INTERNATIONAL STANDARD

ISO 15487

Third edition
2018-09

Textiles — Method for assessing appearance of apparel and other textile end products after domestic washing and drying

Textiles — Méthode d'évaluation de l'aspect des vêtements et autres produits textiles finis après lavage et séchage domestiques

Reference number
ISO 15487:2018(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 15487:2009), which has been technically revised. The main changes compared to the previous edition are as follows:

— in Clause 1, the appearance assessment has been extended to colour change, pilling, fuzzing, matting appearance of fabrics, damage of components (buttons, press fasteners, slide fasteners, etc.) and physical garment changes (e.g. spirality);

— in Clause 3, the term "durable press" has been deleted and the succeeding terms have been renumbered;

— in Clause 6, the distinction of preparation of different test specimens (fabrics, garments, etc.) have been specified;

— in 7.4, the use of manikin for the garment assessment has been introduced, and a (non-exhaustive) list of appearance changes (Table 1) for the qualitative method of the assessment has been added;

— procedures described in 7.5, 7.6, 7.7, 7.8, 7.9 and 7.10 have been modified and clarified;

— a new informative Annex B showing an example of appearance rating has been added;

— new references have been added in the Bibliography.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Textiles — Method for assessing appearance of apparel and other textile end products after domestic washing and drying

1 Scope

This document specifies a method of test for evaluating the appearance of apparel and other textile end products after one or several domestic washing and drying treatments. The appearance evaluated includes colour change, pilling, fuzzing, matting appearance of fabrics, smoothness appearance of flat fabric and seams, and the retention of pressed-in creases in garments and other textile products, damage of components – buttons, press fasteners, slide fasteners, etc.

This document is applicable to any washable textile end product of any fabric construction. Techniques for seaming and creasing are not included since the purpose is to evaluate textile end products as they are supplied from the manufacturer or as ready-to-use. Techniques for seaming and creasing are controlled by fabric properties.

This method has been developed primarily for use with domestic washing machines of Type B as defined in ISO 6330, but it can be used with any type of machine defined in ISO 6330.

It is recognized that prints and patterns can mask the wrinkled appearance present in textile end products. The rating process is, however, based on the visual appearance of specimens including such effects.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 105-A03, *Textiles — Tests for colour fastness — Part A03: Grey scale for assessing staining*

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

ISO 6330, *Textiles — Domestic washing and drying procedures for textile testing*

ISO 16322-3, *Textiles — Determination of spirality after laundering — Part 3: Woven and knitted garments*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
appearance
overall visual impression of garments and other textile end product, quantified by comparison of individual components with appropriate reference standards

3.2
crease retention
<fabrics> visual impression of an inserted crease, quantified by comparison with a set of reference standards

3.3
dryer crease
<fabrics> sharp fold or line running in any direction in a laundered or dried specimen

Note 1 to entry: Dryer creases are unintended results of restricted movement of specimens in the washer or the dryer.

3.4
laundering
<fabric, garments and textile end products> process intended to remove soils and/or stains by treatment (washing) with aqueous detergent solution and normally including rinsing, extracting and drying

3.5
seam smoothness
<fabrics> visual impression of flatness of a seamed specimen

3.6
smoothness appearance
<fabrics> visual impression of flatness of a specimen

4 Principle

4.1 Garments or other textile end products are subjected to procedures simulating domestic laundering practices. One of the washing and drying procedures specified in ISO 6330 is used, as agreed between the interested parties.

4.2 Garments or other textile end products are visually assessed under specified illumination. A supplemental spot light suitably placed to highlight the creased area of the textile is used in crease evaluation.

4.3 If required, garments or other textile end products are compared visually with plastic smoothness appearance replicas, plastic crease replicas and/or photographic seam standards under specified illumination.

5 Apparatus

5.1 **Washing and drying apparatus**, as specified in ISO 6330.

5.2 **Lighting and evaluation area**, in a darkened room using lighting arrangement shown in Figure 1 and Figure 2 and comprising the following items. Lamp dimensions should be chosen to extend beyond the overall surface of a test specimen and replicas, when used for the assessment.

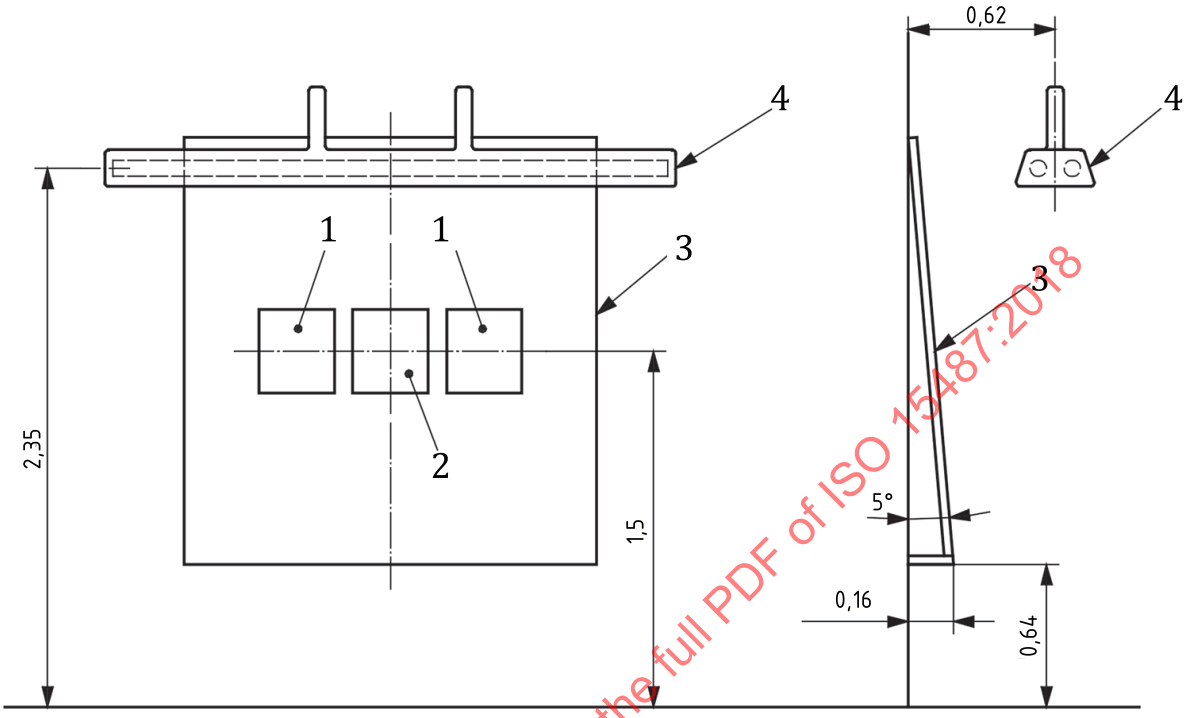
5.2.1 **Two cool white (CW) fluorescent lamps**, placed side by side, without baffle or glass, a minimum of 2 m in length each.

5.2.2 **One white enamel reflector**, without baffle or glass.

5.2.3 **One thick plywood viewing board**, painted in grey to match grade 2 on the grey scale for assessing staining specified in ISO 105-A03.

5.2.4 One 500 W reflector floodlight and lightshield, for protecting the viewer's eyes from direct light for grading creases, as illustrated in Figure 2.

Dimensions in metres

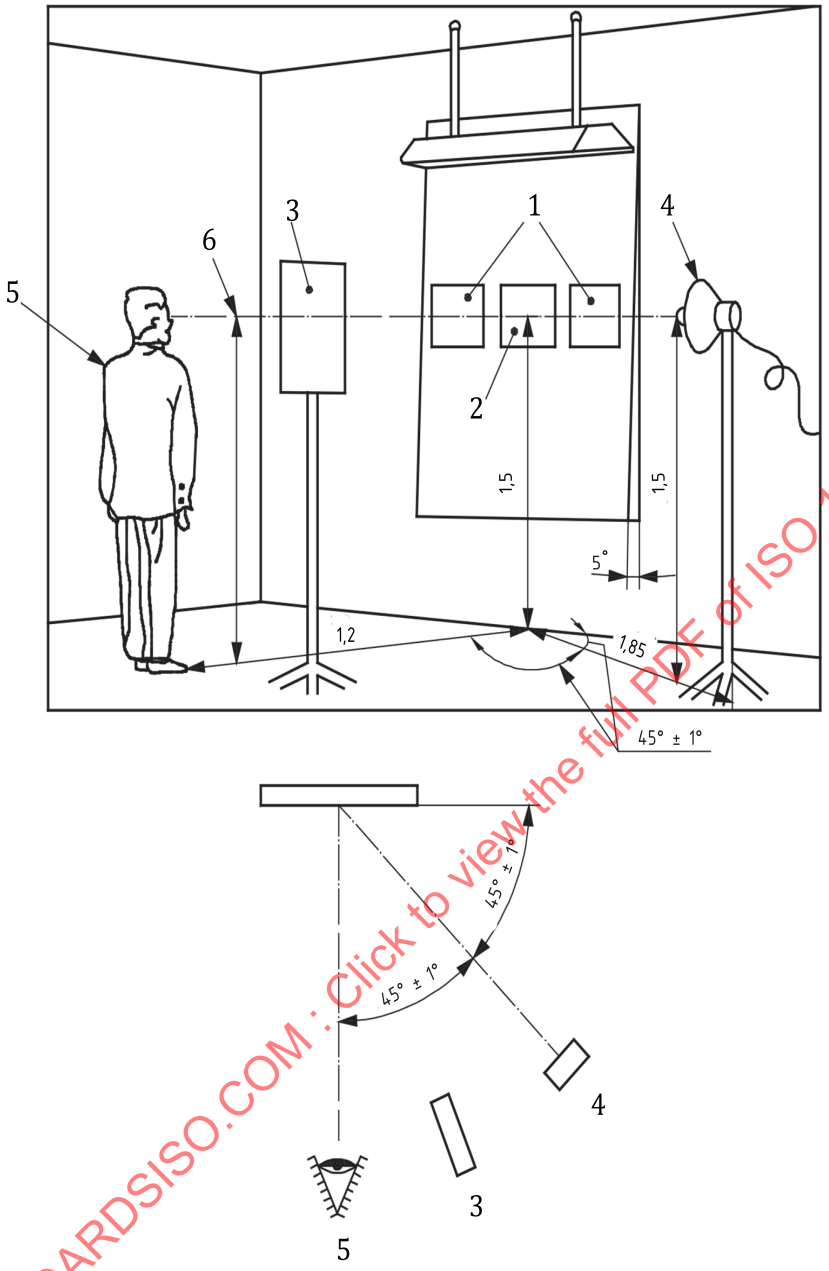


Key

1 replica
2 test specimen
3 board for viewing
4 example of fluorescent lamp placement

Figure 1 — Lighting and viewing arrangement for test specimens for smoothness and seam appearance

Dimensions in metres



Key

1 replica
2 test specimen
3 light shield
4 500 W reflector floodlight
5 observer
6 arbitrary eye level

Figure 2 — Lighting and viewing arrangement for creases only

5.3 Manikin, three dimensional form (used commonly for tailoring).

5.4 American Association of Textile Chemists and Colourists (AATCC) standard plastic crease replicas, prepared for evaluating creases, as shown in Figure 3.

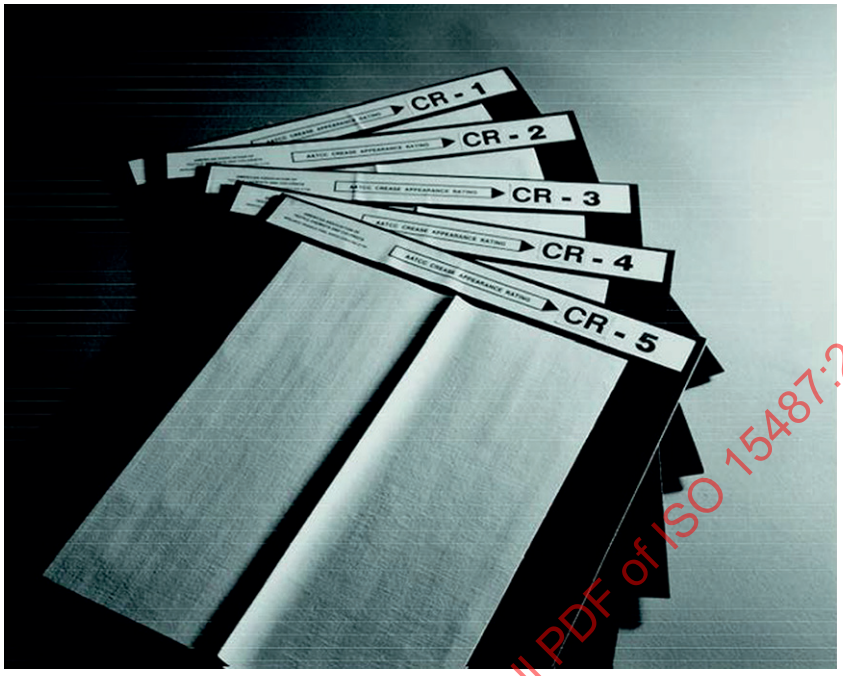


Figure 3 — AATCC standard plastic crease replicas

5.5 AATCC photographic standards prepared for evaluating seam appearance (single- and double-needle stitching), as shown in Figures 4 and 5.

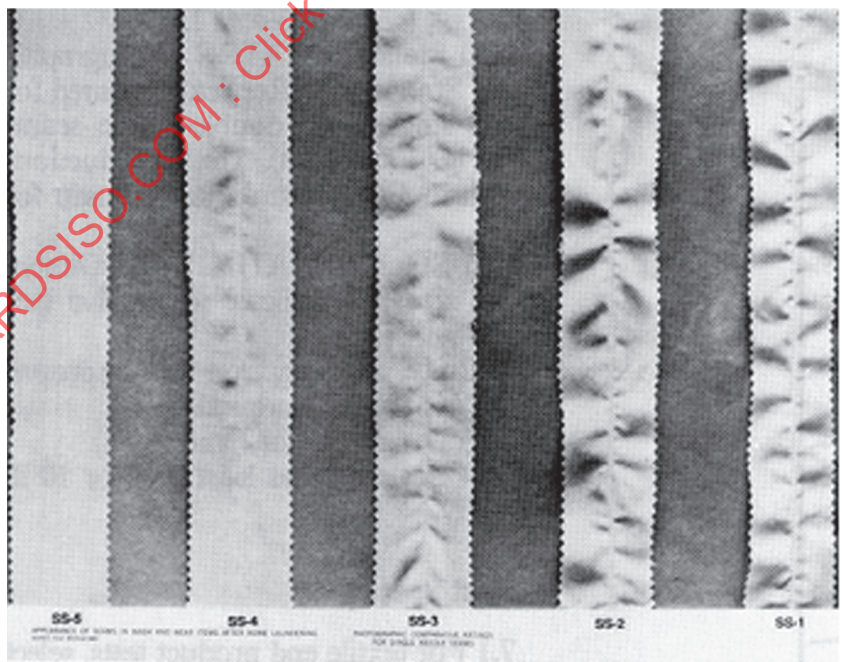


Figure 4 — AATCC standard single-needle seam smoothness photograph

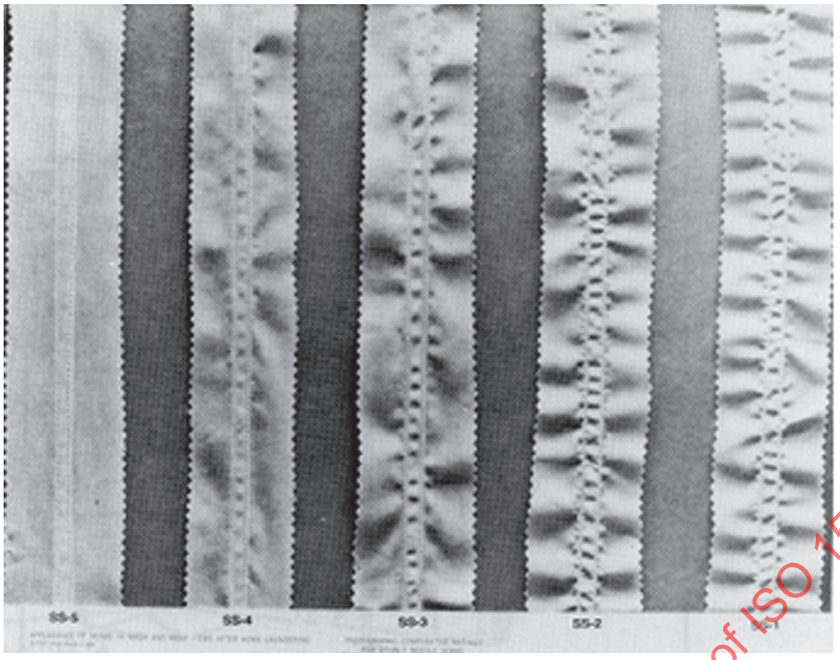


Figure 5 — AATCC standard double-needle seam smoothness photograph

5.6 AATCC standard smoothness appearance replicas prepared for evaluating appearance, as shown in Figure 6 (see also Annex A).

NOTE Details of the source of supply can be obtained from the Secretariat of ISO/TC 38/SC 2.

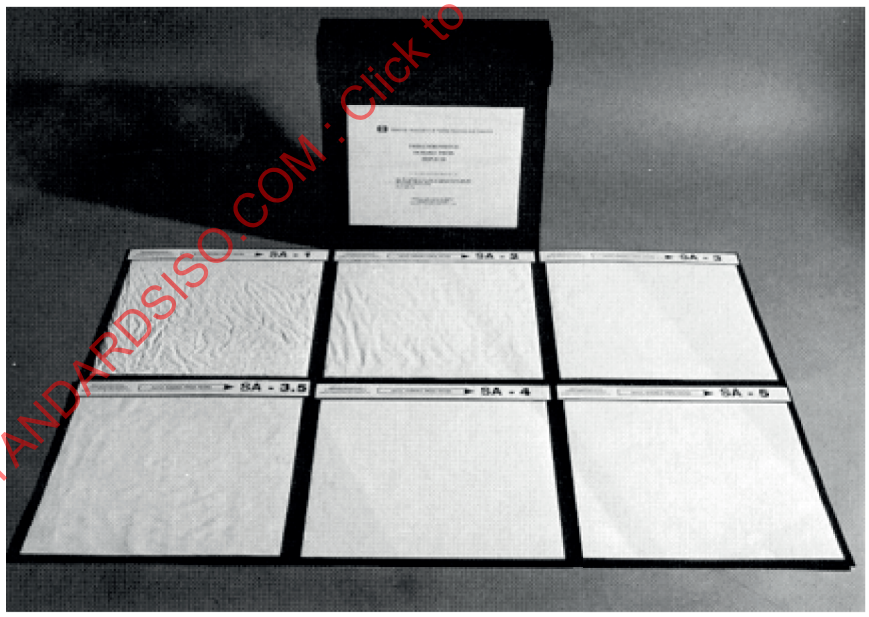


Figure 6 — AATCC standard 3D smoothness appearance replicas

6 Test specimens

6.1 For garments or textile end product tests

Select three items for testing.

6.2 For fabric tests

Prepare three test specimens, each measuring 38 cm × 38 cm, cut parallel to the length direction, pinked to prevent fraying and marked to indicate the length direction

7 Procedure

7.1 Washing and drying

Wash and dry the specimens in accordance with one of the procedures specified in ISO 6330, as agreed between the interested parties.

If required, repeat the selected washing and drying cycle four times to give a total of five cycles.

If dryer creases develop in specimens after any drying cycle except the last, they shall be rewet and an attempt made to remove the creases prior to additional washing and drying. No attempt to remove wrinkles or creases shall be made after the fifth cycle of drying.

7.2 Conditioning

Condition the test specimens for 4 h in the standard atmosphere specified in ISO 139, by hanging on a hanger, straightening and smoothing facings, seams, etc.

7.3 Observation

Three observers shall rate each treated test specimen independently, as follows:

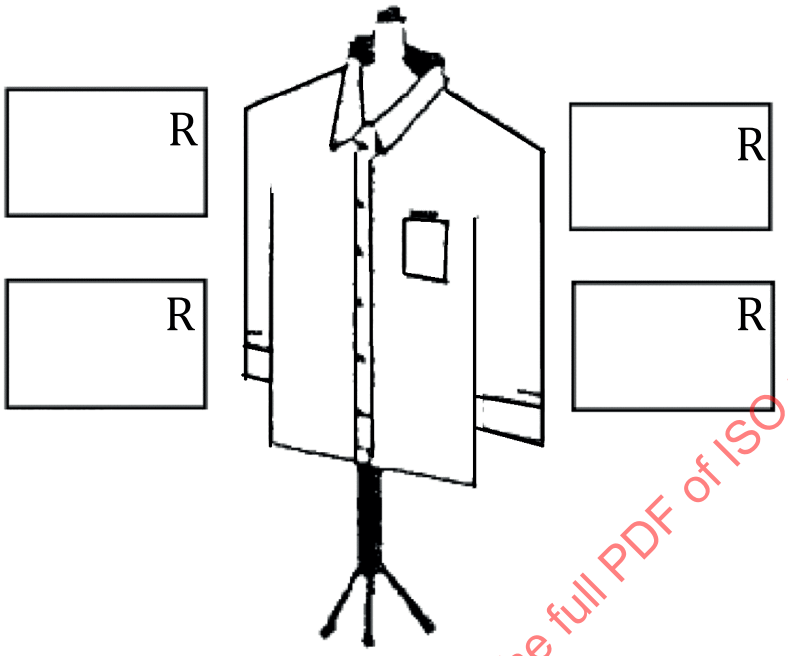
a) The overhead fluorescent light (5.2.1) shall be the only light source for the viewing board (5.2.3). All other lights in the room shall be turned off except when rating crease appearance. In that case, the floodlight with reflector and light shield (5.2.4), positioned as shown in Figure 2, is also required.

b) Fabrics shall be placed on to the viewing board. Garments and other end use items shall be placed on or close to the viewing board that, as far as possible, the observer views them in the spatial placement in which they are encountered in use.

c) The observer shall stand directly in front of the specimen, (120 ± 3) cm away from the board or, when relevant, from the manikin. It has been found that normal variations in the height of the observer above and below the arbitrary 1,5 m eye level have no significant effect on the grade given.

7.4 Appearance assessment (qualitative method)

7.4.1 Mount the test specimen on the viewing board as illustrated in Figure 2 (fabric) or on manikin (garment) as illustrated in Figure 7.



Key

R replicas (in different consecutive grades)

Figure 7 — Example of a garment on a manikin

7.4.2 The floodlight with reflector and lightshield shall be positioned in the viewing area, as shown in Figure 2, and used during the rating process.

7.4.3 Confine observations to the change of the appearance, based on the Table 1.

Table 1 — Change in appearance

Change in appearance	Examples	Garments	Fabrics
colour	Colour change	Applicable	Applicable
	Staining		
	Printing pattern		
fabric	Smoothness	Applicable	Applicable
	Pilling		
	Fuzzing		
	Matting		
seams	Smoothness	Applicable	Not applicable
	Slippage		

Table 1 *(continued)*

Change in appearance		Examples	Garments	Fabrics
components	buttons	Breakage	Applicable	Not applicable
	press fasteners	Detachment		
	slide fasteners	Damage		
	touch and close fasteners	Colour change		
	labels	Detachment Fraying Printing removal		
	embroidery	Colour change Dimensional change		
	others			
garment structure		Spirality	Applicable	Not applicable

7.4.4 Assign the qualitative rating that most closely matches the change in appearance of the test specimen in comparison with its initial state. The qualitative rating is based on the following expressions.

1 – Severe or distinct change in appearance

3 – Moderate change in appearance

5 – No change or negligible change in appearance

NOTE The values of the qualitative rating have been chosen in order to be consistent with other grading schemes commonly used in textile sector. As decision aid tools related to the qualitative rating:

— for some specific appearance, optional grading procedures are described in 7.5, 7.6, 7.7, 7.8, 7.9;

— for change of the garment spirality, optional procedure is described in 7.10.

Subsequently, for textile end products, the optional overall appearance rating is described in 7.11 based on the exploitation of the qualitative rating results.

7.5 Grading of the smoothness appearance (optional)

7.5.1 Mount the test specimen (fabric) on the viewing board as illustrated in Figure 1, with the fabric length in the vertical direction or mount the test specimen (garment) on the manikin placed close to the viewing board. Place the most similar 3D plastic replicas (5.6) on each side of the test specimen to facilitate comparative rating.

7.5.2 Although the 3D smoothness appearance (SA) replicas (5.6) were cast from woven fabrics, it is understood that these wrinkled surfaces do not duplicate all possibilities of fabric surfaces. The replicas shall be used as guides that represent various levels of fabric smoothness or freedom from wrinkles. The observer should mentally integrate the degree and frequency of wrinkles in the specimen in order to determine a level of smoothness that can be identified with the SA replica number which most closely represents that smoothness appearance level (see Table 2).

7.5.3 Assign the numerical grade of the replica which most closely matches the smoothness appearance of the test specimen.

7.5.4 SA-5 grade is equivalent to SA-5 replica and represents the smoothest appearance, while an SA-1 replica represents very poor appearance.

Table 2 — Fabric smoothness grades by SA replica equivalents

Grade	Description
SA-5	Equivalent to the SA-5 replica. Very smooth, pressed, finished appearance.
SA-4	Equivalent to the SA-4 replica. Smooth, finished appearance.
SA-3,5	Equivalent to the SA-3,5 replica. Fairly smooth but non-pressed appearance.
SA-3	Equivalent to the SA-3 replica. Mussed, non-pressed appearance.
SA-2	Equivalent to the SA-2 replica. Rumpled, obviously wrinkled appearance.
SA-1	Equivalent to the SA-1 replica. Crumpled, creased and severely wrinkled appearance.

7.5.5 If dryer creases are present on any specimens to be evaluated, take care in rating the specimens. Some dryer creases can be disregarded (generally called "reading out"). When the grade of a dryer-creased specimen differs from the other specimens by more than one grade, the test should be repeated with new specimens, taking all precautions to avoid the occurrence of dryer creases.

7.6 Grading of the appearance of seams (optional)

7.6.1 Mount the test specimen (fabric) on the viewing board as illustrated in Figure 1 with the seam in the vertical direction or mount the test specimen (garment) on the manikin placed close to the viewing board. Place the appropriate single- or double-needle standard seam smoothness (SS) replicas beside the specimen in order to facilitate comparative rating.

7.6.2 Confine observations to the area influenced by the seam and disregard the appearance of the surrounding fabric.

7.6.3 Assign the numerical grade of the photographic standard (5.5) that most closely matches the appearance of the seam in the test specimen.

7.6.4 A seam smoothness grade of SS-5 is equivalent to the appearance of Standard No. 5, the best level of seam appearance; a seam smoothness grade of SS-1 is equivalent to that of Standard No. 1, which represents a very poor level of seam appearance.

7.7 Grading of the appearance of creases (optional)

7.7.1 Mount the test specimen (fabric) on the viewing board as illustrated in Figure 2 with the crease in the vertical direction or mount the test specimen (garment) on the manikin placed close to the viewing board. Place the most similar 3D plastic crease replicas (5.4) on each side of the test specimen to facilitate comparative rating. Mount replicas 1, 3 and 5 on the left, and 2 and 4 on the right.

7.7.2 The floodlight with reflector and lightshield shall be positioned in the viewing area, as shown in Figure 2, and used during the rating process.

7.7.3 Confine observations to the crease itself and disregard the appearance of the fabric.

7.7.4 Assign the numerical grade of the replica that most closely matches the appearance of the crease in the test specimen.

7.7.5 A crease retention grade of CR-5 is equivalent to the appearance of Standard No. 5, the best level of crease appearance; a crease retention grade of CR-1 is equivalent to that of Standard No. 1, which represents a very poor level of crease appearance.

7.8 Grading of the pilling, fuzzing or matting appearance (optional)

7.8.1 Mount the test specimen (fabric) on the viewing board as illustrated in Figure 1, with the fabric length in the vertical direction or mount the test specimen (garment) on the manikin placed close to the viewing board.

7.8.2 The observer should mentally integrate the degree of the disorientation of the fibres in the specimen in order to determine a level of pilling, fuzzing or matting (see Table 3, Table 4, Table 5, respectively).

7.8.3 Assign the numerical grade which most closely matches the pilling, fuzzing or matting appearance of the test specimen, or assign a grade midway between those whole-number standards which have no half-number standards separating them if the appearance of the test specimen warrants it.

7.8.4 Grade 5 represents the initial appearance, while Grade 1 represents very poor appearance.

Table 3 — Fabric pilling grades

Grade	Description
5	No change
4	Slight surface pilling, Partially formed pills
3	Moderate pilling. Pills of varying size and density partially covering the specimen surface
2	Distinct pilling. Pills of varying size and density covering a large proportion of the specimen
1	Severe pilling. Pills of varying size and density covering the whole of the specimen surface
NOTE Source: ISO 12945-3.	

Table 4 — Fabric fuzzing grades

Grade	Description
5	No change
4	Slight surface fuzzing
3	Moderate surface fuzzing
2	Distinct surface fuzzing
1	Dense surface fuzzing
NOTE Source: ISO 12945-3.	

Table 5 — Fabric matting grades

Grade	Description
5	No change
4	Slight surface matting
3	Moderate surface matting
2	Distinct surface matting
1	Dense surface matting
NOTE Source: ISO 12945-3.	

7.9 Grading of the colour change and staining (optional)

7.9.1 Mount the test specimen (fabric) on the viewing board as illustrated in Figure 1, with the fabric length in the vertical direction or mount the test specimen (garment) on the manikin placed close to the viewing board.

7.9.2 The observer should mentally integrate the degree of the change of colour or staining of the specimen in order to determine a level of change, using the grey scales as described in ISO 105-A02 and ISO 105-A03.

7.9.3 Assign the numerical grade which most closely matches the colour appearance of the test specimen.

7.9.4 Grade 5 represents the initial appearance, while Grade 1 represents very poor appearance.

7.10 Evaluation of the spirality (optional)

Evaluate the spirality according to ISO 16322-3.

7.11 Appearance rating of textile end products (optional)

7.11.1 The individual components to be evaluated in each test item shall be determined and entered in a rating chart (see Table 6).

7.11.2 If it is desired to designate certain components as more or less important to the overall appearance of the item, weighting factors should be added to the rating chart.

7.11.3 The weighting factors to be assigned to each component are:

3 – Very important to overall item appearance

2 – Moderately important to overall item appearance

1 – Slightly important to overall item appearance

7.11.4 Mount the item on the viewing board so that the centre of the area or component to be rated is approximately 1,5 m from the floor as illustrated in Figures 1 and 2. Place the appropriate 3D plastic replicas or photographs in proper position to facilitate comparative rating (see 7.4, 7.5 or 7.6).

Table 6 — Rating chart

Component (characteristic, attribute)	Weighting factor		Average grade		Point value	
		×		=		
		×		=		
		×		=		
		×		=		
		×		=		
		×		=		
	1	×		=		Percentile value
Total weighting factor		× 5	Total point value = Maximum point value		— × 100 = ..%	

Example(s) of calculation is given in Annex B.

7.11.5 If the item is exceptionally large, such as a sheet, comforter, bedspread, curtain or drapery, fold the item lengthwise to produce a panel of half the original width. Place this half-panel over a rod so that the fabric length is vertical and the folded item is in equal quarters. The rod should be sufficiently long to accommodate the half-width item. Attach the rod with the large item to the rating board at

approximately 1,8 m from the floor. Position the standard replicas or photographs in such a way as to facilitate comparative rating. Evaluate the area across the full width of the quartered panel at the same eye level as the replicas. Evaluate all four quarters in the same manner and report the average grade for each component evaluated in the test item.

8 Expression of results

Average the nine observations made by the three observers on the set of three test specimens for each of the evaluation procedures specified in 7.4, 7.5 and 7.6. Using either Option 1 or Option 2, report the three averages to the nearest half-rating.

a) Option 1: Using weighting factors

   Total the weighting factors assigned to each component in the rating chart (see Table 6) and multiply by 5. This gives the maximum point value achievable by the item. Multiply the average grade recorded for each component by its assigned weighting factor. Total these values to obtain the actual point value achieved by the item. Report as the percentile value of the item the number obtained by dividing the actual point value by the maximum point value achievable and multiplying by 100. This value is the unit of measure of this test method.

b) Option 2: Calculate and report average grades for each individual component of each test item using the average grade column of the rating chart.

9 Test report

The test report shall include the following information:

a) a reference to this document, i.e. ISO 15487:2018;

b) details of the sample evaluated;

c) details of the washing and drying procedures used as specified in ISO 6330;

d) the number of washing and drying cycles used;

e) appearance change types (Table 1);

f) if fraying occurs in laundering at seams or elsewhere within the product, a record of the location and amount;

g) if required, the value calculated according to Clause 8, a) or the average grades calculated according to Clause 8 b);

h) details of any deviation from the specified procedure.