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Refrigerant compressors — Presentation of performance data

Compresseurs pour fluides frigorigènes — Présentation des performances

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Foreword

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Introduction

Rating conditions for refrigerant compressors are given in publications produced by various organizations such as CECOMAF¹⁾. It is considered that, because of the many varying conditions of use found in practice, there is a need for users to be able to compare the performance data of different refrigerant compressors at any particular operating conditions.

This International Standard therefore specifies the items of performance data relating to the refrigerating capacity and power absorbed to be given and their manner of presentation so that such comparisons may be made.

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1) CECOMAF — European Committee of Manufacturers of Refrigeration Equipment.

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Refrigerant compressors — Presentation of performance data

1 Scope

This International Standard specifies the performance data, and their manner of presentation, for single-stage refrigerant compressors of the positive-volume-displacement type, which are necessary for a comparison of different refrigerant compressors to be made. These performance data relate to the refrigerating capacity and power absorbed, and include correction factors and part-load performance where applicable.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 817 : 1974, *Organic refrigerants — Number designation.*

ISO 917 : 1974, *Testing of refrigerant compressors.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 basic refrigerating capacity : Product of the mass flow rate of refrigerant through the compressor and the difference between the specific enthalpy of the refrigerant, superheated at the compressor inlet to the appropriate value shown in table 1, and the specific enthalpy of saturated liquid at a condition corresponding to the compressor discharge pressure.

NOTE — This definition is not the same as definition 2.1, *Refrigerating capacity of a refrigerant compressor*, given in ISO 917.

Table 1 — Superheat values for presentation of performance data

Refrigerant	Suction temperature (°C) or suction superheat (K)	Typical applications
Most commonly used halocarbons, e.g. R12, R13, B1, R22, R500, R502	25 °C	Generally for smaller compressors, e.g. commercial, air conditioning
	20 K	Generally for larger compressors, e.g. industrial, air conditioning
R717	10 K	Any application using ammonia
Other refrigerants, e.g. R.11, R114, hydrocarbons	As appropriate, to be clearly specified in the performance data	—

3.2 power absorbed

- 1) for externally driven compressors, the power at the compressor shaft;
- 2) for hermetic and semi-hermetic motor compressors, the electrical power input at the motor terminals.

4 General requirements

4.1 The performance data of a refrigerant compressor shall be presented in either tabular or graphical form to enable the refrigerating capacity and power absorbed to be found for various conditions of use within the working range of the compressor.

4.2 The refrigerating capacity and power absorbed shall be presented for particular conditions as shown in clause 5. In order to calculate these data for other conditions (including capacity control), correction factors and part-loading factors shall be given (see clauses 6 and 7).

5 Performance data

5.1 The performance data to be given, in either tabular or graphical form, shall comprise

- a) the basic refrigerating capacity, in values able to be read to an accuracy of $\pm 2\%$;
- b) the absorbed power, in values able to be read to an accuracy of $\pm 2\%$;
- c) the evaporating temperatures, at intervals not greater than $5\text{ }^{\circ}\text{C}$ (for their graphical presentation, scale divisions of $1\text{ }^{\circ}\text{C}$ shall be used);
- d) the condensing temperatures, at intervals not greater than $10\text{ }^{\circ}\text{C}$.

5.2 The performance data shall be presented for a fixed speed.

For hermetic motor compressors, the performance data shall be presented for a fixed electrical supply voltage and frequency.

5.3 Published performance data shall be used only if they give values equivalent to those which would be obtained if the compressor were tested in accordance with ISO 917.

5.4 The errors applicable to the results obtained from calculations using published performance data, taking account of the use of the correction factors (see clause 6) and the part-load factors (if applicable; see clause 7), shall be stated.

6 Correction factors

6.1 The correction factor applicable to the performance data relating to liquid sub-cooling (see 5.1) shall comprise the change in basic refrigerating capacity as a function of liquid sub-cooling.

6.2 The correction factors applicable to the performance data relating to superheated vapour (see 3.1) shall comprise

- a) the change in basic refrigerating capacity as a function of the suction vapour superheating;
- b) the change in power absorbed as a function of the suction vapour superheating.

6.3 The correction factors applicable to the performance data relating to the fixed speed (see 5.2) shall comprise

- a) the basic refrigerating capacity as a function of varying compressor speeds;
- b) the power absorbed as a function of varying compressor speeds.

The correction factors given in 6.3 do not apply to hermetic motor compressors.

7 Part-load performance

For compressors fitted with a means of reducing the capacity, part-load factors shall be given enabling the following to be determined :

- a) the basic refrigerating capacity;
- b) the power absorbed.

8 Other information and data

For compressors using organic refrigerants, the number designation shall be shown in accordance with the requirements of ISO 817.

Sufficient other information shall be shown, together with the performance data to ensure that the compressor concerned is correctly related to the data, whether they are presented in tabular form or graphically.

NOTE — Other data, such as the swept volume, cylinder dimensions, number of cylinders and speed range, may also be shown.

9 Example

It is recommended that an example illustrating the use of the performance data and the correction factors be given.