
**Non-destructive testing of welds —
Magnetic particle testing of welds —
Acceptance levels**

*Contrôle non destructif des assemblages soudés — Contrôle par
magnétoscopie des soudures — Niveaux d'acceptation*

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Foreword

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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 23278 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding* (as EN 1291:1998 and its Amd.1:2002 and Amd.2:2003), and was adopted, under a special “fast-track procedure”, by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 5, *Testing and inspection of welds*, in parallel with its approval by the ISO member bodies.

This document constitutes a consolidated version.

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 5 via your national standards body. A complete listing of these bodies can be found at <http://www.iso.org>.

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Non-destructive testing of welds — Magnetic particle testing of welds — Acceptance levels

1 Scope

This International Standard specifies acceptance levels for indications from imperfections in ferromagnetic steel welds detected by magnetic particle testing.

The acceptance levels are primarily intended for use during manufacture examination, but where appropriate they can be used for in-service inspection.

The acceptance levels in this International Standard are based on detection capabilities that can be expected when using techniques specified in ISO 17638 and parameters recommended in Annex A. The acceptance levels can be related to welding standards, application standards, specifications or codes. Such a relationship is shown in ISO 17635 for ISO 5817.

2 Normative references

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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 5817, *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 fusion welds in metallic materials*

ISO 17638, *Non-destructive testing of welds — Magnetic particle testing*

ISO/TS 18173, *Non-destructive testing — General terms and definitions*

EN 1330-2, *Non-destructive testing — Terminology — Part 2: Terms common to the non-destructive testing methods*

EN 1330-7, *Non-destructive testing — Terminology — Part 7: Terms used in magnetic particle testing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 18173, EN 1330-2 and EN 1330-7 and the following apply.

3.1

linear indication

indication having a length greater than three times its width

3.2

non-linear indication

indication having a length less than or equal to three times its width

4 Testing parameters

Many parameters, either individually or in combination, will affect the ability of a technique to detect imperfections of a given size and orientation with respect to the condition of the test surface.

Detection of small imperfections is highly dependent on the surface condition of the weld and the detection media used. Examples of the application of these parameters to give a high probability of detection are given in Annex A.

5 Acceptance levels

5.1 General

The width of the test surface shall include the weld metal and the adjacent parent metal up to a distance of 10 mm on each side.

Acceptance levels prescribed for linear indications are those corresponding to the evaluation level. Indications lower than this shall not be taken into account. Normally, acceptable indications shall not be recorded.

Local grinding may be used to improve the classification of all or just part of a test surface, when it is required to work to a higher detection limit than that expected by the existing weld surface condition.

Acceptance levels are given in Table 1.

Table 1 — Acceptance levels for indications
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Dimensions in millimetres

Type of indication	ISO 23278:2006 Acceptance level ^a		
	1	2	3
Linear indication <i>l</i> = length of indication	$l \leq 1,5$	$l \leq 3$	$l \leq 6$
Non-linear indication <i>d</i> = major axis dimension	$d \leq 2$	$d \leq 3$	$d \leq 4$

^a Acceptance levels 2 and 3 may be specified with a suffix "X" which denotes that all linear indications detected shall be assessed to level 1. However the probability of detection of indications smaller than those denoted by the original acceptance level can be low.

5.2 Grouped indications

Any adjacent indications separated by less than the major dimension of the smaller shall be assessed as a single, continuous indication.

Grouped indications shall be evaluated in accordance with application standards.

5.3 Removal of imperfections

Where the product specification permits, local grinding may be used to reduce or remove imperfections which are the cause of unacceptable indications. All such areas shall be re-tested and evaluated with the same magnetic system and technique.

Annex A (informative)

Recommended testing parameters

Recommended testing parameters for reliable detection of small imperfections are given in Table A.1. The surfaces are in the as-welded condition. It can be necessary to improve the surface condition, e.g. by abrasive paper or local grinding, to permit accurate interpretation of indications. The detection media are given in order of preference.

Table A.1 — Recommended testing parameters

Acceptance level	Surface condition	Detection media
1	Fine surface ^a	Fluorescent or colour contrast with contrast aid
2	Smooth surface ^b	Fluorescent or colour contrast with contrast aid
3	General surface ^c	Colour contrast with contrast aid or fluorescent

^a The weld cap and parent material offer smooth clean surfaces with negligible undercut, rippling and spatter. The surface finish is typical of welds, made by automatic TIG-welding; submerged arc welding (fully mechanized) and manual metal arc welding with iron powder electrodes.

^b The weld cap and parent material offer reasonably smooth surfaces with minimal undercut, rippling and spatter. The surface finish is typical of welds made by manual metal arc welding vertical downwards and MAG-welding using argon rich gas for the capping runs.

^c The weld cap and parent material are in the as-welded condition. The surface finish is typical of welds made by manual metal arc welding or MAG-welding in any position.

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