



# DWA Set of Rules

## **Standard DWA-A 262E**

Principles for Dimensioning, Construction and Operation of Wastewater Treatment Plants with Planted and Unplanted Filters for Treatment of Domestic and Municipal Wastewater

November 2017

**Grundsätze für Bemessung, Bau und Betrieb von Kläranlagen mit  
bepflanzten und unbepflanzten Filtern zur Reinigung häuslichen und  
kommunalen Abwassers  
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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 organisation it is professionally active in the field of water management, wastewater, waste and soil protection.

In Europe DWA is the association with the largest number of members within this field. Therefore it takes on a unique position in connection with professional competence regarding standardisation, professional training and information. The approximately 14,000 members represent specialists and executives from municipalities, universities, engineering offices, authorities and companies.

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## Foreword

This document is a revision of the Standard DWA-A 262 (March 2006). This revision is based on a variety of findings gained in recent years from experience with planted and unplanted filters in Germany and across Europe. Prior to publication of the “yellow print” (a draft released for public review in April 2016), the proposed changes to the Standard were discussed with technical experts in January 2014.

Wastewater treatment with planted and unplanted filters is characterized by a simple structural design, a simple mode of operation, a low production of biomass and secondary sludge, a low use of external energy, and a high treatment efficiency, even for treatment systems with a small number of sewer connections. Horizontal flow filters are described in this Standard only as a downstream (tertiary) treatment stage, no longer as a main (secondary) biological treatment stage, since there is not sufficient knowledge in comparison to vertical flow filters. However, this does not exclude their application. As long as the water management requirements and effluent parameters are met and proper operation is ensured, existing systems can continue to be operated.

### Changes

Compared to the Standard DWA-A 262 (March 2006), the following changes have been made:

- a) modification to the title of the Standard;
- b) adaptation to European standards and changes that have occurred in laws and regulations in the meantime;
- c) consideration of recent findings on primary treatment with multicompartment septic tanks;
- d) newly added: treatment systems with raw wastewater filters for combined sewer networks and for separated sewer networks;
- e) newly added: treatment systems with lava sand filters for combined sewer networks and for separated sewer networks;
- f) newly added: two-stage process with vertical flow filters;
- g) newly added: actively aerated filters;
- h) newly added: two-layer filter trenches;
- i) newly added: seasonally loaded treatment systems;
- j) newly added: systems for greywater treatment.

The Standard is aimed at wastewater treatment plant planners and operators as well as specialist authorities.

This Standard on small wastewater treatment systems (< 50 P) deals with the requirements resulting from reasons of water protection that are not covered by unified European standards, both for CE-marked and non CE-marked wastewater treatment systems as well as non-mass-produced small wastewater treatment systems.

The design principles presented here apply to Central European climatic conditions with warm summers and cold winters without permafrost. In other climatic conditions, changes in the design are possible, or even necessary. Regions with permafrost are fundamentally unsuitable for filters.

## DWA-A 262E

In order to provide a clear and easy-to-read text, this document uses the feminine form (in German) in a generalized way for personal occupational and functional titles. However, all information applies equally to all genders.

### **Previous Versions**

Standard DWA-A 262 (March 2006)

Standard ATV-A 262 (July 1998)

Technical Report ATV-H 262 (August 1989)

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# Content

<b>Foreword</b> .....	<b>3</b>
<b>Authors</b> .....	<b>5</b>
<b>List of Figures</b> .....	<b>8</b>
<b>List of Tables</b> .....	<b>9</b>
<b>User Notes</b> .....	<b>10</b>
<b>1 Scope</b> .....	<b>10</b>
<b>2 References</b> .....	<b>11</b>
<b>3 Terms and Definitions</b> .....	<b>12</b>
3.1 Definitions .....	12
3.2 Symbols and Abbreviations .....	14
<b>4 Dimensioning</b> .....	<b>19</b>
4.1 Principles of Design .....	19
4.1.1 Small Wastewater Treatment Systems .....	19
4.1.2 Municipal Wastewater Treatment Plants .....	19
4.1.3 Greywater Treatment Plants .....	21
4.2 Dimensioning of Pretreatment .....	21
4.2.1 General .....	21
4.2.2 Multicompartment Septic Tank .....	21
4.2.3 Rotting Tank .....	21
4.2.4 Settling Ponds .....	22
4.2.5 Imhoff Tank .....	22
4.2.6 Raw Wastewater Filter .....	23
4.2.7 Aerated Settling Pond .....	25
4.3 Filter Dimensioning .....	25
4.3.1 Vertical Filters as the Main Biological Treatment Step for Small Wastewater Treatment Systems from 4 P .....	25
4.3.1.1 Preliminary Remarks .....	25
4.3.1.2 Vertical Filter with Sand 0 mm to 2 mm .....	25
4.3.1.3 Two-stage Vertical Filter with Fine Gravel 2 mm to 8 mm and Coarse Sand mm to 4 mm .....	26
4.3.1.4 Vertical Filter with Coarse Sand 0 mm to 4 mm .....	26
4.3.1.5 Actively Aerated Vertical Filter with Gravel 8 mm to 16 mm .....	26
4.3.1.6 Two-layer Filter Trench with Fine Gravel 2 mm to 8 mm and Coarse Sand 0 mm to 4 mm .....	27
4.3.2 Actively Aerated Horizontal Filter with 8 mm to 16 mm Gravel as the Main Biological Treatment Step in Small Wastewater Treatment Systems .....	27
4.3.3 Vertical Flow Filters as the Main Biological Treatment Step in Municipal Wastewater Treatment Plants .....	28
4.3.3.1 Preliminary Remarks .....	28
4.3.3.2 Vertical Filter with Sand 0 mm to 2 mm .....	28

4.3.3.3	Two-stage Vertical Filters with Fine Gravel 2 mm to 8 mm and Coarse Sand 0 mm to 4 mm .....	29
4.3.3.4	Vertical Filter with Coarse Sand 0 mm to 4 mm .....	30
4.3.3.5	Actively Aerated Vertical Filter with Gravel 8 mm to 16 mm .....	30
4.3.3.6	Vertical Filter with Lava Sand 0 mm to 4 mm .....	31
4.3.4	Vertical Filters with Sand 0 mm to 2 mm as the Main Biological Treatment Step During Seasonal Operation .....	32
4.3.5	Greywater Treatment.....	34
4.3.6	Downstream Filters in Combination Plants as an Additional Cleaning or Polishing Step.....	34
4.3.6.1	Vertical Filter with Sand 0 mm to 2 mm.....	34
4.3.6.2	Horizontal Filter with Coarse Sand 0 mm to 4 mm or Gravel 2 mm to 8 mm .....	35
4.4	Summary of Dimensioning and Processes .....	36
4.5	Treatment Systems with Additional Requirements on the Effluent Quality .....	43
<b>5</b>	<b>Design and Construction.....</b>	<b>45</b>
5.1	Location .....	45
5.2	General Requirements for Pretreatment.....	45
5.3	Lining .....	45
5.4	Filter Construction.....	46
5.4.1	General.....	46
5.4.2	Vertical Flow Filters.....	51
5.4.2.1	Raw Wastewater Filter .....	51
5.4.2.2	Vertical Filter with Sand 0 mm to 2 mm.....	51
5.4.2.3	Two-stage Vertical Filter with Fine Gravel 2 mm to 8 mm and Coarse Sand 0 m to 4 mm.....	52
5.4.2.4	Vertical Filter with Coarse sand 0 mm to 4 mm.....	53
5.4.2.5	Actively Aerated Vertical Filter with Gravel 8 mm to 16 mm .....	53
5.4.2.6	Vertical Filter and Overflow Filter with Lava Sand 0 mm to 4 mm .....	54
5.4.2.7	Two-layer Filter Trench with Fine Gravel 2 mm to 8 mm and Coarse Sand 0 m to 4 mm.....	55
5.4.3	Horizontal Flow Filters .....	56
5.4.3.1	Horizontal Filter with Coarse Sand 0 mm to 4 mm.....	56
5.4.3.2	Horizontal Filter with Fine Gravel 2 mm to 8 mm.....	57
5.4.3.3	Actively Aerated Horizontal Filter with Gravel 8 mm to 16 mm.....	58
5.5	Inlet and Outlet Construction .....	59
5.5.1	General.....	59
5.5.2	Inlet and Outlet Structures for Vertical Flow Filters.....	59
5.5.2.1	Preliminary Remarks .....	59
5.5.2.2	Raw Wastewater Filter .....	60
5.5.2.3	Vertical Flow Filter with Sand 0 mm to 2 mm .....	60
5.5.2.4	Two-stage Vertical Filter with Fine Gravel 2 mm to 8 mm and Coarse Sand 0 mm to 4 mm .....	60
5.5.2.5	Vertical Filter with Coarse Sand 0 mm to 4 mm .....	60
5.5.2.6	Actively Aerated Vertical Filter with Gravel 8 mm to 16 mm .....	60
5.5.2.7	Vertical Filter with Lava Sand 0 mm to 4 mm .....	61



5.5.2.8	Two-layer Filter Trench with Fine Gravel 2 mm to 8 mm and Coarse Sand 0 mm to 4 mm .....	61
5.5.3	Inlet and Outlet Structures for Horizontal Flow Filters .....	61
5.6	Planting of Filters .....	61
5.7	Further Specifications Regarding Construction.....	62
<b>6</b>	<b>Operation</b> .....	<b>63</b>
6.1	Fundamentals .....	63
6.2	Function Control .....	63
6.2.1	General .....	63
6.2.2	Self-inspection and Maintenance of Small Wastewater Treatment Systems .....	63
6.2.3	Self-inspection and Maintenance of Municipal Wastewater Treatment Plants .....	65
6.3	Sludge Removal for Pretreatment Technologies .....	66
6.3.1	Multicompartment Septic Tanks .....	66
6.3.2	Settling Ponds.....	66
6.3.3	Imhoff Tanks .....	67
6.3.4	Raw Wastewater Filter .....	67
6.3.5	Aerated Settling Ponds.....	67
6.4	Operating Instructions.....	67
<b>7</b>	<b>Costs</b> .....	<b>68</b>
<b>8</b>	<b>Environmental Impact</b> .....	<b>68</b>
	<b>Sources and References</b> .....	<b>69</b>

## List of Figures

Figure 1:	Settling pond for primary treatment, schematic diagram with important dimensions.....	22
Figure 2:	Imhoff tank, schematic diagram with important dimensions.....	23
Figure 3:	Raw wastewater filter, schematic diagram with important dimensions, systems for separate sewer networks and combined sewer networks .....	24
Figure 4:	Aerated settling pond, schematic diagram with important dimensions.....	25
Figure 5:	Process diagram of a municipal wastewater treatment plant for a combined sewer network, with an aerated lagoon, two vertical flow filters with lava sand, and an overflow filter with lava sand.....	31
Figure 6:	Vertical filter with sand 0 mm to 2 mm, schematic diagram with important dimensions.....	51
Figure 7:	Vertical filter (1 <sup>st</sup> stage) with fine gravel 2 mm to 8 mm, schematic diagram with important dimensions.....	52
Figure 8:	Vertical filter (2 <sup>nd</sup> stage) with coarse sand 0 mm to 4 mm, schematic diagram with important dimensions.....	52
Figure 9:	Vertical filter with coarse sand 0 mm to 4 mm, schematic diagram with important dimensions.....	53
Figure 10:	Actively aerated vertical filter with medium gravel 8 mm to 16 mm, schematic diagram with important dimensions.....	53
Figure 11:	Vertical filter and overflow filter with lava sand 0 mm to 4 mm, schematic diagram with important dimensions .....	54
Figure 12:	Two-layer filter trench with fine gravel 2 mm to 8 mm and coarse sand 0 mm to 4 mm, schematic diagram with important dimensions .....	56

Figure 13: Horizontal filter, schematic diagram with important dimensions, independent from type of filter material used .....	57
Figure 14: Actively aerated horizontal filter with gravel 8 mm to 16 mm, schematic diagram with important dimensions .....	58

## List of Tables

Table 1: Wastewater specific mass loads per population equivalent in g/(P · d) .....	20
Table 2: Greywater specific mass loads per population equivalent in g/(P · d) .....	21
Table 3: Requirements for raw wastewater filters for use as primary treatment .....	23
Table 4: Requirements of vertical filters with sand for use as the main biological treatment step in small wastewater treatment systems.....	25
Table 5: Requirements of two-stage vertical filters with fine gravel and coarse sand for use as the main biological treatment step in small wastewater treatment systems.....	26
Table 6: Requirements of vertical filters with coarse sand for use as the main biological treatment step in small wastewater treatment systems.....	26
Table 7: Requirements of actively aerated vertical filters with gravel for use as the main biological treatment step in small wastewater treatment systems.....	26
Table 8: Requirements of two-layer filter trenches with fine gravel and coarse sand for use as the main biological treatment step in small wastewater treatment systems .....	27
Table 9: Requirements of actively aerated horizontal filters with gravel for use as the main biological treatment step in small wastewater treatment systems.....	27
Table 10: Requirements of vertical filters with sand for use as the main biological treatment step in municipal wastewater treatment plants .....	28
Table 11: Requirements of two-stage vertical filters with fine gravel and coarse sand for use as the main biological treatment step in municipal wastewater treatment plants.....	29
Table 12: Requirements of vertical filters with coarse sand for use as the main biological treatment step in municipal wastewater treatment plants .....	30
Table 13: Requirements of actively aerated vertical filters with gravel for use as the main biological treatment step in municipal wastewater treatment plants .....	31
Table 14: Requirements of vertical filters with lava sand for use as the main biological treatment step in municipal wastewater treatment plants .....	32
Table 15: Requirements of vertical flow filters with sand for use as a polishing step.....	34
Table 16: Requirements of horizontal filters with coarse sand or gravel for use as a downstream treatment step.....	35
Table 17: Summary of the most important design parameters for planted and unplanted filters in small wastewater treatment systems .....	37
Table 18: Summary of the most important design parameters for planted and unplanted filters in municipal wastewater treatment systems .....	39
Table 19: Selected examples of common combinations of the different treatment steps .....	41
Table 20: Characteristics of different soil types .....	47
Table 21: Characteristics of recommended filter materials .....	49
Table 22: Self-inspection tasks for small wastewater treatment systems, for treatment system operators .....	63
Table 23: Maintenance requirements of small wastewater treatment systems, for trained operators .....	64
Table 24: Scope and timing of self-inspection and maintenance checks for municipal wastewater treatment plants .....	66

## 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

This Standard sets out a common basis for the design, construction, and operation of planted and unplanted filters for biological treatment of municipal wastewater.

The treatment of wastewater that differs significantly in nature from municipal or household wastewater, as well as the treatment of separated partial wastewater streams - with the exception of greywater - fall outside of the scope of this Standard.

The scope of this Standard includes planted and unplanted filters for:

- small wastewater treatment systems treating domestic wastewater with an inflow of up to 50 P;
- wastewater treatment systems serving fewer than 50 P for which extraneous water must be taken into account. By definition, these are not small wastewater treatment systems, because small wastewater treatment plants may not be connected to sewer networks where extraneous water (e.g., rainwater flowing into shaft covers or infiltration of groundwater into the sewer network) is an issue. These systems must be considered as municipal wastewater treatment plants;
- municipal wastewater treatment plants with either separated or combined sewer networks;
- combined wastewater treatment plants providing additional biological treatment or polishing;
- seasonal wastewater treatment plants operated only in summer.

Generally, the treatment plants described herein are able to meet the wastewater treatment requirements according to the Size Class #1, Appendix 1, Part C of the German Wastewater Ordinance ( $BOD_5 \leq 40$  mg/l,  $COD \leq 150$  mg/l in randomly collected samples; four out of five samples must be within the limit). In addition, vertical flow filters and aerated horizontal flow filters are suitable for further nitrification ( $S_{NH_4} \leq 10$  mg/l) at filter effluent water temperatures of at least 12°C.

Design advice for achieving total nitrogen removal is provided. However, long-term phosphorus removal in the filters cannot be expected. For this, a separate treatment step is required (not the subject of this Standard). The removal of hygienically relevant microorganisms by planted and unplanted filters is principally possible, but design specifications cannot be established at this time.

For many years, filters have been used for seasonal wastewater treatment. These include systems in alpine areas (higher than 2,000 meters above sea level) treating greywater as well as domestic wastewater. Beyond that, filters have also been used for treating wastewater generated at seasonal