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AMENDMENT 2
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Textiles — Tests for colour fastness —

Part B02:
Colour fastness to artificial light: Xenon arc fading lamp test —

AMENDMENT 2

Textiles — Essais de solidité des teintures —

Partie B02: Solidité des teintures à la lumière artificielle: Lampe à arc au xénon

AMENDEMENT 2

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this Amendment may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

Amendment 2 to International Standard ISO 105-B02:2000 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 1, *Tests for coloured textiles and colorants*.

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Textiles — Tests for colour fastness —

Part B02:
Colour fastness to artificial light: Xenon arc fading lamp test

AMENDMENT 2

1 Scope

Page 3, 4.2.1.1 c) Heat filter

Replace the term in parentheses at the end of the first paragraph by the following:

(see A.1.2.1 and A.1.2.2)

Pages 11 and 12, Annex A

Substitute annex A of this document for the existing annex A.

Pages 13 and 14, Annex B

Substitute annex B of this document for the existing annex B.

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Annex A
(normative)

Apparatus for determining colour fastness with air-cooled xenon arc lamps

A.1 Description and conditions of use

A.1.1 The test apparatus used utilizes one or more air-cooled xenon arc lamps as the source of radiation. Different-type and different-size lamps operating in different wattage ranges are used in several of the different sizes and types of apparatus. In each of the various models of exposure apparatus, the diameter of the specimen rack, lamp size and lamp wattage has been established so that, when the specimens are exposed in the holders, the irradiance at the face of the specimens is at the appropriate level.

A.1.2 The radiation system used consists of one or more xenon burner tubes, filter elements and the necessary accessories. For tests as described in this part of ISO 105, absorption filters or reflection-absorption filters are used in the different models of exposure apparatus so that the radiation at the specimen has a spectral cut off value as defined in section 4.2.1.1.

A.1.2.1 In apparatus with absorption filters the xenon arc lamp is surrounded by a lantern comprising infrared filter glasses or window glasses in the case of xenon arc radiation with a reduced infrared part of radiation as well as an outer cylinder of special UV-glass.

A.1.2.2 In apparatus with reflection-absorption filters one or more xenon arc lamps are used, surrounded by a lantern comprising quartz filters with a special reflecting coating as well as an outer cylinder of special UV-glass.

A.1.2.3 Because of the drop in intensity with continued use, the xenon burner tube(s) shall be discarded after 1 500 h of use or, in apparatus with automatic control of irradiance in specimen area, when the level of irradiance as recommended in section 4.2.1 is no longer achievable. In apparatus with more than one xenon arc lamp, the burners shall be exchanged in rotation.

A.1.2.4 Because of transmission changes (solarization) of the infrared and window glass filters the oldest filter in the lantern shall always be replaced every 500 h.

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A.1.3 The space between the xenon arc lamp(s) and the filtering device is cooled by a current of air.

A.1.4 Specimen holders mounted on a revolving rack or a cylindrical, vertical or inclined frame supporting the specimen holders are rotated at between 0,033 s^{-1} (2 rpm) and 0,117 s^{-1} (7 rpm) around the vertical lamp unit, which is located centrally with respect to the specimen rack. After each revolution of the rack the specimen holders may be turned about their longitudinal axis or maintained facing the xenon arc lamp(s) depending on the type of equipment used.

A.1.5 A ventilating system provides a varying volume of air through the test chamber and over the test specimens. The black standard temperature or the temperature of the air are automatically controlled by varying the volume of warm air circulated from the test chamber mixed with cooler room air. In some types of apparatus, it is possible to adjust the fan speed to keep constant the difference between the black standard temperature and the temperature of the air. The test chamber is air-conditioned by adding moisture to the air using an ultrasonic humidification device or by means of water atomized by an aerosol device and fed into the air stream. The relative humidity in the test chamber is measured and controlled using either a capacitative sensor or a contact hygrometer.

A.1.6 Apparatus for use in this method is equipped with timing units for controlling the length of exposure. Some types of apparatus are additionally equipped with a radiometer (broadband UV: 300 nm to 400 nm) designed to switch off the apparatus as soon as a given radiant exposure has been achieved.

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A.1.7 A monitoring/controlling radiometer mounted on the test specimen area can be used in this method. A radiometer with a broad bandpass filter restricting measurement to the ultraviolet spectral region between 300 nm and 400 nm has been used satisfactorily. Filter radiometers capable of integrating irradiance with respect to time are satisfactory.

For radiometers designed to automatically maintain a constant level of irradiance, exposures of equal time should provide equivalent radiant exposure, which may be calculated by the following formula:

$$H = E\ 3{,}6\ t$$

where

H is the radiant exposure in kilojoules per square metre;

E is the irradiance in watts per square metre (or joules per square metre and second);

t is the time in hours;

3,6 is a conversion factor.

Filter radiometers equipped with a presettable countdown integrator calibrated in joules per square metre, designed for use with the exposure apparatus, can be used to terminate the test when the specimens have received the required level of radiant exposure.

The radiometer shall have means, provided by the manufacturer, for checking the calibration, or calibration shall be certified by the manufacturer for a specified time interval when the apparatus is used in the manner described herein.

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Annex B
(normative)

Apparatus for determining colour fastness with water-cooled xenon arc lamps

B.1 Description and conditions of use

B1.1 The test apparatus used utilizes one water-cooled xenon arc lamp as the source of radiation. While all of the xenon arc lamps used are of the same general type, different-sized lamps operating in different wattage ranges are used in several sizes and types of apparatus. In each of the various models of exposure apparatus, the diameter of the specimen rack, lamp size and lamp wattage can be varied so that, when the specimens are exposed in the holders, the irradiance at the face of the specimens is at the appropriate level.

B1.2 The xenon lamp consists of a xenon burner tube, inner glass filter, outer glass filter and the necessary accessories. In some cases additional glass filters may be installed to reduce infrared radiation. For colour fastness tests in accordance with 6.2, a borosilicate glass inner filter and a sodalime glass outer filter are used so that the irradiation at the specimen has a spectral cut-off value approximately equal to that of window glass. Other absorption or reflection-absorption filters recommended by the instrument manufacturer to provide an equivalent spectral cut-off value may be used. When operating the apparatus in accordance with to 6.2, outer filters shall be discarded after 2 000 h of use and inner filters after 400 h of use. For colour fastness tests in accordance with 6.1a) and 6.1b), a lantern equipped with European window glass is used in addition to an infrared inner and outer filter combination. Because of the drop in intensity with continued use, xenon burners shall be discarded when 1,1 W/(m^{2}nm) at 420 nm or 42 W/m^2 for 300 nm to 400 nm is no longer achievable by automatic control.

B.1.3 All xenon arc exposure apparatus for use in this method is equipped with suitable starters and control equipment for either manually- or automatically-controlling wattage of the lamp. In manually-controlled units, the wattage of the lamp may require periodic adjustment to maintain 1,1 W/(m^{2}nm) at 420 nm.

B.1.4 To cool the lamp, grade 3 water is circulated through the lamp assembly at an approximate minimum flow rate of 380 l/h, and is further purified by the use of a mixed-bed deionizer just ahead of the lamp. The recirculated lamp water is cooled without contamination by the use of a heat exchanger unit using either tap water or a refrigerant as the heat transfer medium.

B.1.5 The exposure apparatus is enclosed in an insulated cabinet to minimize the effects of variation in room temperature. A ventilating system provides a varying volume of air through the test chamber and over the test specimens. The temperature of the air and the black standard thermometer are automatically controlled by varying the volumes of warm air circulated from the test chamber mixed with cooler room air. Moisture in the amount required to maintain the specified relative humidity of the exit air from the test chamber as measured by wet- and dry-bulb temperatures or a direct reading humidity controller may be added to the air system as it passes through the air-conditioning chamber in the base of the instrument.

B.1.6 A cylindrical vertical or inclined frame or rack supporting the specimen holders is rotated at 0,017 s^{-1} (1 rpm) around the lamp, which is located centrally with respect to the specimen rack so that the effective arc is centred both horizontally and vertically relative to the exposure area of the specimen holders.

B.1.7 Apparatus for use in this method is equipped with timing units for controlling the length of exposure. Some apparatus is also equipped with a light monitor designed to switch off the apparatus as soon as a given radiant exposure has been achieved.

B.1.8 Apparatus for use in this method may be equipped with a monitoring/controlling radiometer for controlling the length of exposure. A radiometer with a narrow bandpass interference filter restricting measurement to the

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ultraviolet spectral region has been used satisfactorily. It consists of a sensor having a photodetector and interference filter with a central wavelength tolerance $\leqslant$ 2 nm, and a half-bandwidth $\leqslant$ 20 nm.

Single or multiple filter radiometers capable of measuring, controlling and/or integrating irradiance with respect to time are satisfactory.

For monitors designed to automatically maintain a constant level of irradiance, exposures of equal time should provide equivalent radiant exposure, which may be calculated by the following formula:

$$H = E\ 3{,}6\ t$$

where

H is the radiant exposure in kilojoules per square metre;

E is the irradiance in watts per square metre (or joules per square metre and second);

t is the time in hours;

3,6 is a conversion factor.

Single filter radiometers equipped with a presettable countdown integrator calibrated in kilojoules per square metre, designed for use with the exposure apparatus, can be used to terminate the test when the specimens have received the required level of radiant exposure.

The radiometer shall have means, provided by the manufacturer, for checking the calibration, or calibration shall be certified by the manufacturer for a specified time interval when the apparatus is used in the manner described herein.

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