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Advisory Leaflet DWA-M 381E

Sewage Sludge Thickening

October 2007

Eindickung von Klärschlamm

German Association for Water, Wastewater and Waste
Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall e. V.

The German Association for Water, Wastewater and Waste (DWA) is intensively involved with the development of reliable and sustainable water management. Being a politically and economically independent organisation it operates specifically in the areas of water management, wastewater, waste and soil protection.

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Foreword

Thickening of sewage sludge is one of the most important basic treatment steps of the entire sludge treatment process. For decades thickening of sewage sludge has been accomplished by using either gravity settling in thickeners or in a flotation unit or by mechanical thickening. Flotation and mechanical thickening processes are almost solely used for the thickening of waste activated sludge. In 1998 the former ATV Sub-Committee 3.2 "Stabilisation, Disinfection, Thickening, Dewatering and Conditioning of Sewage Sludges" presented the working report "Thickening of Sewage Sludge" [8]. The various procedures and their efficiency and cost-effectiveness have been updated and are now presented in this Advisory Leaflet.

The DWA Sub-Committee AK-2 and its Working Group AK-2.4 have elaborated this Advisory Leaflet taking into consideration the current state of science and technology, relevant legislation, and essential operational requirements. Thus a guideline related to practice has been established.

This DWA Advisory Leaflet first and foremost addresses practicing professionals at wastewater treatment plants as well as planning and operating engineers and technicians.

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This Advisory Leaflet has been elaborated by the DWA Working Group AK-2.4 "Thickening and Dewatering" on behalf of and with the assistance of the Sub-Committee AK-2 "Stabilisation, Disinfection, Conditioning, Thickening and Dewatering of Sewage Sludge".

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User Notes

This Advisory Leaflet has been produced by a group of technical, scientific and economic experts, working in an honorary capacity and applying the rules and procedures of the DWA and the Standard ATV-DVWK-A 400. Based on judicial precedent, there exists an actual presumption that this document is textually and technically correct.

Any party is free to make use of this Advisory Leaflet. However, the application of its contents may also be made an obligation under the terms of legal or administrative regulations, or of a contract, or for some other legal reason.

This Advisory Leaflet is an important, but not the sole, source of information for solutions to technical problems. Applying information given here does not relieve the user of responsibility for his own actions or for correctly applying this information in specific cases. This holds true in particular when it comes to respecting the margins laid down in this Advisory Leaflet.

1 Scope

Thickening of sewage sludge is one of the most important basic operations of sludge treatment. It is the easiest and cheapest way to concentrate solids and to separate solids and liquids during sludge treatment. Sludge thickening is used at virtually every wastewater treatment plant.

A growing interest in process optimization of sludge thickening, and management and treatment of resulting process waters, can be observed. This growing interest is last but not least due to cost pressure faced by treatment plant operators.

This Advisory Leaflet presents recommendations for dimensioning, installation and cost-efficient operation of treatment units for municipal sludge thickening and addresses operators of wastewater treatment plants as well as consulting engineers. It summarizes current knowledge on principles and technologies of various thickening procedures and considers operational experiences as well as costs of technically well-established treatment processes.

The main focus is on sludge thickening procedures which are commonly used at municipal wastewater treatment plants. Information and recommendations of this Advisory Leaflet, however, to a large extent can be used accordingly for the treatment of other sludges, e.g. sludges produced during drinking water treatment (see [20]) or during industrial wastewater treatment. Then it is above all the responsibility of the user to verify transferability of given recommendations in regard to special characteristics of each individual sludge and in regard to impacts on dimensioning and operation of the plant.

2 Terms and Definitions

This Advisory Leaflet refers to the definition of terms of DIN 4045 (August 2003), DIN EN 1085 (May 2007), DIN EN 12832 (November 1999) as well as DIN EN 12255-8 (October 2001). The following especially relevant terms are explained separately in addition to the above-mentioned DIN standards.

Author´s Note: In addition, in the English translation defined terms according to the "Standard Methods for the Examination of Water and Wastewater" (16th Edition, American Public Health Association, American Water Works Association, Water Environment Federation, Washington DC, 1985)" have been used.

2.1 Definitions and Basic Information

2.1.1 Sewage Sludge

Sludge produced during wastewater (sewage) treatment (DIN EN 12832 [3]).

Note: Sewage sludges mainly consist of a solid and a liquid fraction and are thus suspensions.

2.1.2 Sludge

Mixture of water and solids separated from various types of water as a result of natural or artificial processes (DIN EN 1085 [2], DIN 4045 [1], DIN EN 12880 [5]).

Note: The objective of thickening is the accumulation of the solid fraction (volume reduction by water removal) in the sludge. In technical terminology the solid fraction of sludge is generally called solids, suspended solids, total solids or solids content.