
International Standard



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Textiles — Tests for colour fastness — Part N: Colour fastness to bleaching agencies

Textiles — Essais de solidité des teintures — Partie N: Solidité des teintures aux agents de blanchiment

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

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

This part of ISO 105 cancels and replaces group N of ISO 105-1978, originally published as parts 6, 7 and 20 of ISO Recommendation R 105/I-1959, and parts 7 and 8 of ISO Recommendation R 105/II-1963.

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.

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Textiles — Tests for colour fastness

N01 Colour fastness to bleaching : Hypochlorite

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds and in all forms to the action of bleaching baths containing sodium, calcium or lithium hypochlorite in concentrations normally used in commercial bleaching. It is applicable mainly to natural and regenerated cellulose materials.

2 PRINCIPLE

A specimen of the textile is agitated in a solution of sodium or lithium hypochlorite, rinsed in water, agitated in a hydrogen peroxide solution or sodium bisulphite solution, rinsed and dried. The change in colour 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*.

Section C01, *Colour fastness to washing* : Test 1.

4 APPARATUS AND REAGENTS

4.1 Glass or glazed porcelain container which can be closed, for specimen and bleaching solution.

4.2 Either :

Sodium hypochlorite (NaOCl) solution containing 2,0 g of available chlorine per litre, buffered at $\text{pH } 11,0 \pm 0,2$ with 10 g of anhydrous sodium carbonate (Na_2CO_3) per litre, at the temperature $20 \pm 2^\circ\text{C}$.

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 0,2 g of available chlorine per litre, buffered at $\text{pH } 11,0 \pm 0,2$ with 10 g of anhydrous sodium carbonate (Na_2CO_3) per litre, at the temperature $20 \pm 2^\circ\text{C}$.

To prepare this reagent, use solid lithium hypochlorite, which contains approximately 300 g of LiOCl per kilogram. About 10 g of solid lithium hypochlorite dissolved in 1 litre of distilled water yields a solution of the prescribed concentration of 2,0 g of available chlorine per litre.

4.3 Hydrogen peroxide solution containing 2,5 ml of hydrogen peroxide [30 % (m/m) H_2O_2] per litre, or a solution containing 5 g of **sodium bisulphite** (NaHSO_3) per litre.

4.4 Soap solution, containing 5 g of soap per litre (see sub-clause 4.3 of section C01) for wetting out water-repellent fabrics.

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 $\times$ 4 cm.

5.2 If the textile to be tested is yarn, knit it into fabric and use a specimen 10 cm $\times$ 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 $\times$ 4 cm; in order to support the fibres, sew the sheet on a piece of cloth which will not affect the action of the hypochlorite on the specimen.

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6 PROCEDURE

6.1 If the textile to be tested has a water-repellent finish, wet out the specimen thoroughly in the soap solution (4.4) at 25 to 30 °C. Drain the specimen of excess liquor so that it retains approximately its dry mass of wetting-out solution and immediately place the specimen in an open form in the sodium or lithium hypochlorite solution (4.2) at 20 ± 2 °C at a liquor ratio of 50 : 1.

6.2 If the textile to be tested has no water-repellent finish, wet out the specimen in distilled water at room temperature, remove the excess water and place the test specimen in an open form in the sodium or lithium hypochlorite solution (4.2) at 20 ± 2 °C at a liquor ratio of 50 : 1.

6.3 Close the container and keep the specimen in the solution at 20 ± 2 °C for 60 min. Avoid exposure to direct sunlight.

6.4 Rinse the specimen thoroughly in cold running

tap-water, and then stir it for 10 min in one of the solutions specified in 4.3, at room temperature.

6.5 Rinse the specimen thoroughly in cold running tap-water, remove the excess water and dry the specimen by hanging it in air at a temperature not exceeding 60 °C.

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.

8 NOTE

The concentration of active chlorine has to be determined before each test or test series.

Textiles — Tests for colour fastness

N02 Colour fastness to bleaching : Peroxide

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles of all kinds, and in all forms, to the action of bleaching baths containing peroxide in concentrations commonly used in textile processing.

2 PRINCIPLE

A specimen of the textile in contact with adjacent fabrics is immersed in the bleaching solution, rinsed and dried. The change in colour and the staining 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 **Test tube**, of diameter and length such that the composite specimen roll will have a reasonably snug fit in the tube and be covered by the bleaching solution.

4.2 **Reflux condenser**, fitting the test tube, to reduce evaporation from the bleaching bath during the test.

4.3 **Bleaching bath** of the composition given in the following table.

Starting bath per litre of distilled water	Bath 1 for natural and regen- erated cellulose	Bath 2 for natural and regen- erated cellulose	Bath 3 for wool and acetate	Bath 4 for silk
Hydrogen peroxide solution, ¹⁾ ml	5	—	20	20
Sodium peroxide, ²⁾ g	—	3	—	—
Sodium silicate solution, ³⁾ ml	5	5	—	5
Sodium pyro-phosphate, ⁴⁾ g	—	—	5	—
Magnesium chloride, ⁵⁾ g	0,1	0,1	—	0,1
pH, initial value ± 0,26)	10,5	11,5	9,37)	10,0
Temperature, °C ± 2 °C	90	80	50	70
Duration of treatment, h	1	1	2	2
Liquor ratio	30 : 1	30 : 1	30 : 1	30 : 1

- 1) Containing 304 g/l H₂O₂ (= 275 g/kg H₂O₂).

2) 100 % Na₂O₂.

3) Relative density at 20 °C = 1,32; SiO₂/Na₂O ratio ≈ 2,7 : 1.

4) Na₄P₂O₇·10H₂O.

5) MgCl₂·6H₂O.

6) Adjust by addition of NaOH solution, if necessary.

7) The pH of the bath at the end of the test should not be less than 9,0.
- 4.4 **Two adjacent fabrics**, each measuring 10 cm × 4 cm, one piece made of the same kind of fibre as that of the

textile to be tested, or that predominating in the case of blends, and 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 adjacent fabric is :	Second piece to be :
wool, silk, linen, viscose, } polyester, acrylic	cotton
cotton, acetate	viscose

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 of it 10 cm x 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 x 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 Loosely roll the composite specimen in the direction of the long edge, place the 4 cm roll into the test tube containing the appropriate bleaching solution (see table in 4.3) and keep it well covered by the bleaching solution for the time and at the temperature indicated in the table.

6.2 Remove the composite specimen, rinse it for 10 min in cold running tap-water and squeeze it. Open out the composite specimen by breaking the stitching on all sides except one of the shorter sides and dry 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.

6.3 Assess the change in colour of the specimen and the staining of the adjacent fabric with the grey scales.

7 TEST REPORT

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

Textiles — Tests for colour fastness

N03 Colour fastness to bleaching : Sodium chlorite : Mild

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of textiles composed of natural and regenerated cellulose, and synthetic fibres, to the action of mild bleaching with sodium chlorite as employed in textile processing.

2 PRINCIPLE

A specimen of the textile in contact with specified adjacent fabrics is treated in a sodium chlorite solution, 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 Glass container with reflux condenser or other means of reducing evaporation of the bath, and so preventing its modification during the test.

4.2 Sodium chlorite, 1 g/l (800 g/kg) solution brought to pH 3,5 with acetic acid immediately before the test (see clause 8).

4.3 Two adjacent fabrics, 10 cm × 4 cm, each made of a fibre to be assessed for staining.

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 adjacent fabrics (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) 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 Wet out the composite specimen in the sodium chlorite solution (4.2) and immerse it in the solution for 1 h without agitation, at a temperature of $80 \pm 2^\circ\text{C}$. The liquor ratio is 50 : 1.

6.2 Rinse the composite specimen for 10 min in cold running tap-water. 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.

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6.3 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.

8 NOTE

The concentration of sodium chlorite employed is determined by titration with sodium thiosulphate solution :

1 ml of 0,1 N sodium thiosulphate solution corresponds to 0,002 26 g of NaClO_2 .

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Textiles — Tests for colour fastness

N04 Colour fastness to bleaching : Sodium chlorite : Severe

1 SCOPE AND FIELD OF APPLICATION

This method is intended for determining the resistance of the colour of natural cellulose textiles to the action of severe bleaching with sodium chlorite as ordinarily employed in textile processing.

2 PRINCIPLE

A specimen of the textile in contact with specified adjacent fabrics is treated in a sodium chlorite solution, 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 Glass container with reflux condenser or other means of reducing evaporation of the bath, and so preventing its modification during the test.

4.2 Sodium chlorite, 2,5 g/l (800 g/kg) solution, containing 0,1 g of acid sodium pyrophosphate per litre, brought to pH 3,5 with formic acid immediately before the test (see clause 8).

4.3 Two adjacent fabrics, 10 cm × 4 cm, each made of a fibre to be assessed for staining.

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 adjacent fabrics (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) 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 Wet out the composite specimen in the sodium chlorite solution (4.2) and immerse it in the solution for 1 h without agitation, at a temperature of $80 \pm 2^\circ\text{C}$. The liquor ratio is 50 : 1.

6.2 Rinse the composite specimen for 10 min in cold running tap-water. 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.

6.3 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.

8 NOTE

The concentration of sodium chlorite employed is determined by titration with sodium thiosulphate solution :

1 ml of 0,1 N sodium thiosulphate solution corresponds to 0,002 26 g of NaClO_2 .

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