



BSI Standards Publication

Smoke and heat control systems

Part 13: Pressure differential systems (PDS) — Design and calculation methods, installation, acceptance testing, routine testing and maintenance

This is a preview of "BS EN 12101-13:2022". [Click here to purchase the full version from the ANSI store.](#)

National foreword

This British Standard is the UK implementation of EN 12101-13:2022. Together with BS EN 12101-6:2022, it supersedes BS EN 12101-6:2005, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee FSH/25, Smoke, heat control systems and components.

A list of organizations represented on this committee can be obtained on request to its committee manager.

The UK committee emphasizes that BS EN 12101-13:2022 deals with the design of systems to be used in specific applications described therein. Both BS EN 12101-6:2022 and BS EN 12101-13:2022 should be considered in their entirety and only for the types of applications described. No clauses, designs or values in whole or in part should be used in isolation or as justification for system designs that are outside the scope of these standards.

This standard is not intended for corridor/lobby extract or Mechanical Smoke Ventilation Systems (MSVS). These systems generally create a lower pressure in protected spaces, such as lobbies and corridors and are outside of the scope of this standard.

It is the opinion of the UK committee that BS EN 12101-6:2005 contained useful guidance for applications commonly used in the UK. National Annex NA identifies these applications along with explanations of how BS EN 12101-13:2022 can be used to achieve similar design intent. While National Annex NA is informative, the UK committee believes UK users would benefit from referring to the Annex.

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Published by BSI Standards Limited 2022

ISBN 978 0 539 24261 4

ICS 13.220.99

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2022.

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Amendments/corrigenda issued since publication

Date	Text affected
31 October 2022	Correction to national foreword

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EUROPÄISCHE NORM

April 2022

ICS 13.220.99

Supersedes EN 12101-6:2005, EN 12101-6:2005/AC:2006

English Version

Smoke and heat control systems - Part 13: Pressure differential systems (PDS) - Design and calculation methods, installation, acceptance testing, routine testing and maintenance

Systèmes pour le contrôle des fumées et de la chaleur -
Partie 13 : Systèmes à différentiel de pression (SDP) -
Méthodes de conception et de calcul, installation, essais
de réception, essais périodiques et maintenance

Rauch- und Wärmefreihaltung - Teil 13:
Differenzdrucksysteme - Rauchschutz-Druckanlagen
(RDA) - Planung, Bemessung, Einbau,
Abnahmeprüfung, Funktions-Tests, Betrieb und
Instandhaltung

This European Standard was approved by CEN on 14 February 2022.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents		Page
European foreword		4
Introduction		5
1	Scope	6
2	Normative references	6
3	Terms and definitions	7
4	Design objectives	8
4.1	General	8
4.2	Protection of means of escape	8
4.3	Protection of firefighting routes	8
4.4	Property protection	8
4.5	Additional functions	8
5	Normative requirements	9
5.1	General	9
5.2	Application of Class 1 and Class 2	10
5.3	Response delay – time period definitions	10
5.4	Door opening force	12
5.5	Pressure differential systems	12
5.6	Pressurization systems	14
6	Interaction	29
6.1	General	29
6.2	Requirements	30
7	Equipment and components – specification and installation	31
7.1	General	31
7.2	Software based fire control systems	32
7.3	Automatic control of a PDS	32
7.4	Manual control of a PDS	32
7.5	Description of components and their requirements	34
8	Testing and measuring	43
8.1	General	43
8.2	Preconditions	43
8.3	Tests	44
8.4	Minimum number of tests; floor positions and other information	45
8.5	Test procedures	47
9	Additional considerations for design and testing	54
9.1	General	54
9.2	Parameters for consideration during design and performance testing	54
10	Documentation	55
10.1	General	55
10.2	Requirements by the authorities having jurisdiction	55
10.3	Technical description of the PDS	55
10.4	“As built/installed” information	55
10.5	Controls	56
10.6	Components list (inventory) and datasheets	56

This is a preview of "BS EN 12101-13:2022". [Click here to purchase the full version from the ANSI store.](#)

10.7	Completion certification	57
11	Testing and Maintenance, design changes, faults, routine testing and operation	57
11.1	General	57
11.2	Records	57
11.3	Building design changes	58
11.4	Faults	58
11.5	Routine testing	59
11.6	Maintenance	61
Annex A (informative)	Calculation procedures	62
Annex B (informative)	Design example and possible calculation procedures	81
Annex C (informative)	Further information on wind and temperature effects	91
Annex D (informative)	Guidance for PDS design for buildings taller than 60 m	94
Annex E (informative)	(Example) PDS drawing	99
Annex F (informative)	Documentation and responsibilities in the process	100
Annex G (informative)	(Example) PDS concept report	103
Annex H (informative)	(Example) PDS test report	106
Annex I (informative)	Risk assessment – List of potential disturbances	114
Annex J (informative)	Practical suggestions for successful commissioning	116
Annex K (normative)	Labelling	117
Bibliography	118

European foreword

This document (EN 12101-13:2022) has been prepared by Technical Committee CEN/TC 191 "Fixed fire-fighting systems", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2022, and conflicting national standards shall be withdrawn at the latest by October 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document together with EN 12101-6 supersedes EN 12101-6:2005 which will be withdrawn.

This document has the general title "Smoke and heat control systems" and consists of the following parts:

- Part 1: *Specification for smoke barriers;*
- Part 2: *Specification for natural smoke and heat exhaust ventilators;*
- Part 3: *Specification for powered smoke and heat exhaust ventilators;*
- Part 4: *Installed SHEVS systems for smoke and heat ventilation (published as CEN/TR 12101-4);*
- Part 5: *Design and calculation for smoke and heat exhaust ventilation systems using a steady-state fire (published as CEN/TR 12101-5);*
- Part 6: *Specification for pressure differential systems;*
- Part 7: *Smoke control duct sections;*
- Part 8: *Specification for smoke control dampers;*
- Part 10: *Power supplies;*
- Part 11: *Design, installation and commissioning requirements for enclosed car parks;*
- Part 12: *Design and calculation for smoke and heat exhaust ventilation systems using a time dependent fire;*
- Part 13: *Pressure differential systems (PDS) - Design and calculation methods, installation, acceptance testing, routine testing and maintenance.*

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

This document covers information and requirements on the design and calculation methods, installation, acceptance testing, routine testing and maintenance of Pressure Differential Systems (PDS). PDSs are installed in buildings to prevent smoke in hazardous amounts from entering into protected spaces via leakage paths through physical barriers (e.g. cracks around closed doors) or open doors by using pressure differentials.

The requirements and test methods for kits used in PDS are published in EN 12101-6. For certain components as part of the kits, additional tests must be carried out in accordance with Part 6 prior to the kit test.

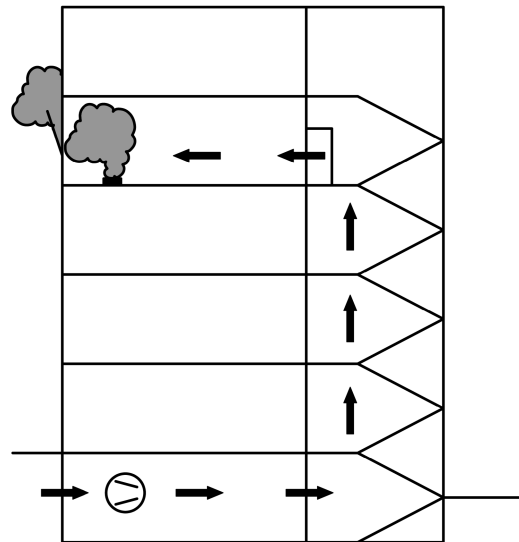


Figure 1 — Pressurization (General)

Pressure differential systems provide a means of maintaining tenable conditions in protected spaces, that are required to be kept free of smoke – e.g. escape routes, firefighting access routes, firefighting lift shafts, lobbies, staircases, and other spaces. It is necessary to determine where the fresh air supply for the PDS is to be introduced into a building as well as where that air and smoke will leave the building and what paths it will follow in the process, including during firefighting (e.g. with fire compartment door open) and in the event of likely events such as window failure.

By means of a PDS, a positive pressure difference is always achieved between the protected space and the unprotected space. This is achieved by pressurizing the protected space(s) (see Figure 1).

The aim therefore is to establish a pressure gradient from the protected space to the unprotected space while the doors are closed and an airflow from the protected space via the unprotected space to outside when specific doors are open.

The figures that accompany the text in this document are informative and are intended for clarification purposes only.

It is recommended that the designer should discuss the design and evacuation concept, including safety targets, with the authorities having jurisdiction, early in the building design process.

NOTE 1 From experience gained since EN 12101-6 was first published, this document now simply prescribes two systems only and these are specifically described in terms of the closed-door differential pressure and the open-door velocity only. Consequently the 10 Pa previously required in some scenarios is now withdrawn.

NOTE 2 It is recommended that an engineered solution for a PDS should adopt the functional requirements set out in this document where appropriate, inclusive of Table 1 as a minimum, in the absence of any national requirements.

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1 Scope

This document gives calculation methods, guidance and requirements for the design, installation, acceptance testing, routine testing and maintenance for pressure differential systems (PDS).

PDSs are designed to hold back smoke at a leaky physical barrier in a building, such as a door (either open or closed) or other similarly restricted openings and to keep tenable conditions in escape and access routes depending on the application.

It covers systems intended to protect means of escape e.g. staircases, corridors, lobbies, as well as systems intended to provide a protected firefighting space (bridgehead) for the fire services.

It provides details on the critical features and relevant procedures for the installation.

It describes the commissioning procedures and acceptance testing criteria required to confirm that the calculated design is achieved in the building.

This document gives rules, requirements and procedures to design PDS for buildings up to 60 m.

For buildings taller than 60 m the same requirements are given (e.g. Table 1), but additional methods of calculation and verification are necessary. Requirements for such methods and verification are given in Annex D, but the methods fall outside the scope of this document [e.g. Additional mathematical analysis and/or Computational Fluid Dynamics (CFD)].

Routine testing and maintenance requirements are also defined in this document.

In the absence of national requirements and under expected ambient and outside conditions, the requirements in Table 1 are fulfilled by the PDS.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 12101-2, *Smoke and heat control systems - Part 2: Natural smoke and heat exhaust ventilators*

EN 12101-3, *Smoke and heat control systems - Part 3: Specification for powered smoke and heat control ventilators (Fans)*

EN 12101-6, *Smoke and heat control systems - Part 6: Specification for pressure differential systems - Kits*

EN 12101-7, *Smoke and heat control systems - Part 7: Smoke duct sections*

EN 12101-8, *Smoke and heat control systems - Part 8: Smoke control dampers*

EN 12101-10, *Smoke and heat control systems - Part 10: Power supplies*

EN 13501-4, *Fire classification of construction products and building elements - Part 4: Classification using data from fire resistance tests on components of smoke control systems*

ISO 21927-9, *Smoke and heat control systems - Part 9: Specification for control equipment*

EN 16763, *Services for fire safety systems and security systems*

EN 12259-1, *Fixed firefighting systems - Components for sprinkler and water spray systems - Part 1: Sprinklers*