INTERNATIONAL STANDARD

ISO 3175-2

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Textiles — Dry cleaning and finishing —

Part 2:
Procedures for tetrachloroethene

Textiles — Nettoyage à sec et finition —

Partie 2: Modes opératoires au tétrachloroéthylène

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 3175-2 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 2, *Cleansing, finishing and water resistance tests*.

ISO 3175 consists of the following parts, under the general title *Textiles — Dry cleaning and finishing*:

— *Part 1: Method for assessing the cleanability of textiles and garments*

— *Part 2: Procedures for tetrachloroethene*

— *Part 3: Procedures for hydrocarbon solvents* (under development)

— *Part 4: Procedure for wet cleaning systems* (under development)

Annex A of this part of ISO 3175 is for information only.

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Introduction

Dry cleaning is a process for cleaning textiles in an organic solvent that dissolves oils and fats and disperses particulate dirt substantially without the swelling and creasing associated with washing or wet cleaning. Small quantities of water may be incorporated in the solvent with the aid of a surfactant for the purpose of obtaining better soil and stain removal. Some moisture-sensitive articles are preferably dry cleaned without the addition of water to the solvent. A surfactant is often used to assist with soil removal and reduce the risk of greying, but it must be borne in mind that surfactants contain varying amounts of water in their formulations.

Dry cleaning is normally followed by an appropriate restorative finishing procedure. In most cases, this comprises some form of steam treatment and/or hot pressing.

Properties of the textile or garment may change progressively on dry cleaning and steaming and/or pressing and in some cases a single treatment may give little indication of the extent of dimensional and other changes that may arise after repeated treatments and which may affect the useful life of the article. Generally, most of the potential change will become apparent after three to five of the dry cleaning and finishing treatments specified in this part of ISO 3175.

The properties which should be considered in an assessment for dry-cleanability together with the methods for their assessment are given in ISO 3175-1.

Textiles — Dry cleaning and finishing —

Part 2:
Procedures for tetrachloroethene

1 Scope

This part of ISO 3175 specifies dry-cleaning procedures for tetrachloroethene (perchloroethylene), using commercial dry-cleaning machines, for fabrics and garments. It comprises a procedure for normal materials and procedures for sensitive and very sensitive materials (see definitions 3.4 and 3.5).

NOTES

1 Various solvents can be used for dry cleaning, of which tetrachloroethene is the most common in many countries. For this reason, the present method prescribes the use of tetrachloroethene.

2 When using commercial dry-cleaning equipment, official regulations and normal safety precautions should be observed.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 3175. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 3175 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of the IEC and ISO maintain registers of currently valid International Standards.

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

ISO 3175-1:1998, *Textiles — Dry cleaning and finishing — Part 1: Method for assessing the cleanability of textiles and garments*.

3 Definitions

For the purposes of this part of ISO 3175, the following definitions apply.

3.1
materials
garments, composites or fabrics

3.2
composite test specimen
test specimen consisting of all component parts used in the finished item, and combined in a representative assembly

3.3
normal materials
materials which are able to withstand the normal dry-cleaning process as specified in this part of ISO 3175 without modification

3.4
sensitive materials
materials which may require restrictions as to mechanical action and/or drying temperatures and/or water additions

EXAMPLES Acrylics, silk, crepe

3.5
very sensitive materials
materials which may require greatly reduced mechanical action and/or greatly reduced drying temperatures and/or no addition of water

EXAMPLES Polyvinylchloride (PVC), modacrylic, novelty tweeds, angora

NOTE — After giving careful consideration to the comments on progressive change in the introduction, textile items which perform satisfactorily for purpose in the procedures intended for normal and sensitive materials in table 1 may be labelled with the Ⓟ and Ⓟ symbols respectively, as described in ISO 3758. There is no care label equivalent to the procedure for very sensitive materials and information on the required processing can only be given in words.

4 Reagents

4.1 Tetrachloroethene, $CCl_2 = CCl_2$ distilled, sold for the purpose of dry cleaning.

4.2 Sorbitan mono-oleate.

NOTE — In order to prevent foaming, it is important to use redistilled, clean solvent solution and not overfill the still.

5 Apparatus

5.1 Dry cleaning machine, consisting of a commercial reversible rotating cage type, totally enclosed machine intended for use with tetrachloroethene, The diameter of the rotating cage shall 600 mm minimum and 1 080 mm maximum. Its depth shall be 300 mm minimum. It shall be fitted with three or four lifters. The speed shall be such as to give a g-factor between 0,5 and 0,8 for cleaning and between 60 and 120 for extraction.

NOTE — The g-factor is calculated according to the following formula:

$$g = 5{,}6\, n^2 d \times 10^{-7}$$

where

n is the rotational frequency, in rotations per minute;

d is the rotating cage diameter, in millimetres.

5.1.1 The machine shall be fitted with the means to control solvent and air temperature as required (see table 1).

5.1.2 The machine shall have suitable facilities to allow the emulsion (see 8.1.3) to be introduced gradually into the solvent between the cage and drum below the level of the solvent.

5.1.3 The machine shall be equipped with a means of measuring the temperature of the solvent during washing and either the incoming or the outgoing air during drying to within ± 2 °C.

5.2 Apparatus for applying the appropriate finishing treatment to the test pieces, consisting of the following:

5.2.1 Iron, with an approximate mass of 1,5 kg and a sole surface area of 150 cm to 200 cm^2.

5.2.2 Steam press, consisting of two bucks, one fixed and the other movable, each buck having a surface area of approximately 0,35 m^2. Steam being conducted to the bucks shall be released under a pressure of approximately 500 kPa. The pressure exerted by the bucks shall be approximately 350 kPa.

5.2.3 Steam table, having a shape and dimensions suitable to the dimensions of the specimens. The steam shall be released at a pressure of approximately 500 kPa.

5.2.4 Steam former (mannequin), which may or may not be specific in shape for garments. The steam shall be released at a pressure of approximately 500 kPa.

5.2.5 Steam cabinet, which needs to be specific for the shape for garments. The steam shall be released at a pressure of approximately 500 kPa.

5.3 Ballast, consisting of clean textile pieces which shall be either white or of a light colour and which shall consist of approximately 80 % wool pieces and 20 % cotton pieces by mass. Each piece shall comprise of two layers of fabric sewn together at the edges and shall be (300 ± 30) mm square.

NOTE — If it is agreed that an alternative ballast (composition or fibre) is to be used this should be included in the test report.

6 Conditioning

The specimens and ballast shall be conditioned for at least 16 h in one of the standard atmospheres for conditioning and testing textiles specified in ISO 139. Specimens shall be tested immediately after removal from the conditioning atmosphere, otherwise they shall be placed in sealed plastic bags and tested within 30 min.

7 Test specimens

7.1 Garments shall be tested as is.

7.2 Composite test specimens (3.2).

7.3 Fabrics shall be cut into test pieces, preferably not smaller than 500 mm square and stitched on all sides with polyester thread to prevent unravelling.

7.4 If assessments/comparisons are required according to ISO 3175-1, at least two identical test specimens shall be required (one for comparison, one for testing).

NOTE — Testing may be an iterative procedure since alternative processes of varying severity may be used, and it is advisable to obtain sufficient specimens for all the testing which may be required.

8 Procedure

NOTE — Selection of the procedure to be used (normal, sensitive or very sensitive) depends on the textile item (see examples in 8.2). It should also take into consideration the end use to which the item will be put since this will have a bearing on the likely type and degree of soiling. Cleaning will be generally less effective the less severe the process. Localised staining and stain removal currently falls outside the scope of this International Standard.

8.1 Procedure for normal materials

8.1.1 The mass of the complete load, measured to ± 0,1%, shall be calculated from the cage volume, for normal materials in the proportion of (50 ± 2) kg/m^3 and for sensitive and very sensitive materials in the proportion of (33 ± 2) kg/m^3. Unless the mass of a single specimen (fabric, composite or garment) exceeds 10 % of the mass of the load, the mass of the test specimen(s) shall not exceed 10 % of the mass of the load. The remainder of the load shall consist of ballast.

8.1.2 Place the conditioned load in the machine and charge the machine with distilled tetrachloroethene, containing 1 g/l of sorbitan mono-oleate so that the liquor ratio, calculated from the volume of solvent in the drum, is (5,5 ± 0,5) l/kg of the load.

Maintain the solvent at (30 ± 3) °C throughout the cleaning operation.

8.1.3 Prepare a fresh emulsion by mixing per kilogram of load, 10 ml of sorbitan mono-oleate with 30 ml of tetrachloroethene and then whilst stirring adding 20 ml of water. This corresponds to 2 % of water calculated on the mass of the load.

If the mixing of the detergent with tetrachloroethene outside the machine is not permitted, a mixture of the detergent and water may be added directly into the machine. Precautions shall be taken to avoid uneven distribution of the individual components in the load. Any deviation from the procedure shall be noted in the test report.

Start the machine with the filter circuit shut off, and 2 min after the cage inlet has closed, add the emulsion slowly over a period of (30 ± 5) s to the machine between the cage and the drum below the level of the solvent.

8.1.4 Switch the machine on and allow it to run for 15 min. Do not use the filter circuit for the duration of the test.

8.1.5 Drain the solvent and centrifugally extract the solvent from the load for 2 min (including at least 1 min at full extraction speed).

8.1.6 Introduce pure dry solvent at the same liquor ratio as that given in 8.1.2 and rinse for 5 min. Drain and extract again for 3 min (including at least 2 min at full extraction speed).

8.1.7 Dry the load in the machine air for an appropriate time, preferably using an automatic solvent dryness control.

After drying, blow air, at ambient temperature, through the rotating load for at least 5 min.

8.1.8 Immediately remove the test piece from the machine. Place garments individually on hangers and place fabric specimens on a flat surface, for at least 30 min before finishing.

8.1.9 Carry out finishing treatments appropriate to the test specimen from the following methods, and record the processing conditions used.

— Method A: no finishing required

— Method B: finishing with an iron

— Method C: finishing with a steam press

— Method D: steaming on a press or table

— Method E: steaming on a mannequin or in a cabinet

— Method F: no suitable finishing method could be found. Report methods and conditions attempted and reasons for unsuitability.

Record actual steaming times to allow for the reaction times of steam pedal switches, and timer mechanisms.

NOTE — The purpose of finishing after dry cleaning is to restore an article to its original condition **before use**. The amount and type of finishing should be consistent with the fabric/garment properties and the restorative requirements. Steaming/vacuuming times for methods C and D will vary, e.g. from (2 ± 1) s actual steam/(5 ± 1) s vacuum for a light weight garment to (4 ± 1) s/(8 ± 1) s for heavy garments. Steaming in method C should be top steam only to equate to good pressing practice. It is likely that method E will be used with methods B or C to achieve a good standard of finish.

8.2 Procedures for sensitive and very sensitive materials

Proceed as in 8.1, but with the appropriate parameters at the reduced levels given in table 1.

EXAMPLES

— An acrylic item may be temperature sensitive and so the drying temperature may be reduced to 60 °C air inlet, 50 °C air outlet, and the remaining parameters maintained in accordance with the "normal" procedure.

— An angora item will be very sensitive to mechanical action and water addition. Thus the machine loading will be reduced to 66 %, no water addition, wash time reduced to 5 min, rinse time reduced to 3 min and final extract time to 2 min. It may also be processed in a net bag. Other parameters will be in accordance with the "normal" procedure.

— Chlorofibre fabric will be very sensitive to time in solvent and drying temperature. The procedure may be 66 % loading, wash time reduced to 5 min, rinse time reduced to 3 min, final extract time reduced to 2 min, drying air inlet temperature reduced to 50 °C, outlet to 40 °C. All other parameters will be in accordance with the "normal" procedure.

9 Test report

The test report shall include the following information:

a) name of testing authority and report identification;

b) date of testing;

c) details of the item evaluated (description and reference);

d) cross-reference to any test report relating to the specimen(s) issued under ISO 3175-1;

e) reference to this part of ISO 3175;

f) the type of dry cleaning and finishing equipment used;

g) procedures used from table 1;

h) variations in procedures and parameters specified in clause 8;

i) total number of cleaning and finishing procedures.

j) details of any deviation from the specified procedure.

Table 1 — Dry cleaning procedures

Procedure	Load ratio[1]	Solvent temperature	Detergent charge[2]	Addition of water[3]	Cleaning cycle time min				Drying temperature[7] °C		Deodorisation time[8]
					Wash[4]	Inter extract[5]	Rinse[6]	Final extract[6]	IN	OUT	
	kg m^{-3}	°C	g/l	%							min
Normal	50 ± 2	30 ± 3	1	2	15	2	5	3	80 ± 3	60 ± 3	5
Sensitive	33 ± 2	30 ± 3	1	0	10	2	3	2	60 ± 3	50 ± 3	5
Very sensitive	33 ± 2	30 ± 3	1	0	5	2	3	2	50 ± 3	40 ± 3	5

1) See 8.1.1.
2) See 8.1.2.
3) See 8.1.3.
4) See 8.1.4.
5) See 8.1.5.
6) See 8.1.6.
7) Machine is set to control on IN or OUT condition.
8) See 8.1.7.