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Fire safety engineering — Active fire protection systems —

Part 1: General principles

Ingénierie de la sécurité incendie — Systèmes de protection active contre l'incendie —

Partie 1: Principes généraux

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 4, *Fire safety engineering*.

A list of all parts in the ISO 20710 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Predicting fire behaviour is important for preventing and reducing losses due to fire. Evaluation of the performance of active fire protection systems based on the prediction of fire phenomena plays a direct part in reaching the goal of fire safety. Therefore, evaluating fire protection system performance, including system operating time and effectiveness, is important for an engineer, peer reviewer, Authority Having Jurisdiction (AHJ), fire officials and other stakeholders. It can also be useful for fire investigators to reconstruct and analyse actual fires.

The ISO 20710 series provides guidance on estimating the activation time and effectiveness of active fire protection systems when carrying out fire hazard assessments and performance-based fire safety designs for all of the abovementioned stakeholders.

This document includes information on methods for estimation, theories and data required. It also provides information on the purpose, configuration, activation procedure and functioning principles of active fire protection systems.

The methods of evaluation are hand calculation, computer fire modelling and performance testing. The objective of the ISO 20710 series is to provide guidance for performance estimation methods for analysing whether a selected system can achieve the desired performance in various environments.

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Fire safety engineering — Active fire protection systems —

Part 1: General principles

1 Scope

This document provides information on the goal, scope, structure, contents and background of the different parts of the ISO 20710 series. The purpose of the ISO 20710 series is to provide information on active fire protection systems according to the design, implementation and maintenance described in ISO 23932-1. The ISO 20710 series is linked to the steps of the performance-based fire safety engineering design process described in ISO 23932-1.

This document is not intended as a detailed technical design guide but is intended to provide the guidance necessary for use of the ISO 20710 series by professionals who consider the active fire protection systems at each step presented in ISO 23932-1.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
activation time
time interval from response by a sensing device until the suppression system, smoke control system, alarm system or other fire safety system is fully operational

[SOURCE: ISO 13943:2017, 3.15]

3.2
active fire protection system
AFPS
system or group of systems that require some amount of action to work in the event of a fire

Note 1 to entry: Actions may be manually operated, like a fire extinguisher or automatic, like a sprinkler.

3.3
ASET
available safe escape time
for an individual occupant, the calculated time interval between the time of ignition and the time at which conditions become such that the occupant is estimated to be incapacitated, i.e. unable to take effective action to escape to a safe refuge or place of safety

[SOURCE: ISO/TS 29761:2015, 3.1, modified — notes to entry removed.]

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3.4
aspirating smoke detector
smoke detector, in which air and aerosols are drawn through a sampling device and carried to one or more smoke-sensing elements by an integral aspirator

[SOURCE: ISO 7240-1:2014, 2.1.13, modified — Note 1 to entry and example removed.]

3.5
authority having jurisdiction
AHJ
organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure

[SOURCE: NFPA 11, 3.2.2]

3.6
automatic closing device
device that causes the fire door, fire shutter, fire and smoke damper, and fire window to close when activated by a fusible link or detector

[SOURCE: NFPA 80, 3.3.6]

3.7
dry chemical fire extinguishing system
dry chemical system
system that discharges dry chemical from fixed nozzles or hand hose line by means of expellant gas

[SOURCE: NFPA 17, 1.1]

3.8
effectiveness
extent to which planned activities are realized and planned results achieved

[SOURCE: ISO 18788:2015, 3.17]

3.9
fire alarm control unit
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 functions

[SOURCE: NFPA 72, 3.3.108]

3.10
fire/smoke barrier
barrier to restrict the spread of flame and/or heat and/or smoke

3.11
fire and smoke damper
device installed in an air distribution system to control the movement of smoke and restrict the passage of flame

[SOURCE: NFPA 80, 3.3.48 and 3.3.118]

3.12
fire door
door assembly capable of maintaining for a specified period some, or all of the fire resistance criteria defined in ISO 3008, as appropriate for the door in use

[SOURCE: ISO/TR 5925-2:2006, 2.3, modified — reference to "or shutter" removed.]

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3.13
fire model
calculation method that describes a system or process related to fire development, including fire dynamics and the effects of fire

[SOURCE: ISO 13943:2017, 3.136, modified — admitted term and Note 1 to entry removed.]

3.14
fire shutter
fire door assembly used for the protection of an opening

[SOURCE: NFPA 80, 3.3.63]

3.15
fire suppression system
technical system to fight a fire and to reduce the damaging effects of flames and heat

[SOURCE: ISO 19353:2019, 3.7, modified — Note 1 to entry removed.]

3.16
fire window
window or glass block assembly having a fire resistance rating

[SOURCE: NFPA 80, 3.3.64]

3.17
flame detector
fire detector which responds to the radiation emitted by flames from a fire

[SOURCE: ISO 7240-1:2014, 2.1.63]

3.18
foam fire extinguishing system
system that uses a foam made by an aqueous solution of a mixture of water and foam-generating agent that extinguishes a fire by covering the surface of the fuel with the generated foam preventing oxygen from reaching the surface of the fuel

3.19
manual call point
component for the manual initiation of an alarm

[SOURCE: ISO 7240-1:2014, 2.1.85]

3.20
performance test for AFPS
test conducted to evaluate the extent to which the active fire protection system design meets the performance criteria for achieving the fire safety objectives

Note 1 to entry: The test uses physical modelling considering the fire and environment to simulate the expected situation. The purpose, scenario, method, procedure and performance criteria of the test should be set by the AHJ and related professionals. The test should be conducted by professionals in a suitable environment using appropriate equipment. Professionals should analyse test results and conduct the evaluation in conjunction with AHJ and professionals.

Note 2 to entry: See Clause 4.

3.21
gaseous fire extinguishing system
system that uses inert gas and chemical agents to extinguish the fire

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3.22
hybrid fire extinguishing system
hybrid system
system that uses a combination of atomized water and inert gas to extinguish fires

[SOURCE: NFPA 770]

3.23
passive fire protection system
system that does not require any external power but relies instead on specific construction features and the use of materials, products, and building elements that meet well-defined fire performance requirements

[SOURCE: Fire Protection Handbook 20th edition, Section 2, Chapter 5 – NFPA - modified]

3.24
RSET
required safe escape time
calculated time period required for an individual occupant to travel from their location at the time of ignition to a safe refuge or place of safety

[SOURCE: ISO 13943:2017, 3.330, modified — admitted term and Note 1 to entry removed.]

3.25
smoke alarm
device containing within one housing all the components, except possibly the power source, necessary for detecting smoke and generating an alarm condition

[SOURCE: ISO 12239:2010, 3.15]

3.26
smoke control systems
engineered system that uses mechanical fans or natural ventilation to produce pressure difference across smoke barriers to inhibit smoke movement

[SOURCE: NFPA 92A]

3.27
video fire detector
fire detector which analyses video images to detect the presence of smoke and/or flame

[SOURCE: ISO 7240-1:2014, 2.1.134, modified — Note 1 to entry removed.]

4 Goal and scope of active fire protection system documents

The purpose of the ISO 20710 series is to provide technical information in fire safety engineering on the design, implementation and maintenance of active fire protection systems to reach the fire safety objectives described in ISO 23932-1. The ISO 20710 series is connected to the phases of the performance-based fire safety engineering design process as described in ISO 23932-1.

ISO 23932-1 requires that appropriate engineering methods be selected to predict the fire consequences of specific scenarios and scenario elements (ISO 23932-1:2018, Clause 12).

Maintenance and reliability of active fire protection systems are also included in the documentation, final report, and fire safety management (ISO 23932-1:2018, Clause 14, Clause 16).

This step in the fire safety engineering process is shown as a highlighted box in Figure 1 and described in ISO 23932-1.

In accordance with the requirements of ISO 23932-1, the ISO 20710 series provides the methods, procedures and information for predicting and demonstrating the performance of the active fire

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