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Non-destructive testing — Visual testing — General principles

The European Standard EN 13018:2001, with the incorporation of amendment A1:2003 has the status of a British Standard

ICS 19.100

National foreword

This British Standard is the official English language version of EN 13018:2001, including amendment A1:2003.

The UK participation in its preparation was entrusted to Technical Committee WEE/46, Non-destructive testing, which has the responsibility to:

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 7 and a back cover.

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This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 May 2001

Amendments issued since publication

Amd. No.	Date	Comments
14963	12 February 2004	Modification to Foreword page and deletion of Annex ZA

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ICS 19.100

English version

Non-destructive testing – Visual testing – General principles
(includes amendment A1:2003)

Essais non destructifs – Examen visual – Principes
généraux
(inclut l'amendement A1:2003)

Zerstörungsfreie Prüfung - Sichtprüfung – Allgemeine
Grundlagen
(enthält Änderung A1:2003)

This European Standard was approved by CEN on 18 January 2001, and amendment A1 was approved by CEN on 20 November 2003.

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Contents

	Page
Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Pre-test documentation	5
5 Direct visual testing	6
6 Remote visual testing	6
7 Personnel	6
8 Evaluation	7
9 Post-test documentation	7
10 Records	7

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 138 "Non-destructive testing", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by September 2001, and conflicting national standards shall be withdrawn at the latest by September 2001.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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.

Foreword to amendment A1

This document EN 13018:2001/A1:2003 has been prepared by Technical Committee CEN/TC 138, Non-destructive testing, the secretariat of which is held by AFNOR.

This Amendment to the European Standard EN 13018:2001 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the general principles for visual testing both directly and remotely when it is used to determine the compliance of a product with specified requirements (e.g. surface condition of the part, alignment of mating surfaces, shape of part).

This European Standard does not apply to viewing activities linked to the use of any other destructive or non-destructive test method.

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
EN ISO 8596	Ophthalmic optics - Visual acuity testing - Standard optotype and its presentation (ISO 8596:1994)
prEN 1330-10:1999	Non-destructive testing – Terminology - Part 10: Terms used in visual testing

3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in prEN 1330-10:1999 apply together with the following.

3.1

direct visual testing

visual testing where there is an uninterrupted optical path from the observer's eye to the test area. This is either unaided or aided via e.g. mirror, lens, endoscope or fibre optic

3.2

remote visual testing

visual testing where there is an interrupted optical path from the observer's eye to the test area. Remote visual testing covers the use of photography, video systems, automated systems and robots

4 Pre-test documentation

4.1 An instruction shall be written which includes the minimum testing requirements in accordance with 4.4.

4.2 When required (e.g. product standard, contract) a written procedure shall be prepared in accordance with 4.4 to 4.7. Written procedures may be in a general form applicable without adaptation to a variety of unlisted products or situations, thereby reducing the overall number of written procedures required.

4.3 Copies of the written instructions and/or the procedures shall be made available to the relevant personnel.

4.4 As a minimum, the following aspects shall be considered for applicability:

- a) the object to be tested, location, accessibility and geometry;
- b) the extent of test coverage;
- c) the technique and sequence of performing the test;
- d) the surface condition;
- e) the surface preparation;
- f) the stage of manufacture or service life when testing is carried out;
- g) the requirements of personnel (see clause 7);
- h) the acceptance criteria;
- i) the illumination (type, level and direction);
- j) the visual testing equipment to be used;
- k) the post-test documentation (see clause 9).

4.5 A demonstration test piece shall be used to prove the procedure. The test piece should be as close as possible to the component with respect to relative reflectivity, surface texture, contrast ratio and accessibility. The procedure should be demonstrated on the least discernible location in the area to be tested. This demonstration test piece may be replaced by the component to be tested or an approved system of reference.

4.6 Changes in equipment and in the details of the tests arrangement which do not adversely affect sensitivity levels shall not require the procedure to be reproven.

4.7 Any record of the image shall be of the same standard as defined in the procedure.

5 Direct visual testing

5.1 Direct visual testing may usually be made for local visual testing when access is sufficient to place the eye within 600 mm of the surface to be tested and at an angle not less than 30° to the surface to be tested. Mirrors may be used to improve the angle of vision, and aids such as a magnifying lens, endoscope and fibre optic may be used to assist testing.

5.2 Direct visual testing may also be made at greater distances than 600 mm specifically for general visual testing. A viewing distance appropriate to the test shall be used.

5.3 The specific part, component, vessel, or section thereof, under immediate test, shall be illuminated, if necessary, with auxiliary lighting, to attain a minimum of 160 lx for general visual testing and a minimum of 500 lx for local visual testing.

5.4 Consideration shall be given to the application of illuminance to maximize the effectiveness of the test by:

- a) using the optimum direction of light with respect to the viewing point;
- b) avoiding glare;
- c) optimizing the colour temperature of the light source;
- d) using an illumination level compatible with the surface reflectivity.

6 Remote visual testing

6.1 When direct visual testing cannot be utilized, remote visual testing may have to be substituted. Remote visual testing uses visual aids such as endoscopes and fibre optics, coupled to cameras or other suitable instruments.

6.2 The suitability of the remote visual testing system to perform the designated task shall be proven.

7 Personnel

Personnel who carry out tests according to this standard shall be shown to:

- a) be familiar with relevant standards, rules, specifications, equipment and procedures/instructions;
- b) be familiar with the relevant manufacturing procedure used and/or with the operating conditions of the component to be tested;
- c) have satisfactory vision in accordance with EN 473. In addition, when performing general visual testing far vision shall be checked using the standard optotype in

accordance with EN ISO 8596 visual acuity grade 0,63 in at least one eye corrected or uncorrected. Vision shall be checked at least every 12 months.

8 Evaluation

All visual tests shall be evaluated in terms of the acceptance criteria specified (e.g. product standard, contract).

9 Post-test documentation

When required (e.g. product standard, contract) a written test report shall be provided detailing the following:

- a) date and place of test;
- b) method used according to clauses 5 or 6;
- c) acceptance criteria and/or written procedure/instruction reference;
- d) equipment and/or system utilized including set-up;
- e) reference to customer's order;
- f) name of organization carrying out test;
- g) description and identification of test object;
- h) details of test findings with respect to the acceptance criteria (e.g. size, location);
- i) extent of test coverage;
- j) name and signature of person conducting test with date;
- k) name and signature of person supervising test with date, if required;
- l) marking of component tested, when appropriate;
- m) results.

This may be accomplished by referencing the visual testing written procedure and/or the instruction.

10 Records

Records shall be maintained as required (e.g. product standard, contract).

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