

# SVENSK STANDARD

## SS-EN ISO 11666:2018



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### **Oförstörande provning av svetsar – Ultraljudsprovning – Acceptansnivåer (ISO 11666:2018)**

### **Non-destructive testing of welds – Ultrasonic testing – Acceptance levels (ISO 11666:2018)**



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Europastandarden EN ISO 11666:2018 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 11666:2018.

Denna standard ersätter SS-EN ISO 11666:2011, utgåva 1.

The European Standard EN ISO 11666:2018 has the status of a Swedish Standard. This document contains the official version of EN ISO 11666:2018.

This standard supersedes the Swedish Standard SS-EN ISO 11666:2011, edition 1.

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EUROPEAN STANDARD

EN ISO 11666

NORME EUROPÉENNE

EUROPÄISCHE NORM

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Supersedes EN ISO 11666:2010

English Version

## Non-destructive testing of welds - Ultrasonic testing - Acceptance levels (ISO 11666:2018)

Essais non destructifs des assemblages soudés -  
Contrôle par ultrasons - Niveaux d'acceptation (ISO  
11666:2018)

Zerstörungsfreie Prüfung von Schweißverbindungen -  
Ultraschallprüfung - Zulässigkeitsgrenzen (ISO  
11666:2018)

This European Standard was approved by CEN on 21 January 2018.

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**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN ISO 11666:2018) has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" in collaboration with Technical Committee CEN/TC 121 "Welding and allied processes", 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of an identical text or by endorsement, at the latest by August 2018, and conflicting national standards shall be withdrawn at the latest by August 2018.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 ISO 11666:2010.

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## Endorsement notice

The text of ISO 11666:2018 has been approved by CEN as EN ISO 11666:2018 without any modification.





# Non-destructive testing of welds — Ultrasonic testing — Acceptance levels

## 1 Scope

This document specifies two ultrasonic acceptance levels known as acceptance level 2 (AL 2) and acceptance level 3 (AL 3) for full penetration welded joints in ferritic steels, which correspond to ISO 5817:2014, quality levels B and C. An acceptance level corresponding to ISO 5817:2014, quality level D is not included in this document, as ultrasonic testing is generally not requested for this weld quality.

These acceptance levels are applicable to testing carried out in accordance with ISO 17640.

This document applies to the testing of full penetration ferritic steel welds, with thicknesses from 8 mm to 100 mm. It can also be used for other types of welds, materials and thicknesses, provided the tests have been performed with necessary consideration of the geometry and acoustic properties of the component, and an adequate sensitivity can be employed to enable the acceptance levels of this document to be applied. The nominal frequency of probes used in this document is between 2 MHz and 5 MHz, unless attenuation or requirements for higher resolution call for other frequencies. It is important to consider the use of these acceptance levels in conjunction with frequencies outside this range carefully.

## 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 5577, *Non-destructive testing — Ultrasonic testing — Vocabulary*

ISO 5817:2014, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections*

ISO 17635, *Non-destructive testing of welds — General rules for metallic materials*

ISO 17640, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment*

ISO 23279, *Non-destructive testing of welds — Ultrasonic testing — Characterization of discontinuities in welds*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5577 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/>

**SS-EN ISO 11666:2018 (E)**

**4 Determination of discontinuity length**

The length of a discontinuity shall be determined by measuring the distance along the length over which the echo amplitude is above the evaluation level, using the fixed-amplitude level technique specified in [Annex B](#).

**5 Sensitivity setting and levels**

The sensitivity setting shall be performed by one of the following techniques. For sensitivity setting and the subsequent testing, the same technique shall be used.

- a) Technique 1: based on 3 mm diameter side-drilled holes.
- b) Technique 2: based on distance-gain-size (DGS) curves for flat-bottomed holes (disk-shaped reflectors).
- c) Technique 3: using a distance-amplitude-corrected (DAC) curve of a rectangular notch of 1 mm depth and 1 mm width.
- d) Technique 4: using the tandem technique with reference to a 6 mm diameter flat-bottomed hole (disk-shaped reflector).

Four levels as defined in ISO 17640 are to be used:

- a) reference level;
- b) acceptance levels (for two quality levels);
- c) recording levels (recording levels are 4 dB below the corresponding acceptance levels);
- d) evaluation level.

All levels are linked to the reference reflectors specified in [Table A.1](#).

The sensitivity setting techniques and corresponding levels shall be in accordance with [Annex A](#).

**6 Acceptance levels**

**6.1 General**

The relationship between acceptance levels, testing levels and quality levels is given in ISO 17635. See also [Table 1](#).

**Table 1 — Ultrasonic pulse-echo technique (UT)**

Quality level in accordance with ISO 5817:2014	Testing level in accordance with ISO 17640 <sup>a</sup>	Acceptance level in accordance with this document
B	At least B	2
C	At least A	3
D	At least A	3 <sup>b</sup>
<sup>a</sup> When characterization of discontinuities is required, ISO 23279 shall be applied. <sup>b</sup> UT is not recommended but may be defined in a specification (with the same requirements as quality level C).		

The acceptance levels in this document are valid for all testing levels and for all techniques as defined in ISO 17640, including tests with straight-beam probes.

If characterization has been specified in accordance with ISO 23279, planar discontinuities are not acceptable and for non-planar discontinuities, the acceptance levels in this document apply.

If characterization has not been specified, the acceptance levels in this document apply to all discontinuities.

## 6.2 Indications from longitudinal discontinuities

[Table A.1](#) gives information on the techniques used for evaluation of discontinuities according to ISO 17640 and the related evaluation and acceptance levels. [Table A.2](#) specifies the reference levels for acceptance levels 2 and 3 for technique 2 using angle-beam scanning with transverse waves. [Table A.3](#) specifies the reference levels for acceptance levels 2 and 3 for technique 2 using straight-beam scanning with longitudinal waves.

For techniques 1 (side-drilled holes) and 3 (rectangular notch), see [Figures A.1](#) to [A.4](#).

For techniques 2 [flat-bottomed holes (disk-shaped reflectors)] and 4 (tandem technique), see [Figures A.5](#) to [A.10](#).

Any discontinuities providing an amplitude below the acceptance level but with a length (above evaluation level) exceeding  $t$ , for the thickness range of  $8 \text{ mm} \leq t < 15 \text{ mm}$ , or  $t/2$  or 20 mm, whichever is larger, for all other thickness ranges, shall be subject to further testing. This requires the use of additional beam angle(s), and, if specified, the tandem technique.

The final evaluation shall be based on the maximum echo amplitude and length measured.

## 6.3 Indications from transverse discontinuities

When detection of transverse discontinuities is specified, the acceptance levels stated in [6.2](#) apply.

## 6.4 Grouping of discontinuities

Grouping of discontinuities is based on the length and the separation of individually acceptable discontinuities providing amplitudes above the recording level. The length of a group shall not be used for further grouping.

For evaluation, a group of discontinuities shall be considered as a single one if:

- a) the distance,  $d_x$ , between two discontinuities is less than twice the length of the longer discontinuity (see [Figure 1](#));
- b) the distance,  $d_y$ , between two discontinuities is less than half of the thickness but not more than 10 mm; and
- c) the distance,  $d_z$ , between two discontinuities is less than half of the thickness but not more than 10 mm.

The combined length of the group of two discontinuities is  $l_{12} = l_1 + l_2 + d_x$  (see [Figure 2](#)).

The combined length,  $l_{12}$ , and the larger maximum amplitude of the two discontinuities shall then be assessed against the applicable acceptance levels given in [Table A.1](#).