INTERNATIONAL STANDARD

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Compressed air —

Part 1: Contaminants and purity classes

Air comprimé —

Partie 1: Polluants et classes de pureté

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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 8573-1 was prepared by Technical Committee ISO/TC 118, *Compressors and pneumatic tools, machines and equipment*, Subcommittee SC 4, *Compressed air purity specification and compressed air treatment equipment*.

This third edition cancels and replaces the second edition (ISO 8573-1:2001), which has been technically revised. It also incorporates the Technical corrigendum ISO 8573-1:2001/Cor.1:2002.

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ISO 8573 consists of the following parts, under the general title *Compressed air*:

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— *Part 1: Contaminants and purity classes*

— *Part 2: Test methods for oil aerosol content*

— *Part 3: Test methods for measurement of humidity*

— *Part 4: Test methods for solid particle content*

— *Part 5: Test methods for oil vapour and organic solvent content*

— *Part 6: Test methods for gaseous contaminant content*

— *Part 7: Test method for viable microbiological contaminant content*

— *Part 8: Test methods for solid particle content by mass concentration*

— *Part 9: Test methods for liquid water content*

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Introduction

This part of ISO 8573 is the key element of the ISO 8573 series of documents, which provides a classification system for the main contaminants of a compressed air system and identifies how other contaminants can be identified in addition to the classification system.

This part of ISO 8573 is supplemented by other parts that provide measurement methods for a wide range of contaminants.

As an important addition to this part of ISO 8573, Annex A has been added to provide the user with guidance on a number of aspects of the classification system and topics related to the associated measurement methods.

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Compressed air —

Part 1:
Contaminants and purity classes

1 Scope

This part of ISO 8573 specifies purity classes of compressed air with respect to particles, water and oil, independent of the location in the compressed air system at which the air is specified or measured.

This part of ISO 8573 provides general information about contaminants in compressed air systems as well as links to the other parts of ISO 8573, either for the measurement of compressed air purity or the specification of compressed air purity requirements.

In addition to the above-mentioned contaminants of particles, water and oil, this part of ISO 8573 also identifies gaseous and microbiological contaminants.

Guidance is given in Annex A as to the application of this part of ISO 8573.

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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 7183, *Compressed-air dryers — Specification and testing*

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

ISO 8573-3, *Compressed air — Part 3: Test methods for measurement of humidity*

ISO 8573-4, *Compressed air — Part 4: Test methods for solid particle content*

ISO 8573-5, *Compressed air — Part 5: Test methods for oil vapour and organic solvent content*

ISO 8573-6, *Compressed air — Part 6: Test methods for gaseous contaminant content*

ISO 8573-7, *Compressed air — Part 7: Test method for viable microbiological contaminant content*

ISO 8573-8, *Compressed air — Part 8: Test methods for solid particle content by mass concentration*

ISO 8573-9, *Compressed air — Part 9: Test methods for liquid water content*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7183, ISO 8573-7 and the following apply.

3.1
aerosol
suspension in a gaseous medium of solid particles, liquid particles or solid and liquid particles having negligible fall-velocity/settling-velocity

3.2
agglomerate
group of two or more particles combined, joined or formed into a cluster by any means

3.3
lubricant/coolant
fluid used to remove heat and reduce friction in a compressor

3.4
dewpoint
temperature at which water vapour begins to condense

3.5
hydrocarbon
organic compound consisting mainly of hydrogen and carbon

3.6
microbiological contaminants
viable colony-forming units, which can be of bacteria, fungi or yeasts

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3.7
oil
mixture of hydrocarbons composed of six or more carbon atoms (C_{6+})

3.8
particle
small discrete mass of solid or liquid matter

3.9
particle size
d
length of the greatest distance between two external boundaries

3.10
pressure dewpoint
dewpoint of the air at the specified pressure

3.11
relative water vapour pressure
relative humidity
ratio of the partial pressure of water vapour to its saturation pressure at the same temperature

3.12
vapour
gas that is at a temperature below its critical temperature and that, therefore, can be liquefied by isothermal compression

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4 Reference conditions

The reference conditions for gas volumes shall be as follows:

— air temperature 20 °C

— absolute air pressure 100 kPa = [1 bar](a)

— relative water vapour pressure 0

5 Compressed air purity classes

5.1 General

The three major contaminants in compressed air are solid particles, water and oil; these are categorized by compressed air purity classes.

These compressed air purity classes group the concentrations of each of the above contaminants into ranges, each range being given its own purity class index. The range limits are aligned to those figures found in practice.

When required, all other contaminants should be stated directly by the specific concentrations allowed, or determined within the compressed air supply; see 6.4.

5.2 Particle classes

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The particle purity classes are identified and defined in Table 1. Measurements shall be made in accordance with ISO 8573-4 and, when required, ISO 8573-8.

Where it is determined that there are particles with a size greater than 5 µm, then the classification of 1 to 5 cannot be applied.

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Table 1 — Compressed air purity classes for particles

Class[a]	**Maximum number of particles per cubic metre as a function of particle size, d**[b]		
	0,1 µm < d ⩽ 0,5 µm	0,5 µm < d ⩽ 1,0 µm	1,0 µm < d ⩽ 5,0 µm
0	As specified by the equipment user or supplier and more stringent than class 1		
1	⩽ 20 000	⩽ 400	⩽ 10
2	⩽ 400 000	⩽ 6 000	⩽ 100
3	Not specified	⩽ 90 000	⩽ 1 000
4	Not specified	Not specified	⩽ 10 000
5	Not specified	Not specified	⩽ 100 000
Class	**Mass concentration**[b] C_p mg/m^3		
6[c]	$0 < C_p \leqslant 5$		
7[c]	$5 < C_p \leqslant 10$		
X	$C_p > 10$		

[a] To qualify for a class designation, each size range and particle number within a class shall be met.

[b] At reference conditions; see Clause 4.

[c] See A.3.2.2.

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5.3 Humidity and liquid water classes

The humidity and liquid water purity classes are identified and defined in Table 2. Measurements shall be made in accordance with ISO 8573-3 and, when required, ISO 8573-9.

Table 2 — Compressed air purity classes for humidity and liquid water

Class	Pressure dewpoint °C
0	As specified by the equipment user or supplier and more stringent than class 1
1	$\leqslant -70$
2	$\leqslant -40$
3	$\leqslant -20$
4	$\leqslant +3$
5	$\leqslant +7$
6	$\leqslant +10$
Class	**Concentration of liquid water**[a] C_w g/m^3
7	$C_w \leqslant 0{,}5$
8	$0{,}5 < C_w \leqslant 5$
9	$5 < C_w \leqslant 10$
X	$C_w > 10$
[a] At reference conditions; see Clause 4.	

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5.4 Oil classes

The total oil purity classes are identified and defined in Table 3. Measurements for liquid oil and aerosols of oil shall be made in accordance with ISO 8573-2. It is considered that, for classes 3, 4 and X, the oil vapour content is not expected to significantly affect the total concentration; therefore, the measurement of vapour is optional. Where it is deemed necessary to measure the oil vapour, then ISO 8573-5 shall be used.

Table 3 — Compressed air purity classes for total oil

Class	Concentration of total oil[a] (liquid, aerosol and vapour) mg/m^3
0	As specified by the equipment user or supplier and more stringent than class 1
1	$\leqslant 0{,}01$
2	$\leqslant 0{,}1$
3	$\leqslant 1$
4	$\leqslant 5$
X	> 5
[a] At reference conditions; see Clause 4.	

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