



# SLOVENSKI STANDARD

## oSIST prEN 1397:2020

01-maj-2020

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### 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-Ventilator-konvektoren - Prüfverfahren zur Leistungsfeststellung

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

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 1397**

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ICS

Will supersede EN 1397:2015

English Version

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

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

Wärmeübertrager - Wasser-Luft-  
Ventilatorconvektoren - Prüfverfahren zur  
Leistungsfeststellung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 113.

If this draft becomes a European Standard, 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.

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**prEN 1397:2020 (E)****European foreword**

This document (prEN 1397:2020) has been prepared by Technical Committee CEN/TC 113 “Heat pumps and air conditioning units”, the secretariat of which is held by UNE.

This document is currently submitted to the CEN Enquiry.

This document will supersede 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.

For relationship with EU Directive, 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.

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## 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.

<std>ISO 5801:2017, *Fans — Performance testing using standardized airways*</std>

## 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.

**prEN 1397:2020 (E)****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

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

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**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

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**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	$\text{kJ}/(\text{kg K})$
$h_{L1}$	Specific enthalpy of liquid at inlet connection ( $= c_{pL1} \times t_{L1}$ )	$\text{kJ}/\text{kg}$
$h_{L2}$	Specific enthalpy of liquid at outlet connection ( $= c_{pL2} \times t_{L2}$ )	$\text{kJ}/\text{kg}$
$\Delta h_w$	Vaporization heat of water (constant = 2460)	$\text{kJ}/\text{kg}$
$n_1$	Rotational speed of the fan at air flow test	$\text{min}^{-1}$
$n_2$	Rotational speed of the fan at capacity test	$\text{min}^{-1}$
$P_{\text{elec}}$	Total electric power input in cooling mode	W
$P_{\text{elec,C}}$	Total electric power input in heating mode	W
$P_{\text{elec,H}}$	Total electric power input	W
$P_{\text{lat}}$	Latent cooling capacity	W
$P_{\text{sens}}$	Sensible cooling capacity	W
$P_C$	Total cooling capacity	W
$P_H$	Heating capacity	W
$P_{\text{atm}}$	Atmospheric pressure	kPa
$p_A$	External static pressure	Pa
$q_{mA}$	Mass flow rate of air	$\text{kg}/\text{s}$
$q_{mL}$	Mass flow rate of liquid	$\text{g}/\text{s}$
$q_{mW}$	Mass flow rate of condensate (air side)	$\text{g}/\text{s}$

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Symbol	Description	Unit
$t_{L1}$	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
$\Delta p_L$	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

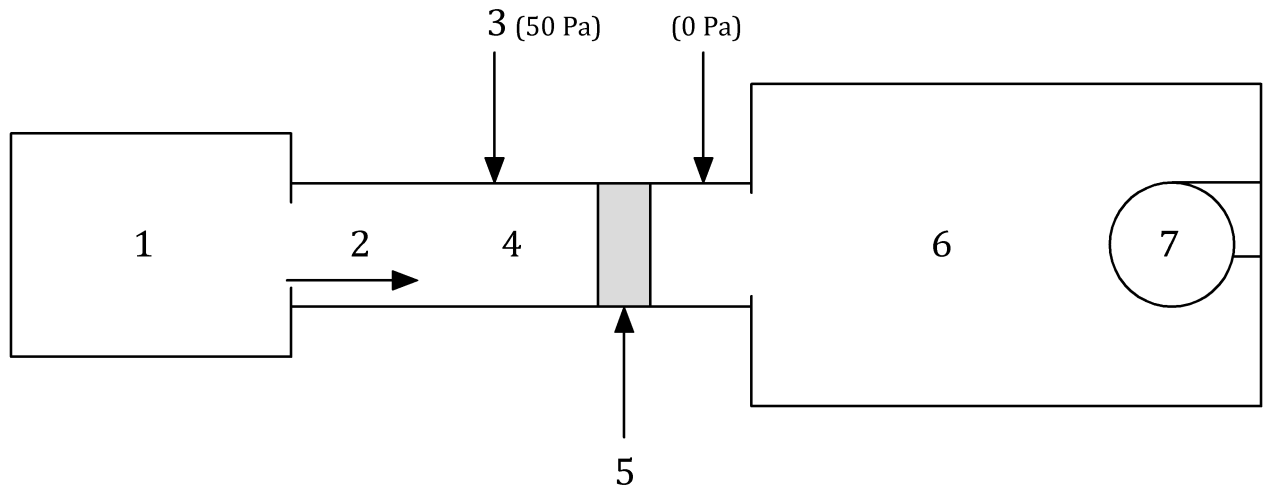
#### 6.2.1 Outlet measurement method

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) | 5 | adjustable duct resistance (e.g. damper)             |
| 2 | measured air flow                          | 6 | test chamber with airflow measuring apparatus        |
| 3 | external static pressure                   | 7 | fan (may be inside or outside the discharge chamber) |
| 4 | ductwork                                   |   |  |

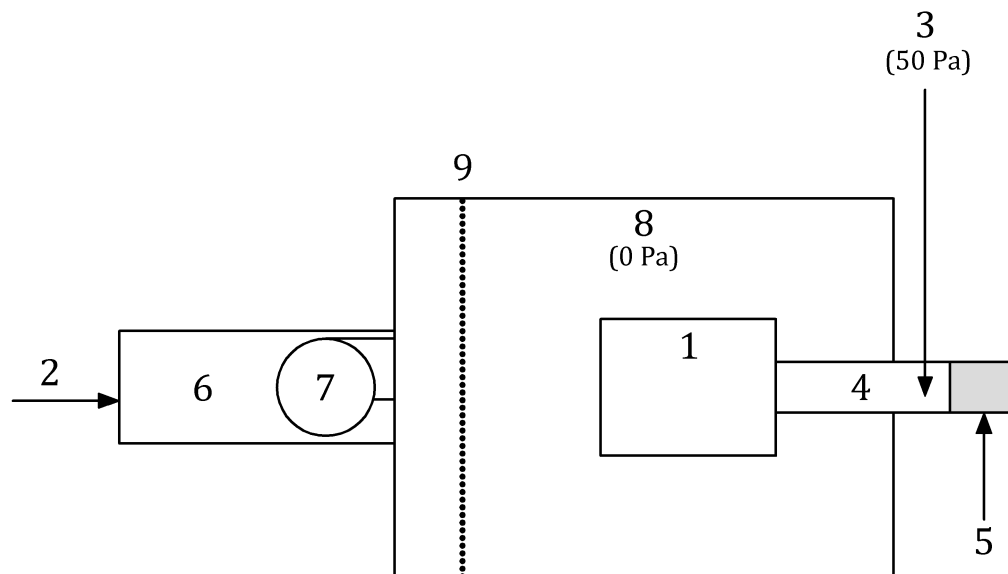
**Figure 1 — Schematic of test installation (outlet measurement method)**

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

**6.3 Pressure settings**

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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).