SLOVENSKI STANDARD
SIST EN 1397:2015

01-oktober-2015

Nadomešča:
SIST EN 1397:1999

Prenosniki toplote - Ventilatorski konvektorji voda/zrak - Postopki preskušanja za ugotavljanje tehničnih karakteristik

Heat exchangers - Hydronic room fan coil units - Test procedures for establishing the performance

Wärmeübertrager - Wasser-Luft-Ventilatorkonvektoren - Prüfverfahren zur Leistungsfeststellung

Échangeurs thermiques - Ventilo-convecteurs à eau - Procédures d'essai pour la détermination des performances

Ta slovenski standard je istoveten z: **EN 1397:2015**

ICS:

27.060.30	Grelniki vode in prenosniki toplote	Boilers and heat exchangers

SIST EN 1397:2015 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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Supersedes EN 1397:1998

English Version

Heat exchangers - Hydronic room fan coil units - Test procedures for establishing the performance

Échangeurs thermiques - Ventilo-convecteurs à eau - Procédures d'essai pour la détermination des performances

Wärmeübertrager - Wasser-Luft-Ventilatorkonvektoren - Prüfverfahren zur Leistungsfeststellung

This European Standard was approved by CEN on 3 July 2015.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 1397:2015) has been prepared by Technical Committee CEN/TC 113 “Heat pumps and air conditioning units”, the secretariat of which is held by AENOR.

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of an identical text or by endorsement, at the latest by February 2016 and conflicting national standards shall be withdrawn at the latest by February 2016.

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 1397:1998.

The main modifications with regard to the previous edition include:

— modification of the scope, with the inclusion of ducted units < 120 Pa;

— revision of test conditions and technical requirements to be consistence with CEN/TC 113 standards;

— revision of test methods;

— addition of an informative annex for measurement of the inlet air flow rate for non-ducted units;

— deletion of the clause about sound power level measurement that will be dealt with in EN 16583.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard applies to hydronic fan coil units (FCU) as factory-made single assemblies which provide the functions of cooling and/or heating but do not include the source of cooling or heating.

This European Standard covers both air free delivery and air ducted units with a maximum external static pressure due to duct resistance of 120 Pa max.

This European Standard applies to all types of fan speed control of a fan coil unit (variable speed, multispeed).

This European Standard deals with the cooling and heating functions of the FCU considered as an emitter for cooling/heating of a room/space. It does not cover any ventilation function of the unit.

If the FCU can also provide fresh air, this function is not considered and the fresh air inlet closed during testing.

This European Standard provides a method for the determination of the thermal performance of fan coil units in standard conditions, for the use with hot or chilled water or water mixtures. The test procedures given in this standard may additionally be used for determining performance at other conditions.

It also provides the method for the determination of the air flow rate supplied by the fan coil unit.

This standard does not cover the rating of heating or cooling from direct expansion coils or heating from electric resistance elements.

The standard does not cover acoustic performance of fan coil units which is dealt with in EN 16583.

It is not the purpose of this standard to specify the tests used for production or field testing.

NOTE For the purpose of remaining clauses, the term “unit” is used to mean “fan coil unit” as defined in 3.1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5801, *Industrial fans — Performance testing using standardized airways*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
hydronic fan-coil unit
factory-made single assembly which provides one or more of the functions of forced circulation of air, heating, cooling, dehumidification and filtering of air, but which does not include the source of heating or cooling

Note 1 to entry: This device includes at least a liquid-to-air heat exchanger and a fan, and may be designed for free or ducted intake air and/or for free or ducted delivery of supply air.

3.2
heating capacity
total heat added to the air by the unit

3.3
total cooling capacity
total heat removed from the air by the unit which is the sum of the sensible and latent cooling capacities

3.4
sensible cooling capacity
heat which is removed from the air by means of a dry-bulb temperature drop

3.5
latent cooling capacity
heat which is removed from the air by condensation of water vapour on the cooling coil

3.6
total electric power input
total electric power absorbed by the unit, including fan(s) and auxiliary devices but excluding any electrical resistance heater

3.7
2-pipe fan coil unit
fan coil unit having a single coil, one supply pipe, supplying either cold or hot water to the unit, and one return pipe

Note 1 to entry: The fan coil unit can include an electrical resistance for heating purpose.

3.8
4-pipe fan coil unit
fan coil unit having one coil with two independent water circuits for cooling and heating, or two independent cooling/heating coils

3.9
standard rating condition
mandatory condition that is used for comparison purposes

3.10
application rating condition
optional rating condition which provides additional information on the performance of the unit

3.11
standard fan speed
fan speed setting declared by the manufacturer and used for setting the air flow rate conditions of ducted units

Note 1 to entry: The fan speed setting can be declared by the manufacturer as a certain wiring, a switch position or a steering voltage.

3.12
external static pressure
positive pressure difference measured between the air outlet and inlet sections of the unit

3.13
liquid pressure drop
negative pressure difference measured between the outlet and inlet connections of the liquid circuit of the unit

4 Designation of fan coil units

Fan coil units can be ducted or non-ducted. They can be standing on the floor, hung on the wall, or fitted into the ceiling or floor, with the inlet and outlet air sections located either on the front, back, bottom or top of the unit.

Annex A provides a series of drawing schemes associated to designations to show typical existing configurations.

5 Symbols

For the purposes of this document, the symbols indicated in Table 1 apply.

Table 1 — Symbols

Symbol	Description	Unit
c_{pL}	Specific heat capacity of liquid	kJ/(kg K)
h_{L1}	Specific enthalpy of liquid at inlet connection (= $c_{pL1} \times t_{L1}$)	kJ/kg
h_{L2}	Specific enthalpy of liquid at outlet connection (= $c_{pL2} \times t_{L2}$)	kJ/kg
Δh_w	Vaporization heat of water (constant = 2460)	kJ/kg
n_1	Rotational speed of the fan at air flow test	min^{-1}
n_2	Rotational speed of the fan at capacity test	min^{-1}
P_{elec}	Total power input	W
P_{lat}	Latent cooling capacity	W
P_{sens}	Sensible cooling capacity	W
P_C	Total cooling capacity	W
P_H	Heating capacity	W
P_{atm}	Atmospheric pressure	kPa
p_A	External static pressure	Pa
q_{mA}	Mass flow rate of air	kg/s
q_{mL}	Mass flow rate of liquid	g/s
q_{mW}	Mass flow rate of condensate (air side)	g/s
t_{L1}	Liquid inlet temperature	°C
t_{L2}	Liquid outlet temperature	°C
t_A	Air inlet dry bulb temperature	°C
t_{Adp}	Air inlet dew point temperature	°C
t_{Aw}	Air inlet wet bulb temperature	°C
Δp_L	Liquid side pressure drop	kPa

6 Air flow rate test for ducted units

6.1 General conditions

The test is required to measure the outlet air flow rate of ducted units.

For non-ducted units or ducted units with a declared static pressure lower than 50 Pa at standard fan speed, the test is optional and is described in the informative Annex B.

For testing, the unit shall include an air filter but no any other accessory for air inlet or diffusion or others. Dampers for fresh air intake shall be closed.

NOTE 1 No modification such as sealing is made on the unit before testing.

If the unit includes flaps, they shall be adjusted in a fixed position according to the manufacturer instructions. If this information is not available, their position shall correspond to the maximum mechanical open position.

NOTE 2 This maximum mechanical open position might differ from the minimum airflow resistance.

6.2 Test installation

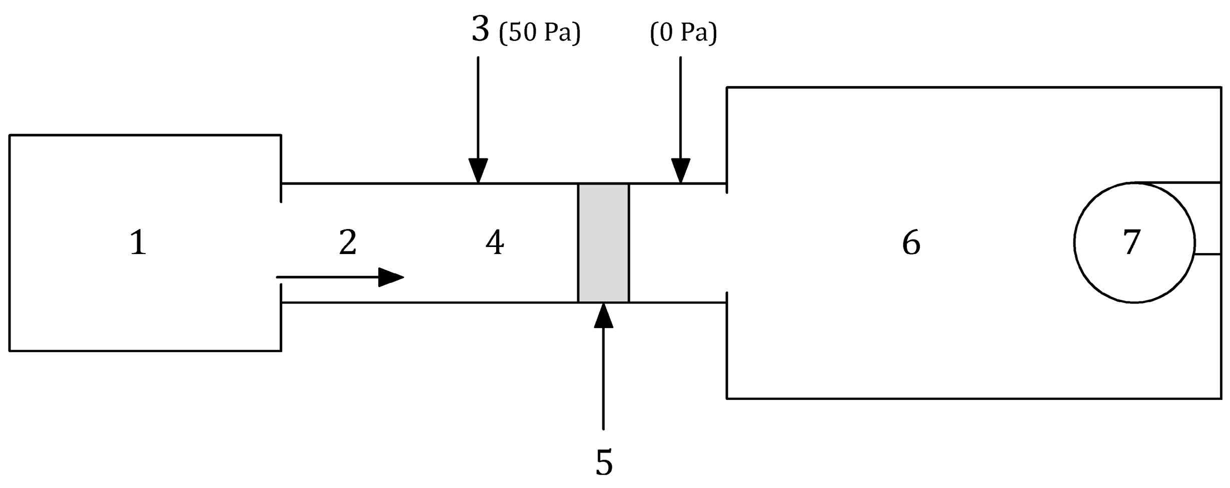
6.2.1 Outlet measurement method

The installation is described in Figure 1.

The air flow measurement equipment consists of a test chamber, an air flow measuring device and an auxiliary fan, all in accordance with ISO 5801, installation category "B".

The discharge section of the fan coil unit shall be connected to the test chamber through a ductwork having an adjustable resistance, and made in compliance with ISO 5801. In case of several outlet sections, the ductwork shall contain all of them.

For units that can be ducted at the inlet, the tests are performed without inlet duct(s).



Key

1 object under test (with 0 Pa at the inlet)

2 measured air flow

3 external static pressure

4 ductwork

5 adjustable duct resistance (e.g. damper)

6 test chamber with airflow measuring apparatus

7 fan (may be inside or outside the discharge chamber)

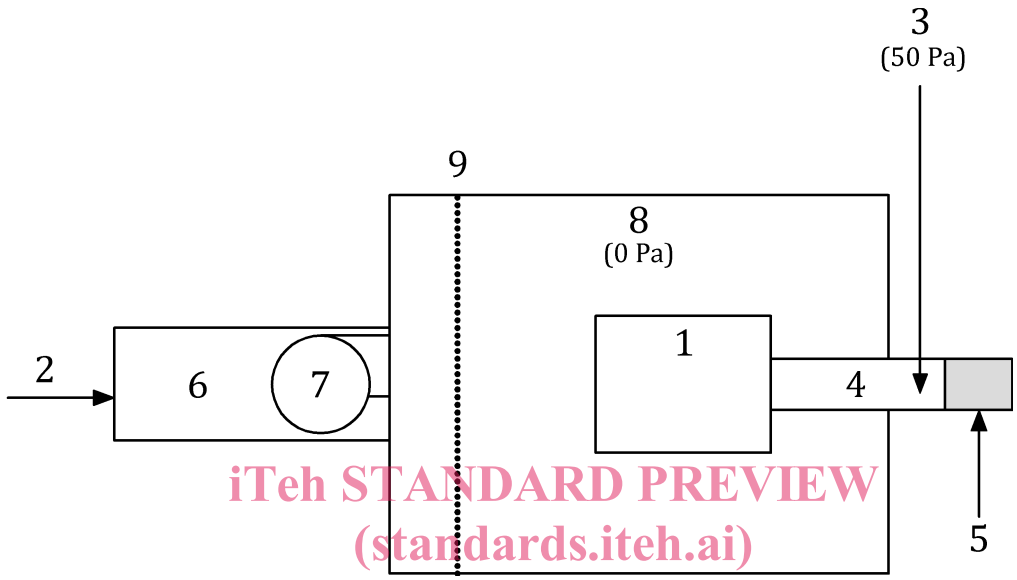
Figure 1 — Example of test installation (outlet measurement method)

6.2.2 Inlet measurement method

The installation is described in Figure 2.

The fan coil unit is placed in a chamber. The air flow measuring device is connected to the entrance of this chamber.

The outlet section of the unit is connected to a ductwork including a damper for adjusting the external static pressure. In case of several outlet sections, the ductwork shall contain all of them.



Key

1	object under test (with 0 Pa at the inlet)	6	airflow measuring apparatus
2	measured air flow	7	fan
3	external static pressure	8	test chamber
4	ductwork	9	flow straightener
5	adjustable duct resistance (e.g. damper)		

Figure 2 — Example of test installation (inlet measurement method)

6.3 Pressure settings

For the standard fan speed declared by the manufacturer, the following conditions shall be fulfilled:

— 0 Pa at the inlet of the unit;

— an external static pressure (ESP) of 50 Pa at the outlet of the unit;

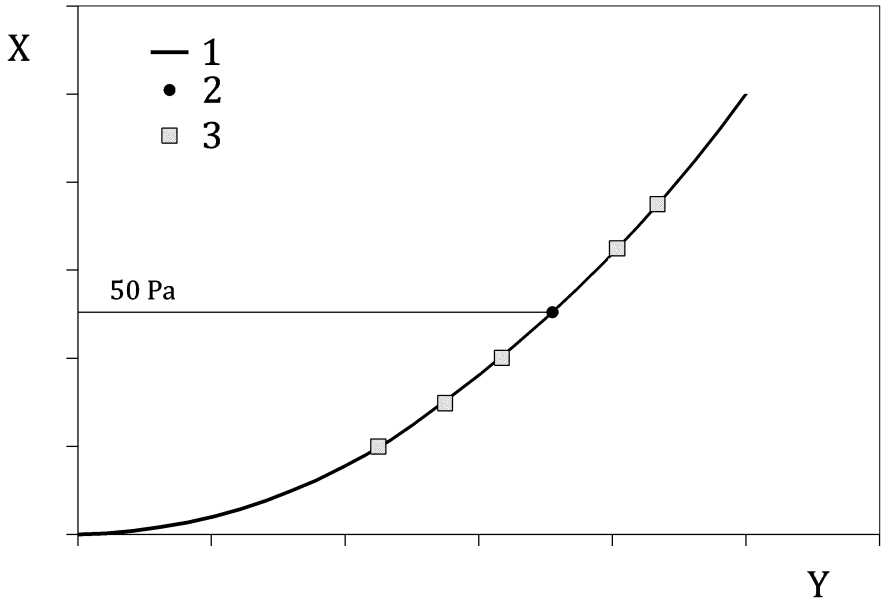
— inside the test chamber a static pressure equal to 0 Pa.

For air flow rate measurements at other fan speeds than the standard fan speed, the following apply:

— no change in the position of the adjustable outlet duct resistance;

— 0 Pa at the inlet of the unit;

— inside the test chamber a static pressure equal to 0 Pa, so that the same network curve resistance is used (see Figure 3).



Key

1 ductwork load curve
2 reference standard speed
3 other speeds
X external static pressure difference (Pa)
Y flow rate

Figure 3 — Setup external static pressure difference of ducted units other speeds

6.4 Standard rating conditions

The air flow rate measurement shall be made in isothermal conditions with dry coil, at an ambient temperature of 20 °C and at nominal voltage and frequency as specified by the manufacturer, for all fan speeds declared by the manufacturer, with the allowable deviations as specified in Table 2.

Table 2 — Permissible deviations for set values

Measured quantity	Permissible deviation of the arithmetic mean values from set values	Permissible deviations of time-individual measured values from set values
Ambient air: dry bulb temperature	± 5 K	± 5 K
Voltage	± 1 %	± 2 %
External static pressure	± 1 Pa	± 5 Pa

6.5 Test procedure

The fan coil shall be disconnected from the cooling or heating power supply or the liquid circulation shall be stopped.

Test shall be performed according to ISO 5801.