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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION
R 105/II

TESTS FOR COLOUR FASTNESS OF TEXTILES

SECOND SERIES

1st EDITION

March 1963

For each individual country the only valid standard is the national standard of that country.

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BRIEF HISTORY

The ISO Recommendation R 105/II, *Tests for Colour Fastness of Textiles—Second Series*, was drawn up by Technical Committee ISO/TC 38, *Textiles*, the Secretariat of which is held by the British Standards Institution (B.S.I.).

Work on this question by the Technical Committee began in 1954 and led, in 1956, to the adoption of a Draft ISO Recommendation.

In January 1960, this Draft ISO Recommendation (No. 322) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies:

Australia	France	Portugal
Belgium	Germany	Romania
Bulgaria	Ireland	Spain
Burma	Italy	Sweden
Chile	Japan	Switzerland
Colombia	Netherlands	Turkey
Denmark	New Zealand	United Kingdom

Three Member Bodies opposed the approval of the Draft:

Hungary, India, U.S.S.R.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in March 1963, to accept it as an ISO RECOMMENDATION.

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ISO Recommendation R 105/II March 1963

TESTS FOR COLOUR FASTNESS OF TEXTILES

SECOND SERIES

Part 1

COLOUR FASTNESS TO ALKALINE MILLING

1. PURPOSE AND SCOPE

1.1 This method is intended for assessing the resistance of the colour of wool and part wool textiles to the action of soap and sodium carbonate solutions used in alkaline milling.

2. PRINCIPLE

2.1 A specimen of the textile in contact with specified undyed cloths is milled in a jar containing stainless steel balls and a solution of soap and sodium carbonate. The severity of the action is standardized by means of a test-control dyeing milled in the same way. The change in colour of the specimen and the staining of undyed cloths are assessed with standard grey scales.

3. APPARATUS AND REAGENTS

3.1 Suitable container with means of agitation.*

3.2 Non-corrodible (stainless) steel balls, 6 mm in diameter.

3.3 Two undyed cloths, each 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, and the second made of the fibre indicated in the table below or of another fibre to be assessed for staining.

If first piece is:	Second piece to be:
cotton	wool
wool	cotton
linen	wool
viscose	wool
acetate	wool
polyamide	wool
polyester	wool
polyacrylic	wool

3.4 Solution containing 50 g soap and 10 g anhydrous sodium carbonate per litre. The soap should contain not more than 5 per cent moisture and comply with the following specifications based upon dry weight:

Free alkali, calculated as Na_2CO_3	0.3 per cent maximum
Free alkali, calculated as NaOH	0.1 per cent maximum
Total fatty matter	85 per cent minimum
Titre of mixed fatty acids prepared from the soap	30 °C maximum
Iodine value	50 maximum

3.5 **Test control.** A dyeing of 3 per cent Disulphine Blue ANS on wool cloth (see clause 7.1).

* The Wash Wheel, sponsored by the Society of Dyers and Colourists, and the " Launder-Ometer ", sponsored by the American Association of Textile Chemists and Colourists and equipped with metal specimen containers, or other mechanical apparatus giving identical results, may be used for the test.

3.6 Grey scales for assessing change in colour and staining of undyed cloths.*

4. SPECIMEN

4.1 If the textile to be tested is fabric, place a 10 cm × 4 cm specimen of it between the two pieces of undyed cloth (see clause 3.3) and stitch them together along all four sides to form a composite specimen. In addition, sew parallel stitches in straight lines at intervals of approximately 1 cm.

4.2 If the textile to be tested is yarn, knit it into fabric or form a layer of parallel lengths of it and prepare a composite specimen as in clause 4.1.

4.3 If the textile to be tested is loose fibre, comb and compress an amount weighing approximately half the combined weight of the undyed cloths. Lay the bulk fibre evenly between the two undyed cloths and sew the layers together by stitching in one direction at intervals of approximately 1 cm.

4.4 Prepare a composite test-control specimen from the test control (see clause 3.5), in the way that the composite specimen was prepared (see clause 4.1).

5. PROCEDURE

5.1 Carry out the operations described in clauses 5.2 to 5.4 inclusive with the composite specimen and the composite test-control specimen, in parallel, in separate baths.

5.2 Put the composite specimen and the composite test-control specimen in separate containers in the machine (see clause 3.1), each with three times its own weight of the milling solution (see clause 3.4) and 50 of the stainless steel balls. Run the machine for two hours at 40 ± 2 °C (104 ± 4 °F).

5.3 Add sufficient distilled water at 40 ± 2 °C (104 ± 4 °F) to give a liquor ratio of 100:1, and run the machine for an additional 10 minutes.

5.4 Remove the composite specimens, rinse twice in cold distilled water, rinse 10 minutes in cold running water, separate the specimens from the undyed cloths, and dry them at a temperature not exceeding 60 °C (140 ° F).

5.5 Assess the change in colour of the test control and the staining of undyed cloths with the appropriate grey scales.
If the change in colour and staining are not equal to rating 3 on the appropriate grey scales, the test has not been carried out correctly, and the operations described in clauses 5.1 to 5.4 should be repeated with a fresh composite specimen and a fresh composite test-control specimen.

5.6 Assess the change in colour of the specimen and the staining of the undyed cloths with the grey scales.*

6. REPORT

6.1 Report the numerical ratings for change in colour of the specimen and for staining of each kind of undyed fibre tested.

7. NOTE

7.1 **Test control.** A well wetted-out pattern of wool serge is entered at 40 °C (104 °F) into a dye-bath containing 3 per cent Disulphine Blue ANS **, 10 per cent sodium sulphate crystals ($Na_2SO_4 \cdot 10H_2O$) and 3 per cent sulphuric acid (density 1.84 g/cm³), all percentages being calculated on the mass of the wool, at a liquor ratio of 40 : 1. The dye-bath is raised to the boil in 30 minutes and boiled for 45 minutes. The pattern is removed, rinsed and dried.

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* See ISO Recommendation R 105/I, *Tests for Colour Fastness of Textiles (First Series)* :
Part 1: " General principles of testing ",
Part 2: " Grey scale for assessing change in colour ",
Part 3: " Grey scale for assessing staining ".

** Colour Index, 2nd edition, Acid Blue 7.

Part 2

COLOUR FASTNESS TO ACID FELTING: SEVERE

1. PURPOSE AND SCOPE

1.1 This method is intended for assessing the resistance of the colour of textiles in all forms to the action of acids, as used under severe conditions in the acid-felting process.

2. PRINCIPLE

2.1 A specimen of the textile in contact with undyed cloths is treated in solutions of acetic acid and sulphuric acid, rinsed and dried. The change in colour of the specimen and the staining of the undyed cloths are assessed with standard grey scales.

3. APPARATUS AND REAGENTS

3.1 Solution containing 1 ml concentrated sulphuric acid (density 1.84 g/cm³) per litre.

3.2 Solution containing 5 ml acetic aid (30 per cent) per litre.

3.3 Two undyed cloths, each 10 cm × 4 cm, one piece made of wool and the other made of wool or of another fibre to be assessed for staining, as desired. They should be of plain construction and unsized.

3.4 Standard grey scales.*

4. SPECIMEN

4.1 If the textile to be tested is fabric, place a 10 cm × 4 cm specimen of it between the two pieces of undyed cloth (see clause 3.3) and stitch them together along all four sides to form a composite specimen.

4.2 If the textile to be tested is yarn, knit it into fabric or form a layer of parallel lengths of it and prepare a composite specimen as in clause 4.1.

4.3 If the textile to be tested is loose fibre, comb and compress an amount weighing approximately half the combined weight of the undyed cloths (see clause 3.3) so as to obtain a layer 10 cm × 4 cm. Prepare a composite specimen of it as in clause 4.1.

5. PROCEDURE

5.1 Test the composite specimen in accordance with clauses 5.2 to 5.4 inclusive with sulphuric acid (see clause 3.1) and acetic acid (see clause 3.2) as separate tests or with only one of these reagents, as required. The liquor ratio in both cases is 40 : 1.

5.2 Bring the test solution to 90 ± 2 °C (194 ± 4 °F). Immerse the specimen in the solution for 30 minutes, maintaining this temperature.

5.3 Rinse the milled composite specimen for 10 minutes in cold running water and drain it. Open out the specimen by breaking the stitching on three sides and dry it in air at a temperature not exceeding 60 °C (140 °F), without allowing the composite parts to come into contact other than at the remaining stitching.

5.4 Assess the change in colour of the specimen and the staining of the undyed cloths with the grey scales.*

6. REPORT

6.1 Report, for each reagent used, the numerical ratings for change in colour of the specimen and for staining of the undyed cloths.

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* See ISO Recommendation R 105/I, *Tests for Colour Fastness of Textiles (First Series)* :
Part 1: " General principles of testing ",
Part 2: " Grey scale for assessing change in colour ",
Part 3: " Grey scale for assessing staining ".

Part 3

COLOUR FASTNESS TO ACID FELTING: MILD

1. PURPOSE AND SCOPE

1.1 This method is intended for assessing the resistance of the colour of textiles to the action of diluted and hot mineral acids, as used under mild felting conditions in the hat-making and felt industries.

2. PRINCIPLE

2.1 A specimen of the textile in contact with undyed cloths is milled in acid solution, rinsed and dried. The change in colour of the specimen and the staining of the undyed cloths are assessed with standard grey scales.

3. APPARATUS AND REAGENTS

3.1 A suitable receptacle and a glass rod, flattened at one end, or appropriate mechanical apparatus (see clause 5.2 below).

3.2 Solution containing 1 ml concentrated sulphuric acid (density 1.84 g/cm³) per litre.

3.3 Two undyed cloths, each 10 cm × 4 cm, one piece made of wool and the other made of wool or of another fibre to be assessed for staining, as desired. They should be of plain construction and unsized.

3.4 Standard grey scales.*

4. SPECIMEN

4.1 If the textile to be tested is fabric, place a 10 cm × 4 cm specimen of it between the two pieces of undyed cloth (see clause 3.3) and stitch them together along all four sides to form a composite specimen.

4.2 If the textile to be tested is yarn, knit it into fabric or form a layer of parallel lengths of it and prepare a composite specimen as in clause 4.1.

4.3 If the textile to be tested is loose fibre, comb and compress an amount weighing approximately half the combined weight of the undyed cloths (see clause 3.3) so as to obtain a layer 10 cm × 4 cm. Prepare a composite specimen of it as in clause 4.1.

5. PROCEDURE

5.1 Mill the composite specimen in the sulphuric acid solution (see clause 3.2) at a temperature of 60 ± 2 °C (140 ± 4 °F) for a period of 1 hour. The liquor ratio is 40 : 1.

5.2 If possible, use a mechanical milling device set to give results identical with those of the hand test.

5.3 When milling by hand, move the composite specimen about continuously with the glass rod while it is in the milling bath and press it with the rod every 2 minutes, without removal from the bath.

5.4 Rinse the milled composite specimen for 10 minutes in cold running water and drain it. Open out the specimen by breaking the stitching on three sides and dry it in air at a temperature not exceeding 60 °C (140 °F), without allowing the composite parts to come into contact other than at the remaining stitching.

5.5 Assess the change in colour of the specimen and staining of the undyed cloths with the grey scales.*

6. REPORT

6.1 Report the numerical ratings for change in colour of the specimen and for staining of the undyed cloths.

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* See ISO Recommendation R 105/I, *Tests for Colour Fastness of Textiles (First Series)* :
Part 1: " General principles of testing ",
Part 2: " Grey scale for assessing change in colour ",
Part 3: " Grey scale for assessing staining ".

Part 4

COLOUR FASTNESS TO CROSS-DYEING: WOOL

1. PURPOSE AND SCOPE

1.1 This method is intended for assessing the resistance of the colour of textiles to the action of processes used for dyeing wool.

2. PRINCIPLE

2.1 Specimens of the textile in contact with specified undyed cloths are treated in different types of wool dye-bath, but without any dyestaff. The specimens are then rinsed and dried. The change in colour of the specimen and the staining of undyed cloths are assessed by standard grey scales.

3. APPARATUS AND REAGENTS

3.1 Suitable dye vessels.

3.2 Acetic acid solution (30 per cent).

3.3 Sulphuric acid (density 1.84 g/cm³).

3.4 Sodium sulphate crystals ($Na_2SO_4 \cdot 10H_2O$).

3.5 Potassium dichromate ($K_2Cr_2O_7$).

3.6 Ten undyed cloths, each 10 cm × 4 cm, five pieces made of the same kind of fibre as that of the textile to be tested or that predominating in the case of blends, and five made of the fibre indicated in the table below or as otherwise specified.

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

3.7 Standard grey scales.*

4. SPECIMEN

4.1 If the textile to be tested is fabric, place a 10 cm × 4 cm specimen of it between the two pieces of undyed cloth (see clause 3.6), and stitch them together along all four sides to form a composite specimen.

4.2 If the textile to be tested is yarn, knit it into fabric or form a layer of parallel lengths of it, and prepare a composite specimen as in clause 4.1.

4.3 If the textile to be tested is loose fibre, comb and compress an amount weighing approximately half the combined weight of the undyed cloths (see clause 3.6), so as to obtain a layer 10 cm × 4 cm. Prepare a composite specimen of it as in clause 4.1.

4.4 Prepare five composite specimens in the manner described.

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* See ISO Recommendation R 105/I, *Tests for Colour Fastness of Textiles (First Series)* :
Part 1: " General principles of testing ",
Part 2: " Grey scale for assessing change in colour ",
Part 3: " Grey scale for assessing staining ".

5. PROCEDURE

5.1 Carry out the operations described in clauses 5.2 to 5.8 inclusive, using a liquor ratio of 50 : 1. The liquor ratio and the percentages of reagents in the baths are based upon the mass of the composite specimen.

5.2 **Neutral cross-dyeing.** Place one composite specimen in a bath containing 20 per cent sodium sulphate crystals. Raise the temperature to 98 ± 2 °C (208 ± 4 °F) in 30 minutes, and maintain this temperature for 90 minutes.

5.3 **Acetic acid cross-dyeing.** Place one composite specimen in a bath containing 5 per cent of the 30 per cent acetic acid solution and 20 per cent sodium sulphate crystals. Raise the temperature to 98 ± 2 °C (208 ± 4 °F) in 30 minutes, and maintain this temperature for 90 minutes.

5.4 **Sulphuric acid cross-dyeing.** Place one composite specimen in a bath containing 20 per cent sodium sulphate crystals and 4 per cent sulphuric acid (density 1.84 g/cm³). Raise the temperature to 98 ± 2 °C (208 ± 4 °F) in 30 minutes, and maintain this temperature for 90 minutes.

5.5 **Acetic acid—chrome cross-dyeing.** Place one composite specimen in a bath containing 20 per cent sodium sulphate crystals and 5 per cent of the 30 per cent acetic acid solution. Raise the temperature to 98 ± 2 °C (208 ± 4 °F) in 30 minutes, and maintain this temperature for 30 minutes. Add 2 per cent potassium dichromate ($K_2Cr_2O_7$), and maintain the bath at 98 ± 2 °C (208 ± 4 °F) for an additional 60 minutes.

5.6 **Sulphuric acid—chrome cross-dyeing.** Place one composite specimen in a bath containing 20 per cent sodium sulphate crystals and 5 per cent of the 30 per cent acetic acid solution. Raise the temperature to 98 ± 2 °C (208 ± 4 °F) in 30 minutes, and maintain this temperature for 30 minutes. Add 2 per cent sulphuric acid (density 1.84 g/cm³), and maintain the bath at 98 ± 2 °C (208 ± 4 °F) for an additional 15 minutes. Add 2 per cent potassium dichromate, and maintain at 98 ± 2 °C (208 ± 4 °F) for an additional 60 minutes.

5.7 Rinse the composite specimens in running water, open out the specimens by breaking the stitching on three sides, and dry them in air at a temperature not exceeding 60 °C (140 °F), without allowing the three parts to come into contact other than at the remaining stitching.

5.8 Assess the change in colour of the specimen and the staining of undyed cloths with the grey scales.*

6. REPORT

6.1 Report the method of cross-dyeing used, the numerical ratings for change in colour of the specimen and for staining of each kind of undyed fibre tested.

* See ISO Recommendation R 105/I, *Tests for Colour Fastness of Textiles (First Series)* :
Part 1: " General principles of testing ",
Part 2: " Grey scale for assessing change in colour ",
Part 3: " Grey scale for assessing staining ".

Part 5

COLOUR FASTNESS TO DECATIZING

1. PURPOSE AND SCOPE

1.1 This method is intended for assessing 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

2.1 A specimen of the textile is wrapped round a perforated cylinder, and steam passed through it for 15 minutes. The specimen is then dried and the change in colour assessed with a standard grey scale. A test-control fabric is used.

3. APPARATUS AND REAGENTS

3.1 Suitable decatizing apparatus (see clause 7.1).

3.2 Cotton blanket cloth, boiled off, napped on both sides, weighing about 400 g/m² (12 oz/yd²).

3.3 **Test control.** A 1 per cent dyeing of Diamond Brown RH Extra (see clause 7.2.).

3.4 Standard grey scale for assessing change in colour.*

4. SPECIMEN

4.1 If the textile to be tested is fabric, a 10 cm × 4 cm specimen of it is required.

4.2 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 pieces of undyed cotton cambric, and sew around the four sides to hold the yarn in place.

4.3 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 pieces of undyed cotton cambric, and sew around the four sides to hold the fibre in place.

4.4 **Test control.** Prepare a 10 cm × 4 cm specimen of the test-control dyeing (see clause 3.3).

5. PROCEDURE

5.1 Carry out the operations described in clauses 5.2 to 5.4 inclusive, with the specimens and the test-control specimen in parallel.

5.2 Wrap a length of the cotton blanket cloth three times around the perforated cylinder of the decatizing apparatus (see clause 7.1). Place the specimen and the test-control specimen around the wrapped cylinder and cover with three further wrappings of the blanket cloth.

* See ISO Recommendation R 105/I, *Tests for Colour Fastness of Textiles (First Series)* :
Part 1: " General principles of testing ",
Part 2: " Grey scale for assessing change in colour ".

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

Decatizing	Absolute pressure		or Pressure above atmospheric pressure		Temperature of entering steam	
	kgf/cm²	lbf/in²	kgf/cm²	lbf/in²	°C	°F
mild	1.5	21.3	0.5	7.1	110	230
severe	2.5	33.5	1.5	21.3	127	261

5.4 Dry the specimen in air at a temperature not exceeding 60 °C (140 °F). Yarn or loose fibre should be removed from between the two pieces of undyed cotton before drying.

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

mild decatizing: 4 Y,
severe decatizing: 3 Y,

the test has not been carried out correctly, and the operations described in clauses 5.1 to 5.4 inclusive should be repeated with fresh specimens and a fresh test-control specimen.

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

6. REPORT

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

7. NOTES

7.1 **Decatizing apparatus.** The apparatus shown in the figure opposite or a similar apparatus may be used.**

7.2 **Test-control specimen.** A well wetted-out pattern of wool cloth is entered at 40 °C (104 °F) into a dye-bath containing 1 per cent Diamond Brown RH extra ***, 10 per cent sodium sulphate crystals ($Na_2SO_4 \cdot 10H_2O$) and 3 to 5 per cent acetic acid (30 per cent), all percentages being calculated on the weight of the wool pattern, at a liquor ratio of 40 : 1.

The dyebath is raised to the boil within 30 minutes, and boiled for a further 30 minutes. If necessary, it is exhausted by careful addition of 3 to 5 per cent acetic acid (30 per cent). Boil for a further 15 minutes after addition of the acid. The dye-bath is cooled down by addition of cold water, and 0.5 per cent potassium dichromate dissolved in water is added. Then it is raised to the boil and boiled for 45 minutes. The pattern is removed, rinsed in cold running tap-water and dried.

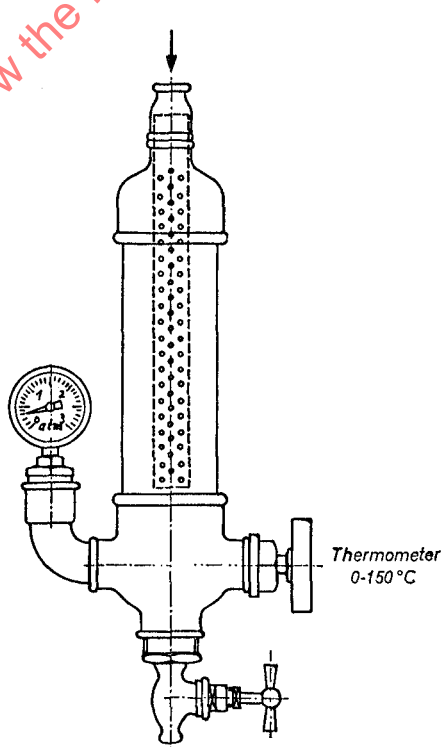

FIGURE.—**Decatizing apparatus** **

* See ISO Recommendation R 105/I, *Tests for Colour Fastness of Textiles (First Series)* :
Part 1: " General principles of testing ",
Part 2: " Grey scale for assessing change in colour ".

** Journal of the Society of Dyers and Colourists, June 1955, page 324.

*** Colour Index, 2nd Edition, Mordant Brown 33.