

ILNAS

Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 12101-13:2022

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

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,

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

04/2022



National Foreword

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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.

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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.

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

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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of an identical text or by endorsement, at the latest by October 2022, and conflicting national standards shall be withdrawn at the latest by October 2022.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.

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.

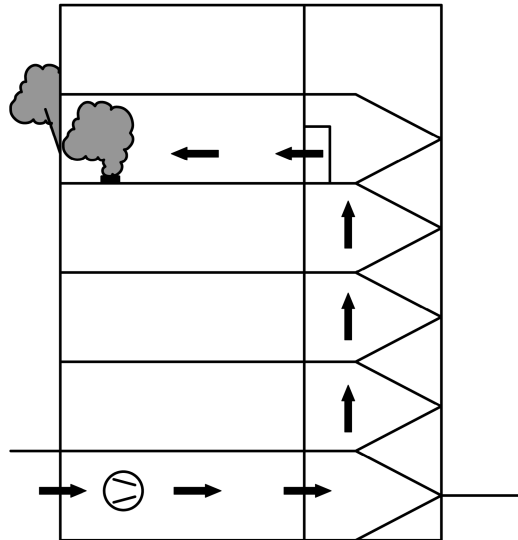


Figure 1 — Pressurization (General)

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.

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*

EN 54 (all parts), *Fire detection and fire alarm systems*

EN 60770-1, *Transmitters for use in industrial-process control systems - Part 1: Methods for performance evaluation*

EN 60751, *Industrial platinum resistance thermometers and platinum temperature sensors*

3 Terms and definitions

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

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

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

accommodation

any part of the construction works which is not part of the protected escape route

3.2

air inlet

connection from the outside of the building to allow air entry

3.3

authorities

authorities having jurisdiction

AHJ

organizations, officers or individuals responsible for approving pressure differential systems, e.g. the local/national fire and building control authorities having jurisdiction, or other approved third parties

3.4

barometric relief damper

damper which opens automatically without a controlled actuator at a specific pressure to allow pressure relief by providing flow of air to outside

3.5

control panel

multi-operational device to activate and/or control a PDS.

3.6

fire compartment

space (room or set of rooms) contained by boundaries with classified fire resistance

3.7

pressurized space

space (e.g. lift shaft, staircase, lobby, corridor, or other compartment) in which the air pressure is maintained at a higher level than that in the space where a fire is located

3.8

protected space

space where the design prevents smoke entry