
International Standard



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**Textiles — Tests for colour fastness —
Part C : Colour fastness to washing and laundering**

Textiles — Essais de solidité des teintures — Partie C : Solidité des teintures au lavage

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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/C was developed by Technical Committee ISO/TC 38, *Textiles*.

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.

Section C06, contained in this second edition of part C of ISO 105, was circulated to the member bodies in December 1979 and completes sections C01-1978, C02-1978, C03-1978, C04-1978 and C05-1978.

This part of ISO 105 cancels and replaces group C of ISO 105-1978.

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Textiles — Tests for colour fastness —

C01 Colour fastness to washing : Test 1¹⁾

1 Scope and field of application

This is Test No. 1 of a series of five washing tests that have been established to investigate the fastness to washing of coloured textiles and which between them cover the range of washing procedures from mild to severe.

NOTE — This method is designed to determine the effect of washing only on the colour fastness of the textile. It is not intended to reflect the result of the comprehensive laundering procedure.

2 Principle

A specimen of the textile in contact with specified adjacent fabrics is mechanically agitated under specified conditions of time and temperature in a soap solution, then rinsed 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 mechanical device (see clause 8) consisting of a water bath containing a rotatable shaft which supports,

radially, glass or stainless steel containers (75 ± 5 mm diameter \times 125 ± 10 mm high) of 550 ± 50 ml capacity, the bottom of the containers being 45 ± 10 mm from the centre of the shaft. The shaft/container assembly is rotated at a frequency of 40 ± 2 min⁻¹. The temperature of the water bath is thermostatically controlled to maintain the test solution at the prescribed temperature ± 2 °C.

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

- free alkali, calculated as Na₂CO₃ : 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 entirely free from fluorescent brightening agents.

4.3 Soap solution, containing 5 g of soap (4.2) per litre of distilled water.

4.4 Two adjacent fabrics, each measuring 10 cm \times 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 following table or, in the case of blends, of the kind of fibre second in order of predominance, or as otherwise specified.

1) This test superseded ISO Recommendation R 105/1, *Tests for colour fastness of textiles (First series) — Part 21 : "Colour fastness to washing — Hand washing"*.

If first piece is :	Second piece to be :
cotton	wool
wool	cotton
silk	cotton
linen	cotton
viscose	wool
acetate	viscose
polyamide	wool or viscose
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 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 (4.4), 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 (4.4) into a sheet 10 cm × 4 cm. Place the sheet between the two adjacent fabrics and sew along all four sides to hold the fibre in place and to form a composite specimen.

6 Procedure

6.1 Place the composite specimen in the container and add the necessary amount of soap solution (4.3), previously heated to 40 ± 2 °C, to give a liquor ratio of 50 : 1.

6.2 Treat the composite specimen at 40 ± 2 °C for 30 min.

6.3 Remove the composite specimen, rinse it twice in cold distilled water and then in cold running tap water for 10 min and squeeze it. 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 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 :

- Launderometer as described in the *Technical Manual of the American Association of Textile Chemists and Colorists* (AATCC), Test Method 61;
- Linitest, as described in *Melliands Textilberichte* **49** (1968), 6, pp. 709-711;
- Wash Wheel sponsored by the Society of Dyers and Colourists.

8.2 Other mechanical devices may be used for this test, provided that the results are identical with those obtained by the apparatus described in 4.1.

Textiles — Tests for colour fastness —

C02 Colour fastness to washing : Test 2

1 Scope and field of application

This is Test No. 2 of a series of five washing tests that have been established to investigate the fastness to washing of coloured textiles and which between them cover the range of washing procedures from mild to severe.

NOTE — This method is designed to determine the effect of washing only on the colour fastness of the textile. It is not intended to reflect the result of the comprehensive laundering procedure.

2 Principle

A specimen of the textile in contact with specified adjacent fabrics is mechanically agitated under specified conditions of time and temperature in a soap solution, then rinsed 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 mechanical device (see clause 8) consisting of a water bath containing a rotatable shaft which supports, radially, glass or stainless steel containers (75 ± 5 mm diameter \times 125 ± 10 mm high) of 550 ± 50 ml capacity, the bottom of the containers being 45 ± 10 mm from the centre of the shaft. The shaft/container assembly is rotated at a frequency of 40 ± 2 min⁻¹. The temperature of the water bath is thermostatically controlled to maintain the test solution at the prescribed temperature ± 2 °C.

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

- free alkali, calculated as Na₂CO₃ : 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 entirely free from fluorescent brightening agents.

4.3 Soap solution, containing 5 g of soap (4.2) per litre of distilled water.

4.4 Two adjacent fabrics each measuring 10 cm \times 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 following table 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	cotton
viscose	wool
acetate	viscose
polyamide	wool or viscose
polyester	wool or cotton
acrylic	wool or cotton

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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 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 (4.4), 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 (4.4) into a sheet 10 cm × 4 cm. Place the sheet between the two adjacent fabrics and sew along all four sides to hold the fibre in place and to form a composite specimen.

6 Procedure

6.1 Place the composite specimen in the container and add the necessary amount of soap solution (4.3), previously heated to 50 ± 2 °C, to give a liquor ratio of 50 : 1.

6.2 Treat the composite specimen at 50 ± 2 °C for 45 min.

6.3 Remove the composite specimen, rinse it twice in cold distilled water and then in cold running tap water for 10 min and squeeze it. 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 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 :

— Launderometer as described in the *Technical Manual of the American Association of Textile Chemists and Colorists* (AATCC), Test Method 61;

— Linitest, as described in *Melliands Textilberichte* 49 (1968), 6, pp. 709-711;

Wash Wheel sponsored by the Society of Dyers and Colourists.

8.2 Other mechanical devices may be used for this test, provided that the results are identical with those obtained by the apparatus described in 4.1.

Textiles — Tests for colour fastness —

C03 Colour fastness to washing : Test 3

1 Scope and field of application

This is Test No. 3 of a series of five washing tests that have been established to investigate the fastness to washing of coloured textiles and which between them cover the range of washing procedures from mild to severe.

NOTE — This method is designed to determine the effect of washing only on the colour fastness of the textile. It is not intended to reflect the result of the comprehensive laundering procedure.

2 Principle

A specimen of the textile in contact with specified adjacent fabrics is mechanically agitated under specified conditions of time and temperature in a solution of soap and sodium carbonate, then rinsed 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 mechanical device (see clause 8) consisting of a water bath containing a rotatable shaft which supports, radially, glass or stainless steel containers (75 ± 5 mm diameter \times 125 ± 10 mm high) of 550 ± 50 ml capacity, the bottom of the containers being 45 ± 10 mm from the centre of the shaft. The shaft/container assembly is rotated at a frequency of 40 ± 2 min⁻¹. The temperature of the water bath is thermostatically controlled to maintain the test solution at the prescribed temperature ± 2 °C.

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

- free alkali, calculated as Na₂CO₃ : 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 entirely free from fluorescent brightening agents.

4.3 Soap solution, containing 5 g of soap (4.2) and 2 g of anhydrous sodium carbonate per litre of distilled water.

4.4 Two adjacent fabrics each measuring 10 cm \times 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 following table 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	cotton
viscose	wool
acetate	viscose
polyamide	wool or viscose
polyester	wool or cotton
acrylic	wool or cotton

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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 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 (4.4), 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 (4.4) into a sheet 10 cm × 4 cm. Place the sheet between the two adjacent fabrics and sew along all four sides to hold the fibre in place and to form a composite specimen.

6 Procedure

6.1 Place the composite specimen in the container and add the necessary amount of soap solution (4.3), previously heated to 60 ± 2 °C, to give a liquor ratio of 50 : 1.

6.2 Treat the composite specimen at 60 ± 2 °C for 30 min.

6.3 Remove the composite specimen, rinse it twice in cold distilled water and then in cold running tap water for 10 min and squeeze it. 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 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 :

— Launderometer as described in the *Technical Manual of the American Association of Textile Chemists and Colorists* (AATCC), Test Method 61;

— Linitest, as described in *Melliands Textilberichte* **49** (1968), 6, pp. 709-711;

— Wash Wheel sponsored by the Society of Dyers and Colourists.

8.2 Other mechanical devices may be used for this test, provided that the results are identical with those obtained by the apparatus described in 4.1.

Textiles — Tests for colour fastness —

C04 Colour fastness to washing : Test 4

1 Scope and field of application

This is Test No. 4 of a series of five washing tests that have been established to investigate the fastness to washing of coloured textiles and which between them cover the range of washing procedures from mild to severe.

NOTE — This method is designed to determine the effect of washing only on the colour fastness of the textile. It is not intended to reflect the result of the comprehensive laundering procedure.

2 Principle

A specimen of the textile in contact with specified adjacent fabrics is mechanically agitated under specified conditions of time and temperature in a solution of soap and sodium carbonate, then rinsed 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 mechanical device (see clause 8) consisting of a water bath containing a rotatable shaft which supports, radially, glass or stainless steel containers (75 ± 5 mm diameter \times 125 ± 10 mm high) of 550 ± 50 ml capacity, the bottom of the containers being 45 ± 10 mm from the centre of the shaft. The shaft/container assembly is rotated at a frequency of 40 ± 2 min⁻¹. The temperature of the water bath is thermostatically controlled to maintain the test solution at the prescribed temperature ± 2 °C.

4.2 Non-corrodible (stainless) steel balls, approximately 0,6 cm in diameter.

4.3 Soap, containing not more than 5 % moisture and complying with the following requirements based upon dry mass.

- free alkali, calculated as Na₂CO₃ : 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 entirely free from fluorescent brightening agents.

4.4 Soap solution, containing 5 g of soap (4.3) and 2 g of anhydrous sodium carbonate per litre of distilled water.

4.5 Two adjacent fabrics each measuring 10 cm \times 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 following table 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	viscose
silk	cotton
linen	cotton or viscose
viscose	cotton
triacetate	viscose
polyamide	cotton or viscose
polyester	cotton or viscose
acrylic	cotton or viscose

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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.

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 fibre in place and to form a composite specimen.

6 Procedure

6.1 Place the composite specimen in the container together with ten non-corrodible (stainless) steel balls (4.2) and add the necessary amount of soap solution (4.4), previously heated to 95 ± 2 °C, to give a liquor ratio of 50 : 1.

6.2 Treat the composite specimen at 95 ± 2 °C for 30 min.

6.3 Remove the composite specimen, rinse it twice in cold distilled water and then in cold running tap water for 10 min and squeeze it. 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 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 :

— Launderometer as described in the *Technical Manual of the American Association of Textile Chemists and Colorists* (AATCC), Test Method 61;

— Linitest, as described in *Melliands Textilberichte* **49** (1968), 6, pp. 709-711;

— Wash Wheel sponsored by the Society of Dyers and Colourists.

8.2 Other mechanical devices may be used for this test, provided that the results are identical with those obtained by the apparatus described in 4.1.

Textiles — Tests for colour fastness —

C05 Colour fastness to washing : Test 5

1 Scope and field of application

This is Test No. 5 of a series of five washing tests that have been established to investigate the fastness to washing of coloured textiles and which between them cover the range of washing procedures from mild to severe.

NOTE — This method is designed to determine the effect of washing only on the colour fastness of the textile. It is not intended to reflect the result of the comprehensive laundering procedure.

2 Principle

A specimen of the textile in contact with specified adjacent fabrics is mechanically agitated under specified conditions of time and temperature in a solution of soap and sodium carbonate, then rinsed 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 mechanical device (see clause 8) consisting of a water bath containing a rotatable shaft which supports, radially, glass or stainless steel containers (75 ± 5 mm diameter \times 125 ± 10 mm high) of 550 ± 50 ml capacity, the bottom of the containers being 45 ± 10 mm from the centre of the shaft. The shaft/container assembly is rotated at a frequency of 40 ± 2 min⁻¹. The temperature of the water bath is thermostatically controlled to maintain the test solution at the prescribed temperature ± 2 °C.

4.2 Non-corrodible (stainless) steel balls, approximately 0,6 cm in diameter.

4.3 Soap, containing not more than 5 % moisture and complying with the following requirements based upon 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 entirely free from fluorescent brightening agents.

4.4 Soap solution, containing 5 g of soap (4.3) and 2 g of anhydrous sodium carbonate per litre of distilled water.

4.5 Two adjacent fabrics each measuring 10 cm \times 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 following table 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	viscose
linen	cotton or viscose
viscose	cotton
polyamide	cotton or viscose
polyester	cotton or viscose
acrylic	cotton or viscose

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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.

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 fibre in place and to form a composite specimen.

6 Procedure

6.1 Place the composite specimen in the container together with ten non-corrodible (stainless) steel balls (4.2) and add the necessary amount of soap solution (4.4), previously heated to 95 ± 2 °C, to give a liquor ratio of 50 : 1.

6.2 Treat the composite specimen at 95 ± 2 °C for 4 h.

6.3 Remove the composite specimen, rinse it twice in cold distilled water and then in cold running tap water for 10 min and squeeze it. 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 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 :

— Launderometer as described in the *Technical Manual of the American Association of Textile Chemists and Colorists* (AATCC), Test Method 61;

— Linitest, as described in *Melliands Textilberichte* **49** (1968), 6, pp. 709-711;

Wash Wheel sponsored by the Society of Dyers and Colourists.

8.2 Other mechanical devices may be used for this test, provided that the results are identical with those obtained by the apparatus described in 4.1.

Textiles — Tests for colour fastness —

C06 Colour fastness to domestic and commercial laundering

0 Introduction

This section is intended to reflect the effect of comprehensive laundering by either domestic or commercial procedures, as distinct from the washing methods given in ISO 105, Sections C01 to C05.

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

Section A03, *Grey scale for assessing staining.*

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 domestic laundering procedures. The tests also reflect the effect of commercial laundering procedures, which are used for normal household articles. Industrial and hospital articles may be subjected to special laundering procedures which are more severe in some respects.

1.2 The colour loss and staining resulting from desorption and/or abrasive action in the "single test" closely approximate to one commercial or domestic laundering. The results of multiple launderings are approximated by the "multiple test". [See 6.1.1 a) and b).]

2 Principle

A specimen of the textile in contact with specified adjacent fabric or fabrics is laundered, rinsed and dried. Specimens are laundered under appropriate conditions of temperature, alkalinity, bleaching and abrasive action such that the result is obtained in a conveniently short time. The abrasive action is accomplished by the use of throw, slide, and impact, together with the use of a low liquor ratio and an appropriate number of steel balls. The change in colour of the specimen and the staining of the adjacent fabric or fabrics are assessed with the grey scales.

3 References

ISO 105 :

Section A01, *General principles of testing.*

4 Apparatus and reagents

4.1 Suitable mechanical device (see 8.1), consisting of a water bath containing a rotatable shaft which supports, radially, stainless steel containers 75 ± 5 mm diameter \times 125 ± 10 mm high of capacity 550 ± 50 ml, the bottom of the containers being 45 ± 10 mm from the centre of the shaft. The shaft/container assembly is rotated at a frequency of 40 ± 2 min⁻¹. The temperature of the water bath is thermostatically controlled to maintain the test solution at a prescribed temperature ± 2 °C.

4.2 Non-corrodible (stainless) steel balls, approximately 0,6 cm in diameter.

4.3 Adjacent fabrics

Either :

4.3.1 A standard multi-fibre fabric

Or :

4.3.2 Two specified standard single fibre fabrics, each measuring 10 cm \times 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 following table or, in the case of blends, of the kind of fibre second in order of predominance, or as otherwise specified.

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Table 1

If first piece is	Second piece to be	
	For tests A and B	For tests C to E
cotton	wool	viscose
wool	cotton	—
silk	cotton	—
linen	cotton	viscose
viscose	wool	cotton
acetate and triacetate	viscose	viscose
polyamide	wool or viscose	viscose or cotton
polyester	wool or cotton	viscose or cotton
acrylic	wool or cotton	viscose or cotton

4.3.3 If required, a **standard non-dyeable fabric** (for example polypropylene).

4.4 **Detergent**, without optical brightener (see 8.2).

4.5 If required, **sodium carbonate** anhydrous (Na_2CO_3).

4.6 **Sodium or lithium hypochlorite** (see 8.3).

4.7 **Distilled water** (see 8.4).

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

4.9 If required, **sodium perborate** tetrahydrate ($\text{NaBO}_3 \cdot 4\text{H}_2\text{O}$).

4.10 If required for pressing treatment, **flat-iron**, of mass not exceeding 2,5 kg and capable of giving the temperature indicated in 6.1.5 b).

4.11 If required for souring treatment, **acetic acid**, solution containing 0,2 g of glacial acetic acid per litre.

5 Test specimen

5.1 If the textile to be tested is fabric, either

a) attach a specimen 10 cm × 4 cm to a piece of the standard multi-fibre fabric (see 8.5), also 10 cm × 4 cm, by sewing along one of the shorter edges, with the multi-fibre fabric next to the face side of the specimen, or

b) attach by sewing one piece each of the two single fibre fabrics (4.3.2) to one end, and on either side of the specimen, all 3 pieces measuring 10 cm × 4 cm.

5.2 Where yarns or loose fibre are to be tested, take a mass of the yarn or loose fibre approximately equal to one half of the combined mass of the adjacent fabrics, and either

a) place it between a 10 cm × 4 cm piece of the standard multi-fibre fabric (see 8.5) and a 10 cm × 4 cm piece of the

standard non-dyeable fabric (4.3.3) and sew them along all four sides (see sub-clause 8.5 of Section A01), or

b) place it between 10 cm × 4 cm pieces of the two specified standard single fibre fabrics (4.3.2), and sew them along all four sides.

6 Procedures (see table 2 for test conditions)

Table 2

Test No.	Temperature °C	Liquor volume ml	Available chlorine %	Sodium perborate g/l	Steel balls	
					single test	multiple test
A1	40	150	none	none	0	10
A2	40	150	none	none	0	10
B1	50	150	none	none	0	50
B2	50	150	none	1	0	50
C1	60	50	none	none	25	50
C2	60	50	none	1	25	50
D1	70	50	none	none	25	100
D2	70	50	none	1	25	100
D3	70	50	0,015	none	25	100
E1	95	50	none	none	25	100
E2	95	50	none	1	25	100

6.1 Test A1

6.1.1 Dissolve 4 g of detergent (4.4) per litre of distilled water, preparing a minimum volume of 1 litre (see 8.6). Heat this solution to 40 ± 2 °C and place 150 ml of it in each container. Proceed according to a) or b) below, depending on whether the "single test" or "multiple test" is required.

a) "Single test". Place one composite specimen in each container, clamp the lids, and run the machine for 30 min.

b) "Multiple test". Place one composite specimen and 10 steel balls in each container, clamp the lids, and run the machine for 45 min.

6.1.2 Stop the machine, remove the containers and empty them of their content. Rinse each composite specimen twice for periods of 1 min in separate 100 ml portions of water at 40 °C.

6.1.3 In countries where the practice is to sour at the end of the washing operation the following optional operation may be conducted.

Treat each composite specimen in a 100 ml portion of the acetic acid solution (4.11) for 1 min at 30 °C. Then rinse each composite specimen in a 100 ml portion of water for 1 min at 30 °C.

6.1.4 Extract the excess water from the composite specimen.

6.1.5 Dry the specimen by one of the following procedures :

a) by hanging it in air at a temperature not exceeding 60 °C, with the two or three parts in contact only at the line of stitching, or

b) in countries where the practice is to dry fabrics by pressing, each specimen may be dried by pressing it with the flat-iron (4.10) at the temperature appropriate to the fabric under test, but in no case at a temperature above 150 °C, with the adjacent fabric uppermost and in contact with the face side of the specimen.

6.1.6 Assess the change in colour of the specimen and the staining of the adjacent fabric using the grey scales.

6.2 Test A2

6.2.1 Dissolve 4 g of detergent (4.4) per litre of distilled water, preparing a minimum volume of 1 litre (see 8.6). Add 1 g of sodium perborate (4.9) per litre of solution and heat it to 40 ± 2 °C. Place 150 ml of the solution in each container. Proceed according to a) or b) below, depending on whether the "single test" or "multiple test" is required.

a) "Single test". Place one composite specimen in each container, clamp the lids, and run the machine for 30 min.

b) "Multiple test". Place one composite specimen and 10 steel balls in each container, clamp the lids, and run the machine for 45 min.

6.2.2 Stop the machine, remove the containers and empty them of their content. Rinse each composite specimen twice for periods of 1 min in separate 100 ml portions of water at 40 °C.

6.2.3 In countries where the practice is to sour at the end of the washing operation the following optional operation may be conducted.

Treat each composite specimen in a 100 ml portion of the acetic acid solution (4.11) for 1 min at 30 °C. Then rinse each composite specimen in a 100 ml portion of water for 1 min at 30 °C.

6.2.4 Extract the excess water from the composite specimen.

6.2.5 Dry the specimen by one of the following procedures :

a) by hanging it in air at a temperature not exceeding 60 °C, with the two or three parts in contact only at the line of stitching, or

b) in countries where the practice is to dry fabrics by pressing, each specimen may be dried by pressing it with the flat-iron (4.10) at the temperature appropriate to the fabric under test, but in no case at a temperature above 150 °C, with the adjacent fabric uppermost and in contact with the face side of the specimen.

6.2.6 Assess the change in colour of the specimen and the staining of the adjacent fabric using the grey scales.

6.3 Test B1

6.3.1 Dissolve 4 g of detergent (4.4) per litre of distilled water, preparing a minimum volume of 1 litre (see 8.6). Heat this solu-

tion to 50 ± 2 °C and place 150 ml of it in each container. Proceed according to a) or b) below, depending on whether the "single test" or "multiple test" is required.

a) "Single test". Place one composite specimen in each container, clamp the lids, and run the machine for 30 min.

b) "Multiple test". Place one composite specimen and 50 steel balls in each container, clamp the lids, and run the machine for 45 min.

6.3.2 Stop the machine, remove the containers and empty them of their content. Rinse each composite specimen twice for periods of 1 min in separate 100 ml portions of water at 40 °C.

6.3.3 In countries where the practice is to sour at the end of the washing operation the following optional operation may be conducted.

Treat each composite specimen in a 100 ml portion of the acetic acid solution (4.11) for 1 min at 30 °C. Then rinse each composite specimen in a 100 ml portion of water for 1 min at 30 °C.

6.3.4 Extract the excess water from the composite specimen.

6.3.5 Dry the specimen by one of the following procedures :

a) by hanging it in air at a temperature not exceeding 60 °C, with the two or three parts in contact only at the line of stitching, or

b) in countries where the practice is to dry fabrics by pressing, each specimen may be dried by pressing it with the flat-iron (4.10) at the temperature appropriate to the fabric under test, but in no case at a temperature above 150 °C, with the adjacent fabric uppermost and in contact with the face side of the specimen.

6.3.6 Assess the change in colour of the specimen and the staining of the adjacent fabric using the grey scales.

6.4 Test B2

6.4.1 Dissolve 4 g of detergent (4.4) per litre of distilled water, preparing a minimum volume of 1 litre (see 8.6). Add 1 g of sodium perborate (4.9) per litre of solution and heat it to 50 ± 2 °C. Place 150 ml of the solution in each container. Proceed according to a) or b) below, depending on whether the "single test" or "multiple test" is required.

a) "Single test". Place one composite specimen in each container, clamp the lids, and run the machine for 30 min.

b) "Multiple test". Place one composite specimen and 50 steel balls in each container, clamp the lids, and run the machine for 45 min.

6.4.2 Stop the machine, remove the containers and empty them of their content. Rinse each composite specimen twice for periods of 1 min in separate 100 ml portions of water at 40 °C.

6.4.3 In countries where the practice is to sour at the end of the washing operation the following optional operation may be conducted.

Treat each composite specimen in a 100 ml portion of the acetic acid solution (4.11) for 1 min at 30 °C. Then rinse each composite specimen in a 100 ml portion of water for 1 min at 30 °C.

6.4.4 Extract the excess water from the composite specimen.

6.4.5 Dry the specimen by one of the following procedures :

a) by hanging it in air at a temperature not exceeding 60 °C, with the two or three parts in contact only at the line of stitching, or

b) in countries where the practice is to dry fabrics by pressing, each specimen may be dried by pressing it with the flat-iron (4.10) at the temperature appropriate to the fabric under test, but in no case at a temperature above 150 °C, with the adjacent fabric uppermost and in contact with the face side of the specimen.

6.4.6 Assess the change in colour of the specimen and the staining of the adjacent fabric using the grey scales.

6.5 Test C1

6.5.1 Dissolve 4 g of detergent (4.4) per litre of distilled water, preparing a minimum volume of 1 litre (see 8.6). Adjust the pH to $10,5 \pm 0,1$ by adding sodium carbonate (4.5). 1 g of sodium carbonate per litre of solution is the amount which gives this value. Heat this solution to 60 ± 2 °C and place 50 ml of it in each container. Proceed according to a) or b) below, depending on whether the "single test" or "multiple test" is required.

a) "Single test". Place one composite specimen and 25 steel balls in each container, clamp the lids, and run the machine for 30 min.

b) "Multiple test". Place one composite specimen and 50 steel balls in each container, clamp the lids, and run the machine for 45 min.

6.5.2 Stop the machine, remove the containers and empty them of their content. Rinse each composite specimen twice for periods of 1 min in separate 100 ml portions of water at 40 °C.

6.5.3 In countries where the practice is to sour at the end of the washing operation the following optional operation may be conducted.

Treat each composite specimen in a 100 ml portion of the acetic acid solution (4.11) for 1 min at 30 °C. Then rinse each composite specimen in a 100 ml portion of water for 1 min at 30 °C.

6.5.4 Extract the excess water from the composite specimen.

6.5.5 Dry the specimen by one of the following procedures :

a) by hanging it in air at a temperature not exceeding 60 °C, with the two or three parts in contact only at the line of stitching, or

b) in countries where the practice is to dry fabrics by pressing, each specimen may be dried by pressing it with the flat-iron (4.10) at the temperature appropriate to the fabric under test, but in no case at a temperature above 150 °C, with the adjacent fabric uppermost and in contact with the face side of the specimen.

6.5.6 Assess the change in colour of the specimen and the staining of the adjacent fabric using the grey scales.

6.6 Test C2

6.6.1 Dissolve 4 g of detergent (4.4) per litre of distilled water, preparing a minimum volume of 1 litre (see 8.6). Adjust the pH to $10,5 \pm 0,1$ by adding sodium carbonate (4.5). 1 g of sodium carbonate per litre of solution is the amount which gives this value. Add 1 g of sodium perborate (4.9) per litre of solution and heat it to 60 ± 2 °C. To prevent possible loss of oxidant, prepare the washing solution containing sodium perborate at the time of use, and pre-heat it to a maximum temperature of 60 °C for not more than 30 min. Place 50 ml of the solution in each container. Proceed according to a) or b) below, depending on whether the "single test" or "multiple test" is required.

a) "Single test". Place one composite specimen and 25 steel balls in each container, clamp the lids, and run the machine for 30 min.

b) "Multiple test". Place one composite specimen and 50 steel balls in each container, clamp the lids, and run the machine for 45 min.

6.6.2 Stop the machine, remove the containers and empty them of their content. Rinse each composite specimen twice for periods of 1 min in separate 100 ml portions of water at 40 °C.

6.6.3 In countries where the practice is to sour at the end of the washing operation the following optional operation may be conducted.

Treat each composite specimen in a 100 ml portion of the acetic acid solution (4.11) for 1 min at 30 °C. Then rinse each composite specimen in a 100 ml portion of water for 1 min at 30 °C.

6.6.4 Extract the excess water from the composite specimen.

6.6.5 Dry the specimen by one of the following procedures :

a) by hanging it in air at a temperature not exceeding 60 °C, with the two or three parts in contact only at the line of stitching, or

b) in countries where the practice is to dry fabrics by pressing, each specimen may be dried by pressing it with the flat-iron (4.10) at the temperature appropriate to the fabric under test, but in no case at a temperature above 150 °C, with the adjacent fabric uppermost and in contact with the face side of the specimen.

6.6.6 Assess the change in colour of the specimen and the staining of the adjacent fabric using the grey scales.