INTERNATIONAL STANDARD

ISO 3059

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Non-destructive testing — Penetrant testing and magnetic particle testing — Viewing conditions

Essais non destructifs — Essai par ressuage et essai par magnétoscopie — Conditions d'observation

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 member bodies casting a vote.

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

International Standard ISO 3059 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 135, *Non-destructive testing*, Subcommittee SC 2, *Surface methods*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this standard, read "...this European Standard..." to mean "...this International Standard...".

This second edition cancels and replaces the first edition (ISO 3059:1974), which has been technically revised.

Annex ZZ provides a list of corresponding International and European Standards for which equivalents are not given in the text.

Contents

Foreword

The text of EN ISO 3059:2001 has been prepared by Technical Committee CEN/TC 138 "Non-destructive testing", the secretariat of which is held by AFNOR, in collaboration with Technical Committee ISO/TC 135 "Non-destructive testing".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2002, and conflicting national standards shall be withdrawn at the latest by May 2002.

NOTE This document is referenced as prEN 1956 in some European Standards.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Both penetrant and magnetic particle testing require controlled conditions for viewing indications, for example:

- sufficient white light to achieve reliable testing with colour contrast techniques;
- adequate UV-A irradiance with minimal light for fluorescent systems.

1 Scope

This European Standard describes the control of the viewing conditions for magnetic particle and penetrant testing. It includes minimum requirements for the illuminance and UV-A irradiance and their measurement. It is intended for use when the human eye is the primary detection aid.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 473, *Qualification and certification of NDT personnel - General principles*.

IEC 60050-845, *International Electrotechnical Vocabulary - Lighting.*

3 Safety precautions

All European, national and local regulations including health and safety shall be taken into account.

Care shall be taken to minimize personnel exposure to UV-A radiation. Exposure of personnel to UV-A radiation below 330 nm should be avoided. Exposure of personnel to UV-B and UV-C radiation shall be avoided (e.g. from damaged or cracked filters).

4 Colour contrast techniques

4.1 Light sources

Inspection shall be carried out in daylight or with artificial light. Monochromatic sources such as sodium bulbs shall not be used.

The test surface shall be illuminated evenly. Glare and reflections shall be avoided.

4.2 Measurements

The illuminance at the test surface shall be determined by means of an illuminance meter under working conditions. The nominal spectral response of the meter shall be in accordance with IEC 60050-845.

4.3 Requirements

The illuminance at the test surface shall be 500 lx or greater.

5 Fluorescent techniques

5.1 Ultraviolet radiation

Testing shall be carried out with UV-A radiation (315 nm to 400 nm) using a source with a nominal maximum intensity at 365 nm.

NOTE The UV-A irradiance can vary with time due for example to ageing of the bulb or deterioriation of the reflector or filter. It is important to minimize visible background light incident upon the component or reaching the inspector's eyes directly from the UV-A lamp or as a result of the limited screening of other sources.

5.2 Measurements

The UV-A irradiance shall be measured under working conditions on the test surface by means of a UV-A irradiation meter having a sensitivity response as defined in Figure 1.

Measurements shall be carried out when the lamp output has stabilized (not less than 10 minutes after switching on).

For measurement of illuminance see 4.2. The reading from the illuminance meter shall not be affected by UV-A irradiance.

5.3 Requirements

The UV-A irradiance shall be greater than 10 W/m^2 (1000 $\mu W/cm^2$) and the illuminance less than 20 lx on the test surface. The measurements shall be carried out under working conditions with the UV-A source turned on and stabilized.

For penetrant testing the UV-A irradiance shall not be greater than 50 W/m^2 (5000 $\mu W/cm^2$).

There shall be no glare or other source of visible light or UV-A radiation within the operator's field of vision. Ambient visible light levels shall be less than 20 lx.

At penetrant washing stations a UV-A irradiance of at least 3 W/m^2 (300 $\mu W/cm^2$) shall be provided on the parts, and the illuminance shall be less than 150 lx.

6 Visual acuity

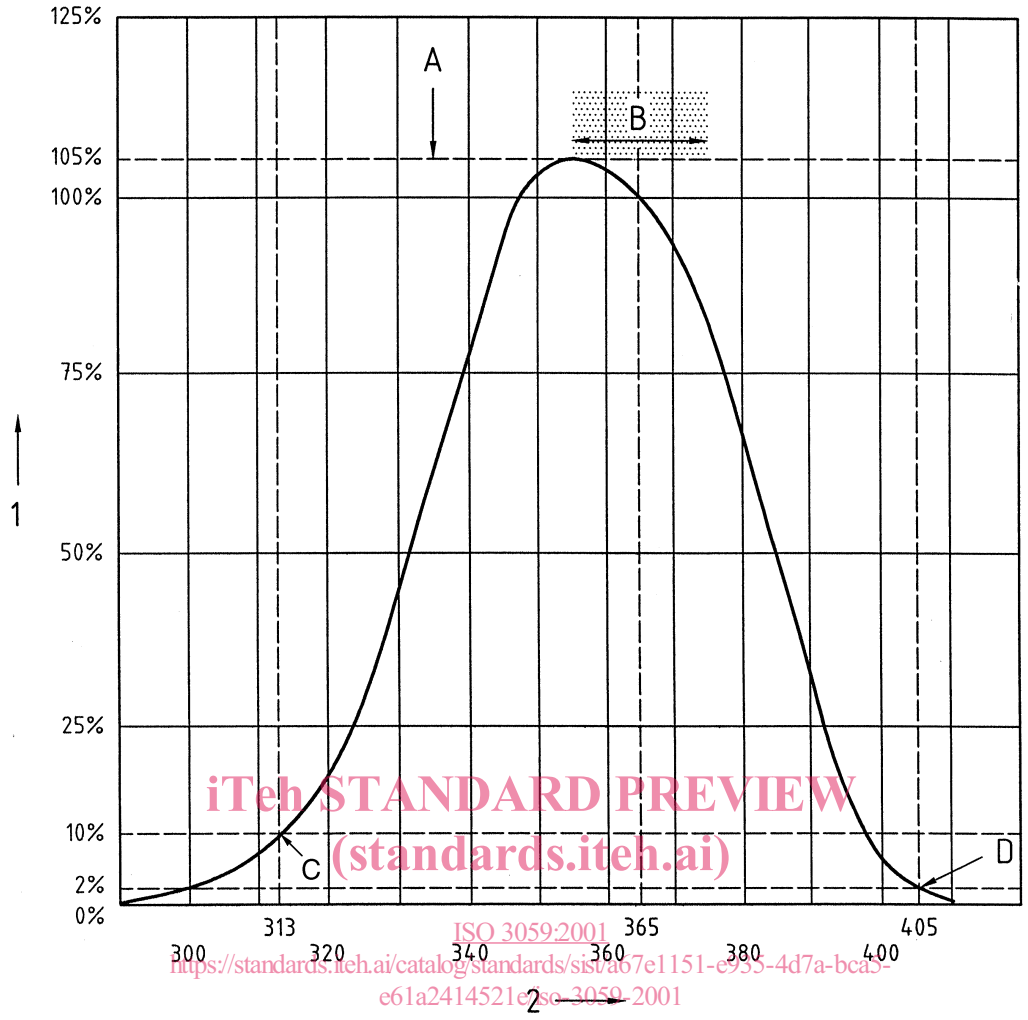
Requirements shall be in accordance with EN 473.

7 Verification

The calibration of irradiation and illuminance meters shall be verified at the frequency recommended by the manufacturer using a standard which is traceable to national or European Standards. This period shall not exceed 24 months. The calibration of the UV-A irradiation meter shall be carried out with monochromatic radiation at a wavelength of 365 nm. Maintenance of or damage to the meter shall necessitate verification.

When detachable sensors and readout units are used, verification shall be carried out on the entire system (readout unit and sensors).

The verification shall be documented by a test certificate, a declaration of conformity or a test report as applicable.



Key

1 Relative spectral response
2 Wavelength λ

Relative spectral response is the ratio of the response of the sensor to radiation of a given wavelength (λ) to the response at 365 nm.

The relative spectral response curve for a suitable sensor shall not enter the shaded area. A, B, C and D in the figure denote limits corresponding to the following requirements:

A The relative spectral response shall not exceed 105 % for any wavelength;
B The peak relative spectral response shall occur between 355 nm and 375 nm;
C The relative spectral response at a wavelength of 313 nm shall be less than 10 %;
D The relative spectral response at a wavelength of 405 nm shall be less than 2 %.

The curve shown is an example of one produced by an acceptable meter.

Figure 1 – Spectral response of UV-A irradiation meters