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BSI Standards Publication

Application of fire safety engineering principles to the design of buildings

Part 1: Initiation and development of fire within the enclosure of origin (Sub-system 1)

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Contents

Summary of pages
This document comprises a front cover, and inside front cover, pages i to iv, pages 1 to 41, an inside back cover and a back cover.

Foreword

This part of PD 7974 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 March 2019. It was prepared by Technical Committee FSH/24, *Fire safety engineering*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of PD 7974 supersedes PD 7974-1:2003, which is withdrawn.

Relationship with other publications

This Published Document is one of a series of documents published under the Fire Standards Policy Committee, and is a supporting document to BS 7974, *Application of fire safety engineering principles to the design of buildings — Code of practice*.

Other parts in this series, PD 7974, include:

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

Part 5: Fire and rescue service intervention (Sub-system 5)

Part 6: Human factors: Life safety strategies – Occupant evacuation, behaviour and condition (Sub-system 6)

Part 7: Probabilistic risk assessment

Information about this document

This is a full revision of the document, and introduces the following principal changes:

- consolidation of all principal design fire development considerations into sub-system 1 which are subsequently called upon as an input for other sub-systems (e.g. 2 and 3);
- greater clarity regarding the phases of fire development;
- design correlations that logically follow a conventional fire timeline of events;
- where practicable, explicit acknowledgements of the inherent assumptions underpinning design correlations;
- further generalization of design approximations for growing fires;
- revised correlations with respect to ignition, heat flux from localized fires, pre-flashover compartment fire temperatures, and sprinkler-controlled fires;
- the introduction of a travelling fire framework for fully developed fires that might not develop to flashover
- improved reference data for smoke and toxic gas yields; and
- removal of some reference data as it is either too generalized or out of date.

Use of this document

As a guide, this part of PD 7974 takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

This publication is not to be regarded as a British Standard.

Presentational conventions

The guidance in this Published Document is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

Contractual and legal considerations

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

Compliance with a Published Document cannot confer immunity from legal obligations.

Introduction

This Published Document is one of a series of documents intended to support BS 7974. The Code of Practice provides a framework for developing a rational methodology for design using an alternative fire safety engineering approach through the application of scientific and engineering principles to the protection of people, property and the environment from fire.

The Published Documents (PDs) contain guidance and information on how to undertake quantitative and detailed analysis of specific aspects of the design. They are a summary of the "state of the art" and it is intended that they be updated as new theories, calculation methods and/or data become available. They do not preclude the use of appropriate methods and data from other sources.

BS 7974 can be used to define one or more fire safety design issues to be addressed using fire safety engineering. The appropriate PDs can then be used to set specific acceptance criteria and/or undertake detailed analysis.

An alternative holistic fire safety engineering (FSE) approach can often provide a more fundamental, bespoke, safer and/or economical solution than more generic approaches to fire safety. It might, in some cases, be the only viable means of achieving a satisfactory standard of fire safety, where buildings are neither common nor straightforward.

Alternative fire safety engineering approaches can have many benefits. The use of BS 7974 is intended to facilitate the practice of fire safety engineering and in particular it:

- provides the designer with a disciplined approach to fire safety design;
- allows safety levels of specific designs to be assessed, and quantified where appropriate;
- allows the safety levels for alternative designs to be compared;
- provides a basis for selection of appropriate fire protection systems;
- provides opportunities for innovative design;
- provides information on the management of fire safety for a building.

Fire is a complex phenomenon and there are still gaps in the available knowledge. When used by suitably qualified persons experienced in fire safety engineering (see **4.2**), this series of Published Documents might provide a means of establishing adequate levels of fire safety economically without imposing unnecessary constraints on aspects of building design.

1 Scope

This Published Document provides guidance on evaluating fire growth and/or size within the enclosure of fire origin, as well as enclosures to which the fire has subsequently spread.

The characteristics and products of the design fire for any particular scenario are influenced by a number of factors, including building design, environmental influences, potential ignition sources and location, types of combustible materials, distribution and arrangement of combustible materials, ventilation conditions and other events occurring during the fire.

The determination of the characteristics and products of the design fire from ignition through to decay is used by other sub-systems.

2 Normative references

There are no normative references in this document.

