

Tank Insert

Amaclean

**Supplementary Operating
Manual**



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Supplementary Operating Manual Amaclean

Original operating manual

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1 General

1.1 Principles

This operating manual is supplied as an integral part of the type series and variants indicated on the front cover. The manual describes the proper and safe use of this equipment in all phases of operation.

The name plate indicates the type series / size and the main operating data. The serial number uniquely identifies the product and serves as identification in all further business processes.

In the event of damage, immediately contact your nearest KSB service center to maintain the right to claim under warranty.

Noise characteristics see operating manual of the pump.

1.2 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel. (⇒ Section 2.4, Page 6)

1.3 Other applicable documents

Table 1: Overview of other applicable documents

Document	Contents
Data sheet	Description of the technical data
General arrangement drawing/ outline drawing	Description of mating and installation dimensions
General assembly drawing ¹⁾	Sectional drawing

1.4 Symbols

Table 2: Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇒	Result of an action
⇔	Cross-references
1. 2.	Step-by-step instructions
	Note Recommendations and important information on how to handle the product

1) If agreed to be included in the scope of supply



2 Safety

All the information contained in this section refers to hazardous situations.

2.1 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 DANGER	DANGER This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 WARNING	WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
CAUTION	CAUTION This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	Explosion protection This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with EU Directive 2014/34/EU (ATEX).
	General hazard In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	Electrical hazard In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	Machine damage In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.

2.2 General

This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.

The safety information in all sections of this manual must be complied with.

The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.

The contents of this operating manual must be available to the specialist personnel at the site at all times.

The operator is responsible for ensuring compliance with all local regulations which are not taken into account.

2.3 Intended use

Tank insert made of glass fiber reinforced plastics, suitable for use in sewage systems to the following standards: DIN 1986-3, EN 752:2008 and EN 1671

- The tank insert must only be used within the operating limits described in the other applicable documents.
- Only use tank inserts which are in perfect technical condition.
- The tank insert must only be used in the fluid described in the data sheet or product literature.
- Consult the manufacturer about any other modes of use not described in the data sheet or product literature.
- Observe all safety information and instructions in this manual.

2.4 Personnel qualification and personnel training

All personnel involved must be fully qualified to install, operate, maintain and inspect the product this manual refers to.

The responsibilities, competence and supervision of all personnel involved in installation, operation, maintenance and inspection must be clearly defined by the operator.

Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.

Training on the system must always be supervised by technical specialist personnel.

2.5 Consequences and risks caused by non-compliance with this operating manual

- Non-compliance with this operating manual will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
 - Hazard to persons by electrical, thermal, mechanical effects
 - Failure of important product functions
 - Failure of prescribed maintenance and servicing practices

2.6 Safety awareness

In addition to the safety information contained in this manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health regulations and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards, directives and laws

2.7 Safety information for the operator/user

- Fit contact guards supplied by the operator for hot, cold or moving parts, and check that the guards function properly.
- Do not remove any contact guards during operation.
- Provide the personnel with protective equipment and make sure it is used.
- Contain leakages (e.g. at the shaft seal) of hazardous fluids handled (e.g. explosive, toxic, hot) so as to avoid any danger to persons and the environment. Adhere to all relevant laws.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)

2.8 Safety information for maintenance, inspection and installation

- Modifications or alterations of the system require the manufacturer's prior consent.
- Use only original spare parts or parts authorized by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation is performed by authorized, qualified specialist personnel who are thoroughly familiar with the manual.
- Carry out work on the system during standstill of the pump sets only.

- When taking the system out of service always adhere to the procedure described in the manual.
- As soon as the work has been completed, re-install and re-activate any safety-relevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning.
- Make sure the system cannot be accessed by unauthorized persons (e.g. children).

2.9 Safety instructions for entering collecting tanks

	<p style="background-color: #e67e22; color: white; padding: 5px;"> DANGER</p> <p>Risk of ignition by sparks Explosion of the system!</p> <ul style="list-style-type: none"> ▸ Remove flammable gases from the tank.
	<p style="background-color: #e67e22; color: white; padding: 5px;"> DANGER</p> <p>Formation of life-threatening gases Danger to life!</p> <ul style="list-style-type: none"> ▸ Always observe the following safety instructions. ▸ Observe the safety information.

Excerpt from the accident prevention regulations:

- Secure the manhole and cordon off the work area.
- Remove any hazardous and flammable gases from the tank (e.g. by using a fan).
- Persons must only enter the tank in the presence of a responsible supervisor who is outside of the tank.
- When entering the tank use a safety harness, safety ropes and a breathing apparatus.
- Auxiliary tools such as lifting equipment must be in proper and reliable condition.

	<p style="background-color: #e67e22; color: white; padding: 5px;"> DANGER</p> <p>Work in the collecting tank without observing the safety instructions Hazard to persons!</p> <ul style="list-style-type: none"> ▸ Always observe the German health and safety regulations BGR 117-1.
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Examples of special hazards when entering the tank:

- Biological processes, e.g. fermentation, digestion
- Formation of potentially explosive atmospheres
- Lack of oxygen
- Hazardous substances that can be absorbed through the skin or inhaled
- Electrical equipment
- Moving parts or solid parts fitted in the tank
- Psychological stress (confined space)

3 Transport/Temporary Storage/Disposal

3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the distributor and the insurance company about the damage in writing immediately.

3.2 Transport

	<p>⚠ WARNING</p>
	<p>Improper transport Risk of injury by components falling down! The load could slip out of suspension arrangement!</p> <ul style="list-style-type: none"> ▷ Select lifting accessories which are suitable for the system weight. ▷ Use suitable lifting accessories, e.g. a lifting net. ▷ Secure the load appropriately. ▷ Observe the applicable accident prevention regulations.
	<p>⚠ WARNING</p>
	<p>Installation on a mounting surface which is unsecured and cannot support the load Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Observe the required compressive strength class C12/15 of the concrete in exposure class XC1 as per EN 206-1. ▷ The mounting surface must be set, flat, and level. ▷ Observe the weights indicated.
	<p>CAUTION</p>
	<p>Improper transport Damage to the tank insert!</p> <ul style="list-style-type: none"> ▷ Transport the tank insert in such a way that no impermissible loads act on it. ▷ For transport use approved webbing straps or hemp ropes; never use chains or steel ropes. ▷ Protect any built-on components and protruding parts of the tank. ▷ Never roll or drag the tank insert along the floor.

- ✓ Suitable lifting equipment and lifting accessories for the total weight of the tank insert are on hand.
1. Attach the lifting accessories to the tank insert.
 2. Lift the tank insert, transport it and place it horizontally on a level surface. Maintain a safe distance during lifting operations (load may swing when being lifted).
 3. Secure the tank insert against tipping over or rolling off.



Fig. 1: Placing the tank insert down in a horizontal position

3.3 Storage/preservation

If the ambient conditions for storage are met, the tank will give reliable service even after a prolonged period of storage.

	CAUTION
	<p>Damage during storage due to frost, humidity, dirt, UV radiation or vermin Corrosion/contamination of the tank!</p> <ul style="list-style-type: none"> ▷ Store the tank in a frost-proof, roofed area. ▷ Only remove caps/covers from the openings of the tank at the time of installation.

Store the tank in a dry, protected room where the atmospheric humidity is as constant as possible.

3.4 Disposal

	! WARNING
	<p>Fluids handled, consumables and operating supplies which are hot or pose a health hazard Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ Collect and properly dispose of the flushing fluid and of any residues of the fluid handled. ▷ Wear safety clothing and a protective mask if required. ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.

1. Dismantle the system.
Collect greases and other lubricants during dismantling.
2. Separate and sort the pump materials, e.g. by:
 - Metals
 - Plastics
 - Electronic waste
 - Greases and other lubricants
3. Dispose of materials in accordance with local regulations or in another controlled manner.

4 Description

4.1 General description

- Tank insert

Tank insert for installation in tank structures that are new or to be modernized. The tank insert is prepared for two flanged elbows with flange dimensions to EN 1092-2. The tank is suitable for collecting waste water severely contaminated with waste and fibers.

4.2 Designation

Example: Amaclean 1000NDN050GGR60

Table 4: Designation key

Code	Description	
Amaclean	Type series	
1000	Maximum inside diameter [mm]	
	1000	
	1400	
1800		
	N	Type of claw
	N	Claw to European standard
W	Without claw	
DN050	Flanged elbow	
	DN 050	
	DN 065	
	DN 080	
	DN 100	
GG	Material of flanged elbow / claw	
	GG	Cast iron
	CC	Stainless steel
CG	Stainless steel (flanged elbow), gray cast iron (claw)	
R	Installation parts	
	R	Guide rail arrangement
	W	Guide cable arrangement
60	Installation depth	
	4 5	4.5 m
	6 0	6.0 m
9 5	9.5 m	

4.3 Name plate



Fig. 2: Name plate (example)

1	Type series	2	Order number
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4.4 Design details

Design

- Self-cleaning tank insert made of glass fiber reinforced polyester with special gel coating
- 2 flanged elbows made of stainless steel A4 or cast iron²⁾
- Base reinforcement made of steel S235 with integrated fastening bolts made of stainless steel A4

4.5 Configuration and function

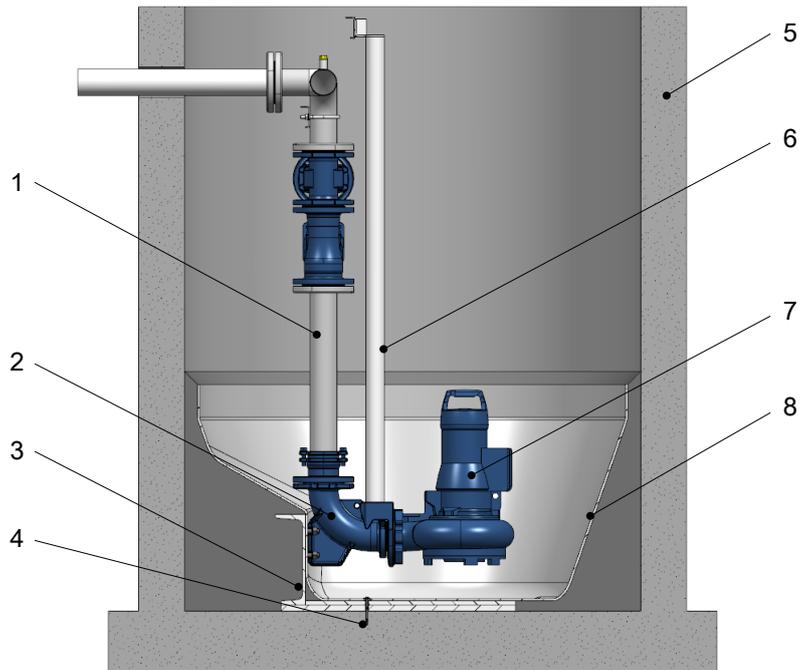


Fig. 3: Configuration (example)

1	Pipe	5	Concrete tank
2	Flanged elbow ³⁾	6	Installation parts
3	Base reinforcement ³⁾	7	Pump set
4	Nail anchor ³⁾	8	Tank insert ³⁾

2) Epoxy-coated
 3) Standard scope of supply



Fig. 4: Illustration (example)

- The installed tank insert enhances the transport of waste water to the pumps.
- The patented, hydraulically optimized shape of the tank insert reliably prevents fiber deposits. The special benching design prevents dead flow zones.
- The self-cleaning effect of the tank insert is further enhanced by the gel-coated surface.
- The tank insert made of glass fiber reinforced plastics exceeds concrete materials in service life and resistance to hydrogen sulphide (H₂S).

4.6 Scope of supply

Depending on the model, the following items are included in the scope of supply:

- Tank insert
- Base reinforcement
- 2 flanged elbows
- 3 nail anchors for fastening the tank insert to the floor of the concrete structure
- Fasteners

In addition for pump sets with guide rail arrangement:

- Claw including stainless steel bolts/screws
- Upper mounting bracket

In addition for pump sets with guide cable arrangement:

- Claw including stainless steel bolts/screws
- Upper mounting bracket
- Guide cable suspension bracket
- 10 m guide cable made of stainless steel

4.7 Dimensions and weights

For dimensions and weights please refer to the general arrangement drawing/outline drawing or data sheet.

4.8 Permissible fluids

	 WARNING
	<p>Pumping impermissible fluids Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▸ Only discharge permissible fluids into the public sewer system. ▸ Verify that the materials of the pump/system are suitable.

Permissible fluids According to DIN 1986-3 the following fluids can be discharged into sewer systems: Water contaminated by domestic use, including human and – as far as required and permitted – animal feces together with the necessary flushing water as well as stormwater in case no other way of disposal is possible. ⁴⁾

Permissible pH Fluids with a pH from 1-10 are permissible.

Impermissible fluids Examples of fluids that must **not** be discharged into the sewer:
Solids, fibers, tar, sand, cement, ash, coarse paper, paper towels, cardboard, debris, garbage, slaughterhouse waste, greases, oils.

All waste water from installations situated above the flood level (EN 12 056-1).

Waste water containing hazardous substances (DIN 1986-100), e.g. greasy waste water from commercial kitchens.

This must only be discharged into the sewer if it has passed through a grease separator to DIN 4040-1.

4) Other types of waste water, e.g. from commercial or industrial use, must not be discharged into the local sewer system without prior treatment.

5 Installation at Site

5.1 Safety regulations

	<p>⚠ DANGER</p> <p>Non-compliance with the safety regulations Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Never work alone. ▷ Wear personal protective equipment. ▷ Observe the applicable local occupational safety regulations and accident prevention regulations. ▷ Stand clear of suspended load. ▷ Use suitable, permitted lifting equipment and lifting accessories.
	<p>⚠ DANGER</p> <p>Formation of life-threatening gases Danger to life!</p> <ul style="list-style-type: none"> ▷ Always observe the following safety instructions. ▷ Observe the general instructions. (⇒ Section 2.9, Page 7)
	<p>⚠ DANGER</p> <p>Persons in the tank for an excessively long time Danger to life!</p> <ul style="list-style-type: none"> ▷ The tanks of lifting units must only be entered occasionally and briefly by a person secured with a harness; the relevant accident prevention regulations must be complied with, and suitable means for entering the tank must be used.
	<p>⚠ DANGER</p> <p>Unsecured tank opening Persons or objects could fall into the tank!</p> <ul style="list-style-type: none"> ▷ Secure/cover the tank opening with suitable means.

5.2 Installing the tank insert in an existing concrete tank

Preparing the modification

- ✓ The valid regulations for modernizing the pump station are adhered to.
- ✓ The condition of the structure has been checked by a specialist.
- ✓ The operating manuals of the installed pump sets and of any accessories are on hand.
- ✓ The pump sets have been checked for any damage in accordance with the operating manual, or new pump sets are available.
 1. Observe all safety instructions for entering the tank. (⇒ Section 6.2, Page 19)
 2. Disconnect the pump station from the sewage system.
 3. Redirect the water inflow pipes.
 4. Drain the pump station. Properly dispose of any residues of the fluid handled.
 5. Prepare all components belonging to the pump station for further work to be carried out.
 6. Dismantle and remove all components in accordance with the relevant operating manual.

7. Remove any corroded concrete layers.
8. Thoroughly clean the area that is usually under water; drain and properly dispose of any residues of the cleaning agent and water used for cleaning.

For installing the tank insert see the following section.

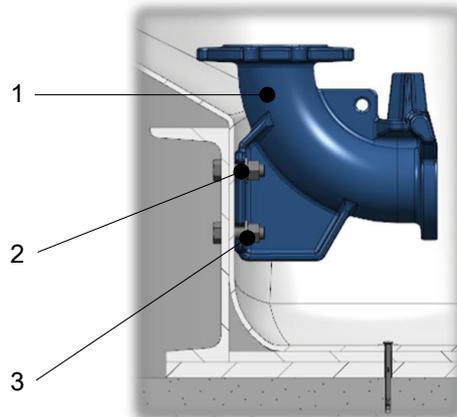
5.3 Installing the tank insert into a new concrete tank

Table 5: Minimum dimension of the concrete tank

Size	Outside diameter of the tank insert	Minimum inside diameter of the concrete tank
	[mm]	[mm]
Amaclean 1000	1014	1200
Amaclean 1400	1414	1500
Amaclean 1800	1814	2000

- ✓ For an existing concrete tank the steps in (⇒ Section 5.2, Page 14) have been carried out.
- ✓ A new concrete tank has been prepared for installation in accordance with the applicable regulations.
- ✓ Suitably dimensioned lifting equipment and lifting accessories are on hand.
- ✓ It has been checked that the size of the tank insert matches the size of the concrete tank.

1. Roughen the surface of the outside wall of the tank insert.



2. If not already fitted, install flanged elbows (1) in the tank insert. To do so, guide flanged elbows (1) onto the bolts (2) provided. Position shims. Fit hexagon nuts (3). Observe the tightening torque. (⇒ Section 6.3, Page 20)
3. Lift the tank insert with suitable lifting accessories. Lower it into the concrete tank. Place it down on the floor of the tank.
4. Make sure that the tank insert is properly aligned. Re-align it if necessary.
5. Fasten the tank insert in the concrete structure with three nail anchors (type FNA II) in accordance with the manufacturer's instructions. (⇒ Section 5.3.1, Page 15)
6. Grout the space between the concrete tank and the tank insert with a suitable grout. (⇒ Section 5.3.2, Page 16)

5.3.1 Using nail anchors

	NOTE
	Always observe the information in the documents provided by the manufacturer. The information given below merely serves as a general reference.

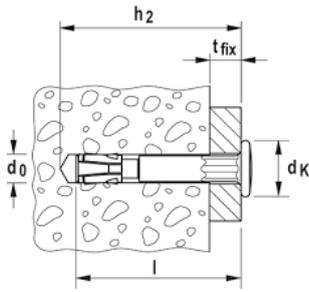


Fig. 5: Nail anchor dimensions

Table 6: Dimensions [mm]

Product variant	Nominal diameter of the drill	Minimum hole depth	Anchor length	Maximum thickness of the part to be fastened	Head diameter
	d_0	h_2	l	t_{fix}	d_k
FNA II 6 x 30/50 A4	6	70	85	35	13

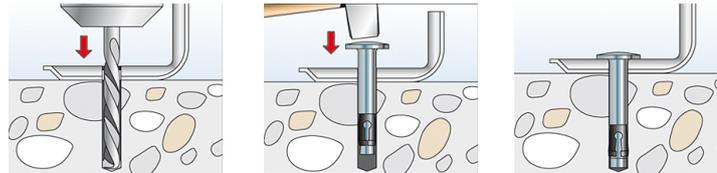


Fig. 6: Fitting nail anchors

5.3.2 Grouting

Recommended quality of grout

- Cement grout to DIN 18557; example: Pagel grout V150 / www.pagel.com
- Grouting mortar to DIN EN 9982 / DIN V 18580-NM; example: Baunit grouting mortar ZVM 94 / www.baunit.de

Required filling quantity

Table 7: Filling quantity

Structure	Filling quantity
	[m ³]
Amaclean 1000 in 1200-mm tank	0,3
Amaclean 1400 in 1500-mm tank	0,5
Amaclean 1800 in 2000-mm tank	1,5

Filling height H

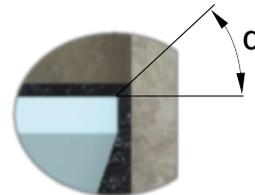


Fig. 7: Filling dimension H

Table 8: Filling height

Structure	Filling height H
	[mm]
Amaclean 1000	527
Amaclean 1400	750
Amaclean 1800	1027

- ✓ The tank insert has been fastened to the concrete structure with nail anchors.
 - ✓ A sufficient quantity of grout is available.
 - ✓ The processing time for the grout is known and observed.
 - ✓ The hardening (curing) time of the grout is known and observed.
1. Protect the tank insert with suitable means to prevent any grout from entering the tank insert.
 2. Carefully grout the space between the concrete structure and the wall of the tank. If provided, use the filler opening.
 - ⇒ The grout must not fall down from above but must be guided down.
 3. Grout slowly and evenly until the filling height H is reached.
 - ⇒ Make sure that the air being displaced can escape and that no pressure builds up during grouting.
 4. If a filler opening is available, close it after grouting is completed.
 5. After the indicated hardening (curing) time, establish a connection between the concrete structure and the wall of the tank insert.



Recommended minimum angle $\alpha = 45^\circ$.

5.4 Installing the installation parts and pump sets

- ✓ The operating manuals of the pump sets are on hand.
 - ✓ The concrete tank with the tank insert has been prepared.
 - ✓ The grout has been filled in and has set.
1. Check and install the installation parts, pipes and pump sets in accordance with the corresponding operating manual.

5.5 Fitting the tank cover

To allow for the system to be serviced safely, the manhole should have the following dimensions as a minimum.

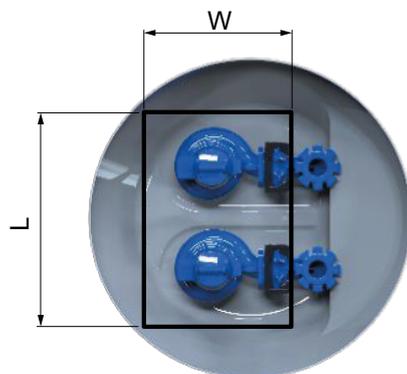


Fig. 8: Manhole dimensions

Table 9: Recommended manhole dimensions depending on the tank size

Size	Manhole
	L x W
	[mm]
Amaclean 1000	750 x 750
Amaclean 1400	1500 x 750
Amaclean 1800	1500 x 750

6 Servicing/Maintenance

6.1 General information

	NOTE
	<p>A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation with a minimum of maintenance expenditure and work.</p>

Check and clean the inside of the concrete tank occasionally. At that time, also check the tank insert for any damage.

	NOTE
	<p>For regular inspection work and maintenance work KSB has a maintenance contract on offer.</p>

6.2 Entering the tank

	DANGER
	<p>Formation of life-threatening gases Danger to life!</p> <ul style="list-style-type: none"> ▷ Always observe the following safety instructions. ▷ Observe the general instructions. (⇒ Section 2.9, Page 7)

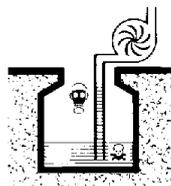
	DANGER
	<p>Persons in the tank for an excessively long time Danger to life!</p> <ul style="list-style-type: none"> ▷ The tanks of lifting units must only be entered occasionally and briefly by a person secured with a harness; the relevant accident prevention regulations must be complied with, and suitable means for entering the tank must be used.

	DANGER
	<p>Unsecured tank opening Persons or objects could fall into the tank!</p> <ul style="list-style-type: none"> ▷ Secure/cover the tank opening with suitable means.

In waste water pump stations the formation of gases which are injurious to health or combustible has to be expected. If the system needs to be entered for repair work, special caution is required.



Gases are heavier than air and can collect at the bottom of the tank.



Never enter the tank before it has been freed from all gases.

	DANGER
	<p>Substances posing health hazards in the tank Danger to life!</p> <p>▶ The systems must be decontaminated prior to anyone entering them.</p>



Use a safety harness when entering the tank. Only enter the tank in the presence of a supervisor.

6.3 Tightening torques

Table 10: Tightening torques [Nm] depending on thread, material and property class

Thread	Tightening torque				
	Material				
	A4-50	A4-70		1.4462	8.8
	Property class Rp 0.2 ^N / _{mm²}				
	210	250	450	450	640
	[Nm]	[Nm]	[Nm]	[Nm]	[Nm]
M 5	-	-	4	4	6
M 6	-	-	7	7	10
M8	-	-	17	17	25
M10	-	-	35	35	50
M12	-	-	60	60	85
M14	-	-	90	90	130
M16	-	-	150	150	210
M20	-	-	290	290	410
M24	230	278	-	500	700
M30	460	-	-	1000	1400
M42	1300	-	-	2750	3900
M48	1950	-	-	4200	6000

7 Related Documents

7.1 Dimensions

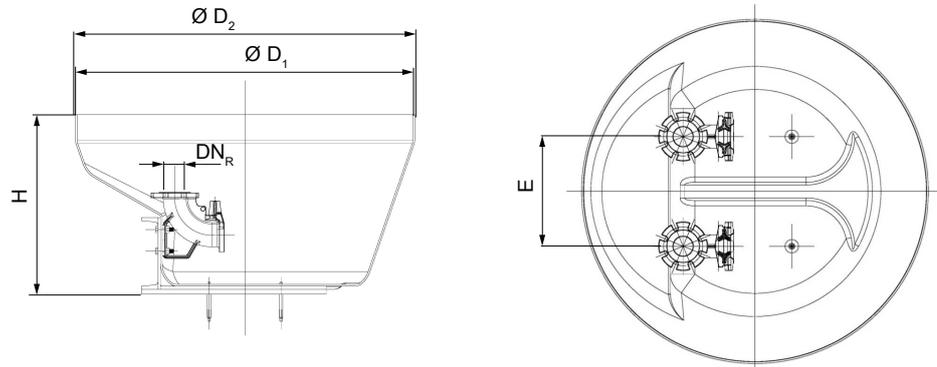


Fig. 9: Dimensions

Table 11: Selection table

Size	D ₁	D ₂	DN _r	E	H	Amarex N	Amarex KRT
	[mm]					Impeller	
Amaclean 1000	1000	1014	50, 65	400	527	F, S	Fmax
Amaclean 1400	1400	1414	50, 65, 80, 100	450	750		Smax, Emax
Amaclean 1800	1800	1814	50, 65, 80, 100	650	1027		Kmax

Table 12: Volume available

Size	Volume of tank insert
	[l]
Amaclean 1000	320 approx.
Amaclean 1400	810 approx.
Amaclean 1800	1740 approx.

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