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| R:\Logos\AQUA DESIGNER\logo-Aqua-DesignerGross.jpg | Update info AQUA DESIGNERVersion 9.1 |

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| Document: | Update info AQUA DESIGNER Version 9.1 |
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# Summary

AQUA DESIGNER is one of the standard design programs for activated sludge plants in Germany and worldwide. The range of tools has been extended over the last few years to all important procedures and procedural stages.

* Sand trap as ventilated sand and fat catcher or round sand trap.
* Primary clarifier as rectangular or round basin.
* Aeration as continuous flow or SBR with common container shapes.
* Sludge treatment as anaerobic treatment or aerobic stabilization.

Many guidelines have been incorporated into the software:

* DWA-A 131, May 2016
* ATV-DVWK-A 198, April 2003
* DWA-A 202, May 2011
* DWA-M 210, July 2009
* DWA-A 226, August 2009
* DWA-M 229-1, September 2017
* DWA-M 368, June 2014
* DWA-M 260, October 2017
* DWA-M 227, October 2014; NEW

# New in AQUA DESIGNER version 9.1

* New Standard M 227, Membrane Bioreactor

Since AQUA DESIGNER 9.0 very detailed ways of design for Membrane Bioreactor Plants is implemented. **In AD 9.1 this part has been refined because of further demands and technical discussions**.

The two common kinds of arrangement are available, modules in the activated chamber or modules in separate chambers.

The design is supported by standard values according to the M 227 and by data banks, containing membranes of suppliers, blowers for cross flow and pumps for permeat pumping.



Figure 1: Selecting Modules and designing cross flow and permeat pumping



Figure 2: Biological Volume and Treatment Parameters



Figure 3: Evaluating the oxygen demand and designing the aeration equipment



Figure 4: True scaled drawing of the activated chamber with equipment

After completing the design of a Membrane Bioreactor the additional tools are available.

Also for MBR you can add

* anaerobic or aerobic sludge treatment
* operational cost
* Oxygen efficiency
* Machine list
* And the other engineering tools of AQUA DESIGNER



Figure 4: True scaled drawing, MBR side view



Figure 4: True scaled drawing, MBR top view

# New in AD 8.3

* New Standard MSIG, Malaysian Sewerage Industry Guidelines
* New Standard Metcalf & Eddy for load, primary sedimentation and clarifiers
* Automatically generated machine and measuring list
* Automatically generated flow diagram
* Excel Export for the documentations

In the current update version 8.3, we added a **Machine List** and a **Flow Diagram**.

After completing a project design including sand- and grease chamber, primary sedimentation, activated chamber, clarifier and return sludge pumping you can add other process steps via the component selection.

The selected steps with a typical set of machines and all the machine data chosen during the design process are listed in the machine list. Also for the measuring equipment a list can be generated. Part of this is also a plant identification system. By this index every machine can be identified in the lists and in the flow diagram.

Based on the design and the selections a flow diagram is generated suitable to the way of calculation.



Figure 5: Flow Diagram Water Line



Figure 5: Flow Diagram Sludge Treatment

See also on youtube at <https://www.youtube.com/watch?v=-uhVsin2rDM>

# New in AD 8.2

Continuous adaptation and improvement of the Design and SBR systems through the standard DWA-M 229-1. The following changes have been introduced into leaflet DWA-M 229-1:

* Case 3: The minimum air volume is calculated using a different approach.
* SOTR: The necessary oxygen supply SOTR was modified in particular with regard to the salt content.
* Operating air quantity Q1: The formula for the operating air quantity Q has not been changed.
* This applies to the design of SBR systems.

The modified formulas are listed in detail in the manual for the current version.

# Examples

## Machine List

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Nr** | **Process stage** | **Order Number** | **Name** | **Type** | **Motor Power [kW]** | **Power Consumption [kW]** | **Capacity** | **Capacity Unit** |
| 1 | Inflow Pumping Station | M-IN-P.1 | Inlet Pump.1 | Centrifugal Pump |   |   | 3.255,21 | m³/h |
| 2 | Inflow Pumping Station | M-IN-P.2 | Inlet Pump.2 | Centrifugal Pump |   |   | 3.255,21 | m³/h |
| 3 | Screen | M-SCR-SCR.1 | Screen.1 | Step Screen with Press |   |   | 6.510,42 | m³/h |
| 4 | Screen | M-SCR-VE.1 | Screen Ventilator.1 | Ventilator |   |   |   |   |
| 5 | Grit and Grease Chamber | M-GC-B.1 | Grit Blower.1 | GM 4 S | 7,5 | 5,4 | 273,6 | m3/h |
| 6 | Grit and Grease Chamber | M-GC-B.2 | Grit Blower.2 | GM 4 S | 7,5 | 5,4 | 273,6 | m3/h |
|  | .............................. |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| 17 | Pre Sedimentation | M-PS-PSP.1 | Primary Sludge Pump.1 | Centrifugal Pump |   |   |   |   |
| 18 | Pre Sedimentation | M-PS-PSP.2 | Primary Sludge Pump.2 | Centrifugal Pump |   |   |   |   |
| 19 | Pre Sedimentation | M-PS-SR.1.1 | Sludge Removal Device.1.1 | Sludge Removal Device |   |   |   |   |
| 20 | Pre Sedimentation | M-PS-SR.2.1 | Sludge Removal Device.2.1 | Sludge Removal Device |   |   |   |   |
|  | .............................. |  |  |  |  |  |  |  |
| 25 | Intermediate Pumping Station | M-INT-P.1 | Intermediate Pump.1 | Centrifugal Pump |   |   | 3.255,21 | m³/h |
| 26 | Intermediate Pumping Station | M-INT-P.2 | Intermediate Pump.2 | Centrifugal Pump |   |   | 3.255,21 | m³/h |
| 27 | Anaerobic Mix Tank | M-AMT-MR.1.1 | Anaerobic Mix Tank Mixer.1.1 | Mixers |   |   |   | kW |
| 28 | Anaerobic Mix Tank | M-AMT-MR.1.2 | Anaerobic Mix Tank Mixer.1.2 | Mixers |   |   |   | kW |
|  | .............................. |  |  |  |  |  |  |  |
| 36 | Activated Chamber | M-AC-B.1 | Blower.1 | GM 50 L | 75 | 63,7 | 3.048,00 | m³/h |
| 37 | Activated Chamber | M-AC-B.2 | Blower.2 | GM 50 L | 75 | 63,7 | 3.048,00 | m³/h |
| 38 | Activated Chamber | M-AC-B.3 | Blower.3 | GM 50 L | 75 | 63,7 | 3.048,00 | m³/h |
| 39 | Activated Chamber | M-AC-B.4 | Blower.4 | GM 50 L | 75 | 63,7 | 3.048,00 | m³/h |
|  | .............................. |  |  |  |  |  |  |  |
| 48 | Activated Chamber | M-AC-VE.1 | Activated Chamber Ventilator.1 | Ventilator |   |   |   |   |
| 49 | Activated Chamber | M-AC-MR.1.1 | Activated Chamber Mixer.1.1 | EMU TR 325 | 4,5 | 14,86 | 1,72 | W/m³ |
| 50 | Activated Chamber | M-AC-MR.1.2 | Activated Chamber Mixer.1.2 | EMU TR 325 | 4,5 | 14,86 | 1,72 | W/m³ |
|  | .............................. |  |  |  |  |  |  |  |
| 61 | Precipitant dosage | M-PD-MNP.1 | Precipitant Dosage Pump.1 | Membrane Pump |   |   |   |   |
| 62 | Precipitant dosage | M-PD-MNP.2 | Precipitant Dosage Pump.2 | Membrane Pump |   |   |   |   |
| 63 | Secondary Settling Tank | M-SS-SR.1.1 | Secondary Sedimentation Scraper.1.1 | Remover Motor |   |   | 1 | kW |
| 64 | Secondary Settling Tank | M-SS-SR.2.1 | Secondary Sedimentation Scraper.2.1 | Remover Motor |   |   | 1 | kW |
|  | .............................. |  |  |  |  |  |  |  |
| 67 | Secondary Settling Tank | M-SS-SCP.1.1 | Scum Pump.1.1 | Scum Pump |   |   | 20 | m³/h |
| 68 | Secondary Settling Tank | M-SS-SCP.2.1 | Scum Pump.2.1 | Scum Pump |   |   | 20 | m³/h |
|  | .............................. |  |  |  |  |  |  |  |
| 71 | Secondary Settling Tank | M-SS-CC.1.1 | Channel Cleaning.1.1 | Channel Cleaning |   |   |   |   |
| 72 | Secondary Settling Tank | M-SS-CC.2.1 | Channel Cleaning.2.1 | Channel Cleaning |   |   |   |   |
|  | .............................. |  |  |  |  |  |  |  |
| 75 | Return Sludge Pump Station | M-RAS-P.1 | Return Sludge Pump.1 | Centrifugal Pump | 25 | 20 | 650 | m³/h |
| 76 | Return Sludge Pump Station | M-RAS-P.2 | Return Sludge Pump.2 | Centrifugal Pump | 25 | 20 | 650 | m³/h |
|  | .............................. |  |  |  |  |  |  |  |
| 85 | Waste Sludge Pumps | M-ES-P.1 | Excess Sludge Pump.1 | Centrifugal Pump |   |   |   |   |
| 86 | Activated Chamber | M-AC-RCP.1 | Recirculation Pump.1 | Recirculation |   |   |   | m³/h |
| 87 | Activated Chamber | M-AC-RCP.2 | Recirculation Pump.2 | Recirculation |   |   |   | m³/h |
|  | .............................. |  |  |  |  |  |  |  |
| 92 | Thickener | M-PTH-MR.1 | Thickener Mixer.1 | Mixer |   |   |   |   |
| 93 | Thickener | M-PTH-PCP.1 | Thickener progressing cavity pump.1 | progr. cav. Pump |   |   |   |   |
| 94 | Thickener | M-PTH-SN-P.1 | Thickener Supernatant Pump.1 | Centrifugal Pump |   |   |   |   |
| 95 | Mechanical Thickening | M-MTH-DSP.1 | Thin sludge Pump.1 | Thin sludge Pump |   |   |   |   |
| 96 | Mechanical Thickening | M-MTH-DSP.2 | Thin sludge Pump.2 | Thin sludge Pump |   |   |   |   |
| 97 | Mechanical Thickening | M-MTH-TM.1 | Thickening Machine.1 | Thickening Machine |   |   |   |   |
| 98 | Mechanical Thickening | M-MTH-TSP.1 | Thick Sludge Pump.1 | Thick Sludge Pump |   |   |   |   |
| 99 | Mechanical Thickening | M-MTH-POM.1 | Mixer Polymer.1 | Polymer |   |   |   |   |
| 100 | Mechanical Thickening | M-MTH-POM.2 | Mixer Polymer.2 | Polymer |   |   |   |   |
| 101 | Mechanical Thickening | M-MTH-PDP.1 | Polymer Dosage Pump.1 | Polymer Dosage Pump |   |   |   |   |
| 102 | Mechanical Thickening | M-MTH-PDP.2 | Polymer Dosage Pump.2 | Polymer Dosage Pump |   |   |   |   |
| 103 | Mechanical Thickening | M-MTH-VE.1 | Mechanical Thickening Ventilator.1 | Ventilator |   |   |   |   |
| 104 | Raw Sludge | M-RMS-P.1 | Raw Sludge Pump.1 | Raw Sludge Pump |   |   |   |   |
| 105 | Raw Sludge | M-RMS-P.2 | Raw Sludge Pump.2 | Raw Sludge Pump |   |   |   |   |
| 106 | Digester | M-DP-PC.1 | Digester Circulating Pump.1 | Circulating Pump |   |   |   |   |
| 107 | Digester | M-DP-PC.2 | Digester Circulating Pump.2 | Circulating Pump |   |   |   |   |
| 108 | Digester | M-DP-MR.1 | Digester Mixer.1 | Mixer |   |   |   |   |
| 109 | Secondary Thickener | M-STH-MR.1 | Secondary Thickener Mixer.1 | Mixer |   |   |   |   |
| 110 | Secondary Thickener | M-STH-PCP.1 | Secondary Thickener progressing cavity pump.1 | progr. cav. Pump |   |   |   |   |
| 111 | Secondary Thickener | M-STH-SN-P.1 | Secondary Thickener Supernatant Pump.1 | Centrifugal Pump |   |   |   |   |
| 112 | Dewatering | M-DW-PFE.1 | Feed Pump.1 | progr. cav. Pump |   |   |   |   |
| 113 | Dewatering | M-DW-PFE.2 | Feed Pump.2 | progr. cav. Pump |   |   |   |   |
| 114 | Dewatering | M-DW-M.1 | Dewatering Machine.1 | Dewatering Machine |   |   |   |   |
| 115 | Dewatering | M-DW-SSC.1 | Screw Conveyor.1 | Screw Conveyor |   |   |   |   |
| 116 | Dewatering | M-DW-SSC.2 | Screw Conveyor.2 | Screw Conveyor |   |   |   |   |
| 117 | Dewatering | M-DW-FIP.1 | Filtrate Pump.1 | Filtrate Pump |   |   |   |   |
| 118 | Dewatering | M-DW-FIP.2 | Filtrate Pump.2 | Filtrate Pump |   |   |   |   |
| 119 | Dewatering | M-DW-VE.1 | Dewatering Ventilator.1 | Ventilator |   |   |   |   |
| 120 | Dewatering | M-DW-POM.1 | Dewatering Mixer Polymer.1 | Polymer |   |   |   |   |
| 121 | Dewatering | M-DW-POM.2 | Dewatering Mixer Polymer.2 | Polymer |   |   |   |   |
|  | .............................. |  |  |  |  |  |  |  |
| 124 | Supernatant | M-SN-P.1 | Supernatant Pump.1 | Centrifugal Pump |   |   |   |   |
| 125 | Supernatant | M-SN-P.2 | Supernatant Pump.2 | Centrifugal Pump |   |   |   |   |

## Measuring List

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Nr** | **Process stage** | **Process stage** | **Order Number** | **Measuring Point (\*)** |
| 1 |   | Inflow Measuring | MES-IN.1 | Flow |
| 2 |   | Inflow Measuring | MES-IN.2 | Conductivity |
| 3 |   | Inflow Measuring | MES-IN.3 | PH |
| 4 |   | Inflow Measuring | MES-IN.4 | NH4 |
| 5 |   | Inflow Pumping Station | MES-IN-PS.1 | Flow |
| 6 |   | Inflow Pumping Station | MES-IN-PS.2 | Level |
| 7 |   | Screen | MES-SCR.1 | Level |
| 8 |   | Activated Chamber | MES-AC.1.1 | PH |
| 9 |   | Activated Chamber | MES-AC.1.2 | Temperature |
| 10 |   | Activated Chamber | MES-AC.1.3 | O2 |
| 11 |   | Activated Chamber | MES-AC.1.4 | NH4 |
| 12 |   | Activated Chamber | MES-AC.1.5 | NO3 |
| 13 |   | Activated Chamber | MES-AC.1.6 | MLSS |
| 14 |   | Activated Chamber | MES-AC.1.7 | Pressure |
| 15 |   | Activated Chamber | MES-AC.2.1 | PH |
| 16 |   | Activated Chamber | MES-AC.2.2 | Temperature |
| 17 |   | Activated Chamber | MES-AC.2.3 | O2 |
| 18 |   | Activated Chamber | MES-AC.2.4 | NH4 |
| 19 |   | Activated Chamber | MES-AC.2.5 | NO3 |
| 20 |   | Activated Chamber | MES-AC.2.6 | MLSS |
| 21 |   | Activated Chamber | MES-AC.2.7 | Pressure |
| 22 |   | Activated Chamber | MES-AC.3.1 | PH |
| 23 |   | Activated Chamber | MES-AC.3.2 | Temperature |
| 24 |   | Activated Chamber | MES-AC.3.3 | O2 |
| 25 |   | Activated Chamber | MES-AC.3.4 | NH4 |
| 26 |   | Activated Chamber | MES-AC.3.5 | NO3 |
| 27 |   | Activated Chamber | MES-AC.3.6 | MLSS |
| 28 |   | Activated Chamber | MES-AC.3.7 | Pressure |
| 29 |   | Activated Chamber | MES-AC.4.1 | PH |
| 30 |   | Activated Chamber | MES-AC.4.2 | Temperature |
| 31 |   | Activated Chamber | MES-AC.4.3 | O2 |
| 32 |   | Activated Chamber | MES-AC.4.4 | NH4 |
| 33 |   | Activated Chamber | MES-AC.4.5 | NO3 |
| 34 |   | Activated Chamber | MES-AC.4.6 | MLSS |
| 35 |   | Activated Chamber | MES-AC.4.7 | Pressure |
| 36 |   | Activated Chamber | MES-AC.5.1 | PH |
| 37 |   | Activated Chamber | MES-AC.5.2 | Temperature |
| 38 |   | Activated Chamber | MES-AC.5.3 | O2 |
| 39 |   | Activated Chamber | MES-AC.5.4 | NH4 |
| 40 |   | Activated Chamber | MES-AC.5.5 | NO3 |
| 41 |   | Activated Chamber | MES-AC.5.6 | MLSS |
| 42 |   | Activated Chamber | MES-AC.5.7 | Pressure |
| 43 |   | Activated Chamber | MES-AC.6.1 | PH |
| 44 |   | Activated Chamber | MES-AC.6.2 | Temperature |
| 45 |   | Activated Chamber | MES-AC.6.3 | O2 |
| 46 |   | Activated Chamber | MES-AC.6.4 | NH4 |
| 47 |   | Activated Chamber | MES-AC.6.5 | NO3 |
| 48 |   | Activated Chamber | MES-AC.6.6 | MLSS |
| 49 |   | Activated Chamber | MES-AC.6.7 | Pressure |
| 50 |   | Secondary Sedimentation | MES-SS.1 | Flow |
| 51 |   | Return Sludge Pump Station | MES-RAS-PS.1.1 | Level |
| 52 |   | Return Sludge Pump Station | MES-RAS-PS.2.1 | Level |
| 53 |   | Return Sludge Pump Station | MES-RAS-PS.3.1 | Level |
| 54 |   | Return Sludge Pump Station | MES-RAS-PS.4.1 | Level |
| 55 |   | Thickener | MES-PTH.1 | Level |
| 56 |   | Excess Sludge Thickening | MES-MTH.1 | Flow |
| 57 |   | Excess Sludge Thickening | MES-MTH.2 | MLSS |
| 58 |   | Raw Sludge | MES-RMS-PS.1 | Flow |
| 59 |   | Raw Sludge | MES-RMS-PS.2 | Level |
| 60 |   | Raw Sludge | MES-RMS-PS.3 | Phosphate |
| 61 |   | Raw Sludge | MES-RMS-PS.4 | MLSS |
| 62 |   | Digester | MES-DP.1 | Level |
| 63 |   | Digester | MES-DP.2 | PH |
| 64 |   | Digester | MES-DP.3 | Temperature |
| 65 |   | Sludge Dewatering | MES-DW.1 | Flow |
| 66 |   | Sludge Dewatering | MES-DW.2 | Level |
| 67 |   | Sludge Dewatering | MES-DW.3 | MLSS |
| 68 |   | Supernatant | MES-SN.1 | Level |

## Flow Diagram

## Drawing combined denitrification



## Drawing clarifier

