
Dehumidifiers with electrically driven compressors - Rating tests, marking, operational requirements and technical data sheet

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Entfeuchter mit elektrisch angetriebenen Verdichtern - Leistungsprüfungen, Kennzeichnung, Funktionsanforderungen und technische Datenblätter

Déshumidificateurs a compresseur entraîné par moteur électrique - Essais de performance, marquage, exigences de fonctionnement et fiche technique

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91.140.30 Ú!^: !æ^çæ} ã Á|ã æ\ã Ventilation and air-conditioning
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EUROPEAN STANDARD

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EUROPÄISCHE NORM

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Descriptors: air conditioning equipment, humidifiers, tests, testing conditions, installation, measurements, calorific power, marking

English version

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moteur électrique - Essais de performance,
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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee by CEN/TC 113 "Heat pumps and air conditioners", the secretariat of which is held by AENOR.

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of an identical text or by endorsement, at the latest by August 1997, and conflicting national standards shall be withdrawn at the latest by August 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This standard specifies the methods for testing and reporting the rating and operational requirements and it specifies requirements for marking for dehumidifiers with electrically driven compressors. This standard does not apply to continuously variable capacity control units.

In the case of dehumidifiers consisting of several parts, the standard applies only to those designed and supplied as a complete package.

2 Normative references

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred applies.

- EN 255-1 Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors - Heating mode - Part 1: Terms, definitions and designations
- EN 814-1 Air conditioners and heat pumps with electrically driven compressors - Cooling mode - Part 1: Terms, definitions and designations
- EN 60335-2-40 Safety of household and similar electrical appliances - Part 2: Particular requirements for electrical heat pumps, air conditioners and dehumidifiers (IEC 335-2-40:1992 modified)
- ENV 12102 Air conditioners, heat pumps and dehumidifiers with electrically driven compressors - Measurement of airborne noise - Determination of sound power level

3 Definitions

For the purpose of this standard the definitions given in EN 255-1 and EN 814-1 apply together with the following.

3.1 dehumidification for Comfort: Dehumidification to reduce the humidity within a space to a level to satisfy the requirements of the occupants.

3.2 dehumidification for Process: Dehumidification to reduce the humidity within a space to a level necessary for the process or the storage of goods and/or materials or the drying out of a building.

3.3 dehumidification for Heat Recovery: Dehumidification where the latent and sensible heat removed from the space together with the compressor heat is re-used in another application rather than rejected outside to waste.

3.4 dehumidifier: Encased assembly designed to remove moisture from its surrounding atmosphere. It includes an electrically operated refrigeration system and means to recirculate air. It also includes a drain arrangement for collecting and storing and/or disposing of the condensate.

3.5 dehumidification capacity: Measure of the net removal of moisture by the unit from its surrounding atmosphere expressed in liters per hour.

3.6 dehumidification efficiency ratio (DER): Ratio of dehumidification capacity to the effective power input of the dehumidifier measured over a defined interval of time.

4 Rating test

4.1 Basic principles

4.1.1 General

All measured parameters, with the exception of time measurement shall be understood to be average values over the duration of the test period.

4.1.2 Dehumidification capacity

The capacity of the dehumidifier is determined by measurements in a suitable test chamber.

4.1.3 Power input of fans for dehumidifiers without duct connection

In the case of dehumidifiers which are not designed for duct connection, i.e. which do not permit any external pressure difference, and which are equipped with an integral fan, the power absorbed by the fan shall be included in the (effective or total) power absorbed by the dehumidifier.

4.1.4 Power input of fans for dehumidifiers with duct connection

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

$$\frac{q \Delta p_e}{\eta} \quad \text{in watts}$$

where:

- η is 0,3 by convention;
- Δp_e is the available external static pressure difference, in pascals;
- q is the nominal air flow rate, in cubic meters per second.

4.1.4.2 If no fan is provided with the dehumidifier, a fraction of the power input shall be included in the effective power absorbed by the dehumidifier, using the following formula:

$$\frac{q \Delta p_i}{\eta} \quad \text{in watts}$$

where:

η is 0,3 by convention;
 Δp_i is the measured internal static pressure difference, in pascals;
 q is the nominal air flow rate in cubic meters per second.

4.1.5 Power input of water pump

4.1.5.1 At the water or brine cooled condenser, the fraction of the power absorbed by the pump which is required to overcome the internal static pressure of the dehumidifier shall be calculated.

4.1.5.2 If the pump is an integral part of the dehumidifier only a fraction of the input to the pump motor shall be included in the effective power absorbed by the dehumidifier. The fraction which is to be excluded from the total power absorbed by the dehumidifier shall be calculated using the following formula:

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$$\frac{q \Delta p_e}{\eta} \quad \text{in watts}$$

where:

η is 0,3 by convention;
 Δp_e is the available external static pressure difference, in pascals;
 q is the nominal flow rate, in cubic meters per second.

4.1.5.3 If no pump is provided with the dehumidifier, a fraction of the power input shall be included in the effective power absorbed by the dehumidifier, using the following formula:

$$\frac{q \Delta p_i}{\eta} \quad \text{in watts}$$

where:

η is 0,3 by convention;
 Δp_i is the measured internal static pressure difference, in pascals;
 q is the nominal air flow rate, in cubic meters per second.

4.2 Test apparatus

4.2.1 Arrangement of the test apparatus

4.2.1.1 General requirements

The test apparatus shall be designed in such a way that all requirements on adjustment of set values, stability criteria and uncertainties of measurement according to this European standard can be fulfilled.

Ducted air systems shall be sufficiently air tighted to ensure that the measured results are not significantly influenced by exchanges of air with the surroundings.

4.2.1.2 Test room for the airside

The size of the test room shall be selected such that any resistance to air flow at the air inlet and air outlet orifices of the test object is avoided. The air flow through the room shall not be capable of initiating any short circuit between these two orifices and therefore the velocity of the air flows through the room at these two locations shall not exceed 1,5 m/s when the test object is switched off. The air velocity in the room shall also not be greater than the mean velocity through the unit inlet. Unless otherwise stated by the manufacturer, the air inlet and outlet orifices shall not be less than 1 m distant from the surfaces of the test room; this also applies to any measuring ducts.

Any direct heat radiation by heating devices in the test room onto the unit or onto the temperature measuring points shall be avoided.

4.2.1.3 Setting the external static pressure difference on the air side for appliances with duct connection

For appliances with duct connection, the maximum external pressure difference available at the nominal flow rate specified by the manufacturer is preferably set on the air outlet side of the unit when the refrigerating system does not operate. The nominal air flow shall then be verified.

4.2.1.4 Setting the external static pressure difference on the water side for appliances with integral pumps

For appliances with integral water pumps, the maximum external static pressure difference available at the nominal flow rate specified by the manufacturer is preferably set on the outlet side of the unit, this also sets the water flows.

4.2.2 Installation and connection of the test object

The test object shall be installed and connected for the test as recommended by the manufacturer in his installation and operation manual.

Temperature and pressure measuring points shall be arranged in order to obtain mean significant values.

4.2.3 Installation of dehumidifiers consisting of several parts

In the case of a dehumidifier consisting of several parts, the following installation conditions shall be complied with for the test:

- a) each refrigerant line shall be installed in accordance with the manufacturer's instructions with the maximum stated length or 8 m, whichever is shorter;
- b) the lines shall be installed so that the difference in elevation does not exceed 1 m;
- c) the thermal insulation of the lines shall be applied in accordance with the manufacturer's instructions;
- d) unless constrained by the design, at least half of the connecting lines shall be exposed to the outside conditions, with the rest of the lines exposed to the inside conditions.

4.3 Uncertainties of measurement

Uncertainties of measurement shall not exceed the values specified in table 1.

Table 1: Uncertainties of measurement for indicated values

Measured quantity	Unit	Uncertainty of measurement
Water		
- temperature	°C	± 0,1 K
- temperature difference	K	± 0,1 K
- (volume) flow	l/s	± 5 %
- static pressure difference	Pa	± 5 Pa ($\Delta p \leq 100\text{Pa}$) ± 5 % ($\Delta p > 100\text{Pa}$)
Air		
- dry bulb temperature	°C	± 0,2 K
- wet bulb temperature	°C	± 0,2 K
- (volume) flow	m³/s	± 5 %
- static pressure difference	Pa	± 5 Pa ($\Delta p \leq 100\text{Pa}$) ± 5 % ($\Delta p > 100\text{Pa}$)
Electrical power	W	± 1 %
Voltage	V	± 0,5 %
Current	A	± 0,5 %
Electrical energy	kWh	± 1 %

The capacity shall be determined within a maximum uncertainty of 5% independent of the individual uncertainties of measurement.

4.4 Test conditions

4.4.1 Environmental conditions and electrical power supply requirements

The tests shall be carried out under the environmental conditions and with the electrical power supply specified in table 2.

Table 2: Environmental conditions and electrical power supply requirements

Measured quantity	Rating test
Dry bulb temperature	As inlet temperature see table 3
Voltage	Rated voltage
Frequency	Rated frequency

4.4.2 Rating test conditions

For the rating test, the appropriate test conditions in accordance with tables 2 and 3 shall be applied.

Table 3: Rating test conditions

Test conditions	Comfort	Process	Heat recovery (air cooled)	Heat recovery (water cooled)
Mandatory	A27(21)/ A27(21)	A12(9)/ A12(9)	A27(21)/ A27(21)	A27(21)/ W24.
NOTE 1:	All temperatures are inlet temperatures in degrees Celsius.			
NOTE 2:	Air temperatures in brackets are wet bulb temperatures in degrees Celsius.			
NOTE 3:	Where the dehumidifier has the condenser placed immediately after the evaporator only the inlet temperature to the evaporator is used.			
NOTE 4:	All tests are carried out with nominal flow rates indicated by the manufacturer in cubic meters per second. Where no nominal flow rate is indicated by the manufacturer and only a range of flow is given, tests shall be carried out at the minimum value.			
NOTE 5:	Permissible external pressure difference and associated internal pressure difference at the evaporator and condenser shall be indicated by the manufacturer in pascals for appliances with duct connection.			

4.5 Test procedure

4.5.1 General

For test conditions see clause 4.4.

In the case of appliances with duct connection and a fan motor with variable speed, the test is carried out at the nominal flow rate with a permissible external static pressure difference of 100 Pa or the closest value belonging to the range specified by the manufacturer. If the appliance can also be used without duct connection, then (unless agreed otherwise) the measurement with duct connection is sufficient.