

GAASIKÜTTEL TÖÖTAVAD ENDOTERMILISE
MOOTORIGA SOOJUSPUMBAD. OSA 5: KÜTTE- JA
JAHUTUSREŽIIMI SESOONSE SOORITUSVÕIME
ARVUTAMINE

Gas-fired endothermic engine driven heat pumps - Part
5: Calculation of seasonal performances in heating and
cooling mode

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 16905-5:2017 sisaldab Euroopa standardi EN 16905-5:2017 ingliskeelset teksti.	This Estonian standard EVS-EN 16905-5:2017 consists of the English text of the European standard EN 16905-5:2017.
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English Version

**Gas-fired endothermic engine driven heat pumps - Part 5:
Calculation of seasonal performances in heating and
cooling mode**

Pompes à chaleur à moteur endothermique alimenté
au gaz -Partie 5 : Calcul des performances saisonnières
en modes chauffage et refroidissement

Gasbefeuerte endothermische Motor-Wärmepumpen -
Teil 5: Berechnung der saisonalen Effizienzkennzahlen
im Heiz- und Kühlmodus

This European Standard was approved by CEN on 9 January 2017.

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European foreword

This document (EN 16905-5:2017) has been prepared by Technical Committee CEN/TC 299 “Gas-fired sorption appliances, indirect fired sorption appliances, gas-fired endothermic engine heat pumps and domestic gas-fired washing and drying appliances”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by September 2017, and conflicting national standards shall be withdrawn at the latest by September 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA and Annex ZB, which are integral parts of this document.

This standard comprises the following parts under the general title, *Gas-fired endothermic engine driven heat pumps*:

- *Part 1: Terms and definitions;*
- *Part 2: Safety* (WI 00299025; currently in preparation);
- *Part 3: Test conditions;*
- *Part 4: Test methods;*
- *Part 5: Calculation of seasonal performances in heating and cooling mode.*

EN 16905-1, prEN 16905-2, EN 16905-3, EN 16905-4 and EN 16905-5 have been prepared to address the essential requirements of the European Directive 2009/142/EC relating to appliances burning gaseous fuels (see prEN 16905-2:201X, Annex ZA for safety aspects and EN 16905-5:2017, Annex ZA for rational use of energy aspects).

These documents are linked to the Energy Related Products Directive (2009/125/EC) in terms of tests conditions, tests methods and seasonal performances calculation methods under Mandate M/535; (see EN 16905-3:2017, Annex ZA, EN 16905-4:2017, Annex ZA, EN 16905-5:2017, Annex ZA and prEN 16905-2:201X, Annex ZB).

These documents will be reviewed whenever new mandates could apply.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

1.1 Scope of EN 16905 series

This European Standard specifies the requirements, test methods and test conditions for the rating and performance calculation of air conditioners and heat pumps using either air, water or brine as heat transfer media, with gas-fired endothermic engine driven compressors when used for space heating, cooling and refrigeration, hereafter referred to as “GEHP appliance”.

This European Standard only applies to appliances with a maximum heat input (based on net calorific value) not exceeding 70 kW at standard rating conditions.

This European Standard only applies to appliances under categories I_{2H}, I_{2E}, I_{2Er}, I_{2R}, I_{2E(S)B}, I_{2L}, I_{2LL}, I_{2ELL}, I_{2E(R)B}, I_{2ESi}, I_{2E(R)}, I_{3P}, I_{3B}, I_{3B/P}, II_{2H3+}, II_{2Er3+}, II_{2H3B/P}, II_{2L3B/P}, II_{2E3B/P}, II_{2ELL3B/P}, II_{2L3P}, II_{2H3P}, II_{2E3P} and II_{2Er3P} according to EN 437.

This European Standard only applies to appliances having:

- a) gas fired endothermic engines under the control of fully automatic control systems;
- b) closed system refrigerant circuits in which the refrigerant does not come into direct contact with the fluid to be cooled or heated;
- c) where the temperature of the heat transfer fluid of the heating system (heating water circuit) does not exceed 105 °C during normal operation;
- d) where the maximum operating pressure in the:
 - 1) heating water circuit (if installed) does not exceed 6 bar,
 - 2) domestic hot water circuit (if installed) does not exceed 10 bar.

This European Standard applies to appliances only when used for space heating or space cooling or for refrigeration, with or without heat recovery.

The appliances having their condenser cooled by air and by the evaporation of external additional water are not covered by this European Standard.

Packaged units, single split and multisplit systems are covered by this European Standard. Single duct and double duct units are covered by this European Standard.

The above appliances can have one or more primary or secondary functions.

This European Standard is applicable to appliances that are intended to be type tested. Requirements for appliances that are not type tested would need to be subject to further consideration.

In the case of packaged units (consisting of several parts), this European Standard applies only to those designed and supplied as a complete package.

NOTE All the symbols given in this text are used regardless of the language used.

1.2 Scope of EN 16905-5

This part of the EN 16905 series specifies the calculation of seasonal performance factor for gas-fired endothermic engine driven heat pumps for heating and/or cooling mode including the engine heat recovery.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16905-1, *Gas-fired endothermic engine driven heat pumps — Part 1: Terms and definitions*

EN 16905-4:2017, *Gas-fired endothermic engine driven heat pumps — Part 4: Test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16905-1 apply.

4 Part load conditions in cooling mode

4.1 General

For the purpose of calculation of application $SGUE_c$, $SAEF_c$, $SEHREgas_c$, $SEHREelec_c$ and reference $SGUE_c$, $SAEF_c$, $SEHREgas_c$, $SEHREelec_c$ as explained in Clauses 6 and 7, the part load ratios mentioned below shall be based on the part load ratio Formulae (1)st column of Tables 1 to 2) and not on the rounded figures as mentioned in the 2nd column of these tables. The calculation of $SGUE_c$, $SAEF_c$, $SEHREgas_c$, $SEHREelec_c$ and reference $SGUE_c$, $SAEF_c$, $SEHREgas_c$, $SEHREelec_c$ is determined via linear interpolation of the respective part load values at the reference part load conditions mentioned below (A, B, C, D).

4.2 Air-to-air units

The part load conditions for determining the reference $SGUE_c$ (Formula (2)), $SAEF_c$ (Formula (4)), $SEHREgas_c$ (Formula (7)), $SEHREelec_c$ (Formula (8)) are given in the following table:

Table 1 — Part load conditions of air to air units and air-cooled multisplit systems in cooling mode

	Part load ratio	Part load ratio %	Outdoor air dry bulb temperature °C	Indoor air dry bulb (wet bulb) temperatures °C
A	$(35-16)/(T_{designc}-16)$	100	35	27(19)
B	$(30-16)/(T_{designc}-16)$	74	30	27(19)
C	$(25-16)/(T_{designc}-16)$	47	25	27(19)
D	$(20-16)/(T_{designc}-16)$	21	20	27(19)

4.3 Water-to-air and brine to air units

The part load conditions for determining the reference $SGUE_c$ (Formula (2)), $SAEF_c$ (Formula (4)), $SEHREgas_c$ (Formula (7)), $SEHREelec_c$ (Formula (8)) are given in the following table: