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**Non-destructive testing of steel  
tubes —**

**Part 7:  
Digital radiographic testing of the  
weld seam of welded steel tubes for  
the detection of imperfections**

*Essais non destructifs des tubes en acier —*

*Partie 7: Contrôle par radiographie numérique du cordon de soudure  
des tubes en acier soudés pour la détection des imperfections*



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# Contents

	Page
Foreword.....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 General requirements.....	3
5 Test equipment.....	3
6 Test method.....	4
7 Image quality.....	6
8 Image processing.....	11
9 Classification of indications.....	12
10 Acceptance limits.....	12
11 Acceptance.....	13
12 Image storage and display.....	13
13 Test report.....	13
Annex A (informative) Examples of distribution of imperfections.....	15
Bibliography.....	17

## 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](http://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](http://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 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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 19, *Technical delivery conditions for steel tubes for pressure purposes*.

This second edition cancels and replaces the first edition (ISO 10893-7:2011), which has been technically revised. The main changes compared with the previous edition are as follows:

- a) some terms and definitions from ISO 17636-2 have been included;
- b) a safety warning for X and gamma rays has been added at the end of [Clause 4](#);
- c) [Figure 2](#) has been aligned with ISO 17636-1 up to 1 000 kV;
- d) the symbols for mathematical formula have been changed in accordance with the ISO/IEC Directives;
- e) it has been clarified in [4.7](#) when the detector size is smaller than the applicable weld length;
- f) “contact technique” has been deleted from the test method in [Clause 6](#);
- g) a reference to ISO 17636-2 has been added in [6.8](#) for additional details related to spatial resolution;
- h) the requirements for duplex wire IQI position have been added in [Clause 7](#);
- i) a reference to ISO 17636-2 for the calibration of DDAs has been added in [Clause 8](#);
- j) [Figure 4](#) and the figures in [Annex A](#) have been revised.

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](http://www.iso.org/members.html).

## Introduction

Digital radiography has been used for the testing of longitudinal weld seams in submerged arc-welded steel tubes for some years. Digital radiography can be automated, and is considered to be more environmentally friendly than film-based radiographic techniques.

Digital radiography maintains the levels of security and availability afforded by X-ray film testing, which have been in place for many years. Images can be made available in a fraction of the time previously taken by film-based techniques, and usually at a lower exposure level and increased detector unsharpness when compared to film.

The storage and handling of digital images maintain the same levels of integrity available from film-based techniques, yet gain all the benefits associated with comprehensive data storage and retrieval systems.

Imaging systems are constantly under development, and an important aspect of this document is to qualify the use of those alternative systems currently available. This document describes the steps required to deliver these benefits.



# Non-destructive testing of steel tubes —

## Part 7:

# Digital radiographic testing of the weld seam of welded steel tubes for the detection of imperfections

## 1 Scope

This document specifies the requirements for digital radiographic X-ray testing by either computed radiography (CR) or radiography with digital detector arrays (DDAs) of the longitudinal or helical weld seams of automatic fusion arc-welded steel tubes for the detection of imperfections. This document specifies acceptance levels and calibration procedures.

It can also be applicable to the testing of circular hollow sections.

NOTE As an alternative, see ISO 10893-6 for film-based radiographic X-ray testing.

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

ISO 11484, *Steel products — Employer's qualification system for non-destructive testing (NDT) personnel*

ISO 17636-2:2013, *Non-destructive testing of welds — Radiographic testing — Part 2: X- and gamma-ray techniques with digital detectors*

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 19232-5, *Non-destructive testing — Image quality of radiographs — Part 5: Determination of the image unsharpness and basic spatial resolution value using duplex wire-type image quality indicators*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5576, ISO 11484 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/>