



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 37910.1-2019

**Non-destructive testing of welds -- Acceptance levels for
radiographic testing -- Part 1: Steel, nickel, titanium and their
alloys**

Issued on: August 30, 2019

Implemented on: March 1, 2020

Issued by: SAMR; SAC

Table of Contents

Foreword...	3
1 Scope...	5
2 Normative references...	5
3 Radiographic technique...	6
4 General...	6
5 Acceptance levels...	6
Annex A (Informative) Guide to the limitations of radiographic testing...	10

Foreword

GB/T 37910, Non-destructive testing of welds - Acceptance levels for radiographic testing, comprises the following two parts:

- Part 1: Steel, nickel, titanium and their alloys;
- Part 2: Aluminium and its alloys;

This Part is the 1st part of GB/T 37910.

This Part was drafted in accordance with the rules given in GB/T 1.1-2009.

This Part was redrafted by modifying and adopting ISO 10675-1:2016, Non-destructive testing of welds - Acceptance levels for radiographic testing - Part 1: Steel, nickel, titanium and their alloys.

The significant technical changes and their reasons with respect to ISO 10675-1:2016 are as follows:

-- with respect to normative references, some adjustments are made in this Part resulting in some technical differences, in order to adapt to the technical conditions in China. The adjustments are intensively reflected in "Normative references" of Clause 2. This Part:

? uses GB/T 3323.1 modifying and adopting the international standard to replace ISO 17636-1 (see Clauses 1 and 3, and Annex A);

? uses GB/T 3323.2 modifying and adopting the international standard to

replace ISO 17636-2 (see Clauses 1 and 3, and Annex A);

? uses GB/T 32259 modifying and adopting the international standard to

replace ISO 17637 (see Clause 4);

? uses GB/T 6417.1 identically adopting the international standard to replace

ISO 6520-1 (see Clause 5, and Tables 2, 3 and A.1);

? in accordance with ISO 5817, adds the acceptance requirements that the

clustered localized porosity need to satisfy the gas pores for the spherical

gas pores for the convenience of use (see Table 2).

This Part was proposed by and shall be under the jurisdiction of National Technical

Committee 55 on Welding of Standardization Administration of China (SAC/TC 55).

The drafting organizations of this Part: Shanghai Research Institute of Materials, China

Nuclear Power Engineering Co., Ltd., Guangzhou Special Pressure Equipment

Inspection and Research Institute, Shanghai Qinhe Welding Technique Development

Co., Ltd., Offshore Oil Engineering Co., Ltd., Xiamen Special Equipment Inspection

Institute, Shanghai Astropulsion Co., Ltd., Tianjin Special Equipment Inspection

Non-destructive testing of welds - Acceptance levels

for radiographic testing - Part 1: Steel, nickel, titanium

and their alloys

1 Scope

This Part of GB/T 37910 specifies acceptance levels for indications from imperfections

in butt welds of steel, nickel, titanium and their alloys detected by radiographic testing.

If agreed, the acceptance levels can be applied to other types of welds or materials.

The acceptance levels can be related to welding standards, application standards,

specifications or codes. This Part assumes that the radiographic testing has been

carried out in accordance with GB/T 3323.1 or GB/T 3323.2. When assessing whether

a weld meets the requirements specified for a weld quality level, the sizes of

imperfections permitted by standards are compared with the dimensions of indications

revealed by a radiograph made of the weld.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition dated applies to this document. For undated references, the latest edition of the referenced documents (including all amendments) applies to this document.

GB/T 3323.1, Non-destructive testing of welds - Radiographic testing - Part 1: X- and gamma-ray techniques with film (GB/T 3323.1-2019, ISO 17636-1:2013, MOD)

GB/T 3323.2, Non-destructive testing of welds - Radiographic testing - Part 2: X- and gamma-ray techniques with digital detectors (GB/T 3323.2-2019, ISO 17636-2:2013, MOD)

GB/T 6417.1, Welding and allied processes - Classification of geometric imperfections in metallic materials - Part 1: Fusion welding (GB/T 6417.1-2005, ISO 6520-1:1998, IDT)

GB/T 32259, Non-destructive testing of welds - Visual testing of fusion-welded joints (GB/T 32259-2015, ISO 17637:2003, MOD)

- A sum of projected areas of indications related to each $L \times W_p$, in % (see Annex B);
- b width of excess penetration of weld, in millimetres;
- d diameter of pore, in millimetres;
- dA diameter of pore envelope area, in millimeters;
- h width of indication, the width or height of surface imperfection, in millimetres;
- L any 100 mm testing length, in millimeters;
- l length of indication, in millimetres;
- s nominal butt weld thickness, in millimetres;
- t base material thickness, in millimetres;
- W_p width of the weld, in millimetres;
- $\sum l$ summary length of imperfections within L, in millimetres.

If the interval between any two adjacent imperfections is less than or equal to the main

dimension of the smaller imperfection, they shall be deemed to be one imperfection.

For the calculation of accumulative areas of imperfections see Annex C.

Indications shall not be divided into different Ls.

Annex A

(Informative)

Guide to the limitations of radiographic testing

A.1 General

The numbers between brackets conform to those used in GB/T 6417.1.

A.2 Volumetric imperfections in butt welds

Volumetric imperfections in butt welds:

- Porosities (2011), clustered porosities (2013), elongated cavities (2015) and gas pores (2017)
- Elongated cavities (2015) and wormholes (2016)
- Solid inclusions (300)
- Copper inclusions (3042)

The above imperfections listed in Table 2 will be readily detected using radiographic technique A or B of GB/T 3323.1 or GB/T 3323.2 as shown in Table 1.

A.3 Cracks in butt welds

Cracks in butt welds:

- Crater cracks (104)
- Cracks (100)

The detectability of cracks by radiographic testing depends on the crack height, the ramification (presence of branching parts), opening width, direction of the X-ray beam to crack orientation and radiographic technique parameters.

Reliable detection of all cracks is therefore limited. The use of radiographic technique B or better, as specified in GB/T 3323.1 or GB/T 3323.2, will provide better crack detectability than radiographic technique A.

A.4 Planar imperfections in butt welds