From EN14511:2013 to prEN14511-2018

ROOFTOPS PROGRAMME (RT)

Waiting for the publication of the EN14511:2018 standard, expected during 1st semester of 2018, the following guide explains the method to calculate the performances of rooftops from the current version of EN14511:2013 standard.

This document is temporary until the formal modification of the Rating Standard RS-6/C/007-2018.

The clauses 4.4.1.3 (Indoor unit) & 4.4.1.4 (Outdoor unit) from EN14511-3:2013 shall be replaced by the following requirements:

1) Units ducted on the indoor heat exchanger

The air volume flow rate $q_{v,declared}$ as specified by the manufacturer for the cooling mode (or heating mode if no cooling mode of the unit) shall be related to standard air.

Note: This air volume flow rate is the one declared in the RT declaration list (Qv).

$q_{v,declared}$ is the targeted flow rate during the initial test in fan mode.

During this test, the measured airflow $q_{v,measured}$ should be set and corrected according to the actual $\rho_{(measured)}$ to reach $q_{v,declared}$ using the formula below:

$$q_{v,declared} = \frac{1.204}{\rho_{(measured)}} \times q_{v,measured}$$

Where

$q_{v,declared}$	is the air flow rate as declared by the manufacturer
1,204	is the density of standard air (20° C, 101 325 Pa) expressed in kg/m^3.
$\rho_{(measured)}$	is the measured density, expressed in kg/m^3
$q_{v,measured}$	is the air flow rate as measured by the laboratory (note: during airflow test at 20 °C)

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Example:

$Qv = q_{v, declared}$ = *25000 m³/h at standard air condition, declared by the manufacturer.*
If during the airflow test, ρ $_{(measured)}$ = 1.18:
Thus, 25000 = $\frac{1.204}{1.18} \times q_{v,measured}$
$q_{v,measured}$ = *24502 m³/h*

Note: This is a calculation only for laboratory and customer information when fan speed of the unit, airflow and Δpe corr (or Δpe measured) will be set.

If the air flow rate is declared by the manufacturer with no atmospheric pressure, temperature and humidity conditions, it shall be considered as given for standard air conditions. Otherwise, the air flow rate <u>under standard air conditions $q_{v\,declared}$</u>, shall be <u>calculated</u> using formula below, *replacing Formula (8) from EN14511-3:2013*.

$$q_{v,declared\ corrected} = \frac{1.204}{\rho_{(declared)}} \times q_{v,declared}$$

2) Calculation of available external static pressure difference

This resulting ESP shall be converted to standard air using Formula below, *replacing Formula (9) from EN14511-3:2013*, to obtain the <u>corrected</u> ESP, $\Delta p_{e(corr)}$.

$$\Delta p_{e(corr)} = \frac{1.204}{\rho\ (measured)} \times \Delta p_{e(measured)}$$

Where

1.204	is the density of standard air (20°C, 101 325 Pa) expressed in kg/m³;
$\rho_{(measured)}$	is the measured air density, expressed in kg/m³;
$\Delta p_{e(measured)}$	is the measured available external static pressure difference, expressed in Pa, as defined in EN14511-1:2013 (§2.54).

If $\Delta p_{e(corr)}$ is lower than the minimum value given in Table 2 (or Table 3), the air flow rate is decreased to reach this minimum value.
If $\Delta p_{e(corr)}$ is greater than twice the minimum value given in Table 2 (or Table 3), the air flow rate is increased to reach twice this minimum value.
If $\Delta p_{e(corr)}$ is greater than the minimum value given in Table 2 (or Table 3) but not greater than twice this minimum value, then keep this $\Delta p_{e(corr)}$.

Notes:
- Modifying the airflow is performed by using the method described in EN 14825 (use a damper at the outlet of the duct, and adjust 0 Pa just after this damper).
- For a ducted outdoor unit, there is only a minimum 30 Pa requirement, but the process is similar.

The § 4.1.5.2 from EN14511-3:2013 shall be replaced by the following requirements:

3) Power input correction for integrated fans

If a fan is an integral part of the unit, only a fraction of the power input of the fan motor shall be included in the effective power absorbed by the unit. The fraction that is to be excluded from the total power absorbed by the unit shall be calculated using formula below:

$$\frac{qv, declared \times \Delta pe(corr)}{\eta}$$

Where

qv, declared	is the air volume flow rate at standard rating conditions, expressed in m^3/s and set according to clause 2);
$\Delta p_{e(corr)}$	is the available external static pressure difference, expressed in Pa and set according to clause 2);
η	is equal to η_{target} as declared by the fan manufacturer according to the ecodesign regulation n°327/2011 for fans driven by motors between 125 W and 500 kW; otherwise is equal to 0.3 by convention.

Notes:

- Power input correction for integrated fans will be used as a constant value during all required airflow or capacity tests in the certification process.
- For fans motors with a power input greater than 125 W, η_{target} shall be declared by the participant.

4) Capacity calculation

In each thermal points, the corresponding q$_{v\ measured}$ is used for the capacity calculation using the formula below:

$$P_{c,h} = \frac{q_{v,(measured)}\ (h_{\alpha1} - h_{\alpha2})}{v'_n\ (1 + Wn)}$$