INTERNATIONAL STANDARD

ISO 8573-9

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Compressed air —

Part 9: Test methods for liquid water content

Air comprimé —

Partie 9: Méthodes d'essai pour la détermination de la teneur en eau liquide

Reference number
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Contents

Page

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 8573-9 was prepared by Technical Committee ISO/TC 118, *Compressors, pneumatic tools and pneumatic machines*, Subcommittee SC 4, *Quality of compressed air*.

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

— *Part 1: Contaminants and purity classes*

— *Part 2: Test methods for aerosol oil 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 methods for viable microbiological contaminant content*

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

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

Part 2 is under revision.

Introduction

Water can be present in compressed air systems in two states: liquid and vapour. Liquid water usually consists of liquid aerosol and wall flow.

This part of ISO 8573 deals with liquid water content. Water vapour content is dealt with in ISO 8573-3.

Compressed air —

Part 9:
Test methods for liquid water content

1 Scope

This part of ISO 8573 specifies test methods for determining the liquid water content in compressed air, expressed as the liquid water mass concentration. The limitations of the methods are also given. One of a series of standards aimed at harmonizing air contamination measurements, it identifies sampling techniques and also gives requirements for evaluation, uncertainty considerations and reporting for the air purity parameter liquid water. The test methods are suitable for determining the purity classes in accordance with ISO 8573-1.

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*

ISO 3857-1, *Compressors, pneumatic tools and machines — Vocabulary — Part 1: General*

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

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

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3857-1, ISO 5598, ISO 8573-1, ISO 8573-2 and the following apply.

3.1
water aerosol
liquid water particles in compressed air that have negligible fall velocity/settling velocity

3.2
liquid water
water aerosol and wall flow in compressed air

4 Units and symbols

For the purposes of this part of ISO 8573, the following, including non-SI-preferred, units are used:

— 1 bar = 100 000 Pa;

— 1 l (litre) = 0,001 m^3;

— bar(a) is used for expressing absolute pressure;

— bar(e) is used for expressing effective pressure.

For the graphic symbols used in Figure 1, diagrams are in accordance with ISO 1219-1.

5 Selection of methods

The method to be selected is dependent on the mass concentration range of liquid water in compressed air. The most suitable method for the range of liquid water content estimated to be present in the sample may be selected from Table 1.

Table 1 — Liquid water mass concentration measurement methods

Type of method	Liquid water concentration (c_w) g/m^3
Gravimetric method	$c_w \geqslant 0{,}1$
Vapourization method	$c_w \leqslant 5$

6 Sampling techniques

The sampling shall be made at or near actual pressure and at a constant compressed air flow rate.

The choice of sampling method will depend upon the actual level of contamination and the compressed air flow in the compressed air system. For sampling methods, see ISO 8573-2.

Compressed air samples may be routed back into main pipe or vent to the atmosphere after measurement. The value of air sample parameters (pressure, temperature, air velocity, etc.) shall be within the ranges specified by the test equipment manufacturer.

7 Measurement methods

7.1 General

The test equipment and instruments shall be in good working order. Consideration shall be given to the calibration requirements of the measurement equipment used as given in the applicable instructions.

Pressure and temperature may also affect liquid water content measurement results. Therefore, the temperature and the pressure at the measuring point should be maintained at steady state conditions.

Reference should be made to the measurement equipment manufacturer as to applicability of the equipment.

7.2 Determination of liquid water content by gravimetric method

7.2.1 General

This method identifies the collection of condensate from the sampling point, the separation of water from that condensate and the weight of liquid water present in the compressed air sample. The volume of compressed air from which the liquid water is separated shall be measured.

7.2.2 Test equipment

7.2.2.1 General description

The general arrangement of the test equipment for the gravimetric method shall be in accordance with Figure 1. In the case of partial flow sampling, the water separator (3) with the attendant components (12 and 13) in the drain line should be excluded.

NOTE The numbers given between parentheses refer to the numbering of the elements in Figure 1.

For symbols, see ISO 1219-1.

7.2.2.2 **Water separator** (3)

The main function of the separator is partial removal of liquid water from air flow and protection of the high-efficiency filter (4) from overflow. The separator efficiency of water removal from the compressed air flow shall be not less than 80 %.

7.2.2.3 **High-efficiency filter** (4)

The high-efficiency coalescing filter for liquid water removal shall have an efficiency of $\geqslant$ 99,9 %, rated for oil particles $\leqslant$ 3 µm.

7.2.2.4 **Collecting vessels** (13)

Vessels with a volume of not less than 0,5 l that enable the liquid water collection to be observed during testing shall be used.

7.2.2.5 **Oil/water separator** (14)

The liquid collected in the collecting vessels (13) shall be transferred to the oil/water separator (14). A detailed explanation of the procedure of water separation is identified in ISO 8573-2.

7.2.2.6 **Drain valves** (12)

Drain valves are used to drain the liquid water collected in the water separator (3), high-efficiency filter (4) and collecting vessels (13). A drain valve between the filter (4) and the collecting vessel is normally left in the open position; a drain valve between the collecting vessel and the oil/water separator (14) is normally left in the closed position.

7.2.2.7 **Measuring columns** (15)

The amount of separated liquid water is measured in the measuring column graduated in millilitres or weighted in grams. The accuracy of measurement of mass shall be better than $\pm$ 2 % of the reading.