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

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National foreword

This British Standard is the UK implementation of EN ISO 23278:2015. It supersedes BS EN ISO 23278:2009 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/46, Non-destructive testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Contrôle non destructif des assemblages soudés - Contrôle par magnétoscopie - Niveaux d'acceptation (ISO 23278:2015)

Zerstörungsfreie Prüfung von Schweißverbindungen - Magnetpulverprüfung von Schweißverbindungen - Zulässigkeitsgrenzen (ISO 23278:2015)

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Foreword

This document (EN ISO 23278:2015) 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of an identical text or by endorsement, at the latest by September 2015, and conflicting national standards shall be withdrawn at the latest by September 2015.

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 5, *Testing and inspection of welds*.

This second edition cancels and replaces the first edition (ISO 23278:2006), which has been technically revised.

Non-destructive testing of welds — Magnetic particle testing — 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.

NOTE They can also 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.

Acceptance levels for grouped indications are not covered by this International Standard.

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.

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 18173 and the following apply.

3.1
linear indication
l
indication having a length greater than three times its width

3.2
non-linear indication
d
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. Acceptable indications do not have to be recorded.

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

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 from imperfections

Dimensions in millimetres

Type of indication	Acceptance level[a]		
	1	2	3
Linear indication l = length of indication	$l \leqslant 1{,}5$	$l \leqslant 3$	$l \leqslant 6$
Non-linear indication d = major axis dimension	$d \leqslant 2$	$d \leqslant 3$	$d \leqslant 4$

[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 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 may 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 with low sensitivity

[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.

Bibliography

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

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

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

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