



SLOVENSKI STANDARD
SIST EN 13100-3:2005

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Non destructive testing of welded joints in thermoplastics semi-finished products - Part 3:
Ultrasonic testing

Zerstörungsfreie Prüfung von Schweißverbindungen thermoplastischer Kunststoffe - Teil
3: Ultraschallprüfung

Contrôle non destructif des assemblages soudés sur produits semi-finis en
thermoplastiques - Partie 3 : Contrôle par ultrasons

Ta slovenski standard je istoveten z: EN 13100-3:2004

ICS:

25.160.40 Varjeni spoji in vari Welded joints

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EUROPEAN STANDARD
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Non destructive testing of welded joints in thermoplastics semi-finished products - Part 3: Ultrasonic testing

Contrôle non destructif des assemblages soudés sur produits semi-finis en thermoplastiques - Partie 3 : Contrôle par ultrasons

Zerstörungsfreie Prüfung von Schweißverbindungen thermoplastischer Kunststoffe - Teil 3: Ultraschallprüfung

This European Standard was approved by CEN on 14 October 2004.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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EN 13100-3:2004 (E)**Foreword**

This document (EN 13100-3:2004) has been prepared by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by IBN.

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 May 2005, and conflicting national standards shall be withdrawn at the latest by May 2005.

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

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1 Scope

This document specifies methods for the manual ultrasonic examination of heated tool, electrofusion, extrusion and hot gas joints in plastics materials. It applies to joints in single wall pipes and plates. The range of thicknesses covered is from 10 mm to 100 mm.

This document does not specify acceptance levels of the indications.

2 Normative references

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.

EN 473, *Non-destructive testing — Qualification and certification of NDT personnel — General principles*

EN 583-2, *Non-destructive testing — Ultrasonic examination — Part 2: Sensitivity and range setting*

EN 583-4, *Non-destructive testing — Ultrasonic examination — Part 4: Examination for discontinuities perpendicular to the surface*

EN 1330-2:1998, *Non-destructive testing — Terminology — Part 2: Terms common to the non-destructive testing methods*

EN 1330-4:2000, *Non-destructive testing — Terminology — Part 4: Terms used in ultrasonic testing*

EN 12668-1, *Non-destructive testing — Characterization and verification of ultrasonic examination equipment — Part 1: Instruments*

EN 12668-2, *Non-destructive testing — Characterization and verification of ultrasonic examination equipment — Part 2: Probes*

EN 12668-3, *Non-destructive testing — Characterization and verification of ultrasonic examination equipment — Part 3: Combined equipment*

ENV 583-6, *Non-destructive testing — Ultrasonic examination — Part 6: Time-of-flight diffraction technique as a method for detection and sizing of discontinuities*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1330-2:1998 and EN 1330-4:2000 apply.

4 Symbols and designations

Symbols and designations are given in Table 1.

Table 1 — Symbols and designations

Symbol	Designations	Unit
t	Thickness of parent material (thinnest part)	mm
l	Length of the indication	mm
h	Extension of the indication in depth direction	mm
x	Position of the indication in the longitudinal direction	mm
y	Position of the indication in the transverse direction	mm
z	Position of the indication in depth	mm
D	Diameter of the component	mm
a	Dimension of the wedge in the direction of examination	mm

5 General

The purpose of this document is to describe general methods of ultrasonic examination for the most commonly used welded joints in thermoplastics. The specific requirements specified by this document cover the equipment, preparation, performance of the examination and reporting. Methods to be used for ultrasonic assessment of indications and acceptance criteria shall be specified.

6 Information required prior to examination

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6.1 Examination procedure

The following items shall be specified:

- method for setting the reference level;
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- method to be used for evaluation of indications;
- acceptance levels;
- examination level;
- manufacturing and operation stage(s) at which the examination is to be carried out;
- qualification of personnel;
- whether or not a written examination procedure is required;
- requirements for written examination procedures.

6.2 Information required by the operator

Before any examination of a welded joint can begin, the operator shall have access to the following information:

- written examination procedure, if required (see 6.3);
- type(s) of parent material;
- joint preparation and dimensions;

- welding procedure or relevant information on the welding process;
- reporting requirements.

6.3 Written examination procedure

The definitions and requirements in this document will normally satisfy the need for a written examination procedure. When this is not the case, or when the techniques described in this document are not applicable to the welded joint to be examined, additional written examination procedures shall be used.

7 Requirements for personnel and equipment

7.1 Personnel qualifications

Personnel performing examinations in accordance with this document shall be qualified to an appropriate level in accordance with the relevant document, e.g. EN 473.

In addition to a general knowledge of ultrasonic weld inspection, the personnel shall be aware of testing problems specifically associated with the thermoplastic material and type of welded joints to be examined.

7.2 Equipment

Any equipment used in conjunction with this document shall comply with the requirements of EN 12668-1 to EN 12668-3. Prior to the publication of a document related to the subject, the corresponding national documents may be used.

7.3 Probe parameters

7.3.1 Frequency

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Only longitudinal (compression) wave transducers shall be used for the inspection of thermoplastics. The frequency of the transducers shall be in the range 1 MHz to 5 MHz and shall be chosen such that flaw sensitivity is maximised without compromising signal-to-noise performance.

To improve signal-to-noise performance piezo-composite transducers may be used.

7.3.2 Angles of incidence

The probe angle(s) used shall ensure that the weld fusion face(s) are examined at, or as near as possible to, normal incidence. This means that for electrofusion joints, for example, a 0° probe angle shall be used.

7.3.3 Focusing

For the examination of electrofusion joints focusing probes should be used. These probes shall be focused to the depth of the welded interfaces, i.e. their focal distance shall be equal to the wall thickness of the socket.

Focused probes should not be used for the examination of heated tool, extrusion or hot gas welded joints unless otherwise specified.

7.3.4 Wedge material

Wedges should be made of PTFE.

EN 13100-3:2004 (E)**7.3.5 Adoption of probes to curved scanning surfaces**

The gap between the test surface and the bottom of the wedge shall not be greater than 0,5 mm. For cylindrical or spherical surfaces this requirement will normally be met when the following equation is fulfilled:

$$D \geq 15 a$$

If this requirement cannot be met, the wedge shall be adapted to the surface and the sensitivity and range shall be set accordingly.

8 Examination volume

The examination volume (see Figure 1) shall include weld and parent material for at least 5 mm on each side of the weld, or the width of the heat affected zone, whichever is greater.

In all cases scanning shall cover the whole examination volume. If individual sections of this volume cannot be covered by a single scanning technique, alternative or supplementary ultrasonic techniques shall be used.

9 Preparation of scanning surfaces

Scanning surfaces shall be wide enough to permit the examination volume to be fully covered. Alternatively, the width of the scanning surfaces may be smaller if equivalent coverage of the examination volume can be achieved by scanning either from both sides of the joint or from both the upper and the lower surface of the joint.

Scanning surfaces shall be even and free from foreign matter likely to interfere with probe coupling (e.g. soil, notches, grooves etc.). Unevenness of the test surface shall not result in a gap between the probe and test surface greater than 0,5 mm

The examination can be performed with either the weld bead intact or removed.