TECHNICAL REPORT

ISO TR 9405

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Textile floor coverings — Assessment of changes in appearance

Revêtements de sol textiles — Évaluation des changements d'aspect

Reference number
ISO/TR 9405:1990(E)

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 main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 9405, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 38, *Textiles*.

Annex A forms an integral part of this Technical Report.

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Introduction

In 1980, a number of areas of work for improving the methods of assessing changes in appearance of textile floor coverings were agreed, including experiments aimed at developing the use of sets of fatigued specimens as reference scales to assist in the assessment of the changes.

Since then, an ad hoc group has developed a succession of reference scales and procedures which formed the basis for round-robin trials to evaluate their usefulness.

The conclusion that could be drawn from these results was that carefully selected reference scales did indeed aid the assessment of appearance changes in textile floor coverings.

However, members expressed concern over the widespread introduction of procedures based on reference scales because of possible problems such as constancy of production and stability in use.

For this reason, further work is required before the publication of an International Standard.

It was decided therefore that a Technical Report (type 2) describing the procedures for using reference scales to assist in the overall assessment of appearance change should be prepared, with the following provisos:

a) although development work has shown that the use of reference scales assists in assessing appearance changes in textile floor coverings, and results in good agreement between experienced assessors, it does not obviate the need for experienced assessors;

b) care should be taken in the handling and storage of the reference scales to ensure that they are not subject to any further compression, flexing or contamination;

c) it has been found that, even with care, the higher-grade scales (3 and 4) made from highly resilient pile material may change with time.

Details of the reference scales are given in annex A. Information about the suppliers of scales and advice on the production of scales specific to a purpose or textile floor covering may be obtained through the Secretariat of ISO/TC 38/SC 12 (BSI).

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Textile floor coverings — Assessment of changes in appearance

1 Scope

This Technical Report describes procedures for assessing the changes in appearance of textile floor coverings. These procedures may be used to assess changes in appearance caused by any testing device or by practical use.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report 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 105-A02:1987, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour.*

ISO 2424:—[1], *Textile floor coverings — Vocabulary.*

3 Definitions

For the purposes of this Technical Report, the following definitions, which are based on those in ISO 2424, apply.

3.1 change in surface appearance: The overall change in appearance between the use-surfaces of a fatigued and an unfatigued specimen, taking into account the following properties:

3.1.1 change in structure/textural change: Visible change in configuration of loops and tufts and/or fibres at the use-surface of a textile floor covering.

3.1.1.1 loss of tuft definition: The bursting, opening and untwisting of the pile yarn and/or decrimping of the fibres in the use-surface of a textile floor covering. This can cause a decrease of the pile definition.

3.1.1.2 felting/matting: Loss of pile definition of a textile floor covering due to entanglement and compression of pile fibres.

3.1.2 crushing/flattening: Loss of thickness of a textile floor covering under the action of a static or dynamic load.

3.1.3 Surface roughening

3.1.3.1 hairiness/filamentation: The protrusion of fibres above the normal level of the use-surface of a textile floor covering and not removable by brushing or suction.

3.1.3.2 cobwebbing: An extreme form of hairiness/filamentation in which the fibres are entangled to form an interlaced web attached to the use-surface.

3.1.3.3 pilling: An extreme form of hairiness/filamentation in which the fibres are entangled to form small aggregates, attached to the use-surface, which may or may not include fibres from other sources.

3.1.3.4 sprouting: The release and appearance during use of extra-long tuft legs which were accidentally trapped within the pile of a textile floor covering during manufacture.

3.1.4 change of pattern definition: Change in the colour appearance of patterned textile floor coverings due to mechanical action. A change of pattern definition may be caused by a change in the clarity of the contour lines.

1) To be published. (Revision of ISO 2424:1977)

3.2 change in colour: Change or apparent change in colour, assessed by the grey scale, which may result from one or more of the following:

— change in orientation of the pile (shading);

— whitening/chalking/frosting;

— fading;

— glossing;

— colour bleeding;

— staining;

— soiling.

NOTE 1 It is not always possible to distinguish clearly between the above factors since each has an interaction with the others.

3.2.1 staining: The accidental transfer of adventitious colorant to a textile floor covering.

3.2.2 soiling: Change in colour of a textile floor covering due to deposition of adventitious material.

4 Principle

The change in surface structure of a specimen is assessed by visual comparison with reference scales. The colour change of the same specimen is then assessed by visual comparison with the grey scale.

5 Apparatus

5.1 Large grey scale[2], comprising five pairs of grey references (200 mm × 150 mm) each representing a contrast corresponding to grade 5, 4, 3, 2 or 1 (see ISO 105-A02). This scale is used for assessing changes in colour. A scale including half-grades (eight pairs) may also be used.

The use of normal (35 mm × 32 mm) grey scales may lead to incorrect assessment and these shall not therefore be used.

5.2 Reference scales, comprising five reference grades of change in surface appearance, from 5 (no change) to 1 (severe change).

Each reference grade has two zones:

— a "new" zone with no change in appearance;

— a "fatigued" zone representing a degree of change in appearance.

Five reference scales produced from textile floor coverings of different construction (see annex A) are available.

5.3 Illumination device, preferably comprising a lamp of correlated colour temperature 5 500 K to 6 500 K, mounted to give an intensity of light at the viewing platform of 1 500 lux ± 100 lux and in such a way as to illuminate the specimens vertically from above. The surroundings shall be neutral and darkened.

The intensity of the light shall be checked frequently by the use of a luxometer. The lifetime of the lamp, as given by the manufacturer, shall not be exceeded.

5.4 Rotary viewing table, enabling the specimens to be rotated so that they may be viewed from all directions under the standard illumination. It shall be sufficiently large to enable the test specimens and references to be laid side-by-side while still ensuring that illumination is vertically from above. The upper surface of the rotary table shall be not more than 10 cm from the floor.

5.5 Masks, designed to restrict the assessment to a portion of the specimen which is representative of the general change in appearance. The masks shall be made of dark-grey non-reflective material and have an aperture of 200 mm × 300 mm so that 150 mm × 200 mm areas of new and fatigued specimen can be viewed side-by-side (see figure 1).

6 Selection and preparation of specimens

Select as specimens for assessment an area of the fatigued sample which is representative of the general change in the textile floor covering (zone for assessment) and a corresponding area with regard to pattern of the unfatigued sample (control zone). For some patterned textile floor coverings it may be necessary to select more than one area to be representative of the pattern and colours. Mark the specimens with a reference direction (which may be the direction of production, if known) for aligning them for the assessment.

Arrange the fatigued and unfatigued specimens side-by-side with the reference directions the same and cover with the appropriate mask as shown in figure 1. Select a reference grade from an appropriate reference scale (see annex A). Lay the specimens and the grade selected from the reference scale side-by-side on the viewing table with the direction of pile lay of the control and new zones (see figure 1) the same.

2) Details of the suppliers of large grey scales may be obtained from the Secretariat of ISO/TC 38/SC 12 (BSI).

Cover with the appropriate masks as shown in figure 1.

7 Assessment procedure

7.1 General

Compare the contrast (structure, colour) between the selected grade of the reference scale and the fatigued and unfatigued specimens. The assessment shall be made independently by at least three persons. The assessors shall look at the specimens from a distance of approximately 1,5 m at an approximate angle of 45° and from all directions by rotating the viewing table slowly. Rotation may be interrupted by the viewers.

7.2 Change in surface appearance

Each assessor shall assess the change in surface structure against the reference grade. Half-grades may be awarded, and any change in colour shall be ignored. For patterned textile floor coverings, the overall change shall be assessed rather than that of the worst colour. The dominant type of change in appearance as defined in clause 3 shall be recorded.

7.3 Change in colour

Assess the same specimens for colour change, using the large grey scales 1 to 5; half-grades may be awarded.

7.4 Expression of results

If there is a difference in assessments between different directions of view, record the worst results for structure change and colour change.

NOTE 2 There may be an interaction of the factors involved in change in surface appearance (see 3.1) or in colour (see 3.2), making the assignment of the dominant factor difficult.

8 Test report

The report shall include the following information:

a) all details necessary for the identification of the specimens;

b) all details necessary for the identification of the reference scale used;

c) that the test was carried out in accordance with this Technical Report;

d) the method and duration of fatiguing the specimens;

e) the individual grades awarded by each assessor for change in surface appearance and change in colour;

f) the median grade for change in surface appearance and for change in colour;

g) any observations concerning the dominant types of change in appearance as defined in clause 3;

h) any deviations from this method, especially if another illumination device is used.

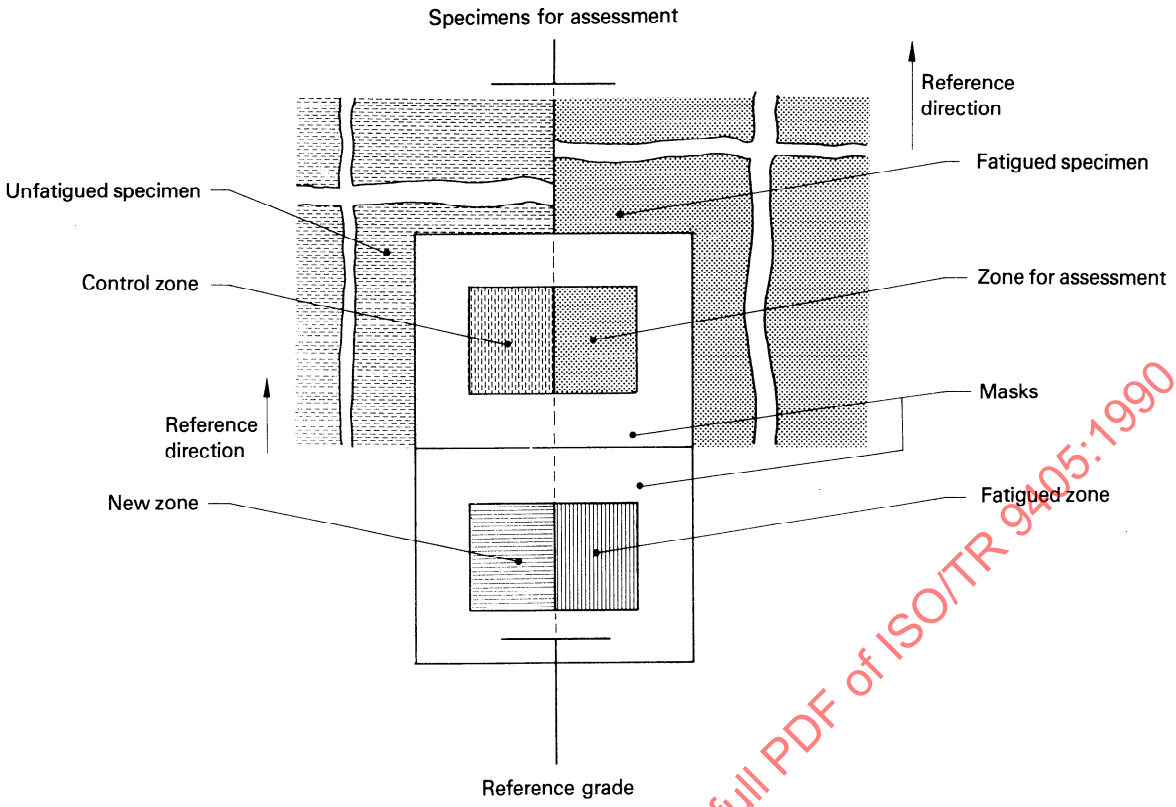

Figure 1 — Arrangement of specimens for assessment

Annex A
(normative)

Constructional details of types of textile floor covering available as reference fatigued specimens

Sets of reference fatigued specimens (reference scales) are available in five types of textile floor covering construction, the details of which are given in table A.1.

Table A.1 — Constructional details of reference scales

Reference set identification[1]	Pile type	Pile fibre	Carpet type	Secondary backing	Gauge	Stitch	Thickness		Mass per unit area		Pile density
							total	pile above backing	total	pile above backing	
					dm^{-1}	dm^{-1}	mm	mm	g/m^2	g/m^2	g/cm^2
A	Loop	PP[2]	tufted	foam	25	40	8,7	4,1	2 070	475	0,116
B	Cut frise	Wool	tufted	jute	31	30	9,3	6,3	2 460	1 120	0,18
C	Cut	PA[3]	tufted	foam	31	34	8,0	3,5	1 980	275	0,078
D	Cut	Wool	tufted (patterned)	jute	31	28	9,3	5,9	3 310	741	0,125
E	Loop	Wool	tufted (berber)	jute	12,6	26	9,6	5,7	2 093	561	0,098

1) Details of the suppliers of these reference scales may be obtained from the Secretariat of ISO/TC 38/SC 12 (BSI).
2) PP = Polypropylene
3) PA = Polyamide