

Non-destructive testing of welds — Ultrasonic testing — Characterization of indications in welds

The European Standard EN 1713:1998, with the incorporation of amendments A1:2002 and A2:2003, has the status of a British Standard

ICS 25.160.40

National foreword

This British Standard is the English language version of EN 1713:1998, including amendments A1:2002 and A2:2003.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to CEN text carry the number of the amendment. For example, text altered by CEN amendment A1 is indicated by **A1** **A1**.

As agreed by CEN/TC 121/SC 5 resolution 134/2000 and in accordance with amendment A1:2002, the term “examination” has been replaced by “testing” throughout the document.

The UK participation in its preparation was entrusted to Technical Committee WEE/46, Non-destructive testing, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 September 1998

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 16, an inside back cover and a back cover.

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Amendments issued since publication

Amd. No.	Date	Comments
13989	15 November 2002	See national foreword
14940	27 April 2004	Revision of foreword and deletion of Annex ZA

ISBN 0 580 29987 2

Non-destructive testing of welds — Ultrasonic testing — Characterization of indications in welds

(includes amendments A1:2002 and A2:2003)

Contrôle non destructif des assemblages soudés —
Contrôle par ultrasons —
Caractérisation des indications dans les
assemblages soudés
(inclut les amendements A1:2002 et A2:2003)

Zerstörungsfreie Prüfung von
Schweißverbindungen —
Ultraschallprüfung —
Charakterisierung von Anzeigen in Schweißnähten
(enthält Änderungen A1:2002 und A2:2003)

This European Standard was approved by CEN on 1 May 1998, amendment A1 was approved by CEN on 1 May 2002 and amendment A2 was approved on 20 November 2003.

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CEN

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 121, Welding, the Secretariat of which is held by DS.

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 November 1998, and conflicting national standards shall be withdrawn at the latest by November 1998.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A1

This document EN 1713:1998/A1:2002 has been prepared by Technical Committee CEN/TC 121, Welding, the Secretariat of which is held by DS.

This amendment to the European Standard EN 1713:1998 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

Annex A is normative.

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Foreword to amendment A2

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This amendment to the European Standard EN 1713:1998 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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Introduction

Classification of indications as planar or non-planar is based on several parameters:

- welding techniques;
- geometrical position of the indication;
- maximum echo height;
- directional reflectivity;
- echostatic pattern (i.e. A-Scan);
- echodynamic pattern.

The process of classification involves testing each of the parameters against all the others in order to arrive at an accurate conclusion.

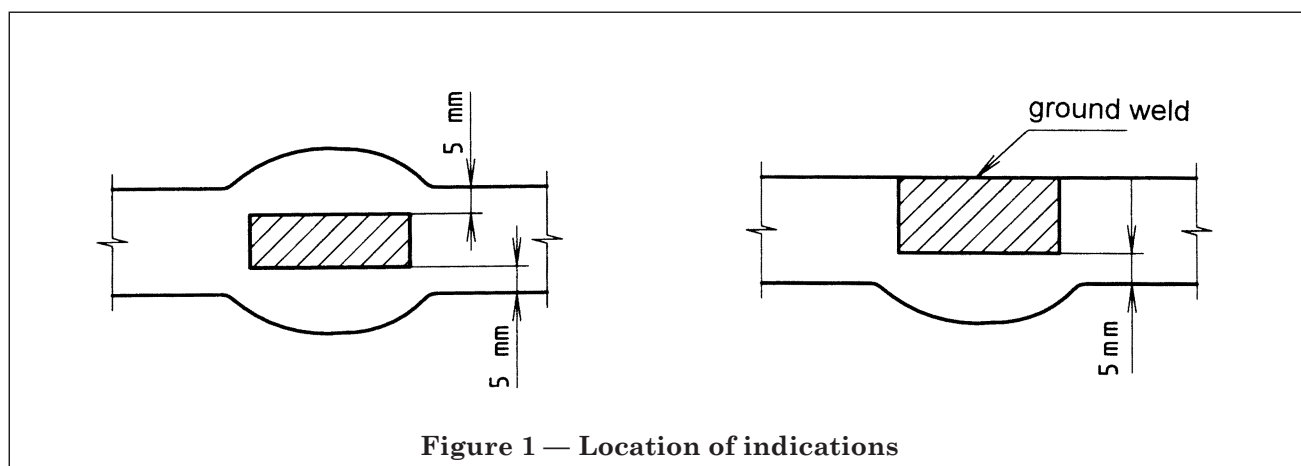
For guidance, the flowchart in Annex A gives the classification of internal weld indications suitable for general applications. This flowchart should be applied in conjunction with the two first parameters listed above and not taken in isolation.

Such classification should only be carried out, in accordance with EN 1712, if $\sqrt{A_1}$ defined by specification. $\sqrt{A_1}$

1 Scope

This standard defines a flowchart procedure, see Annex A, which is devoted to the classification of internal indications as planar or non-planar.

This standard is only suitable for indications located at least 5 mm below the unground surface of the joint, see Figure 1.



2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1712, *Non destructive testing of welds — Ultrasonic testing of welded joints — Acceptance levels.*

3 Description

3.1 General

The classification is carried out by the successive application of several discriminatory criteria namely:

- echo amplitude;
- directional reflectivity;
- echostatic pattern (A-Scan);
- echodynamic pattern.

The flowchart procedure is stopped as soon as one of the above criteria is fulfilled.

The probes used for the classification are, as a general rule, the same as those specified for the detection.

The flowchart procedure standardizes a quality control system of classification. Several levels are defined in decibels (dB) by a comparison with the distance amplitude curve (DAC) or by a comparison between the maximum echo heights from the discontinuity when tested at different angles of incidence.

Proposed dB levels for the different stages in the flowchart procedure are given in Table A.1.

Table 1 — Different stages in the flowchart procedure

S1	S2	S3	S4
DAC – 10 dB	DAC + 6 dB	DAC – 6 dB	9 dB/15 dB

The flowchart procedure calls for five stages, each of them having a precise aim:

- 1st stage: to avoid the classification of indications with very low echo amplitudes;
- 2nd stage: to classify all indications with high echo amplitude as planar;
- 3rd stage: primarily to classify lack of fusion;
- 4th stage: primarily to classify inclusions;
- 5th stage: primarily to classify cracks.

NOTE The “hybrid” indications resulting from the association of an inclusion and lack of fusion are classified as planar by the flowchart procedure. An example of this type of flaw is given in Figure A.3.

3.2 Conventions used

The reference echoes shall be obtained on 3 mm side drilled holes.

By convention:

- a negative level value means that the indication has a lower echo amplitude than the reference;
- a positive level value means that the indication has a higher echo amplitude than the reference.

3.3 Echo height criteria

3.3.1 Low amplitudes (stage 1)

It is accepted that an indication with a lower echo amplitude than level S1 (DAC – 10 dB) is not significant.

For special applications this value S1 should be lowered if $\overline{A_1}$ defined by specification. $\overline{A_1}$

3.3.2 High amplitudes (stage 2)

It is assumed that an echo height that is at least equal to the level S2 (DAC + 6dB) comes from a planar indication.

3.4 Directional reflectivity criteria (stage 3)

This stage of the flowchart procedure shall be applicable either to all indications or, if $\overline{A_1}$ defined by specification $\overline{A_1}$, only to those indications exceeding a specified length. For the range of thicknesses $8 \text{ mm} \leq t < 15 \text{ mm}$, this length is t and for thicknesses over 15 mm, this length is $t/2$ or 20 mm, whichever is the larger. For indications not exceeding the specified length, proceed to stage 4.

For the criteria below, the angle of incidence of testing which gives the highest echo amplitude, relative to a DAC curve, is taken as reference (H_{dmax}). The minimum echo amplitude, relative to a DAC curve, obtained from the other angles of incidence (H_{dmin}), is compared with H_{dmax} .