ILNAS

Institut luxembourgeois de la normalisation
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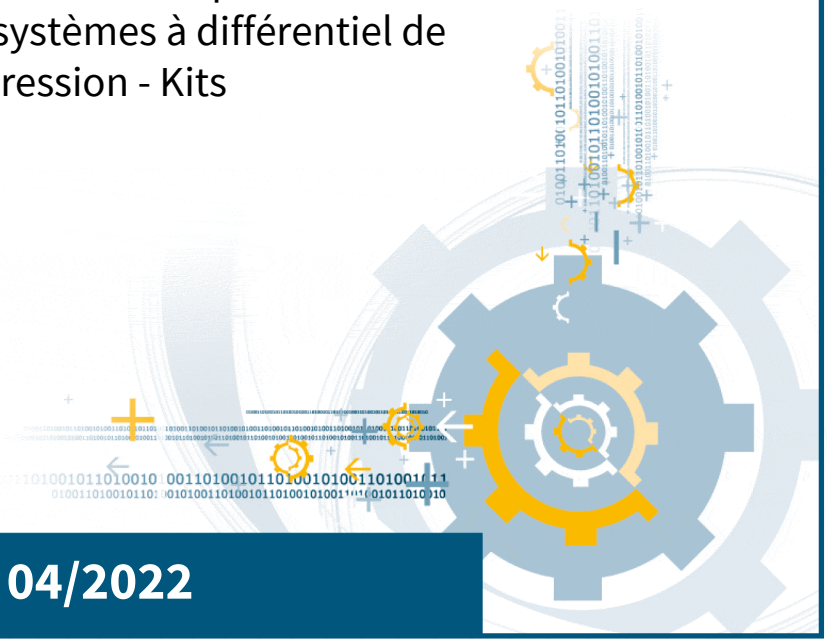
ILNAS-EN 12101-6:2022

Smoke and heat control systems - Part 6: Specification for pressure differential systems - Kits

Rauch- und Wärmefreihaltung - Teil 6: Festlegungen für Differenzdrucksysteme - Bausätze

Systèmes pour le contrôle des fumées et de la chaleur - Partie 6 : Spécifications relatives aux systèmes à différentiel de pression - Kits



04/2022

National Foreword

This European Standard EN 12101-6:2022 was adopted as Luxembourgish Standard ILNAS-EN 12101-6:2022.

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EUROPEAN STANDARD
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English Version

Smoke and heat control systems - Part 6: Specification for pressure differential systems - Kits

Systèmes pour le contrôle des fumées et de la chaleur - Partie 6 : Spécifications relatives aux systèmes à différentiel de pression - Kits

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

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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.

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European foreword

This document (EN 12101-6:2022) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting 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of an identical text or by endorsement, at the latest by October 2022, and conflicting national standards shall be withdrawn at the latest by January 2024.

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 supersedes EN 12101-6:2005.

This document is to be read in conjunction with EN 12101-13.

The EN12101 series has the general title “Smoke and heat control systems” and currently consists of the following parts, which may be expanded in the future:

— Part 1: *Specification for smoke barriers*;

— Part 2: *Natural smoke and heat exhaust ventilators*;

— Part 3: *Specification for powered smoke and heat exhaust ventilators (fans)*;

— 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 – Kits*;

— Part 7: *Smoke duct sections*;

— Part 8: *Smoke control dampers*;

— Part 10: *Power supplies*;

— Part 13: *Pressure differential systems (PDS) design and calculation methods, acceptance testing, maintenance and routine testing of installation.*

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

Objectives of pressure differential systems

Pressure differential systems offer the facility of maintaining tenable conditions in protected spaces, for example: escape routes, firefighting access routes, firefighting lift shafts, lobbies, staircases, and other spaces that require being kept free of smoke. It is necessary to determine not only where the fresh air supply for pressurization is to be introduced into a building, but also where that air and smoke will leave the building and what paths it will follow in the process.

The aim therefore is to establish a pressure gradient from the protected space to the unprotected space (fire room) while the doors are closed, and an airflow while the doors are open.

Smoke control methods

The effect of the air movement forces, described above, are to create pressure differentials across the partitions, walls and floors and can cause smoke to spread to spaces remote from the fire source. The technique most commonly used to limit the degree of smoke spread, or to control its effects, is pressurization.

System components

A typical pressure differential system will comprise three basic components:

a) components for providing supply air and to extract air;

b) components for controlling the pressure difference between the space with higher pressure and the adjoining space with lower pressure;

c) components for releasing air flowing through the door between the space with higher pressure to those with lower pressure (to prevent unwanted pressure build up in this space).

Installations of pressure differential systems (PDS) may comprise:

— fans (temperature rated) if necessary;

— air or smoke control ducts to provide a passageway for the transmission of air or smoke;

— ventilation openings to provide leakage of air (including dampers, active or passive controlled);

— power supply;

— connecting cables;

— means of activation;

— means of pressure control;

— control panel;

— smoke control dampers in branches from the ductwork where the ductwork is situated outside the protected enclosure;

— grilles and diffusers;

— door closers.

The design of pressure differential systems is covered in EN 12101-13.

1 Scope

This document applies to pressure differential system kits and components, positioned on the market and intended to operate as part of a pressure differential system. The purpose of a pressure differential system is to prevent protected spaces from smoke spread by using pressure difference and airflow. This document specifies characteristics and test methods for components and kits for pressure differential systems to produce and control the required pressure differential and airflow between protected and unprotected space.

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 1363-1, *Fire resistance tests - Part 1: General requirements*

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

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*

EN ISO 13943, *Fire safety - Vocabulary (ISO 13943)*

EN 1366-8, *Fire resistance tests for service installations - Part 8: Smoke extraction ducts*

EN 1366-9, *Fire resistance tests for service installations - Part 9: Single compartment smoke extraction ducts*

EN 1366-10, *Fire resistance tests for service installations - Part 10: Smoke control dampers*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms, definitions and abbreviated terms

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

3.1.1
air release
means by which pressurizing air or a mixture of pressurizing air and smoke is able to escape from the accommodation or other unpressurized space to outside the building

3.1.2
control panel
multi-operational device to activate and/or control a PDS

3.1.3
depressurization
smoke control using pressure differentials between the protected space and the unprotected space with a lower pressure in the unprotected space

3.1.4
pressure differential system
PDS
combination of at least one kit and additional components intended to produce pressure differential and airflow between protected and unprotected spaces

3.1.5
pressurization
smoke control using pressure differentials between the protected space and the unprotected space with a higher pressure in the protected space

3.1.6
pressure differential system (PDS)
combination of at least two components which are necessary to produce and control the required pressure differential and airflow-between protected and unprotected space

Note 1 to entry: The type of kit is dictated by the PDS design and objectives. Schematic overviews of different types are given in Annex A.

3.1.7
active control
pressure control actuated from measured pressure and using external energy (e.g. motor driven damper, frequency inverter-controlled fans, etc.)

3.1.8
barometric relief damper
damper activated by local pressure difference that opens to permit airflow and therefore controls the pressure

3.1.9
activation signal
signal to initiate from stand-by to the active mode of the pressure differential system

3.2 Symbols

The symbols and abbreviations below are used in the document:

Symbol	Unit	Description
$\dot{V}_{ar}$	m³/h	measured air release volume flow rate from space 1 (representing the protected space in the building) to space 2 (representing the unprotected space in the building) via open air release path during the test (nominal value given by the manufacturer)
$\dot{V}_{RL}$	m³/h	required leakage flow rate if necessary for the function of the PDS kit. If the building leakages (always present) are at the same rate or larger, during the test (nominal value given by the manufacturer), the component to produce the defined leakage is part of the PDS kit under test
$\dot{V}_{TO_{ps}}$	m³/h	volume flow rate through temporary openings (e.g. open doors from staircases on different levels from fire level, open escape/exit door) in case of pressurization during the test (nominal value given by the manufacturer)
$\dot{V}_{TO_{dp}}$	m³/h	volume flow rate through temporary openings (e.g. open doors from staircases on different levels from fire level, open escape/exit door) in case of **de**pressurization during the test (nominal value given by the manufacturer)
$\dot{V}_{ex}$	m³/h	exhaust volume flow rate out of space 2 for combined systems
$\dot{V}_{rl}$	m³/h	required minimum leakage volume flow rate at nominal pressure difference Δp_{Nom}
$\dot{V}_{ar,ll}$	m³/h	lower limit of volume flow rate through air release $\dot{V}_{ar,ll} = 0,9 * \dot{V}_{ar}$
$\dot{V}_{sa}$	m³/h	supply air volume flow rate measured at inlet nozzle
$\dot{V}_{TC}$	m³/h	total controlled volume flow rate of the PDS kit as sum of flow rate air release $\dot{V}_{ar}$ + flow rate through temporary openings $\dot{V}_{TC}$ (nominal value given by the manufacturer)
$\dot{V}_{BP}$	m³/h	bypass air volume flow rate
Δp_{tr1}	Pa	pressure differential between space 1 and reference pressure (static pressure in test hall)
Δp_{tr2}	Pa	pressure differential between space 2 and reference pressure (static pressure in test hall)
Δp_{nom}	Pa	nominal pressure differential to be maintained by the PDS kit with closed air release opening and closed temporary openings (static conditions)
Δp_{ar}	Pa	pressure difference across the open-air release path
$\Delta p_{Nom,ul}$	Pa	Upper limit of nominal pressure differential $\Delta p_{Nom,ul} = 1,2^{*} \Delta P_{Nom}$