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Fine bubble technology — General principles for usage and measurement of fine bubbles —

Part 4: Terminology related to microbubble beds

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Foreword

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

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Introduction

The flotation process to separate the desired minerals from the gangue started over 2 000 years ago in Ancient Greece. As the one of the flotation processes, dissolved air flotation (DAF) was used mainly in applications in which the material to be removed, such as fat, oil, fibres and grease from water, initially. In the late 1960s, however, the process also became acceptable for wastewater and potable water treatment applications.[3]

DAF has been used as an effective alternative to the more conventional separation process of sediments. The sedimentation process removes particles by submerging them on the floor, while the DAF process utilizes fine bubbles to float on water. Particles floating on the water surface are finally collected through a scraper. Through DAF, low-density flocs can be removed using fine bubbles. Compared to conventional sedimentation processes, DAF has the advantage of being an efficient process because of high hydraulic loading rates.[4]

There are various factors that affect the treatment efficiency of the DAF process, such as air saturation, bubbles and particles size, coagulant, etc. Among them is the bubble bed. To increase the treatment capacity, DAF has been developed as bubble bed become thicker by increasing in the depth of the flotation basin.

NOTE A coagulant is a chemical that causes coagulation to increase particles size during water treatment process.

Even though the characteristics of bubble bed influence on the removal efficiency of DAF process, it was not possible to observe the bubble bed depth in full-scale DAF tanks until few years ago.[6] Recently, new theories and techniques were developed for measurement and evaluation of the bubble bed in full-scale DAF tank. However, these technologies are not yet widely applied in the field. Therefore, it is necessary to minimize the confusion for researchers and pioneers by setting the definitions related to bubble bed before the standards of these measurement and evaluation methods are prepared.

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Fine bubble technology — General principles for usage and measurement of fine bubbles —

Part 4: Terminology related to microbubble beds

1 Scope

This document specifies the terminology related to dissolved air flotation (DAF) bubble bed and its characteristics in the dissolved air flotation process.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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
flotation process
gravity separation process in which gas bubbles attach to solid particles to cause the apparent density of the bubble-solid agglomerates to be less than that of the water, thereby allowing the agglomerate to float to the surface

Note 1 to entry: Different methods of producing gas bubbles give rise to different types of flotation processes: electrolytic flotation, dispersed air flotation, and *dissolved air flotation* (3.2).

3.2
dissolved air flotation
DAF
flotation process (3.1) by which low density particles are removed from water and wastewater by using fine bubbles which are produced by the reduction in pressure of a water stream saturated with air

Note 1 to entry: Pressurized solution system (ISO/DIS 20480-3:2020, 4.5) is usually for generating fine bubbles used in DAF process. However, every fine bubbles generating system can be used if number concentration and size of microbubbles can be produced.

3.3
dissolved air flotation tank
DAF tank
tank in which *dissolved air flotation* (3.2) process is performed and that is roughly divided into two compartments containing contact and *separation zone* (3.10) according to the step of *flotation process* (3.1): formation of particle-bubble aggregates and rising to the surface

3.4
treatment capacity
capacity that a certain process can handle for a unit time

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