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**Fine bubble technology — Elimination  
method for sample characterization —**

Part 2:

**Fine bubble elimination techniques**



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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 20480 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

Fine bubble technology has recently seen growth in its application to markets such as cleaning, water treatment, agriculture and aquaculture and biomedical fields. Now methods are needed to evaluate the efficacy and efficiency of generation systems. The characteristics of most importance are the number concentration and size indices of the fine bubbles produced by such systems.

Furthermore, fine bubble dispersions in water can contain other solid and liquid particles. Contaminants such as these particles make accurate characterization of fine bubbles extremely difficult. Therefore, distinction of fine bubbles from contaminants is an urgent issue. This is also why the term index is used as it can never be 100 % established that a particle is a bubble and not a contaminant.

Currently, there are several measurement methods widely used to evaluate the number concentration index and the size index of particles. However, there are few methods to distinguish bubbles in fine bubble dispersions from other particles.

If the bubbles can be totally eliminated (with no residual bubbles) by mechanisms such as dissolution or flotation, this issue can be solved. If a method that eliminates fine bubbles in a specific size range is used, it is potentially possible to distinguish fine bubbles from other solid and liquid particles. The concentration of material after potential elimination can be compared in particle concentration index to the liquid used prior to generation. If elimination has been successful, they should be the same, and by this comparison, elimination techniques can be developed and optimized.

This document is intended to specify the most effective techniques for eliminating fine bubbles from fine bubble dispersions in water and their optimization.



# Fine bubble technology — Elimination method for sample characterization —

## Part 2: Fine bubble elimination techniques

### 1 Scope

This document specifies the elimination techniques for removing fine bubbles from fine bubble dispersion in water and how to optimize the elimination procedures to obtain better efficiency.

This document is applicable to fine uncoated bubbles (without shells).

It does not apply to fine coated bubbles (with shells).

**NOTE** Fine bubbles dispersed in liquid are classified into “fine bubble with shells” and “fine bubble without shells”. Fine bubble with shells means the fine bubble whose surface/interface is covered almost completely by an object or a collection of objects.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20480-1, *Fine bubble technology — General principles for usage and measurement of fine bubbles — Part 1: Terminology*

ISO 24261-1:2020, *Fine bubble technology — Elimination method for sample characterization — Part 1: Evaluation procedure*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20480-1 and the following apply.

ISO and IEC maintain terminology 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

##### **fine bubble dispersion**

##### **FBD**

liquid which contains fine bubbles

[SOURCE: ISO 20298-1:2018, 3.1]

#### 3.2

##### **frequency**

number of cycles per second

Note 1 to entry: Expressed in Hertz (Hz).