

Rainwater Harvesting System

## Hya-Rain Eco

### Type Series Booklet



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Type Series Booklet Hya-Rain Eco

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## Building Services: Water Supply

### Rainwater Harvesting System

## Hya-Rain Eco



### Main applications

- Rainwater harvesting
- Service water supply systems
- General irrigation systems
- Spray irrigation systems

### Fluids handled

- Service water
- Rainwater (not containing abrasive substances)

### Operating data

#### Operating properties

Characteristic		Value
Flow rate	Q [m³/h]	≤ 4
	Q [l/s]	≤ 1,1
Head	H [m]	≤ 43
Fluid temperature	T [°C]	≤ 35
Operating pressure	p <sub>d</sub> [bar]	≤ 6
Start-up pressure of the pump	p [bar]	≤ 2,5
Suction lift	H <sub>s</sub> [m]	≤ 7
Inlet pressure of the pump	p <sub>vor</sub> [bar]	≤ 1
Inlet pressure of mains water back-up system	p [bar]	≤ 4
Max. mains water back-up flow rate at 4 bar	[l/s]	~ 1

### Designation

Example: Hya-Rain Eco

#### Designation key

Code	Description
Hya-Rain Eco	Type series

### Design details

#### Design

- Angled tank designed for wall mounting
- Mains water storage tank
  - Material: PE-LLD, dark
  - Storage volume: approx. 13 litres
- Float valve for mains water supply (approx. 2.7 m³/h)

#### Pump:

- IP44 enclosure

#### System:

- IP42 enclosure

### Electrical connection

- 230 V, 50 Hz, 800 W
- Power input in stand-by mode: 2.5 - 3 watts
- 1.5 m power cable with shockproof plug

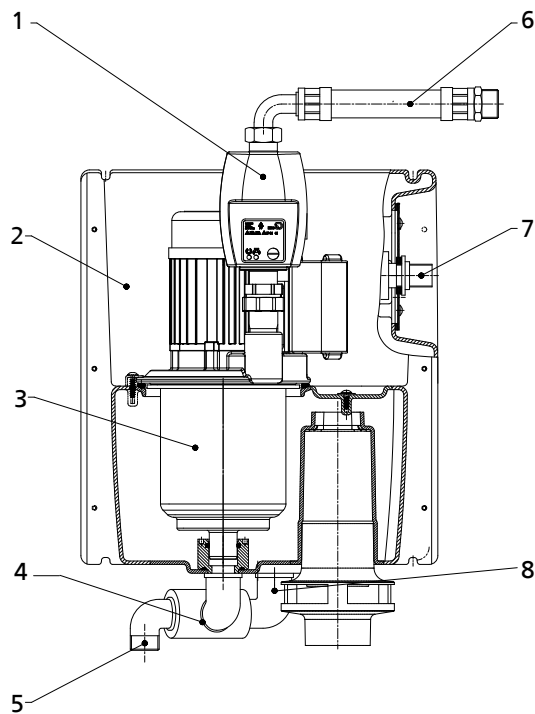
### Drive

- 230 V ± 10 %
- DOL starting
- Thermal class F
- IP44 enclosure
- Thermal motor protection with automatic reset and start-up

### Bearings

- Grease-packed deep groove ball bearings sealed for life

## Configuration and function



Sectional drawing

1	Pump control unit	2	Angled tank
3	Pump	4	Three-way valve
5	Suction nozzle, rainwater storage tank	6	Discharge outlet
7	Mains water supply	8	Suction nozzle, mains water storage tank

## Design

A multi-stage high-pressure pump is installed in an angled tank designed for wall mounting. Via a three-way valve the high-pressure pump is connected to a suction nozzle leading to the outside.

## Function

The self-priming pump withdraws fluid from the rainwater storage tank via the suction nozzle.

If the rainwater storage tank is empty, the pump can withdraw water from the mains water storage tank. To this end, the pump is fitted with a three-way valve providing it with a second suction nozzle towards the mains water storage tank. The mains water storage tank contains a water volume of approximately 13 litres, which is automatically replenished from the public water supply system or from other (service water) pressure lines via a float valve.

If a sensor indicates that the rainwater storage tank is empty, the system will automatically switch to the mains water storage tank from which it will withdraw water until the rainwater storage tank contains a sufficient amount of water again.

Once the rainwater storage tank contains enough water again, this condition is signalled to the system, which will then automatically switch back to rainwater mode.

The pump is started and stopped automatically when a consumer installation is opened and closed.

## Monitoring equipment

For monitoring purposes, the system is equipped with a pump control unit in the discharge line, which starts the pump as soon as the pressure drops below 2.5 bar (factory setting) and stops it (with an after-run time of approx. 10 seconds) when the consumer installation is closed. At the same time, this device protects the pump against dry running. A lift check valve fitted in the control unit prevents the pumped water from flowing back. The pressure is indicated by a fitted pressure gauge.

## Materials

Overview of materials used for the pump

Component	Material
Pump casing	Stainless steel
Discharge cover	Grey cast iron with anti-corrosive coating
Stage casing	Noryl
Impeller	Noryl
Diffuser	Polypropylene
Shaft	Stainless steel
Motor housing	Aluminium
Shaft seal, mechanical seal	Carbon/ceramics
Expansion joints	PN 10 <sup>1)</sup>

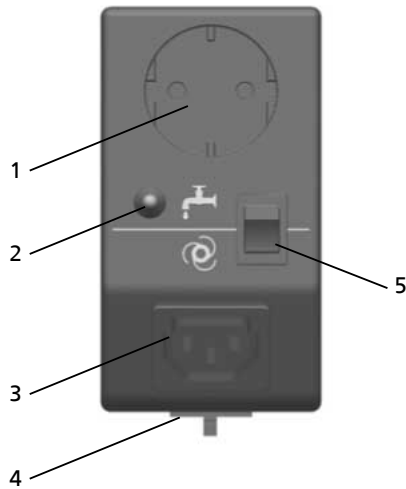
Overview of materials used for the tank

Component	Material
Mains water storage tank	PE-LLD
Valve with electric actuator	Brass
Piping	Plastic / brass <sup>2)</sup>
Float valve	Plastic / stainless steel <sup>2)</sup>

<sup>1)</sup> DVGW/TÜV-approved, with 10-year warranty



<sup>2)</sup> KTW-approved for contact with drinking water

### System control unit



System control unit

1	Socket for pump control unit	2	Indicator lamp for "mains water mode"
3	Socket for three-way valve	4	Socket for float switch
5	Operating mode selector switch		

-  **Automatic operation** Rainwater is withdrawn from the rainwater storage tank. If the rainwater storage tank is empty, mains water supply is automatically activated.
-  **Mains water mode** In this mode the system exclusively withdraws mains water, even if the rainwater storage tank is filled. This mode can be used for replacing the mains water in the mains water storage tank or when the rainwater storage tank requires some maintenance.

When a consumer installation is opened, pump operation starts automatically.

When the consumer installations are closed, the pump stops automatically.

Lack of water will activate the integrated dry running protection function, so that the pump stops automatically.


A lit green LED indicates operational availability. A lit red LED indicates lack of water or a fault. The reset key allows resetting of the fault message. The control unit is in manual mode as long as the reset key is pressed and held.

### Product benefits

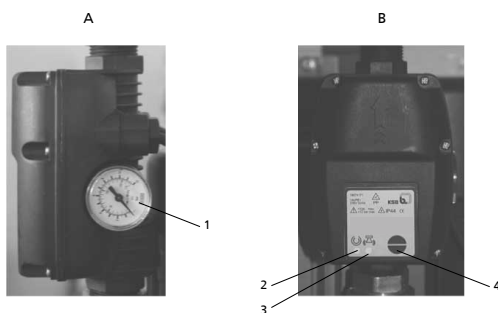
- Very low noise operation ( $\leq 55$  dB)
- Integrated dry running protection
- Automatic switching to mains water if the rainwater storage tank is empty
- User-friendly due to integrated pressure indication
- Ready-to-connect, easy installation and commissioning
- Float switch for rainwater storage tank can be connected easily from outside
- Very compact, space-saving design
- Comprehensive range of accessories for mounting the system and for connecting it to the mains water supply as well as to the consumer line

### Certifications

#### Overview

Label	Effective in:	Note
	Germany	AS-0605AS2173 Mains water protected against any pollution from backflow in accordance with EN 1717 (air gap)

### Pump control unit



Pump control unit

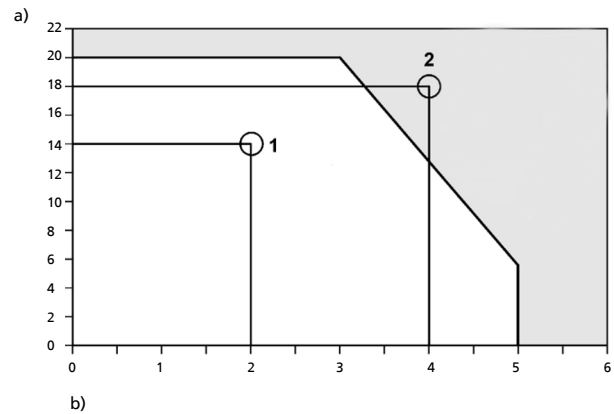
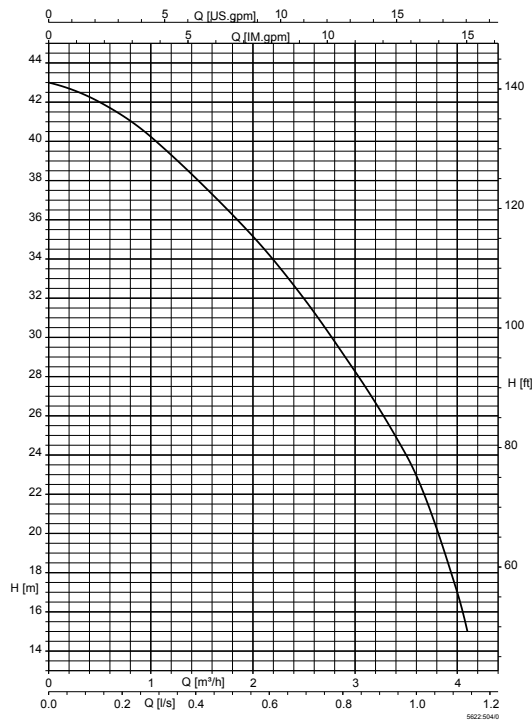
A	Side view	B	Front view
1	Indication of actual pressure	2	Operation LED
3	Fault LED	4	Reset key

## Technical data

### Selection table

Type series	2800 rpm, 1~230 V		Mains water storage tank	Suction lift Suction losses	Cable with plug		Float switch with 20-metre cable	Mat. No.	[kg]
	$P_1$	$I_N$							
	[W]	[A]			[m]	[mm <sup>2</sup> ]			
Hya-Rain Eco	800	3,7	13	7	1,5	3 x 1.0	X	29130495	26.5

### Hya-Rain, n = 2800 rpm



a)	Length of suction line in m
b)	Level difference ( $H_{geo}$ ) in m

#### Example 1:

Length of suction line 14 m, level difference ( $H_{geo}$ ) 2 m  
Hya-Rain can handle the suction losses.

#### Example 2:

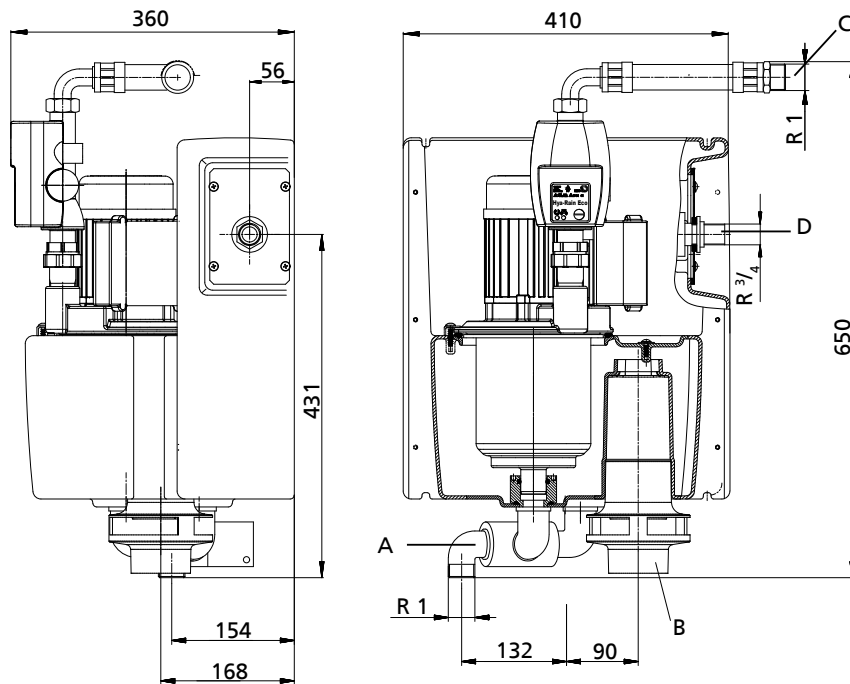
Length of suction line 18 m, level difference ( $H_{geo}$ ) 4 m  
Hya-Rain **cannot** handle the suction losses.

### Diagram for checking the priming ability of a Hya-Rain Eco

Conditions:  $H_{s,max} = 7$  m of water, 1-inch suction hose with foot valve.  $Q_{max} = 4$  m<sup>3</sup>/h

## Dimensions

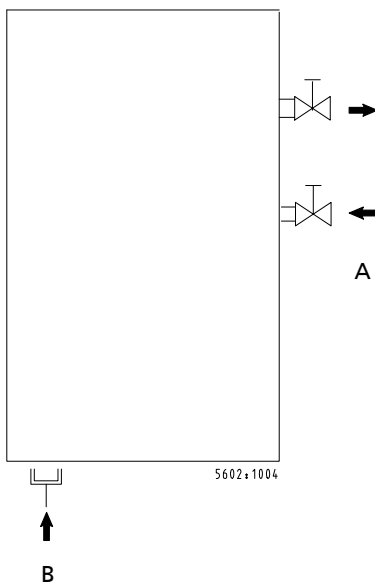
Dimensions [mm]



A	Suction side
B	Overflow, drain line DN 70
C	Discharge side
D	Mains water connection

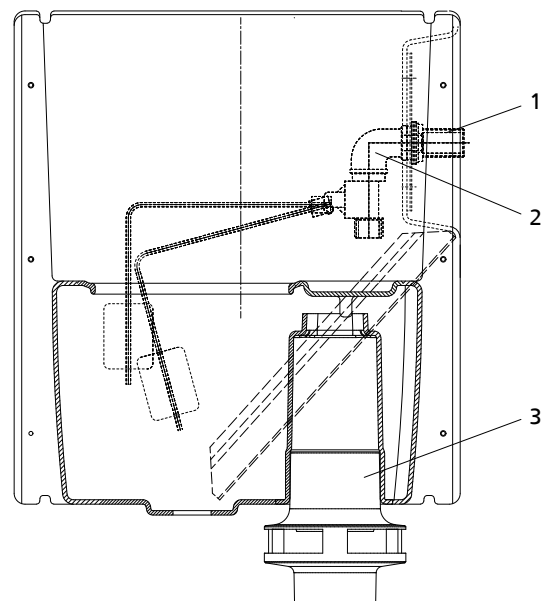
**i** Allow 200 mm clearance in all directions for servicing!

## Installation example



A	Shut-off valves, site-supplied
B	Connection with screwed union

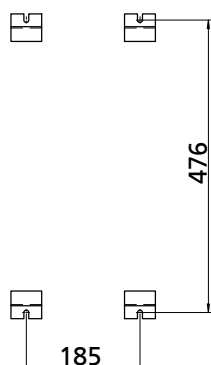
## Connections



## Connections

1	Mains water connection, with air gap inside the tank
2	Mechanical float valve
3	Overflow for direct connection of DN 70 drain pipes in acc. with EN 12056. The overflow must be connected via an air gap to EN 1717, otherwise the DVGW-approval is void.

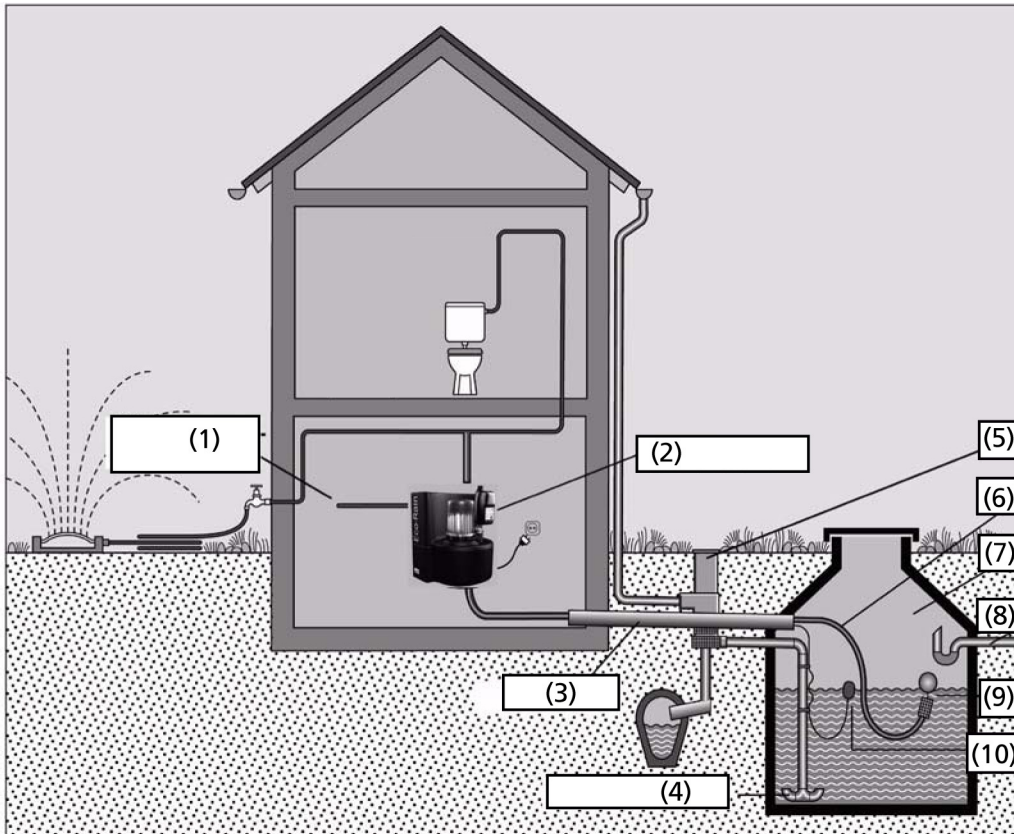
### Drilling pattern for wall mounting



Dimensions in mm

### Installation schematic

Installation example of a Hya-Rain Eco with underground rainwater storage tank outside the building



Installation example of a Hya-Rain Eco with underground rainwater storage tank outside the building

(1)	Mains water supply	(2)	Hya-Rain Eco
(3)	Conduit	(4)	Calmed inlet
(5)	Rainwater filter	(6)	Suction line
(7)	Rainwater storage tank	(8)	Overflow to public sewer or soak hole
(9)	Floating intake	(10)	Float switch with 20-metre cable included in scope of supply

In accordance with EN 1717 the overflow must be connected to a floor drain or the public sewer system via an air gap. The overflow must not be closed with a plug.

The suction line must be laid with a continuously rising slope from the rainwater storage tank to the Hya-Rain Eco pump to provide good suction conditions for the pump.

To avoid intake of sediment the float switch must be fitted so as to ensure a water level of at least 30 cm under the floating intake.

In the case of a lower-lying rainwater storage tank, the overflowing water can be led into the rainwater storage tank via the conduit accommodating the suction line and the float switch cable.

#### NOTE!

Rainwater is **not suitable for drinking**.

Easily accessible tapping points must be marked "**No drinking water**". It is recommended to use child-proof security fittings (e.g. removable turning handle) as an additional precaution.


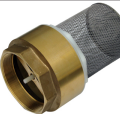








### Scope of supply

#### Hya-Rain Eco:

- Rainwater harvesting system
- Pump
- Control and monitoring unit
- System control unit
- Mains water storage tank with demand-driven, integrated mains water back-up system with a mechanical float valve and air gap to EN 1717
- Three-way valve with electric actuator for automatic switching between rainwater storage tank and mains water storage tank
- Set of mounting elements for wall mounting consisting of bolts, plug fixings and mounting brackets (4 x)
- Flexible expansion joints for the discharge side as well as for connection to the mains water supply (length approx. 30/50 cm)
- Float switch with 20-metre cable
- Instructions for rapid installation including mounting pattern
- Installation/operating manual

### Accessories

#### Pump accessories

	Description	Connection	Mat. No.	[kg]
	Suction hose kit without foot valve, with screwed unions, length 7 m Connection of pre-configured end to Hya-Rain (N/Eco), connection of the loose end with G 1½ union (01076872) to foot valve	G 1½" - G 1"	18040868	4
	Foot valve with suction strainer and spring-loaded lift check valve, opening pressure approx. 2 m of water, stainless steel Required if rainwater storage tank is situated at a higher level than the rainwater harvesting system!	G 1½"	01068052	0.3
	Foot valve with fine strainer, suitable for suction hose 18040868		01076873	0.2
	Screwed union suitable for suction hose 18040868 for floating-suction water intake	G 1½	11037848 01076872	0.15 0.02
	Float for suction hose kit, diameter 150 mm		19071460	0.1
	Expansion joint PN 10, L = 300 mm	Rp 1	11037177	0.378
	Floating-suction intake valve with fine strainer (length 2 m)	Rp 1 Rp 1 1½	18040795 18040796	1.5 1.8
	Overflow syphon Ø50, for overflow with air gap On Hya-Rain Eco, the overflow must be reduced to Ø50.		01068180	0.5
	Lifting unit Ama-Drainer-Box Mini with Ama-Drainer N 301		29131770	9
	Accumulator (membrane-type accumulator), 8 l Fitting this device on the discharge side reduces the frequency of starts of the system.		01079764	2.35

These accessories (Mat. No.) are supplied with the equipment but not fitted.

## System planning example

### 1. Available rainwater

Catchment area  $\times$  runoff coefficient  $\times$  filter efficiency factor  $\times$  average rainfall = rainwater yield / year.

- The catchment area is the plan roof area (length  $\times$  width) in m<sup>2</sup>. In this example: 10 m  $\times$  17 m = 170 m<sup>2</sup>.
- The runoff coefficient takes into account the difference between the amount of rainwater that falls on the roof and the amount of rainwater that actually reaches the gutter. For pitched roofs a factor of 0.75 can be assumed, based on practical experience.
- The *filter efficiency factor* describes the filter losses upstream of the rainwater storage tank.
- In Germany, an annual average *rainfall* of 700 mm can be assumed.

#### Example:

Catchment area = 170 m<sup>2</sup>  
Runoff coefficient = 0.75  
Filter efficiency factor = 0.9  
Annual rainfall = 700 mm  
**Rainwater yield / annum**  
170 m<sup>2</sup>  $\times$  0.75  $\times$  0.9  $\times$  700 mm  
= 80,325 l rainwater yield per year

#### Your data:

Catchment area = \_\_\_\_\_ m<sup>2</sup>  
Runoff coefficient = \_\_\_\_\_  
Filter efficiency factor = \_\_\_\_\_  
Annual rainfall = \_\_\_\_\_ mm  
**Rainwater yield / annum**  
\_\_\_\_\_ m<sup>2</sup>  $\times$  \_\_\_\_\_  $\times$  \_\_\_\_\_  $\times$  \_\_\_\_\_ mm  
= \_\_\_\_\_ l rainwater yield per year

### 2. Required rainwater

#### Example:

4 person household with 200 m<sup>2</sup> garden  
WC/person/day:  
24 l  $\times$  4 persons  $\times$  365 days =

35,040 l

Washing machine/person/day:  
10 l  $\times$  4 persons  $\times$  365 days =

14,600 l

Garden irrigation/m<sup>2</sup>/year:  
60 l  $\times$  200 m<sup>2</sup> garden =

12,000 l

Required rainwater per year

61,640 l

#### Your data:

24 l  $\times$  \_\_\_\_\_ persons  $\times$  365 days = \_\_\_\_\_ l

10 l  $\times$  \_\_\_\_\_ persons  $\times$  365 days = \_\_\_\_\_ l

60 l  $\times$  \_\_\_\_\_ m<sup>2</sup> garden = \_\_\_\_\_ l

Required rainwater per year: \_\_\_\_\_ l

### 3. Storage volume of the rainwater storage tank

The rainwater requirement must be compared against the rainwater yield, and the lower value of the two must be used for calculating the tank size.

6 % of this lower value are considered to be an adequate storage volume (design factor).

It makes sense to select the next common tank size up.

As a rule, it is desirable for the rainwater storage tank to overflow at regular intervals, since dirt particles floating on the water surface are removed in this way.

#### Example:

61,640 l  $\times$  0.06 = 3,698 l

#### Your data:

\_\_\_\_\_ l  $\times$  0.06 = \_\_\_\_\_ l

### 4. Mains water saved per year

The annual amount of mains water saved by harvesting rainwater roughly corresponds to the calculated rainwater requirement per year.

In our example, the annual amount of mains water saved is approximately 61,000 litres.





**KSB Aktiengesellschaft**

67225 Frankenthal • Johann-Klein-Str. 9 • 67227 Frankenthal (Germany)

Tel. +49 6233 86-0 • Fax +49 6233 86-3401

[www.ksb.com](http://www.ksb.com)

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