International Standard 105/X

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

Textiles — Essais de solidité des teintures — Partie X : Solidité des teintures à des agents autres que ceux spécifiés dans les parties A à S et Z

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Foreword

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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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 105/X was prepared by Technical Committee ISO/TC 38, *Textiles.*

ISO 105/B was first published in 1978. This second edition cancels and replaces the first edition, section X12 of which has been technically revised and to which section X14 has been added.

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1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles in all forms to the manufacturing operation designed to remove vegetable impurities by a treatment with aluminium chloride at high temperatures. It is mainly applicable to wool and textiles containing wool, particularly those containing also acetate or polyamide fibres.

2 PRINCIPLE

A specimen containing aluminium chloride solution is dried, baked, rinsed and neutralized. The changes in colour after rinsing, neutralizing and 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 Oven for drying specimens in air at 60 ± 2 °C and baking in air at 115 ± 2 °C.

4.2 Aluminium chloride solution (relative density 1,037) containing 51,4 g of $AlCl_3.6H_2O$ per litre.

4.3 Ammonium hydroxide solution containing 2 ml of 20 % NH_4OH per litre.

4.4 Test control : a dyeing of CI Mordant Red 3 (Colour Index, 3rd Edition) treated with potassium dichromate (see clause 8).

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 specimen 10 cm × 4 cm or make a wick of parallel lengths 10 cm long and about 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 Carry out the operations described in 6.2 to 6.5 with the specimen and the test-control specimen in parallel in separate baths.

6.2 Immerse the specimen in the aluminium chloride solution (4.2) for 15 min at room temperature (liquor ratio 20 : 1). Squeeze it to leave in 80 % of its own mass of solution.

6.3 Dry the specimen by hanging it in an oven for 30 min, or longer if necessary, at 60 ± 2 °C. Then bake it by heating for 15 min at 115 ± 2 °C.

6.4 Rinse the specimen for 5 min in cold running tap-water and then divide it into two equal parts. Dry one half by hanging it in air at a temperature not exceeding 60 °C.

6.5 Agitate the other half for 30 min at room temperature in the ammonium hydroxide solution (4.3) (liquor ratio 40 : 1). Then rinse it for 5 min in cold running tap-water and dry it by hanging it in air at a temperature not exceeding 60 °C.

6.6 Assess the effect on the unneutralized test-control specimen with the grey scale (see clause 8). If the change

in colour is not equal to the rating 4-5 yellower on the appropriate scale, the test has not been carried out correctly, and the operations described in 6.1 to 6.5 inclusive should be repeated with a fresh specimen and a fresh test-control specimen.

6.7 Assess the change in colour of each half of the specimen with the grey scale.

7 TEST REPORT

Report the numerical ratings for changes in colour for both the rinsed and the neutralized portions of the specimen.

8 NOTE

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

The dye-bath is raised to the boil in 30 min and boiled for a further 30 min. If necessary, the dye-bath is exhausted by careful addition of 1 to 3 % acetic acid (300 g/l) or 1 % sulphuric acid (relative density 1,84), well diluted with water. The bath is boiled 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. The dye-bath is raised to the boil and boiled for 30 min. The pattern is then removed, rinsed in cold running tap-water and dried.

X02 Colour fastness to carbonizing : Sulphuric acid

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles in all forms to the manufacturing operation designed to remove vegetable impurities by a treatment with sulphuric acid at high temperatures. It is mainly applicable to wool and textiles containing wool.

2 PRINCIPLE

A specimen containing the sulphuric acid solution is dried, baked, rinsed and neutralized. The changes in colour after rinsing, neutralizing and 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 Oven for drying specimens in air at 60 ± 2 °C and baking in air at 105 ± 2 °C.

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

4.3 Sodium carbonate solution containing 2 g of anhydrous sodium carbonate per litre.

4.4 Test control : a dyeing of CI Mordant Red 3 (Colour Index, 3rd Edition), treated with potassium dichromate (see clause 8).

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 specimen 10 cm × 4 cm or make a wick of parallel lengths 10 cm long and about 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 Carry out the operations described in 6.2 to 6.5 with the specimen and test-control specimen in parallel, in separate baths.

6.2 Immerse the specimen in the sulphuric acid solution (4.2) for 15 min at room temperature (liquor ratio 20 : 1). Squeeze it to leave in 80 % of its own mass of solution.

6.3 Dry the specimen by hanging it in an oven for 30 min, or longer if necessary, at 60 ± 2 °C. Then bake it by heating for 15 min at 105 ± 2 °C.

6.4 Rinse the specimen for 5 min in cold running tap-water and then divide it into two equal parts. Dry one half by hanging it in air at a temperature not exceeding 60 °C.

6.5 Agitate the other half for 30 min at room temperature in the sodium carbonate solution (4.3) (liquor ratio 40 : 1). Then rinse it for 5 min in cold running tap-water and dry it by hanging it in air at a temperature not exceeding 60 °C.

6.6 Assess the effect on the unneutralized test-control specimen with the grey scale (see clause 8). If the change in

colour is not equal to the rating 2 yellower on the appropriate scale, the test has not been carried out correctly and the operations described in 6.1 to 6.5 inclusive should be repeated with a fresh specimen and a fresh test-control specimen.

6.7 Assess the change in colour of each half of the specimen with the grey scale.

7 TEST REPORT

Report the numerical ratings for changes in colour for both the rinsed and the neutralized portions of the specimen.

8 NOTE

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

The dye-bath is raised to the boil in 30 min and boiled for a further 30 min. If necessary, the dye-bath is exhausted by careful addition of 1 to 3 % of acetic acid (300 g/l) or 1 % of sulphuric acid (relative density 1,84), well diluted with water. The bath is boiled for a further 15 min after addition of the acid. The dye-bath is cooled down by addition of cold water, and 0,5 % of potassium dichromate dissolved in water is added. The dye-bath is raised to the boil and boiled for 30 min. The pattern is then removed, rinsed in cold running tap-water and dried.

X03 Colour fastness to chlorination

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 manufacturing operation in which an acid hypochlorite solution is used to prevent wool textiles from shrinking.

2 PRINCIPLE

A specimen of the textile in contact with adjacent fabrics is treated successively with solutions of hydrochloric acid, sodium or lithium hypochlorite and sodium sulphite, rinsed and dried. The change in colour of the specimen and the staining of the adjacent fabrics are assessed with the grey scales. A test-control specimen is used.

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 Yarns of scoured unbleached undyed wool, undyed bleached cotton and other fibres as desired for assessment of staining, if fabrics or yarns are to be tested; comparable **adjacent fabrics** if loose fibres are to be tested.

4.2 Hydrochloric acid solution containing 6 ml of hydrochloric acid (relative density 1,16 at 20 °C) per litre.

4.3 *Either* :

Sodium hypochlorite solution containing 1 g of active chlorine per litre.

To prepare this reagent, use sodium hypochlorite 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

Or :

Lithium hypochlorite (LiOCl) solution containing 1 g of available chlorine per litre.

To prepare this reagent, use solid lithium hypochlorite, which contains approximately 300 g of LiOCl per kilogram. About 5 g of solid lithium hypochlorite dissolved in 1 litre of distilled water yields a solution of the prescribed concentration of 1 g of available chlorine per litre.

4.4 Sodium sulphite solution containing 3 g of $Na_2SO_3.7H_2O$ per litre.

4.5 Test control : dyeing of CI Acid Blue 37 (Colour Index, 3rd Edition) on wool cloth (see clause 8).

4.6 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, sew stitches of the undyed yarns (4.1) at intervals of approximately 1 cm into a specimen of the fabric 10 cm × 4 cm.

5.2 If the textile to be tested is yarn, knit it into fabric and make a composite specimen from it as in 5.1.

5.3 If the textile is loose fibre, comb and compress enough of it to form a sheet 10 cm × 4 cm, place the sheet between the wool and the cotton adjacent fabrics or other adjacent fabrics and sew the three together with stitching at intervals of 1 cm. The mass of the coloured textile should approximate to that of the wool adjacent fabric.

5.4 Prepare a composite specimen of the test-control specimen (4.5) in the way outlined for fabric in 5.1.

6 PROCEDURE

6.1 Carry out the operations described in 6.2 to 6.5 with the composite specimens and the composite test-control specimen, in parallel, in separate baths.

6.2 Immerse the composite specimen in the hydrochloric acid solution (4.2) at a liquor ratio of 25 : 1 for 10 min at room temperature.

6.3 Add an equal volume of the sodium or lithium hypochlorite solution (4.3) and keep the composite specimen immersed for a further 10 min.

6.4 Rinse the composite specimen thoroughly in cold running tap-water and then immerse it in the sodium sulphite solution (4.4) for 10 min, at 35 to 40 °C at a liquor ratio of 50 : 1.

6.5 Thoroughly rinse the composite specimen in cold running tap-water and dry it by hanging it in air at a temperature not exceeding 60 °C.

6.6 Assess the effect on the test-control specimen with the grey scale (see clause 8). If the change in colour is not equal to rating 3, the test has not been carried out correctly, and the operations described in 6.1 to 6.5 inclusive should be repeated with fresh composite specimens and a fresh composite test-control specimen.

6.7 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 undyed fibre used.

8 NOTE

Test control. A well wetted-out specimen of wool cloth is entered at 40 °C into a dye-bath containing 1 % CI Acid Blue 37 (Colour Index, 3rd Edition), 10 % sodium sulphate decahydrate ($Na_2SO_4.10H_2O$) and 3 % sulphuric acid (relative density 1,84), all percentages being calculated on the mass of the specimen, at a liquor ratio of 40 : 1.

The dye-bath is raised to the boil in 15 min and boiled for a further 45 min. The specimen is then removed, rinsed in cold running tap-water and dried.

X04 Colour fastness to mercerizing

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles to the action of concentrated solutions of sodium hydroxide used in mercerizing. It is mainly applicable to cotton and to mixtures containing cotton.

2 PRINCIPLE

2.1 A specimen of the textile in contact with specified adjacent fabric is treated with sodium hydroxide solution, rinsed, acidified, again rinsed and dried. The change in colour of the specimen and the staining of the adjacent fabric are assessed with the grey scales.

2.2 As completely resistant specimens may show an apparent increase in depth of colour, these would not be rated 5 by the normal method of assessment. In such cases, therefore, only the changes in hue and brightness should be assessed using the grey scale, without consideration of the increase in depth, and such assessments should be marked with an asterisk (*). The meaning of the asterisk has to be explained in a foot-note.

Examples

5 * : Increase in depth (not considered); no change in hue and brightness.

3-4 redder * : Increase in depth (not considered); the hue became redder matching grey scale 3-4.

2 bluer, duller * : Increase in depth (not considered); the shade changed in hue and brightness according to grey scale 2.

2.3 Specimens which do not increase in depth shall be assessed in the normal manner and the results shall not be marked with an asterisk.

Example

2 weaker, bluer, duller : Loss in depth (considered) and change in both hue and brightness according to grey scale 2.

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 Cotton adjacent fabric at least 10 cm × 10 cm, for evaluating staining.

4.2 Frame for holding specimen (see clause 8).

4.3 Sodium hydroxide (NaOH) solution, 300 g/l.

4.4 Sulphuric acid solution containing 5 ml of concentrated sulphuric acid (relative density 1,84) per litre.

4.5 Acetic acid solution containing 10 ml of glacial acetic acid per litre.

4.6 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, sew a specimen of it at least 10 cm × 10 cm to an equal sized piece of the adjacent fabric (4.1) around all four sides. Fasten this composite specimen to a frame firmly, but without excessive tension.

5.2 If the textile to be tested is yarn or thread, wind an amount of it equal to the mass of adjacent fabric on a rigid

frame firmly, but without excessive tension, with the strands close together and parallel to provide an area at least 10 cm × 10 cm. Sew an equal sized piece of the adjacent fabric (4.1) to this area along the two sides across the strands.

6 PROCEDURE

6.1 Immerse the composite specimen with the coloured material uppermost in the sodium hydroxide solution (4.3) at 20 ± 2 °C for 5 min. Rinse the composite specimen in the frame by pouring on 1 litre of water at 70 ± 2 °C over a period of 1 min and then rinsing in cold running tap-water for 5 min.

6.2 Remove the composite specimen from the frame and immerse it in the sulphuric acid solution (4.4) or in the acetic acid solution (4.5) for 5 min, at a liquor ratio of 50 : 1. Rinse the specimen in cold running tap-water until neutral.

6.3 Remove the stitching along three sides of the specimen (one side for yarns and threads) and dry it by hanging it in air at a temperature not exceeding 60 °C, taking care that the adjacent fabric and the coloured material are kept apart except at the remaining stitching.

6.4 If the specimen shows increased depth of colour, assess the change in hue and/or brightness only, using the appropriate grey scale (see clause 3). Assess the staining of the adjacent fabric with the appropriate grey scale (see clause 3).

6.5 If the specimen does not show increased depth of colour, assess the change as an overall contrast (see 2.3) and the staining of the adjacent fabric with the grey scales.

7 TEST REPORT

7.1 In the case of assessments in accordance with 6.4, report and mark with an asterisk any changes in hue and/or brightness of the specimen and report the numerical rating for staining of the cotton adjacent fabric.

7.2 In the case of assessments in accordance with 6.5, report the numerical rating for change in colour of the specimen and the numerical rating for staining of the cotton adjacent fabric.

8 NOTE

For the test, a metal frame is suitable which consists of two folding wings which in closed position can be locked by a wing-nut. The two wings have fitting open squares of about 8 cm × 8 cm. All four sides of the frame are corrugated or contain needle bars in order to fix the composite specimen during the treatment. The rigid frame for yarns and threads should be a little larger than the corrugated frame or the needle bar and fits into the metal frame.

X05 Colour fastness to organic solvents

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 organic solvents. If dry-cleaning is involved, use the method in section D01.

2 PRINCIPLE

A specimen of the textile in contact with adjacent fabrics is agitated in the solvent 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 REAGENTS

4.1 Suitable container with means of agitation (see 8.1).

4.2 Specified solvent(s) (see 8.2).

4.3 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 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

4.4 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 sew along all four 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 pieces of adjacent fabric (4.3), the amount of yarn taken being approximately equal to half the combined mass of the adjacent fabrics. Sew along 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 (4.3) to form 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 Agitate the composite specimen continuously for 30 min in the solvent at room temperature, at a liquor ratio

of 40 : 1. If the agitation is by hand, the specimen should be pressed against the container every 2 min with a glass rod (see 8.1), without removing the specimen from the solvent.

6.2 Squeeze excess solvent from the specimen and dry it by hanging it in air at a temperature of 80 ± 2 °C without unstitching. Take the precautions necessary for safety in drying flammable or explosive solvents.

6.3 Remove the stitching, and assess the change in colour of the specimen and the staining of the adjacent fabrics with the grey scales.

7 TEST REPORT

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

8 NOTES

8.1 A 500 ml beaker or other suitable open container may be used for the test, agitation being by hand with a glass rod flattened at one end. A closed vessel agitated by shaking or tumbling in a hand- or motor-driven machine may be used.

8.2 The test should be carried out with the solvent or solvents commonly employed in the country concerned.

X06 Colour fastness to soda boiling

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 boiling dilute sodium carbonate solutions. It is mainly applicable to natural and regenerated cellulose materials.

1.2 Two tests are given : one with and the other without the addition of a reduction inhibitor.

2 PRINCIPLE

A specimen of the textile between specified undyed cloths is rolled around a glass rod and treated with boiling sodium carbonate solution with and without the addition of a reduction inhibitor. The composite specimen is rinsed, the cloths are separated and dried. The change in colour of the specimen and the staining of the undyed cloths 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 Vessel equipped with water-cooled reflux condenser of the finger type to hold a cylindrical specimen 4 cm long in the boiling solution.

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

4.3 Desized undyed cotton fabric measuring 10 cm × 4 cm. (This material is *not* cotton adjacent fabric.)

4.4 Adjacent fabric measuring 10 cm × 4 cm of the type under test (or, if fibre or yarn is being tested, adjacent fabric made from the same kind of fibre).

4.5 Sodium carbonate solution containing 10 g of anhydrous sodium carbonate per litre.

4.6 Sodium carbonate solution containing 10 g of anhydrous sodium carbonate and 4 g of sodium *m*-nitrobenzenesulphonate per litre.

4.7 Test control : dyeings of CI Vat Red 1 (Colour Index, 3rd Edition; see clause 8).

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

5 TEST SPECIMENS

5.1 Two composite specimens, prepared as follows, are required for the tests with and without the addition of a reduction inhibitor.

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

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

5.4 If the textile to be tested is loose fibre, comb and compress an amount approximately equal to half the

combined mass of the undyed cloths (4.3 and 4.4) into a sheet 10 cm × 4 cm. Place the sheet between the two undyed cloths, and sew along all four sides to hold the fibre in place and to form a composite specimen.

5.5 Prepare two composite specimens of the test control (4.7) in the way outlined for fabric in 5.2.

6 PROCEDURE

6.1 Carry out the operations described in 6.2 to 6.4, with each composite specimen and the composite test-control specimen, in parallel, in separate baths.

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

6.3 Treat one composite specimen on the rod by boiling gently under reflux for 1 h in the sodium carbonate solution (4.5), at a liquor ratio of 30 : 1. Treat the other composite specimen in the same way and for the same time in boiling sodium carbonate solution containing sodium *m*-nitrobenzenesulphonate (4.6).

6.4 Remove the composite specimens from the rod immediately, rinse for 10 min in cold running tap-water and separate the undyed cloths from them. Open out the composite specimen and dry it by hanging in air at a temperature not exceeding 60 °C, with the three parts in contact only at the line of stitching.

6.5 Assess the effect on the composite test-control specimens with the grey scales. The ratings of the test-control specimen after boiling with sodium *m*-nitrobenzenesulphonate should be

3-4 weaker, yellower, in respect of change in colour;

5 in respect of staining.

The ratings of the test-control specimen after boiling without sodium *m*-nitrobenzenesulphonate should be

2-3 weaker, yellower, in respect of change in colour;

2-3 in respect of staining.

If the test-control specimens do not yield these values, the test has not been carried out correctly, and the operations described in 6.1 to 6.4 inclusive should be repeated with fresh composite specimens and fresh composite test-control specimens.

6.6 Assess the change in colour of the specimen and the staining of the undyed cotton fabric (4.3) and the adjacent fabric (4.4) with the grey scales.

7 TEST REPORT

Report the numerical ratings for change in colour and the numerical ratings for staining of each kind of undyed cloth tested with sodium carbonate alone and with sodium carbonate and sodium *m*-nitrobenzenesulphonate reduction inhibitor.

When the two pieces of undyed fabric are the same and the two assessments of staining are different, report only the lower.

8 NOTES

Test control

8.1 *Reduction*

CI Vat Red 1 (Colour Index, 3rd Edition) is pasted with 150 times its own mass of water, using an anionic wetting agent at the rate of 3 ml per gram of dye. 40 ml/l of sodium hydroxide and 13 g/l of sodium dithionite are added and the dye is allowed to reduce for 15 min at 80 °C.

8.2 *Dyeing*

The dye-bath is set at a liquor ratio of 25 : 1. To it are added 2 to 3 ml of sodium hydroxide (400 g/l) and 1 g/l of sodium dithionite, followed by the calculated amount of reduced dye. The dyeing is started at 30 °C, and heat is applied for 15 min to bring the temperature to 60 °C. Dyeing is continued at this temperature for 30 min.

The specimen is then oxidized in air, rinsed in cold running tap-water, soaped at the boil, rinsed in distilled water, then in cold running tap-water, and dried.

X07 Colour fastness to cross-dyeing : Wool

1 SCOPE AND FIELD OF APPLICATION

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

2 PRINCIPLE

Specimens of the textile in contact with adjacent fabrics are treated in different types of wool dye-bath, but without any dyestuff. The specimens are then rinsed and dried. The change in colour of the specimen and the staining of 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 Dye vessel equipped with reflux condenser.

4.2 Acetic acid solution (300 g/l).

4.3 Sulphuric acid (relative density 1,84).

4.4 Sodium sulphate decahydrate ($Na_2SO_4.10H_2O$).

4.5 Potassium dichromate ($K_2Cr_2O_7$).

4.6 Ten adjacent fabrics, each measuring 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 following table or as otherwise specified.

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

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

5 TEST SPECIMEN

5.1 Prepare five composite specimens in the manner described.

5.2 If the textile to be tested is fabric, place a specimen 10 cm × 4 cm between the two adjacent fabrics (4.6) and sew along all four sides to form a composite specimen.

5.3 If the textile to be tested is yarn, knit it into fabric and treat it as in 5.2 or form a layer of parallel lengths of it between the two adjacent fabrics (4.6), the amount of yarn taken being approximately equal to half the combined mass of the adjacent fabrics. Sew along all four sides to hold the yarn in place and to form a composite specimen.

5.4 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 (4.6) into a sheet 10 cm × 4 cm. Place the sheet between the two adjacent fabrics, and sew along all four sides to hold the fibre in place and to form a composite specimen.

6 PROCEDURE

6.1 Carry out the operations described in 6.2 to 6.7 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. If no condenser is used, replace the evaporated water.

6.2 Neutral cross-dyeing. Place one composite specimen in a bath containing 20 % sodium sulphate decahydrate. Raise the temperature to 98 ± 2 °C in 30 min, and maintain this temperature for 90 min.

6.3 Acetic acid cross-dyeing. Place one composite specimen in a bath containing 5 % of the acetic acid (300 g/l) solution and 20 % sodium sulphate decahydrate. Raise the temperature to 98 ± 2 °C in 30 min, and maintain this temperature for 90 min.

6.4 Sulphuric acid cross-dyeing. Place one composite specimen in a bath containing 20 % sodium sulphate decahydrate and 4 % sulphuric acid (relative density 1,84). Raise the temperature to 98 ± 2 °C in 30 min, and maintain this temperature for 90 min.

6.5 Acetic acid-chrome cross-dyeing. Place one composite specimen in a bath containing 20 % sodium sulphate decahydrate and 5 % of the acetic acid (300 g/l) solution. Raise the temperature to 98 ± 2 °C in 30 min, and maintain this temperature for 30 min. Add 2 % potassium dichromate ($K_2Cr_2O_7$), and maintain the bath at 98 ± 2 °C for an additional 60 min.

6.6 Sulphuric acid-chrome cross-dyeing. Place one composite specimen in a bath containing 20 % sodium sulphate decahydrate and 5 % of the acetic acid (300 g/l) solution. Raise the temperature to 98 ± 2 °C in 30 min, and maintain this temperature for 30 min. Add 2 % sulphuric acid (relative density 1,84), and maintain the bath at 98 ± 2 °C for an additional 15 min. Add 2 % potassium dichromate ($K_2Cr_2O_7$), and maintain at 98 ± 2 °C for an additional 60 min.

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

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

7 TEST REPORT

Report the method of cross-dyeing used, the numerical ratings for change in colour of the specimen and for staining of each kind of adjacent fabric used.

X08 Colour fastness to degumming

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds, except loose fibre, to the action of soap solutions such as those used in degumming raw silk.

2 PRINCIPLE

A specimen of the textile in contact with adjacent fabric is treated with a soap solution, then rinsed and dried. The change in colour of the specimen and the staining of the adjacent fabric 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 Vessel of capacity 500 ml, with appropriate **reflux condenser.**

4.2 Soap, containing not more than 5 % moisture and complying with the following requirements based on dry mass :

- free alkali, calculated as Na_2CO_3 : 3 g/kg maximum
- free alkali, calculated as NaOH : 1 g/kg maximum
- total fatty matter : 850 g/kg minimum
- titre of mixed fatty acids prepared from soap : 30 °C maximum
- iodine value : 50 maximum

The soap shall be free from fluorescent brightening agents.

4.3 Soap solution, containing 7 g of soap (4.2) per litre of distilled water.

4.4 Sodium carbonate, anhydrous (Na_2CO_3).

4.5 Two adjacent fabrics, 10 cm × 4 cm, one piece made of raw silk, the other made of the same kind of fabric as that of the textile to be tested or that predominating in the case of blends.

4.6 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 (4.5) and sew along all four 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 (4.5), the amount of yarn taken being approximately equal to half the combined mass of the adjacent fabrics. Sew along all four sides to hold the yarn in place and to form a composite specimen.

6 PROCEDURE

6.1 Treat the composite specimen in the vessel (4.1) for 10 min under reflux with a lightly boiling soap solution (4.3). The liquor ratio is 100 : 1.

6.2 After 10 min, add 0,5 g/l of anhydrous sodium carbonate to the boiling soap solution, and keep boiling lightly for 110 min (2 h in all).

6.3 Remove the composite specimen from the soap solution, rinse twice in cold distilled water and then for 10 min in cold running tap-water. Squeeze it thoroughly, 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 the adjacent fabrics.

X09 Colour fastness to formaldehyde

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 formaldehyde vapour, as may be encountered in storehouses where fabrics have been stored with materials which have undergone a crease-resist treatment.

1.2 This method is not suitable for assessing changes in colour which may occur during crease-resist finishing with urea-formaldehyde products, or in subsequent treatment of the dyeing with solutions of formaldehyde.

2 PRINCIPLE

A specimen of the textile is exposed in a closed container to the action of gaseous formaldehyde. 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 REAGENT

4.1 Glass bell, having a capacity of 6 litres.

4.2 Glass frame, for suspending the specimen.

4.3 China dish, of capacity 50 ml.

4.4 Formaldehyde solution (350 g/kg).

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 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 fabric to support the fibre.

6 PROCEDURE

6.1 Fix the specimen to the frame so that it hangs free over the china dish and does not come into direct contact with the formaldehyde solution.

6.2 Place 15 ml of the formaldehyde solution (4.4) in the dish.

6.3 Place the glass bell over the glass frame, the specimen and the china dish.

6.4 Leave the specimen in the formaldehyde-saturated atmosphere at 20 ± 2 °C for 24 h. In tropical countries a temperature of 27 ± 2 °C may be used.

6.5 Remove the specimen and hang it for 24 h in fresh air in a room with indirect light and small changes in relative humidity.

6.6 Assess the change in colour of the specimen with the grey scale.

7 TEST REPORT

Report the numerical rating for change in colour of the specimen.

X10 Assessment to migration of textile colours into polyvinyl chloride coatings

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour in textile fabrics to migration into polyvinyl chloride (PVC) which contains plasticizer.

2 PRINCIPLE

A specimen of a textile impregnated with the plasticizer is brought into contact with a white pigmented polyvinyl chloride foil and kept under pressure at 80 °C. Then the specimen and excess plasticizer are removed from the foil and the staining of the foil 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 REAGENTS

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 80 ± 2 °C.

4.3 Graduated pipette or dropping tube, with which the plasticizer can be applied.

4.4 White pigmented polyvinyl chloride foil, of thickness 0,5 ± 0,1 mm (see 8.3).

4.5 Dioctylphthalate. Other plasticizers or mixtures of plasticizers can also be used.

4.6 Petroleum ether (boiling point below 80 °C).

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

5 TEST SPECIMEN

5.1 Use a fabric specimen measuring 10 cm × 4 cm.

5.2 Cut a piece of the white pigmented polyvinyl chloride foil (4.4) measuring 10 cm × 4 cm.

6 PROCEDURE

6.1 Clean the piece of white PVC foil by wiping with an undyed cloth impregnated with petroleum ether and place it on the glass plate of the test apparatus. Then place the specimen on the foil with the side of the fabric to be tested facing the foil and apply uniformly drop by drop[1] an amount of plasticizer equal to the mass of the specimen. Then cover the composite specimen with another glass plate and subject it to a pressure of 12,5 kPa in the test apparatus. If a weight is used, it must be preheated to the test temperature.

6.2 Place the test apparatus containing the specimen in an oven for 3,5 h at 80 ± 2 °C.

1) In the case of heavy fabrics, care must be taken to have the plasticizer uniformly distributed on the specimen.

6.3 Remove the specimen from the PVC foil. Flush the foil on the glass plate with petroleum ether and allow the latter to evaporate at room temperature.

CAUTION — Petroleum ether is flammable.

6.4 Immediately after drying, assess the staining of the polyvinyl chloride foil by means of the grey scale.

7 TEST REPORT

Report the numerical rating of the staining of the white pigmented polyvinyl chloride foil and the type of plasticizer 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.

Up to 10 specimens can be tested simultaneously, each one separated by a glass plate.

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

8.3 If ready-for-use white pigmented polyvinyl chloride foil cannot be obtained, it may be prepared as follows :

A mixture of

- 65 g of polyvinyl chloride powder,
- 2 g of stabilizer, and
- 5 g of titanium dioxide

is thoroughly stirred with 35 g of dioctylphthalate.

The homogenized paste is poured onto a glass plate to a thickness of 0,5 ± 0,1 mm and the paste allowed to gel for 5 min at 170 °C.

X11 Colour fastness to hot pressing

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 ironing and to processing on hot cylinders.

1.2 Tests are given for hot pressing when the textile is dry, when it is wet and when it is damp. The end-use of the textile usually determines which test should be made.

2 PRINCIPLE

2.1 Dry pressing. The dry specimen is pressed with a heating device of specified temperature and pressure, for a specified time.

2.2 Damp pressing. The dry specimen is covered with a wet cotton adjacent fabric and pressed with a heating device of specified temperature and pressure for a specified time.

2.3 Wet pressing. The upper surface of the wet specimen is covered with a wet cotton adjacent fabric and pressed with a heating device of specified temperature and pressure for a specified time.

2.4 The change in colour and the staining of the adjacent fabrics are assessed with the grey scales immediately and again after a period of exposure to air.

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.*

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

4 APPARATUS

4.1 Heating device consisting of a pair of smooth and parallel plates, equipped with an electrical heating system which is accurately controllable and giving a pressure on the specimen of 4 ± 1 kPa (see 8.4). Heat should be transferred to the specimen from the upper side only; if the lower plate is equipped with a heating system which cannot be turned off, the asbestos sheet (4.2) acts as a heat shield (see 8.3).

4.2 Smooth asbestos sheet of thickness 3 to 6 mm(see 8.2 and 8.3).

4.3 Wool flannel of mass per unit area approximately 260 g/m^2.

Two layers of this material are used to make a pad of thickness approximately 3 mm. Similar smooth wool fabrics or felt can be used to give a pad of thickness approximately 3 mm.

4.4 Undyed, bleached and unmercerized cotton cloth, of mass per unit area 100 to 130 g/m^2 and with a smooth surface.

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

4.6 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, use a specimen 10 cm × 4 cm.

5.2 If the textile to be tested is yarn, knit it into fabric and use a piece 10 cm × 4 cm or wind it closely round a piece of thin inert material measuring 10 cm × 4 cm to form a layer having only the thickness of the yarn.

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 the sheet on a piece of cotton adjacent fabric to support the fibre.

6 PROCEDURE

6.1 The following temperatures are used (see 8.1) :

110 ± 2 °C
150 ± 2 °C
200 ± 2 °C

When necessary, other temperatures may be used, provided that they are specially noted in the test report.

6.2 Specimens of materials that have been subjected to any heat or drying treatment must be allowed to condition in the standard temperate atmosphere for testing (see clause 3), i.e. 65 ± 2 % relative humidity and a temperature of 20 ± 2 °C, before they are tested.

6.3 The bottom plate of the heating device is covered with asbestos sheeting (4.2), wool flannel (4.3) and dry, undyed cotton cloth (4.4), whether it is heated or not (see also 8.3 and 8.4).

6.4 Dry pressing. Place the dry specimen on top of the cotton cloth covering the wool flannel padding (see 6.3). Lower the top plate of the heating device and leave the specimen for 15 s at the specified pressing temperature.

6.5 Damp pressing. Place the dry specimen on top of the cotton cloth covering the wool flannel padding (see 6.3). Soak a piece of cotton adjacent fabric measuring 10 cm × 4 cm in distilled water, and squeeze or extract it to contain its own mass of water. Place the wet fabric on top of the dry specimen. Lower the top plate of the heating device and leave the specimen for 15 s at the specified pressing temperature.

6.6 Wet pressing. Soak the specimen and a piece of cotton adjacent fabric 10 cm × 4 cm (4.5) in distilled water and squeeze or extract them to contain their own mass of water. Place the wet specimen on top of the dry cotton cloth covering the wool flannel pad (see 6.3) and place the wet, adjacent fabric on the specimen. Lower the top plate of the heating device and leave the specimen for 15 s at the specified pressing temperature.

6.7 Assess the change in colour of the specimen with the appropriate grey scale immediately and again after the specimen has been allowed to condition for 4 h in the standard atmosphere for testing textiles.

6.8 Assess the staining of the cotton adjacent fabric with the appropriate grey scale. Use the more heavily stained side of the cotton adjacent fabric for the assessment.

7 TEST REPORT

Report the test procedure (dry, damp or wet) and the temperature of the heating device. Report the numerical rating for change in colour immediately after testing and after conditioning for 4 h in the standard atmosphere for testing textiles. Report the numerical rating for the staining of the cotton adjacent fabric.

8 NOTES

8.1 The choice of pressing temperature used depends to a large extent on the type of fibre and on the construction of the fabric or garment. In the case of blends it is further suggested to use the temperature appropriate to the fibre with the lowest heat resistance. The indicated temperatures cover three commonly used pressing conditions.

8.2 The heating device may be the same as that used in the test for colour fastness to dry heat (excluding pressing) (see clause 8 of section P01), and a suitable insulating material must be used whether the bottom plate is heated or not, to minimize heat transfer to or from the bottom of the test assembly (see 4.2 and 8.3).

8.3 The asbestos sheet used for insulation should be smooth and not warped. It is best to complete the specimen assembly on the asbestos sheet before placing it on the heating device. The asbestos should be cooled and the wet wool should be dried between tests.

8.4 In order to obtain the pressure per unit area (4 ± 1 kPa) the total area of the wool flannel padding should bear a suitable relationship to the mass of the plate pressing down on the padding. If the fabric to be tested has an appreciable thickness, it is necessary either to increase the area of the test specimen, or to augment the pressure-bearing surface using a suitable template made from the same material as the test specimen. If the plates of the heating device are smaller than the specimen size, the pressure depends on the design of the apparatus (ratio of mass to area of top plate).

8.5 If a heating device is not available, a household iron may be used, but its temperature should be measured with a surface pyrometer or with temperature-sensitive papers. The iron should be weighted so that its area and total mass are in the appropriate ratio to exert a pressure of 4 ± 1 kPa. However, due to temperature fluctuation during on-off differences over the iron surface, the accuracy and reproducibility are limited. When a hand iron is used, this fact must be stated in the test report.

8.6 Under normal gravitational conditions, the area over which the mass of the heating-plate should be distributed can be calculated in square centimetres by multiplying the mass in kilograms of the heating-plate by the factor 24,525. If the area of the heating-plate is less than that of the specimen, the required mass is calculated in kilograms by dividing the plate area (expressed in square centimetres) by the same factor. For composite specimens 10 cm × 4 cm, the mass of the heating-plate assembly should be between 1,25 and 2,00 kg.

X12 Colour fastness to rubbing

1 Scope and field of application

1.1 This method is intended for determining the resistance of the colour of textiles of all kinds, including textile floor coverings and other pile fabrics, to rubbing off and staining other materials.

1.2 The method is applicable to a laid textile floor covering or to a detached sample or yarns.

1.3 Two tests are made, one with a dry rubbing cloth and one with a wet rubbing cloth.

2 Principle

Specimens of the textile are rubbed with dry rubbing cloth and with wet rubbing cloth. Two alternative sizes of rubbing finger are specified, one for pile fabrics (see 8.1) and one for other textiles. The staining of the rubbing cloths 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

4.1 Suitable testing device, for determining the colour fastness to rubbing. Such a device has one of two alternative sizes of rubbing finger, dependent on the type of textile to be tested, as follows:

4.1.1 For pile fabrics, including textile floor coverings:

A rubbing finger of 3,2 cm diameter and flat area of 2,5 cm diameter with a circular transition of 0,32 cm radius (see the figure and 8.2).

The rubbing finger exerts a downward force of 22 N, moving to and fro in a straight line along a 10 cm track.

4.1.2 For all other textiles:

A rubbing finger comprising a cylinder of 1,6 cm diameter moving to and fro in a straight line along a 10 cm track on the specimen with downward force of 9 N (see 8.2).

4.2 Rubbing cotton cloth, desized, bleached, without finish, cut into squares 5 cm × 5 cm.

4.3 Grating, of stainless steel wire of 1 mm diameter and a width of mesh of about 20 mm.

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

5 Test specimen

5.1 If the textile to be tested is a fabric or textile floor covering, two pieces not less than 14 cm × 5 cm are required for dry rubbing and two for wet rubbing. One specimen of each pair has the long direction parallel to the warp yarns (or in the direction of manufacture), the other parallel to the weft or filling yarns (or at right angles to the direction of manufacture).

5.2 If the textile to be tested is yarn or thread, knit it into fabric to provide specimens at least 14 cm × 5 cm, or form a layer of parallel strands by wrapping it lengthways on a cardboard rectangle of suitable dimensions.

6 Procedure

6.1 Fasten each test specimen by means of clamps to the baseboard of the testing device so that the long direction of the specimen follows the track of the device. Test the specimens prepared as in clause 5 according to the procedures in 6.2 and 6.3.

When testing multi-coloured textiles, care should be taken to position the specimens in such a way that all colours of the design are rubbed in the test. Alternatively, if the areas of colour are sufficiently large, more test specimens may be taken and individual colours assessed separately.

It is necessary to eliminate dyed fibres pulled out during rubbing and retained on the surface of the rubbing cotton cloth; consider only the coloration due to staining by the dyestuff.

6.2 Dry rubbing. With the dry rubbing cloth (4.2) flat in place over the end of the finger of the testing device (4.1), rub it to and fro in a straight line along a track 10 cm long on the dry specimen, 10 times to and fro in 10 s, with a downward force on the finger of 22 N or 9 N (see 4.1.1 and 4.1.2).

6.3 Wet rubbing. Repeat the test described in 6.2 with a fresh dry specimen and with a rubbing cloth that has been wetted with water by placing it on the grating (4.3) and dropping evenly on to it its own mass of water, or use any method to ensure a take up of about 100 %. After rubbing, dry the cloth at room temperature.

6.4 Assess the staining of the rubbing cotton cloths with the grey scale.

7 Test report

Report the numerical rating for dry staining and for wet staining for each direction of manufacture.

8 Notes

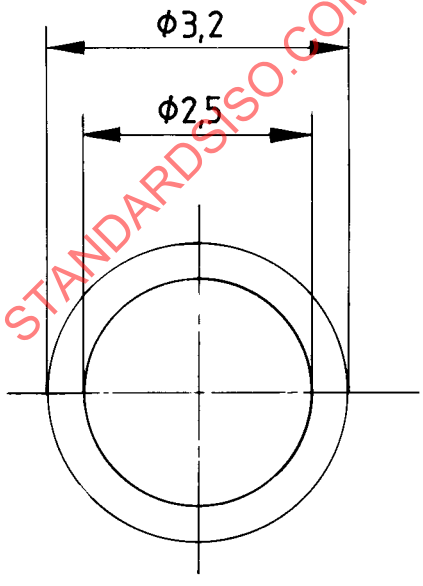
8.1 Difficulty may be experienced in making assessments of the degree of staining on the rubbing cloth when pile fabrics are tested using the 1,6 cm diameter rubbing finger due to heavier staining occurring on the circumference of the stained area, i.e. haloing. The 3,2 cm diameter rubbing finger will eliminate the haloing in many types of pile fabrics.

Even with the use of the larger diameter rubbing finger, difficulty may be experienced in assessing staining when fabrics with high pile are tested.

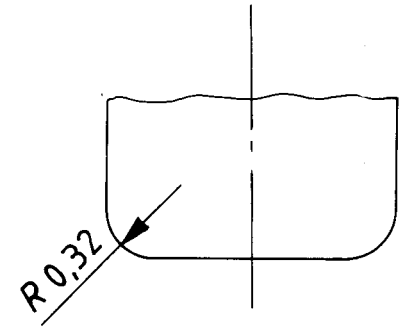
8.2 A suitable apparatus is the Crockmeter, described in the *Technical Manual of the American Association of Textile Chemists and Colorists*, Test Method 8-1972 (Vol. 50, 1974, p. 112). Auto-crockmeter Y5 71B is also suitable and details can be obtained from the China Association for Standardization. Other devices can be used, provided that the same results are obtained as with the apparatus described in 4.1.

A suitable apparatus for testing pile fabrics is described in *J. Soc. Dyers Colourists*, **87** 1971: 155; **88** 1972: 259.

Dimensions in centimetres



Bottom view



Side view

Figure — 3,2 cm radius peg