INTERNATIONAL STANDARD

ISO
12500-1

Filters for compressed air — Test methods —

Part 1:
Oil aerosols

Filtres pour air comprimé — Méthodes d'essai —

Partie 1: Aérosols d'huile

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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 12500-1 was prepared by Technical Committee ISO/TC 118, *Compressors and pneumatic tools, machines and equipment*, Subcommittee SC 4, *Quality of compressed air*.

ISO 12500 consists of the following parts, under the general title *Filters for compressed air — Test methods*:

— *Part 1: Oil aerosols*

— *Part 2: Oil vapours*

— *Part 3: Particulates*

Introduction

Oil aerosols are a typical contaminant found in compressed air streams. Coalescing filters are designed to remove oil aerosols from compressed air.

The most important performance characteristics are the ability of the filter to remove oil aerosols from the air stream and the amount of pressure drop caused by the filter as compressed air flows through it when the filter element is saturated with oil. This part of ISO 12500 provides a means of comparing the performance of filters.

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Filters for compressed air — Test methods —

Part 1:
Oil aerosols

1 Scope

This part of ISO 12500 specifies the test layout and test procedures required for testing coalescing filters used in compressed-air systems to determine their effectiveness in removing oil aerosols.

This part of ISO 12500 provides the means to indicate performance characteristics of the pressure drop and the capability of removing oil aerosols.

This part of ISO 12500 defines one method of presenting filter performance as outlet oil aerosol concentration stated in milligrams per cubic metre from results obtained under standard rating parameters.

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 1219-1, *Fluid power systems and components — Graphic symbols and circuit diagrams — Part 1: Graphic symbols for conventional use and data-processing applications*

ISO 2602, *Statistical interpretation of test results — Estimation of the mean — Confidence interval*

ISO 2854, *Statistical interpretation of data — Techniques of estimation and tests relating to means and variances*

ISO 3649:1980, *Cleaning equipment for air or other gases — Vocabulary*

ISO 5598, *Fluid power systems and components — Vocabulary*

ISO 7000, *Graphical symbols for use on equipment — Index and synopsis*

ISO 7183[1]), *Compressed-air dryers — Specifications and test methods*

ISO 8573-1:2001, *Compressed air — Part 1: Contaminants and purity classes*

ISO 8573-2, *Compressed air — Part 2: Test methods for oil aerosol content*

ISO 14644-3:2005, *Cleanrooms and associated controlled environments — Part 3: Test methods*

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1) To be published. (Revision of ISO 7183:1986)

3   Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7183, ISO 5598 and the following apply.

3.1
ambient temperature
temperature of the air surrounding the filter under test

3.2
coalescing
action by which liquid particles in suspension unite to give particles of greater volume

[ISO 3649:1980, definition 13]

3.3
contaminant
any solid, liquid or gas that adversely affects the system

3.4
filter
apparatus for separation or removal of contamination from a compressed air or gas stream

3.5
pressure drop
differential pressure
Δp
difference between inlet and outlet pressure of a component, measured under specified conditions

3.6
equivalent flow velocity
flow at which, when the test filter is operated at a 700 kPa [7 bar (e)] test pressure, an equal velocity to that for the device would be achieved when operated at a rated pressure and flow other than the test pressure

3.7
wall flow
that proportion of liquid contamination no longer suspended within the air flow of the pipe

4   Units and symbols

General use of SI units (Système international d'unités, see ISO 1000) as given throughout this part of ISO 12500 is recommended. However, in agreement with accepted practice in the pneumatic field, some non-preferred SI units, accepted by ISO, are also used.

1 bar $=$ 100 000 Pa

NOTE   bar (e) is used to indicate effective pressure above atmospheric.

1 l (litre) $=$ 0,001 m^3

The graphic symbols on diagrams are in accordance with ISO 1219-1 and ISO 7000.

5 Reference conditions

The reference conditions for gas volumes shall be:

a) air temperature 20 °C;

b) absolute air pressure 100 kPa [1 bar (a)];

c) relative water vapour pressure 0.

6 Test requirements

6.1 Standard rating parameters

The standard rating parameters are as identified in Table 1.

Table 1 — Standard rating parameters

Reporting parameters	Units	Rating conditions [c]		Maintain within of actual gauge value	Instrument accuracy at test conditions
Inlet temperature	°C	20		± 5	± 2 °C
Inlet pressure	kPa [bar (e)]	700 (7)		± 10 (0,1)	± 10 kPa (± 0,1 bar)
Ambient temperature	°C	20		± 5	± 2 °C
Minimum air purity[a]	—	ISO 8573-1:2001, class 2 6 1[d]			
Air flow for testing	m³/h	100 % rated flow		± 2 %	± 4 % of gauge reading
Inlet oil aerosol concentration[b c]	mg/m³	10	40	± 10 %	± 10 % of gauge reading
Pressure drop	Pa (mbar)	not applicable		not applicable	± 10 % of gauge reading

[a] Minimum air purity to the inlet of the oil aerosol generator, to ensure there is no liquid water present on the inlet of the test filter.

[b] Mineral oil lubricants meeting the requirements of ISO 3448, Viscosity Grade 46 and which are typical of compressor oils may be used.

[c] Selection based on the type and performance of the compressor representative of those which may be found in use

[d] The first number represents the solid-particle classification; the second, the humidity classification; and the third, the total oil classification.

6.2 Inlet air velocity

Testing for aerosol removal shall be carried out at the flow rate which the manufacturer specifies as the maximum rated working flow for continuous operation for each particular filter model.

To maintain turbulent flow and minimise aerosol settling, the minimum Reynolds number in the air stream in the inlet pipe shall be 4 000.

The Reynolds number, Re, shall be calculated using Equation (1);

$$Re = \frac{Dv\rho}{\eta} \tag{1}$$