SLOVENSKI STANDARD
SIST ISO 187:1995

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Papir, karton, lepenka in vlaknine - Standardna atmosfera za kondicioniranje in preskušanje ter postopek za nadzor atmosfere in kondicioniranje vzorcev

Paper, board and pulps -- Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples

Papier, carton et pâtes -- Atmosphère normale de conditionnement et d'essai et méthode de surveillance de l'atmosphère et de conditionnement des échantillons

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85.040	Vlaknine	Pulps
85.060	Papir, karton in lepenka	Paper and board

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INTERNATIONAL STANDARD

ISO 187

Second edition
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Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples

Papier, carton et pâtes — Atmosphère normale de conditionnement et d'essai et méthode de surveillance de l'atmosphère et de conditionnement des échantillons

Reference number
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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.

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.

International Standard ISO 187 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*.

This second edition cancels and replaces the first edition (ISO 187: 1977), which has been technically revised.

Annex A forms an integral part of this International Standard. Annexes B and C are for information only.

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Introduction

The physical properties of paper are affected materially by its moisture content which, in turn, is dependent on the humidity of the surrounding atmosphere. In order that tests may be made on paper in a defined physical state, it is brought into equilibrium with an atmosphere of standardized temperature and relative humidity, and tested in that atmosphere.

The moisture content of a given paper in equilibrium with a given atmosphere varies according to whether the equilibrium is reached by sorption or by desorption of moisture. This hysteresis influences those physical properties that change with moisture content. Unless otherwise specified the equilibrium condition should be attained by the sorptive process.

For a number of years three standard test atmospheres have been in common use:

20 °C/65 % r.h.; 23 °C/50 % r.h. and 27 °C/65 % r.h.

At the time of publication of this revision of ISO 187: 1977 the atmosphere 23 °C/50 % r.h. is used almost exclusively in most countries and after 1 January 1993 is to be considered the ISO standard test atmosphere for testing of pulp, paper and board. However, the 23 °C/50 % r.h. atmosphere is difficult to attain in some of the countries located in tropical zones, and in such countries the 27 °C/65 % r.h. atmosphere is permitted. Until 1 January 1993 the 20 °C/65 % r.h. atmosphere is acceptable as a standard test atmosphere.

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Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples

1 Scope

This International Standard specifies the standard atmosphere for conditioning, and for testing pulp, paper and board, and also the procedures for measuring the temperature and relative humidity.

For the conditioning of laboratory prepared handsheets in accordance with ISO 5269-1, the standard atmosphere is that defined in this International Standard but the procedure is different[1].

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 indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications.*

ISO 4677-1:1985, *Atmospheres for conditioning and testing — Determination of relative humidity — Part 1: Aspirated psychrometer method.*

ISO 5269-1:1979, *Pulps — Preparation of laboratory sheets for physical testing — Part 1: Conventional sheet-former method.*

ISO 5269-2:1980, *Pulps — Preparation of laboratory sheets for physical testing — Part 2: Rapid-Koethen method.*

3 Definitions

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

3.1 relative humidity (r.h.): The ratio, expressed as a percentage, of the actual water vapour content of the air to the water vapour content of air saturated with water vapour at the same temperature and pressure.

3.2 conditioning: A process of establishing a reproducible moisture content equilibrium between the sample and an atmosphere of specified temperature and relative humidity. This equilibrium is considered to be attained when the results of two consecutive weighings of the sample, carried out at an interval of time of not less than 1 h, do not differ by more than a specified amount.

NOTE 1 The interval between weighings is dependent on the grammage of the sample and the degree of agreement expected between successive weighings should take account of the known cycling characteristics of the particular test room. The establishment of moisture content equilibrium is accepted as ensuring that the paper is in a stable physical state, but in special circumstances, conditioning may have to be prolonged until the desired physical equilibrium is attained. Such circumstances are not within the scope of this International Standard.

4 Principle

Exposure of the sample to a specific conditioning atmosphere in such a manner that a reproducible state of moisture content equilibrium is reached between the sample and this atmosphere.

1) ISO 5269-1 requires pulp handsheets to be conditioned by desorption of moisture, whilst ISO 5269-2 requires drying followed by conditioning by sorption of moisture.

5 Standard atmosphere

The standard atmosphere for testing pulp, paper and paperboard shall be 23 °C ± 1 °C and (50 ± 2) % r.h. In tropical countries an atmosphere of 27 °C ± 1 °C and (65 ± 2) % r.h. may be used.

NOTE 2 The temperature and relative humidity conditions are those specified in ISO 554. The tolerances quoted are the reduced or close tolerances specified in ISO 554.

A test atmosphere shall be deemed to be within the requirements of this International Standard if all the test results determined as described in annex A (see, in particular, A.4.2) are within the prescribed limits. Even short-term excursions of temperature or humidity beyond these limits, to the extent that the equilibrium moisture content of the sample will be affected, are not permitted. Whenever the test atmosphere is known to have been outside the limits and if there is any chance that the moisture content of samples has been changed by such excursions, all samples must be reconditioned (repeating clause 6) before any further testing is done.

NOTES

3 If it is known or suspected that the relative humidity has exceeded the upper limit to the extent that the moisture content may have increased, all samples except those prepared in accordance with ISO 5269-1, must be subjected to the preliminary low humidity treatment described in 6.1 before reconditioning.

If it is known or suspected that the relative humidity has fallen below the limit to the extent that the moisture content may have decreased, samples prepared in accordance with ISO 5269-1 should be discarded and new samples prepared. If this is not possible and the samples are tested, the circumstance must be reported.

4 A recording hygrometer, either independent of or part of the control system, should be in continuous operation in the room, but such hygrometer must not be used to assess whether the atmosphere meets the requirements of this International Standard unless it also meets the requirements of annex A of this standard. The hygrometer should respond rapidly to changes in relative humidity, for example, less than 1 min for a change in relative humidity of 10 %.

6 Conditioning procedure

6.1 Pre-conditioning of the sample

For tests in which the hysteresis of the equilibrium moisture content may lead to important errors, the sample shall be pre-conditioned before conditioning, for 24 h in air of relative humidity between 10 % and 35 % and a temperature not above 40 °C. If it is known that conditioning (6.2) will result in an equilibrium moisture content equivalent to that achieved by sorption (see Introduction) this preliminary treatment may be omitted.

NOTE 5 Since the effect of hysteresis may not be known until after the event, it is recommended that preconditioning be always carried out.

6.2 Conditioning

The specimens of the sample shall be held such that the conditioning air has free access to all their surfaces so that their moisture contents attain a state of equilibrium with the water vapour in the atmosphere. This equilibrium is considered to be attained when the results of two consecutive weighings at least 1 h apart do not differ by more than 0,25 % of the total mass (3.2). The interval between weighings needs to be longer for higher grammage products and the degree of agreement expected between successive weighings should take account of the known cycling characteristics of the test room.

NOTE 6 With good air circulation, a conditioning period of 4 h is usually sufficient for paper. A minimum time of 5 h to 8 h will be required for heavy papers. Boards of higher grammage and specially treated materials may require a conditioning period of 48 h or longer.

7 Test report

The test report of any testing which is required to be done in this standard atmosphere shall include the following particulars:

a) reference to this International Standard;

b) the nominal conditioning atmosphere used;

c) the time for which the sample was conditioned;

d) whether the paper or the board was pre-conditioned before conditioning.

Annex A
(normative)

Measurement of temperature and relative humidity

A.1 Scope

This annex is based on ISO 4677-1:1985 and describes the procedures for measurement of temperature and relative humidity to be used in determining compliance with this International Standard. It aims to specify those features which are essential for accurate measurement without specifying a particular type of instrument.

NOTE 7 Condensation type and impedance type hygrometers may be used provided they can be shown to be at least as accurate as the aspirated psychrometer.

A.2 Apparatus

Aspirated wet and dry bulb psychrometer, comprising the following essential components:

A.2.1 Thermometers

These may be liquid-in-glass (either solid stem or enclosed scale type), thermocouples or electrical resistance thermometers with a working range of 10 °C or more. They shall be accurate to within ± 0,1 °C and the pair used in any instrument shall agree to within 0,05 °C. Liquid-in-glass thermometers should be graduated in 0,1 °C scale divisions so that readings can be estimated to the nearest 0,05 °C. Thermocouples and electrical resistance thermometers are usually connected to a digital display panel meter which rounds off to 0,1 °C. However, a chart recorder with scale divisions of 0,05 °C may be connected to provide a permanent record of dry bulb readings and also either wet bulb temperature or preferably, relative humidity computed electronically within the instrument.

The sensing section of the thermometers shall not be less than 1 mm or more than 4 mm in diameter for transverse ventilation, and 6 mm for axial ventilation. Thermocouples and electrical resistance thermometers shall have a response rate sufficient to track a temperature gradient of 1 °C/min and a relative humidity gradient of 1,5 %/min.

A.2.2 Ventilation

The instrument shall provide means of drawing air over the sensing sections of the thermometers which may be mounted for either transverse or axial ventilation. The thermometers shall be mounted so that the axes of the sensors are parallel and separated by a distance of not less than three times the diameter of the wet bulb sensor.

In the case of transverse ventilation both sensors may be located in the same air stream with the dry bulb off-set on the upstream side of the wet bulb. In the case of axial ventilation the direction of air flow shall be from the free end of the sensor to the support end and a separate cylindrical radiation shield, of internal diameter 1,75 to 3 times the wet bulb diameter, shall be provided for each sensor.

The sensors shall be protected from all sources of heat radiation including that provided by the proximity of the operator. The air flow shall be provided by a fan located downstream from the sensors so that any heat generated by it will not affect the sensors, and exhaust air is directed away from the source of incoming air.

The air speed over the sensors shall not be less than 3 m/s. However, the air speed shall not be sufficiently high as to allow the wick to become less than fully saturated or to allow droplets of water to form in the air stream.

A.2.3 Wet wick

The wet wick shall be a seamless fabric sleeve made from cotton or non-acetate rayon. It shall fit the sensor snugly but not tightly and shall cover the sensor completely for such distance that any decrease in length covered does not change the temperature reading. This may be measured by operating both thermometers as wet bulbs and varying the distance covered on one of them.

A.2.3.1 Cleaning and care of wicking material

Cleanliness of wicks is essential for accurate results, particularly in the case of thermocouples and electrical resistance thermometers, and they should be changed frequently in service.

Even the slightest touch of the hand will affect wick performance. Wicks should be handled with tweezers or plastics gloves (or their equivalent) and it is important to ensure that any part of the tweezers or gloves to touch the wick has not been touched previously by the hand.