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Nederlandse norm

NEN-ISO 1217

(en)

Displacement compressors - Acceptance tests
(ISO 1217:2009, IDT)

Vervangt NEN-ISO 1217:1996

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- ISO 1217:2009, IDT

VOORBEELD
Preview

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Preview

**Displacement compressors —
Acceptance tests**

Compresseurs volumétriques — Essais de réception



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Voorbeeld
 Preview

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 1217 was prepared by Technical Committee ISO/TC 118, *Compressors and pneumatic tools, machines and equipment*, Subcommittee SC 6, *Air compressors and compressed air systems*.

This fourth edition cancels and replaces the third edition (ISO 1217:1996), which has been technically revised.

Preview
ISO 1217:2009

Voorbereid
Preview

Displacement compressors — Acceptance tests

1 Scope

This International Standard specifies methods for acceptance tests regarding volume rate of flow and power requirements of displacement compressors. It also specifies methods for testing liquid-ring type compressors (see Annex A).

This International Standard specifies the operating and testing conditions which apply when a full performance test is specified.

For compressors manufactured in batches or in continuous production quantities and supplied against specified data, the tests described in Annexes B, C and D are considered equivalent alternatives.

Annex E, which is normative, applies to any electrically driven compressor manufactured in batches or in continuous production quantities and supplied against specified data having variable speed drive (e.g. variable frequency drive, direct current drive and switched reluctance), which incorporates a displacement compressor of any type driven by an electric motor.

Detailed instructions are given for a full performance test, including the measurement of volume flow rate and power requirement, the correction of measured values to specified conditions and means of comparing the corrected values with the guarantee conditions. This International Standard specifies methods for determining the value of the tolerances to be applied to the measurement of flow, power and specific power.

NOTE The tolerances to be applied to the measurement of flow, power, specific power, etc. for all acceptance tests carried out in accordance with this International Standard are agreed on by the manufacturer and the purchaser at the contractual stage or prior to the execution of the tests.

Annex F specifies standard inlet conditions for reference purposes. Annex G, which is normative, indicates the uncertainty of measurement.

This International Standard is not applicable to noise statements, which are identified in ISO 2151.

2 Normative references

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

ISO 3046-1, *Reciprocating internal combustion engines — Performance — Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods — Additional requirements for engines for general use*

ISO 5167-1, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 1: General principles and requirements*

ISO 9300, *Measurement of gas flow by means of critical flow Venturi nozzles*

IEC 60584-1, *Thermocouples — Part 1: Reference tables*

IEC 60584-2, *Thermocouples — Part 2: Tolerances*

IEC 60584-3, *Thermocouples — Part 3: Extension and compensating cables — Tolerances and identification system*

IEC 60953-2, *Rules for steam turbine thermal acceptance tests — Part 2: Method B — Wide range of accuracy for various types and sizes of turbines*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 General

3.1.1

acceptance test

performance test carried out in accordance with this International Standard, i.e. ISO 1217:2009

3.1.2

aftercooling

removal of heat from a gas after the compression is completed

3.1.3

batch

two or more compressors manufactured at the same time in one operation

3.1.4

clearance volume

volume inside the compression space, which contains gas trapped at the end of the compression cycle

3.1.5

displacement compressor

machine that creates a static pressure rise by allowing successive volumes of gas to be aspirated into and exhausted out of a closed space by means of the displacement of a moving member

3.1.6

displacement of a displacement compressor

volume swept by the compressing element(s) of the compressor's first stage per unit of time

3.1.7

external coolant

medium externally supplied to the compressor to which the generated heat is finally rejected

NOTE

This is usually ambient air or cooling water.

3.1.8

fuel consumption

total mass of fuel consumed by the engine per unit time while the compressor is running on test at the specified conditions of inlet and discharge pressure and speed, with all engine ancillary equipment such as alternator and water pump connected and operating normally

See Annex D.

3.1.9

ideal multi-stage compression

process by which a perfect gas is isentropically compressed and the gas inlet temperature as well as the amount of work spent are the same for each stage

3.1.10

intercooling

removal of heat from a gas between stages

3.1.11**liquid-injected rotary compressors**

rotary compressor in which a liquid is injected into the gas stream before or in the compressor

3.1.12**liquid-ring compressor**

machine with a rotating impeller with protruding blades eccentrically mounted in a stationary round housing or centrally mounted in a stationary elliptical housing

See Annex A.

NOTE 1 A working liquid creating a liquid ring rotating together with the bladed impeller creates either one or two crescent-shaped working spaces.

NOTE 2 The volumes trapped between each pair of blades, the hub and the liquid ring will vary periodically, thereby creating a change in pressure that will generate a flow from the suction to the discharge side of the compressor.

3.1.13**packaged compressor**

compressor with prime mover, transmission, fully piped and wired internally, including ancillary and auxiliary items of equipment and being stationary or mobile (portable unit) where these are within the scope of supply

3.1.14**polytropic process**

compression or expansion process of an ideal gas, in which the relationship between pressure and volume is:

$$pV^n = \text{constant}$$

NOTE 1 The exponent n can have various values. For example:

$$pV = \text{constant}$$

describes an isothermal process, i.e. the gas temperature remains constant.

$$pV^k = \text{constant}$$

describes an isentropic process, i.e. the gas entropy remains constant.

NOTE 2 Sometimes this process is called adiabatic, but to avoid confusion between adiabatic (no heat exchange with the surroundings) and reversible adiabatic (isentropic) process, the expression isentropic is preferred.

3.1.15**relative clearance volume**

ratio of clearance volume of the stage under consideration to the swept volume of the compressing element of this stage

3.1.16**rotary compressor**

displacement compressor in which the element is one or more rotors operating in a casing, the displacement being effected by vanes, meshing elements or by displacement of the rotor itself

3.1.17**shaft-driven reciprocating compressor**

displacement compressor in which gas intake and compression are achieved by the straightforward alternating movement of a moving element in a space constituting a compression chamber due to a shaft rotation

3.1.18**shaft rotational speed**

number of revolutions of the compressor drive shaft per unit of time

ISO 1217:2009(E)**3.1.19****shaft-speed irregularity**

dimensionless number obtained when the difference between maximum and minimum instantaneous shaft speeds during one period is divided by the arithmetic mean of both

$$\text{Shaft-speed irregularity} = 2 \frac{N_{\max.} - N_{\min.}}{N_{\max.} + N_{\min.}} \quad (1)$$

3.1.20**specific fuel consumption**

mass per unit time divided by the compressor volume flow rate, both measurements being corrected to standard conditions by the methods given in Annex D

3.1.21**standard discharge condition**

condition of the compressed gas at the standard discharge point of the compressor

3.1.22**standard discharge point**

discharge point considered representative of each compressor

NOTE This point varies with compressor design and type of installation:

- a) for a bare compressor, it is generally at the compressor discharge flange:
 - 1) reciprocating type compressors: discharge flange of the last (or only) stage cylinder or any chamber fitted as standard to that cylinder to reduce pulsations in the delivered compressed gas and so indicated by the manufacturer in the sales data for the particular type of compressor;
 - 2) rotary type compressors: discharge flange of the last (or only) rotor casing;
- b) for a packaged compressor, it is the terminal outlet of the package.

3.1.23**standard inlet condition**

condition of the aspirated gas at the standard inlet point of the compressor

3.1.24**standard inlet point**

inlet point considered representative of each compressor and which varies with compressor design and type of installation

NOTE 1 For a bare compressor, it is generally the inlet flange to the first (or only) stage cylinder or rotor casing, i.e. after any inlet filter or silencing equipment which can normally be used for test purposes, unless otherwise identified.

NOTE 2 The standard inlet point of a packaged air compressor, unless otherwise indicated by the manufacturer, is the point at which ambient air enters the package or, in the case of a non-enclosed package, where air first enters the confines of the machine, probably the air inlet filter.

3.1.25**swept volume of a displacement compressor**

volume swept in one revolution by the compressing element(s) of the compressor's first stage

3.1.26**turn-down ratio**

ratio expressed in percentage of the difference between maximum and minimum speed divided by the maximum speed of the main driver

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