SLOVENSKI STANDARD
SIST EN 61102:2002/A1:2002
01-september-2002

Measurement and characterisation of ultrasonic fields using hydrophones in the frequency range 0,5 MHz to 15 MHz (IEC 61102:1991/A1:1993)

Measurement and characterisation of ultrasonic fields using hydrophones in the frequency range 0,5 MHz to 15 MHz

Messung und Charakterisierung von Ultraschallfeldern mit Hydrophonen im Frequenzbereich von 0,5 MHz bis 15 MHz

Mesurage et caractrisation des champs ultrasonores l'aide d'hydrophones dans la gamme de frquences de 0,5 MHz 15 MHz

Ta slovenski standard je istoveten z: EN 61102:1993/A1:1994

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Amendment A1 to the English version of EN 61102

Measurement and characterisation of ultrasonic fields using hydrophones in the frequency range 0,5 MHz to 15 MHz (IEC 1102:1991/A1:1993)

Mesurage et caractérisation des champs ultrasonores à l'aide d'hydrophones dans la gamme de fréquences de 0,5 MHz à 15 MHz (CEI 1102:1991/A1:1993)

Messung und Beschreibung von Ultraschallfeldern mit Hydrophonen im Frequenzbereich von 0,5 MHz bis 15 MHz (IEC 1102:1991/A1:1993)

This amendment A1 modifies the European Standard EN 61102:1993. It was approved by CENELEC on 1993-12-08. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 CENELEC member.

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

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

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FOREWORD

The text of document 87(CO)30, as prepared by IEC Technical Committee 87: Ultrasonics, was submitted to the IEC-CENELEC parallel vote in April 1993.

The reference document was approved by CENELEC as amendment A1 to EN 61102 on 8 December 1993.

The following dates were fixed:

- latest date of publication of an identical national standard	(dop)	1994-12-01
- latest date of withdrawal of conflicting national standards	(dow)	1994-12-01

ENDORSEMENT NOTICE

The text of amendment 1:1993 to the International Standard IEC 1102:1991 was approved by CENELEC as an amendment to the European Standard without any modification.

NORME INTERNATIONALE
INTERNATIONAL STANDARD

CEI
IEC
1102

1991

AMENDEMENT 1
AMENDMENT 1

1993-09

Amendement 1

Mesurage et caractérisation des champs ultrasonores à l'aide d'hydrophones dans la gamme de fréquences de 0,5 MHz à 15 MHz

Amendment 1

Measurement and characterisation of ultrasonic fields using hydrophones in the frequency range 0,5 MHz to 15 MHz

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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FOREWORD

This amendment has been prepared by technical committee 87: Ultrasonics.

The text of this amendment is based on the following documents:

DIS	Report on Voting
87(CO)30	87(CO)33

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

INTRODUCTION

Add the following text:

This amendment defines alternative procedures for the measurement of acoustic pressure and derived intensity parameters for the sound fields generated by single ultrasonic transducers which have cylindrical or spherical active elements and defines additional acoustical terms.

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3 Definitions

Add the following new definitions:

3.62 **bandwidth:** Difference in the frequencies f_1 and f_2 at which the amplitude of the acoustic pressure spectrum first becomes 3 dB below the peak amplitude.

3.63 **pulse beam-width:** Distance between two points, on a specified surface and in a specified direction passing through the point of the maximum **pulse-pressure-squared integral** in that surface, at which the **pulse-pressure-squared integral** is a specified fraction of the maximum value of the **pulse-pressure-squared integral** in the surface. The two points are farthest from and on opposite sides of the point of maximum **pulse-pressure-squared integral.** If the position of the surface is not specified, then the surface passes through the point of **spatial-peak temporal-peak acoustic pressure** in the whole acoustic field. The specified levels are 0,25 and 0,01 for the –6 dB and –20 dB **pulse beam-widths,** respectively. The distance is measured on the specified surface.

NOTE - The specified surface is usually a plane perpendicular to the **beam alignment axis** but can be cylindrical for **ultrasonic transducers** with cylindrical active elements or can be spherical for **ultrasonic transducers** with spherical active elements.

Symbols: wpb_6, wpb_{20}
Unit: metre, m

3.64 **pulse beam-radii:** Two distances between the specified points defining the **pulse beam-width** and the point of maximum **pulse-pressure-squared integral.** The distances are measured on the specified surface. The specified level for **pulse beam-radii** is the same as that used for the **pulse beam-width.**

Symbols: wpr_6, wpr_{20}
Unit: metre, m

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5 Measurement requirements

Add the following text:

5.5 *Requirements for transducers with cylindrical or spherical active elements*

For measurement and characterization of ultrasonic transducers which have cylindrical or spherical active elements, subclauses 3.5, 3.12 and 3.25 do not apply, and the remaining subclauses require the following modifications.

Replace subclause 3.6 by the following:

beam-area: Area on a specified surface consisting of all points at which the **pulse-pressure-squared integral** is greater than a specified fraction of the maximum value of the **pulse-pressure-squared integral** in that surface. The specified surface is cylindrical for **ultrasonic transducers** with cylindrical active elements and spherical for **ultrasonic transducers** with spherical active elements, and at a specified radius. The specified levels are 0,25 and 0,01 for the –6 dB and –20 dB **beam-areas**, respectively.

Modify subclauses 3.7, 3.8, 3.9 and 3.10 as follows:

Replace "in a specified plane or in a plane containing" *by* "in a specified surface or in a surface containing".

Modify subclauses 3.26, 3.27, 3.45, 3.46, 3.47, 3.48, 3.49 and 3.51 as follows:

Replace "in a specified plane" *by* "in a specified surface".

Modify subclause 3.57 as follows:

Replace "and a specified plane" *by* "and a specified surface".

Replace subclause 5.2.1.1 by the following:

The **ultrasonic transducer** is set up in the coordinate positioning system such that the axis of symmetry of its active element is parallel to either the *y* or *z* axis of the **hydrophone** positioning system. Here, the axis of symmetry for **ultrasonic transducers** with cylindrical active elements shall be the axis of the cylinder. For **ultrasonic transducers** with spherical active elements, the axis of symmetry shall be the axis which passes through the geometrical centre of the sphere and approximately bisects the usable external surface of the **ultrasonic transducer.**

NOTE - For spherical **ultrasonic transducers** consisting of a segment of a sphere, the symmetry axis would be the axis passing through the geometrical centre of the sphere and through the centre of the circle defining the segment. For some spherical **ultrasonic transducers** consisting of a full (or nearly full) sphere supported by a thin structure such as a tube or rod, the symmetry axis would be the axis passing through the centre of the sphere and also through the centre of the supported area.

The **ultrasonic transducer** should be mounted in such a way that rotation about the axis of symmetry through 360° is provided.

Replace subclause 7.1.3 by the following:

For reliable characterization of acoustic fields produced by **ultrasonic transducers** with cylindrical or spherical active elements, it is necessary to align the *x*-axis of the **hydrophone,** which itself is parallel to the direction of maximum sensitivity, such that it is parallel to the particular direction of propagation of the ultrasound of interest.

Replace subclause 8.1.1 by the following:

A systematic search shall be made to locate the point or points of **peak-positive acoustic pressure** and **peak-negative acoustic pressure.**

In the case of **ultrasonic transducers** with cylindrical active elements, the search shall be undertaken at a specified distance l between the **hydrophone** and the axis of symmetry of the **ultrasonic transducer.** This may be achieved by first moving the **hydrophone** along a straight line parallel to the axis of symmetry of the **ultrasonic transducer** and then rotating the **ultrasonic transducer** about its axis of symmetry and repeating the straight line scan of the **hydrophone.** The angular rotation of the **ultrasonic transducer** should be equivalent to $2a_g/l$ radians, where a_g is the geometrical radius of the **hydrophone.**

In the case of **ultrasonic transducers** with spherical active elements, the search shall be undertaken at a specified distance l between the **hydrophone** and the centre of the active element of the **ultrasonic transducer.** This may be achieved by first moving the **hydrophone** to the specified distance l and then performing a circular scan by rotating the **ultrasonic transducer** about an axis perpendicular to its axis of symmetry and passing through its geometrical centre. The angular rotation of the **ultrasonic transducer** about its axis of symmetry is then changed. The circular scan is repeated by rotating the **ultrasonic transducer** and keeping the **hydrophone** fixed. The angular rotation of the **ultrasonic transducer** between each circular scan should be equivalent to $2a_g/l$ radians, where a_g is the geometrical radius of the **hydrophone.**