INTERNATIONAL STANDARD

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Specifications for industrial laundry machines — Definitions and testing of capacity and consumption characteristics —

Part 2: Batch drying tumblers

Spécifications pour les machines de blanchisserie industrielles — Définitions et contrôle des caractéristiques de capacité et de consommations —

Partie 2: Séchoirs rotatifs

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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 9398-2 was prepared by Technical Committee ISO/TC 72, *Textile machinery and allied machinery and accessories*, Sub-Committee SC 4, *Dyeing, finishing and allied machinery and accessories*.

ISO 9398 consists of the following parts, under the general title *Specifications for industrial laundry machines — Definitions and testing of capacity and consumption characteristics*:

— *Part 1: Flatwork ironing machines*

— *Part 2: Batch drying tumblers*

— *Part 3: Washing tunnels*

— *Part 4: Washers-extractors*

Annex A of this part of ISO 9398 is for information only.

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Specifications for industrial laundry machines — Definitions and testing of capacity and consumption characteristics —

Part 2:
Batch drying tumblers

1 Scope

This part of ISO 9398 defines the characteristics of batch drying tumblers and gives the usual test methods for these characteristics with regard to the capacity, power consumption and productivity of these machines.

It does not cover safety requirements, for which reference should be made to the appropriate national regulations and legal texts.

This part of ISO 9398 is used for reference in the drafting of purchasing orders for batch drying tumblers whose nominal capacity is at least 7 kg.

NOTE 1 If more detailed information on the effect of laundry machines on textiles is required, reference should be made to ISO 7772 after agreement between the parties involved.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 9398. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9398 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 9398-1:1993, *Specifications for industrial laundry machines — Definitions and testing of capacity and consumption characteristics — Part 1: Flatwork ironing machines.*

3 Definitions

For the purposes of this part of ISO 9398, the definitions given in ISO 9398-1 and the following definitions apply.

3.1 nominal capacity of a batch drying tumbler: The maximum load (in kilograms) of decatized cotton articles as specified in 4.1 that may be dried in this dryer under the specified test conditions; it corresponds to the mass of these cotton articles at (8 ± 0,5) % residual moisture.

NOTE 2 The value of this load is given on the rating plate of the machine.

3.2 cage (basket) volume (V)**:** Inside volume of the cage, expressed in cubic decimetres (litres), minus all the inwardly projecting volumes (except those of baffles or bars).

3.3 volumetric ratio (v)**:** Ratio of the *cage volume*, expressed in cubic decimetres (litres), to the *nominal capacity* of the tumbler, expressed in kilograms.

3.4 load ratio (c)**:** Ratio of the *nominal capacity* of the tumbler, expressed in kilograms, to the *cage volume*, expressed in cubic decimetres (litres).

The optimum value of this ratio is between 1/23 and 1/30.

4 General test conditions

4.1 Machine load

4.1.1 Amount of load

The test load shall correspond to the nominal capacity of the machine as defined in 3.1.

4.1.2 Nature of the load

The test load shall comprise decatized cotton towels with a mass per unit area of (375 ± 25) g/m^2 and dimensions of (90 ± 10) cm × (60 ± 10) cm.

4.1.3 Conditioning

The residual moisture content of the test load shall be (65 ± 1) % after rinsing in water and suitable extraction.[1)]

4.1.4 Number of loads

Two identical loads, as defined in 4.1.1, shall be tested.

If the test loads conditioned as in 4.1.3 have to be kept for a period of time in the area where the tests are carried out, they shall be stored under a cover which will prevent any evaporation.

4.2 Energy supply

Energy for the test shall be supplied by steam, gas, electricity or heat-transport fluid, as specified by the manufacturer.

4.3 Temperature of the rinse water before extraction

The temperature of the rinse water used in the test shall be (17 ± 7) °C before extraction.

4.4 Ambient air

The ambient air temperature during the test shall be (24 ± 6) °C, and the relative humidity shall be (50 ± 10) %.

4.5 Condition of the machine

The tumbler shall be installed in accordance with the manufacturer's instructions and shall be clean.

5 Determination of residual moisture content after drying

5.1 Test method

5.1.1 Under the general test conditions as specified in clause 4, carry out two consecutive test cycles with a load corresponding to the nominal capacity, in order to condition the machine.

5.1.2 Load the dryer with a first test load (4.1) and after $0{,}85t_0$, where t_0 (in minutes) is the drying duration for the test load according to the manufacturer's instructions, remove the load, weigh it and calculate its residual moisture content in accordance with the definition given in ISO 9398-1.

5.1.3 Introduce into the dryer a second test load (4.1) and after $1{,}15t_0$ remove the load, weigh it and calculate its residual moisture content in accordance with ISO 9398-1.

5.1.4 Repeat the operations in 5.1.2 and 5.1.3 one more time.

5.2 Expression of results

5.2.1 Plot the values found in 5.1.2, 5.1.3 and 5.1.4 on a graph and draw the curve of the residual moisture content after drying as a function of the time.

5.2.2 Determine from the graph the time t which permits drying of the test load (4.1) to give a residual moisture content after drying of (8 ± 0,5) %.

6 Energy consumption of the machine

6.1 General

The energy consumption of a batch drying tumbler is defined as the number of kilojoules or kilowatt-hours (of steam, gas, electricity or heat-transport fluid energy) required for the drying of a test load (4.1) to obtain a residual moisture content after drying of (8 ± 0,5) % (see 6.3).

6.2 Test method

6.2.1 Under the general test conditions as specified in clause 4, carry out two consecutive test cycles with a machine load as in 4.1 in order to condition the machine.

1) This moisture level [(65 ± 1) %] may also be expressed as a level of 52 % with respect to a dried mass which has regained moisture to a level of (8 ± 0,5) %.

6.2.2 Carry out two series of operations in succession with a test load (4.1) using the drying time t determined in 5.2.2.

6.2.3 Using suitable instruments, record the corresponding energy consumptions and take the mean value of the two tests.

6.3 Expression of results

6.3.1 Indicate the energy consumption of the machine, expressed as kilojoules or kilowatt-hours, for the drying of 1 kg of decatized cotton towels as specified in 4.1, the residual moisture of which has been reduced from (65 ± 1) % to (8 ± 0,5) % after drying.

6.3.2 Indicate the energy consumption required by the motor(s) for the mechanical drive of the drum and the ventilator.

6.3.3 The total energy consumption required by a batch drying tumbler is the sum of the mechanical and thermal energies required.

EXAMPLE

Motor(s) ..... kWh
Heating ..... kWh

Total ..... kWh

7 Hourly productivity of a tumbler

The hourly productivity of a batch drying tumbler shall be controlled simultaneously with its energy consumption.

7.1 General

The hourly productivity of a tumbler is defined as the mass, in kilograms, of decatized cotton towels, as specified in 4.1 , that may be dried in 1 h (not including the time necessary for loading and unloading the machine) to give a moisture content which has been reduced from (65 ± 1) % to (8 ± 0,5) %.

7.2 Test method

The test conditions for determining the hourly productivity are identical to those specified in 6.2.

7.3 Expression of results

The hourly productivity of a batch drying tumbler shall be expressed as:

a) the mass of water evaporated during 1 h under the test conditions, as described in 6.2;

and

b) the number of kilograms of decatized cotton towels, as specified in 4.1, that may be dried in 1 h under the test conditions specified in 6.2.

8 Machine information

8.1 Identification

— manufacturer;

— manufacturer's address;

— machine type and reference number.

8.2 Specifications

— diameter, in metres;

— length, in metres;

— volume, in cubic decimetres (litres);

— speed, in revolutions per minute;

— type of cool-down (polyester-cotton);

— whether the cage reverses direction;

— air flow, in metres per second, at the outlet duct;

— nominal steam pressure, in kilopascals;

— mass (usually "gross mass"), in kilograms.

Annex A
(informative)

Bibliography

[1] ISO 6348:1980, *Textiles — Determination of mass — Vocabulary.*

[2] ISO 6741-1:1989, *Textiles — Fibres and yarns — Determination of commercial mass of consignments — Part 1: Mass determination and calculations.*

[3] ISO 7772-1:—[2], *Assessment of industrial laundry machinery and its effect on textiles — Part 1: Washing machines.*

[4] ISO 7772-2:—[2], *Assessment of industrial laundry machinery and its effect on textiles — Part 2: Extracting machines.*

[5] ISO 7772-3:—[2], *Assessment of industrial laundry machinery and its effect on textiles — Part 3: Flatwork ironing machines.*

[6] ISO 7772-4:—[2], *Assessment of industrial laundry machinery and its effect on textiles — Part 4: Batch drying tumblers.*

2) To be published.

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