SLOVENSKI STANDARD
SIST EN 16573:2017

01-april-2017

Prezračevanje stavb - Preskušanje lastnosti sestavnih delov za stanovanjske stavbe - Večnamenske uravnotežene prezračevalne enote za posamična stanovanja, vključno s toplotnimi črpalkami

Ventilation for Buildings - Performance testing of components for residential buildings - Multifunctional balanced ventilation units for single family dwellings, including heat pumps

Lüftung von Gebäuden - Leistungsprüfung von Bauteilen für Wohnbauten - Multifunktionale Zu-/Abluft-Lüftungseinheiten für Einzelwohnungen, einschließlich Wärmepumpen

Ventilation des bâtiments - Essais de performance des composants pour les bâtiments résidentiels - Centrales de ventilation double flux multifonctions pour les logements individuels, comprenant des pompes à chaleur

Ta slovenski standard je istoveten z: **EN 16573:2017**

ICS:

91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning systems

SIST EN 16573:2017 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 16573

February 2017

ICS 91.140.30

English Version

Ventilation for Buildings - Performance testing of components for residential buildings - Multifunctional balanced ventilation units for single family dwellings, including heat pumps

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

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Ref. No. EN 16573:2017 E

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European foreword

This document (EN 16573:2017) 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of an identical text or by endorsement, at the latest by August 2017, and conflicting national standards shall be withdrawn at the latest by August 2017.

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1 Scope

This European Standard specifies the laboratory test methods and test requirements for aerodynamic, energy rating and acoustic performance, of multifunctional balanced units intended for use in a single dwelling.

In the case of units consisting of several parts, this standard applies only to those designed and supplied as a complete package with the mount instructions.

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

— supply and exhaust air fans;

— air filters

— common control system;

and one or more of the additional components:

— air to water heat pump;

— air to air heat pump;

— air-to-air heat exchanger.

Units including only an air to air heat exchanger and/or an exhaust air to supply air heat pump are covered by EN 13141-7.

A non-exhaustive list of possible configurations of multifunctional units covered by this standard is given in Clause 5.

The standard does not cover the thermal aspects of humidity transfer in the air-to-air heat exchanger.

This standard does not deal with non-ducted units on supply and extract air side.

This standard does not deal with collective units (centralized or semi-centralized systems)

These multifunctional balanced units can be connected to ground heat exchanger for air preheating, solar collector or other heating systems. This standard does not cover the testing with these additional components.

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

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.

EN 12102, *Air conditioners, liquid chilling packages, heat pumps and dehumidifiers with electrically driven compressors for space heating and cooling - Measurement of airborne noise - Determination of the sound power level*

EN 12792, *Ventilation for buildings - Symbols, terminology and graphical symbols*

EN 13141-7:2010, *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*

EN 14511 (all parts), *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling*

EN 16147, *Heat pumps with electrically driven compressors - Testing and requirements for marking of domestic hot water units*

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)*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12792, EN 13141-7, EN 14511-1 and EN 16147, and the following apply.

3.1.1
declared maximum air volume flow
maximum of the removed or fresh air volume flow corresponding to the declared total pressure of the unit at the maximum setting, without any recirculation, for standard air conditions (20 °C, 101 325 Pa)

[SOURCE: EN 13141-7:2010, 3.1.4, modified — The beginning of the definition has been redrafted and the expression “without any recirculation” has been added.]

3.1.2
declared total pressure difference
total pressure difference between the outlet and the inlet of the unit, without any recirculation, declared by the manufacturer, and corresponding to 100 Pa or to a lower total pressure if the intended use declared by the manufacturer is less than 100 Pa

[SOURCE: EN 13141-7:2010, 3.1.6, modified — The original term was “Ptud/2” and it was defined with the beginning of the present definition.]

3.1.3
multifunctional balanced ventilation unit
unit intended for use in a single family dwelling to primary provide balanced ventilation and in addition heating and/or cooling and/or hot water production and contains at least, within one or more modular casing supply and exhaust air fans, air filters, common control system and one more of the additional components, air to water heat pump, air to air heat pump, air-to-air heat exchanger

3.1.4
hydronic heating/cooling
heating or cooling supplied by a water or brine circuit

3.1.5
air heating/cooling
heating or cooling supplied by an air stream

3.1.6
air supply free cooling
recovering of cooling energy produced by the heat pump while producing hot water

Note 1 to entry: Hot water has priority.

3.1.7
reference fresh air volume flow
fresh air volume flow $q_{V,ref,fresh}$ at the reference point defined at $p_{tUd/2}$ and 70 % of declared maximum air volume flow

3.2 Symbols

ODA, 21	Outdoor Air
SUP, 22	Supply Air
RCA,	Recirculation air (additional airflow for example for air heating or air cooling function)
ETA, 11	Extract Air
EHA, 12	Exhaust Air
OEA	Outdoor to Exhaust Air (additional airflow for example to raise the thermal capacity of the heat pump)

List of symbols

P	capacity or power input, in kW
p_{tUd}	declared total pressure, in Pa
Q	thermal energy, in kWh
t	time duration, in s or in h
W	electrical work, in kWh
h	specific enthalpy in kJ/kg
q_m	mass flow rate, in kg/s
q_v	volume flow rate, in m³/h
T	temperature in °C

List of indices used for the individual and combined functions in the symbols:

AC	supply Air Cooling
AH	supply Air Heating
AFC	supply air free cooling
C	cooling
WH	(Domestic) hot water production
el	electric
H	heating
HC	Hydronic Cooling
HH	Hydronic Heating
HR	heat recovery
V	Ventilation
es	stand by

The combination of indices indicates simultaneous operation of the corresponding functions.

4 Functions

A multifunctional ventilation unit provides ventilation for single dwelling as a leading function. This means, that all additional functions:

— hydronic heating/air heating;

— hydronic cooling/air cooling;

— hot water production;

shall be operating only when ventilation is operating.

The multifunctional ventilation unit shall be designed and controlled to provide the hygienic ventilation rate for a dwelling or part of a dwelling. That means for example, that the ventilation rate shall not be controlled according to the hydronic heating demand.

If specified by the manufacturer, the unit may use an additional outdoor air volume flow, to provide a higher thermal capacity if needed. This leads to two alternatives:

1) The higher outdoor air volume flow (outdoor exhaust air) does not affect the ventilation function (fresh air and removed air).

   Additional tests shall be performed according to the declaration of manufacturer. No further correction needed

2) The air volume flows for ventilation (fresh air and/or removed air) increase. In this case the air volume flows shall be measured and documented as a percentage of reference air volume flow.

NOTE This may be needed to allow a correction of system performance according to the EPBD calculation.

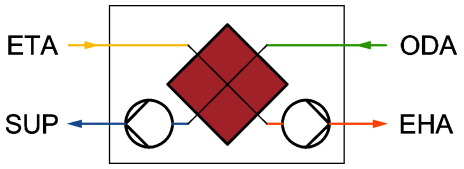
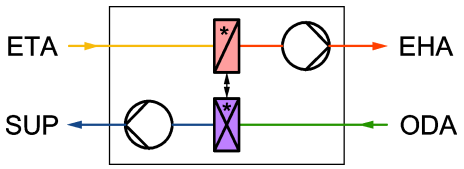
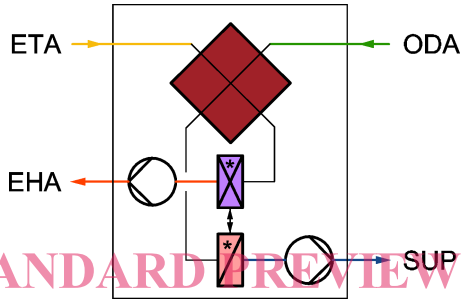
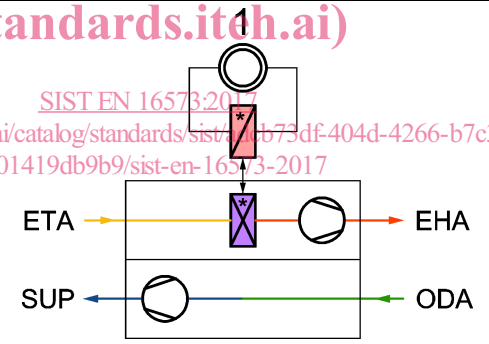
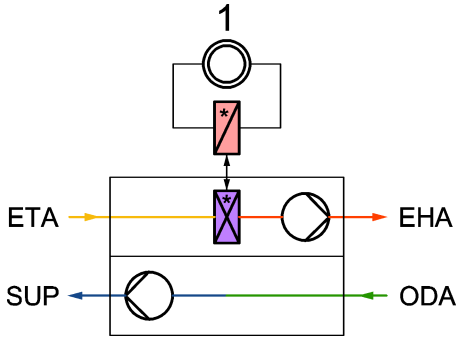
5 Description and testing of multifunctional units

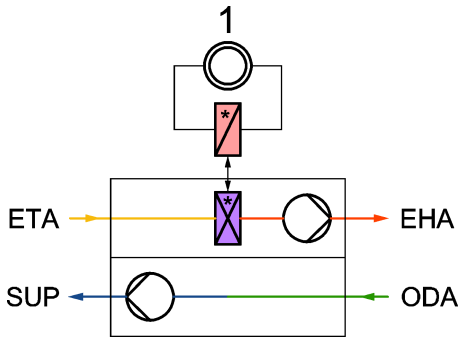
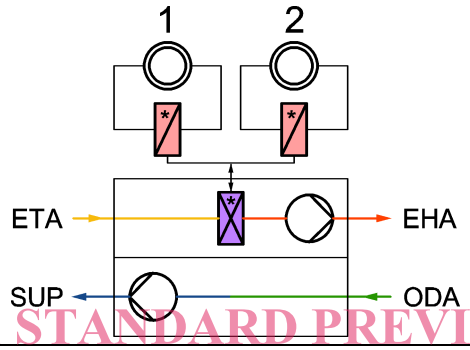
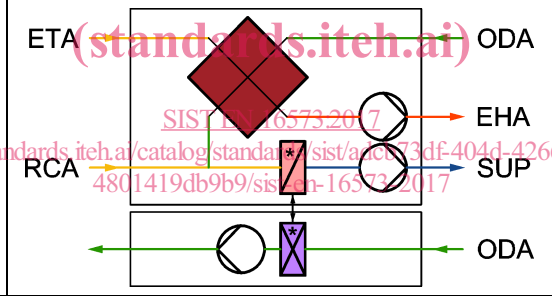
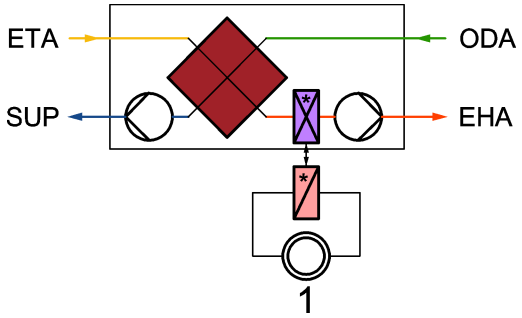
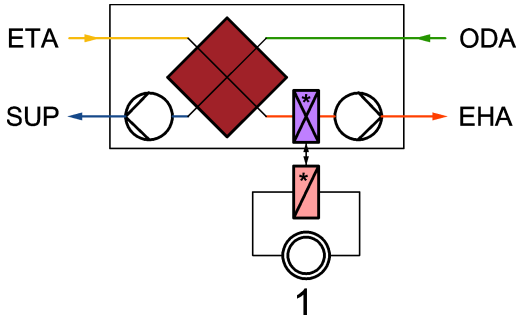
Table 1 shows a non-exhaustive list of relevant combinations of multifunctional units with the corresponding applicable test procedures according to Clause 6, 7 and 8 for thermal and acoustic performance.

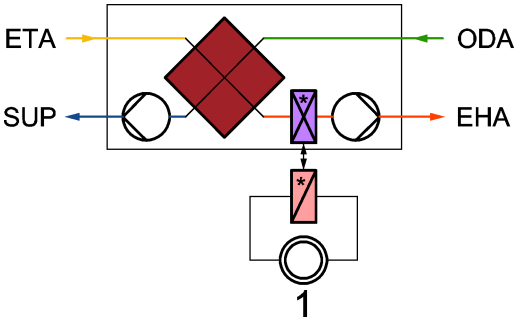
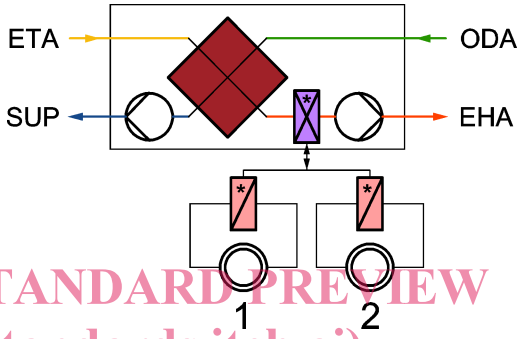
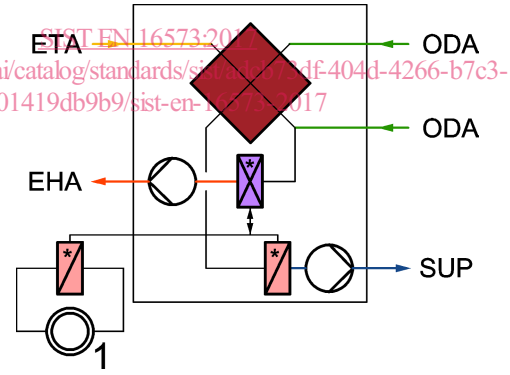
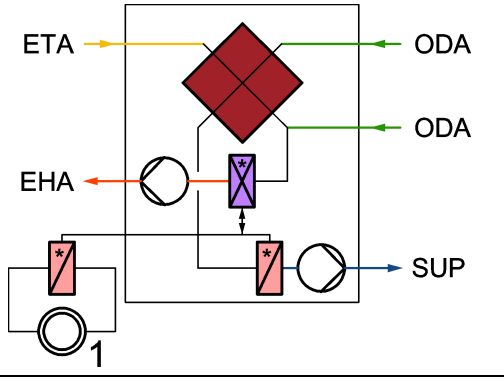
The leading function is ventilation at reference air volume flow. The heat pump can use any air source: outdoor air, exhaust air, recirculation air or any mixture of these.

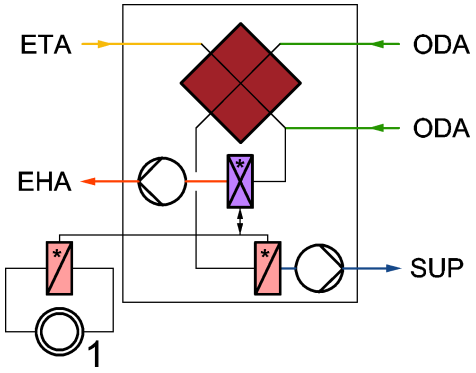
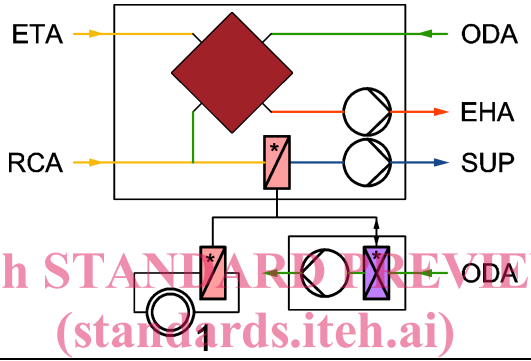
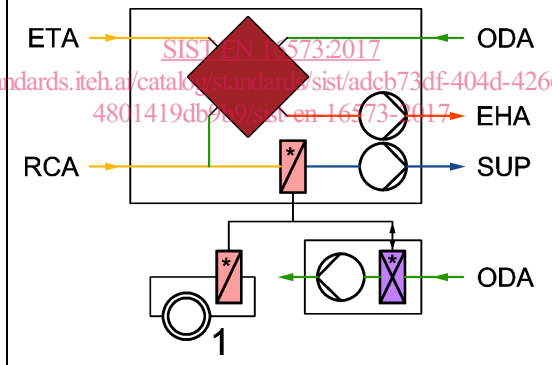
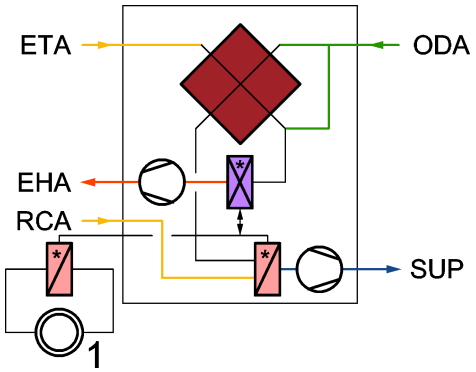
For testing the unit shall be installed according to the manufacturer instructions given in the installation manuals unless otherwise specified in the referred standards for specific tests.

Table 1 — Units and test procedures

	Description Balanced ventilation including:	**Function scheme**	**Test procedure (sub)clause:**
1.	+ Air to air heat exchanger		Fully covered by EN 13141–7
2.	+ Air to air heat pump		Fully covered by EN 13141–7
3.	+ Air to air heat exchanger + Air to supply air heat pump		Fully covered by EN 13141–7
4.	+ Air to water heat pump for the domestic hot water production		Clause 6 7.4 8.3 8.7 **Key** 1 domestic hot water
5.	+ Air to water heat pump for hydronic heating or cooling		Clause 6 7.5 8.3 8.4 **Key** 1 water heating or cooling

	Description Balanced ventilation including:	Function scheme	Test procedure (sub)clause:
6.	+ Air to water heat pump for alternative: – hydronic heating and cooling – domestic hot water production		Clause 6 7.4 7.5 8.3 8.4 **Key** 1 water heating or cooling/domestic hot water
7.	+ Air to water heat pump for simultaneous: – hydronic heating or cooling – domestic hot water		Clause 6 7.8 8.3 8.6 **Key** 1 water heating or cooling 2 domestic hot water
8.	+ air to air heat exchanger + Air source heat pump for heating or cooling with recirculating air		Clause 6 7.3 7.6 8.3 8.5
9.	+ air to air heat exchanger + Air to water heat pump for domestic hot water production		Clause 6 7.3 7.4 8.3 8.7 **Key** 1 domestic hot water
10.	+ air to air heat exchanger + Air to water heat pump for hydronic heating or cooling		Clause 6 7.3 7.5 8.3 8.4 **Key** 1 water heating or cooling

	Description Balanced ventilation including:	Function scheme	Test procedure (sub)clause:
11.	+ air to air heat exchanger + Air to water heat pump for alternative: – hydronic heating or cooling – domestic hot water production		Clause 6 7.3 7.4 7.5 8.3 8.4 **Key** 1 water heating or cooling/domestic hot water
12.	+ air to air heat exchanger + air to water heat pump for simultaneous: – hydronic heating or cooling – domestic hot water production		Clause 6 7.3 7.8 8.3 8.4 **Key** 1 water heating or cooling 2 domestic hot water
13.	+ air to air heat exchanger + Air source heat pump for: – supply air heating or cooling – for alternative: – hydronic heating or cooling – domestic hot water production		Clause 6 7.3 7.6 7.7 7.8 8.3 8.6 **Key** 1 water heating or cooling/ domestic hot water
14.	+ air to air heat exchanger + Air source heat pump for: – supply air heating or cooling – domestic hot water production		Clause 6 7.3 7.8 8.3 8.5 **Key** 1 domestic hot water

	Description Balanced ventilation including:	Function scheme	Test procedure (sub)clause:
15.	+ air to air heat exchanger + Air source heat pump for: – supply air heating or cooling – for simultaneous: – hydronic heating – domestic hot water production		Clause 6 7.3 7.6. 7.7 7.8 8.3 8.6 **Key** 1 water heating/ domestic hot water
16.	+ air to air heat exchanger + Air source heat pump for: – supply air heating or cooling – domestic hot water production With recirculation air		Clause 6 7.3 7.7 7.8 8.3 8.5 **Key** 1 domestic hot water
17.	+ air to air heat exchanger + Air source heat pump for: – supply air heating or cooling – for alternative: – domestic hot water production – hydronic heating or cooling With recirculation air		Clause 6 7.3 7.6 7.7 7.8 8.3 8.6 **Key** 1 water heating or cooling/Domestic hot water
18.	+ air to air heat exchanger + Air source heat pump for: – supply air heating or cooling and simultaneous or alternative domestic hot water production With recirculation air		Clause 6 7.3 7.4 7.6 7.9 8.3 8.5 **Key** 1 domestic hot water
NOTE EHA – Exhaust air, ETA – Extract air, ODA - Outdoor air, RCA – Recirculation air, SUP – Supply air.			

6 Performance testing of aerodynamic characteristics

6.1 Leakages

6.1.1 Test method

Pressure testing method applies to classify leakages of the unit as defined in EN 13141-7.

For internal leakage, if the pressure method is not applicable, e.g. units using recirculation air, the unit shall be tested as category 2 heat exchanger (tracer gas method) in accordance with EN 13141-7.

6.1.2 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 in case the supply and extract air volume flows are different.

In addition, to assess correctly the thermal performance, aerodynamic characteristics shall be tested before or together with any thermal characteristics testing.

Aerodynamic characteristics shall include:

— 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.

The tests for air flow/pressure curve and thermal performances shall not be made because of measurement uncertainty when leakages according to 6.1.1 are too high. The external and internal leakage of the unit shall comply with Class A1 or A2, B1 or B2, C1 or C2 as defined in EN 13141-7 depending on the test method.

6.2 Air flow/pressure curve

Tests shall be performed according to EN 13141-7 with the following parameters:

1) Ventilation function only:

   That means the heat pump is not operating. Any additional fan is off and any bypass damper is closed ($q_{V, OEA} = 0$ and $q_{V, RCA} = 0$) or any other recirculation air flow is off.

2) Ventilation function with additional flow rates:

   In case of additional air flow rates for the other functions the pressure curves shall be repeated with different damper positions and/or additional fans speeds (minimum 3 settings in case of stepless control). If the ventilation mode can be set independently from the recirculation mode, then the ventilation setting is the intermediate setting as defined in EN 13141-7 (see Clause 1 above) During this test, pressure at each connection shall respect the repartition of 1/3 on the outside and 2/3 on the inside.

6.3 Reference point for aerodynamic conditions

For all the thermal tests of the multifunctional unit, the reference fresh air volume flow point shall be used.

In addition, if the multifunctional ventilation unit is operating with an additional outdoor air flow at the evaporator (heating mode)/condenser (cooling mode) side, this additional air flow rate shall also be specified by the manufacturer.