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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 radiographique 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 .....	2
5 Equipment .....	2
6 Test method .....	3
7 Image quality.....	5
8 Image processing .....	10
9 Classification of indications.....	11
10 Acceptance limits .....	11
11 Acceptance .....	11
12 Image storage and display .....	12
13 Test report.....	12
Annex A (informative) Examples of distribution of imperfections.....	14
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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 10893-7 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 19, *Technical delivery conditions for steel tubes for pressure purposes*.

ISO 10893 consists of the following parts, under the general title *Non-destructive testing of steel tubes*:

- *Part 1: Automated electromagnetic testing of seamless and welded (except submerged arc-welded) steel tubes for the verification of hydraulic leaktightness*
- *Part 2: Automated eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections*
- *Part 3: Automated full peripheral flux leakage testing of seamless and welded (except submerged arc-welded) ferromagnetic steel tubes for the detection of longitudinal and/or transverse imperfections*
- *Part 4: Liquid penetrant inspection of seamless and welded steel tubes for the detection of surface imperfections*
- *Part 5: Magnetic particle inspection of seamless and welded ferromagnetic steel tubes for the detection of surface imperfections*
- *Part 6: Radiographic testing of the weld seam of welded steel tubes for the detection of imperfections*
- *Part 7: Digital radiographic testing of the weld seam of welded steel tubes for the detection of imperfections*
- *Part 8: Automated ultrasonic testing of seamless and welded steel tubes for the detection of laminar imperfections*
- *Part 9: Automated ultrasonic testing for the detection of laminar imperfections in strip/plate used for the manufacture of welded steel tubes*
- *Part 10: Automated full peripheral ultrasonic testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of longitudinal and/or transverse imperfections*
- *Part 11: Automated ultrasonic testing of the weld seam of welded steel tubes for the detection of longitudinal and/or transverse imperfections*
- *Part 12: Automated full peripheral ultrasonic thickness testing of seamless and welded (except submerged arc-welded) steel tubes*

## 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 part of ISO 10893 is to qualify the use of those alternative systems currently available. This part of ISO 10893 describes the steps required to deliver these benefits.

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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

### 1 Scope

This part of ISO 10893 specifies the requirements for digital radiographic X-ray testing by either computed radiography (CR) or radiography with digital detector arrays (DDA) of the longitudinal or helical weld seams of automatic fusion arc-welded steel tubes for the detection of imperfections. This part of ISO 10893 specifies acceptance levels and calibration procedures.

This part of ISO 10893 can also be applicable to the testing of circular hollow sections.

### 2 Normative references

The following referenced documents are indispensable for the application 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 personnel*

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

ISO 17636, *Non-destructive testing of welds — Radiographic testing of fusion-welded joints*

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

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

ISO 19232-5, *Non-destructive testing — Image quality of radiographs — Part 5: Image quality indicators (duplex wire type) — Determination of image unsharpness value*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5576 and ISO 11484 and the following apply.

#### 3.1

##### **tube**

hollow long product open at both ends, of any cross-sectional shape

#### 3.2

##### **welded tube**

tube made by forming a hollow profile from a flat product and welding adjacent edges together, and which after welding can be further processed, either hot or cold, into its final dimensions