International Standard 105/E

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Textiles — Tests for colour fastness — Part E: Colour fastness to aqueous agencies

Textiles — Essais de solidité des teintures — Partie E: Solidité des teintures aux agents aqueux

First edition — 1978-12-15
Updated and reprinted — 1982-09-01

UDC 677.016.47 **Ref. No. ISO 105/E-1978 (E)**

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, water resistance tests, submerging tests, impregnating tests, chemical tests, acid resistance tests, alkali resistance tests, boiling temperature tests, water vapour tests, high temperature tests, crushing tests, distilled water, sea water, sodium hypochlorite, chlorine, sweat, histidine, hot water, boiling water, soaps, sodium carbonates, acetic acid, sulphuric acid, wool, decatizing, reference sample.

Price based on 24 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

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.

International Standard ISO 105/E was developed by Technical Committee ISO/TC 38, *Textiles*.

It was submitted directly to the ISO Council, in accordance with sub-clause 5.10.1 of part 1 of the Directives for the technical work of ISO.

This part of ISO 105 cancels and replaces group E of ISO 105-1978, originally published as parts 4, 5, 16, 22, 23 and 24 of ISO Recommendation R 105/I-1959, parts 1, 2, 3 and 5 of ISO Recommendation R 105/II-1963, part 1 of ISO Recommendation R 105/IV-1968, and part 3 of ISO Recommendation R 105/V-1969.

NOTE — International Standard ISO 105 is presented in the form of parts. Each of these parts corresponds to a group and is split up into its different component sections. This form facilitates the replacement of existing sections by successive editions as necessary.

Printed in Switzerland

Contents of ISO 105

ISO 105/J **Textiles — Tests for colour fastness —**
Part J : Measurement of colour and colour differences

- **J01** Method for the measurement of colour and colour differences

ISO 105/N **Textiles — Tests for colour fastness —**
Part N : Colour fastness to bleaching agencies

- **N01** Colour fastness to bleaching : Hypochlorite
- **N02** Colour fastness to bleaching : Peroxide
- **N03** Colour fastness to bleaching : Sodium chlorite : Mild
- **N04** Colour fastness to bleaching : Sodium chlorite : Severe
- **N05** Colour fastness to stoving

ISO 105/P **Textiles — Tests for colour fastness —**
Part P : Colour fastness to heat treatments

- **P01** Colour fastness to dry heat (excluding pressing)
- **P02** Colour fastness to pleating : Steam pleating

ISO 105/S **Textiles — Tests for colour fastness —**
Part S : Colour fastness to vulcanizing

- **S01** Colour fastness to vulcanizing : Hot air
- **S02** Colour fastness to vulcanizing : Sulphur monochloride
- **S03** Colour fastness to vulcanizing : Open steam

ISO 105/X **Textiles — Tests for colour fastness —**
Part X : Tests not included in parts A to S or part Z

- **X01** Colour fastness to carbonizing : Aluminium chloride
- **X02** Colour fastness to carbonizing : Sulphuric acid
- **X03** Colour fastness to chlorination
- **X04** Colour fastness to mercerizing
- **X05** Colour fastness to organic solvents
- **X06** Colour fastness to soda boiling
- **X07** Colour fastness to cross-dyeing : Wool
- **X08** Colour fastness to degumming
- **X09** Colour fastness to formaldehyde
- **X10** Assessment of migration of textile colours into polyvinyl chloride coatings
- **X11** Colour fastness to hot pressing
- **X12** Colour fastness to rubbing
- **X13** Colour fastness of wool dyes to processes using chemical means for creasing, pleating and setting

ISO 105/Z **Textiles — Tests for colour fastness —**
Part Z : Colorant characteristics

- **Z01** Colour fastness to metals in the dye-bath : Chromium salts
- **Z02** Colour fastness to metals in the dye-bath : Iron and copper

Textiles — Tests for colour fastness

E01 Colour fastness to water

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to immersion in water.

2 PRINCIPLE

A specimen of the textile in contact with adjacent fabrics is immersed in water, drained and placed between two plates under a specified pressure in a testing device (see 8.1). The specimen and the adjacent fabrics are dried separately. The change in colour of the specimen and the staining of the adjacent fabrics are assessed with the grey scales.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

Section A03, *Grey scale for assessing staining.*

4 APPARATUS

4.1 Testing device, consisting of a frame of stainless steel into which a weight-piece of mass 5 kg and base of 11,5 cm × 6 cm is closely fitted, so that a pressure of 12,5 kPa can be applied on test specimens measuring 10 cm × 4 cm placed between glass or acrylic resin plates. If the weight-piece is removed during the test, the testing device shall be so constructed that the pressure of 12,5 kPa remains unchanged (see 8.1).

4.2 Oven maintained at 37 ± 2 °C.

4.3 *Distilled water.*

4.4 Two adjacent fabrics, each measuring 10 cm × 4 cm, one piece made of the same kind of fibre as that of the textile to be tested, or that predominating in the case of blends, the second piece made of the fibre as indicated in the table below or, in the case of blends, of the kind of fibre second in order of predominance, or as otherwise specified.

If the first adjacent fabric is :	Second piece to be :
cotton	wool
wool	cotton
silk	cotton
linen	wool
viscose	wool
acetate or triacetate	viscose
polyamide	wool or cotton
polyester	wool or cotton
acrylic	wool or cotton

4.5 Grey scales for assessing change in colour and staining (see clause 3).

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, place a specimen 10 cm × 4 cm between the two adjacent fabrics (4.4) and sew along one of the shorter sides to form a composite specimen.

5.2 If the textile to be tested is yarn, knit it into fabric and treat it as in 5.1 or form a layer of parallel lengths of it between the two adjacent fabrics (4.4), the amount of yarn taken being approximately equal to half the combined mass of the adjacent fabrics (4.4). Sew along two opposite sides to hold the yarn in place and to form a composite specimen.

5.3 If the textile to be tested is loose fibre, comb and compress an amount approximately equal to half the combined mass of the adjacent fabrics (4.4) into a sheet

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, water resistance tests, distilled water, submerging tests.

Approved by member bodies of : Austria; Belgium; Bulgaria; Canada; Chile; Czechoslovakia; Denmark; France; Greece; Hungary; India; Ireland; Israel; Italy; Netherlands; New Zealand; Norway; Pakistan; Poland; Portugal; Spain; Sweden; Switzerland; United Kingdom; U.S.S.R.

10 cm × 4 cm. Place the sheet between the two adjacent fabrics and sew along all four sides to hold the fibres in place and to form a composite specimen.

6 PROCEDURE

6.1 Thoroughly wet the composite specimen in distilled water at room temperature. Pour off the water and place the composite specimen between two glass or acrylic resin plates, measuring about 11,5 cm × 6,0 cm, under a pressure of 12,5 kPa.

6.2 Place the apparatus containing the composite specimen in the oven for 4 h at 37 ± 2 °C.

6.3 Open out the composite specimen and dry it by hanging it in air at a temperature not exceeding 60 °C with the three parts in contact only at the remaining line of stitching.

6.4 Assess the change in colour of the specimen and the staining of the adjacent fabrics with the grey scales.

7 TEST REPORT

Report the numerical rating for change in colour and the numerical rating for staining of each kind of adjacent fabric used.

8 NOTES

8.1 Suitable testing devices are the Hydrotest, the Perspiration Tester and the Perspirometer. If the dimensions of the composite specimen differ from the size of 10 cm × 4 cm, such a weight-piece has to be used that a pressure of 12,5 kPa is applied to the specimen.

8.2 Other devices may be used provided that the same results are obtained as with the apparatus described in 4.1.

Textiles — Tests for colour fastness

E02 Colour fastness to sea water

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to immersion in sea water.

2 PRINCIPLE

A specimen of the textile in contact with specified adjacent fabrics is immersed in a sodium chloride solution, drained, and placed between two plates under a specified pressure in a testing device (see 8.1). The specimen and the adjacent fabrics are dried separately. The change in colour of the specimen and the staining of the adjacent fabrics are assessed with the grey scales.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

Section A03, *Grey scale for assessing staining.*

4 APPARATUS AND REAGENT

4.1 Testing device, consisting of a frame of stainless steel into which a weight-piece of mass 5 kg and a base of 11,5 cm × 6 cm is closely fitted, with glass or acrylic resin plates of the same size and of 0,15 cm thickness. In this case the size of the composite specimen must be 10 cm × 4 cm (see 8.1).

4.2 Oven maintained at 37 ± 2 °C.

4.3 Sodium chloride, 30 g/l solution.

4.4 Two adjacent fabrics, each measuring 10 cm × 4 cm, one piece made of the same kind of fibre as that of the textile to be tested, or that predominating in the case of blends, the second piece made of the fibre as indicated in the table below or, in the case of blends, of the kind of fibre second in order of predominance, or as otherwise specified.

If the first adjacent fabric is :	Second piece to be :
cotton	wool
wool	cotton
silk	cotton
linen	wool
viscose	wool
acetate or triacetate	viscose
polyamide	wool or cotton
polyester	wool or cotton
acrylic	wool or cotton

4.5 Grey scales for assessing change in colour and staining (see clause 3).

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, place a specimen 10 cm × 4 cm between the two adjacent fabrics (4.4) and sew along one of the shorter sides to form a composite specimen.

5.2 If the textile to be tested is yarn, knit it into fabric and treat it as in 5.1 or form a layer of parallel lengths of it between the two adjacent fabrics (4.4), the amount of yarn taken being approximately equal to half the combined mass of the adjacent fabrics. Sew along two opposite sides to hold the yarn in place and to form a composite specimen.

5.3 If the textile to be tested is loose fibre, comb and compress an amount approximately equal to half the combined mass of the adjacent fabrics (4.4) into a sheet 10 cm × 4 cm. Place the sheet between the two adjacent fabrics and sew along all four sides to hold the fibres in place and to form a composite specimen.

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, water resistance tests, sea water, submerging tests.

Approved by member bodies of : Austria; Belgium; Bulgaria; Canada; Chile; Czechoslovakia; Denmark; France; Greece; Hungary; India; Ireland; Israel; Italy; Netherlands; New Zealand; Norway; Pakistan; Poland; Portugal; Spain; Sweden; Switzerland; United Kingdom; U.S.S.R.

Printed in Switzerland

6 PROCEDURE

6.1 Thoroughly wet the composite specimen in the sodium chloride solution (4.3) at room temperature. Pour off the solution and place the composite specimen between two glass or acrylic resin plates measuring 11,5 cm × 6,0 cm under a pressure of 12,5 kPa.

6.2 Place the apparatus containing the composite specimen in the oven for 4 h at 37 ± 2 °C.

6.3 Open out the composite specimen and dry it by hanging it in air at a temperature not exceeding 60 °C, with the three parts in contact only at the remaining line of stitching.

6.4 Assess the change in colour of the specimen and the staining of the adjacent fabrics with the grey scales.

7 TEST REPORT

Report the numerical rating for change in colour and the numerical rating for staining of each kind of adjacent fabric used.

8 NOTES

8.1 Suitable testing devices are the Hydrotest, the Perspiration Tester and the Perspirometer. If the dimensions of the composite specimen differ from the size of 10 cm × 4 cm, such a weight-piece has to be used that a pressure of 12,5 kPa is applied to the specimen.

8.2 Other devices may be used provided that the same results are obtained as with the apparatus described in 4.1.

Textiles — Tests for colour fastness

E03 Colour fastness to chlorinated water (swimming-bath water)

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to the action of active chlorine in concentrations such as are used to disinfect swimming-bath water (break point chlorination).

2 PRINCIPLE

A specimen of the textile is treated with a very weak chlorine solution and dried. The change in colour of the specimen is assessed with the grey scale.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

4 APPARATUS AND REAGENTS

4.1 Glass container or glazed china container, which can be closed, for specimen and chlorine solution.

4.2 Sodium hypochlorite (NaOCl) solution, of the following composition :

- active chlorine : 140 to 160 g/l
- sodium chloride (NaCl) : 120 to 170 g/l
- sodium hydroxide (NaOH) : 20 g/l maximum
- sodium carbonate (Na_2CO_3) : 20 g/l maximum
- iron (Fe) : 0,01 g/l maximum

4.3 Sodium hypochlorite solution, containing 20 mg of active chlorine per litre, at pH 8,5 (see clause 8).

4.4 Grey scale for assessing change in colour (see clause 3).

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, use a specimen 10 cm × 4 cm.

5.2 If the textile to be tested is yarn, knit it into fabric and use a specimen 10 cm × 4 cm or make a wick of parallel lengths 10 cm long and about 0,5 cm in diameter, tied near both ends.

5.3 If the textile to be tested is loose fibre, comb and compress enough of it to form a sheet 10 cm × 4 cm, and sew it on to a piece of cotton adjacent cloth to support the fibre.

6 PROCEDURE

6.1 Immerse the specimen in the sodium hypochlorite solution (4.3), liquor ratio 100 : 1, ensuring that the specimen is thoroughly wetted. Close the container and allow to stand at 20 ± 2 °C for 4 h in subdued light.

6.2 Remove the specimen from the container, squeeze or hydro-extract it to contain its own mass of solution, and dry it by hanging it in air at room temperature.

6.3 Assess the change in colour with the grey scale.

7 TEST REPORT

Report the numerical rating for change in colour.

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, water resistance tests, sodium hypochlorite, chlorine.

Approved by member bodies of : Australia; Belgium; Brazil; Bulgaria; Canada; Chile; Czechoslovakia; Denmark; Egypt, Arab Rep. of; France; Germany, F.R.; Hungary; India; Iran; Israel; Japan; Korea, Rep. of; South Africa, Rep. of; Spain; Sweden; Switzerland; United Kingdom; U.S.S.R.

Disapproved by member bodies of : Italy; Netherlands; Norway; U.S.A.

8 NOTE

A hypochlorite solution of 20 mg of active chlorine per litre, at pH 8,5, may be obtained as follows :

— solution A : dilute 4 ml of sodium hypochlorite solution (4.2) to 1 litre;

— solution B : dissolve in 51,0 ml of 1 N sodium hydroxide (NaOH) solution, 18,64 g of potassium chloride (KCl) and 15,46 g of boric acid (H_3BO_3), and dilute to 1 litre.

To 50 ml of solution A add excess potassium iodide (KI) and hydrochloric acid (HCl), and titrate the liberated iodine with 0,1 N sodium thiosulphate ($Na_2S_2O_3$) solution, using starch as an indicator. Let the volume of 0,1 N sodium thiosulphate solution required be V ml.

For each 100 ml of working solution required, add $(28,2/V)$ ml of solution A to 20 ml of solution B, and dilute to 100 ml.

The pH of the solution should be checked against a standard buffer solution.

The solution should be prepared just prior to use.

Textiles — Tests for colour fastness

E04 Colour fastness to perspiration

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to the action of human perspiration.

2 PRINCIPLE

Specimens of the textile in contact with adjacent fabrics are treated in two different solutions containing histidine, drained, and placed between two plates under a specified pressure in a testing device (see 8.1). The specimens and the adjacent fabrics are dried separately. The change in colour of each specimen and the staining of the adjacent fabrics are assessed with the grey scales.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

Section A03, *Grey scale for assessing staining.*

4 APPARATUS AND REAGENTS

4.1 Testing device, consisting of a frame of stainless steel into which a weight-piece of mass 5 kg and a base of 11,5 cm × 6 cm is closely fitted, with glass or acrylic resin plates of the same size and of 0,15 cm thickness. In this case the size of the composite specimen must be 10 cm × 4 cm (see 8.1).

4.2 Oven, maintained at 37 ± 2 °C.

4.3 Alkaline solution, freshly prepared, containing, per litre,

0,5 g of *l*-histidine monohydrochloride monohydrate ($C_6H_9O_2N_3.HCl.H_2O$);

5 g of sodium chloride (NaCl);

5 g of disodium hydrogen orthophosphate dodecahydrate ($Na_2HPO_4.12H_2O$), or

2,5 g of disodium hydrogen orthophosphate dihydrate ($Na_2HPO_4.2H_2O$).

The solution is brought to pH 8 with 0,1 N sodium hydroxide solution.

4.4 Acid solution, freshly prepared, containing, per litre,

0,5 g of *l*-histidine monohydrochloride monohydrate ($C_6H_9O_2N_3.HCl.H_2O$);

5 g of sodium chloride (NaCl);

2,2 g of sodium dihydrogen orthophosphate dihydrate ($NaH_2PO_4.2H_2O$).

The solution is brought to pH 5,5 with 0,1 N sodium hydroxide solution.

4.5 Two adjacent fabrics, each measuring 10 cm × 4 cm, one piece made of the same kind of fibre as that of the textile to be tested, or that predominating in the case of blends, the second piece made of the fibre as indicated in the table below or, in the case of blends, of the kind of fibre second in order of predominance, or as otherwise specified.

If first piece is :	Second piece to be :
cotton	wool
wool	cotton
silk	cotton
linen	wool
viscose	wool
acetate	viscose
polyamide	wool or viscose
polyester	wool or cotton
acrylic	wool or cotton

4.6 Grey scales for assessing change in colour and staining (see clause 3).

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, chemical tests, sweat, histidine.

Approved by member bodies of : Australia; Belgium; Brazil; Bulgaria; Canada; Chile; Czechoslovakia; Denmark; Egypt, Arab Rep. of; Germany, F.R.; Hungary; India; Iran; Israel; Japan; Korea, Rep. of; Netherlands; Pakistan; Romania; South Africa, Rep. of; Spain; Sweden; Switzerland; United Kingdom; U.S.S.R.
Disapproved by member bodies of : France; Italy; Norway; U.S.A.

Printed in Switzerland

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, place a specimen 10 cm × 4 cm between the two adjacent fabrics (4.5) and sew along one of the shorter sides to form a composite specimen. Two such composite specimens are required.

5.2 If the textile to be tested is yarn, knit it into fabric and treat it as in 5.1 or form a layer of parallel lengths of it between the two adjacent fabrics (4.5), the amount of yarn taken being approximately equal to half the combined mass of the adjacent fabrics. Sew along two opposite sides to hold the yarn in place and to form a composite specimen. Two such composite specimens are required.

5.3 If the textile to be tested is loose fibre, comb and compress an amount approximately equal to half the combined mass of the adjacent fabrics (4.5) into a sheet 10 cm × 4 cm. Place the sheet between the two adjacent fabrics and sew along all four sides to hold the fibres in place and to form a composite specimen. Two such composite specimens are required.

6 PROCEDURE

6.1 Thoroughly wet one composite specimen in each of the solutions (4.3 and 4.4) at a liquor ratio of 50 : 1, and allow them to remain in the solutions at room temperature for 30 min. Press and move them from time to time to ensure good and uniform penetration of the liquor. Pour off the solutions and wipe the excess liquor off the specimens between two glass rods. Then place each composite specimen between two glass or acrylic resin plates measuring about 11,5 cm × 6 cm under a pressure of 12,5 kPa. Use separate apparatus for the alkaline and the acid test.

6.2 Place both sets of apparatus containing a composite specimen in the oven for 4 h at 37 ± 2 °C.

6.3 Open out the composite specimen by breaking the stitching on all sides except one of the shorter sides and dry it by hanging it in air at a temperature not exceeding 60 °C with the three parts in contact only at the remaining line of stitching.

6.4 Assess the change in colour of each specimen and the staining of the adjacent fabrics with the grey scales.

7 TEST REPORT

For each of the solutions specified in 4.3 and 4.4 report the numerical rating for the change in colour of the test specimen and for the staining of each kind of adjacent fabric used.

8 NOTES

8.1 Suitable testing devices are the Hydrotest, the Perspiration Tester and the Perspirometer. If the dimensions of the composite specimen differ from the size of 10 cm × 4 cm, such a weight-piece has to be used that a pressure of 12,5 kPa is applied to the specimen.

8.2 Other devices may be used provided that the same results are obtained as with the apparatus described in 4.1.

Textiles — Tests for colour fastness

E05 Colour fastness to spotting : Acid

1 SCOPE AND FIELD OF APPLICATION

1.1 This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to the action of dilute solutions of organic and mineral acids.

1.2 Three tests differing in severity are provided. Any or all may be used depending upon the nature of the fibre.

2 PRINCIPLE

Drops of the acid solution are placed on the specimen, the surface of which is rubbed gently with a glass rod to ensure penetration. The changes in colour of the textile, while it is still wet and after drying, are assessed with the grey scale.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

4 APPARATUS AND REAGENTS

4.1 Pipette or **dropper**.

4.2 Glass rod with rounded end.

4.3 Grey scale for assessing change in colour (see clause 3).

4.4 Acetic acid solution containing 300 g of glacial acetic acid (CH_3COOH) per litre.

4.5 Sulphuric acid solution containing 50 g of concentrated sulphuric acid (relative density 1,84) per litre.

4.6 Tartaric acid solution containing 100 g of crystalline tartaric acid per litre (especially for acetate, instead of acetic acid).

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, use a specimen 10 cm × 4 cm.

5.2 If the textile to be tested is yarn, knit it into fabric and use a specimen 10 cm × 4 cm, or make a wick of parallel lengths 10 cm long and about 0,5 cm in diameter, tied near both ends.

5.3 If the textile to be tested is loose fibre, comb and compress enough of it to form a sheet 10 cm × 4 cm.

6 PROCEDURE

6.1 Spot the specimen at room temperature with distilled water so that after working the water into the specimen with the glass rod a spot of diameter approximately 20 mm is formed. In the case of water-repellent fabrics, the amount of water should not exceed 0,5 ml.

6.2 Dry the specimen by hanging it in air at room temperature.

6.3 Assess the change in colour with the grey scale.

7 TEST REPORT

Report the numerical rating for change in colour for each kind of acid used and for change in colour when wet, if of interest.

8 NOTE

The change in colour of the specimen may be observed after it has been wet for 10 min; it is of interest for the evaluation of dyestuffs.

It is recommended also that the test for resistance to water spotting, specified in section E07, be carried out to ascertain that the change in colour is not due to the action of water alone.

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, acid resistance tests.

Approved by member bodies of : Austria; Belgium; Bulgaria; Canada; Chile; Czechoslovakia; Denmark; France; Greece; Hungary; India; Ireland; Israel; Italy; Netherlands; New Zealand; Norway; Pakistan; Poland; Portugal; Spain; Sweden; Switzerland; United Kingdom; U.S.S.R.

Printed in Switzerland

Textiles — Tests for colour fastness

E06 Colour fastness to spotting : Alkali

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to the action of dilute alkaline solutions.

2 PRINCIPLE

Drops of a solution of sodium carbonate are placed on the specimen, the surface of which is rubbed gently with a glass rod to ensure penetration. The change in colour of the textile is assessed with the grey scale.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

4 APPARATUS AND REAGENT

4.1 Pipette or **dropper**.

4.2 Glass rod with rounded end.

4.3 Grey scale for assessing change in colour (see clause 3).

4.4 Sodium carbonate solution containing 100 g of anhydrous sodium carbonate per litre.

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, use a specimen 10 cm × 4 cm.

5.2 If the textile to be tested is yarn, knit it into fabric and use a specimen 10 cm × 4 cm or make a wick of parallel lengths 10 cm long and about 0,5 cm in diameter, tied near both ends.

5.3 If the textile to be tested is loose fibre, comb and compress enough of it to form a sheet 10 cm × 4 cm.

6 PROCEDURE

6.1 Spot the specimen at room temperature with distilled water so that after working the water into the specimen with the glass rod a spot of diameter approximately 20 mm is formed. In the case of water-repellent fabrics, the amount of water should not exceed 0,5 ml.

6.2 Dry the specimen by hanging it in air at room temperature; brush it to remove sodium carbonate residues.

6.3 Assess the change in colour with the grey scale.

7 TEST REPORT

Report the numerical rating for change in colour.

8 NOTE

It is recommended also that the test for resistance to water spotting, specified in section E07, be carried out to ascertain that the change in colour is not due to the action of water alone.

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, alkali resistance tests.

Approved by member bodies of : Austria; Belgium; Bulgaria; Canada; Chile; Czechoslovakia; Denmark; France; Greece; Hungary; India; Ireland; Israel; Italy; Netherlands; New Zealand; Norway; Pakistan; Poland; Portugal; Spain; Sweden; Switzerland; United Kingdom; U.S.S.R.

Textiles — Tests for colour fastness

E07 Colour fastness to spotting : Water

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to spotting by water.

2 PRINCIPLE

A droplet of distilled water is worked into the textile with a glass rod, and the change in colour of the textile is assessed with the grey scale after 2 min and after drying.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

4 APPARATUS

4.1 Pipette or **dropper** to deliver approximately 0,15 ml of water.

4.2 Glass rod with rounded end.

4.3 Distilled water.

4.4 Grey scale for assessing change in colour (see clause 3).

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, use a specimen 10 cm × 4 cm.

5.2 If the textile to be tested is yarn, knit it into fabric and use a specimen 10 cm × 4 cm or make a wick of parallel lengths, 10 cm long and 0,5 cm diameter, tied near both ends.

5.3 If the textile to be tested is loose fibre, comb and compress enough of it to form a sheet 10 cm × 4 cm.

6 PROCEDURE

6.1 Spot the specimen at room temperature with distilled water so that after working the water into the specimen with the glass rod a spot of diameter approximately 20 mm is formed. In the case of water-repellent fabrics, the amount of water should not exceed 0,5 ml.

6.2 After 2 min, assess the change in colour in the periphery of the spot with the grey scale.

6.3 Dry the specimen in air at room temperature and assess the change in colour with the grey scale.

7 TEST REPORT

Report the numerical ratings for change in colour after 2 min and after drying.

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, water resistance tests, distilled water, impregnating tests.

Approved by member bodies of : Austria; Belgium; Bulgaria; Canada; Chile; Czechoslovakia; Denmark; France; Greece; Hungary; India; Ireland; Israel; Italy; Netherlands; New Zealand; Norway; Pakistan; Poland; Portugal; Spain; Sweden; Switzerland; United Kingdom; U.S.S.R.

Printed in Switzerland

Textiles — Tests for colour fastness

E08 Colour fastness to water : Hot water

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to the action of hot water. It is mainly applicable to wool and textiles containing wool.

2 PRINCIPLE

A specimen of the textile in contact with adjacent fabrics is rolled around a glass rod, treated with slightly acidified hot water and dried. The change in colour of the specimen and the staining of the adjacent fabrics are assessed with the grey scales.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

Section A03, *Grey scale for assessing staining.*

4 APPARATUS AND REAGENT

4.1 Vessel, equipped with reflux condenser, to hold a cylindrical specimen 4 cm long in hot water.

4.2 Thermostatically controlled bath, to maintain the contents of the vessel (4.1) at 70 ± 2 °C.

4.3 Glass rod, 0,5 to 0,8 cm in diameter.

4.4 Wool adjacent fabric, 10 cm × 4 cm.

4.5 Cotton adjacent fabric, or, in the case of blends, adjacent fabric made from the kind of fibre admixtured with the wool, measuring 10 cm × 4 cm.

4.6 Distilled water, if necessary acidified with acetic acid to pH 6 ± 0,5.

4.7 Grey scales for assessing change in colour and staining (see clause 3).

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, place a specimen 10 cm × 4 cm between the two adjacent fabrics (4.4 and 4.5) and sew along one of the shorter sides to form a composite specimen.

5.2 If the textile to be tested is yarn, knit it into fabric and treat it as in 5.1, or form a layer of parallel lengths of it between the two adjacent fabrics (4.4 and 4.5), the amount of yarn taken being approximately equal to half the combined mass of the adjacent fabrics. Sew around all four sides to hold the yarn in place and to form a composite specimen.

5.3 If the textile to be tested is loose fibre, comb and compress an amount approximately equal to half the combined mass of the adjacent fabrics (4.4 and 4.5) into a sheet 10 cm × 4 cm. Place the sheet between the two adjacent fabrics and sew around all four sides to hold the fibres in place and to form a composite specimen.

6 PROCEDURE

6.1 Roll the composite specimen compactly around the glass rod to form a cylinder 4 cm long, and tie it loosely and uniformly with thread.

6.2 Leave the specimen on the rod for 30 min in slightly acidified distilled water (4.6) at a temperature of 70 ± 2 °C at a liquor ratio of 30 : 1 under reflux. During the test ensure that the composite specimen is always submerged in the water.

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, wool, water resistance tests, hot water.

Approved by member bodies of : Austria; Belgium; Brazil; Canada; Czechoslavakia; Denmark; France; Germany, F.R.; Hungary; India; Iran; Israel; Japan; Korea, Rep. of; Netherlands; New Zealand; Norway; Portugal; Romania; South Africa, Rep. of; Spain; Sweden; Switzerland; Turkey; United Kingdom; U.S.A.; U.S.S.R.
Disapproved by member body of : Italy.

Printed in Switzerland

6.3 Remove the specimen from the rod and squeeze the specimen. Open out the composite specimen by breaking the stitching on all sides except one of the shorter sides and dry it by hanging it in air at a temperature not exceeding 60 °C with the three parts in contact only at the remaining line of stitching.

6.4 Assess the change in colour of the specimen and the staining of the adjacent fabrics with the grey scales.

7 TEST REPORT

Report the numerical ratings for change in colour of the specimen and for staining of each kind of adjacent fabric used.

Textiles — Tests for colour fastness

E09 Colour fastness to potting

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to the action of boiling water. It is mainly applicable to wool and textiles containing wool.

2 PRINCIPLE

A specimen of the textile between adjacent fabrics is rolled around a glass rod and treated with boiling water. The specimen and the adjacent fabrics are dried separately. The change in colour of the specimen and the staining of the adjacent fabrics are assessed with the grey scales.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

Section A03, *Grey scale for assessing staining.*

4 APPARATUS AND REAGENT

4.1 Vessel equipped with reflux condenser to hold a cylindrical specimen 4 cm long in boiling water.

4.2 Glass rod, 0,5 to 0,8 cm in diameter.

4.3 Wool adjacent fabric measuring 10 cm × 4 cm.

4.4 Cotton adjacent fabric or, in the case of blends, adjacent fabric made from the kind of fibre admixtured with the wool, measuring 10 cm × 4 cm.

4.5 Grey scales for assessing change in colour and staining (see clause 3).

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, place a specimen 10 cm × 4 cm between the two adjacent fabrics (4.3 and 4.4) and sew along one of the shorter sides to form a composite specimen.

5.2 If the textile to be tested is yarn, knit it into fabric and treat it as in 5.1, or form a layer of parallel lengths of it between the two adjacent fabrics (4.3 and 4.4), the amount of yarn taken being approximately equal to half the combined mass of the adjacent fabrics. Sew along two opposite sides to hold the yarn in place and to form a composite specimen.

5.3 If the textile to be tested is loose fibre, comb and compress an amount approximately equal to half the combined mass of the adjacent fabrics (4.3 and 4.4) into a sheet 10 cm × 4 cm. Place the sheet between the two adjacent fabrics and sew along all four sides to hold the fibres in place and to form a composite specimen.

6 PROCEDURE

6.1 Roll the composite specimen compactly around the glass rod to form a cylinder 4 cm long and tie it loosely and uniformly with thread.

6.2 Treat the specimen on the rod for 1 h in boiling distilled water, at a liquor ratio of 30 : 1, under reflux.

6.3 Open out the composite specimen by breaking the stitching on all sides except one of the shorter sides and dry it by hanging it in air at a temperature not exceeding 60 °C with the three parts in contact only at the remaining line of stitching.

6.4 Assess the change in colour of the specimen and the staining of the adjacent fabrics with the grey scales.

7 TEST REPORT

Report the numerical rating for change in colour and the numerical rating for staining of each kind of adjacent fabric used.

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, wool, boiling temperature tests, boiling water, decatizing.

Approved by member bodies of : Austria; Belgium; Bulgaria; Canada; Chile; Czechoslovakia; Denmark; France; Greece; India; Ireland; Israel; Italy; Netherlands; New Zealand; Norway; Pakistan; Poland; Portugal; Spain; Sweden; Switzerland; United Kingdom; U.S.S.R.

Printed in Switzerland

Textiles — Tests for colour fastness

E10 Colour fastness to decatizing

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles to the action of steam, as employed in the decatizing of wool fabrics. Two tests, mild and severe, are given.

2 PRINCIPLE

A specimen of the textile is wrapped round a perforated cylinder, and steam passed through it for 15 min. The change in colour of the dried specimen is assessed with the grey scale. Correct handling of the method is controlled by use of a test control specimen tested under identical conditions.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A02, *Grey scale for assessing change in colour.*

4 APPARATUS AND REAGENT

4.1 Suitable decatizing apparatus

Such a device consists of an autoclave having an approximate capacity of 20 litres (for example 26 cm in diameter and 40 cm high) with a safe operating pressure of up to 400 kPa and an adjustable heat source (electric or gas). In the middle of the cover is a threaded opening. At this opening on the underside of the cover is attached a perforated cylinder 2 cm in diameter and 16 cm high. The lower end of the cylinder is closed by a round piece of sheet metal 20 cm in diameter. A regulating valve and a manometer shall be connected with the perforated cylinder on the upper side of the cover. A safety valve and a thermometer are mounted separately in the cover (see figure).

4.2 Cotton blanket cloth, boiled off, napped on both sides, of mass per unit area about 400 g/m^2.

4.3 Cotton adjacent fabric, measuring 10 cm × 4 cm.

4.4 Test control : a dyeing of CI Mordant Brown 33 Colour Index, 3rd Edition (see 8.3).

4.5 Grey scale for assessing change in colour (see clause 3).

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, use a specimen 10 cm × 4 cm.

5.2 If the textile to be tested is yarn, knit it into fabric and use a 10 cm × 4 cm specimen or form a layer of parallel lengths of it, place it between two cotton adjacent fabrics (4.3) and sew around the four sides to hold the yarn in place.

5.3 If the textile to be tested is loose fibre, comb and compress enough of it to form a layer 10 cm × 4 cm, place it between two cotton adjacent fabrics (4.3) and sew around the four sides to hold the fibre in place.

5.4 Prepare a 10 cm × 4 cm specimen of the test-control dyeing (4.4).

6 PROCEDURE

6.1 Prior to the first operation, i.e. without the specimen and test control, heat the apparatus (see 8.2) in order to prevent the formation of condensed water.

6.2 Carry out the operations described in 6.3 and 6.4 with the specimens and the test control in parallel.

UDC 677.016.47 First edition — 1978-12-15

Descriptors : Textiles, dyes, tests, colour fastness, visual inspection, water vapour tests, high temperature tests, wool fabrics, decatizing, reference sample.

Approved by member bodies of : Australia; Belgium; Bulgaria; Chile; Colombia; Denmark; France; Germany, F.R.; Ireland; Italy; Japan; Netherlands; New Zealand; Portugal; Romania; Spain; Sweden; Switzerland; Turkey; United Kingdom.
Disapproved by member bodies of : Hungary; India; U.S.S.R.

Printed in Switzerland

6.3 Wrap a length of the cotton blanket cloth (4.2) three times around the perforated cylinder of the decatizing apparatus (4.1). Place the specimen and the test-control specimen around the wrapped cylinder and cover with three further wrappings of the blanket cloth.

Pass saturated, but water-free, steam through the specimen for 15 min at one of the following pressures :

Decatizing	Steam pressure kPa	Temperature of entering steam °C
Mild	147	111
Severe	245	127

6.4 Dry the specimen by hanging it in air at a temperature not exceeding 60 °C. Yarn or loose fibre should be removed from between the two pieces of cotton adjacent fabric before drying.

6.5 Assess the change in colour of the test control with the grey scale. If the change is not equal to the following :

mild decatizing : 4Y
severe decatizing : 3Y

the test has not been carried out correctly, and the operations described in 6.1 to 6.4 inclusive should be repeated with fresh specimens and a fresh test-control specimen.

6.6 Assess the change in colour of the test specimens with the grey scale.

7 TEST REPORT

Report the numerical ratings for change in colour of the specimen, specifying the severity of the test used, i.e. "mild" or "severe".

8 NOTES

8.1 Other devices similar to that described in 4.1 may be used, provided that they give identical results.

8.2 Test control. A well wetted-out pattern of wool cloth is entered at 40 °C into a dye-bath containing 1 % CI Mordant Brown 33 (Colour Index, 3rd Edition), 10 % sodium sulphate decahydrate ($Na_2SO_4.10H_2O$) and 3 to 5 % acetic acid (300 g/l), all percentages being calculated on the mass of the wool pattern. The liquor ratio is 40 : 1.

The dye-bath is raised to the boil within 30 min, and boiled for a further 30 min. If necessary, it is exhausted by careful addition of 3 to 5 % acetic acid (300 g/l). Boil for a further 15 min after addition of the acid. The dye-bath is cooled down by addition of cold water, and 0,5 % potassium dichromate dissolved in water is added. Then it is raised to the boil and boiled for 45 min. The pattern is removed, rinsed in cold running tap water and dried.

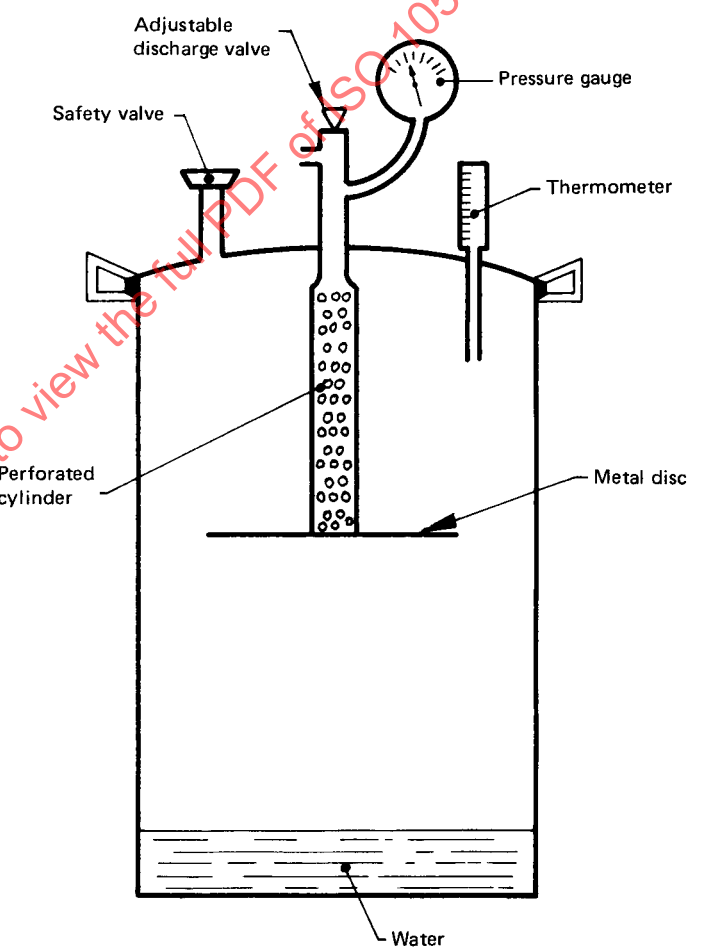

FIGURE — **Decatizing apparatus**

Textiles — Tests for colour fastness

E11 Colour fastness to steaming

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to the action of steaming under atmospheric pressure.

2 PRINCIPLE

A specimen of the textile in contact with specified adjacent fabrics is rolled into a cylinder and placed in the neck of a flask containing boiling water. The staining of the adjacent fabrics is assessed with the grey scale.

3 REFERENCES

ISO 105 :

Section A01, *General principles of testing.*

Section A03, *Grey scale for assessing staining.*

4 APPARATUS AND REAGENT

4.1 Glass tube open at both ends, with 3 cm inside diameter, mounted in a cork stopper and fitted into the neck of a wide-neck conical flask, of about 2 litres capacity. A wire ring is fixed in the cork stopper, with the loop covered with a thin fabric to catch spray. The flask contains about 0,5 litre of water, to which some small beads are added (see figure).

4.2 Adjacent fabric, 10 cm × 4 cm, of the same fibre as the specimen.[1)]

4.3 Two cotton adjacent fabrics, each 10 cm × 4 cm.[1)];

4.4 Undyed scoured wool felt.

4.5 Grey scale for assessing staining (see clause 3).

5 TEST SPECIMEN

5.1 If the textile to be tested is fabric, prepare a composite specimen measuring 10 cm × 4 cm[1)] by placing successively on a piece of cotton adjacent fabric (4.3) the textile to be tested, a piece of adjacent fabric (4.2) and a further piece of cotton adjacent fabric (4.3). Roll this composite specimen into a cylinder, with the cloth being tested as near the middle as possible.

5.2 If the textile to be tested is yarn, knit it into cloth and use a piece 10 cm × 4 cm[1)]; treat as in 5.1.;

5.3 If the textile to be tested is loose fibre, comb and compress enough of it to form a sheet 10 cm × 4 cm[1)], and place it on a piece of cotton adjacent fabric (4.3); place successively on this a piece of adjacent fabric (4.2) and a further piece of cotton adjacent fabric (4.3). Roll the composite specimen into a cylinder, with the fibre to be tested as near the middle as possible.

6 PROCEDURE

6.1 Bring the water in the conical flask to the boil. Wrap the cylindrical composite specimen in felt (4.4) so that the whole fits easily in the glass tube in the neck of the flask and can be retained by the indentations in the lower part of the tube, and boil for 30 min.

6.2 Remove the composite specimen from the tube,

1) The length of 10 cm may be reduced if the cloth to be tested is too thick for the cylinder to be inserted into the tube. To facilitate rolling, stitch at one end the cloth (knitted yarn or fibre) forming the composite specimen.

UDC 677.016.47 First edition — 1978-12-15

Descriptors : textiles, dyes, tests, colour fastness, visual inspection, boiling temperature tests, water vapour tests.

Approved by member bodies of : Australia; Austria; Belgium; Canada; Chile; Czechoslovakia; Denmark; France; Germany, F.R.; Greece; Hungary; India; Iran; Israel; Japan; Netherlands; New Zealand; Norway; Poland; Romania; South Africa, Rep. of; Spain; Sweden; Switzerland; Turkey; United Kingdom; U.S.S.R.
Disapproved by member bodies of : Italy; U.S.A.