SLOVENSKI STANDARD
SIST-TS CEN/TS 14825:2005

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Klimatske naprave, enote za tekoļinsko hlajenje in toplotne ļrpalke z elektriļnimi kompresorji za segrevanje in hlajenje prostora ï Preskuģanje in ocenitev ob delni obremenitvi

Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling - Testing and rating at part load conditions

Luftkonditionierer, Flüssigkeitskühlsätze und Wärmepumpen mit elektrisch angetriebenen Verdichtern zur Raumbeheizung und -kühlung - Prüfung und Leistungsbemessung unter Teillastbedingungen

Climatiseurs, groupes refroidisseurs de liquide et pompes a chaleur avec compresseur entrainé par moteur électrique pour le chauffage et la réfrigération - Essais et détermination des caractéristiques a charge partielle

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27.080	Toplotne ļrpalke	Heat pumps

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This Technical Specification (CEN/TS) was approved by CEN on 24 September 2003 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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Foreword

This document (CEN/TS 14825:2003) has been prepared by Technical Committee CEN/TC 113 “Heat pumps and conditioning units”, the secretariat of which is held by AENOR.

This Technical Specification was first intended to be published as EN standard, but due to the little experience in this type of testing, the Technical Committee decided to issue it as a TS.

This Technical Specification is published to give the general conditions and requirements for testing. When further experience will be reached in test methods, the change to EN will be considered.

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: : Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Heat pumps, air conditioners and liquid chilling packages are, at present, selected and compared at a rated condition. This condition does not represent the usual operating conditions of the equipment over a season. This operating condition can be better assessed by comparing equipment at a representative 50% reduced capacity.

Fixed capacity air conditioners, liquid chilling packages and heat pumps deal with varying loads by varying the operation time. The efficiency of the system is dependent on the effectiveness of the controlling thermostats. Variable capacity air conditioners, liquid chilling packages and heat pumps, by continuous or step control of the compressor, can more closely match the varying load improving system efficiency.

This standard gives the rating conditions and methods for testing air conditioners, heat pumps and liquid chilling packages operating to overcome part load.

The rating conditions and test methods of units operating to overcome full load are given in EN 14511-2 and EN 14511-3.

1 Scope

This Technical Specification covers testing of air conditioners, heat pumps and liquid chilling packages for part load conditions.

It specifies the terms, the definitions, the methods for testing and reporting, and the calculation method for the cyclic and compressor reduced capacity. The temperature and system reduced capacities are excluded.

This European Standard applies to factory made units defined in EN 14511-1.

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 (including amendments).

EN 14511-1; *Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors for space heating and cooling – Part 1: Terms and definitions*.

EN 14511-2; *Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors for space heating and cooling – Part 2: Test conditions.*

EN 14511-3; *Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors for space heating and cooling – Part 3: Test methods.*

EN 14511-4; *Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling – Part 4: Requirements.*

3 Terms and definitions

For the purposes of this European Standard, the definitions given in EN 14511-1 apply together with the following.

3.1
full load
the thermal load of the building or process at design conditions.

3.2
part load
the thermal load of the building or process which is lower than the full load.

3.3
compensation load
the heating or cooling load imposed by the test apparatus on the test object.

3.4
rated capacity
the capacity measured at rating conditions as defined in EN 14511-2.

3.5
reduced capacity
the capacity which is lower than the rated capacity.

3.6
reduced capacity types

3.6.1
cyclic reduced capacity
the capacity obtained by switching the compressor on and off.

3.6.2
system reduced capacity
the capacity obtained by changing the size of the evaporator or the condenser (e.g. by switching 1 of 2 indoors off; or letting the refrigerant flow through only part of the heat exchanger).

Note This type of reduced capacity is not within the scope of this Technical Specification.

3.6.3
compressor reduced capacity
the capacity obtained when changing the refrigerant volume flow rate by any compressor unloading systems. This applies to step controlled and continuously controlled variable capacity units.

3.6.4
temperature reduced capacity
the capacity obtained by changing the outside temperature conditions.

Note: This type of reduced capacity is not within the scope of this Technical Specification.

3.7
$EER_{50\%}$
the EER of a unit when the unit delivers 50% of its rated capacity.

3.8
$COP_{50\%}$
the COP of a unit when the unit delivers 50% of its rated capacity.

3.9
fixed capacity unit
air conditioner, heat pump or liquid chilling package, which does not have the possibility to change automatically (in minimum two steps or continuously) the amount of refrigerant flowing through the system.

Note: Where no refrigerant is flowing through the indoor side (or one of the indoor units) it is not considered a capacity step.

3.10
variable capacity

3.10.1
variable capacity – Step controlled
where the capacity is varied or changed in a series of steps or increments by off loading the compressor(s), by a number of compressors operating in sequence, by a combination of both, or by other means.

Note: If the combination of compressors include one which is inverter controlled, this combination is considered as continuously controlled.

3.10.2
variable capacity – Continuously controlled
where the capacity is varied or changed continuously, for example by varying the speed of the compressor(s), normally by inverter control.

4 Reduced capacity test

4.1 Test apparatus

For the purpose of this standard, the test apparatus given in EN 14511-3 apply.

4.2 Test conditions

The tests shall be carried out under the same environmental conditions and with the same electrical power supply as for the rated capacity test, as defined in EN 14511-2.

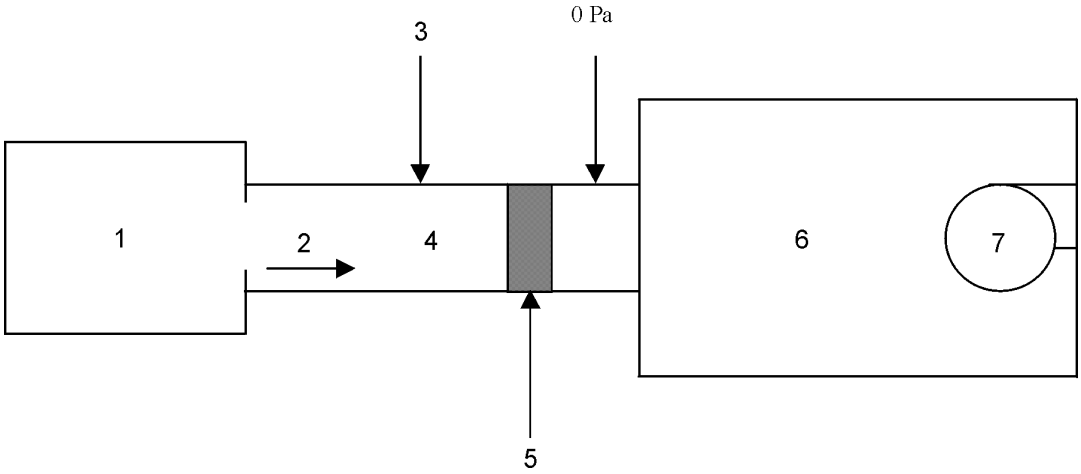
The inlet temperature conditions used in the rated capacity test are maintained during the reduced capacity test at both the condenser and evaporator.

The flow rate conditions used in the rated capacity test are maintained during the reduced capacity test at both the condenser and evaporator except if they are automatically changed by the control system of the unit.

In case of appliances with variable flow rate, the pressure drop coefficient between the outlet and the inlet of the unit shall be the same as during the rated capacity test. For variable air flow units, this can be achieved by setting a damper after the section used for the measurement of the external static pressure, and by adjusting it in order to get a 0 Pa static pressure after the damper, with the air flow and external static pressure remained as during the rated capacity test (see Figure 1).

This setting is made when the refrigerating system does not operate.

Then the reduced capacity test is performed without changing the setting of the damper, and maintaining the 0 Pa static pressure after the damper.



Key

1 Object under test
2 Air flow
3 External static pressure
4 Duct
5 Damper
6 Air flow measuring apparatus
7 Fan

Figure 1 — Example of test apparatus for variable air flow

For variable water flow units, a device producing a variable pressure drop may be used to produce a similar effect.

4.3 Test procedures

4.3.1 Unit with fixed capacity

For units with fixed capacity a cyclic reduced capacity test is performed. The unit shall operate with equal compressor ON and OFF periods of 30 minutes each.

If the reduced capacity is not in the range of 40% to 60% of the rated capacity and the efficiency resulting from the reduced capacity test differs more than 5% from the efficiency resulting from the rated capacity test a new test shall be performed. In this new test the OFF period shall be changed proportionally to the result, within the limit of the forced OFF period of the control device of the unit.

Alternatively, where applicable (with water enthalpy or calorimeter methods), a compensation load is set at half of the rated capacity of the unit.

4.3.2 Unit with step controlled variable capacity

A unit with step controlled variable capacity shall be forced to operate at the step which is nearest to 50% of its rated capacity.

The unit shall operate continuously during the reduced capacity test. The only discontinuity allowed is the defrost cycle for the reduced capacity test of a heat pump.

a) If the reduced capacity is in the range of 47% to 53% there is no need for an additional test.