



SLOVENSKI STANDARD SIST EN 1397:2021

01-november-2021

Nadomešča:

SIST EN 1397:2015

SIST EN 1397:2015/AC:2016

Prenosniki toplote - Ventilatorski konvektorji voda/zrak - Preskusni postopki za ugotavljanje lastnosti

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

Wärmeübertrager - Wasser-Luft-Ventilatorkonvektoren - Prüfverfahren zur Leistungsfeststellung

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

Ta slovenski standard je istoveten z: EN 1397:2021

ICS:

27.060.30 Grelniki vode in prenosniki toplote Boilers and heat exchangers

SIST EN 1397:2021

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1397:2021

<https://standards.iteh.ai/catalog/standards/sist/093c6a4f-41df-4468-8114-f9182617e97a/sist-en-1397-2021>

EUROPEAN STANDARD

EN 1397

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2021

ICS 27.060.30

Supersedes EN 1397:2015

English Version

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

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

Wärmeübertrager - Wasser-Luft-
Ventilatorconvektoren - Prüfverfahren zur
Leistungsfeststellung

This European Standard was approved by CEN on 23 May 2021.

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
1 Scope.....	5
2 Normative references.....	5
3 Terms and definitions.....	5
4 Designation of fan coil units.....	7
5 Symbols.....	7
6 Air flow rate test for ducted units.....	8
6.1 General conditions.....	8
6.2 Test installation.....	8
6.2.1 Outlet measurement method.....	8
6.2.2 Inlet measurement method.....	9
6.3 Pressure settings.....	10
6.4 Standard rating conditions.....	11
6.5 Test procedure.....	11
6.6 Data to be recorded.....	12
7 Capacity rating tests.....	13
7.1 General conditions.....	13
7.2 Test room.....	13
7.3 Installation of the test object.....	13
7.4 Standard rating conditions.....	13
7.4.1 Air flow conditions.....	13
7.4.2 Temperature conditions.....	14
7.4.3 Electrical conditions.....	14
7.5 Test method.....	14
7.5.1 General.....	14
7.5.2 Cooling capacity.....	15
7.5.3 Total heating capacity.....	16
7.5.4 Total electric power input.....	16
7.6 Measurements criteria.....	16
7.6.1 Air inlet dry bulb temperature.....	16
7.6.2 Moisture content.....	17
7.6.3 Liquid temperature.....	17
7.6.4 Liquid pressure.....	17
7.6.5 Condensate flow rate.....	17
7.6.6 Steady-state conditions.....	17
7.7 Uncertainties of measurement from indicated values.....	18
7.8 Test duration.....	19
7.9 Data to be recorded.....	19
8 Operating tests.....	20
8.1 General.....	20
8.2 Test conditions.....	20
8.3 Sweat test.....	20
8.4 Condensate disposal test.....	21

9	Test report	21
9.1	General information	21
9.2	Additional information.....	21
9.3	Test results.....	21
10	Manufacturer's data.....	22
Annex A (informative) Drawings of the different types of configurations of fan coil units		23
A.1	General	23
A.2	Non ducted units	23
A.3	Ducted units.....	24
Annex B (informative) Air flow rate test for non-ducted units		26
B.1	General conditions	26
B.2	Testing equipment	26
B.3	Test installation	26
B.4	Standard rating conditions	26
B.5	Test procedure	26
B.6	Data to be recorded.....	27
Annex C (normative) Design of separation partition for testing of cassette type fan coil units		28
C.1	General	28
C.2	1-way and 2-way cassette type	28
C.3	4-way cassette type	29
Annex ZA (informative) Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) No 2016/2281 (OJEU L346/1-50, 20.12.2016) aimed to be covered		30

EN 1397:2021 (E)**European foreword**

This document (EN 1397:2021) has been prepared by Technical Committee CEN/TC 113 “Heat pumps and air conditioning units”, the secretariat of which is held by UNE.

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 March 2022, and conflicting national standards shall be withdrawn at the latest by March 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 supersedes EN 1397:2015.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

This document was prepared in the framework of the Commission Regulation (EU) 2016/2281 of 30 November 2016 implementing Directive 2009/125/EC of the European Parliament and of the Council establishing a framework for the setting of ecodesign requirements for energy-related products, with regard to ecodesign requirements for air heating products, cooling products, high temperature process chillers and fan coil units.

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.

1 Scope

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

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

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

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

It is not the purpose of this document 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 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 ISO 5801:2017, *Fans - Performance testing using standardized airways (ISO 5801:2017)*

3 Terms and definitions

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

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

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

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.

EN 1397:2021 (E)**3.2****total 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

Note 1 to entry: When a unit is equipped with a drain pump which continuously operates, the drain pump power input is included in the total electric power input.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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

[SIST EN 1397:2021](https://standards.iteh.ai/catalog/standards/sist/093c6a4f-41df-4468-8114-b12617c97a/sist-en-1397-2021)

[https://standards.iteh.ai/catalog/standards/sist/093c6a4f-41df-4468-8114-](https://standards.iteh.ai/catalog/standards/sist/093c6a4f-41df-4468-8114-b12617c97a/sist-en-1397-2021)

Note 1 to entry: The fan coil unit can include an electrical resistance for heating purpose, but not in operation during testing.

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_{pL1}	Specific heat capacity of liquid at inlet connection	kJ/(kg K)
c_{pL2}	Specific heat capacity of liquid at outlet connection	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 electric power input	W
$P_{elec,C}$	Total electric power input in cooling mode	W
$P_{elec,H}$	Total electric power input in heating mode	W
P_{lat}	Latent cooling capacity	W
P_{sens}	Sensible cooling capacity	W
P_C	Total cooling capacity	W
P_H	Total 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

EN 1397:2021 (E)

Symbol	Description	Unit
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

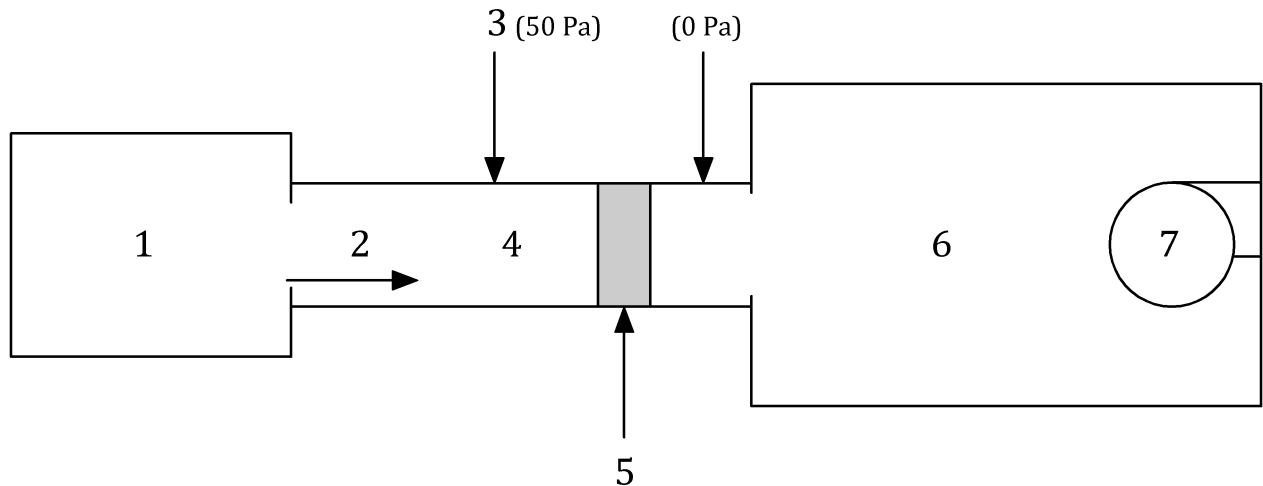
The installation is described in Figure 1.

The air flow measurement equipment consists of a test chamber, an air flow measuring device and an auxiliary fan.

The discharge section of the fan coil unit is connected to the test chamber through a ductwork having an adjustable resistance. 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).

EN ISO 5801:2017, Category "B" installation may be used.

**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 — Schematic of test installation (outlet measurement method)

<https://standards.iteh.ai/catalog/standards/sist/093c6a4f-41df-4468-8114-f9182617e97a/sist-en-1397-2021>

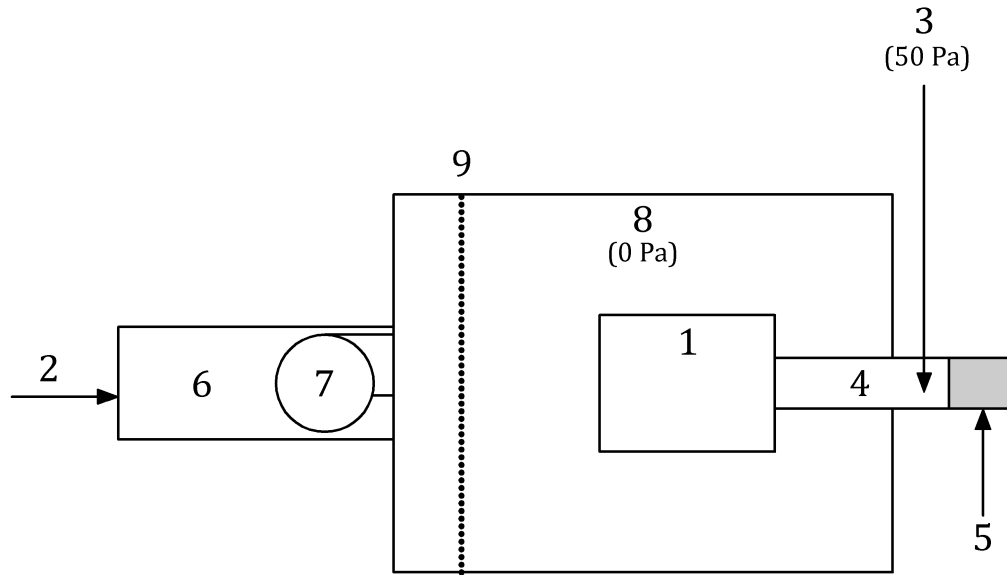
6.2.2 Inlet measurement method

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.

EN ISO 5801:2017, Category “B” installation may be used.

**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 — Schematic of test installation (inlet measurement method)

<https://standards.iteh.ai/catalog/standards/sist/093c6a4f-41df-4468-8114-f9182617e97a/sist-en-1397-2021>

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).