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INTERNATIONAL STANDARD

AMENDMENT 1

Ultrasonics - Hydrophones - Part 3: Properties of hydrophones for ultrasonic fields

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Ultrasonics - Hydrophones - Part 3: Properties of hydrophones for ultrasonic fields

AMENDMENT 1

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Amendment 1 to IEC 62127-2:2022 has been prepared by IEC technical committee 87: Ultrasonics.

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

Draft	Report on voting
87/897/CDV	87/914/RVC

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

The language used for the development of this Amendment is English.

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– reconfirmed,
– withdrawn, or
– revised.

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INTRODUCTION

The second edition of IEC 62127-3 was published in 2022. The application of the document has revealed improvement potential with respect to the measurement requirements for **directional responses** and regarding data evaluation requirements for **effective hydrophone size** determination. This amendment addresses these items to ensure the practicality of the required measurements as well as the generation of a common data base to support **hydrophone** spatial averaging correction methods and the simplifying assumptions therein.

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2 Normative references

Replace the IEC 62127-2 reference with the following new reference:

"IEC 62127-2, *Ultrasonics - Hydrophones - Part 2: Calibration for ultrasonic fields*"

5.3 Sensitivity

*Replace the seventh paragraph starting "*The temperature dependence of …*" with the following new paragraph:*

"The particular water temperature to which the stated sensitivity relates shall be given. The temperature dependence of the sensitivity should be described. The **hydrophone** sensitivity should be stated as a function of the water temperature, at least over the temperature range 19 °C to 25 °C, or the particular water temperature to which the stated sensitivity relates should be stated together with the temperature coefficient of the sensitivity.

NOTE 4 The former requirement to state the temperature dependence has been modified to become a recommendation for practical reasons. Though being of importance for some applications, the former general requirement here posed disproportional measurement burden to conform with IEC 62127-3. As long as water temperatures at calibration and measurement application differ by one or two degrees only, consideration of the effect within an uncertainty component is reasonable [15],[16],[17]."

5.4.2 Frequency dependence

First paragraph:

*Delete, in the first sentence, "*either graphically or*".*

*Delete, in the second sentence, "*If it is given as a list of values or as discrete points in a graph,*".*

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Add the following new sentence at the end of the paragraph:

"In addition to the list of values, a graphical representation of the data may be provided."

Third paragraph:

*Delete "*either graphically or*".*

Add the following new sentence at the end of the paragraph:

"In addition, a graphical representation of the data may be provided."

5.5.2 Determination of the directional response

*In the third paragraph starting with "*The angular increment …*", add the following text after "*1 dB*":*

"for frequencies up to 20 MHz. At higher frequencies larger variation between adjacent points may be accepted for practicability".

5.6.2 Model of directional response

First paragraph:

*Delete, in the second sentence, "*unless clear justification is provided for the choice of an alternative model of **directional response***".*

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Add the following new sentence after the second sentence:

"Use of the default model also has the advantage of retaining a common data base, in particular for spatial averaging applications. An alternative model of **directional response** can be applied in addition if clear justification is provided."

Add, at the end of item a), the following note:

"NOTE 1 For nominally circular shaped membrane **hydrophone** active elements, effective receiving areas of elliptical shape are frequently observed due to the impact of the electric leads during the spot-poling process [10]. The size data obtained for different directions (see 5.5.2) [18],[19] can then be averaged to obtain simplified circular size data."

Add, at the end of item b), the following notes:

"NOTE 2 Formula (9) is correct for the two directions parallel to the rectangle sides only. It cannot be applied to measurements around additional axes, for instance the diagonals.

NOTE 3 Membrane **hydrophones** with rectangular electrode design can actually provide rounded effective elements due to the spot-poling process within fabrication [20]. In such cases, a similar **effective hydrophone size** can be expected in directions parallel to the rectangle sides and the diagonals, and the use of the model for nominally circular shaped **hydrophones** is appropriate."

Add, at the end of the subclause, the following paragraphs:

"Spatial averaging correction methods usually assume circular receiving elements and, possibly, frequency-dependent **effective hydrophone sizes**, see IEC 62127-1 and [21]. Detailed **hydrophone**-type-specific modelling of the receiving process within the sensing elements aperture of the individual **hydrophone** type, however, is usually not considered within the generalized spatial averaging compensation approaches. Usage of the default rigid baffle piston model has been shown to provide usable effective size data for membrane, needle-type and capsule-type **hydrophones** if the frequency dependence is included [20], [22].

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