

Founding - Radiographic testing - Part 1: Film  
techniques

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 12681-1:2017 sisaldab Euroopa standardi EN 12681-1:2017 ingliskeelset teksti.	This Estonian standard EVS-EN 12681-1:2017 consists of the English text of the European standard EN 12681-1:2017.
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English Version

## Founding - Radiographic testing - Part 1: Film techniques

Fonderie - Contrôle par radiographie - Partie 1 :  
Techniques à l'aide de films

Gießereiwesen - Durchstrahlungsprüfung - Teil 1:  
Filmtechniken

This European Standard was approved by CEN on 16 July 2017.

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## European foreword

This document (EN 12681-1:2017) has been prepared by Technical Committee CEN/TC 190 “Foundry technology”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by May 2018, and conflicting national standards shall be withdrawn at the latest by May 2018.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 12681:2003.

Within its programme of work, Technical Committee CEN/TC 190 requested CEN/TC 190/WG 10 “Testing for inner discontinuities”:

- to revise EN 12681:2003 into EN 12681-1, *Founding — Radiographic testing — Part 1: Film techniques*;
- and to prepare a further standard EN 12681-2, *Founding — Radiographic testing — Part 2: Techniques with digital detectors*

Annex G covers the significant technical changes between this European Standard and EN 12681:2003.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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.

## Introduction

Radiography can be used to detect internal discontinuities in a casting. The discontinuities can be gas holes, non-metallic inclusions, shrinkage, cracks, inserts or chills or inclusions that have lower or higher densities than the parent metal. This European Standard gives acceptance criteria through severity levels.

## 1 Scope

This European Standard gives specific procedures for industrial X-ray and gamma radiography for discontinuity detection purposes, using NDT (Non-destructive testing) film techniques. This part of EN 12681 specifies the requirements for film radiographic testing of castings.

Films after exposure and processing become radiographs with different area of optical density. Radiographs are viewed and evaluated using industrial radiographic illuminators.

This part of EN 12681 specifies the recommended procedure for the choice of operating conditions and radiographic practice.

These procedures are applicable to castings produced by any casting process, especially for steel, cast iron, aluminium, cobalt, copper, magnesium, nickel, titanium, zinc and any alloys of them.

NOTE This European Standard considers EN ISO 5579.

This part of this European Standard does not apply to:

- radiographic testing of castings for aerospace applications (see prEN 2002-21);
- radiographic testing of welded joints (see EN ISO 17636-1);
- radiography with digital detectors (see EN 12681-2);
- radiosopic testing (see EN 13068, all parts).

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

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

EN 25580, *Non-destructive testing - Industrial radiographic illuminators - Minimum requirements (ISO 5580:1985)*

EN ISO 5579:2013, *Non-destructive testing - Radiographic testing of metallic materials using film and X-ray or gamma rays - Basic rules (ISO 5579:2013)*

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

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

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

EN 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 19232-1)*



EN 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 19232-2)*

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

ASTM E 1320:2010, *Reference Radiographs for Titanium Castings*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5576, EN ISO 5579 and the following apply.

#### 3.1

##### **wall thickness**

**$t$**

thickness as measured on the casting

#### 3.2

##### **nominal wall thickness**

**$t_n$**

thickness as specified on the drawing

#### 3.3

##### **penetrated thickness**

**$w$**

thickness of material in the direction of the radiation beam calculated on the basis of the real thicknesses of all penetrated walls

#### 3.4

##### **source size**

**$d$**

size of the radiation source or focal spot size

[SOURCE: EN ISO 5579:2013, definition 3.4]

#### 3.5

##### **object-to-film distance**

**$b$**

largest (maximum) distance between the source side of the radiographed part of the test object and the film surface measured along the central axis of the radiation beam

#### 3.6

##### **source-to-object distance**

**$f$**

distance between the source of radiation and the source side of the test object, most distant from the film, measured along the central axis of the radiation beam