



DWA Set of Rules

Standard DWA-A 131E

Dimensioning of Single-stage Activated Sludge Plants

June 2016

Bemessung von einstufigen Belebungsanlagen
Juni 2016

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The German Association for Water, Wastewater and Waste (DWA) is strongly committed to the development of secure and sustainable water and waste management. As a politically and economically independent organization, it is professionally engaged in the fields of water management, wastewater, waste and soil protection.

In Europe, DWA is the association with the largest number of members in this field. It therefore occupies a unique position in connection with its professional expertise regarding standardization, professional training and the provision of information to both professionals and the general public. The around 14.000 members represent the specialists and executives from municipal authorities, universities, engineering firms, authorities and commercial enterprises.

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Foreword

Since 1991, Standard ATV-A 131, "Dimensioning of Single-Stage Activated Sludge Plants" has presented the dimensioning procedure for nitrifying and denitrifying activated sludge plants for more than 5.000¹ population equivalents on the basis of the measured BOD₅ load. The edition from the year 2000 already contained an Annex presenting a dimensioning procedure based on the COD load. As BOD₅ does not permit complete mass balance calculations for sludge production and oxygen demand, and as BOD-measurements are no longer carried out in practice on every plant, the Technical Committee KA-6 decided to revise the Standard and to base the dimensioning exclusively on the COD. In spite of the classification of mercury, which is required by DIN 38409-41 for masking of chloride, as a priority hazardous substance with the aim of phasing out at a later date (Directive 2008/105/EC), COD remains indispensable as the basis for dimensioning and modelling of biological wastewater treatment. The use of potassium dichromate as an oxidizing agent is also restricted by the REACH regulation (Regulation no. 1907/2006/EC). Work is in progress on a revision of DIN 38409-41.

As a result of favourable experience worldwide with the previous Standard ATV-DVWK-A 131, the steady state dimensioning approach for the activated sludge tank has been retained. The stoichiometric and kinetic coefficients for this steady state approach has been deduced from the previous procedure and accompanying dynamic simulations.

In the future the determination of design loads and concentrations will be based solely on the methodology described in the Standard ATV-DVWK-A 198. Consequently, the specific loads and population equivalents have been deleted from Standard ATV-DVWK-A 131. The efficiency of the primary settling tank at different retention times has been evaluated based on large scale measurements and is included in this revised version of Standard DWA-A 131.

The male gender has been used as a generalization in this Standard for the designations of professions and functions, with the aim of presenting a readable and easily comprehensible text. All references to the male gender are therefore intended to include the female gender on an equal basis.

Earlier editions

Standard ATV-DVWK-A 131 (05/2000)

Standard ATV-A 131 (02/1991)

Standard ATV-A 131 (11/1981)

1) **Editor's note:** In Standard DWA-A 131E a comma is used as decimal marker.

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User Notes

This Standard 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 DWA-A 400. Based on judicial precedent, there exists an actual presumption that this document is textually and technically correct and also generally recognised.

Any party is free to make use of this Standard. 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 Standard 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 Standard.

1 Scope

1.1 Objective

Using the dimensioning values recommended in this Standard, the requirements of the German Wastewater Ordinance (AbwV) and the associated sampling regulations for municipal wastewater can be met with single-stage activated sludge plants. The same applies to the European requirements as set out in the Directive concerning Urban Waste Water Treatment (Directive 91/271/EEC), which sets out a different monitoring method from that of the German Wastewater Ordinance. If commercial or industrial wastewater with high fractions of slowly biodegradable and / or inert organic substances is discharged into the sewer system, a higher residual COD in the effluent can arise than with domestic wastewater. The same applies to areas with low water consumption and a low infiltration rate.

Technical regulations are presented for the selection of the most practical process configurations for carbon, nitrogen and phosphorus removal, and for the dimensioning of the essential components and facilities of the plant. The selection and dimensioning of aeration equipment is not dealt within this Standard.

Since this Standard is also applied outside Germany and because even stricter requirements can be set locally, it is not aimed exclusively at compliance with the monitoring levels for nitrogen set down in Annex 1 of the German Wastewater Ordinance.

In accordance with the requirements of water law, the structural and operating requirements and the sensitivity of the receiving waters, the planning of the single-stage activated sludge plant is to be oriented towards an appropriately high level of operational reliability by using parallel units, reserve equipment etc.

The safe and secure function of a plant designed in accordance with this Standard depends on adequately qualified, trained and permanently supported operating personnel working on the plant. See Guideline ATV-M 271 "Personalbedarf für den Betrieb kommunaler Kläranlagen" (Personnel requirements for the operation of municipal wastewater treatment plants). It is recommended that the plant operators are involved in the planning process from the very beginning.

PREVIEW

Using the dimensioning values recommended in this Standard, the minimum requirements for municipal wastewater with single-stage activated sludge plants can be met or bettered at national level. In contrast to earlier editions, in which the dimensioning procedure for nitrifying and denitrifying activated sludge plants was based on the measured BOD_5 load, the design is now based exclusively on the COD load.

Standard DWA-A 131 deals not only with the description of the process, the design procedure and the design bases, but also with the calculation of the mass of the sludge and the design of the secondary treatment and sludge activation. In addition, planning and operational aspects are dealt with and the possibility of simulation, e.g. scenario comparisons or the consideration and quantification of the effect of further automation functions and operational management concepts, are explained.

The Standard is aimed at operators of wastewater treatment plants, planning engineers and approving authorities.

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