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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Closed-circuit dry-cleaning machines — Defining and checking of machine characteristics

Machines de nettoyage à sec fonctionnant en circuit fermé — Définitions et contrôle des caractéristiques d'une machine

Reference number
ISO 8232 : 1988 (E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8232 was prepared by Technical Committee ISO/TC 72, *Textile machinery and allied machinery and accessories*.

Annex A forms an integral part of this International Standard. Annex B is for information only.

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Closed-circuit dry-cleaning machines — Defining and checking of machine characteristics

1 Scope

This International Standard specifies a closed-circuit dry-cleaning machine, and suitable methods of checking the following characteristics:

— solvent consumption;

— efficiency of solvent recovery during drying;

— solvent concentrations in the atmosphere surrounding the closed-circuit dry-cleaning machine.

For safety requirements concerning the industrial use of these machines, reference should be made to the appropriate regulations.

2 Definitions

2.1 closed-circuit dry-cleaning machine: Machine with integral systems of solvent recovery necessary for all phases of cleaning, to give a clean, dry and deodorized load, avoiding, automatically and without regeneration,

— any leakage between the atmosphere of the plant and the machine surroundings (including inside parts of the machine and piping),

— any evacuation of waste (except water, free of solvent undissolved in the separator siphon).

The operations of solvent purification are not taken into account by this definition.

2.2 solvent consumption of a dry-cleaning machine: Consumption, expressed in litres of solvent, necessary to clean the nominal capacity of a machine working to set test cycles.

It may also be expressed as a percentage of the nominal capacity.

3 General test conditions

3.1 Cycles

One or both of the following cycles shall be used :

— a "manufacturer" cycle corresponding to careful work, used when the "theoretical" cycle changes machine performance significantly;

— a "theoretical" cycle for which the drying temperature shall be 78 °C ± 2 °C at the inlet and 58 °C ± 2 °C at the outlet.

NOTES

1 For a given machine, the cycles chosen should be the same for the whole series of tests.

2 For a machine working with a solvent other than perchlorethylene, only the "manufacturer" cycle is used.

Table 1 — Theoretical test cycle with perchlorethylene

Operation	Theoretical cycle min
Washing	10
Liquid emptying time	2
Spin time	2
Drying and deodorization[1)]	15 — 20 — 25
1) Time set according to the type of machine tested.	

3.2 Machine load

3.2.1 Load size

The load shall correspond to the nominal capacity of the machine[1)].

1) The nominal capacity (P) of the dry-cleaning machine is the maximum load, in kilograms, of dry textile articles which may be cleaned in the machine, as specified on the name-plate of the machine.

3.2.2 Load composition

The load shall be composed of modern clothing divided:

— 20 % wool;

— 50 % polyester/wool[1];

— 30 % cotton.

3.2.3 Number of loads

Two loads are necessary to carry out the tests, as they are used alternately.

3.2.4 Conditioning

The load shall be conditioned before the start of the tests at 20 °C ± 2 °C and (65 ± 2) % relative humidity[2].

3.3 Steam supply

The steam pressure shall be compatible with the solvent used.

3.4 Water supply

The water supply for the test shall meet the following conditions:

— temperature: 15 °C ± 2 °C

— pressure (measured at the inlet): $2{,}5 \times 10^5$ Pa (2,5 bar).

3.5 Ambient temperature and relative humidity

The test atmosphere shall meet the following conditions:

— temperature: 23 °C ± 3 °C;

— relative humidity: (60 ± 15) %.

3.6 Machine and solvent conditions

The machine and solvent shall be clean. A leaktightness test of the machine shall be carried out to ensure that there is no loss of the clean solvent (new or just distilled).

The method specified in 4.1.2.1, or a method of equivalent efficiency, may be used.

4 Solvent consumption

4.1 Methods of checking

4.1.1 General conditions

General conditions shall be those given in clause 3.

4.1.2 Specific conditions

4.1.2.1 With the filters filled with solvent and the separator balanced, mark the level in the tank(s). Leave the machine undisturbed for 24 h and check the level in the tank(s).

4.1.2.2 Carry out 100 cycles, at the rate of 10 consecutive cycles per test day.

4.1.2.3 Leave the machine undisturbed for 24 h.

4.1.2.4 Measure the amount of solvent to be added to reach the mark noted in 4.1.2.1.

4.2 Expression of results

Note the consumption of solvent in litres per cycle at nominal capacity and the mass by volume of solvent used (noted in parentheses).

Consumption may also be expressed as a percentage of the trial load (corresponding to the nominal capacity).

NOTES

1 If necessary, details can be given about the loss caused by the regeneration in the appropriate module of the machine (filtering, distillation, centrifugal spillage, etc.).

2 The solvent consumption for regeneration of solvent by the appropriate module of the machine can be noted in a separate document.

5 Checking method for solvent recovery efficiency during dry-cleaning and deodorization phase

5.1 General test conditions

General test conditions shall be those given in clause 3.

5.2 Specific conditions

5.2.1 Insert a load m_1, expressed in kilograms, corresponding to the nominal capacity of the machine.

5.2.2 Note the value m_2 of the load, expressed in kilograms, after impregnation in anhydrous solvent and spinning.

5.2.3 Dry.

5.2.4 Before any measurement, carry out three cycles to condition the machine, with the same load m_1.

5.2.5 Carry out three successive series of operations (reverting to the general test conditions after each series), measuring, as a function of time, the amount of solvent recovered during drying, expressed in litres.

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1) Normal composition between 50 % and 65 % polyester and 35 % to 50 % wool.

2) In accordance with ISO 139.

5.2.6 Draw the graph curves corresponding to the three series of operations.

5.2.7 Note the time of drying, from which a level is reached for the value of the load; note this value, m_3, expressed in kilograms.

6 Checking method for control of solvent concentration in the atmosphere of a test-plant containing a closed-circuit dry-cleaning machine

With a closed-circuit dry-cleaning machine working with perchlorethylene and in the conditions specified in 6.1 and 6.2, the reference value of the concentration of gaseous perchlorethylene solvent shall not be higher than 335 mg/m^3 on average[1]. This value corresponds to the average integration of the curve of the different concentration checks carried out during a one-day trial by an appropriate means.

6.1 General test conditions

General test conditions shall be those given in clause 3.

6.2 Specific conditions

6.2.1 Machines of nominal capacity less than or equal to 20 kg

6.2.1.1 Use a test-plant containing only the closed-circuit dry-cleaning machine, of which

a) the size corresponds approximately to that of a dry-cleaning shop:

— area = 70 m^2 ± 10 m^2,

— volume = 350 m^3 ± 30 m^3;

b) the value of the air-renewal rate, t, expressed in cubic metres per hour, is the following:

$$t = (58 \pm 8)\, C_n$$

where C_n is the nominal capacity of the machine, expressed in kilograms.

6.2.1.2 Run the machine for 8 h consecutively, using two standard loads alternately as follows:

While a load is being cleaned and dried in the machine situated in a corner of the shop, the clothes from the other load shall be put to air on two rails away from the machine.

6.2.1.3 Put the sensors of a suitable measuring apparatus[2] 1 m from, and on the axis of, the machine loading-door for one of the measurement points, and 1,7 m ± 0,1 m from the floor for each of the other four points set in the figure in clause A.1.

NOTE — The respective positions of the machine, the rods, the room ventilation holes (intake and extraction) and of the sensors should be those indicated in the figure under clause A.1. (The extraction hole, or the extractor itself, should be as far away as possible from the room door or the intake hole.)

6.2.1.4 Draw, in terms of time, the curve of the gaseous solvent concentrations[3] in the atmosphere, expressed in milligrams per cubic metre.

6.2.1.5 Repeat the test over three consecutive days (three times 8 h) with a return to the general test conditions (see clause 3) every day.

6.2.2 Machines of nominal capacity over 20 kg

6.2.2.1 Use a test-plant containing only the closed-circuit dry-cleaning machine, of which

a) the size corresponds approximately to that of a dry-cleaning shop

— area = 100 m^2 ± 15 m^2,

— volume = 500 m^3 ± 40 m^3;

b) the value of the air-renewal rate, t, expressed in cubic metres per hour, is the following:

$$t = (58 \pm 8)\, C_n$$

where C_n is the nominal capacity of the machine, expressed in kilograms.

6.2.2.2 Then proceed as in 6.2.1.2 to 6.2.1.5, except that the figure to be used shall be that in clause A.2.

NOTE — The respective positions of the machine, the rods, the room ventilation holes (intake and extraction) and of the sensors should be those indicated in the figure under clause A.2. (The extraction hole, or the extractor itself, should be as far away as possible from the room door or the intake hole.)

1) This concentration is sometimes expressed in parts per million by volume (ppm).
This concentration for other solvents shall be not greater than

7 000 mg/m^3 (1 250 ppm) for 1.1-trichlorofluoromethane
1 050 mg/m^3 (250 ppm) for 1.1.1-trichloroethane
9 500 mg/m^3 (1 250 ppm) for 1.1.3-trichlorotrifluoroethane

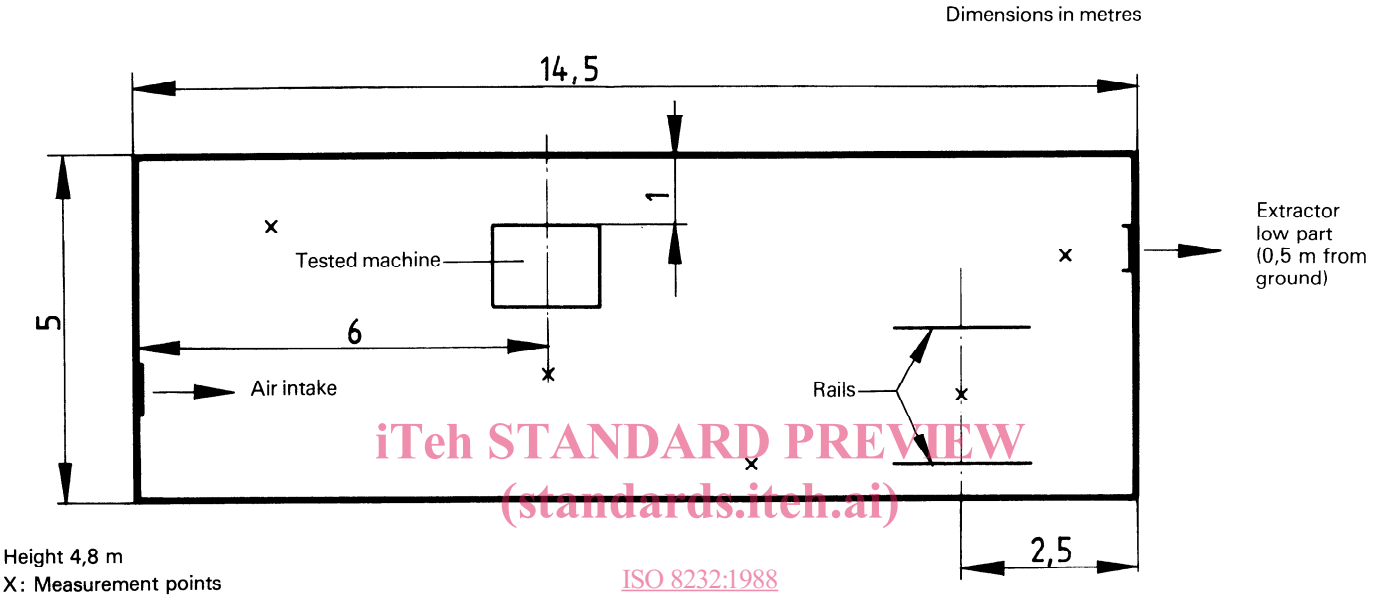
2) Apparatus working continuously over the 8 h of test.

3) This concentration is sometimes expressed in parts per million by volume.

Annex A
(normative)

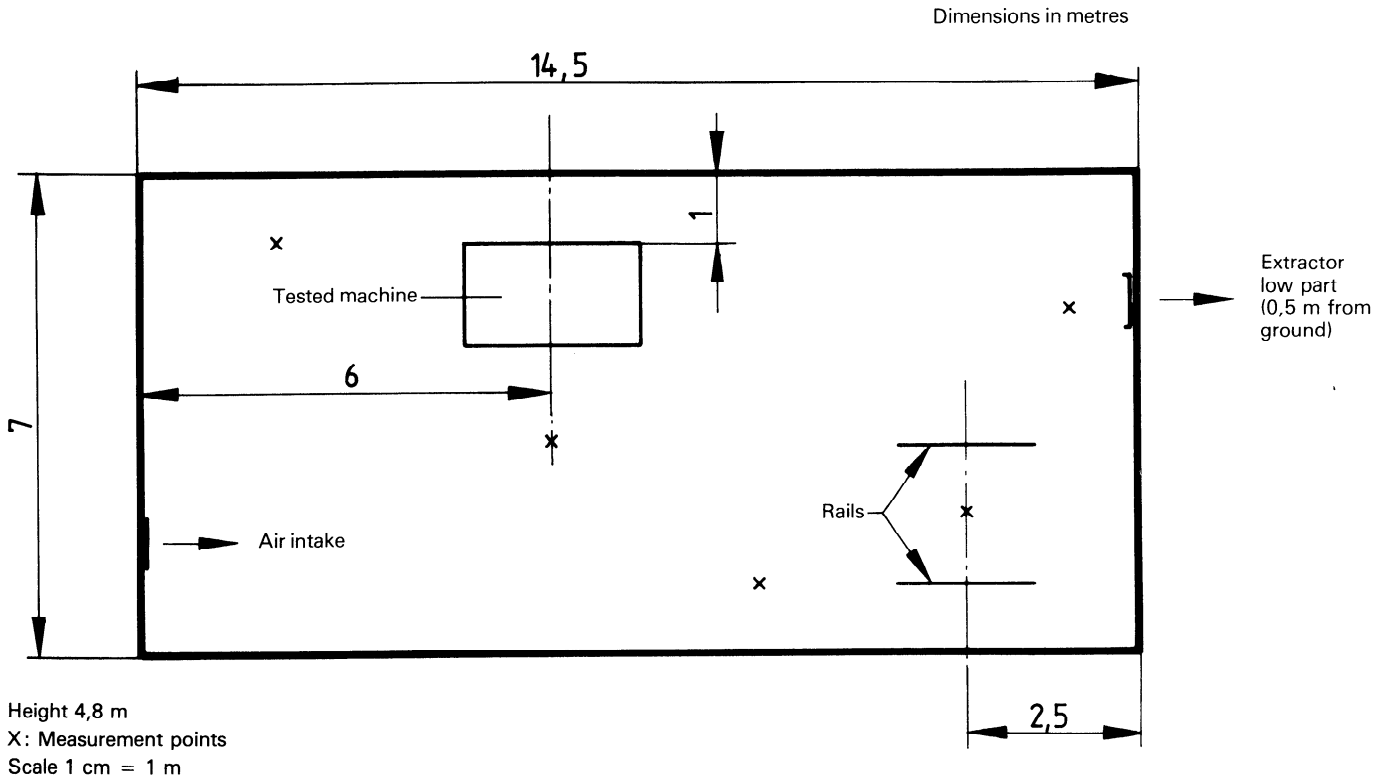
Representative test-plant

A.1 Dry-cleaning machine of capacity less than or equal to 20 kg



Height 4,8 m
X: Measurement points
Scale 1 cm = 1 m

A.2 Dry-cleaning machine of capacity over 20 kg



Height 4,8 m
X: Measurement points
Scale 1 cm = 1 m

Annex B
(informative)

Bibliography

ISO 139 : 1973, *Textiles — Standard atmospheres for conditioning and testing.*

UDC 648.28

Descriptors : chemical cleaning, dry cleaning, cleaning equipment, tests.

Price based on 5 pages