Application of fire safety engineering principles to the design of buildings —

Part 4: Detection of fire and activation of fire protection systems (Sub-system 4)
Published Document

The preparation of this British Standard was entrusted by FSH/24, Fire safety engineering, to Subcommittee FSH/24/4, upon which the following bodies were represented:

- Association of Building Engineering
- BRE/LPC Laboratories
- Chief and Assistant Chief Fire Officer's Association
- DETR
- DoH — NHS Estates
- District Surveyors Association
- Fire Safety Development Group
- Home Office
- Fire Brigades Union
- Fire Service
- London Fire and Emergency Planning Authority

Amendments issued since publication

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The following BSI references relate to the work on this Published Document:

Committee reference: FSH/24/4

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This Published Document (PD) was published under the Fire Standards Policy Committee. Other parts published or about to be published are as follows:

— Part 0: Guide to design framework and fire safety engineering procedures (QDR);
— Part 1: Initiation and development of fire within the enclosure of origin (Sub-system 1);
— Part 2: Spread of smoke and toxic gases within and beyond the enclosure of origin (Sub-system 2);
— Part 3: Structural response and fire spread beyond the enclosure of origin (Sub-system 3);
— Part 5: Fire service intervention (Sub-system 5);
— Part 6: Evacuation (Sub-system 6);
— Part 7: Probabilistic risk assessment (Sub-system 7).

These Published Documents are intended to be used in support of BS 7974:2001, Application of fire safety engineering principles to the design of buildings — Code of practice.

It has been assumed in the drafting of this PD that the execution of its provisions is entrusted to appropriately qualified and competent people.

Historically, fire detection, alarm and suppression systems have been subject to product orientated prescriptive codes and standards. Research to calculate and predict fire growth and the performance of detection, suppression and smoke control systems is still ongoing. There is much still to be done before the area becomes a mature science.

This document will not provide all information necessary to undertake a full fire safety engineering design of fire detection and fire control systems. It will, however, provide a framework and guidance for the design assessment, and will identify other documents that should be referred to, as appropriate.

Drafting of this publication was completed in July 2001.

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This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Summary of pages
This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 39 and a back cover.

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1 Scope

This Published Document provides guidance on the development, design and application of fire detection systems, and the activation of fire alarm and fire control systems to fulfil a role in the fire safety engineered design for a building. Scientific and engineering principles are used as part of a structured approach. The key elements covered are:

— detection: information is provided on the various types of fire detection system and their application for a given set of circumstances, as derived from a qualitative design review, risk assessment and the results of formulae provided by other Sub-systems;

— activation and control: once the fire detection system has detected a fire, it activates a series of measures designed to fulfil the requirements of the fire safety engineered design. These measures may include operation of fire warning systems, the remote signalling to emergency services, and the operation of fire alarm, fire suppression and fire control systems. Guidance is given on the methodology and formulae required in ensuring that the appropriate systems are activated in an appropriate manner and within given criteria.

In the context of this document, fire control includes:

— fire suppression systems: active systems designed to suppress a fire, temporarily (i.e. control) or permanently (i.e. extinguish). Examples include automatic water sprinkler systems;

— fire barrier systems: active systems designed to contain a fire within a given area or separate a fire from another area. Such systems may be regarded as offering similar benefits to passive fire compartments or separations for the duration of their operation. Examples include fire damper systems and door release mechanisms;

— smoke/heat control systems: active systems designed to positively control the movement and build up of fire effluents such as smoke, heat and toxic gases. Examples include smoke venting systems and air pressurization systems.

NOTE This document does not contain detailed design and installation instructions for the systems covered. This information may be obtained from other relevant British Standard codes of practice and specifications.

2 Normative references

BFPSA, COP12, Code of practice — Category 1 Aspirating Detection Systems. Issue 1. Available from BFPSA, Neville House, 55 Eden Street, Kingston-Upon-Thames, Surrey KT1 1BW.

BS 5306-2, Fire extinguishing installations and equipment on premises — Part 2: Specification for sprinkler systems.


BS 5839-1, Fire detection and alarm systems for buildings — Part 1: Code of practice for system design, installation, commissioning and maintenance.

BS 5839-8, Fire detection and alarm systems for buildings — Part 8: Code of practice for the design, installation and servicing of voice alarm systems.

BS EN 54-2, Fire detection and alarm systems — Part 2: Control and indicating equipment.

BS EN 54-3, Fire detection and alarm systems — Part 3: Fire alarm devices — Sounders.

BS EN 54-4, Fire detection and alarm systems — Part 4: Power supply equipment.

BS EN 54-5, Fire detection and alarm systems — Part 5: Heat detectors — Point detectors.

BS EN 54-7, Fire detection and alarm systems — Part 7: Smoke detectors — Point detectors using scattered light, transmitted light or ionization.

BS EN 54-10, Fire detection and alarm systems — Part 10: Flame detectors — Point detectors.

BS EN 54-11, Fire detection and fire alarm systems — Part 11: Manual call points.

BS ISO 14520 (all parts), Gaseous fire-extinguishing systems — Physical properties and system design