BRITISH STANDARD

BS EN
814-3 : 1997

Air conditioners and heat pumps with electrically driven compressors — Cooling mode

Part 3. Requirements

The European Standard EN 814-3 : 1996 has the status of a British Standard

ICS 23.120; 27.080; 91.140.30

Committees responsible for this British Standard

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British Gas plc
British Refrigeration Association
Building Services Research and Information Association
Chartered Institution of Building Services Engineers
Department of the Environment — Building Research Establishment
Electricity Association
Heating and Ventilating Contractors' Association
Hevac Association
Institute of Refrigeration
Institution of Mechanical Engineers

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National foreword

This British Standard has been prepared by Technical Committee RHE/17 and is the English language version of EN 814-3 : 1996 *Air conditioners and heat pumps with electrically driven compressors — Cooling mode — Part 3: Requirements*, published by the European Committee for Standardization (CEN).

Cross-references

Publication referred to	Corresponding British Standard
	BS EN 255 *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors — Heating mode*
EN 255-1 : 1996	Part 1 : 1997 *Terms, definitions and designations*
EN 255-4 : 1996	Part 4 : 1997 *Requirements for space heating and sanitary hot water units*
	BS EN 814 *Air conditioners and heat pumps with electrically driven compressors — Cooling mode*
EN 814-1 : 1996	Part 1 : 1997 *Terms, definitions and designations*
EN 814-2 : 1996	Part 2 : 1997 *Testing and requirements for marking*
	BS EN 60335 *Specification for safety of household and similar electrical appliances*
	Part 2 : *Particular requirements*
EN 60335-2-40 : 1993	Section 2.40 : 1993 *Electric heat pumps, air conditioners and dehumidifiers*
ENV 12102 : 1996	DD ENV 12102 : 1997 *Air conditioners, heat pumps and dehumidifiers with electrically driven compressors — Measurement of airborne noise — Determination of the sound power level*

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 6, an inside back cover and a back cover.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 814-3

February 1997

ICS 23.120; 27.080; 91.140.30

Descriptors: Air conditioning equipment, air conditioners, condensation, water, tests, testing conditions, installation, measurements, calorific power, marking

English version

Air conditioners and heat pumps with electrically driven compressors — Cooling mode — Part 3: Requirements

Climatiseurs et pompes à chaleur avec compresseur entrainé par moteur électrique — Mode réfrigération — Partie 3: Exigences

Luftkonditionierer und Wärmepumpen mit elektrisch angetriebenen Verdichtern — Külen Teil 3: Anforderungen

CEN

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

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

Foreword

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

This standard consists of the following Parts:

EN 814-1 *Air conditioners and heat pumps with electrically driven compressors — Cooling mode — Part 1: Terms, definitions and designations*

EN 814-2 *Air conditioners and heat pumps with electrically driven compressors — Cooling mode — Part 2: Testing and requirements for marking*

EN 814-3 *Air conditioners and heat pumps with electrically driven compressors — Cooling mode — Part 3: Requirements*

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.

Contents

1 Scope

This part of EN 814 specifies minimum requirements which ensure that an air or water cooled air conditioner, air/air or water/air heat pump, with electrically driven compressor, is fitted for the use designated by the manufacturer, when used in cooling mode. When these units are used in heating mode by reversing the refrigerating cycle, then EN 255-4 applies.

This standard also specifies recommendations for the way the characteristics of units shall be specified by the manufacturer in order to assist users and manufacturers in the understanding and comparison of various types.

This standard applies to factory-made units which can be ducted. The units can be of the following specific types: comfort air conditioner or heat pump, spot air conditioner, single duct air conditioner, control cabinet air conditioner, close control air conditioner.

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

Units having two or more indoor sections connected to a single outdoor unit (multiple split system air conditioners or heat pumps) are excluded from this standard.

This standard does not apply to continuously variable capacity control units.

This standard does not apply to liquid chilling packages/units.

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 to 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 255-4	*Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors — Heating mode — Part 4: Requirements for space heating and sanitary hot water units*
EN 814-1	*Air conditioners and heat pumps with electrically driven compressors — Cooling mode — Part 1: Terms, definitions and designations*
EN 814-2 : 1997	*Air conditioners and heat pumps with electrically driven compressors — Cooling mode — Part 2: Testing and requirements for marking*
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 the sound power level*

3 Definitions

For the purposes of this standard, the definitions given in EN 814-1 apply.

4 Requirements

4.1 General

Except where otherwise stated, tests shall be conducted as described in EN 814-2.

4.2 Temperature operating range

4.2.1 *General*

Units are tested at the limits described by tables 1, 2 and 3; the maximum operating test and the freeze up test can be combined with the corresponding starting tests, in that case, the first 20 min of the first hour is used to check the starting test.

The temperatures are set at the beginning of the test and maintained constant during the test, except for the test at maximum operating conditions of control cabinet air conditioners, where the inlet temperature at the evaporator is lowered to 35 °C after the starting test.

Test voltages shall be as specified in tables 1 to 3. They are set at the beginning of the test and maintained constant during the test.

The ambient conditions during the test shall be as specified in table 2 of EN 814-2 : 1997.

The flow rates shall be the same as that used for rating test, as specified in table 3 of EN 814-2 : 1997.

Deviation between individual values and set values shall be between:

– zero and minus twice the permissible deviation according to table 4 of EN 814-2 : 1997 (the upper limit of use);

– zero and plus twice the permissible deviation according to table 4 of EN 814-2 : 1997 (the lower limit of use).

Uncertainty of measurement shall be as specified in table 1 of EN 814-2 : 1997.

4.2.2 *Starting test*

The unit shall be capable of operating within the limits of use indicated by the manufacturer.

For every condition stated in table 1 the unit shall start up and operate for at least 20 min, without being stopped by the safety devices.

Table 1. Operational requirements conditions

Type	Temperature at condenser °C	Temperature at evaporator °C	Voltage V
All types	Upper limit of use	Upper limit of use	Rated voltage
All types	Lower limit of use	Lower limit of use	Rated voltage

4.2.3 *Test at maximum operating conditions*

When operated at conditions stated in table 2 during 1 h, then switch off for 3 min, and then switched on again for 1 h, the unit shall meet the following requirements: – the unit shall suffer no damage;

– the unit motor shall operate continuously for the first hour without tripping of the motor overload protective devices;

– after the shut-down period of 3 min, the unit shall restart automatically no more than 5 min after restarting of the compressor;

– the unit motor shall operate again continuously for the rest of the second hour without tripping of the motor overload protective devices.

Table 2. Maximum operating conditions

Type	Temperature at condenser °C	Temperature at evaporator °C	Voltage V
Control cabinet air conditioner	Upper limit of use	35 °C	Rated voltage
All other types	Upper limit of use	Upper limit of use	Rated voltage

4.2.4 *Freeze up test*

After the unit has operated for 2 h at conditions stated in table 3, no ice shall have accumulated on the evaporator.

Table 3. Freeze up conditions

Type	Temperature at condenser °C	Temperature at evaporator °C	Voltage V
All types	Lower limit of use	Lower limit of use	Rated voltage

4.3 Outside the operating range

If operating outside the temperature range can cause damage to the unit, it shall be provided with safety devices which ensure that the unit suffers no damage when the operating limits of use indicated by the manufacturer are exceeded and remains capable of operating when coming back within these limits. A safety device that does not automatically reset may trip provided that a warning device is fitted.

The manufacturer shall indicate any safety devices provided and their operating conditions (see **6.1.2**).

4.4 Shutting off the heat transfer media flows

4.4.1 To check the correct operating of the safety devices on the unit, the following faults shall be simulated consecutively. The unit shall have attained steady state in the conditions at (T1) according to prEN 814-2 table 3 before every fault is simulated. Each fault simulated shall be maintained for at least 1 h:

a) shutting off the heat transfer medium flow at the condenser;

b) shutting off the heat transfer medium flow at the evaporator.

4.4.2 The unit is checked for any damage sustained during the test and if any safety devices have operated during the test. The unit shall suffer no damage and shall remain capable of operating after restoration of the flow rates. A safety device that does not automatically reset can trip provided that a warning device is fitted.

4.5 Complete power supply failure

Complete power supply failure lasting approximately 5 s shall be simulated. The unit has attained steady state conditions before the fault simulation, under conditions (T1) in accordance with table 3 of EN 814-2 : 1997.

After restoration of power the unit shall restart automatically no more than 20 min after the compressor has been allowed to restart by the control devices of the unit.

The unit is checked for any damage sustained during the test and if any safety devices have operated during the test.

4.6 Condensate draining and enclosure sweat test

Draining of condensate, including that formed on the enclosure shall be made correctly when operating at conditions given in table 4. During the test of 4 h no condensed water shall drip, run or blow off the unit except through the drain.

Table 4. Condensate draining and enclosure sweat test

Type	Condition
Comfort air conditioner or heat pump, air cooled	A27(24)/A27(24)
Comfort air conditioner or heat pump, water cooled	W27/A27(24)
Single duct air conditioner	A27(24)/A27(24)
Spot air conditioner	A27(24)/A27(24)
Close control air conditioner, air cooled	A27/A27 (with the highest relative humidity stated by the manufacturer)
Close control air conditioner, water cooled	W27/A27 (with the highest relative humidity stated by the manufacturer)
Control cabinet air conditioner, air cooled	A27(24)/A27(24) *)
Control cabinet air conditioner, water cooled	W27/A27(24) *)

NOTE 1. All air temperatures in brackets are wet bulb temperatures in degrees Celsius.

NOTE 2. All temperatures are inlet temperatures in degrees Celsius.

*) If not possible, make the test at the lowest dry bulb temperature (greater than 27 °C) with 80 % relative humidity.

4.7 Other requirements

Components in air handling systems, such as fans, filters, heat exchangers, etc., shall be easily accessible and resistant for cleaning purposes recommended by the manufacturer.

5 Technical data sheet

5.1 General description

The manufacturer shall provide the following information:

– trade mark, model designation;

– power supply (voltage, frequency);

– denomination of the unit according to EN 255-1 or EN 814-1;

– intended use of the unit;

– number of separate component units;

– type and mass of refrigerant charge;

– overall dimensions and weight of each separate component unit.

5.2 Performance characteristics

5.2.1 *Rating characteristics*

The manufacturer shall provide in a table or as a graph the performance characteristics according to EN 814-2. Performance characteristics include the total cooling capacity, the effective power input, the *EER* and *SHR*.

5.2.2 *Additional characteristics*

In addition, the manufacturer shall provide the following characteristics for the rated point(s):

– non ducted units: flow rates or rotational speeds of fans;

– non ducted water cooled units: air flow rate or rotational speed of fan; water flow rate and pressure difference;

– unit intended to discharge into double floor: nominal flow rate and external static pressure difference;

– other types of unit: nominal flow rates and external static pressure differences for air and water.

5.2.3 *Sound characteristics*

The manufacturer shall provide the sound power level according to ENV 12102.

5.3 Electrical characteristics

The manufacturer shall specify:

– the maximum starting current of the unit (according to EN 60335-2-40);

– the total power input and current at the rated point, excluding the starting period;

– the reactive power or power factor at the rated point, for units with a total power input greater than 10 kW;

– the power input of fan and pump if included in the unit.

5.4 Operating range

The manufacturer shall specify:

– the limits of use (temperatures and flows);

– whether there are devices fitted which do not allow the unit to operate when these limits are exceeded.

6 Instructions

6.1 Physical description

6.1.1 *Refrigerant, air and/or liquid circuits*

The manufacturer shall:

– specify the refrigerant, air and liquid circuits preferably providing circuit diagrams, showing every functional unit, control and safety device and specifying their type;

– if the unit uses water in the condenser, specify the water capacity contained in the machine, and specify the constructional materials of the heat exchangers;

– specify the type of oil to be used in the compressor.

6.1.2 *Control and safety*

The manufacturer shall:

– state the functions achieved by the control and safety devices provided with the unit and specify when applicable their provision for adjustment and the method by which the safety devices are reset;

– provide specifications for any control or safety devices necessary to ensure correct operation of the unit but which are not provided with the unit;

– specify any limitation to the use of the rest of the installation.

6.2 Instructions for installation

The manufacturer shall specify in particular:

– the required environmental conditions (whether units are to be installed outside or in a weather proof enclosure, or in a heated space);

– requirements of physical layout, access and clearance;

– requirements for the electrical, liquid, air and refrigerant connections, to be made on site;

– the location of warning and tripping devices;

– the installation precautions to be taken to ensure, in particular:

– correct circulation of the heat transfer media;

– water draining;

– cleanliness of heat exchange surfaces;

– to minimize noise, vibration or other adverse effects.

Special indications for units using sea-water, ground water or surface water: specify any materials which are in contact with the water.

6.3 Instruction for maintenance

The manufacturer shall state:

– the content and frequency of routine maintenance operations to be performed by the user;

– the content and frequency of maintenance and inspection operations which shall be performed by a specialist.

List of references

See national foreword.

BSI — British Standards Institution

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