



# TECHNICAL SPECIFICATION



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

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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AND ULTRASONIC REACTORS****FOREWORD**

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IEC TS 63001 has been prepared by IEC technical committee 87: Ultrasonics. It is a Technical Specification.

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. **Transient Inertial cavitation** is the rapid collapse of bubbles. **Stable Non-inertial cavitation** refers to persistent pulsation of bubbles as a result of stimulation by an ultrasonic field. Both **transient inertial cavitation** and **stable non-inertial cavitation** may create significant localized streaming effects that contribute to cleaning. **Transient Inertial cavitation** additionally causes a localized shock wave that may contribute to cleaning and /or damage of parts. Both types of cavitation create acoustic signals (**cavitation noise**) which may 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  $2,25f_0$  in the frequency range 20 kHz to 150 kHz, and~~
- ~~the cavitation measurement by extraction of broadband spectral components in the frequency range 10 kHz to 5 MHz.~~
- 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.

# TECHNICAL SPECIFICATION



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





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