

## AQUALOOP Greywater Recycling System

AL-GW48600 l/day

✓ NSF 350 certified series



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## INTEWA AQUALOOP Greywater Recycling System - AL-GW48600 I/d

### Your requirements – Our solutions

AQUALOOP greywater recycling systems as **packaged solutions** offer the following advantages:

- ✓ Pre-assembled greywater recycling system
- ✓ Low space requirement
- ✓ Experience: AQUALOOP systems are installed and work successfully in over 20 countries worldwide.
- ✓ Installation can be supported by online assistance of INTEWA experts.
- ✓ AQUALOOP I-CONNECT systems guarantee automatic operation and permanent monitoring of the whole system.
- ✓ Saving water as valuable resource
- ✓ More independence from the drinking water supplier
- ✓ Pays for itself within a few years
- ✓ INTEWA is **the only company worldwide with NSF 350:2014 Class C certification** for their series of commercial grey water recycling systems, guaranteeing excellent treated water quality and safety.
- ✓ AQUALOOP is certified according to British Standard BS 8525-2:2011 for the most critical application. BS certified systems must be additionally equipped with a UV unit.



Certified to NSF/ANSI  
Standard 350

**BS**

8525-2:2011

# Functional description

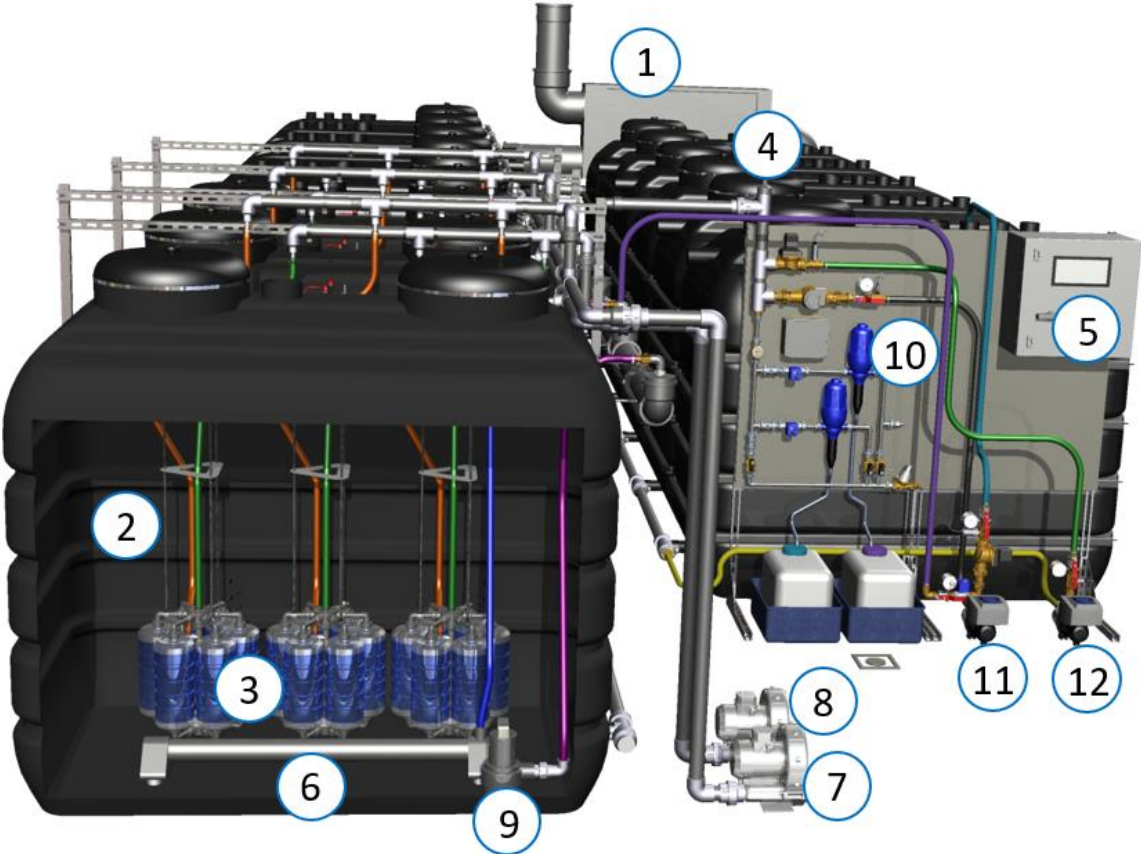


Figure 1: Overview: Packaged system AQUALOOP Greywater Recycling System 48600 l/day  
 Note: metal rack, drainage pipes, aerator hoses on site

- 1. PURAIN filter
- 2. Bioreactor
- 3. AQUALOOP Membrane stations
- 4. Clear water tank
- 5. I-CONNECT system control with touch display
- 6. Pipe diffuser
- 7. Blower for pipe diffuser
- 8. Blower for membrane station
- 9. Sludge pump
- 10. I-CON-ADS cleaning technology
- 11. Central filtration pump
- 12. Central backwash pump

### ***Prefiltration and bioreactor***

In the AQUALOOP complete greywater systems we use prefabricated, stable, opaque and reinforced internal tanks.

The greywater from showers, bathtubs and hand washbasins is pre-filtered through a highly efficient PURAIN filter (1) before entering the bioreactor (2). The dirt collected in the PURAIN filter is regularly flushed back into the sewer using a backwash nozzle.

In the core of the plant, the bioreactor, continuous biodegradation takes place. This is achieved by means of a pipe diffuser (6) located at the bottom of the plant and packing floating in the water. This fine-beaded diffuser, which is supplied with oxygen by a blower (7), creates an aerated fluidized bed, which is a prerequisite for the growth of bacteria within the greywater. Settlement occurs here on the many hundreds of AQUALOOP packed beds, which are special suspended bodies with a large surface area. A sludge pump (9), which is also located at the bottom, periodically removes any sediment that is formed.

### ***Membrane station and control***

The bioreactor also contains the AQUALOOP membrane stations (3), which filter the greywater into the clear water storage tank (4). For system with a daily treatment volume of 32,400 liters or larger, one central filtration pump (11) and one central backwash pump (12) are used. Due to the small membrane pore size of 0.02  $\mu\text{m}$ , particles, bacteria and viruses are retained by ultrafiltration. The membrane station is pre-installed with a hose connection for installation of a blower (8). The air provided cleans the ultrafiltration membrane fibres and also delivers oxygen for biological treatment in the membrane tank.

The membranes are periodically cleaned by backwashing and by coarse air bubbles. The system is equipped with the browser-capable I-CONNECT control system (5) and the automatic chemical cleaning technology I-CON-ADS (10). This enables even more economical and low-maintenance operation, especially for the larger systems.

### ***Further process***

Depending on requirements, the bioreactor tank or clear water tank can also be equipped with a separate heat exchanger. Via this, the excess heat energy can be extracted from the clear water tank by means of a heat pump and reused for hot water preparation.

The clean service water is pumped to the consumers by our various pressure boosting systems, such as the RAINMASTER systems, depending on the calculated and required flow rate and pressure. The service water can be used for consumers such as toilets, washing machines or irrigation. In order to achieve the greatest possible safety, the already ultrafiltered service water passes through a UV treatment as the last stage. The dimensioning of the UV disinfection system is done according to the dimensioning of the pressure boosting system.

## Main Components for Greywater Recycling



### 1. PURAIN filter

The PURAIN high-efficiency, self-cleaning filter with integrated skimmer overflow is installed inside of the bioreactor tank. It is equipped with a backflush nozzle for an automatic cleaning.



### 2./4. Bioreactor and clear water tank

The INT tanks are used as well for bioreactor and clear water tank. They are pre-installed as much as possible. Different tank sizes results in the best suitable tank configuration for each greywater system.



### 3. AQUALOOP membrane station

This station comprises a platform for mounting the membranes. A filtration pump, backwash pump, backwash tank and blower connection are all integrated. One station can be equipped with 6 membranes. The specialized hollow membrane fibres with a pore size of 0.02  $\mu\text{m}$  reliably prevent passage of bacteria and viruses. Each membrane cartridge has a filtration area of 6  $\text{m}^2$ . The innovative construction and design allow for long-lasting operation up to 10 years with only minimal maintenance effort.

### Main benefits of AQUALOOP membranes to other Membrane Filtration Systems

- ✓ AQUALOOP membrane fibres protected in cartridges
- ✓ Cartridges allow higher fluxes and protect the fibres from frequent clogging through with air scouring.
- ✓ AQUALOOP fibres and cartridges allow more equal distribution of applied pressures and flows because they are within a small range of hydrostatic pressure difference (only about 40 mbar compared to up to 200 mbar pressure difference in other systems).
- ✓ The handling of AQUALOOP cartridges is user friendly and can be lifted much easier than conventional plate or hollow fibres systems.
- ✓ AQUALOOP CIP allows cleaning chemicals to work directly on the membrane without any dilution or chemical contamination of the surrounding bioreactor media.



### 5. INTEWA I-CONNECT control system

The control of a greywater recycling plant with I-CONNECT enables a transparent, monitored process flow. The control system includes the regulation of the blowers for the membrane stations and the pipe diffusers and their pressure monitoring, as well as the process control of the filtration and backwash pumps, the sludge pumps, the pre-filter cleaning valve and the level probes for recording the levels in the membrane storage tank and the clear water storage tank.

The connection of the automatic dosing station and its automatic cleaning operation reduces the maintenance effort and improves the flow rate. The integrated touch display is used for setting and displaying the entire system. With the optional I-CONNECT license, users can access the same system display and parameter setting via web application or mobile app. Alerts are sent directly to the user. This offers the advantage that maintenance can be carried out more precisely.



### 10. AQUALOOP automatic chemical cleaning device I-CON-ADS

The fully automatic cleaning is controlled by the central control unit. The required daily treatment flow can be set via the setting in the multi controller menu. The automatic cleaning is activated on a timed basis, e.g. every 2 weeks. The cleaning consists of two cleaning steps, first an acid cleaning through citric acid, for the removal of scaling components. The second part is an oxidative cleaning with chlorine to remove biofilm.



### 6. AQUALOOP pipe diffuser

A diffuser is installed to ensure the most efficient biodegradation possible.



### 7. AQUALOOP blower for pipe diffusor

Blower for the AQUALOOP diffuser used



### 8. AQUALOOP blower for membrane station

With AQUALOOP technology, air is supplied through the blower which performs several functions at the same time:

- Cleaning of the membrane fibers by creating turbulence through the fibers
- Cleaning the fluidized-bed growth bodies
- Introduction of oxygen



### **9. Sludge pump (only available in Europe)**

This pump serves to automatically remove sludge from the bioreactor.



### **11./12. central filtration and back flushing pump**

This external pump serves to draw filtered water to the clean water tank as well to back flush the membrane cartridges automatically.



### **AQUALOOP growth bodies**

Special floats with a large surface area, on which the bacteria settle and enable biological cleaning.



## Water quality and safety

INTEWA greywater systems deliver crystal-clear water through ultrafiltration.

The INTEWA test system was able to meet all requirements and was thus the first and so far only system to be certified according to "Class C". In contrast to Class R (turbidity 5 NTU, E.coli 14 MPN/100 ml as average values), Class C, for example, may reach a maximum of 2 NTU and 2.2 MPN/100 ml E.coli on average. Class C systems are intended in particular for commercial greywater systems. Overall, the entire INTEWA system series AL-GW300 to AL-GW5400 could be certified according to NSF/ANSI 350-2014.

For larger systems, INTEWA is authorised to issue an NSF declaration of conformity, which entitles the holder to carry the NSF certificate. For this purpose, INTEWA will perform a system-specific verification of compliance with the specifications of the INTEWA NSF report. See the confirmation of the official NSF listing.

	Influent range source water <sup>4</sup>	Requirement effluent NSF/ANSI 350-2014 Class C		AQUALOOP effluent Test results NSF approval Class C	
		Test Average	Single Sample Maximum	Result Average	Single Sample Maximum
<b>BOD<sub>5</sub> [mg/l]</b>	130 – 180	--	--	--	--
<b>CBOD<sub>5</sub> [mg/l]</b>	--	10	25	5	17
<b>TSS [mg/l]</b>	80-100	10	30	2	7.8
<b>turbidity [NTU]</b>	50-100	2	5	0.57	3.89
<b>E. coli <sup>2</sup></b>	10 <sup>2</sup> -10 <sup>4</sup> cfu/100ml	2.2 MPN/100ml	200 MPN/100ml	1.0 MPN/100ml	13.0 MPN/100ml
<b>pH</b>	6.5 – 8.0	6.0 – 9.0	NA <sup>1</sup>	7.38	NA <sup>1</sup>
<b>colour</b>	--	MR <sup>3</sup>	NA	MR <sup>3</sup>	NA
<b>odor</b>	--	Non offensive	NA	Non offensive	NA
<b>oily film and foam</b>	--	Non-detectable	Non-detectable	Non-detectable	Non-detectable

1 NA: not applicable

2 calculated as geometric mean.

3 MR: measured and reported only.

4 System for treating bathing and laundry source waters (combined)

## Dimensions and planning data

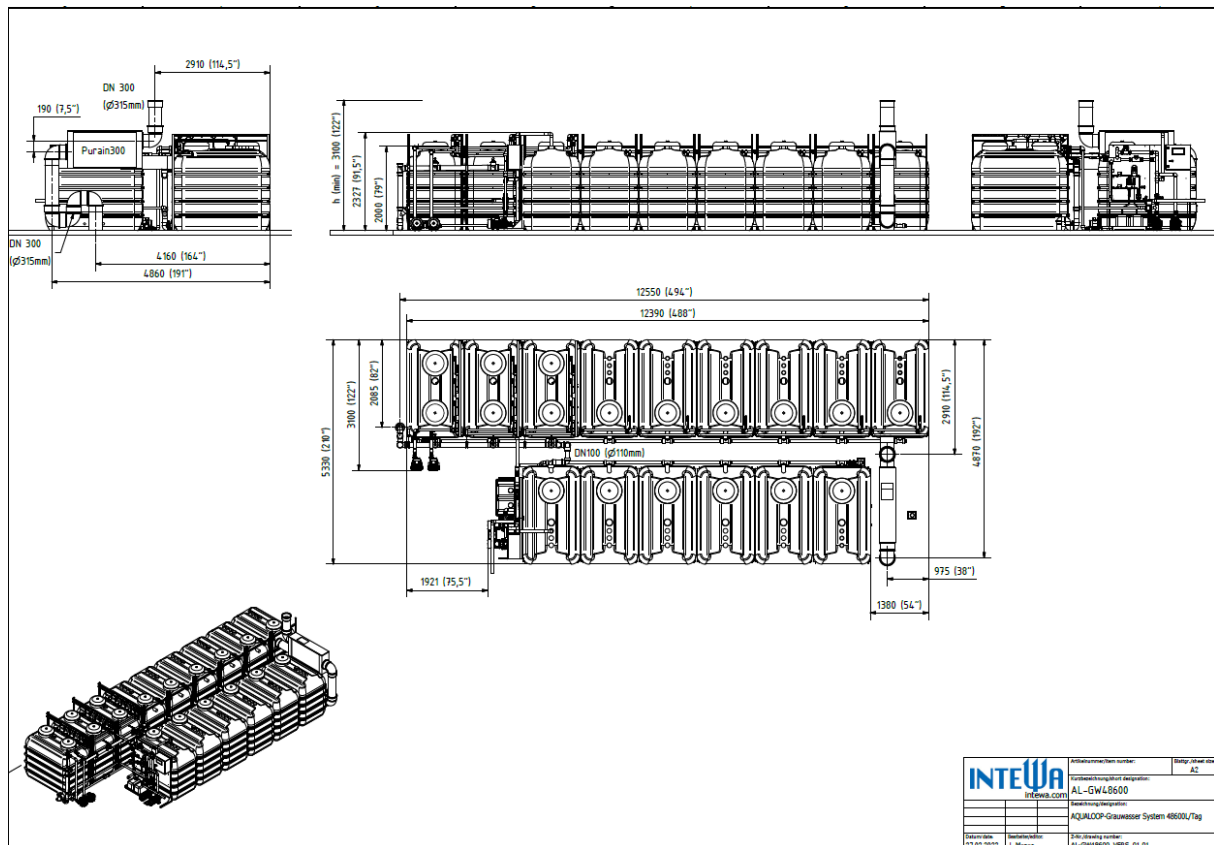


Figure 2: Dimensions and connections AQUALOOP AL-GW48600 I/d

### Technical Data:

Treatment capacity:	48600 l/Tag
Length:	12550 mm
Width:	5330 mm
Inlet connection:	DN300 (ø315mm)
Emergency overflow:	DN300 (ø315mm)
Floor space required:	66 m <sup>2</sup>
Ceiling height required:	3100 mm
Net weight, without water	4400 kg
Weight max. (filled with water):	79400 kg
Drainage connection:	DN300 and floor drain
Voltage:	230 VAC/ 50 Hz
Power requirement:	9.3 kW
Power consumption, max:	1.4 kWh/m <sup>3</sup>
Internet connection:	RJ45

### Packaging and shipping:

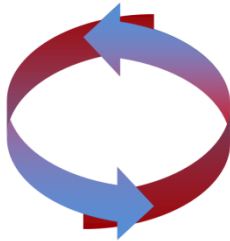
14 x 5000L tanks (239x135x210cm): 14 x 6.77 m<sup>3</sup> / 14 x 260 kg  
 9 x Pallets (120x80x150): 9 x 1.44m<sup>3</sup> / 9 x 150 kg  
 1 x PR300 (178x80x86): 1 x 1.22m<sup>3</sup> / 1 x 100 kg  
 Total ca.: 108.96 m<sup>3</sup> / 5090 kg

## System and Running costs

Upon request

## Additional system benefits

### Heat recycling with treated greywater



In modern, well-insulated buildings, more energy leaves the building with the warm wastewater than is needed for heating. Most of this energy is contained in the greywater, which runs into the bioreactor at about 33°. If a greywater recycling system is installed in a building anyway, it is therefore particularly obvious to extract this energy from the treated greywater shortly after the point of origin and to return it to the water heating system. If the energy is extracted from the bioreactor, it can be lowered to a maximum of 15° to ensure biodegradation. This would correspond to a heat capacity of over 17 kWh/m<sup>3</sup> of water. If the energy is withdrawn from the clear water storage tank, the temperature can theoretically be lowered further. The technology used depends on the hot water and heating water supply planned for the building anyway and should be planned by a suitable engineering firm. If the cold drinking water has to be heated correspondingly less with electrical energy through the use of a heat exchanger, the savings are financially enormous with today's electricity costs. If, as in modern buildings, heat pumps with source management are used, the additional source "warm greywater" can significantly improve the coefficient of performance and thus reduce the electricity requirement. Here, too, good economic efficiency can often be achieved.

### I-CONNECT Licences

The I-CONNECT licenses allow you to monitor and/ or control your plant via the web portal. Thus, the purchase of a license offers the plant operator or a person authorized by him a variety of options.

<b>Viewer – 240 €/year</b>	<ul style="list-style-type: none"><li>✓ Plant overview</li><li>✓ Locations</li><li>✓ Condition monitoring</li><li>✓ Fault messages by e-mail</li><li>✓ Statistics</li></ul>
<b>Expert – 495 €/year</b>	<ul style="list-style-type: none"><li>✓ Viewer +++</li><li>✓ Active remote control</li><li>✓ System configurations</li><li>✓ Maintenance package</li></ul>

### Lead time

INTEWA GmbH specifies a **lead time of minimum 3 months** from deposit being paid to system component delivery to site.

Shipping details or pickup agreements have to be defined separately.

## Downloads and references

### System Overview

Greywater for commercial use

<https://www.intewa.com/en/water-treatment/commercial/greywater-recycling/>

Pre-assembled systems

<https://www.intewa.com/en/water-treatment/commercial/greywater-recycling/pre-assembled-systems/>

### More details

AQUALOOP

<https://www.intewa.com/en/products/aqualoop/membranes/>

Greywater recycling complete system

<https://building.intewa.net/en/360-exhibition/greywater-recycling-complete-system>

### References



Campsite in Austria

<https://www.intewa.com/en/references/campsite-gerhardhof-relies-on-sustainable-use-of-grey-water/>



Headquarter of the DGS Natural Resources, Sacramento

<https://www.intewa.com/en/references/large-scale-greywater-system-in-sacramento/>



Gastronomic marketplace in the USA

<https://www.intewa.com/en/references/eataly-in-los-angeles-stages-grey-water/>

## Additional INTEWA components for greywater recycling systems

The clean service water is pumped to the consumers by our various pressure boosting systems. INTEWA can offer these systems depending on the calculated and required flow rate and pressure. All technical data of the below mentioned products can be seen in our store

<https://www.intewa-store.com/start.aspx>

INTEWA sales team helps to find the best suitable solution.



### **MULTI** Submersible pumps type

<https://www.intewa.com/en/intewa-products/pumps/>  
-additional mains water top up included



### **RAINMASTER**

The RAINMASTER with different power levels and integrated mains water top up draws the treated water from the clear water tank to the consumers.

<https://www.intewa.com/en/products/rainmaster/>



### **PROFI** pumping and water control units

Double-pump system for high operational safety with self-priming multistage horizontal centrifugal pump with frequency converters (optional) and alternating start-up



### **UV Unit**

The UV units are installed behind the pressurizing system to the reuse consumers (toilets, washing machine, irrigation, cleaning, and so on). The UV units deliver an additional second safety in case of a bacteria growth in the clear water storage tank with the disinfected membrane filtered water.

According to BS standard, UV unit is a mandatory part of the greywater system.

# NSF Certification confirmation for AQUALOOP

The INTEWA system is the first and only system in the world to be certified to the high NSF Standard Class C (commercial type) standard for commercial installations and also to the British Standard for spray irrigation.



## OFFICIAL LISTING

NSF certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI 350 - Onsite Residential and Commercial Water Reuse Treatment Systems

This is the Official Listing recorded on February 11, 2019.

**INTEWA Ingenieur-Gesellschaft für Energie- und Wassertechnik GmbH**  
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**Aachen 52068**  
**Germany**  
**49 241 966 050**

**Facility: Aachen, Germany**

<b>Model Number</b>	<b>Rated Capacity Gallons/Day</b>	<b>Classification</b>	<b>Type</b>
AQUALOOP System GW300	79	Class C	Laundry & Bathing
AQUALOOP System GW600	158	Class C	Laundry & Bathing
AQUALOOP System GW900	238	Class C	Laundry & Bathing
AQUALOOP System GW1200	317	Class C	Laundry & Bathing
AQUALOOP System GW1500	396	Class C	Laundry & Bathing
AQUALOOP System GW1800	476	Class C	Laundry & Bathing
AQUALOOP System GW3600	951	Class C	Laundry & Bathing
AQUALOOP System GW5400 <sup>[1]</sup>	1427	Class C	Laundry & Bathing

[1] Larger systems available in accordance with treatment volume and duration specified in the INTEWA NSF Final Report and Certification.

Note: Additions shall not be made to this document without prior evaluation and acceptance by NSF.

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