EVIA Guidance on Ecodesign requirements for ventilation units

Commission Regulation (EU) No 1253/2014 of 7 July 2014 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for ventilation units

Commission Delegated Regulation (EU) No 1254/2014 of 11 July 2014 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of residential ventilation units

Preface:

This EVIA FAQ-Guidance is intended to contribute to a better understanding of EU 1253 and 1254/2014 and to their more uniform and coherent application across different sectors and product groups in this regulation and throughout the single market. It is addressed to industry, EU-Commission, Member States, enforcement bodies and others who need to be informed of the provisions (e.g. trade and consumer associations standardisation bodies, manufacturers, importers, distributors, conformity assessment bodies and trade unions).

(Disclaimer) This is intended purely as a guidance document – only the text of the Union harmonisation act itself has legal force. In certain cases, there may be differences between the provisions of a Union harmonisation act and the contents of this Guidance, in particular where slightly divergent provisions in the individual Union harmonisation act cannot be fully described in this Guide. The binding interpretation of EU legislation is the exclusive competence of the Court of Justice of the European Union. The views expressed in this Guidance cannot prejudge the position that the Commission or the Member States might take before the Court of Justice. Neither the EVIA nor any person acting on behalf of EVIA is responsible for the use which might be made of the following information.

As this EVIA-Guidance reflects the state of the art interpretation of the regulation of the involved industry at the time of its drafting, the Guidance offered may be subject to later modification. This is also applicable in the case, where the EU-Commission, Member States or enforcement bodies communicate conflicting interpretation with this Guidance.

EU 1253 and 1254/2014 will be enforce 1st Jan. 2016 and industry needs clear interpretation at an early stage to provide consistent documentation.

Brussels 13th October 2015

EVIA European Ventilation Industry Association
Avenue des Arts 46 Kunstlaan
1000 Brussels
Tel: +32 (0) 2 7327040
secretariat@evia.eu

Article 1 Subject matter and scope

2. This Regulation shall not apply to ventilation units which:
(a) are unidirectional (exhaust or supply) with an electric power input of less than 30 W, except for information requirements;
(b) are bidirectional, with a total electric power input for the fans of less than 30 W per air stream, except for information requirements;

Question:

How is (total) electric power Input defined?

Answer:

The electrical power input at maximum flow rate according to the manufacturer declaration.
It is not the maximum capacity written on the name plate of the fan itself.
It is not the power in Best Efficiency Point according EU 327/2011 (Fan Regulation)

Justification:

Small ventilation units with an electric power input of less than 30 W per air stream are exempted from the minimum requirements of this Regulation.
This means 60W for bidirectional units and 30W for unidirectional units.
The 30W limit is related to the maximum declared flow rate including all electrical demand of the fans and controllers without frost protection.
The 30W limit has nothing to do with the maximum power written on the type plate of the fan or the unit.
The maximum power on the name plate of the entire unit is also not relevant because this includes also the power of additional components like pre- and afterheater etc..

To determine if the power input of the device is more or less than 30W per airstream the power consumption at the declared maximum air flow has to be measured per individual fan.

Question:

How to deal with intermittent ventilation unidirectional Units?

Answer:

There is no special requirement for intermittent units.

Unidirectional units below 30W have no minimum requirements and no Label, but all informational data shall be provided (Annex IV).

This includes SEC for each climate zone, SPI, etc..

Article 1 Subject matter and scope 2. (g) - Combination with other heaters

2. This Regulation shall not apply to ventilation units which:
(g) include a heat exchanger and a heat pump for heat recovery or allowing heat transfer or being additional to that of the heat recovery system, except heat transfer for frost protection or defrosting;

Question:

What does this mean if the ventilation unit casing includes more functional components which might be regulated by other ErP regulations?

For example a ventilation unit casing includes a separate heat pump, or gas boiler etc..

Answer:

If the ventilation and heat recovery function has no energy related connection with the additional components (except defrosting) the ventilation part is covered by the regulation.

Examples:

1. Ventilation unit and brine-water heat pump for heating in one casing or casing parts with no heat transfer in the air stream except brine circuit for defrosting. The ventilation part is covered by the regulation

2. Ventilation unit and exhaust air to water heat pump. The ventilation part is covered by the regulation

3. Ventilation unit with heat recovery plus exhaust to supply air heat pump. This unit is excluded because the combined heat recovery of heat exchanger and heat pump is not defined.

Question:

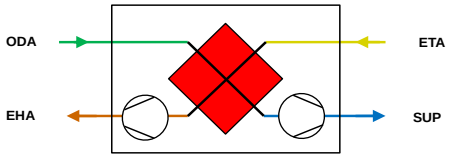
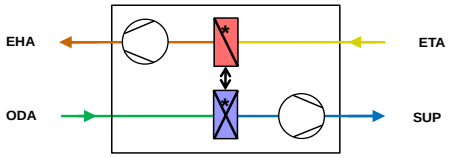
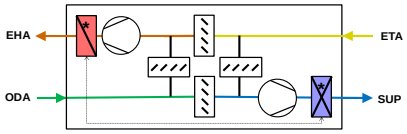
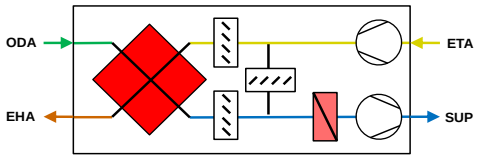
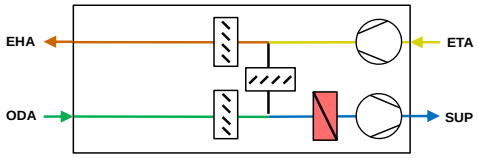
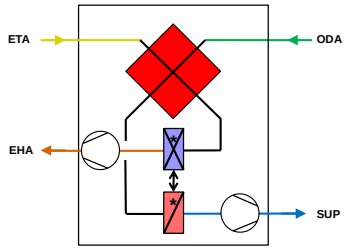
Which ventilation units are excluded?

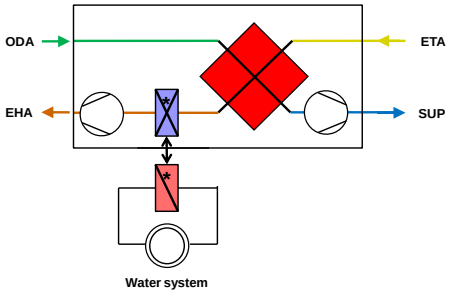
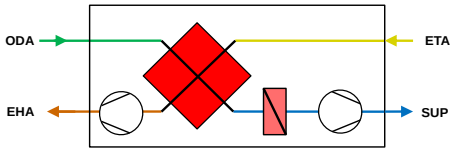
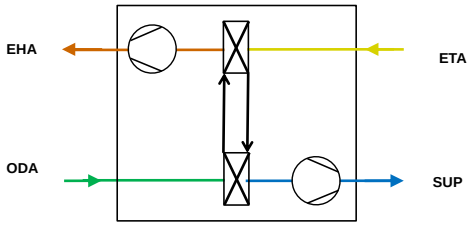
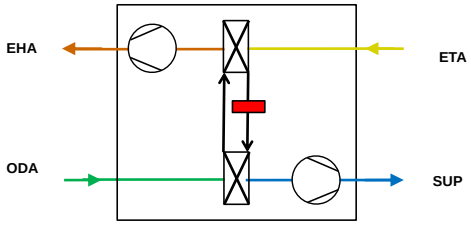
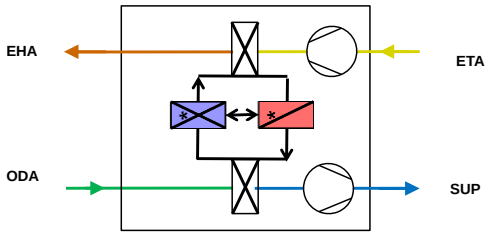
Answer:

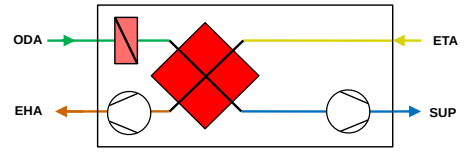
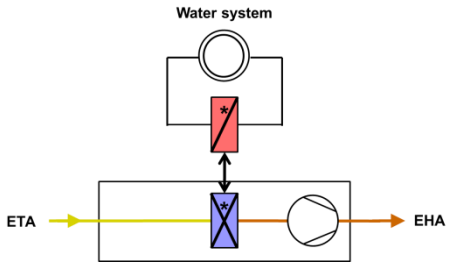
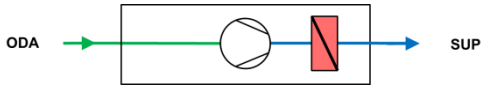
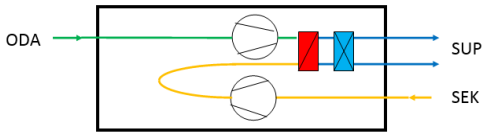
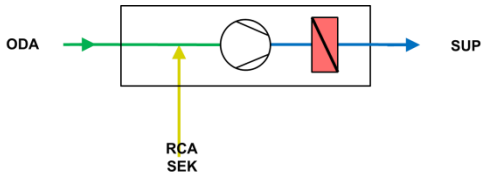
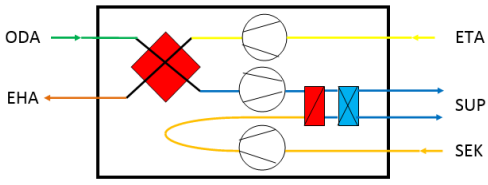
See following table for further explanations.

Justification:

The core of the regulation is to specify the ventilation function of a unit. If the unit provides additional functions in combination with heat pumps or by using recirculation or secondary air the main function might not be ventilation.

#	Unit design	Comments	EU 1253 1254/2014
1	Heat recovery only 		Included
2	Air to air Heat pump only 	No performance data available for ventilation units with a heat pump for heat recovery only. This system allows heat transfer being add. to heat recovery This system shall be regulated in LOT 21. No double regulation Predominantly heating or cooling	Excluded
3	Heat pump only 4 damper rooftop 	No performance data available for ventilation units with a heat pump for heat recovery only. This system allows heat transfer being add. to heat recovery This system shall be regulated in LOT 21. No double regulation Predominantly heating or cooling	Excluded -
4	Heat recovery + 3 damper – heating 	The additional heating and mixing does not affect the heat recovery SFP INT shall be calculated with SUP and ETA air volume flow as follows: $SPF_{int} = SPF_{all} \times (1 - \frac{\Delta p_{s,ext}}{\Delta p_{s,fan}})$ with $SPF_{all} = \frac{q_{V,ETA\ or\ SUP}}{P_{el,ETA\ or\ SUP}}$	Included
5	3 damper only 	No longer allowed in NRV, because BVU shall have heat recovery, if the purpose of the unit is predominantly ventilation. Remarks: See question on recirculation air	Included
6	Heat recovery + air to air heat pump 	Clearly specified as an exclusion.	Excluded

#	Unit design	Comments	EU 1253 1254/2014
7	Heat recovery + Air/water heat pump 	The Unit can be specified without impact of water heat pump NRVU: The condenser/evaporator is considered as additional component and not included in SFP int. RVU: The condenser/evaporator is not included in SFI.	Included
8	Heat recovery + add heating 	The additional heating does not affect the heat recovery NRVU: The heating coil is add. Component RES. The impact of the re heater on the electrical power input should be corrected	Included
9	Run around coil 	Heat recovery only	Included
10	Run around Coil + add heating 	The RAC can be measured without add. heating or cooling inside the water/brine circuit	Included
11	Run around Coil + add heat pump in the water/brine circuit 	The RAC can be measured without add. heat pump inside the water/brine circuit.	Included

#	Unit design	Comments	EU 1253 1254/2014
12	Heat recovery plus frost protection 		Included
12	UVU plus Hot Water Heat Pump 	The evaporator/condenser in the air stream has no impact on ventilation function and shall be considered as an additional component.	Included
13	Positive Input Ventilation with reheater 		Included
14	Secondary air fan-coil with outdoor air and 2 fans. 	Is predominantly a fan coil Using some outdoor air LOT 21	SEK Excluded ODA included
15	Secondary air fan-coil with outdoor air and 1 fan 	Is predominantly a fan coil if outdoor air flow is minor (<10%) Covered in LOT 21 ODA included if air volume flow is significant (>=10%)	SEK and RCA Excluded ODA included if significant (>=10%)
16	Ventilation unit with add. secondary air 	See above including cooling	SEK Excluded ODA and EHA included

Article 2 Definitions (1) - Ventilation Unit

(1) 'ventilation unit (VU)' means an electricity driven appliance equipped with at least one impeller, one motor and a casing and intended to replace utilised air by outdoor air in a building or a part of a building;

Question:

What means the replace of utilized air by outdoor air in a building or a part of a building?

Answer:

Utilized air is polluted from human or building emission caused by a typical use for human presence. This does not include application, where minimum one of the air streams is defined by an industrial or a production process (for example: heat dissipation, removal of gaseous and particle components caused by a process)..

Process ventilation:

The following applications (non-exhaustive list) are considered to be process ventilation and are therefore out of scope of the regulation:

- Swimming pools
- Agricultural applications
- Professional kitchens
- Data centres, server rooms
- Machine exhaust
- Recirculation units in clean rooms
- Heat dissipation, e.g. compressor rooms, generator rooms, CHP-rooms, Televisions and other studios with high lighting heat load
- Foundries, forging processes
- Halls with industrial furnaces
- Paper production

Recirculation air:

Secondary or recirculation air is not ventilation. These products are air heating/cooling systems according LOT 21. If the unit is only operating in these conditions, the units are excluded.

In case there is an outdoor air connection (with significant amount of minimum outdoor air >=10% during regular operation (not in heat up modus etc.), the unit is included and the declaration shall be as follows.

Cases:

- BVU with fixed or controlled outdoor air volume flow:
  The heat recovery shall fulfil the minimum requirement at maximum outdoor air volume flow in heating period/mode.
  SFP_{int} shall be calculated using the nominal operation point of the fan (see example 4 of annex systems)

Article 2 Definitions (2) (3) RVU - NRVU 250 to 1000 m3/h Article 2 Definitions

For the purposes of this Regulation the following definitions shall apply:

(2) 'residential ventilation unit' (RVU) means a ventilation unit where:

(a) the maximum flow rate does not exceed 250 m³/h;
(b) the maximum flow rate is between 250 and 1 000 m³/h, and the manufacturer declares its intended use as being exclusively for a residential ventilation application;

(3) 'non-residential ventilation unit' (NRVU) means a ventilation unit where the maximum flow rate of the ventilation unit exceeds 250 m³/h, and, where the maximum flow rate is between 250 and 1 000 m³/h, the manufacturer has not declared its intended use as being exclusively for a residential ventilation application;

Question:

a) Who declares ´residential´and ´non-residential´ ventilation units in the range between 250 and 1000 m³/h?

b) What does this mean for a unit applicable for both and fulfilling criteria for both?

Answers

a) The manufacturer declares.
b) Double declaration is allowed as RV and NRV unit is allowed if the units fulfils both requirements and the performance data are declared according Annex II, III, IV and V and the unit is labelled according EU 1254/2014

a) Does every VU installed in a residential application need to have an energy label?
b) Double declaration: Only NRVU with double declaration are usable also for residential?
c) Can an energy label for NRVU be delivered on request if used in residential application?

Answers

a) No. If the unit is declared only as Non-Residential, no Label is allowed.
This means a NRV (typically >1.000 m3/h) installed in a Residential building shall not have a label.
In analogy also NRV Units between 250 and 1000 declared as a NRV.
b) No. The manufacturer declares, he cannot proof the use of the unit in the real building.
c) No Label allowed for NRV units. Only possible if declared double.

Article 2 Definitions (4) - maximum flow rate for RVU

4) 'maximum flow rate' is the declared maximum air volume flow rate of a ventilation unit that can be achieved with integrated or separately co-supplied controls at standard air conditions (20 °C) and 101 325 Pa, where the unit is installed complete (e.g. including clean filters) and according to the manufacturer's instructions, for ducted RVUs the maximum flow is related to the air flow at 100 Pa of external static pressure difference, and for non-ducted RVUs to the air flow at the lowest achievable total pressure difference to be chosen from a set of values of 10 (minimum)-20-50-100-150-200-250 Pa, whichever is equal or just below the measured pressure difference value;

Question:

How to define Maximum flow rate if 100 Pa cannot be reached?

Answer: According EN 13141-7:
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

Non ducted RVU shall be declared at 0 Pa external static pressure.

Justification:

Mistake in the regulation. Non-ducted single room units do regularly not operate at external pressure.

Article 2 Definitions (5) - (6) - Alternating heat recovery systems

Article 2 Definitions
For the purposes of this Regulation the following definitions shall apply:
(5) 'bidirectional ventilation unit (BVU)' means a ventilation unit producing an air flow between indoors and outdoors and which is equipped with both exhaust and supply fans;
(6) 'equivalent ventilation unit model' means a ventilation unit with the same technical characteristics according to the applicable product information requirements, but placed on the market as a different ventilation unit model by the same manufacturer, authorized representative or importer.

Question:

Is a Ventilation unit with alternating flow directions a UVU or a BVU?

Answer:

1. Alternating Ventilation Units placed on the market as pairs and tested according EN 13141-8 are bidirektional Ventilation Units BVU. Heat recovery is possible and shall be corrected due to wind impact according Table 10 EN 13141-8 by using η_5 for SEC and AHS calculation.

2. One single airflow unit is a UVU. If placed on the market as a UVU the unit needs instructions for supply/exhaust grilles. Heat recovery can, if partial possible, not be measured according EN 13141-8.

Justification:

ANNEX IV Information requirements for RVUs as referred to in Article 4(1):
(r) for unidirectional ventilation systems, instructions to install regulated supply/exhaust **grilles in the façade for natural air supply/extraction;**

Article 2 Definitions (5) UVU

(5) 'unidirectional ventilation unit' (UVU) means a ventilation unit producing an air flow in one direction only, either from indoors to outdoors (exhaust) or from outdoors to indoors (supply), where the mechanically produced air flow is balanced by natural air supply or exhaust;

Question:

What is the difference between a fan and an UVU?
What is part of an UVU and what is external component

Answer:

A fan (rotor and stator) integrated in a casing is considered as an UVU. This casing provides functional parts guiding the air but does not include **additional components** in the air stream (means air passing though): such as

- Dampers, butterfly dampers -> external pressure
- Rain guards -> external pressure
- Sound attenuators (not parts of casing) -> additional component or external
- Etc.

UVU´s shall be divided in

- UVU **with** air treatment -> unidirectional air handling units containing for example in the casing::
  - Filters -> reference and add component
  - Heating cooling coils -> add component
  - Sound attenuator -> add component
  - Humidifyers dehumidifyers etc. -> add component
  - Condensors/ evaporators of heat pumps -> add component

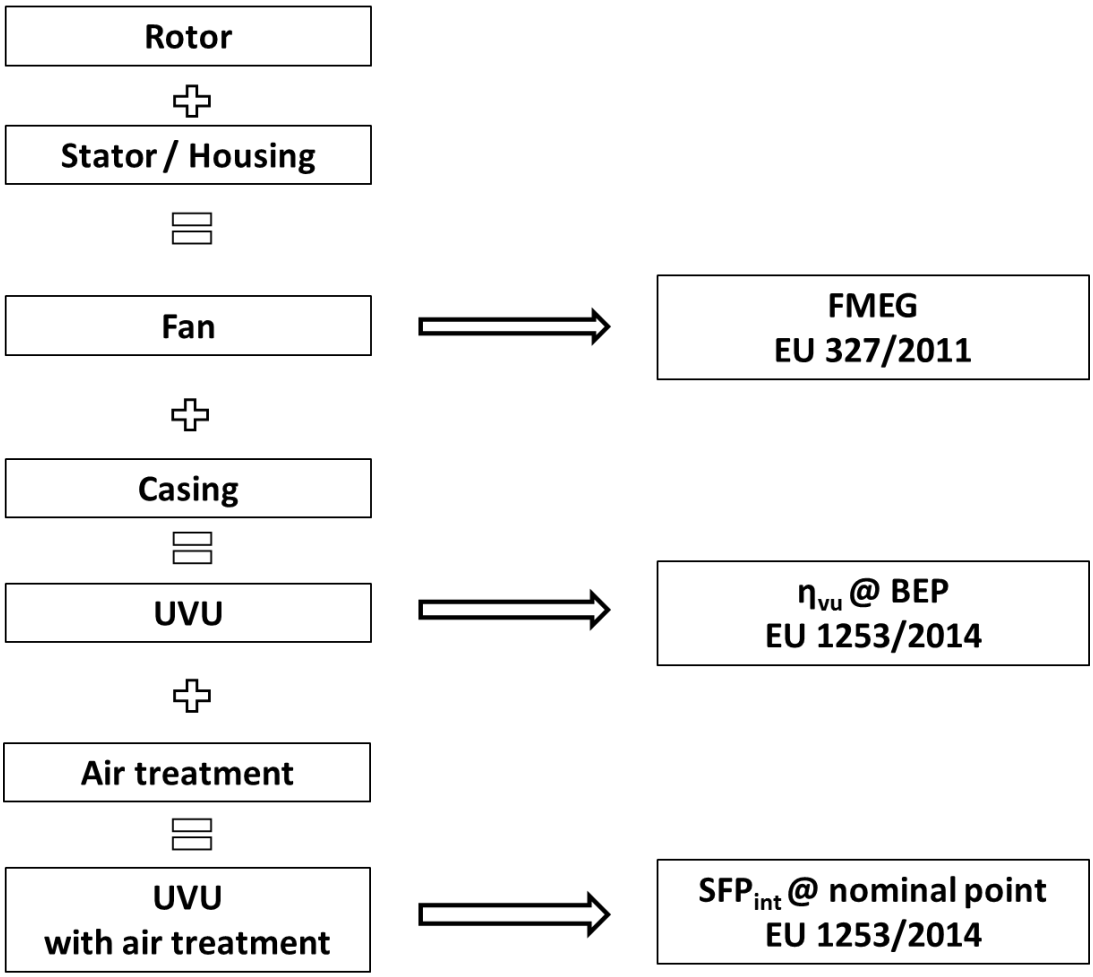
- UVU **without** air treatment -> ventilation fan units

1st/2nd layer approach as mentioned in "discussion-document-fans-ventilation-units-03.06.2015" does not reflect definitions of fans set out in 327/2011 in its initial proper sense and should therefore be replaced by this definition.

Justification:

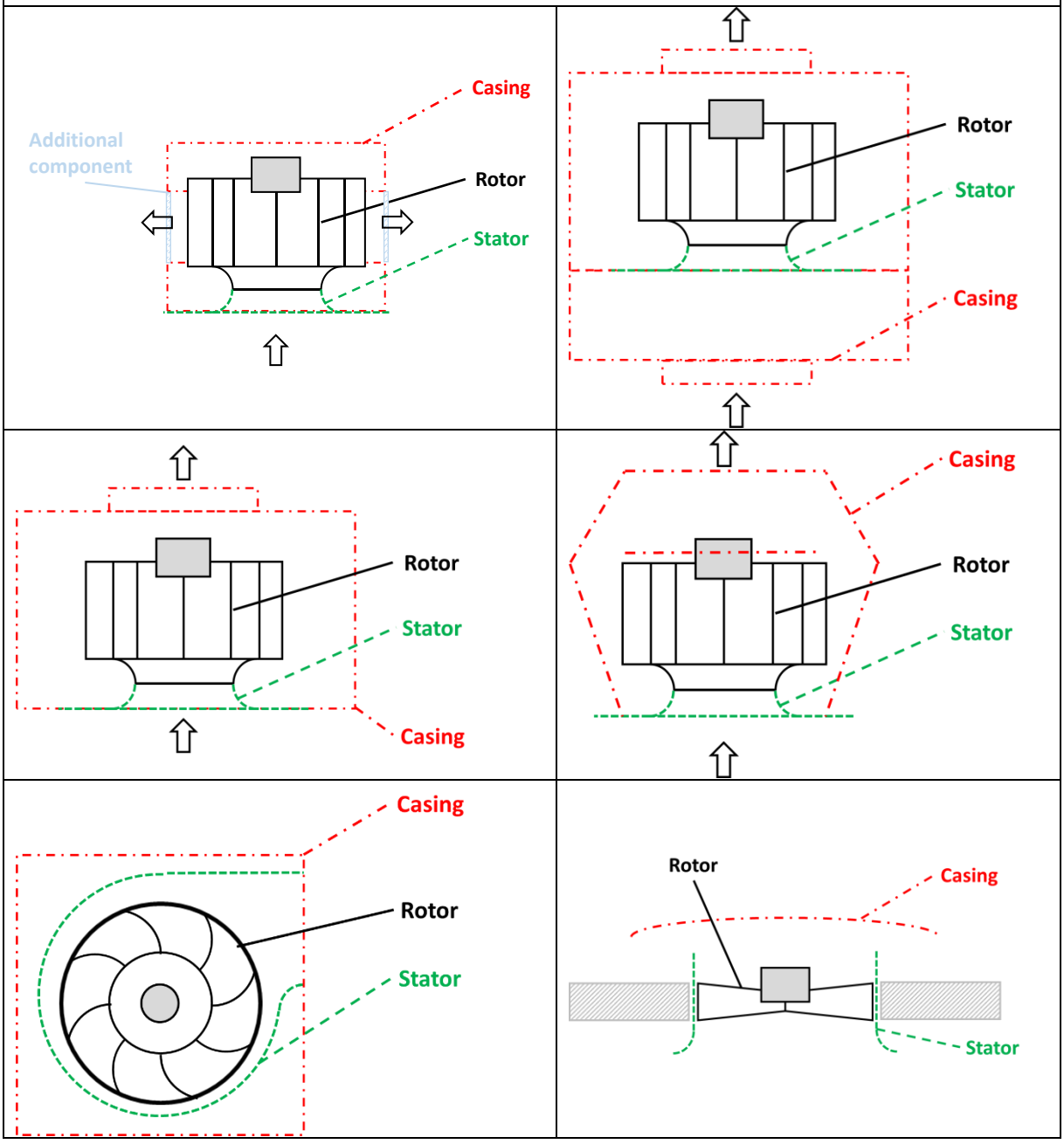
EU 327/2011 and the review is defining a fan including motor, rotor and stator (previously called housing).

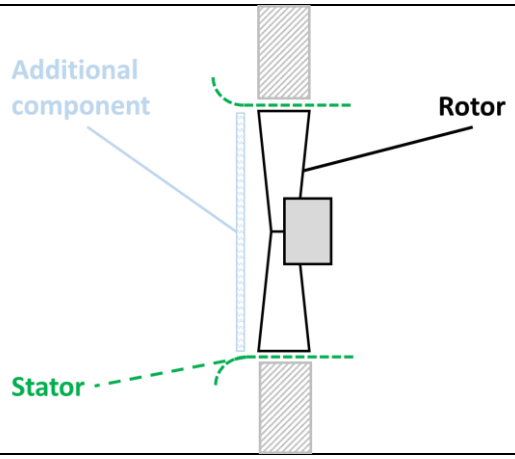
EU 1253/2014 is defining a ventilation unit, which contains minimum a fan in a casing suitable for ventilation purposes.


Rotor
Stator / Housing
Fan
FMEG
EU 327/2011
Casing
UVU
ηvu @ BEP
EU 1253/2014
Air treatment
UVU
with air treatment
SFPint @ nominal point
EU 1253/2014

Examples:

UVU according revision of EU 1253/2014



Fan according EU 327/2014	
	

Article 3 Ecodesign requirements - Dates

Article 3 Ecodesign requirements

1. From 1 January 2016 RVUs shall comply with the specific ecodesign requirements set out in Annex II, point 1.
2. From 1 January 2016 NRVUs shall comply with the specific ecodesign requirements set out in Annex III, point.1.
3. From 1 January 2018 RVUs shall comply with the specific ecodesign requirements set out in Annex II, point 2.
4. From 1 January 2018 NRVUs shall comply with the specific ecodesign requirements set out in Annex III point 2.

Question:

What does this mean for serial and individual produced Ventilation units?

Answer (view of the European Commission):

The requirements for serial and individual products shall be fulfilled, when the unit is placed on the market.

Question:

What is applicable: placing on the market or putting into service?

Answer:
Placing on the market is relevant

"putting into service" is used, as the EU legislation also needs to cover products, which are "physically" never placed on the market, but installed directly at the end-user's place.

Annex I 1. Definitions (4)

'variable speed drive (VSD)' means an electronic controller, integrated or functioning as one system or as a separate delivery with the motor and the fan, which continuously adapts the electrical power supplied to the motor in order to control the flow rate

In the draft of November 2013, the definition was more comprehensive and stated clearly that EC fans were considered as VSD:

(4) 'variable speed drive (VSD)' means [...], including EC (electronically commutated) motors with an internal control which can be considered to fulfil the VSD requirement, [...]

Question:

Is an EC (Electronically Commuted) fan considered as including a VSD?

Answer:

Yes, a fan equipped with EC motor is considered as equipped with VSD and thus fullfilling the VSD requirement.

Justification:

In the definition of draft 11/2013 it was clear that EC fans were considered as VSD. The definition in the published regulation has been truncated and is vague enough to include all fans controlled with some electronics

Annex I.1 Definitions (4) –variable speed drive and separate delivery:

(4) variable speed drive 'separate delivery'

(4)'variable speed drive (VSD)' means an electronic controller, integrated or functioning as one system or as a separate delivery with the motor and the fan, which continuously adapts the electrical power supplied to the motor in order to control the flow rate;

Question:

What does it mean 'separate delivery'?

Answer:

It means the delivery of the completed VU in different separate orders. This way can be possible a minimum of two separate deliveries: one for the VU, another for the VSD and, possibly or linked together, the sensor device or set of sensor devices that measures the parameters used for the demand controlled ventilation.

Justification:

A single RVU can be adjusted to the customers needs as it can be sold as system packages:

- RVU+ VSD + Humidity sensor ,
- same RVU+VSD+CO_2 sensor
- same RVU+Clock Control, etc.

Furthermore, the sensor control device can be linked together with the VSD in a 'separate delivery'.

A set of declarations has to be delivered for each valid combinations.

Example:

	Control Option					
	manual		clock		Local demand	
CTRL	1		0,95		0,65	
	SEC	**Class**	**SEC**	**Class**	**SEC**	**Class**
Unit xxx	-37	A	-38	A	-43	A+
Unit yyy	-26	B	-28	B	-37	A
Unit zzz	-22	D	-24	C	-34	A

This is also applicable for multi speed drive (Annex I.1 (3).

Question:

How to handle effective power, SFP and ηv_u of BVU and UVU (e.g. roof fans) if the controller for Multi Speed drive is not part of delivery?

Answer:

The values of SFP_{int} and ηv_u shall be corrected in analogy with the Factor C_C EU 327/2011.

Justification:

Fan regulation EU 327/2011 is defining:

> *(12) 'Part load compensation' C_c is a correction factor with one of the following values:*
>
> > *C_c=1 for a motor without a variable speed drive;*
> >
> > *C_c=1,04 for a motor with a variable speed drive and $P_e \geq 5$ kW;*
> >
> > *$C_c = -0{,}03 \ln(P_e) + 1{,}088$ for a motor with a variable speed drive and $P_e < 5$ kW;*
>
> *(8) 'Fan efficiency' (η_f) is the ratio of the fan gas power output P_u and the electric power input P_e, both expressed in W and determined at bep, multiplied with correction factor part load compensation C_c, following the expression:*
>
> > $\eta_f = C_c \cdot P_u / P_e$

Correction adapted to Ventilation Units:

Default correction if no specified variable speed drive is considered in the performance data P_{el} and SFP_{int}:

$C_{drive} = \frac{1}{C_C} = 1$: fan and motor and variable speed drive

$C_{drive} = \frac{1}{C_C} = \frac{1}{1{,}04} = 0{,}96$: fan and motor without variable speed drive and $P_{el} \geq 5$kW

$C_{drive} = \frac{1}{C_C}$: $C_c = -0{,}03 \ln(P_e) + 1{,}088$ for $P_e < 5$ kW

$$P_{el} = \frac{P_m}{C_{drive}} = P_m \cdot C_c$$

P_m: Electrical power of fan and motor without drive
P_{el}: Electrical power of fan and motor and drive

$$SFP_{int} = SFP_{int,no\ drive} \cdot C_c$$

The documentation shall include:

- Advice to install a specified drive and
- a description of additional items (multi speed drive or variable speed drive) used when determining the fan energy efficiency and SFP_{int} that are not supplied with the fan or

The ventilation unit shall have CE-mark according EU 1253/2014

Remark:

Variable voltage controllers where only the supply voltage for the motor is varied shall not be corrected (in analogy with EU 327/2011).

Annex 1.1 Definitions (7) internal leakage:

(7) 'internal leakage rate'means the fraction of extract air present in the supply air of ventilation units with HRS as a result of leakage between extract and supply airflows inside the casing when the unit is operated at reference air volume flow, measured at the ducts; the test shall be performed for NRVUs at 250 Pa;

Question:

How to determine the internal leakage rate?

Answer:

The 'internal leakage rate' corresponds to the 'Internal exhaust air leakage' as defined in EN 308 and to EATR (see prEN 16798-3), see definition below (see also Eurovent Comments 27th April 2015).

Internal leakage test, if not an EATR test, shall be performed with a pressure difference of 250 Pa between supply and extract air side, the higher pressure on supply air side; Δp22-11=250 Pa. All NRVU connections shall be closed during the leakage test. The supply air side is pressurised to 250 Pa with an external fan. The extract air side is connected to a flow measurement device and then to a suction fan. The pressure in the extract air is adjusted to be 0 Pa in order to avoid extract air side external leakage. The measured air flow will be the internal leakage.

Run-around HRS are connected through a heat transfer system and are not allowed to have any internal leakage, if there is a common wall between the supply and extract air side, then the leakage shall be tested with a differential pressure of 250 Pa in accordance with EN 308 and the leakage have to be negligible (less than 0.1 %). Recuperators can be tested with 250 Pa pressure difference in accordance with EN 308 or with an EATR test. EATR shall be tested for regenerators. EATR is defined as:

Extract Air Transfer Ratio (EATR) [%]: percentage of the extract air transferred to the supply air. With $q_{m,22,net}$ the portion of the supply air mass flow that originated as outdoor air (net supply air mass flow), EATR is defined as:

$$EATR = \frac{q_{m,22} - q_{m,22,net}}{q_{m,22}} = 1 - \frac{q_{m,22,net}}{q_{m,22}}$$

EATR is measured by gas concentrations of inert gas and represents the extract air leakage to the supply airflow, which is in general described as internal extract air leakage.

Annex 1.1 Definitions (8) carry over:

(8) carry over'means the percentage of the exhaust air which is returned to the supply air for a regenerative heat exchanger according to the reference flow;

Question:

How to determine carry over?

Answer

The carry over flow will be zero if the purging sector works in an ideal manner. Carry over will be present if insufficient or lack of purging sector. More information can be found in Eurovent 6/8, page 53. There is always a carryover from outdoor air to exhaust air.

Annex 1.1 Definitions (9) external leakage

(9) 'external leakage rate 'means the leakage fraction of the reference air volume flow to or from the inside of the casing of a unit to or from the surrounding air when it is subjected to a pressure test; the test shall be performed at400 Pa for NRVUs, for both under and over pressure;

Question:

How to determine external leakage

Answer:

The external leakage class shall be declared according to EN 1886 for non residential ventilation units.

Annex I.1 Definitions (10) (11) – Mixing rate

(10) 'mixing' means the immediate recirculation or short-circuiting of airflows between discharge and intake ports at both the indoor and outdoor terminals so that they do not contribute to the effective ventilation of a building space, when the unit is operated at reference air volume rate;

(11) 'mixing rate' means the fraction of extract airflow, as part of the total reference air volume, that recirculates between discharge and intake ports at both the indoor and outdoor terminals and thus does not contribute to the effective ventilation of a building space, when the unit is operated at reference air volume (measured at 1 m distance from the indoor supply duct), less the internal leakage rate;

Question:

How to determine the mixing rate for residential ventilation units?

Answer

Outdoor and indoor mixing of air flows shall be declared for non-ducted residential ventilation units (see Annex IV.1.p), where distances of air inlets and outlets are small.

Justification EN 13141-8 and draft prEN 13142:

Due to the small dimensions of a single room unit the distance between the air inlets and outlets can be very small and thus there is a great risk of mixing fresh outdoor air with used indoor air.
Tests are not necessary when the maximum air flow rate is according or below the values mentioned in EN 13141-8 Table 2. Outdoor mixing of ducted units.

Annex 1.1 Definitions (15) – reference flow rate - RVU

(15) 'reference flow rate' (expressed in m3/s) is the abscissa value to a point on a curve in the flow rate/pressure diagram which is on or closest to a reference point at 70 % at least of the maximum flow rate and 50 Pa for ducted units and at a minimum pressure for non-ducted units. For bidirectional ventilation units, the reference air volume flow rate applies to the air supply outlet;

Question:

How to determine reference flow rate for RVU?

Answer:

All data shall be specified at reference flow rate and corresponding static pressure (reference point)

For ducted units, the reference flow rate shall be determined as follows (see example down):

1. The fan speed at maximum setpoint of the unit at 100 Pa defines the maximum flow rate (maximum point).
2. Go down on the ideal load curve to 70% of maximum flow rate, which is reference flow rate.
3. Go vertical up to the next available fan curve
4. Intersection specifies reference point.
5. All data shall based on reference flow (SPI, heat recovery, leakage, acoustic etc.) shall be determined at reference point.

For unducted units reference flow is 70% of maximum flow at 0 Pa external pressure.

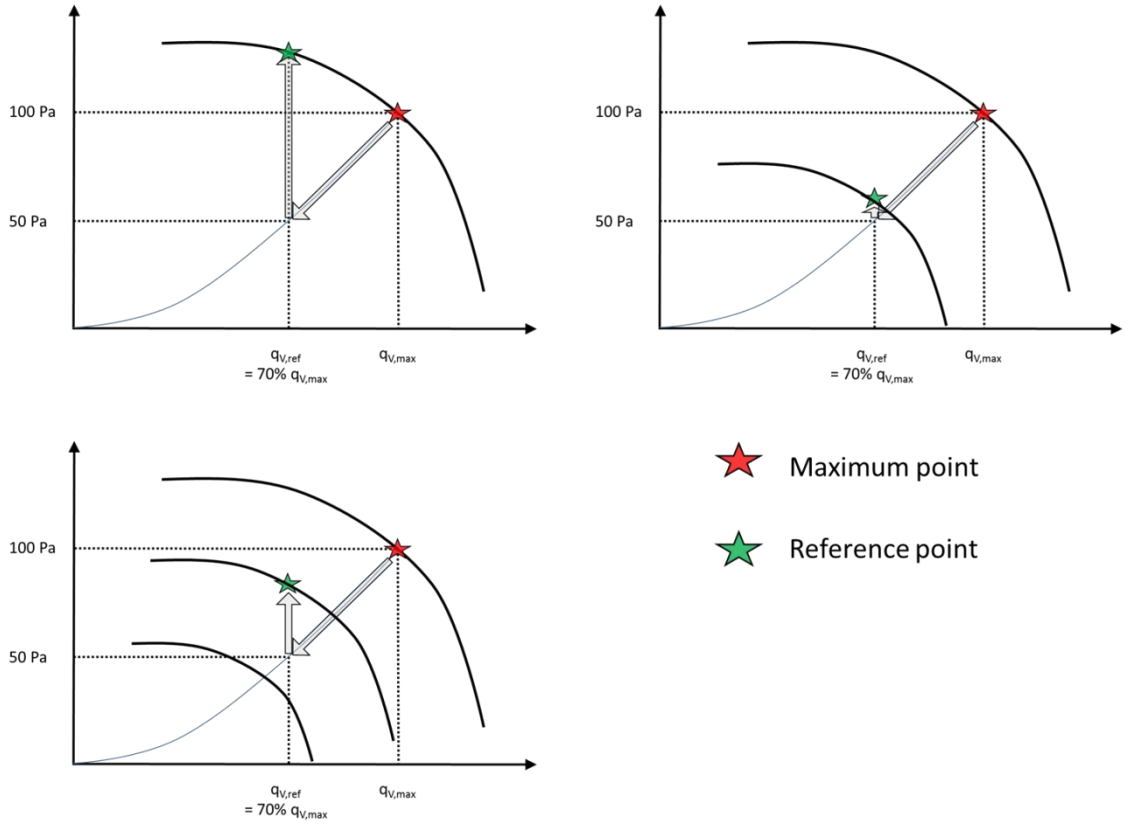
Question:

How to determine maximum flow rate for distinction between RVU and NRVU?

Answer:

Based on RVU the maximum flow rate shall be determined at 100 Pa external at the theoretical load curve. See following graphs.

Justification:


100 Pa
50 Pa
$q_{V,ref}$ = 70% $q_{V,max}$
$q_{V,max}$
100 Pa
50 Pa
$q_{V,ref}$ = 70% $q_{V,max}$
$q_{V,max}$
100 Pa
50 Pa
$q_{V,ref}$ = 70% $q_{V,max}$
$q_{V,max}$
Maximum point
Reference point

Annex I.1 Definition (16) –(21) CTRL and control parameter

(16) 'control factor (CTRL)' means a correction factor for the SEC calculation depending on the type of control that is part of the ventilation unit, according to the description in Annex VIII Table 1;

(17) 'control parameter' means a measurable parameter or set of measurable parameters that are assumed to be representative of the ventilation demand, e.g. the level of relative humidity (RH), carbon dioxide (CO2), volatile organic compounds (VOC) or other gases, presence, motion or occupancy detection from infrared body heat or from reflection of ultrasonic waves, electrical signals from human operation of lights or equipment;

(18) 'manual control' means any control type that does not use demand control;

(19) 'demand control' means a device or set of devices, integrated or as a separate delivery, that measures a control parameter and uses the result to regulate automatically the flow rate of the unit and/or the flow rates of the ducts;

(20) 'clock control' means a clocked (daytime-controlled) human interface to control the fan speed/flow rate of the ventilation unit, with at least seven weekday manual settings of the adjustable flow rate for at least two setback periods, i.e. periods in which a reduced or no flow rate applies;

(21) 'demand controlled ventilation (DCV)' means a ventilation unit that uses demand control;

Question:

How to specify CTRL factors?

Answer:

The CTRL factors shall be specified by the manufacturer considering the following aspects:

1. **Occupancy or presence sensors**,
   or sensors for other parameters that are representative for the ventilation demand (but not IAQ sensor):
   A measurable parameter or set of measurable parameters that are assumed to be representative of the ventilation demand and are not an IAQ sensor. For example :
   a. Detection of presence
   b. Detection of motion or occupancy from infrared body heat or from reflection of ultrasonic waves
   c. Electrical signals from human operation of lights or equipment
   d. Other parameters that are representative of the ventilation demand

2. **IAQ sensor** (CO2, VOC, humidity, etc.) :
A measurable parameter or set of measurable parameters that are assumed to be representative of the ventilation demand and that can measure the concentration of gas or humidity or other "pollutant" which have an impact on the indoor air quality. For example :
   a. Detection of the level of relative humidity (RH),
   b. Detection of the level of carbon dioxide (CO2),
   c. Detection of the level of volatile organic compounds (VOC)
   d. Detection of the level of other gases or other parameters that influence the well human being.

3. **Demand control**:
A device or set of devices, integrated or as a separate delivery, that measures a control parameter and uses the result to regulate automatically the flow rate of the unit and/or the flow rates of the ducts.

The CTRL factors shall be specified by the manufacturer based on the following aspects:

	Description	**CTRL**	
		Central units	Single room units
Manual control	any control type that does not use demand control	1	1
Clock control	a clocked (daytime-controlled) human interface to control the fan speed/flow rate of the ventilation unit, with at least seven weekday manual settings of the adjustable flow rate for at least two setback periods, i.e. periods in which a reduced or no flow rate applies	0,95	0,95
Central demand control	a demand control of a ducted ventilation unit that continuously regulates the fan speed(s) and flow rate based on one sensor (type O or I) for the whole ventilated building or part of the building at central level	0,85	-
Local demand control	a demand control for a ventilation unit that continuously regulates the fan speed(s) and flow rates based on more than one sensor (type O or I) for a ducted ventilation unit or one sensor for a non-ducted unit	0,65	0,65

Annex I.1. Definitions (35) - Thermal by-pass facility - Fans OFF

(35) 'thermal by-pass facility' means any solution that circumvents the heat exchanger or controls automatically or manually its heat recovery performance, without necessarily requiring a physical airflow bypass (for example: summer box, rotor speed control, control of air flow);

Question:

Is one fan switched off a by-pass facility?
Is both fans switched off a by-pass facility?

Answer:

One fan switched off during summer season (non-heating) can generally not be considered as a thermal by-pass facility.
It may only be accepted as a bypass facility if air volume flow is balanced by designed openings in the facade in analogy with UVU ventilation systems (see annex IV (r)).

Note: For central non residential ventilation units not possible

Two fans off is not a thermal by-pass.

A physical bypass of heat recovery shall be able to bypass at least 90% of air volume flow.

Justification:

Annex IV:
(r) for unidirectional ventilation systems, instructions to install regulated supply / exhaust grilles in the façade for natural air supply / extraction;

Annex 1.2 Definitions. NRVU (3) - Reference Configuration

(3) 'reference configuration of a BVU' means a product configured with a casing, at least two fans with variable speed or multi-speed drives, a HRS, a clean fine filter on the inlet-side and a clean medium filter on the exhaust-side;

Question:

What is included in the reference configuration?
What is not included?

Answer:

Reference configuration of a BVU includes the following components:

- two fans
- heat recovery
- casing including flow entrance and exit
- clean filters M5 extract and F7 supply air

Reference configuration does not include any other components in the unit like:

- Sound attenuator
- second and additional filter stages
- cooling or heating coils
- humidifiers and dehumidifiers
- heat exchangers from heat pumps or condensing units
- Etc.

The design of the fan (efficiency) includes the pressure of all additional components and external pressure of the ductwork. See SFP_{int}

Question:

What if a single Filter in the airstream is not an F7 supply or M5 exhaust filter?

Answer:

The values of $SFP_{int,.limit}$ and/or $\Delta p_{add\ components}$ shall be corrected.

Example case:

1. The unit has a higher efficient filter, for example a single F9 Filter in supply, then the difference between F=200 of F7 and the F of the F9 filter is considered as additional component.
2. The unit has a single M5 filter in supply, then the difference between F= 200 of F7 and the F=160 of the M5 Filter has to be deducted from $SFP_{int,\ limit}$
3. No filter: Correction as stated in the regulation

Annex I.2 Definitions (4). Definitions for NRVU – reference configuration UVU

(4) 'reference configuration of an UVU' means a product configured with a casing and at least one fan with variable speed or multi-speed drive, and — in case the product is intended to be equipped with a filter on the inlet-side — this filter shall be a clean fine filter;

Question:

What is reference configuration for an exhaust UVU intended to be used with a filter?

Answer:

The values of $SFP_{int,.limit}$ and/or $\Delta p_{add\ components}$ shall be corrected (see filter correction)

Justification:

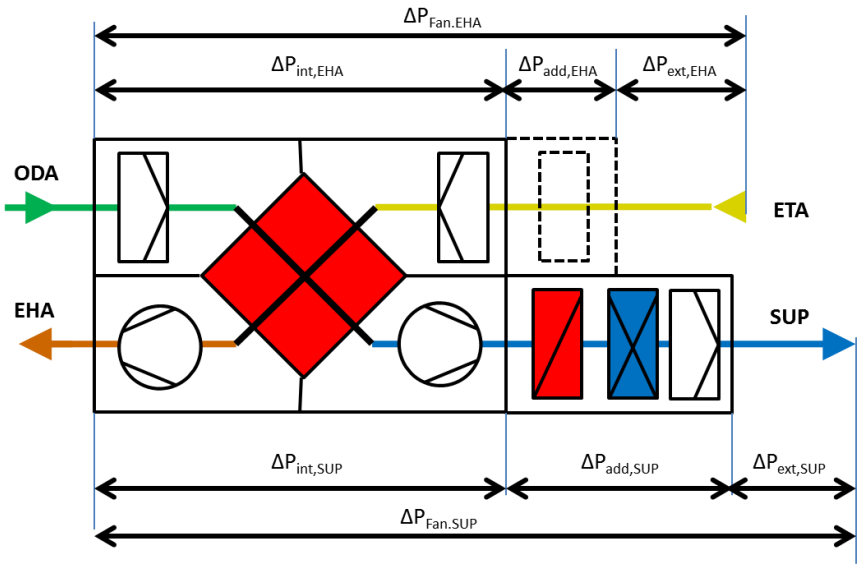
An UVU intended to be used with a filter seem to be considered as a supply air unit $SFP_{int,limit}$ = 250 (230 in Tier 2 starting Jan 2018).

Annex I.2 Definitions for NRVU (12) - internal specific fan power

(12) 'internal specific fan power of ventilation components (SFPint)' (expressed in W/(m3/s)) is the ratio between the internal pressure drop of ventilation components and the fan efficiency, determined for the reference configuration;

Question:

How to determine SFP_{int}?



The **specific fan power, *SFP*int** is the electric power supplied to a fan and related to the internal pressure of all ventilation components (Filters, heat recovery and related casing including flow entrance and exit) divided by the air flow expressed in m^3/s under design load conditions.
The **specific fan power, *SFP*add** is the electric power supplied to a fan and related to the internal pressure of all internal additional ventilation components (coolers, heaters, humidifier, etc.) divided by the air flow expressed in m^3/s under design load conditions.
The **specific fan power, *SFP*ext** is the electric power supplied to a fan and related to the external pressure divided by the air flow expressed in m^3/s under design load conditions.

$P_{SFP,\,SUP} = P_{SFP,\,SUP,\,int} + P_{SFP,\,SUP,\,add} + P_{SFP,SUP,\,ext}$

$P_{SFP,\,EXT} = P_{SFP,\,EXT,\,int} + P_{SFP,\,EXT,\,add} + P_{SFP,EXT,\,ext}$

$$P_{SFP,all} = \frac{\Delta p_{int,stat}}{\eta_{stat}} + \frac{\Delta p_{add,stat}}{\eta_{stat}} + \frac{\Delta p_{ext,stat}}{\eta_{stat}}$$

The requirement of the regulation is the sum of both air streams::

$P_{SFP,int} = P_{SFP,\,SUP,\,int} + P_{SFP,\,EXT,\,,int}$

$$\Delta p_{all} = \Delta p_{int} + \Delta p_{add} + \Delta p_{ext}$$

For each air stream the values shall be calculated as follows:

$$P_{SFP,int} = P_{SFP,all} \times \frac{\Delta p_{int}}{\Delta p_{all}} = P_{SFP,all} \times \left(1 - \frac{\Delta p_{add+}\Delta p_{ext}}{\Delta p_{all}}\right)$$

Question:

How to calculate SFP_{int} with unbalanced units?

Answer:

Limits:

The limits Annex III $SFP_{int,limit}$ shall be calculated with the average flow SUP and EXT

$$q_{V,nom} = \frac{q_{V,SUP} + q_{V,EXT}}{2}$$

Real Unit:

SFP real shall be calculated with the real values for supply air and extract air and added, using the principles above:

$P_{SFP,int} = P_{SFP, SUP, int} + P_{SFP, EXT, ,int}$

Title: Annex III - "Minimum Fan Efficiency"

The minimum fan efficiency for UVUs (ηv u) is
— 6,2 % * ln(P) + 35,0 % if P ≤ 30 kW and
— 56,1 % if P > 30 kW.

Question:

Does η_{vu} refer to both UVUs including air treatment and UVUs without air treatment?

Answer:

η_{vu} refers to UVUs **without** air treatment only at the best efficiency point of the fan.

In consequence UVU **with** filter shall comply with SFP_{int} only

Justification:

UVUs including filter would be discriminated otherwise, because the pressure loss of the air treatment reduces the "fan efficiency". UVUs including air treatment are accessed on the basis of SFP_{int} at nominal operation point.

- UVU defined as an ventilation unit with at least minimum one filter SFP_{int} = 250 / 230 (Tier 2) W/m³/s
- UVU defined as an ventilation unit with no air treatment (only moving air like box fans) fan efficiency η in %

Annex I - 2. Definitions for NRVU (2) "fan efficiency"

(2) 'fan efficiency (ηfan)' means the static efficiency including motor and drive efficiency of the individual fan(s) in the ventilation unit (reference configuration) determined at nominal air flow and nominal external pressure drop;

Question:

Does this fan efficiency η_{fan} refer to the individual fan(s) in the VU or to the complete VU (including housing)?

Answer:

η_{fan} refers to the complete UVU at the best efficiency point of the fan.

Justification:

The efficiency requirement of the individual fans (P>125W) is determined in the fan regulation EU 327/2011. The efficiency of the incorporated fans cannot be subject of different requirements at the same time.

For a stakeholder of both fans according regulation 327/2011 and ventilation units according regulation 1253/2014, the definition given in 1253/2014 for 'fan efficiency (η_{fan})' could be misunderstood as the efficiency of the fan alone (327/2011) as a component of the ventilation unit. This mistake is based in the definition of the efficiency in the best efficiency point (reg. 327/2011) or at nominal point (reg.1253/2014). Since the 'fan efficiency (η_{fan})' given in 1253/2014 is for the ventilation unit in its reference configuration, it would be better to redefine it or clarify it as the following proposal:

- 'aerodynamic ventilation unit efficiency (η_{vu})' instead of 'fan efficiency (η_{fan})'
- 'aerodynamic ventilation unit target efficiency (η_{target_vu})'instead of 'minimum fan efficiency (η_{vu})'

Annex 4 and 5: Language of product information according annex 4 and 5

Question:

How to deal with the language and translation of these documents?

Is it mandatory to have the information in the language of the country where the unit is sold, or is one English document enough?

Answer:

The language(s) of the country where the unit is placed on the market.
The abbreviations are allowed in English.

Annex III: Specific ecodesign requirements for NRVU

Question:

Shall Non residential BVU be declared at one point or as a valid area?

Answer:

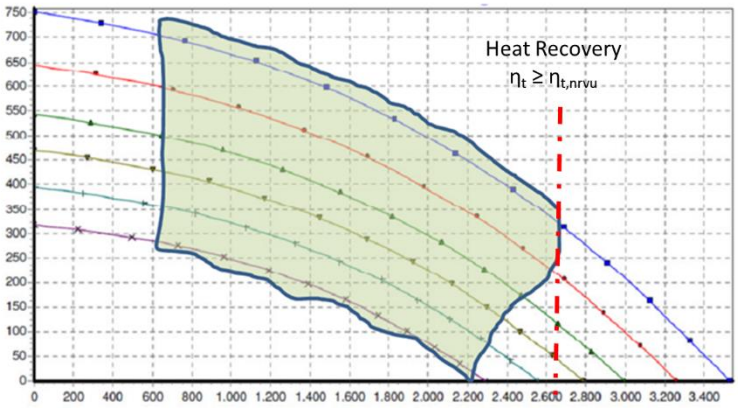
The manufacturers are under a legal obligation to ensure that any ventilation unit (i.e., deriving from any possible product combination) within the scope of the Ecodesign Regulation, shall meet the requirements within that regulation.

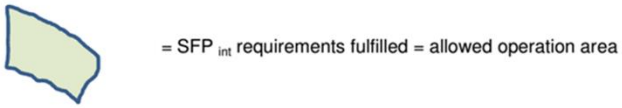
NVRU consists of two main groups, i.e. tailor-made NVRUs and mass-produced standardised compact NVRUs. They deviate in the matter of working point. A tailor-made NVRU is designed for specific working points but a compact NVRU is typically used for a wide range of working points.
If the working point is not specified by the customer, which can be the case for a mass-produced compact NVRU, one can declare a field (graph) of nominal airflows with associated 'nominal external pressure (Δps, ext)', SFP_{int} and ηt_nrvu (thermal efficiency).
The customer could then be allowed to use the NRVU if the design working point is within the declared field.

See also DTI Questions from Stakeholder 15th June 2015.

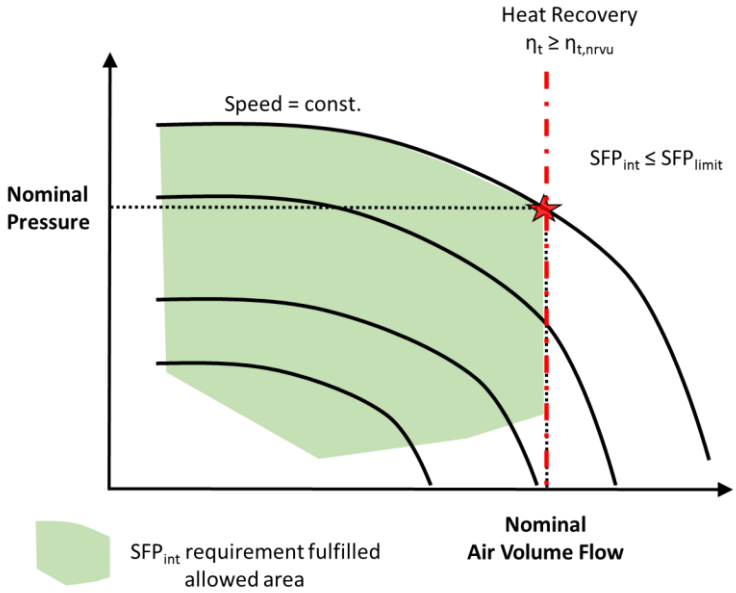
The area of the possible working points can be specified as follows (Optional 1 or 2):

1. Calculate SFP_{int} for each combination of pressure and air volume flow. The allowed area is $SFP_{int} \leq SFP_{limit}$
   The limitation on the right side is either:
   a. The SPF_{limit} and/or
   b. The limit of heat recovery efficiency or
   c. both





2. Manufacturer can specify an operation point (pressure and air volume flow) where $SFP_{int} \leq SFP_{limit}$.
   The upper limitation of the allowed area is the constant fan speed line corresponding to this operation point.
   The limitation on the right side is either:
   a. The SPF_{limit} and/or
   b. The limit of heat recovery efficiency or
   c. Both



ANNEX V
Information requirements for NRVUs as referred to in Article 4(2)

(o) declared maximum external leakage rate (%) of the casing of ventilation units; and declared maximum internal leakage rate (%) of bidirectional ventilation units or carry over (for regenerative heat exchangers only); both measured or calculated according to the pressurisation test method or tracer gas test method at declared system pressure;

Question:

Is external leakage relevant for UVU?

Answer:

External leakage rate is relevant for both side ducted UVU (measurement Cat D EU 327/2011).

Annex VI Verification and CE-marking

Question:

How to fix CE-mark if the product fulfils not all relevant EU-Regulation?

The case:

1. Fan is sold outside of the EU. This fan or ventilation unit does not comply with ErP EU 327/2011or 1253/2014 but it complies with LVD, EMC and MD (Machines Directive).

The Declaration of conformity includes only the fulfilled criteria and EU-Regulation.

CE mark possible based on the fulfilled regulation plus declaration of incorporation if needed: