



EUROVENT CERTIFICATION COMPANY

# **RS 6/C/004 - 2010**

Issued April 2010

**RATING STANDARD  
for the  
CERTIFICATION  
of  
CHILLED WATER CLOSE CONTROL  
AIR CONDITIONERS**

# RS 6/C/004 - 2010

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## I. PURPOSE

The purpose of this standard is to establish definitions and specifications to be used in connection with the EUROVENT CERTIFICATION Programme for Chilled Water type Air Conditioners used in Close Control Applications.

## II. SCOPE

This standard applies to factory made units intended to produce cooled air for air conditioning. This Programme excludes units with cooling capacity exceeding 100 kW at the test conditions specified in Section V.

## III. DEFINITIONS

### **Air Conditioner**

An Air Conditioner is an encased assembly or assemblies designed as a unit to provide conditioned air to an enclosed space. It includes or is connected to an electrically operated refrigeration system for cooling and possibly dehumidifying the air. It may have means for heating, circulating, cleaning and humidifying the air. Where such equipment is provided in more than one assembly, the separate assemblies are to be used together.

An Air Conditioner may be designated as:

### **Single Packaged Unit:**

A factory assembly of components of a refrigeration system suitably fixed on a common mounting to form a single unit.

### **Split Packaged Unit**

A factory assembly of components of a refrigeration system suitably fixed on two or more mountings to form a matched functional unit.

### **Comfort Air Conditioner:**

Unit designed to satisfy the requirements of the occupants of the air conditioned enclosure.

### **Close Control Air Conditioner:**

Unit designed to satisfy the requirements of the process carried out in the conditioned enclosure.

### **Chilled Water Close Control Air Conditioner:**

Close Control Air Conditioner connected to a chilled fluid generator which contains a refrigeration circuit.

### **Total Cooling Energy:**

Heat removed by the Air Conditioner from air within a defined interval of time.

### **Total Cooling Capacity:**

Total cooling energy divided by the defined interval of time.

**Sensible Cooling Capacity:**

Capacity of the unit to remove sensible heat from the evaporator intake air.

**Sound Power:**

Total sound energy radiated by the Air Conditioner per unit of time.

**A-Weighted Sound Power:**

A single figure on a specific scale which can be related to the subjective assessment of the loudness of a noise.

**Effective Power Input:**

Average electrical power input to the unit within a defined interval of time obtained from:

- a) The power input for operation of the compressor (excluding Chilled Water Close Control Air Conditioners) and any power input for defrosting excluding additional electrical heating devices not used for defrosting
- b) The power input of all control and safety devices of the unit
- c) The power input of the fan(s) within the unit or the power allowance for units without fans (see V.3)
- d) The power input for fluid circulating pumps if included in the Air Conditioner or the power allowance defined in V.3d.

#### **IV. TESTING REQUIREMENTS**

Standard ratings shall be established at the standard rating conditions specified in section V. All standard ratings shall be verified by tests conducted in accordance with the following standards:

- Performance testing using the calorimeter room method (for non ducted units and for ducted units with a total cooling capacity lower than 12 kW):  
**EN 14511** “Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling”.
- Performance testing using the air enthalpy method (units with a total cooling capacity greater than 12 kW):  
**EN 14511** “Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling”.
- Acoustical testing:  
**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” considering the frequency range of interest between 100 Hz and 10 kHz” with exception of the duct end correction method described in section 6.2.2 of this standard.
- Acoustical testing of large equipment:  
**EUROVENT 8/1** “Acoustical measurement on machines and equipment in the free fields or large rooms on a hard reflecting plane”.

Specifications concerning temperature conditions and installation of units for acoustical testing are defined in RS 6/C/006- 2010.

## V. RATING REQUIREMENTS

### V.1 General

Standard rating conditions in Table 1 shall be used. The tests shall be carried out at the rated voltage and rated frequency specified on the nameplate of the unit with the supplied air filter.

Units with dual-rated frequencies shall be tested at each frequency.

For dual-rated voltage unit, the test shall be performed at the lowest voltage.

The ambient temperature surrounding units or parts with duct connection on the air inlet and outlet sides shall be set between 15 and 30°C.

**Table 1: Operating conditions for standard rating  
Chilled Water Close Control Air Conditioner**

Air entering °C		Chilled Water °C	
Dry bulb	Wet bulb	In	Out
24	17	7	12,5

**Table 2: Allowable deviations from set values**

Measured quantity	Allowable deviation from set values of the arithmetic mean values	Allowable deviations from set values of individual measured values
Dry bulb temperature	0,3 K	1,0 K
Wet bulb temperature	0,2 K	0,5 K
Water temperature	0,1 K	0,3 K
Air and water flow rate	2 %	5 %
Voltage	2%	2 %

### V.2 Pressure Requirement for Close Control Air Conditioners

For duct or double floor connected Chilled Water Close Control Air Conditioners, the tests shall be carried out with the air filter installed as specified by the manufacturer

and at the following external static pressure (or the nearest value included in the working range declared by the manufacturer).

For downflow discharge into double floor:

- **20 Pa** for units with capacity < 30 kW
- **75 Pa** for units with capacity ≥ 30 kW

For upflow discharge into duct: **50 Pa**.

The airflow rates shall be as specified by the manufacturer. If part of the system, both humidifier and reheater units shall be installed but not operating during the capacity testing.

### **V.3 Fan Power Treatment**

#### **a. Cooling Capacity**

The cooling capacity of the Air Conditioner is determined by measurements in a calorimeter room or by the air enthalpy method.

If the fan at the evaporator is an integral part of the Air Conditioner, the heat from the fan power input shall be reflected as a reduction of cooling capacity. Thus, the net cooling capacity (i.e. rated capacity) shall equal the gross cooling capacity (excluding fan power input) less the fan power input.

If the fan at the evaporator is not an integral part of the Air Conditioner, an appropriate fan input power, determined in accordance with V.3c shall be deducted from the system gross cooling capacity to compute the net cooling capacity (i.e. rated cooling capacity).

#### **b. Power input of fans for Air Conditioners without duct connection**

In the case of Air Conditioners which are not designed for duct connection, i.e. which do not permit any external static pressure differences and which are equipped with an internal fan, the power absorbed by the fan shall be included in the effective or total power absorbed by the Air Conditioner.

#### **c. Power input of fans for Air Conditioners with duct connection**

If no fan is provided with the Air Conditioner, an equivalent fan power of 215 Watts per 1000 m<sup>3</sup> per hour air volume shall be included in the effective power absorbed by the Air Conditioner. An equal amount shall be deducted from the cooling capacity as determined in accordance with V.1.

If the fan is an integral part of the Air Conditioner, the actual power input to the evaporator fan motor shall be included in the effective power absorbed by the Air Conditioner.

#### **d. Power input of water pump**

If no pump is provided with the Air Conditioner, an equivalent proportional pump power of 35 Watts shall be assigned per each 1000 Watts of cooling capacity. The pump power shall be added to the compressor and fan power.

To calculate total effective power input, there shall be no adjustment to the system capacity.

If the pump is an integral part of the Air Conditioner, the actual power input to the pump shall be included in the total effective power absorbed by the Air Conditioner.

## **VI. CERTIFIED CHARACTERISTICS**

The following characteristics of Chilled Water Close Control Air Conditioners shall be verified by tests:

- Total cooling capacity,
- Sensible cooling capacity,
- Effective power input,
- A-weighted sound power level indoor side (non-ducted units),
- A-weighted sound power radiated by the duct (ducted units),
- Water pressure drop.

## **VII. TOLERANCES**

When tested by the EUROVENT CERTIFICATION Laboratory the characteristics obtained shall not differ from the values claimed in the participant's literature by more than:

- Capacity - 8 %
- Effective power input + 8 %
- A-weighted sound power + 0 dB
- Water pressure drop + 10 %