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Resilient floor coverings — Specification for floor coverings based on thermoplastic polymers

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 219, *Floor coverings*.

Resilient floor coverings — Specification for floor coverings based on thermoplastic polymers

1 Scope

This document specifies the characteristics for resilient floor coverings based upon thermoplastic polymers, supplied either in roll, plank or tile form.

To encourage the consumer to make an informed choice, this document includes a classification system (see ISO 10874) based on intensity of use, which shows where these floor coverings should give satisfactory service. It also specifies requirements for marking.

This specification does not apply to floor coverings specified in ISO 10581, ISO 10582, ISO 10595, ISO 11638, ISO 10575, ISO 10577, ISO 24011 and ISO 26986.

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-B02, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*

ISO 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 4918, *Resilient, textile and laminate floor coverings — Castor chair test*

ISO 9405, *Textile floor coverings — Assessment of changes in appearance*

ISO 10874, *Resilient, textile and laminate floor coverings — Classification*

ISO 16581, *Resilient and laminate floor coverings — Determination of the effect of simulated movement of a furniture leg*

ISO 16906, *Resilient floor coverings — Determination of seam strength*

ISO 23997, *Resilient floor coverings — Determination of mass per unit area*

ISO 23999, *Resilient floor coverings — Determination of dimensional stability and curling after exposure to heat*

ISO 24340, *Resilient floor coverings — Determination of thickness of layers*

ISO 24341, *Resilient and textile floor coverings — Determination of length, width and straightness of sheet*

ISO 24342, *Resilient and textile floor-coverings — Determination of side length, edge straightness and squareness of tiles*

ISO 24343-1, *Resilient and laminate floor coverings — Determination of indentation and residual indentation — Part 1: Residual indentation*

ISO 24343-2, *Resilient and laminate floor coverings — Determination of indentation and residual indentation — Part 2: Short-term residual indentation of resilient floor covering*

ISO 24344, *Resilient floor coverings — Determination of flexibility and deflection*

ISO 24345, *Resilient floor coverings — Determination of peel resistance*

ISO 24346, *Resilient floor coverings — Determination of overall thickness*

EN 1372, *Adhesives — Test method for adhesives for floor coverings and wall coverings — Peel test*

ASTM F 1515, *Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change*

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:

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

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

3.1
homogeneous floor covering
floor covering with one or more layers of the same composition and colour, patterned throughout its thickness

3.2
heterogeneous floor covering
floor covering consisting of a *wear layer* (3.8) and other layer(s) which differ in composition and/or design and can contain a reinforcement

3.3
factory finish
transparent coating applied during the manufacture, usually not thicker than 0,03 mm not using *thermoplastic polymer* (3.6) as base resin

Note 1 to entry: This coating should not be counted as part of the *wear layer* (3.8).

3.4
product with backing
homogeneous (3.1) or a *heterogeneous floor covering* (3.2) with a backing of any material different from the upper layers or a backing made with a foamed layer

Note 1 to entry: Typical example backings include materials such as cork, foams, polyester or jute.

3.5
scratch
permanent damage or mark on the surface of the floor covering made with a sharp or pointed object

3.6
thermoplastic polymer
polymers that become liquid when heated above Tg (glass transition temperature) or Tm (melting temperature) and return to the solid state when cooled

Note 1 to entry: This cycle of melting and freezing can be repeated.

3.7
plank
tile with a ratio length divided by width superior or equal to 1,3

3.8
wear layer
portion of a resilient floor covering that contains or protects the pattern and design exclusive of temporary *factory finishes* (3.3) or maintenance coating(s)

4 Requirements

Floor coverings described in this document shall comply with the appropriate general requirements specified in Table 1, when tested in accordance with the methods given therein.

Some optional properties required for specific applications are defined in Annex B (informative).

Table 1 — General requirements

Characteristic	Requirement		Test method
	For product without backing or with non-foamed backing	For product with foamed backing	
Roll form — Length (in m) — Width (in mm)	 not less than the nominal value not less than the nominal value		ISO 24341
Tiles/planks: Side length and square panel Width Squareness and straightness ≤ 400 mm > 400 mm > 400 mm (intended for welding)	 Deviation ≤ 0,13 % of nominal length up to 0,5 mm maximum. Deviation < 0,1 % up to 0,5 mm maximum. Deviation allowed at any point ≤ 0,25 mm ≤ 0,35 mm ≤ 0,50 mm		ISO 24342
Overall thickness — Average thickness[a] — Individual results	 Nominal value + 0,13 mm − 0,10 mm Average value[b] ± 0,15 mm	 Nominal value + 0,18 mm − 0,15 mm Average value[b] ± 0,20 mm	ISO 24346
Thickness of wear layer — Average thickness[a] — Individual results	For heterogeneous floor coverings, thickness of wear layer should be declared in mm. Nominal value + 13 % − 10 % and shall not exceed ± 0,1 mm Individual results shall not exceed 0,05 mm or 15 % below the average, whichever is greater. Where this requirement is not met by only one individual value, a new single value has to be measured. If this still does not meet the requirement, the test result does not pass.		ISO 24340
Total mass per unit area in g/m² (average)	Nominal value + 13 % − 10 %		ISO 23997
Dimensional stability after exposure to heat:			ISO 23999

[a] Average of the batch.

[b] Average of the results of one sample.

[c] Provided that manufacturer-specified installation procedures are strictly followed to ensure an adhesive strength of more than 50 N/50 mm at 90 °, when pulled and measured at a speed of 100 mm/min complying with EN 1372.

[d] Floating installation: Without any fixation to the subfloor. Loose lay (e.g. pressure-sensitive adhesives): Installed with an adhesive strength less than 50 N/50 mm at 90 °, when pulled and measured at a speed of 100 mm/min complying with EN 1372.

[e] Test with blue wool scale N°6 according to ISO 105-B02. Compare the sample with a reference sample which was stored in the dark.

Table 1 *(continued)*

Sheets and tiles intended for welding and glued installation[c]	|change of dimension| ≤ 0,4 %		Two procedures are set up: Procedure A: 80 °C Procedure B: 50 °C
Tiles/planks intended for dry-joint laying and glued installation[c]	|change of dimension| ≤ 0,25 %		The choice of the procedure is the decision of the manufacturer. A result cannot be claimed without reporting the procedure used.
Tiles/planks intended for loose lay or floating installation[d]	|change of dimension| ≤ 0,15 %		
Curling under exposure to heat in mm			ISO 23999
Rolls and tiles intended for welding and glued installation[c]	|curling| ≤ 8 mm		Two procedures are set up: Procedure A: 80 °C Procedure B: 50 °C
Tiles/planks intended for dry-joint laying and glued installation[c]	|curling| ≤ 2 mm		The choice of the procedure is the decision of the manufacturer. A result cannot be claimed without mentioning the procedure used.
Tiles/planks intended for loose lay or floating installation[d]	|curling| ≤ 1 mm		
Flexibility (only for sheet floorings)	Test using a 20 mm mandrel. For products which show signs of cracking, perform a further test using a 50 mm mandrel. If results show no further cracking, record the use of a 50 mm diameter mandrel.		ISO 24344:2008, Method A
Colour fastness to artificial light	≥ 6 or ΔE ≤ 8 after 300 h, where ΔE is the colour change.		ISO 105-B02 Method 3[e] ASTM F1515
Peel resistance of the backing		Average: ≥ 50 N/50 mm Individual results: ≥ 40 N/50 mm	ISO 24345

[a] Average of the batch.

[b] Average of the results of one sample.

[c] Provided that manufacturer-specified installation procedures are strictly followed to ensure an adhesive strength of more than 50 N/50 mm at 90 °, when pulled and measured at a speed of 100 mm/min complying with EN 1372.

[d] Floating installation: Without any fixation to the subfloor. Loose lay (e.g. pressure-sensitive adhesives): Installed with an adhesive strength less than 50 N/50 mm at 90 °, when pulled and measured at a speed of 100 mm/min complying with EN 1372.

[e] Test with blue wool scale N°6 according to ISO 105-B02. Compare the sample with a reference sample which was stored in the dark.

5 Classification requirements

The classification scheme for resilient floor coverings shall be as defined in ISO 10874. The requirements for the use of resilient floor coverings based upon thermoplastic polymers in accordance with this scheme are specified in Table 2.

Table 2 — Classification requirement for level of use (minimal)

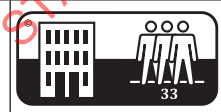
Class	Symbol	Level of use	Overall thickness (mm)		Residual indentation (mm)		Seam strength if welding is required (N/50 mm)
Test method			ISO 24346		[a] ISO 24343-1 [b] ISO 24343-2		ISO 16906
			Product without backing or with non-foamed backing	**Product with foamed backing**	**Product without backing or with non-foamed backing**	**Product with foamed backing**	
Domestic							
21		Moderate/ Light	≥ 1	≥ 2,5	≤ 0,1[a]	≤ 0,35[b]	No requirement
22		General/ Medium	≥ 1,5	> 2,5	≤ 0,1[a]	≤ 0,35[b]	
22+		General	≥ 1,5	≥ 2,5	≤ 0,1[a]	≤ 0,35[b]	
23		Heavy	≥ 1,5	≥ 2,5	≤ 0,1[a]	≤ 0,35[b]	
Commercial							
31		Moderate	≥ 2	≥ 2,5	≤ 0,1[a]	≤ 0,35[a]	When welded in accordance with the manufacturer's instructions: Average value ≥ 240 Individual values ≥ 180
32		General	≥ 2	≥ 2,5	≤ 0,1[a]	≤ 0,2[a]	
33		Heavy	≥ 2	≥ 2,5	≤ 0,1[a]	≤ 0,2[a]	
34		Very heavy	≥ 2	≥ 2,5	≤ 0,1[a]	≤ 0,2[a]	

Table 2 *(continued)*

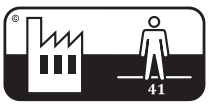
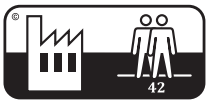
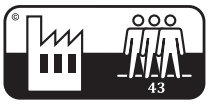
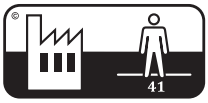
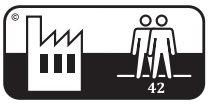
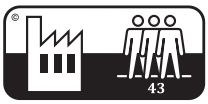
Class	Symbol	Level of use	Scratch appearance assessment (N)		Simulated movement of a furniture leg		Castor chair suitability
Light industrial							
41		Moderate	≥ 2	≥ 2,5	≤ 0,1[a]	≤ 0,2[a]	When welded in accordance with the manufacturer's instructions: Average value ≥ 240 Individual values ≥ 180
42		General	≥ 2	≥ 2,5	≤ 0,1[a]	≤ 0,2[a]	
43		Heavy	≥ 2	≥ 2,5	≤ 0,1[a]	≤ 0,2[a]	
Test Method			Annex A		ISO 16581		ISO 4918
							The effect of the castor chair can be impacted by an installation on an underlay. The product shall be tested with prescribed underlay by the manufacturer if underlay is recommended.
Domestic							
21		Moderate /Light	No requirement		No requirement		No requirement
22		General/ Medium			No damage shall be visible with foot 3 (70 kg)		
22+		General					
23		Heavy					

Table 2 *(continued)*

Class	Symbol	Level of use	Scratch appearance assessment (N)	Simulated movement of a furniture leg	Castor chair suitability
Commercial					
31		Moderate	No requirement	No damage shall be visible with foot 3 (70 kg)	No requirement
32		General	≥ 3	No damage shall be visible with foot 2 (100 kg). When welded in accordance with manufacturer's instructions: No damage shall be visible with foot 0 (32 kg) to the weld	After 25 000 cycles, no delamination shall occur. No disturbance to the surface other than a slight change in appearance.[c]
33		Heavy	≥ 3		
34		Very heavy	≥ 3		
Light industrial					
41		Moderate	≥ 3	No damage shall be visible with foot 2 (100 kg). When welded in accordance with manufacturer's instructions: No damage shall be visible with foot 0 (32 kg) to the weld	After 25 000 cycles, no delamination shall occur. No disturbance to the surface other than a slight change in appearance.[c]
42		General	≥ 3		
43		Heavy	≥ 3		

[c] For planks intended for loose lay or floating installation (see NOTE 1), a test should be performed with floor specimens fixed only in their perimeter for products aimed to be installed without any fixation to the subfloor. For products aimed to be installed with an adhesive, a test should be performed with floor specimens fixed with an adequate adhesive (see NOTE 2).

Take a representative sample from the available material. The test area shall include at least one short side joint in the path of the castor when the specimens are assembled according to the manufacturer's instructions.

An example of an assembled test area is shown in Figure 1. The dimension, *l*, shall be at least 300 mm.

For rolls, the test should include at least one side joint in the path of the castor. For tiles/planks, the test should include at least two joints crossed in the path of the castor. In any case, the sample should allow mounting according to Figure 2.

The diameter of the test area shall be at least 750 mm.

NOTE 1 Floating installation: Without any fixation to the subfloor. Loose lay (e.g. pressure-sensitive adhesives): Installed with an adhesive strength less than 50 N/50 mm at 90°, when pulled and measured at a speed of 100 mm/min, complying with EN 1372.

NOTE 2 Provided that manufacturer-specified installation procedures are strictly followed to ensure an adhesive strength of more than 50 N/50 mm at 90°, when pulled and measured at a speed of 100 mm/min, complying with EN 1372.

Dimensions in millimetres

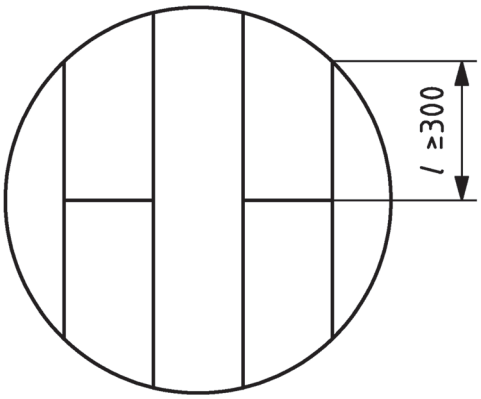
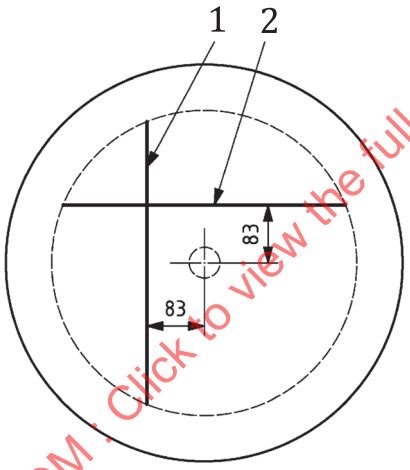


Figure 1 — Example of an assembled test area for a castor chair test (planks)

Dimensions in millimetres



Key

1 first joint for rolls and tiles

2 second joint for tiles

Figure 2 — Example of an assembled test area for a castor chair test (rolls, tiles and planks)

6 Marking

Floor coverings covered by this document and/or their packaging shall bear the following marking:

a) number and date of this document, i.e. ISO 19322;

b) manufacturer's or supplier's identification;

c) product name;

d) colour/pattern and batch and roll/package number if applicable;

e) classes/level of use/symbols appropriate for the product;

f) for rolls: length, width and thickness;

g) for tiles/planks: dimensions of the tile/plank and the area in square metres contained in a package.

Annex A
(normative)

Method of test for resistance to scratching

A.1 General

This method of test specifies a procedure to assess the appearance of scratches on resilient floor covering surfaces under laboratory conditions.

A.2 Principle

A test piece mounted on a horizontal rotating plate is scratched by a defined steel pin. The pin can be loaded with different weights. The load at which the pin causes an uninterrupted scratch of defined characteristics is used for the ranking of the product.

A.3 Apparatus and materials

A.3.1 General

NOTE The item numbers in parentheses in A.3.2.2 to A.3.2.7 refer to Figure A.1.

A.3.2 Scratch tester

A.3.2.1 Figure A.1, consisting of A.3.2.2 to A.3.2.7.

A.3.2.2 **Stand**, with a device to indicate the horizontal, e.g. a spirit level.

A.3.2.3 **Turntable** (4), freely rotating, motor-driven, for supporting the test piece, rotating around its vertical axis at (35 ± 5) mm/s at the position where the scratch is made.

A.3.2.4 **Clamping disc** (6), to keep the test specimen flat.

A.3.2.5 **Arm** (5), with a holder for the steel pin (3), mounted on a ball bearing, with horizontal axis.

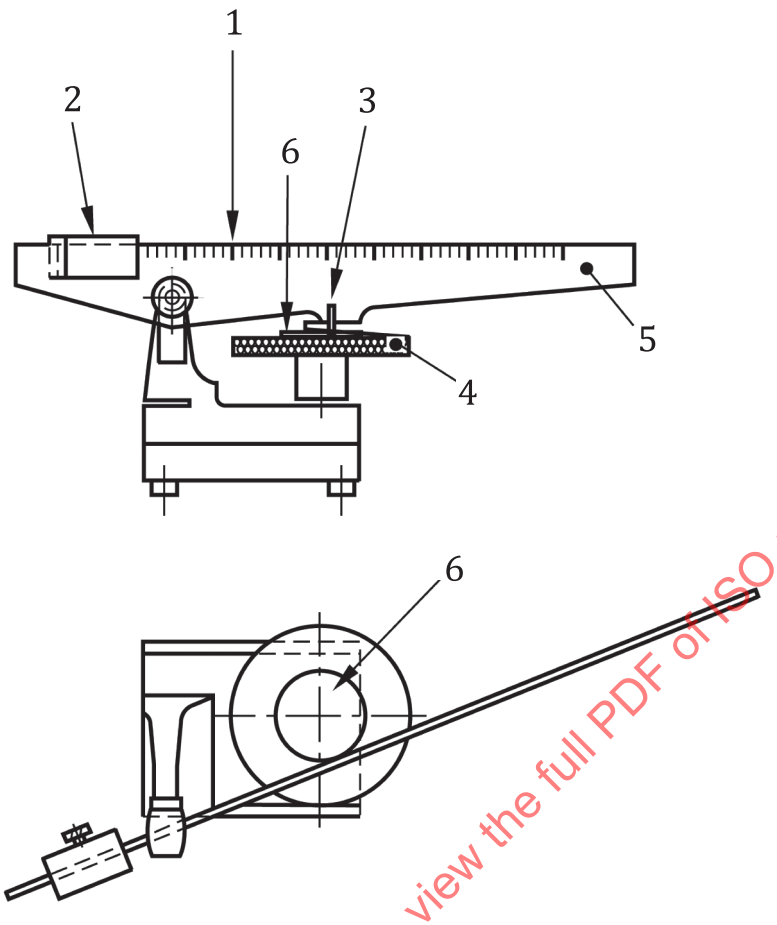
This arm is engraved with a scale (1) and is made adjustable in order to ensure that it is always horizontal, independent of the thickness of the test piece, when the steel pin touches the surface of the specimen.

A.3.2.6 **Movable weight** (2) that can be moved along the arm (5). The mass of the weight together with the effective mass of the arm presses the steel pin onto the surface to be tested.

The force exerted on the steel pin shall be accurate to 0,01 N, when measured at the mounting device for the pin.

A.3.2.7 **Steel pin** (3) (also shown in Figure A.2), made from tungsten carbide–cobalt (WC–Co) hard metal, hot isostatic pressed (HIP) treated.

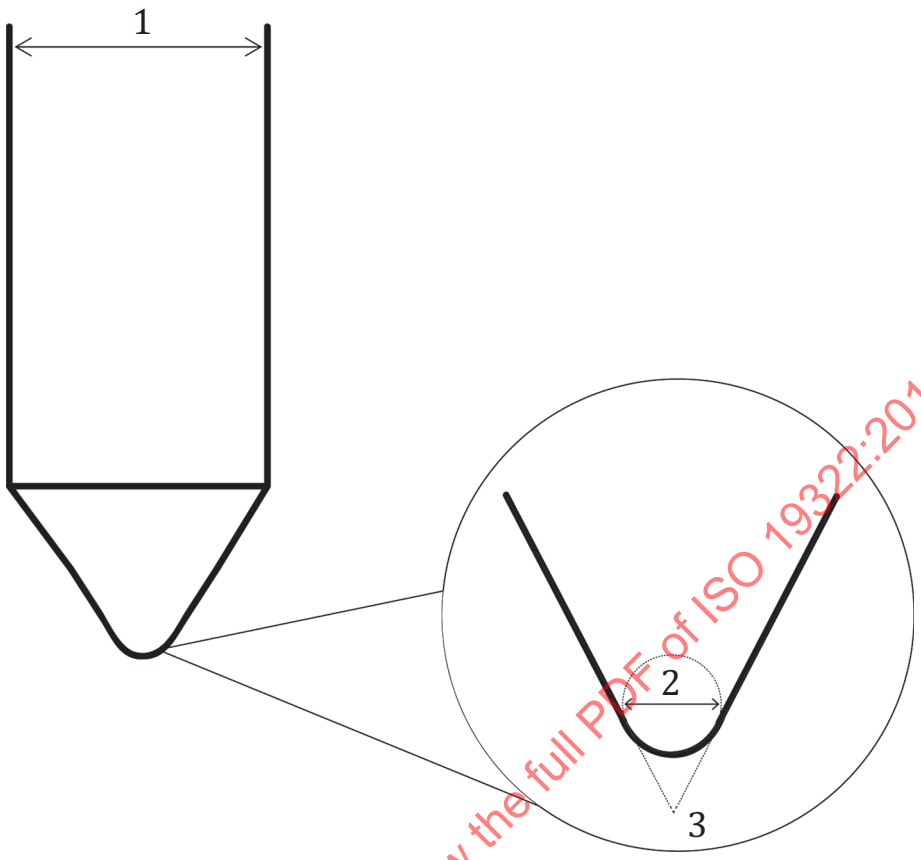
The steel pin shall have a diameter of 3 mm ± 0,02 mm. The conical tip shall have a diameter of 0,50 mm ± 0,04 mm and an angle of 45° ± 1° from the base, as indicated in Figure A.2.



Key

1	adjustable scale	4	turntable
2	movable weight	5	arm
3	steel pin	6	clamping disk

Figure A.1 — Scratch tester



Key

1 pin diameter (3 mm ± 0,02 mm)

2 cone tip diameter (0,50 mm ± 0,04 mm)

3 cone angle (45° ± 1°)

Figure A.2 — Steel pin

A.3.3 Soil B02[1], according to ISO 11378-1 consisting of:

— 37,80 % peat dust;

— 17,45 % Portland cement;

— 17,70 % kaolin;

— 17,70 % quartz;

— 6,20 % Nujol[2] mineral oil 014;

— 1,05 % dust WFK 09 X[3];

1) Soil B02 is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

2) Nujol is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

3) WFK 09 X is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

— 0,60 % ferric oxide black;

— 1,50 % ferric oxide yellow.

A.4 Sampling and conditioning

Take three circular test pieces from a sample. The diameter shall be approximately 105 mm, depending on the device.

Condition the test pieces for at least 24 h at the standard atmosphere (23 ± 2) °C and (50 ± 10) % relative humidity in accordance with ISO 291.

A.5 Procedure

Carry out the tests at the standard atmosphere, in accordance with ISO 291.

Place the test piece on the rotating plate.

Start the test with a weight of 2 N. Place the arm (5) in a vertical position. Fix the test piece with the clamping disc (6) and secure it so as to avoid any slipping. Lower the arm carefully so as to place the steel pin in contact with the test piece, being careful to avoid any damage to the pin. Adjust the height of the arm (5), so that it is horizontal when the point of the steel pin rests on the test piece.

Start the turntable rotating. If there is no scratch, increase the weight for each new test by 5 N. To increase the weight lift up the arm. Use the screw fitted to the device to adjust to a new trace for each test.

Continue the tests until a continuous and permanent surface damage is obtained on the sample. Then reduce the force in steps of 0,5 N to determine the lowest force that causes damage.

The distance between the traces on the surface shall be at least 2 mm. Ensure that the traces are at a distance from the centre of the test piece than to provide a speed of (35 ± 5) mm/s. Take a new test piece if more traces are needed.

A.6 Evaluation

Once traces have been made on the test piece, rub soil conforming to A.3.3 over the test piece using a cotton cloth. Place the test piece into an observation box as specified in ISO 9405. The distance between the eye and the test piece shall be approximately 80 cm.

Record the mass of the load that caused the first uninterrupted scratch on the surface.

A.7 Report

The report shall contain the following information:

a) a reference to this document, i.e. ISO 19322;

b) complete identification of the product tested, including type, source, colour and manufacturer's reference number;

c) method of sampling;

d) previous history of the sample;

e) for each test piece, the mass of the load that caused the first visible uninterrupted circle of scratch on the surface;

f) any deviation from this method of test which may have affected the results.

A.8 Calibration of steel pins

A.8.1 General

The steel pin shall meet the requirements shown in Figure A.2. It shall not be refurbished. Check the calibration of each new steel pin according to A.8.3 before the first test and after every 20 test pieces tested.

Replace the pin when it ceases to meet the requirement.

A.8.2 Procedure

Take a photograph of the conic peak of the steel pin in a microscope (enlarged four times). It is useful to put the steel pin on a white background.

Place a standard template of the steel pin of the same magnification as the photograph over the photograph and measure the deviation of the radius of the peak.

In addition, measure the angle of the cone, which should be the same as for a new pin.

A.8.3 Evaluation

The radius of the tip shall be 0,25 mm ± 0,02 mm. The angle of the legs of the cone shall be 45° ± 1°, as shown in Figure A.2. If the deviation is higher, the steel pin shall be replaced.