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**PHARMACEUTICAL INDUSTRY STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

**YY/T 0865-2011**

Replacing YY/T 0865.1-2011

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**Ultrasonics - Hydrophones - Part 1: Measurement and  
characterization of medical ultrasonic fields  
(English Translation)**

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## Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is Part 1 of YY/T 0865 Ultrasonic Hydrophones. YY/T 0865 has been published in the following parts.

- Part 1: Measurement and characterization of medical ultrasound fields;
- Part 2: Calibration of hydrophones in ultrasonic fields below 40 MHz;
- Part 3: Characteristics of hydrophones for ultrasonic fields below 40 MHz.

This document replaces YY/T 0865.1-2011 "Ultrasonic hydrophones Part 1: Measurement and characteristics of medical ultrasound fields below 40 MHz" Compared with YY/T 0865.1-2011, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

- Changed the scope of application (see Chapter 1, Chapter 1 of the 2011 edition);
- Changed the normative references (see Chapter 2, Chapter 2 of the 2011 edition);
- Changed the terms and definitions (see Chapter 3, Chapter 3 of the 2011 edition);
- Changed the symbols (see Chapter 4, Chapter 4 of the 2011 edition);
- Changed the bandwidth (see 5.1.7, 5.1.7 of the 2011 edition);
- Changed the basic sound pressure parameters (see Chapter 7, Chapter 7 of the 2011 edition).

This document is modified to adopt IEC 62127-1:2022 "Ultrasonic hydrophones Part 1: Measurement and characterization of medical ultrasound fields".

The technical differences between this document and IEC 62127-1:2022 and their reasons are as follows.

- IEC 61689 (see Chapter 8) was replaced by YY/T 0750 to adapt to my country's technical conditions;
- IEC 62127-2 (see Chapter 7 and Chapter 8) was replaced by YY/T 0865.2 to adapt to my country's technical conditions;
- IEC 62127-3 (see Chapter 5 and Chapter 8) was replaced by YY/T 0865.3 to adapt to my country's technical conditions;
- ISO 16269-6 (see Chapter 9) was replaced by GB/T 3359 to adapt to my country's technical conditions;
- Replaced ISO/IEC Guide 98-3:2008 (see Chapter 5, Chapter 6, Chapter 9) with JJF 1059.1-2012 to adapt to our the technical conditions of the country.

## Introduction

YY/T 0865 Ultrasonic hydrophone is a standard for ultrasonic hydrophones, which aims to specify the parameters, calibration and and characteristics, it is planned to consist of three parts.

--- Part 1: Measurement and characterization of medical ultrasound fields. The purpose is to define the various acoustic parameters that can be measured using the hydrophone method.

These parameters are used to specify and characterize the ultrasonic field propagating in liquids, especially water; they can be used to determine these parameters are measured in steps.

--- Part 2: Calibration of hydrophones in ultrasonic fields below 40 MHz. The purpose is to specify the absolute calibration method and relative calibration method of hydrophones.

(Comparative) Calibration method.

--- Part 3: Characteristics of hydrophones for ultrasonic fields below 40 MHz. The purpose is to specify the characteristic requirements of hydrophones.

Relevant measurement standards for specific devices, for example, YY/T 0750, GB/T 16846, YY/T 0644 or YY/T 0642, as applicable Acoustic parameters can be found in this document. In YY/T 0642, some additional measurement methods for attenuation parameters and indicators are described to meet Special requirements for the characterization of acoustic output of ultrasonic diagnostic equipment in GB 9706.237.

The idea followed in this document is to describe in detail the characteristics of the sound field using sound pressure parameters, with sound pressure as the primary measurement quantity of the hydrophone.

This document specifies several sound intensity parameters, but they are derived quantities and are valid only under certain assumptions related to the measured ultrasonic field.

significance.

Ultrasonic hydrophones Part 1: Measurement of medical ultrasound fields Measurement and characterization

## 1 Scope

This document describes a method for measuring the acoustic field produced by medical ultrasound equipment in liquids using calibrated hydrophones, including Bandwidth standards and calibration frequency range requirements for the spectral components of the sound field to be characterized.

This document.

--- A set of measurable acoustic parameters based on acoustic foundations is given;

--- A set of auxiliary acoustic parameters that can be derived under specific assumptions of these measurements are given, called derived acoustic parameters;

--- Gives the measurement steps that can be used to determine the sound pressure

parameters;

--- Gives the conditions for measuring acoustic parameters using calibrated hydrophones;

---Procedures for correcting for limitations caused by using hydrophones with limited bandwidth and limited sensitive element size are given, and the to estimate the corresponding uncertainty.

This document applies to the measurement and characterization of medical ultrasound fields using ultrasound hydrophones.

**NOTE 1:** The International System of Units is used in this document. For certain parameters, such as beam area and sound intensity, decimal multiples or sub-multiples are used for simplicity.

For example, the sound beam area is expressed in cm<sup>2</sup>, and the sound intensity is expressed in W/cm<sup>2</sup> or mW/cm<sup>2</sup>.

NOTE 2 By definition, hydrophones may be of either piezoelectric or fibre optic type.

## 2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

GB/T 3359 Statistical processing and interpretation of data - Determination of statistical tolerance intervals (GB/T 3359-2009, ISO 16269-6.

2005, IDT)

YY/T 0750 Requirements and measurement methods for sound fields in the frequency range of 0.5MHz to 5MHz for ultrasonic therapy equipment (YY/T 0750-2018,IEC 61689:2013,MOD) YY/T 0865.2 Ultrasonic hydrophones Part 2: Calibration of hydrophones for ultrasonic fields below 40 MHz (YY/T 0865.2-2018,IEC 62127-2:2013,IDT) YY/T 0865.3 Ultrasonic hydrophones Part 3: Characteristics of hydrophones for ultrasonic fields below 40 MHz (YY/T 0865.3-2013,IEC 62127-3:2007,IDT) JJF1059.1-2012 Evaluation and expression of measurement uncertainty (ISO/IEC Guide98-3, MOD) IEC 60565-1 Underwater acoustics - Hydrophone calibration - Part 1: Free-field calibration procedure for hydrophones) IEC 63009 Ultrasonic therapy equipment - Sound field requirements and measurement methods in the frequency range of 20kHz to 500kHz 20kHzto500kHz)