

BS EN 13018:2016



BSI Standards Publication

# Non-destructive testing — Visual testing — General principles

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**National foreword**

This British Standard is the UK implementation of EN 13018:2016. It supersedes BS EN 13018:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/46, Non-destructive testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

## Non-destructive testing - Visual testing - General principles

Essais non destructifs - Examen visuel - Principes généraux

Prüfung - Sichtprüfung - Allgemeine Grundlagen

This European Standard was approved by CEN on 27 December 2015.

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## European foreword

This document (EN 13018:2016) 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of an identical text or by endorsement, at the latest by August 2016, and conflicting national standards shall be withdrawn at the latest by August 2016.

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## 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

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1330-10, *Non-destructive testing - Terminology - Part 10: Terms used in visual testing*

EN ISO 8596, *Ophthalmic optics - Visual acuity testing - Standard optotype and its presentation (ISO 8596)*

EN ISO 9712, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712)*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1330-10 and the following apply.

### 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, it may have to be substituted by remote visual testing. 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 ISO 9712. 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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