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**Fine bubble technology —  
Characterization of microbubbles —  
Part 1:  
Off-line evaluation of size index**



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 281, *Fine bubble technology*.

A list of all parts in the ISO 21910 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Recent development in the fine bubble technology expands its market, such as cleaning, water treatment, agriculture and aquaculture as well as biomedical. Above all, the application of microbubble technology accelerates the market penetration.

Many measurement technologies have been historically developed to assess the characteristics of microbubbles and are now used in various application fields. However, the dynamic nature of microbubbles makes it hard for the users to report their measurement results with confidence. The low stability of microbubbles that includes shrinking, deformation, coalescence and dissolution of individual microbubble can require a specific sampling procedure and short measurement time.

This document is intended to specify an evaluation method for size index of microbubbles in water to be used in a measurement laboratory. The application of the document to measurement system will yield comparable results over an application field, as far as the specified types of measuring instruments are equipped and the specified sampling procedures are met. Since the comparability relevance depends on the sampling procedures and the measurement environments, each measurement can require relevant descriptions. The specifications of the measuring instruments are described in other standards or the individual operation instruction manuals.

# Fine bubble technology — Characterization of microbubbles —

## Part 1: Off-line evaluation of size index

### 1 Scope

This document specifies the evaluation method for the size index of microbubbles in microbubble dispersion. It is only applicable to microbubbles with or without shell in water within the range from 1  $\mu\text{m}$  to 100  $\mu\text{m}$ . It describes the sampling methods from the point generating or dispersing microbubbles in the retention container to the detecting point of the measuring instruments.

### 2 Normative references

There are no normative references in this document.

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

#### 3.1

##### **measurement time**

period for a sequence of measuring process, whereas the size index and/or the number concentration index of the microbubbles can be assumed stable all through the period and reproducible over the periods with similar measurement condition

Note 1 to entry: Measurement time is described by the starting time and the ending time, or by either of them and the duration.

#### 3.2

##### **water diluent**

homogeneous water which is used for dilution without causing any deleterious effects and whose number concentration of ultrafine bubbles is known

Note 1 to entry: Water diluent is used to decrease the number concentration of ultrafine bubbles in a dispersion without changing their total number, state of aggregation with particles, size or surface chemistry.

Note 2 to entry: Water diluent is called blank water when its number concentration of ultrafine bubbles is known to be zero and when it is used for the evaluation of ultrafine bubbles.

[SOURCE: ISO 20298-1:2018, 3.2]

#### 3.3

##### **retention time**

period from the point generating or dispersing microbubbles in the retention container to the detecting point of the measuring instruments