SLOVENSKI STANDARD
oSIST prEN ISO 17636-2:2021

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Neporušitveno preskušanje zvarnih spojev - Radiografske preiskave - 2. del: Tehnike z rentgenskimi in gama žarki z uporabo digitalnih detektorjev (ISO/DIS 17636-1:2021)

Non-destructive testing of welds - Radiographic testing - Part 2: X- and gamma-ray techniques with digital detectors (ISO/DIS 17636-1:2021)

Zerstörungsfreie Prüfung von Schweißverbindungen - Durchstrahlungsprüfung - Teil 2: Röntgen- und Gammastrahlungstechniken mit digitalen Detektoren (ISO/DIS 17636-1:2021)

Contrôle non destructif des assemblages soudés - Contrôle par radiographie - Partie 2: Techniques par rayons X ou gamma à l'aide de détecteurs numériques (ISO/DIS 17636-1:2021)

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Non-destructive testing of welds — Radiographic testing —

Part 1:
X- and gamma-ray techniques with film

Contrôle non destructif des assemblages soudés — Contrôle par radiographie —

Partie 1: Techniques par rayons X ou gamma à l'aide de film

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Contents

Page

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).

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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 44 *Welding and allied processes*, Subcommittee SC 5 *Testing and inspection of welds*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces ISO 17636-1:2013, which has been technically revised.

The main changes compared to the previous edition are as follows:

— the normative references have been updated;

— the figures have been updated;

— in 6.9 the lower thickness limit for Se-75 applications has been deleted;

— in 7.3.2 the lower thickness limit for Se-75 by agreement of contracting parties has been deleted;

— Update of references to the Figures 1 to 19 in the whole document;

— in 6.7 the usage of ASTM wires and other IQIs by agreement of contracting parties has been added;

— Clarification for measurement of optical density in the weld root;

— Clarification for IQI usage for DWDI technique;

— Addition of the acceptance of shorter wire visibility than 10 mm for pipes with an external diameter < 50 mm in 6.7 a);

— the document has been editorial revised.

A list of all parts in the ISO 17636 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: https://committee.iso.org/sites/tc44/home/interpretation.html

Introduction

This document specifies fundamental techniques of radiography with the objective of enabling satisfactory and repeatable results. The techniques are based on generally recognized practice and fundamental theory of the subject, inspection of fusion welded joints with industrial radiographic films.

Non-destructive testing of welds — Radiographic testing —

Part 1:
X- and gamma-ray techniques with film

1 Scope

This document specifies techniques of radiographic examination of fusion welded joints in metallic materials using industrial radiographic film techniques.

This document applies to the joints of plates and pipes. Besides its conventional meaning, "pipe" as used in this document it covers other cylindrical bodies such as tubes, penstocks, boiler drums, and pressure vessels.

NOTE This document complies with most requirements of ISO 5579 [1].

This document does not specify acceptance levels for any of the indications found on the radiographs.

If contracting parties apply lower test criteria, it is possible that the quality achieved is significantly lower than when this document is strictly applied.

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 5576, *Non-destructive testing — Industrial X-ray and gamma-ray radiology — Vocabulary*

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

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

ISO 11699-1, *Non-destructive testing — Industrial radiographic film — Part 1: Classification of film systems for industrial radiography*

ISO 11699-2, *Non-destructive testing — Industrial radiographic films — Part 2: Control of film processing by means of reference values*

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*

EN 12543 (all parts), *Non-destructive testing — Characteristics of focal spots in industrial X-ray systems for use in non-destructive testing*

EN 12679, *Non-destructive testing — Determination of the size of industrial radiographic sources — Radiographic method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5576 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
nominal thickness
t
nominal thickness of the parent material only where manufacturing tolerances do not have to be taken into account

3.2
penetration thickness change
Δt
change of penetrated thickness relative to the nominal thickness due to beam angle

3.3
penetrated thickness
w
thickness of material in the direction of the radiation beam calculated on the basis of the nominal thicknesses of all penetrated walls

3.4
object-to-film distance
b
distance between the radiation side of the radiographed part of the test object and the film surface measured along the central axis of the radiation beam

3.5
source size
d
size of the radiation source or focal spot size

Note 1 to entry: See EN 12679 or EN 12543.

3.6
source-to-film distance
SFD
distance between the source of radiation and the film measured in the direction of the beam

Note 1 to entry: SFD = $f + b$

where

f source-to-object distance

b object-to-film distance

3.7
source-to-object distance
f (SOD)
distance between the source of radiation and the source side of the test object measured along the central axis of the radiation beam

3.8
external diameter
D_e
nominal external diameter of the pipe

3.9
Region of Interest
RoI
minimum area which should be visible on the radiograph and contains the weld and the heat affected zone (HAZ) on both sides

3.10
Area of Interest
AoI
minimum area which should be visible on the radiograph and contains the weld, the heat affected zone HAZ on both sides and all IQIs

4 Symbols and abbreviated terms

For the purposes of this document, the symbols given in Table 1 apply.

Table 1 — Symbols and terms

Symbol	Term
b	object-to-film distance
b'	object-to-film distance perpendicular to test object
D_e	external diameter
d	source size
f	source-to-object distance
f'	source-to-object distance perpendicular to test object
f_{min}	minimum source-to-object distance
t	nominal thickness
Δt	penetration thickness change
w	penetrated thickness
F	film
IQI	image quality indicator
S	radiation source
SFD	source-to-film distance

NOTE Object-to-film distance (OFD) is equivalent to b.

Object-to-detector distance (ODD) as used in part 2 is equivalent to b.

The source-to-detector-distance (SDD) as used in digital radiography is equivalent to SFD.

The source-to-object distance (SOD) is equivalent to f.

5 Classification of radiographic techniques

The radiographic techniques are divided into two classes:

— Class A: basic techniques;

— Class B: improved techniques.

Class B techniques are used when class A might be insufficiently sensitive.

Radiographic techniques providing higher sensitivity than class B are possible and may be agreed between the contracting parties by specification of all appropriate test parameters.

The choice of radiographic technique shall be agreed between the contracting parties.