



# TECHNICAL SPECIFICATION



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## Measurement of cavitation noise in ultrasonic baths and ultrasonic reactors

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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# INTERNATIONAL ELECTROTECHNICAL COMMISSION

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## MEASUREMENT OF CAVITATION NOISE IN ULTRASONIC BATHS AND ULTRASONIC REACTORS

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This second edition cancels and replaces the first edition published in 2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) addition of a new method of measurement: the measurement of integrated broadband cavitation energy between two frequency bounds.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
87/804/DTS	87/822A/RVDTS

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 Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

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## INTRODUCTION

Ultrasonically induced **cavitation** is used frequently for immersion cleaning in liquids. There are two general classes of ultrasonically induced cavitation. **Inertial cavitation** is the rapid collapse of bubbles. **Non-inertial cavitation** refers to persistent pulsation of bubbles as a result of stimulation by an ultrasonic field. Both **inertial cavitation** and **non-inertial cavitation** can create significant localized streaming effects that contribute to cleaning. **Inertial cavitation** additionally causes a localized shock wave that can contribute to cleaning and or damage of parts. Both types of cavitation create acoustic signals (**cavitation noise**) which can be detected and measured with a **hydrophone**. This document provides techniques to measure and evaluate the degree of cavitation in support of validation efforts for ultrasonic cleaning tanks, cleaning equipment, and reactors, as used, for example, for the purposes of industrial process control or for hospital sterilization.

# MEASUREMENT OF CAVITATION NOISE IN ULTRASONIC BATHS AND ULTRASONIC REACTORS

## 1 Scope

This document, which is a Technical Specification, provides a technique of measurement and evaluation of ultrasound in liquids for use in cleaning devices, equipment, and ultrasonic reactors. It specifies

- the **cavitation** measurement at frequencies between harmonics of the **operating frequency**  $f_0$ ,
- the **cavitation** measurement derived by integrating broadband cavitation noise energy,
- the **cavitation** measurement by extraction of broadband spectral components.

This document covers the measurement and evaluation of cavitation, but not its secondary effects (cleaning results, sonochemical effects, etc.). Further details regarding the generation of cavitation noise in ultrasonic baths and ultrasonic reactors are provided in Annex A.

## 2 Normative references

There are no normative references in this document.