SLOVENSKI STANDARD
SIST EN 13141-7:2011

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Nadomešča:
SIST EN 13141-7:2004

Prezračevanje stavb - Preskušanje lastnosti stanovanjskih prezračevalnih komponent/proizvodov - 7. del: Preskušanje lastnosti mehanskih dovodnih in odvodnih enot (vključno z enotami za vračanje toplote) za mehanske prezračevalne sisteme za enodružinska stanovanja

Ventilation for buildings - Performance testing of components/products for residential ventilation - Part 7: Performance testing of a mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for single family dwellings

Lüftung von Gebäuden - Leistungsprüfungen von Bauteilen/Produkten für die Lüftng von Wohnungen - Teil 7: Leistungsprüfung von mecanischen Zuluft- und Ablufteinheiten (einschließlich Wärmerückgewinnung) für mecanische Lüftungsanlagen in Einfamilienhäusern

Ventilation dans les bâtiments - Essais de performance des composants/produits pour la ventilation des logements - Partie 7: Essais de performance des bouches d'alimentation et d'évacuation (y compris la récupération de chaleur) pour les systèmes de ventilation mécaniques prévus pour des logements individuels

Ta slovenski standard je istoveten z: **EN 13141-7:2010**

ICS:

91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning

SIST EN 13141-7:2011 **en,fr**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13141-7

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ICS 91.140.30

Supersedes EN 13141-7:2004

English Version

Ventilation for buildings - Performance testing of components/products for residential ventilation - Part 7: Performance testing of a mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for single family dwellings

Ventilation des bâtiments - Essais de performance des composants/produits pour la ventilation des logements - Partie 7: Essais de performance des centrales double flux (y compris la récupération de chaleur) pour les systèmes de ventilation mécaniques prévus pour des logements individuels

Lüftung von Gebäuden - Leistungsprüfungen von Bauteilen/Produkten für die Lüftung von Wohnungen - Teil 7: Leistungsprüfung von mechanischen Zuluft- und Ablufteinheiten (einschließlich Wärmerückgewinnung) für mechanische Lüftungsanlagen in Wohneinheiten (Wohnung oder Einfamilienhaus)

This European Standard was approved by CEN on 25 September 2010.

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 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 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

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Contents

Foreword

This document (EN 13141-7:2010) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, 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 May 2011, and conflicting national standards shall be withdrawn at the latest by May 2011.

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

This document supersedes EN 13141-7:2004.

Compared to the 2004 version, changes have been made to the following (sub)clauses, tables and annexes:

— modification of the test temperatures to be similar to those of heat pump;

— possibility of measuring supply and exhaust ventilation and heat pump;

— suppression of reference to EN 308 for heat exchangers particular test conditions, this standard define its own conditions;

— introduction of tracer gas method for leakages;

— dependence of leakages under/over pressure configurations on fan position in airflow;

— obligation of reporting the two temperature ratios (on exhaust and supply air);

— possibility of doing an optional test by measuring on the outdoor side of the building while the measure is made on the inside side of the building in the mandatory test (exhaust and supply air flow rate);

— possibility of giving humidity ratios, like for PAC, this allowed to test enthalpy heat exchangers;

— review of value for balanced mass flows at 3 %, over 3% declaration of unbalanced unit and report of the disbalance value;

— setting of the declared maximum air volume flow at 50 Pa by default in lack of other declaration;

— addition of the declared minimum air volume flow at Ptud/2 and minimum setting;

— creation of a reference point at Ptud/2 and 70 % of declared maximum air volume flow;

— correction of the temperature ratios considering flow rate ratios.

This standard is a part of a series of standards on residential ventilation. It has a parallel standard referring to the performance characteristics of the components/products for residential ventilation.

The position of this standard in the field of standards for the mechanical building services is shown in Figure 1.

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

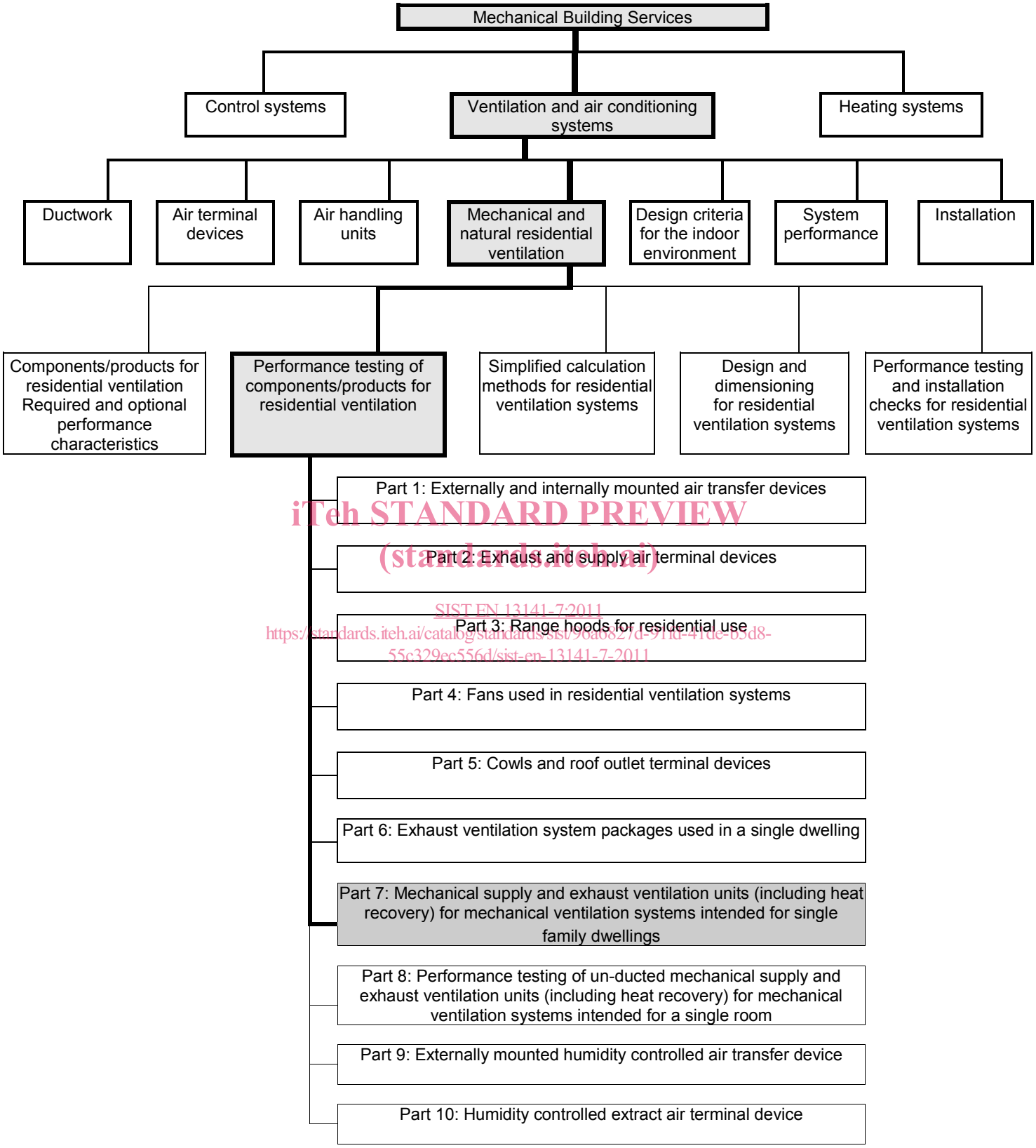

Figure 1 — Position of EN 13141-7 in the field of the mechanical building services

Introduction

This European Standard specifies methods for the performance testing of components used in residential ventilation systems to establish the performance characteristics as identified in EN 13142.

This European Standard does not contain any information on ductwork and fittings, which are covered by other European Standards.

The standard can be used for the following applications:

— laboratory testing;

— attestation purposes.

1 Scope

This part of EN 13141 specifies the laboratory test methods and test requirements for the testing of aerodynamic, thermal and acoustic performance, and the electrical performance characteristic of a mechanical supply and exhaust ventilation units used in a single dwelling.

It covers unit that contain at least, within one or more casing:

— supply and exhaust air fans;

— air filters;

— air-to-air heat exchanger and/or Extract Air-to-Outdoor Air heat pump for extract air heat recovery;

— control system.

Such unit can be provided in more than one assembly, the separate assemblies of which are designed to be used together.

The different possible arrangements of heat recovery heat exchangers and/or heat pumps are described in Annex A.

This standard does not deal with non-ducted units or reciprocating heat exchangers.

This standard does not deal with units that supply several dwellings.

This standard does not cover ventilation systems that may also provide water space heating and hot water.

This standard does not cover units including combustion engine driven compression heat pumps and absorption heat pumps.

Electrical safety requirements are given in EN 60335-2-40 and EN 60335-2-80.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 306, *Heat exchangers — Methods of measuring the parameters necessary for establishing the performance*

EN 12792:2003, *Ventilation for buildings — Symbols, terminology and graphical symbols*

EN 13141-4, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 4: Fans used in residential ventilation systems*

EN 14511-2, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Part 2: Test conditions*

EN 14511-3, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Part 3: Test methods*

EN 14511-4, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Part 4: Requirements*

EN ISO 3741, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Precision methods for reverberation rooms (ISO 3741:1999, including Cor 1:2001)*

EN ISO 3743-1, *Acoustics — Determination of sound power levels of noise sources — Engineering methods for small, movable sources in reverberant fields — Part 1: Comparison method for hard-walled test rooms (ISO 3743-1:1994)*

EN ISO 3743-2, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields — Part 2: Methods for special reverberation test rooms (ISO 3743-2:1994)*

EN ISO 3744, *Acoustics — Determination of sound power levels of noise sources using sound pressure – Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)*

EN ISO 3745, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Precision methods for anechoic and semi-anechoic rooms (ISO 3745:2003)*

EN ISO 5135, *Acoustics — Determination of sound power levels of noise from air-terminal devices, air-terminal units, dampers and valves by measurement in a reverberation room (ISO 5135:1997)*

EN ISO 5136, *Acoustics — Determination of sound power radiated into a duct by fans and other air-moving devices — In-duct method (ISO 5136:2003)*

EN ISO 9614-1, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points (ISO 9614-1:1993)*

EN ISO 9614-2, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning (ISO 9614-2:1996)*

3 Terms, definitions and classification

For the purposes of this document, the terms and definitions given in EN 12792:2003 and the following apply.

3.1 Terms and definitions

3.1.1
external leakage
leakage to or from the air flowing inside the casing of the unit to or from the surrounding air

3.1.2
internal leakage
leakage inside the unit between the exhaust and the supply air flows

3.1.3
filter bypass leakage
air flow around filter cells

3.1.4
declared maximum air volume flow
air volume flow corresponding to the declared total pressure of the unit at the maximum setting for standard air conditions (20 °C, 101325 Pa)

3.1.5
declared minimum air volume flow
air volume flow corresponding to Ptud/2 Pa at the minimum setting for standard air conditions (20 °C, 101325 Pa)

3.1.6
Ptud/2
declared total pressure difference between the outlet and the inlet of the unit

3.1.7
temperature ratio
temperature difference between inlet and outlet of one of the air flows divided by the temperature difference between the inlets of both air flows

3.1.8
electric power input
average electrical power input to the equipment within a defined interval of time, in watts, obtained from:

- the power input of the fans;
- the power input for operation of any compressor(s) and any power input for defrosting, excluding additional electrical heating devices not used for defrosting;
- the power input of all control and safety devices of the equipment

3.1.9
test voltage
voltage to be used for supplying the components during the testing

3.1.10
humidity ratio
difference of water content between inlet and outlet of one of the air flows divided by the difference of water content between the inlets of both air flows

3.1.11
recirculation fraction (R)
mass fraction of the discharged air to a zone (see Figure 2: from key 4 (extract) to key 5 (supply)) that is actually recirculated air from the same zone, due to internal leakage, external casing leakage and local short-circuiting

3.2 Categories of heat exchangers

Category I: Recuperative heat exchangers (e.g. air-to-air plate or tube heat exchanger)

Recuperative heat exchangers are designed to transfer thermal energy (sensible or total) from one air stream to another without moving parts. Heat transfer surfaces are in form of plates or tubes. This heat exchanger may have parallel flow, cross flow or counterflow construction or a combination of these. Plate and tube heat exchangers with vapour diffusion (for instance cellulose) are also in this category.

Category II: Regenerative heat exchangers (e.g. rotary or reciprocating heat exchanger)

A rotary heat exchanger is a device incorporating a rotating “thermal wheel” for the purpose of transferring energy (sensible or total) from one air stream to the other. It incorporates material allowing latent heat transfer, a drive mechanism, a casing or frame, and includes any seals which are provided to retard bypassing and leakage or air from one air stream to the other. Regenerative heat exchangers have varying degrees of moisture recovery, depending on the material used (e.g. "condensation rotor/non hygroscopic rotor", "hygroscopic rotor" and 'sorption rotor" heat exchangers).

4 Symbols and abbreviations

For the purposes of this document, the symbols and abbreviations given in EN 12792:2003 and the following apply.

c	Concentration of tracer gas	ppm
D	Diameter of the measurement duct (see Figure 2)	in m
D_{h1}, D_{h2}	Hydraulic diameters of the connecting duct (see Figure 3)	in m
L_W	Sound power level	in dB
L_{WA}	A-weighted sound power level	in dB
p_s	Static pressure	In Pa
P_E	Effective power input	in W
p_{tU}	Total pressure difference between the outlet and the inlet of the unit	in Pa
p_{tUd}	Declared total pressure difference between the outlet and the inlet of the unit	in Pa
q_m	Mass air flow rate	in $kg.s^{-1}$ or $g.s^{-1}$
q_v	Volume flow rate	in $m^3.s^{-1}$ or $l.s^{-1}$
q_{vn}	Nominal air volume flow	in $m^3.s^{-1}$ or $l.s^{-1}$
q_{vd}	Declared maximum air volume flow rate	in $m^3.s^{-1}$ or $l.s^{-1}$
q_{ve}	External leakage air volume flow rate	in $m^3.s^{-1}$ or $l.s^{-1}$
q_{vi}	Internal leakage air volume flow rate	in $m^3.s^{-1}$ or $l.s^{-1}$
R	Recirculation fraction, measured with tracer gas test.	-
V	Air velocity in the measurement duct (see Figure 3)	in $m.s^{-1}$
θ	Air temperature	in °C
x	water content	in kg water / kg dry air
21	Outdoor air (see Figure 2)	
22	Supply air (see Figure 2)	
11	Extract air (see Figure 2)	
12	Exhaust air (see Figure 2)	
$\eta_{\theta, ex}$	Temperature ratio of the unit on exhaust air side	
$\eta_{\theta, su}$	Temperature ratio of the unit on supply air side	
$\eta_{x, ex}$	Humidity ratio of the unit on exhaust air side	
$\eta_{x, su}$	Humidity ratio of the unit on supply air side	

5 Requirements

To set the declared maximum air volume flow, the declared total pressure shall correspond to 100 Pa, or to a lower total pressure if the intended use declared by the manufacturer is less than 100 Pa.

The declared maximum air volume flow shall be equal to the smaller if the supply and extract air volume flows are different.

In addition, to assess correctly the thermal performance, aerodynamic characteristics, including all leakages, shall be tested before or together with any thermal characteristics testing (see 6.3).

Aerodynamic characteristics (see 6.2) shall include three characteristics listed below:

— external leakage or total recirculated fraction in supply air;

— internal leakage or recirculated fraction from extract to supply air or total recirculated fraction in supply air;

— air flow/pressure curve;

Other characteristics such as filter bypass leakage are optional.

The tests for air flow/pressure curve and thermal performances shall not be made because of measurement uncertainty when leakages according to 6.2.1 are too high. The unit shall have the leakage class specified in Table 1.

Table 1 — Classification requirements for thermal performance

	Supply fan upstream and exhaust fan downstream of the heat exchanger or Exhaust fan upstream and supply fan downstream of the heat exchanger[a]	Other fan positions
required class to allow measurements	Class A1, A2, B1, B2, C1, C2	All classified units
[a] This configuration is not recommended for good Indoor air quality.		

The manufacturer shall declare:

— maximum air volume flow;

— maximum disbalance air flow;

— declared total pressure difference of the unit;

— minimum air volume flow;

— minimum outside operation temperature;

— filter classes supply and exhaust air;

— balancing of air volume flows;

— presence of by-pass and its control;

— frost protection function and control (for cold climate test).

6 Test methods

6.1 General

Tests shall be conducted with a unit containing all components as supplied for intended use, and installed according to the manufacturer's instructions.

For units which are intended to be used in dwellings of different sizes (e.g. 4, 5 or 6 rooms), the tests shall be made in the “maximum” configuration (i.e. 6 rooms).