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Fire resistance tests — Elements of building construction — Requirements for active fire curtains

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Contents

Fore	Foreword					
Intro	Introduction					
	Role	and use of active fire curtains	6			
	Appli	cation of active fire curtains	6			
	Deplo	oyment of active fire curtains	7			
	Heat	transfer through active fire curtains	7			
1	Scope					
2	Normative references					
3	Terms and definitions					
4	Symbols and abbreviated terms					
5	Requ	irements	7			
	5.1	General	7			
	5.2	Side retention	7			
	5.3	Additional requirements for multiple active fire curtains	8			
	5.4	Horizontal or angled TANDARD PREVIEW	10			
	5.5	Pass door(s)	12			
	5.6	Vision panels	13			
6	Samp	Dingnttps://standards.iten.a/catalog/standards/sist/73d1db14-b6/d-4f06-b964-	14			
	6.1	Test samples, testing and compliance criteria-24	14			
7	Test	methods	15			
	7.1	General	16			
	7.2	Durability and force gauge	16			
	7.3	Reliability and durability	16			
	7.4	Deployment	17			
	7.5	Smoke leakage	18			
	7.6	Fire resistance	18			
	7.7	Reaction to fire	20			
	7.8	Ancillary devices	20			
8	Mark	ing, labelling and packaging	21			
Anne	Annex A					
Anne	Annex B2					
Anne	ex C		29			
Anne	Annex D45					
Anne	Annex E47					
Anne	Annex F					

ISO/DIS 21524-1:2019(E)

Annex G		56
Annex H		60
Annex I		63
Annex J		67
Annex K		70
Annex L		73
Annex M		
Annex N		92
Annex O		95
Annex P		
Annex Q		
Annex R		
Annex S		
Annex T		
Annex U		
Annex V	Teb STANDADD DDEVIEW	
Annex W		
Annov X	(standards.iten.al)	118
Dibliograph	<u>ISO/DIS 21524</u>	110
ыопоgraphy	https://standards.iteh.av/catalog/standards/sist/73d1db14-b67d-4106-b964- b7075b1e31b6/iso-dis-21524	

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).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement **andards.iteh.ai**) 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 https://www.iso.org/foreword.htmb.7075b1e31b6/iso-dis-21524

This document was prepared by Technical Committee ISO/TC 92, Fire safety, Subcommittee SC 2, Fire containment.

A list of all parts in the ISO 834 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 <u>www.iso.org/members.html</u>.

Introduction

Role and use of active fire curtains

As fire-separating elements, active fire curtains are required to provide two main functions:

- a) to maintain any compartmentation of buildings needed to limit the spread of fire and smoke;
- b) to allow access to protected escape routes, both vertical and horizontal, without any loss of fire resistance, and to limit smoke entry into these routes, i.e. protected corridors and protected shafts.

They can also be partially deployed to control the deployment of fire effluent within buildings in the event of fire, prior to being fully deployed as active fire curtains.

Recommended positions and ratings for fire-separating elements for means of escape purposes are given in National Codes providing either prescriptive or risk-based approaches using the principles of fire safety engineering.

When used as part of a fire-engineered design solution, active fire curtains can become a critical element of design. If active fire curtains do not deploy to their operational position, the fire-engineered design solution would be compromised. However, in the event that other fire protection systems or elements do not function, e.g. due to total power failure, active fire curtains in their fire-operational position provide fire separation.

Application of active fire curtainstandards.iteh.ai)

Active fire curtains used in life safety and property protection applications can be vertical, horizontal or angled. Depending upon the application, they could be used to replace fire doors, roller shutters, non-loadbearing walls, non-load-bearing ceilings, glazed elements, etc. They could also be used to form fire separation, e.g. forming protected routes or lobbies. They can provide some of the functionality of a fire door, but when used only for fire and smoke leakage, as a fire door, then different requirements apply. These requirements will be given in ISO 3008-1 and ISO 5925-1 and ISO/TR 5925-2. Active fire curtains can enable greater widths and deployments using less space than other traditional methods.

It is essential that any proposed use of active fire curtains are assessed in the context of the building use and perceived occupancy to ensure that it is ultimately suitable and fit for purpose, taking into consideration such factors as:

- a) fire resistance;
- b) reaction to fire;
- c) smoke leakage;
- d) occupancy type and risk profile;
- e) occupancy load;
- f) means of escape for egress;
- g) ingress for fire and rescue service;

h) life safety and property protection objectives.

Deployment of active fire curtains

Some examples of how active fire curtains could be deployed are:

- a) deploy fully upon receipt of a signal from the fire alarm system;
- b) remain retracted when the fire alarm system is activated and only deploy upon receipt of a signal from a local smoke/heat detector. In these circumstances, only the active fire curtains to deploy are those where fire or smoke are in the vicinity;
- c) remain retracted when the fire alarm system is activated for a predetermined time to allow for evacuation before deploying fully;
- for vertical installations move to a given height above finished floor level when the fire d) alarm system is activated to contain smoke for a predetermined time before closing fully for fire separation;
- for vertical installations move to a given height above finished floor level when a specific e) fire alarm system signal is provided to contain smoke when the fire location is such that active fire curtains are not required to deploy fully;
- deploy on loss of primary and auxiliary power supply.
- f)

Heat transfer through active fire curtains

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In fire safety situations/it is often important to establish the heat transfer from one side of the separating element to the other in order to calculate escape route sizes and safe operating distances. Traditionally this has been established using insulation and radiation measurements.

NOTE National Codes only apply to life safety. Higher performance levels might be necessary for certain applications if property protection is required.

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Fire resistance tests — Elements of building construction — Requirements for active fire curtains

1 Scope

This part of ISO 21524-1 specifies requirements for the design, testing and classification of active fire curtains applicable to any material that are designed to provide fire and smoke resistance.

This part gives recommendations for the application, installation and maintenance of active fire curtains. It is also intended to provide guidance and recommendations for designers, specifiers (e.g. architects, fire engineers), Authorities Having Jurisdiction (AHJs), installers and maintainers for the following:

- a) creating compartmentation;
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- b) creating protected routes for the purpose of means of escape;
- c) providing protection at the location of non-fire resisting elements e.g. in front of non-fire-resisting glazing and doorsets where required for compartmentation or protecting means of escape;
- d) providing fire- and smoke-resistant active fire curtains in conjunction with non-smoke rated products protecting openings to reduce leakage of smoke.

This Standard does not apply to the following which are intended for a different use:

- barriers made of part of the building's structure;
- theatre/proscenium textile curtains;
- smoke barriers to ISO 21927-1;
- doorsets or operable fabric curtains according to ISO 3008-1.

NOTE 1 Smoke barriers, used solely for smoke control, are covered by ISO 21927-1. Such smoke barriers are not considered to be active fire curtains.

NOTE 2 Requirement of fire doors is given in ISO 3008-1. Requirements for leakage are given in ISO 5925-1 and ISO/TR 5925-2.

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2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 834-1, Fire resistance tests Elements of building construction — Part 1: General requirements for fire resistance testing

ISO 3008-1, Fire resistance tests -- Door and shutter assemblies — Part 1: General requirements

ISO 3009, Fire-resistance tests — Elements of building construction — Glazed elements

ISO 5925-1, Fire tests – Smoke-control door and shutter assemblies — Part 1: Ambient- and medium- temperature leakage tests

ISO/TR 5925-2, Fire tests -- Smoke-control door and shutter assemblies — Part 2: Commentary on test method and the applicability of test conditions and the use of test data in a smoke containment strategy

ISO 21927-1, Smoke and heat control systems — Part 1: Specification for smoke barriers

ISO 21927-9, Smoke and heat control systems Part 9: Specification for control equipment (standards.iteh.ai)

ISO 21927-10, Smoke and heat control systems — Part 10: Specification for power output devices

ISO/DIS 21524 ISO 1182, Reaction to fire tests for products/starNon-combustibility test f06-b964b7075b1e31b6/iso-dis-21524

ISO 1716, Reaction to fire tests for products — Determination of the gross heat of combustion (calorific value)

ISO 11295-2, Reaction to fire tests — Ignitability of products subjected to direct impingement of flame — Part 2: Single-flame source test

ISO 13943, Fire Tests — Vocabulary

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 834-1 and ISO 13943 the following apply.

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

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

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

3.1

active fire curtains

manufactured from flexible materials, not hinged or pivoted, provided for the passage of persons, air and objects, which, together with its frame as installed in a building, is intended (when closed) to resist the passage of fire

3.2

active fire curtains with smoke rating

manufactured from flexible materials, not hinged or pivoted, provided for the passage of persons, air or objects, which together with its frame as installed in a building is intended (when closed) to resist the passage of fire and gaseous products of combustion

3.3

compartmentation

process of separating a building or part of a building, into one or more rooms, spaces or storeys, with the intention of preventing the spread of fire to or from another part of the same building or adjoining building

Note 1 to entry: Compartmentation is mainly implemented to assist the 'fire and rescue services by confining the fire within a fire-resisting enclosure. In some instances, it is employed to assist means of escape in buildings where evacuation might be delayed, e.g. where phased evacuation policy has been applied in premises such as hospitals and care homes or where a policy of non-evacuation (e.g. "defend in place" or "stay put strategy") is employed as in blocks of flats.

Note 2 to entry: Fire enclosures specifically for the purpose of means of escape, such as lobby protection to stairways and enclosure of special risks, are not regarded as compartments and may employ passive smoke separation measures.

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3.4

competent person

suitably trained and qualified by knowledge and practical experience, and provided with the necessary instructions, to enable the required task(s) to be carried out correctly

3.5

deployment

movement of an active fire curtains from its retracted position to its fire-operational position

3.6

dwelling

unit of residential accommodation occupied (whether or not as a sole or main residence):

- a) by a single person or by people living together as a family; or
- b) by not more than six residents living together as a single household, including a household where care is provided for residents

3.7

emergency access

manually operated switch to enable fire and rescue services to initiate or terminate the operation of a fire safety system or other device

3.8

fire effluent

all gases and aerosols, including suspended particles, created by combustion or pyrolysis and emitted to the environment

[SOURCE: ISO 26367-1:2011, 3.4, modified — "and emitted to the environment" has been added.]

3.9

fire-operational position

final configuration of an active fire curtains specified by its designer to achieve and be sustained in the ultimate fire condition of the design

3.10

fire separation

method of providing an element that is intended for use in maintaining separation between two adjacent areas of a building in the event of a fire to form protected routes and/or compartmentation

3.11

fire strategy

safety design for a particular building determined by prescriptive codes, fire safety engineering or fire risk assessment

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3.12

fit for purpose

ISO/DIS 21524 e-to serve a defined a

ability of a product, process or service to serve a defined purpose under specific conditions b7075b1e31b6/iso-dis-21524

3.13

gravity fail-safe

ability of an active fire curtains to move to its fire-operational position in a safe and controlled manner to facilitate fire separation when all consumable primary and auxiliary power supplies are removed, in the event of wiring or system corruption, open or short circuit, or any combination thereof

3.14

integrity

ability of a separating element, when exposed to fire on one side, to prevent the passage of flames and hot gases or the occurrence of flames on the unexposed side for a stated period of time in a standard fire resistance test

[SOURCE: ISO 13943, 3.133]

3.15

hold-open device

element of the hold-open system that allows a gravity fail-safe active fire curtains to remain open either at a pre-set or chosen position until released

3.16

life safety

application of the active fire curtains in its fire-operational position assisting in the protection of the means of escape and access for the fire and rescue service

3.17

material or surface

material or surface that is either:

- a) non-combustible test to ISO 1182; or
- b) of limited combustibility test to ISO 1716;
- c) requires a room corner test for wall and ceiling linings to ISO 9705-2;
- d) requires an ignitability of products test when subjected to direct impingement of flame to ISO 11925-2.

3.18

means of escape

means whereby a safe route (or routes) in the event of fire is (or are) provided for persons to travel from any point in a building to a place of ultimate safety.

3.19

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multi-positional deployment

staged deployment of active fire curtains to provide initial smoke separation prior to full fire separation https://standards.iteh.ai/catalog/standards/sist/73d1db14-b67d-4f06-b964b7075b1e31b6/iso-dis-21524

3.20

property protection

application of the active fire curtains in its fire-operational condition to protect a building's contents and structure

3.21

reaction to fire

response of a test specimen when it is exposed to fire under specified conditions in a fire test

Note 1 to entry: Fire resistance is regarded as a special case and is not normally considered as a "reaction to fire" property.

[SOURCE: ISO 13943, 3.324]

3.22

side retention

retention device which links the active fire curtains fabric to the building structure to contain fire and smoke

3.23 smoke visible part of a fire effluent

[SOURCE: ISO 13943, 3.347]

3.24 smoke barrier

device to channel, control and/or prevent the migration of smoke

Note 1 to entry: Smoke is as the visible part of fire effluent. Smoke barriers can also be referred to as smoke curtains, smoke blinds or smoke screens. These are specified in ISO 21927-1.

3.25

temperature-time curve

<standardized> time-related variation of temperature prescribed in a specified way during a standard fire resistance test

[SOURCE: ISO 13943, 3.381]

4 Symbols and abbreviated terms

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Symbol	Unit	Description
	<u>(standards</u>	liteh.ai)
Н	metre	height of the fire tested active fire
	ISO/DIS 21	<u>5cu</u> rtains (m)
H_p	metheps://standards.iteh.ai/catalog/standards/	siproposed height (m) 964-
0	metre b7075b1e31b6/iso	width of the tested overlap (m)
O_m	metre	required minimum width of the
		overlap (m)
W	metre	width of the tested end curtain (m)
W_m	metre	required minimum width of the end
		curtain (m)
Α	metre squared	tested exposed fabric area (m ²)
Ar	metre squared	required exposed fabric area (m ²)
Н	metre	tested height of the exposed fabric (m)
H_r	metre	required height of the exposed fabric
		(m)
L _c	metre cubed per hour	leakage through the complete active
		fire curtains (m³/h)
L _{fa}	metre per hour cubed	leakage through the fabric only (m ³ /h)
L_{fb}	metre cubed, metre squared per	leakage per square metre of fabric
	hour	$(m^3/m^2/h)$
L_{fh}	metre per hour cubed	leakage through the fabric and the
		horizontal edge (m ³ /h)
L_{ph}	metre per hour cubed	leakage through the perimeter gap at
		the horizontal edge (m ³ /h)

Symbol	Unit	Description
L_{phb}	metre cubed per metre per hour	leakage per metre through the perimeter gap at the horizontal edge (m ³ /m/h)
L_{pv}	metre per hour cubed	leakage through the perimeter gap at the two vertical edges (m ³ /h)
L _{pvb}	metre cubed per metre per hour	leakage per metre through the perimeter gaps at the vertical edges (m ³ /m/h)
L_{lt}	metre cubed per metre per hour	effective linear perimeter leakage (m³/m/h)
W	metre	tested width of the exposed fabric (m)

5 Requirements

5.1 General

The active fire curtains shall be designed and manufactured to create a fire-separating element in a horizontal, vertical or angled orientation.

NOTE Typical uses of the active fire curtains include: **iTeh STANDARD PREVIEW**

a) compartmentation;

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- b) creating protected routes for the purpose of means of escape where using standard fire doors/shutters and non-loadbearing walls and ceilings would be prohibitive to the design; https://standards.iteh.ai/catalog/standards/sist/73d1db14-b67d-4f06-b964-b7075b1e31b6/iso-dis-21524
- c) providing protection at the location of non-fire resisting elements, e.g. in front of non-fire resisting glazing and doorsets, where required for compartmentation or protecting means of escape;
- d) meeting the requirements for smoke leakage in conjunction with other non-smoke rated products (e.g. lift door) protecting openings to reduce leakage of smoke.

5.2 Side retention

Where active fire curtains, whether single or multiple units, are reliant on side retention as part of their integral design, shall have no gaps between the fabric edge and the leading edge of the retention guide that would fail integrity (see <u>C.3</u>).

NOTE 1 Figure 1 illustrates an example of a typical example of a single active fire curtain.

NOTE 2 Active fire curtains having side tabs (retention device which is fixed to, and extends beyond, the edge of the active fire curtains but is not integral to the active fire curtains itself) have been found in some circumstances to produce edge gaps in end-use applications. Care should be taken during installation to use side-retention that is identical to the tested samples.