



BSI Standards Publication

Non-destructive testing – Industrial computed radiography with storage phosphor imaging plates

Part 2: General principles for testing of metallic materials using X-rays and gamma rays (ISO 16371-2:2017)

This is a preview of "BS EN ISO 16371-2:20...". [Click here to purchase the full version from the ANSI store.](#)

National foreword

This British Standard is the UK implementation of EN ISO 16371-2:2017. It is identical to ISO 16371-2:2017. It supersedes BS EN 14784-2:2005, which is withdrawn.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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2018
Published by BSI Standards Limited 2018

ISBN 978 0 539 01939 1

ICS 19.100

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2017.

Amendments/corrigenda issued since publication

Date	Text affected
31 July 2018	Implementation of ISO corrected text 02 May 2018: See ISO foreword for details

EUROPÄISCHE NORM

November 2017

ICS 19.100

Supersedes EN 14784-2:2005

English Version

Non-destructive testing - Industrial computed radiography with storage phosphor imaging plates - Part 2: General principles for testing of metallic materials using X-rays and gamma rays (ISO 16371-2:2017)

Essais non destructifs - Radiographie industrielle numérisée avec écrans photostimulables à mémoire - Partie 2: Principes généraux de l'essai radiographique des matériaux métalliques au moyen de rayons X et gamma (ISO 16371-2:2017)

Zerstörungsfreie Prüfung - Industrielle Computer-Radiographie mit Phosphor-Speicherfolien - Teil 2: Grundlagen für die Prüfung von metallischen Werkstoffen mit Röntgen- und Gammastrahlen (ISO 16371-2:2017)

This European Standard was approved by CEN on 5 September 2017.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

This is a preview of "BS EN ISO 16371-2:20...". [Click here to purchase the full version from the ANSI store.](#)

European foreword

This document (EN ISO 16371-2:2017) 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 2018, and conflicting national standards shall be withdrawn at the latest by May 2018.

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

This document supersedes EN 14784-2:2005.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 16371-2:2017 has been approved by CEN as EN ISO 16371-2:2017 without any modification.

This is a preview of "BS EN ISO 16371-2:20...". Click here to purchase the full version from the ANSI store.

Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols and abbreviated terms	5
5 Personnel qualification	6
6 Classification of computed radiographic techniques and compensation principles	6
6.1 Classification.....	6
6.2 Compensation principles, CP I and CP II.....	6
7 General	7
7.1 Protection against ionizing radiation.....	7
7.2 Surface preparation and stage of manufacture.....	7
7.3 Identification of radiographs.....	7
7.4 Marking.....	7
7.5 Overlap of phosphor imaging plates.....	7
7.6 Types and positions of image quality indicators and IQI values.....	8
8 Recommended techniques for making computed radiographs	9
8.1 Test arrangements.....	9
8.2 Choice of X-ray tube voltage and radiation source.....	9
8.2.1 X-ray equipment.....	9
8.2.2 Other radiation sources.....	10
8.3 CR systems and screens.....	11
8.3.1 Minimum normalized signal-to-noise ratio.....	11
8.3.2 Metal screens and shielding.....	11
8.4 Maximum unsharpness and basic spatial resolution for CR system selection.....	13
8.4.1 System selection.....	13
8.4.2 Compensation principle II.....	13
8.5 Alignment of beam.....	15
8.6 Reduction of scattered radiation.....	15
8.6.1 Metal filters and collimators.....	15
8.6.2 Interception of back scattered radiation.....	15
8.7 Source to object distance.....	15
8.7.1 General requirements.....	15
8.7.2 Testing of planar objects and curved objects with flexible IPs.....	15
8.7.3 Testing of curved objects with IPs in cassettes.....	16
8.7.4 Exceptions for panoramic projection exposures with the source in the centre of the pipe.....	16
8.8 Maximum area for a single exposure.....	18
8.9 Erasure of imaging plates.....	19
8.10 Data processing.....	19
8.10.1 Image processing.....	19
8.10.2 Monitor, viewing conditions and storage of digital radiographs.....	19
9 Test report	19
Annex A (normative) Determination of basic spatial resolution, SR_b^{detector}	21
Annex B (normative) Determination of normalized SNR_N from SNR_{measured}	26
Annex C (normative) Determination of minimum grey value	28
Bibliography	31

This is a preview of "BS EN ISO 16371-2:20...". Click here to purchase the full version from the ANSI store.

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee ISO/TC 135, *Non-destructive testing*, Subcommittee SC 5, *Radiographic testing*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 16371 series can be found on the ISO website.

This corrected version of ISO 16371-2:2017 incorporates the following correction:

- [Figure A.1](#) b) has been corrected.

This is a preview of "BS EN ISO 16371-2:20...". [Click here to purchase the full version from the ANSI store.](#)

Non-destructive testing – Industrial computed radiography with storage phosphor imaging plates —

Part 2:

General principles for testing of metallic materials using X-rays and gamma rays

1 Scope

This document specifies fundamental techniques of computed radiography with the aim of enabling satisfactory and repeatable results to be obtained economically. The techniques are based on the fundamental theory of the subject and tests measurements. This document specifies the general rules for industrial computed X-rays and gamma radiography for flaw detection purposes, using storage phosphor imaging plates (IP). It is based on the general principles for radiographic examination of metallic materials on the basis of films, as specified in ISO 5579. The basic set-up of radiation source, detector and the corresponding geometry are intended to be applied in accordance with ISO 5579 and corresponding product standards such as ISO 17636 for welding and EN 12681 for foundry.

This document does not lay down acceptance criteria of the imperfections. Computed radiography (CR) systems provide a digital grey value image which can be viewed and evaluated on basis of a computer only. This practice describes the recommended procedure for detector selection and radiographic practice. Selection of computer, software, monitor, printer and viewing conditions are important but not the main focus of this document.

The procedure it specifies provides the minimum requirements and practice to permit the exposure and acquisition of digital radiographs with a sensitivity of imperfection detection equivalent to film radiography and as specified in ISO 5579. Some application standards, e.g. EN 16407, can require different and less stringent practice conditions.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5579, *Non-destructive testing — Radiographic testing of metallic materials using film and X- or gamma rays — Basic rules*

ISO 5580, *Non-destructive testing — Industrial radiographic illuminators — Minimum requirements*

ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel*

ISO 16371-1:2011, *Non-destructive testing — Industrial computed radiography with storage phosphor imaging plates — Part 1: Classification of systems*

ISO 19232-1, *Non-destructive testing — Image quality of radiographs — Part 1: Determination of the image quality value using wire-type image quality indicators*

ISO 19232-2, *Non-destructive testing — Image quality of radiographs — Part 2: Determination of the image quality value using step/hole-type image quality indicators*

ISO 19232-3:2013, *Non-destructive testing — Image quality of radiographs — Part 3: Image quality classes*