
INTERNATIONAL STANDARD



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Prints and printing inks — Assessment of light fastness

Impressions et encres d'imprimerie — Évaluation de la résistance à la lumière

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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.

International Standard ISO 2835 was drawn up by Technical Committee ISO/TC 130, *Graphic technology* and circulated to the Member Bodies in August 1972.

It has been approved by the Member Bodies of the following countries :

Austria	Germany	Sweden
Chile	India	Switzerland
Czechoslovakia	Ireland	Thailand
Denmark	New Zealand	Turkey
Egypt, Arab Rep. of	Romania	United Kingdom
Finland	South Africa, Rep. of	
France	Spain	

The Member Body of the following country expressed disapproval of the document on technical grounds :

Italy

Prints and printing inks — Assessment of light fastness

0 INTRODUCTION

This International Standard is in technical conformity with CEI specification 02-59 of the European Committee of the Paint and Printing Ink Manufacturers' Associations.

In addition, this International Standard is in broad technical agreement with the ISO Recommendations and International Standards dealing with lightfastness tests for textiles (and more particularly fastness of dyes to daylight and artificial light) to which it may be helpful to refer in connection with test apparatus and operating methods.

1 SCOPE

This International Standard specifies a method of assessing the light fastness of prints and printing inks, by giving

- the general test requirements for prints;
- the special test requirements for inks.

2 REFERENCES

ISO/R 105/I, *Tests for colour fastness of textiles — First series.*

ISO/R 105/V, *Tests for colour fastness of textiles — Fifth series.*

ISO/R 105/VI, *Tests for colour fastness of textiles — Sixth series.*

ISO 2834, *Printing inks — Preparation of standard prints for determination of resistance to physical and chemical agents.*¹⁾

3 TESTING OF PRINTS

3.1 Field of application

This International Standard applies to all print substrates such as paper, board, metals (thin metal sheets and plate) and plastics materials, and to all printing processes: letterpress, lithographic and gravure.

3.2 Definition

By the **light fastness of prints** is meant their resistance to daylight, without the direct effect of bad weather.

3.3 Principle

A test piece is exposed to daylight in specified conditions and at the same time as standard blues for the assessment of light fastness.

Light fastness is evaluated by noting, on the scale of blue wool standards, the rating of the standard which has undergone a similar change to that of the test print.

3.4 Apparatus

3.4.1 Comparison scales

3.4.1.1 RANGE OF BLUE DYES

The lightfastness of prints is estimated by comparison with a standard range of eight blue dyes on wool cloth, their degree of lightfastness being in regular geometric steps. These dyings are largely unaffected by variations in temperature and humidity and constitute an acceptable scale for the determination of the lightfastness of all types of prints, whatever their colour, type and intensity.

1) At present at the stage of draft.

The standards comprise smooth wool fabric of about 200 g/m² in weight and dyed blue. The standard range is that established for textiles¹⁾ (see the table). The blue wool standard must be protected from light before use. Samples of the blue standards are available in each country for means of reference.

The lightfastness of prints is expressed as the number corresponding to one of the eight blue wool standards²⁾ of the range "1" denotes the lowest degree of fastness and "8" the highest.

The lightfastness required for any given print will be that agreed between supplier and customer.

Light fastness rating	Dye	Colour index
1	Acid blue 104	42735
2	Acid blue 109	42740
3	Acid blue 83	42660
4	Acid blue 121	50310
5	Acid blue 47	62085
6	Acid blue 23	61125
7	Blue solution Vat blend 5	73066
8	Blue solution Vat blend 8	73801

The details shown in the column "Dye" correspond to the directions shown in the same column of the relevant tables of ISO/R 105/I, Part 11, and ISO/R 105/V, Part 2.

3.4.1.2 GREY SCALE

Grey scale for the determination of colour change, in accordance with ISO/R 105/I, Part 2: *Grey scale for assessing change in colour.*

3.4.2 Exposure equipment (method of operation)

The equipment is set up facing the south in the northern hemisphere and the north in the southern hemisphere at an angle to the horizontal which is approximately equal to the latitude of the location where the exposure is being done. The equipment must be :

- situated in a way which will not allow the shadows of any nearby objects to fall on the test materials,
- covered with a sheet of glass to protect the test pieces from the weather. This glass must be not less than 5 cm from the test pieces,
- adequate ventilation must be provided.

The glass used must have a 90 % transparency between 370 and 380 nm and should be opaque between 300 and 320 nm.

1) See ISO/R 105/I, Part 11 : *Colour fastness to light – Daylight;*

ISO/R 105/V, Part 2 : *Colour fastness to artificial light – Xenon arc lamp test.*

2) Standards for ratings 7 and 8 are decatized after dyeing.

3) ISO/R 105/V, Part 2 : *Colour fastness to artificial light – Xenon arc lamp test.*

4) Corresponds to method 2 of ISO/R 105/I, Part 2; method 1 must be used in the case of a dispute.

The test pieces are fixed to one side of the standard range and partly covered by board which is opaque to light and the thickness of which is at least 0,5 mm (for example board rendered impervious to infra-red radiation by covering it with a sheet of aluminium).

NOTE – ISO/R 105/I Part II : *Colour fastness to light – Daylight* recommends carrying out tests on test pieces of the same dimensions as the blue strips of the standard range or using a neutral grey mask (approximately Munsell M/6) in order to demarcate on the test pieces an area identical to that of the standards at the time of the colour change comparison.

3.4.3 Light source

Daylight only shall be used to obtain a valid assessment of light fastness.

The use of mercury arc lamps is not permissible since their emission spectrum is very different from that of daylight and accordingly leads to erroneous results.

NOTE – For an accelerated test, good values can be obtained with high pressure xenon lamps.³⁾

If, in order to accelerate the tests use is made of light sources the spectral energy distribution of which differs greatly from that of daylight, it is impossible to assess the results by comparison with the aforementioned standard range.

3.5 Procedure

Expose the test piece simultaneously with the blue wool standards or (the series of test pieces) to daylight throughout the whole day.

Watch for the first distinct change of the test piece. A really definite alteration corresponds to grade 3 of the grey scale as defined in 3.4.1.2.

Then determine to what degree of the standard range a change equal to that of the test piece corresponds.

NOTE – For a simultaneous and systematic examination of a series of print samples, the following method is recommended⁴⁾ :

- Expose all the prints until standard 3 of the range of blue dyes shows a definite change.
- Then cover approximately a quarter of the exposed part of the print and of the standard and continue exposure to light until standard 5 shows a definite change.
- Cover a quarter of the remaining exposed part and continue to expose to light until a colour change is noted in standard 6. A clearly visible change corresponds to grade 3 of the grey scale (see 3.4.1.2).
- Cover once more and continue exposure to the point where a change becomes just visible in standard 7.

A change which is just apparent corresponds to grade 4 of this grey scale.

This process of exposure by successive coverings makes it possible to assess prints with very different degrees of light fastness in a single test.

3.6 Expression of results

Give the test piece a light fastness rating corresponding to the number of the blue standard which has changed to the same degree.

Should the change in the test piece fall between the changes of two successive standards, the test piece should be given the two corresponding ratings (for example 6.7). This method of grading is not used below rating 5. If the test piece's colour darkens, the light fastness rating is followed by the letter "N".¹⁾

3.7 Test report

Quoting this International Standard, state the light fastness rating. The light fastness of the substrate may also be mentioned. Should this be the case, the latter will then have to be tested, unprinted, following the same procedure.

4 TESTING OF INKS

4.1 Definition

By the **light fastness of an ink** is meant the resistance of a standard print assessed according to the instructions given in this International Standard relating to prints.

4.2 Preparation of the standard print

Prepare the standard print according to the instructions given in ISO 2834.

4.3 Test method

Follow the instructions given in clause 3.

5 IMPORTANT NOTE

An accelerated light fastness test will be published later as an addendum to this International Standard.

1) An abbreviated test for change in colour of the degree necessary to assess the degree of change can equally well be based on the conditions given in ISO/R 105/1, Part 11.