (DARR)** - A system component composed of two subcomponents: one that receives and decodes radio signals, the other that annunciates the

decoded data. These two subcomponents can be coresident at the central station or separated by means of a data transmission channel [NFPA 72, Chapter 3.3.70].

- **Digital Alarm Radio System (DARS)** - A system in which signals are transmitted from a digital alarm radio transmitter (DART) located at a protected premises through a radio channel to a digital alarm radio receiver (DARR) [NFPA 72, Chapter 3.3.71].
- **Digital Alarm Radio Transmitter (DART)** - A system component that is connected to or an integral part of a digital alarm communicator transmitter (DACT) that is used to provide an alternate radio transmission channel [NFPA 72, Chapter 3.3.72].

Emergency Communications System – A system for the protection of life by indicating the existence of an emergency situation and communicating information necessary to facilitate an appropriate response and action. [NFPA 72, Chapter 3.3.87].

- **One-Way Emergency Communications System.** – One way emergency communications systems are intended to broadcast information, in an emergency, to people in one or more specified indoor or outdoor areas. It is intended that emergency messages be conveyed either by audible, visible, or textual means, or any combination. [NFPA 72, Chapter 3.3.87.1]
- **Distributed Recipient Mass Notification System (DRMNS)** - A distributed recipient mass notification system is a system meant to communicate directly to targeted individuals and groups that might not be in a contiguous area [NFPA 72, Chapter 3.3.87.1.1].
- **In-Building Fire Emergency Voice/Alarm Communications System** - Dedicated manual or automatic equipment for originating and distributing voice instructions, as well as alert and evacuation signals pertaining to a fire emergency, to the occupants of a building [NFPA 72, Chapter 3.3.87.1.2].
 - **In-Building Mass Notification System** - A system used to provide information and instructions to people in a building(s) or other space using intelligible voice communications and including visible signals, text, graphics, tactile, or other communication methods [NFPA 72, Chapter 3.3.87.1.3].
 - **Wide-Area Mass Notification System** - Wide-area mass notification systems are generally installed to provide real-time information to outdoor areas and could have the capability to communicate with other notification systems provided for a campus, military base, municipality, or similar single or multiple contiguous areas [NFPA 72, Chapter 3.3.87.1.4].
 - **Two-Way Emergency Communications System** – Two-way emergency communications systems are divided into two categories, those systems that are anticipated to be used by building occupants and those systems that are to be used by fire fighters, police, and other emergency services personnel. Two-way emergency communications systems are used to both exchange information and to communicate information such as, but not limited to, instructions, acknowledgement of receipt of messages, condition of local environment, and condition of persons, and to give assurance that help is on the way [NFPA 72, Chapter 3.3.87.2].

Emergency Communication Control Unit [ECCU] –See Control Unit [NFPA 72, Chapter 3.3.86].

Emergency Control Functions - Building, fire, and emergency control functions that are intended to increase the level of life safety for occupants or to control the spread of the harmful effects of fire [NFPA 72, Chapter 3.3.91].

Fire Alarm Control Interface - The fire alarm control interface coordinates signals to and from the fire alarm

system and other systems. [NFPA 72, Chapter 3.3.137.2]

Fire Alarm Control Unit (FACU) - A component of the fire alarm system, provided with primary and secondary power sources, which receives signals from initiating devices or other fire alarm control units, and processes these signals to determine part or all of the required fire alarm system output function(s). [NFPA 72, Chapter 3.3.102]

Fire Alarm System - A system or portion of a combination system that consists of components and circuits arranged to monitor and annunciate the status of fire alarm or supervisory signal-initiating devices and to initiate the appropriate response to those signals [NFPA 72, Chapter 3.3.105].

- **Auxiliary Alarm System** - A protected premises fire alarm system or other emergency system at the protected premises and the system used to connect the protected premises system to a public emergency alarm reporting system for transmitting an alarm to the communications center [NFPA 72, Chapter 3.3.199.1].
- **Central Station (Fire Alarm System)** - See NFPA 72 Chapter 3.3.267.1, Central Station Service Alarm System. [NFPA 72, Chapter 3.3.38].
- **Combination System** - A fire alarm system in which components are used, in whole or in part, in common with a non-fire signaling system [NFPA 72, Chapter 3.3.105.1].
- **Dedicated Function Fire Alarm System** – See NFPA 72, Chapter 3.3.105.4.2.

Initiating Device - A system component that originates transmission of a change-of-state condition, such as in a smoke detector, manual fire alarm box, or supervisory switch. [NFPA 72, Chapter 3.3.132]

Initiating Device Circuit (IDC) - A circuit to which automatic or manual initiating devices are connected where the signal received does not identify the individual device operated. [NFPA 72, Chapter 3.3.133]

Master Fire Alarm Control Unit - A fire alarm control unit that serves the protected premises or portion of the protected premises as a local fire alarm control unit and accepts inputs from other fire alarm control units. [NFPA 72, Chapter 3.3.102.1]

- **Protected Premises (Local) Control Unit** - A fire alarm control unit that serves the protected premises or a portion of the protected premises. [NFPA 72, Chapter 3.3.102.2]
- **Dedicated Function Fire Alarm Control Unit** - A protected premises fire alarm control unit which is intended to provide operation of a specifically identified fire safety function. [NFPA 72, Chapter 3.3.102.2.1]
- **Releasing Service Fire Alarm Control Unit** - A protected premises fire alarm control unit specifically listed for releasing service that is part of a fire suppression system and which provides control outputs to release a fire suppression agent based on either automatic or manual input. [NFPA 72, Chapter 3.3.102.2.2]

Municipal (Fire Alarm System) – A public emergency alarm reporting system.. [NFPA 72, Chapter 3.3.105.3]

Managed Facility-Based Voice Network (MFVN) - A physical facilities-based network capable of transmitting real time signals with formats unchanged that is managed, operated, and maintained by the service provider to ensure service quality and reliability from the subscriber location to public switched telephone network (PSTN) interconnection points or other MFVN peer networks. [NFPA 72, Chapter 3.3.152]

Multiplexing - A signaling method characterized by transmission and reception of multiple signals on a signaling line circuit, a transmission channel, or a communications channel, including the means to positively identifying each signal. [NFPA 72, Chapter 3.3.163]

Notification Appliance - A fire alarm system component such as a bell, horn, speaker, light, or text display that provides audible, tactile, or visible outputs, or any combination thereof. [NFPA 72, Chapter 3.3.173]

Notification Appliance Circuit (NAC) - A circuit or path directly connected to a notification appliance(s). [NFPA 72, Chapter 3.3.174]

NRTL – OSHA (Occupational Safety and Health Administration) accredited Nationally Recognized Testing Laboratory.

Pathway (Pathways) -Any circuit, conductor, optic fiber, radio carrier, or other means connecting two or more locations. [3.3.190]

Pathway Survivability - The ability of any conductor, optic fiber, radio carrier, or other means for transmitting system information to remain operational during fire conditions. [NFPA 72, Chapter 3.3.191]

Positive Alarm Sequence - An automatic sequence that results in an alarm signal, even when manually delayed for investigation, unless the system is reset. [NFPA 72, Chapter 3.3.198]

Pre-Signal - An application where the operation of an input device actuates only a selective or partial notification for the purpose of notifying key personnel who then have the option of manually initiating a general alarm.

Proprietary Supervising Station (Fire Alarm System) - See Supervising Station Alarm System. [NFPA 72, Chapter 3.3.209]

Protected Premises (Local) Fire Alarm System – A fire alarm system located at the protected premises. [NFPA 72, Chapter 3.3.213, .105]

Public Emergency Alarm Reporting System - A system of alarm-initiating devices, transmitting and receiving equipment, and communication infrastructure (other than a public telephone network) used to communicate with the communications center to provide any combination of manual or auxiliary alarm service. [NFPA 72, Chapter 3.3.215]

Public Switched Telephone Network - An assembly of communications equipment and telephone service providers that utilize managed facilities-based voice networks (MFVN) to provide the general public with the ability to establish communications channels via discrete dialing codes. [NFPA 72, Chapter 3.3.220, 290]

Releasing Fire Alarm System - A protected premises fire alarm system that is part of a fire suppression system and/or which provides control inputs to a fire suppression system related to the fire suppression system's sequence of operations and outputs for other signaling and notification. [NFPA 72, Chapter 3.3.234, .105]

Remote Supervising Station - A supervising station to which alarm, supervisory, or trouble signals or any combination of those signals emanating from protected premises fire alarm systems are received and where personnel are in attendance at all times to respond. [NFPA 72, Chapter 3.3.237, .283]

Reset - A control function that attempts to return a system or device to its normal, non-alarm state. [NFPA 72, Chapter 3.3.241]

Response Time - The time lapse from the occurrence of an input status change, (alarm, trouble or supervisory) to the activation of a system output.

Risk Analysis - A process to characterize the likelihood, vulnerability, and magnitude of incidents associated with natural, technological, and manmade disasters and other emergencies that address scenarios of concern, their probability, and their potential consequences. [NFPA 72, Chapter 3.3.246]

Signal - A status indication communicated by electrical or other means [NFPA 72, Chapter 3.3.257]:

- **Fire Alarm Signal** - A signal initiated by a fire alarm-initiating device such as a manual fire alarm box, automatic fire detector, water-flow switch, or other device in which activation is indicative of the presence of a fire or fire signature. [NFPA 72, Chapter 3.3.257.5]
- **Alert Tone** - An attention-getting signal to alert occupants of the pending transmission of a voice message. [NFPA 72, Chapter 3.3.17]
-
- **Evacuation Signal** - A distinctive signal intended to be recognized by the occupants as requiring evacuation of the building. [NFPA 72, Chapter 3.3.257.4]
-
- **Supervisory Signal** - A signal indicating the need for action in connection with the supervision of fire suppression systems or equipment, or the maintenance features of related systems. [NFPA 72, Chapter 3.3.287]
-
- **Guard's Tour Supervisory Signal** - A supervisory signal monitoring the performance of guard patrols. [NFPA 72, Chapter 3.3.257.6]
-
- **Trouble Signal** - A signal initiated by the fire alarm system or device indicative of a fault in a monitored circuit or component. [NFPA 72, Chapter 3.3.257.10]

Signaling Line Circuit (SLC) - A circuit or path between any combination of circuit interfaces, control units, or transmitters over which multiple system input signals or output signals, or both, are carried. [NFPA 72, Chapter 3.3.259]

Supervisory Service - The service required to monitor performance of guard tours and the operative condition of fixed suppression systems or other systems for the protection of life and property [NFPA 72, Chapter 3.3.286].

Supervisory Signal Initiating Device - An initiating device such as a valve supervisory switch, water level indicator, or low air pressure switch on a dry-pipe sprinkler system in which the change of state signals an off-normal condition and its restoration to normal of a fire protection or life safety system; or a need for action in connection with guard tours, fire suppression systems or equipment, or maintenance features of related systems. [NFPA 72, Chapter 3.3.132.5]

Supplementary - As used in this Code, supplementary refers to equipment or operations not required by this Code and designated as such by the authority having jurisdiction. [NFPA 72, Chapter 3.3.289]

Two way Emergency Communication Systems – [NFPA 72, Chapter 3.3.302, .87.2] See Emergency Communications System [NFPA 72, Chapter 3.3.87].

Voice Intelligibility - Voice communication using prerecorded messages and manual voice announcements verified as being intelligible in accordance with the requirements of NFPA 72, 18.4.10. [NFPA 72, Chapter 3.3.302, .87.2, 3.3.135, 3.3.136, 14.4.11]

Wireless Protection System - A system or a part of a system that can transmit and receive signals without the aid of interconnection wiring. It can consist of either a wireless control unit or a wireless repeater. [NFPA 72, Chapter 3.3.318]

Zone - A defined area within the protected premises from which a signal can be received, an area to which a signal can be sent, or an area in which a form of control can be executed. [NFPA 72, Chapter 3.3.300]

2 GENERAL INFORMATION

2.1 Fire Alarm and Signaling Product Categorization

Fire alarm control equipment is comprised of electronic components that when combined in accordance with the manufacturers instructions make up a Fire Alarm Signaling System. They may be fabricated and shipped as complete assemblies or sub-assemblies. Fire Alarm Control Equipment is usually categorized based on the intended application or use as follows:

Protected Premises Fire Alarm Systems

- In-Building Fire Emergency Voice/Alarm Communications
- Two-Way Communication Service
- Guard's Tour Supervisory Service
- Protected Premises Fire Safety Functions
- Special Requirements for Low-Power Radio (Wireless) Systems
- Suppression System Actuation
 - Automatic Extinguishing or
 - Pre-Action & Deluge Release

Emergency Communications Systems [ECS]

- One-Way Emergency Communications System.
- Distributed Recipient Mass Notification System (DRMNS)
- In-Building Fire Emergency Voice/Alarm Communications System
- In-Building Mass Notification System
- Wide-Area Mass Notification System -
- Two-Way Emergency Communications System
- Information, Command, and Control

Supervising Station Alarm Systems

- Proprietary Supervising Station Systems
- Alarm Systems for Central Station Service
- Remote Supervising Station Alarm Systems
- Communications Methods

Public (Municipal) Emergency Reporting Systems

- Communications Methods
- Alarm Processing Equipment Alarm Boxes
- Emergency Communications Systems (ECS)

2.2 Approval Application Requirements

To apply for an Approval examination the manufacturer, or its authorized representative, should submit a request to information@fmapprovals.com

The manufacturer shall provide the following preliminary information with any request for Approval consideration:

- A complete list of all models, types, sizes, and options for the products or services being submitted for Approval consideration;
- General assembly drawings, complete set of manufacturing drawings, materials list, anticipated marking format, piping and electrical schematics, nameplate format, brochures, sales literature, spec. sheets, installation, operation and maintenance procedures; and
- the number and location of manufacturing facilities.
- All documents shall identify the manufacturer's name, document number or other form of reference, title, date of last revision, and revision level. All documents shall be provided with English translation.

2.3 Requirements for Examination

- 2.3.1 Following authorization of an Approval examination, the manufacturer shall submit samples for examination and testing based on the following:
- Sample requirements to be determined by FM Approvals following review of the preliminary information and defined in the test proposal or quotation provided.
- 2.3.2 Requirements for samples may vary depending on design features, results of prior or similar testing, and results of any foregoing tests.
- 2.3.3 The manufacturer shall submit samples representative of production. Any decision to use data generated using prototypes is at the discretion of FM Approvals.
- 2.3.4 It is the manufacturer's responsibility to provide any necessary test fixtures, such as those which may be required to evaluate the maximum rated load capabilities, maximum system configurations and the devices necessary for the determination of peripheral compatibility with the fire alarm signaling equipment.
- 2.3.5 Review of Documentation - During the initial investigation and prior to physical testing, the manufacturer's specifications and details shall be reviewed to assess the practicality of installation and use. The Approval investigation shall define the limits of the Approval.

3 GENERAL SYSTEM REQUIREMENTS

3.1 Fire Alarm System Physical or Structural Features

The fire alarm equipment and enclosure shall include the required features and be suitable for the intended environmental exposures as determined by testing in accordance with this standard and acceptable national, regional, or international codes and standards (see 2.3.5).

- 3.1.1 Means shall be provided to mount the fire alarm equipment securely and independently of the wiring.
- 3.1.2 The fire alarm equipment shall be capable of withstanding normal handling and installation.
- 3.1.3 Fire alarm control equipment intended for use in hazardous (classified) locations shall comply with Approval requirements for hazardous (classified) location electrical equipment in addition to this standard.

- 3.1.4 The fire alarm control equipment shall accommodate secure and compliant wiring methods in accordance with NFPA 70 including Articles 760, 770 and 800, National Electrical Code and NFPA 72, National Fire Alarm and Signaling Code.
- 3.1.5 The fire alarm control equipment shall be compatible with an FM Approved fire alarm control system that will produce distinctive alarm, supervisory (if equipped) and trouble signals.
- 3.1.6 The fire alarm equipment shall have response times in accordance with NFPA 72, National Fire Alarm and Signaling Code and within those defined in the manufacturer's specifications and installation and operational manual. The maximum response values as found in NFPA 72 are as follows [for other system timing requirements see the applicable sections]:

- Alarm - 10 seconds
- Supervisory – 90 seconds
- Trouble – 200 seconds

- 3.1.7 The controls on a product intended for use in unsecured (public) areas for the purpose of signal acknowledge, reset, optional program initiation, manual override of any control sequence, or altering of system parameters, shall be of restricted access. Access shall be via a key-lock, or located within a locked cabinet, or limited by a software security code or other equivalent protection against unauthorized use.

Note: If the manual controls are accessed via the opening of the key-locked enclosure, the equipment shall be arranged so that access does not result in the exposure of live electrical parts.

- 3.1.8 As a minimum, all control equipment and their displays shall use the following basic indicators:
- GREEN (Normal). This green indicator shall illuminate when all power is applied to the system and no off-normal situations exist.
 - RED (Fire Alarm). This red indicator shall illuminate when any fire condition exists in the building, flashing until acknowledged, steady state following acknowledgement.
 - YELLOW (Supervisory signal). This yellow indicator shall illuminate when any supervisory condition exists in the building, flashing until acknowledged, steady state following acknowledgement.
 - YELLOW, (Trouble signal). This yellow indicator shall illuminate when any trouble condition exists in the building, flashing until acknowledged, steady state following acknowledgement.
 - For alarm, supervisory and trouble conditions, the annunciation shall be audible and visible.

While adherence to the Standard Fire Service Interface (NFPA 72, E.4, E.5) is not required, it is suggested.

3.2 Equipment Construction

3.2.1 Requirement

- 3.2.1.1 The fire alarm system construction shall not adversely affect the functionality, present the risk of fire, electric shock, and/or injury to persons that may operate the product, when tested under all conditions as defined in this standard.
- 3.2.1.2 As tested within the definitions of this standard, the system shall:
- Not sustain damage that may compromise functionality, except were permitted, and/or safety,
 - Restrict entry of foreign objects so functionality, except were permitted, and/or safety are not compromised;