



Roediger

Roediger[®] Vacuum-Technology Sanitation Solutions

A brand of
Acseptence Group

Willkommen im Darmstadtium

MARINAS
 ENGINEERING
 WASTEWATER

SEPARATION

VACUUM

SANITATION

DECAY PLANTS
 HOTELS
 SEWER REHABILITATION

MOBILE SANITATION

HOSPITALS

BIOGAS

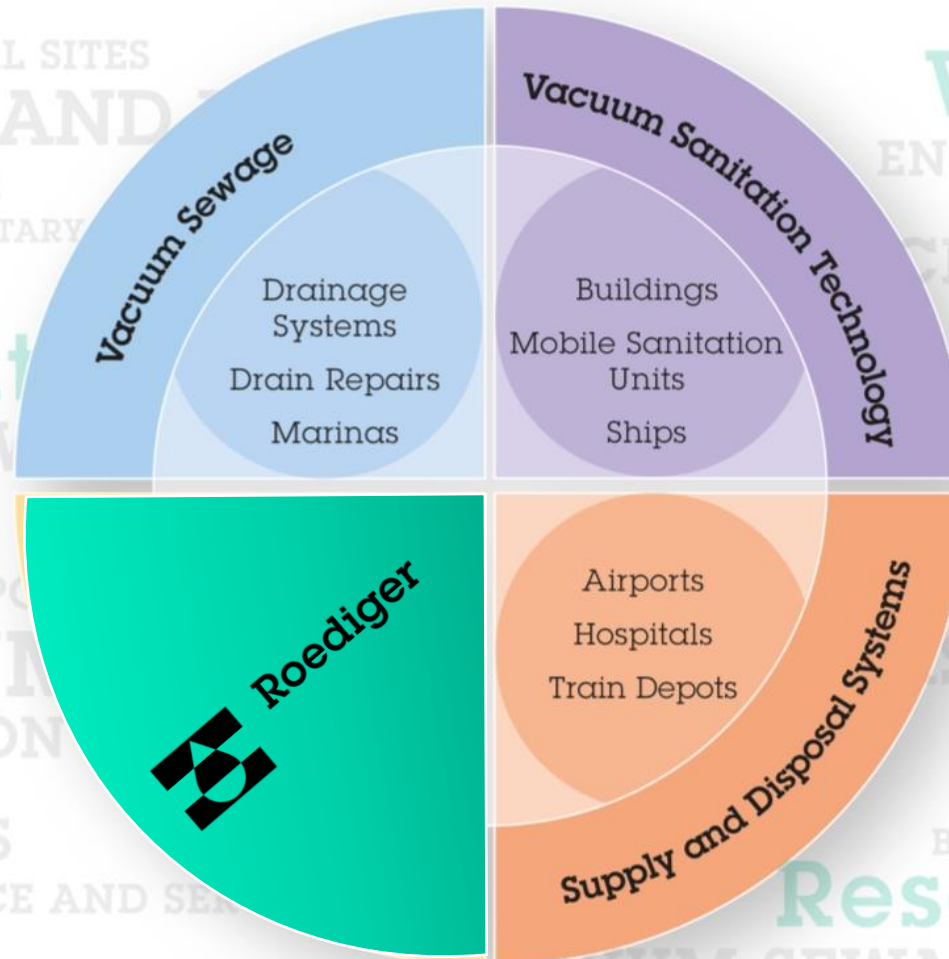
LABORATORIES
 PERMAFROST SOLUTIONS

VACUUM SEWERAGE

GREEN BUILDINGS
 MAINTENANCE AND SERVICE

SHIPS

KITCHEN AND RESTAURANTS
 WET SERVICES



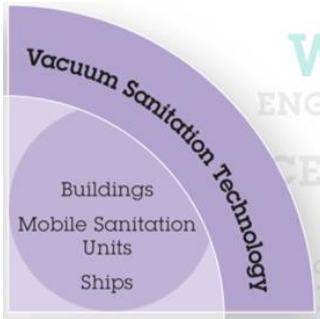
WASTE DISPOSAL SITES
 SUPPLY AND
 DRAIN REPAIRS
 MOBILE SANITARY
 HOSPITALS
 Element
 SEWAGE V
 TRAIN DEPO
 VACUUM
 DIGESTION
 SHIPS
 MAINTENANCE AND SE
 VACUUM SEWERAGE

Water
 ENGINEERING
 MARINAS
 CE SYSTEMS
 GE WATER SEPARATION
 TECHNOLOGY
 SEWAGE GAS
 BIOGAS
 LE SANITARY UNITS
 S SERVICES
 AIRPORTS
 BUILDINGS
Resources



Optimal solutions to collect and transport wastewater under difficult conditions

- ❑ Unfavorable underground conditions
- ❑ High groundwater level
- ❑ Sparsely populated areas
- ❑ Water protection zones
- ❑ Sewer Rehabilitation
- ❑ Holiday Resorts
- ❑ Marinas / Yacht harbors
- ❑ Camping Sites
Tiny House Developments



Saving water without giving up on hygiene and comfort - Roediger Vacuum-Sanitary Technology for

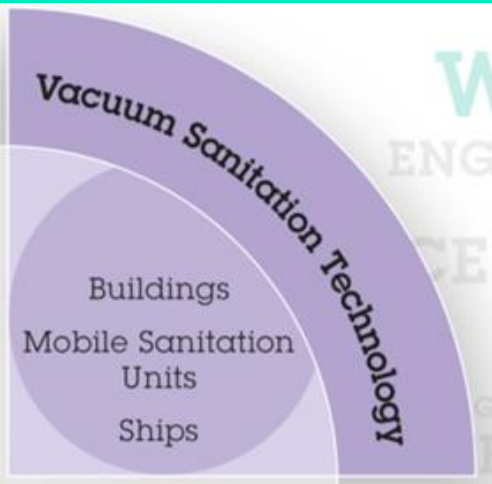
- Buildings
- Mobile sanitary units
- Ships



Roediger collecting systems for buildings offer flexible solution for collecting and disposal of wastewater and liquid waste

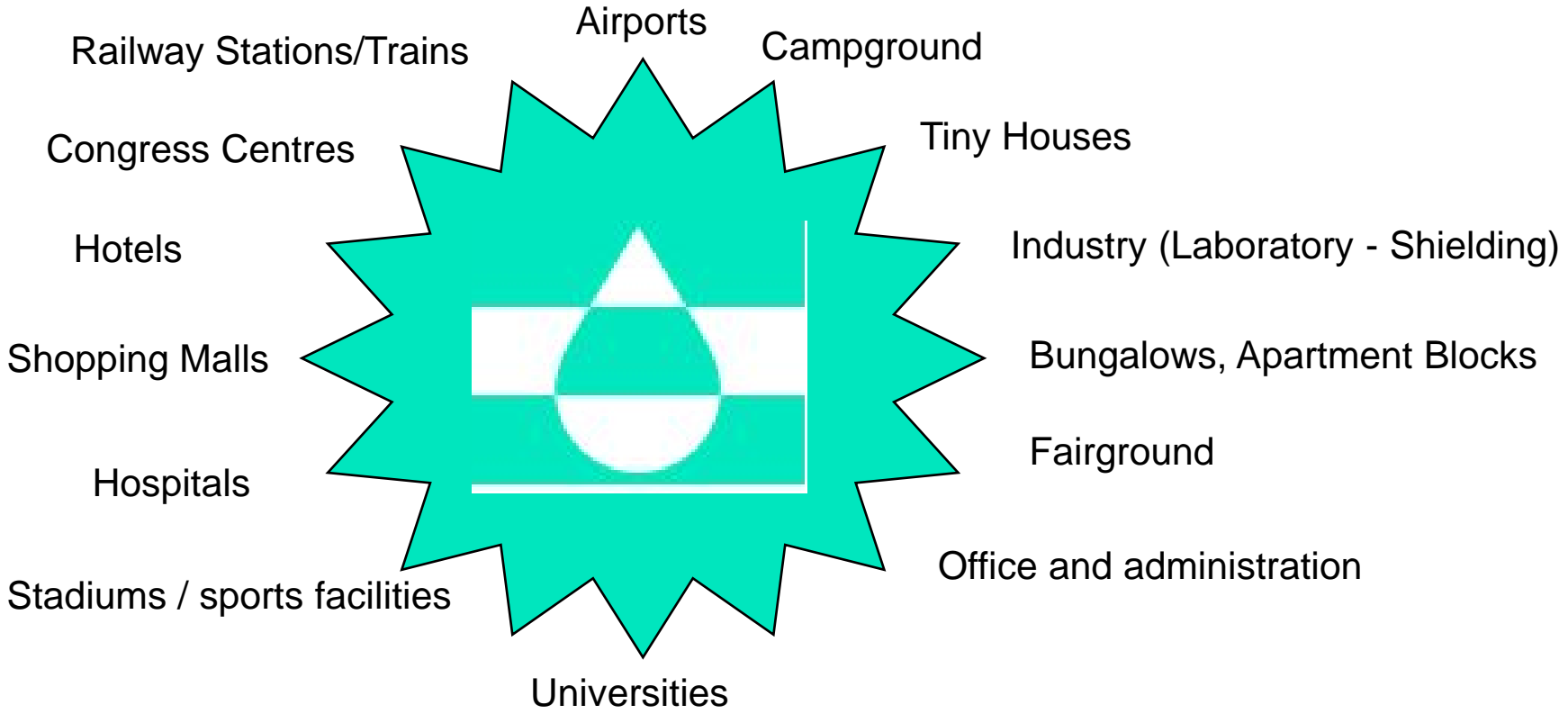


- Water technology for train depots and train washing systems
- Systems for the treatment of radioactively contaminated wastewater in hospitals



Vacuum – Sanitary Technology Introduction

- ❏ Vacuum sanitary is a wastewater system based on negative pressure
- ❏ Wastewater is discharged by means of negative pressure, in contrast to flushing or downpipe systems.
- ❏ Vacuum sanitary technology is water-saving with ecological and economic advantages in planning, construction and operation.
- ❏ Vacuum sanitary technology has successfully been used for decades in shipbuilding, aircraft construction, trains and buildings.
- ❏ Vacuum sanitary technology is an important part of a wastewater separation system ("source separation")



- Public sector (airport, railway station)
- Architecture - office, hotel
- Architecture - Exhibition and congress centre
- Architecture - Mixed-use building
- Architecture - Remodelling & Refurbishment
- Sports facilities, stadiums
- Industry – Laboratories
- Shopping centres - Food markets – Restaurants
- Construction projects with planned wastewater separation systems - Source Separation
- Areas with natural drinking water scarcity/deficiency - Desert, high mountain, Arctic
- Areas with "limited drinking water storage"- Mobile toilets, ships

General building authority approval with annual quality control

System approval includes all components (vacuum station, evacuation units, etc.).

DIN EN 12109 - Vacuum drainage in buildings

- System description
- Most important design factors
- Performance
- Design
- Installation
- Commissioning
- Maintenance
- Verification
- Assessment of general performance
- Quality control



Deutsche
Instit.
Bautechni

Zulassungstitel
Bautechnisches
Eine vom Bund
gemeinsam get
Mitglied der EO

Datum:
14.12.2016

**Allgemeine
bauaufsichtliche
Zulassung**

Zulassungsnummer:
Z-53.6-410

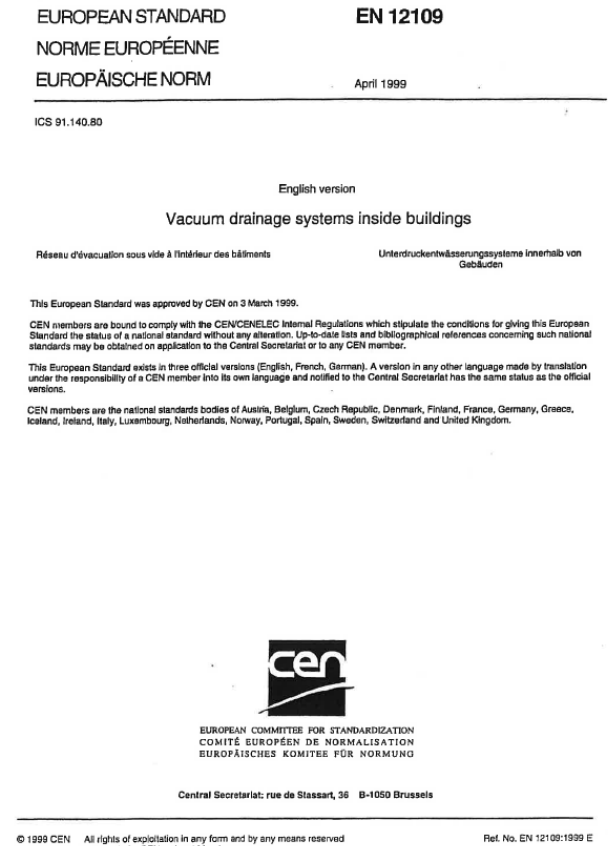
Antragsteller:
Aseptance Group GmbH
Passavant-Geiger-Straße 1
65326 Aarbergen

Zulassungsgegenstand:
Unterdruck-Entwässerungssystem innerhalb von Gebäuden

Der oben genannte Zulassungsgegenstand wird hiermit allgemein bauaufsicht-
Diese allgemeine bauaufsichtliche Zulassung umfasst zehn Seiten und 31 Anl
Diese allgemeine bauaufsichtliche Zulassung ersetzt die allgemeine bauaufsik
Nr. Z-53.6-410 vom 31. Juli 2000, geändert und verlängert durch die Beschei
18. Juni 2010.

DIBt

DIBt | Kolonnenstraße 30 B | D-10829 Berlin | Tel.: +49 30 78730-0 | Fax: +49 30 78730-320 | E-Mail



EUROPEAN STANDARD **EN 12109**
NORME EUROPÉENNE
EUROPÄISCHE NORM

ICS 91.140.80

April 1999

English version
Vacuum drainage systems inside buildings

Réseau d'évacuation sous vide à l'intérieur des bâtiments
Unterdruckentwässerungssysteme innerhalb von Gebäuden

This European Standard was approved by CEN on 3 March 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

cen
EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

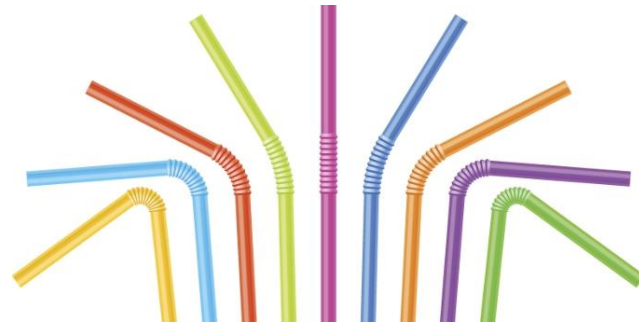
Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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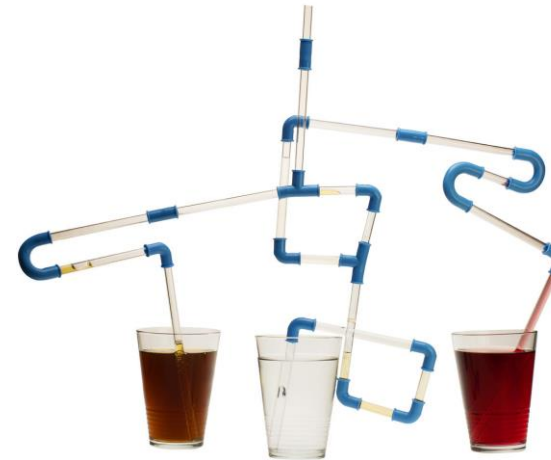
Vacuum-Sanitary Technology Components



Vacuum Evacuation Units



Vacuum Pipes














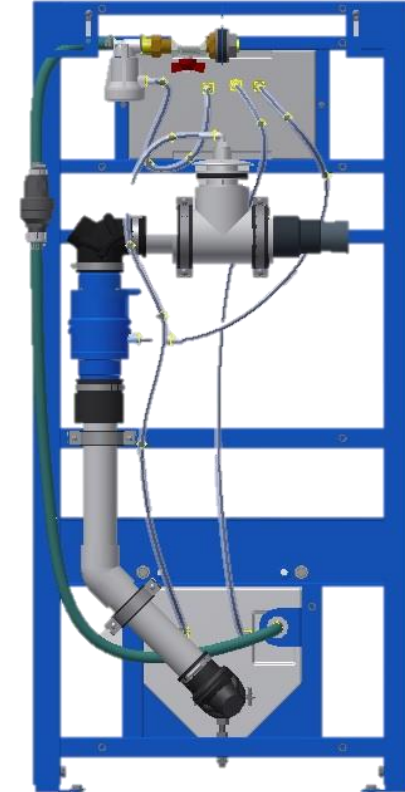
Vacuum Pipe Network



Vacuum Station

Roediger® vacuum toilet (Laufen) - pre-assembled frame

-  Water valve
-  Aqua stop
-  Vacuum valve AV 40
-  UVE plug
-  Push-button controller
-  Pneumatic control and operation
-  Adjustable water/evacuation time
-  Memory effect
-  Integrated odour filter
-  Operating vacuum: - 300 hPa (mbar) to - 600 hPa (mbar)
-  Maintenance-free














Toilet Design – Selection

Mounting Frame

Roediger® Vacuum Sanitary Technology

Components – Evacuation Unit

Roediger® vacuum toilet (Laufen) - pre-assembled frame

-  Wall mounted toilet
-  Glazed porcelain
-  Thin wall thickness
-  Weight approx. 17 kg
-  Integrated vacuum buffer
-  Rimless with efficient flushing nozzles
-  Hygienic - no overspray; no cross-contamination
-  Water consumption 1l/flush
-  Integrated Silentium technology (noise emission: 76.9 dB (A))
-  Contemporary design (Pro-S)
-  Various covers available



Toilet bowl (Laufen)



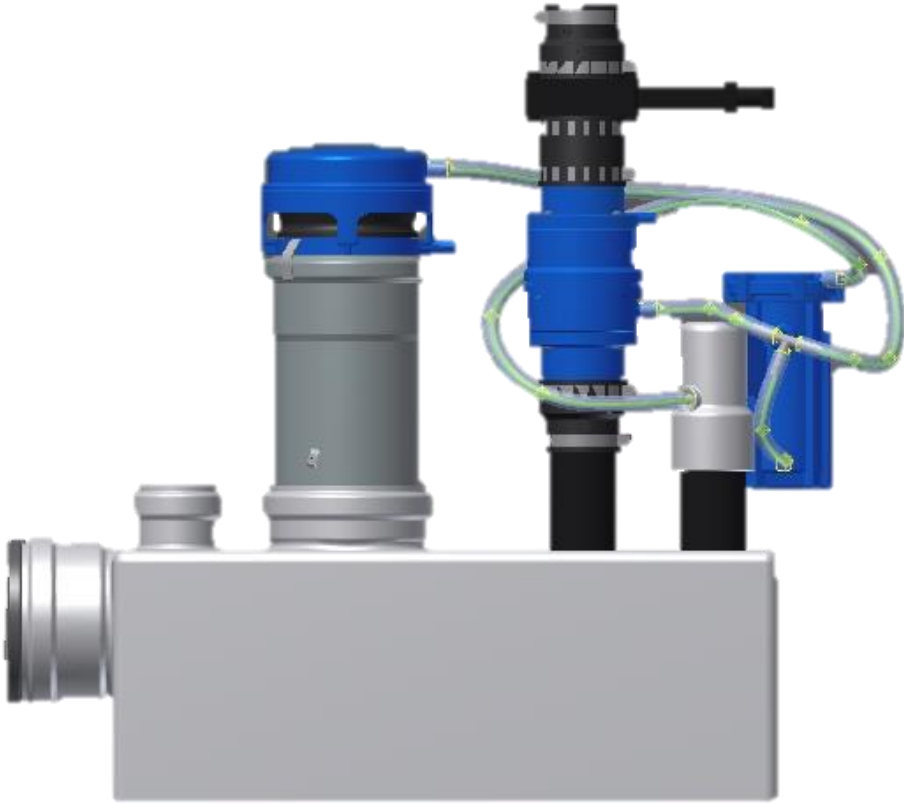
Flushing nozzles = effective cleaning without rim



Space saving installation



Floor Drain - Example



Hausanschlusschacht (G-Schacht) + Ventil (2", 2.5", 3")



Wash bassin with valve




Valve for installation under the sink or in the wall





The vacuum pump builds up a vacuum in the network within a predefined range (regulated by a pressure switch) in the complete vacuum system.

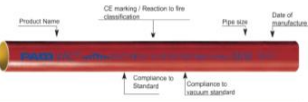
e.g. Saint-Gobain PAM-VAC piping system

 Soil and Drain BU	PAM-VAC® PIPE SYSTEM TECHNICAL SPECIFICATION	Technical Dept Reference - ES13FLV081B
		04/12/2013 Ind.2

PRODUCTS IDENTIFICATION

Pipes

PAM-VAC®



According to standard EN 877, pipes, fittings and accessories as well as the couplings or clamping components and the gaskets shall be legibly and indelibly marked and shall bear at least the following information:

- the manufacturer's name or mark
- the identification of the production site
- the period of manufacturing, coded or not
- the reference to the European standard
- the DN, or Dia, where applicable
- the design angle of fittings
- the identification of the accredited third party where applicable


In the case of pipes the above markings shall be applied at least once per metre length.

Fittings


The identification marking for PAM-VAC® fittings is a label inserted in a cast frame.

PAM-VAC®

EN 877 =
EN 12109 =
In conformity with the Standards










CE Marking = A2-s1, d0



PAM-VAC® Pipe System
Product range



	1.7 PAM-VAC® Double-Bend 88° <table border="1"> <tr><th>Ref. Nr.</th><th>DN</th></tr> <tr><td>400007610</td><td>50</td></tr> <tr><td>400007611</td><td>80</td></tr> <tr><td>400007612</td><td>100</td></tr> </table>	Ref. Nr.	DN	400007610	50	400007611	80	400007612	100						
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	1.8 PAM-VAC® Double-Bend long tail 88° <table border="1"> <tr><th>Ref. Nr.</th><th>DN</th></tr> <tr><td>400007613</td><td>80</td></tr> <tr><td>400007614</td><td>100</td></tr> </table>	Ref. Nr.	DN	400007613	80	400007614	100								
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	1.9 PAM-VAC® Bend 45° long tail <table border="1"> <tr><th>Ref. Nr.</th><th>DN</th></tr> <tr><td>400007615</td><td>100</td></tr> </table>	Ref. Nr.	DN	400007615	100										
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	1.10 PAM-VAC® Bend 88° long tail <table border="1"> <tr><th>Ref. Nr.</th><th>DN</th></tr> <tr><td>400007616</td><td>100</td></tr> </table>	Ref. Nr.	DN	400007616	100										
Ref. Nr.	DN														
400007616	100														
	1.11 PAM-VAC® Offset DN 100 <table border="1"> <tr><th>Ref. Nr.</th><th>Step</th></tr> <tr><td>400007617</td><td>65 mm</td></tr> <tr><td>400007618</td><td>130 mm</td></tr> <tr><td>400007619</td><td>200 mm</td></tr> </table>	Ref. Nr.	Step	400007617	65 mm	400007618	130 mm	400007619	200 mm						
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400007617	65 mm														
400007618	130 mm														
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	1.12 PAM-VAC® Branch 45° <table border="1"> <tr><th>Ref. Nr.</th><th>DN</th></tr> <tr><td>400007620</td><td>50x50</td></tr> <tr><td>400007621</td><td>80x50</td></tr> <tr><td>400007622</td><td>80x80</td></tr> <tr><td>400007623</td><td>100x50</td></tr> <tr><td>400007624</td><td>100x80</td></tr> <tr><td>400007625</td><td>100x100</td></tr> </table>	Ref. Nr.	DN	400007620	50x50	400007621	80x50	400007622	80x80	400007623	100x50	400007624	100x80	400007625	100x100
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	1.13 PAM-VAC® Access door round <table border="1"> <tr><th>Ref. Nr.</th><th>DN</th></tr> <tr><td>400007626</td><td>50</td></tr> <tr><td>400007627</td><td>80</td></tr> <tr><td>400007628</td><td>100</td></tr> </table>	Ref. Nr.	DN	400007626	50	400007627	80	400007628	100						
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PAM-VAC® Pipe System
Product range



	1.20 PAM-VAC® Flange <table border="1"> <tr><th>Ref. Nr.</th><th>DN</th></tr> <tr><td>400007645</td><td>100</td></tr> </table>	Ref. Nr.	DN	400007645	100				
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	1.21 PAM-VAC® Application bend <table border="1"> <tr><th>Ref. Nr.</th><th>DN</th></tr> <tr><td>400007646</td><td>50x50 long</td></tr> <tr><td>400007647</td><td>80x50 long</td></tr> </table>	Ref. Nr.	DN	400007646	50x50 long	400007647	80x50 long		
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400007647	80x50 long								
	1.22 PAM-VAC® Application T-bend <table border="1"> <tr><th>Ref. Nr.</th><th>DN</th></tr> <tr><td>400007648</td><td>50x50x50</td></tr> </table>	Ref. Nr.	DN	400007648	50x50x50				
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400007648	50x50x50								
	1.23 PAM-VAC® SMU Coupling, EPDM-Gasket, DIN EN 877, Material 1.4510/11, CE-Marking <table border="1"> <tr><th>Art.Nr.</th><th>DN</th></tr> <tr><td>400008262</td><td>50</td></tr> <tr><td>400008263</td><td>80</td></tr> <tr><td>400008264</td><td>100</td></tr> </table>	Art.Nr.	DN	400008262	50	400008263	80	400008264	100
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	1.24 PAM-VAC® UNIGRIP Grip-Collar <table border="1"> <tr><th>Art.Nr.</th><th>DN</th></tr> <tr><td>400007652</td><td>50</td></tr> <tr><td>400007653</td><td>80</td></tr> <tr><td>400007654</td><td>100</td></tr> </table>	Art.Nr.	DN	400007652	50	400007653	80	400007654	100
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	1.25 PAM-VAC® UNIGRIP Grip-Collar for expansion plug <table border="1"> <tr><th>Art.Nr.</th><th>DN</th></tr> <tr><td>400007655</td><td>50</td></tr> <tr><td>400007656</td><td>80</td></tr> <tr><td>400007657</td><td>100</td></tr> </table>	Art.Nr.	DN	400007655	50	400007656	80	400007657	100
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	1.26 PAM-VAC® Ultraquick Universal flange adaptor <table border="1"> <tr><th>Art.Nr.</th><th>DN</th></tr> <tr><td>400008274</td><td>50/80</td></tr> </table>	Art.Nr.	DN	400008274	50/80				
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400008274	50/80								












Roediger® **Compact Station** – Model 30/50

- Double pump configuration
- Screw pumps
- Without collecting tank
- Frequency changeover with CPU
- All outgoing and incoming pipes can be interrupted via ball valves
- Only one electrical supply point for the entire system
- No vent pipe required



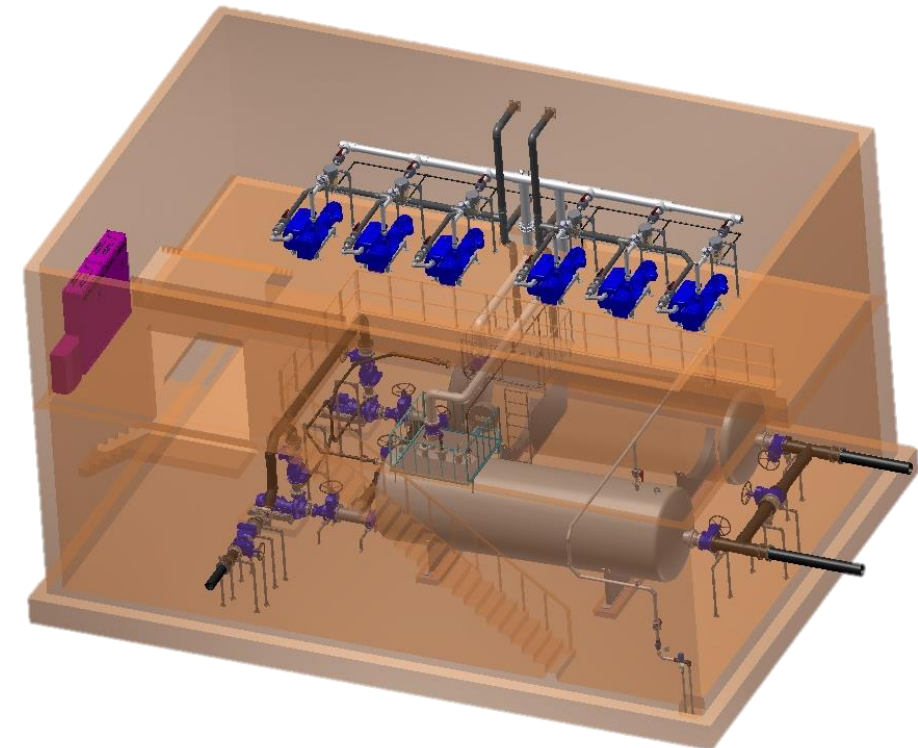
Roediger® Compact Station – Model 360

-  Collection tank
-  3 vacuum pumps
-  2 feed pumps
-  Control panel
-  Pipes and fittings
-  Inspection chamber
-  Waste water inlet
-  Waste water inlet socket
-  Ventilation socket



Customized configuration

- ❑ Redundant pump configuration - Adaptable to project requirements
- ❑ Collection tank 1/3 wastewater storage - 2/3 vacuum buffer
- ❑ Tank volume radar controlled
- ❑ Outgoing and incoming lines are interruptible via ball valves
- ❑ Only one electrical supply point for the entire system
- ❑ Only one ventilation pipe
- ❑ On-site Assembly



VES – mit Vakuumsensor



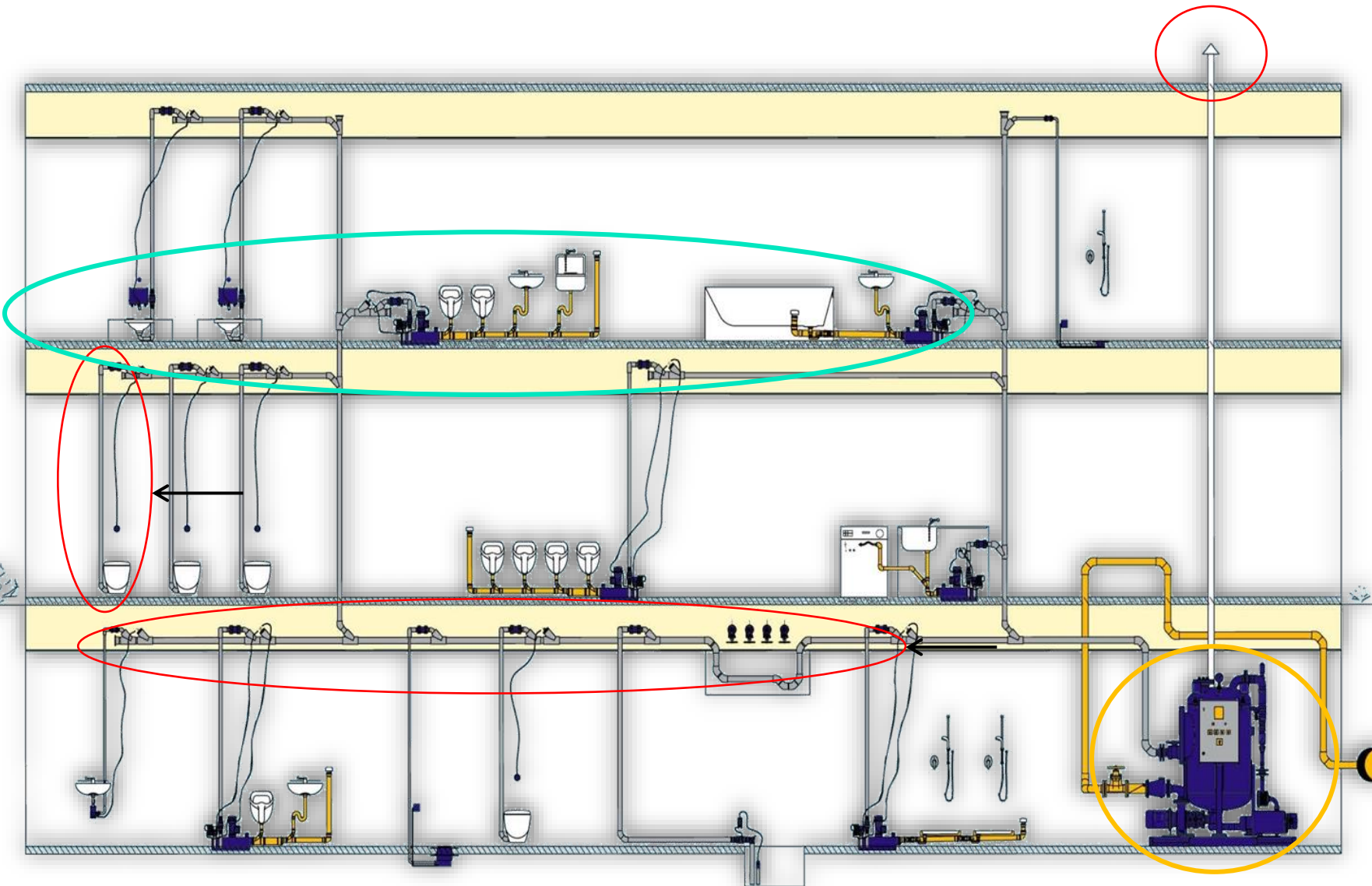
GSM - Module



Mobile Phone



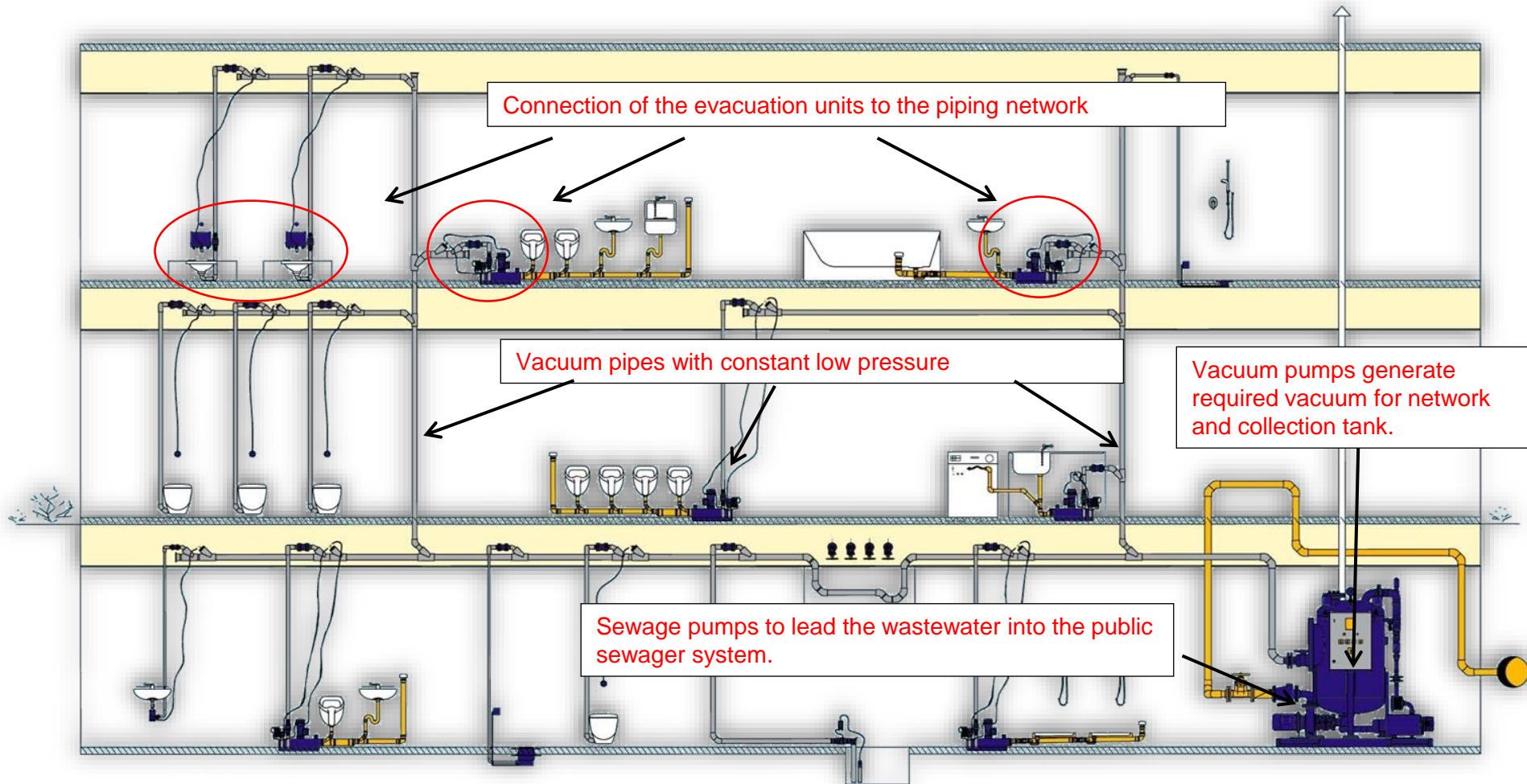
Vacuum-Sanitary Technology Design & Layout

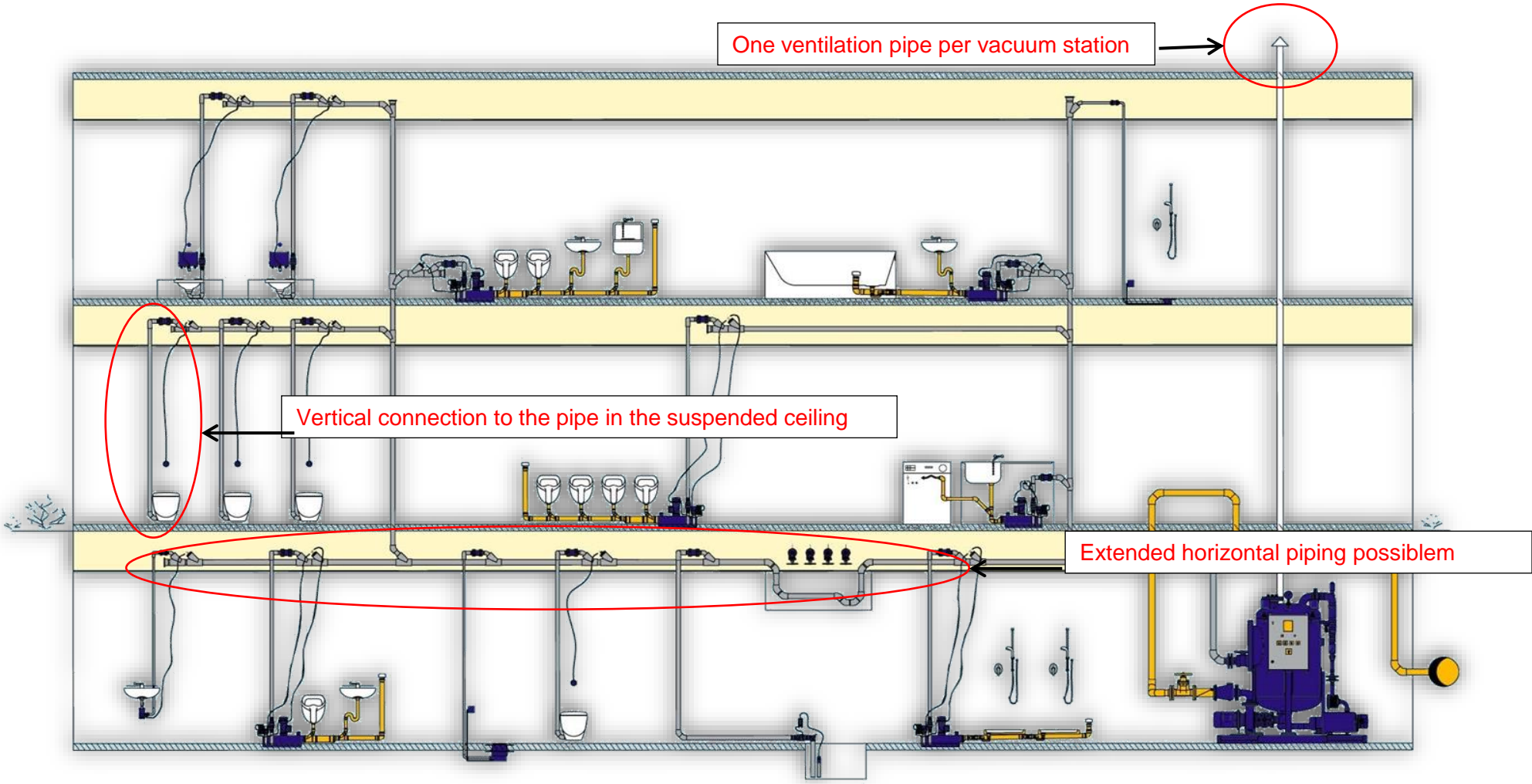


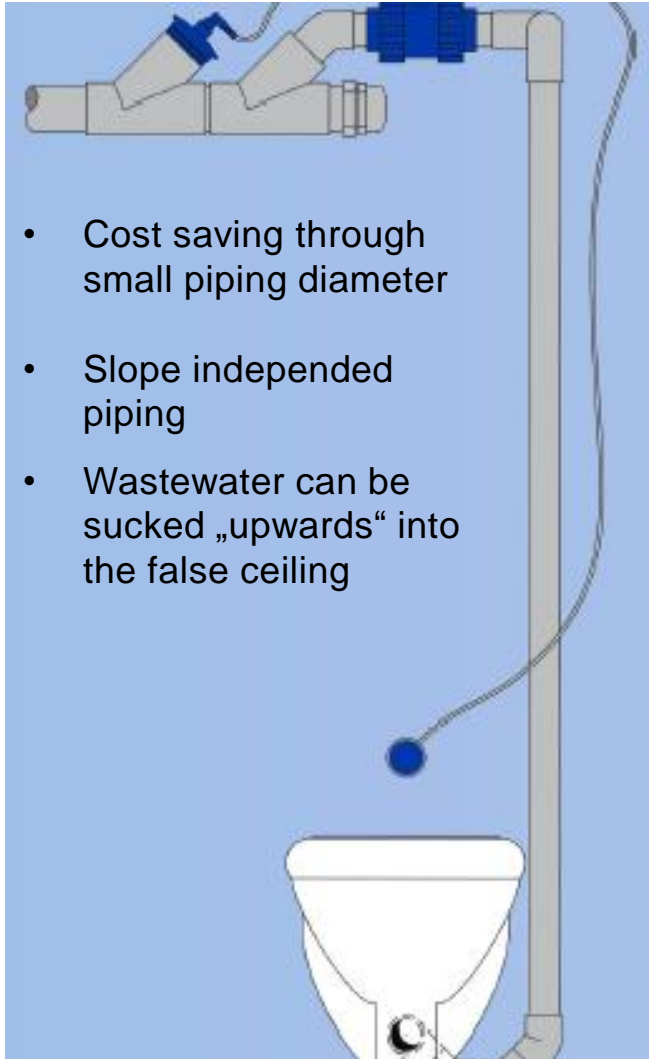
1. Evacuation Units
Vacuum toilets, Floor Drains

2. Pipe Network
Pipes D40-D100 (rare) layed nearly without slope and connect the evacuations units with the vacuum station

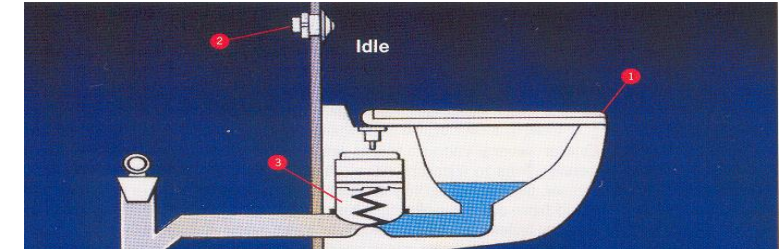
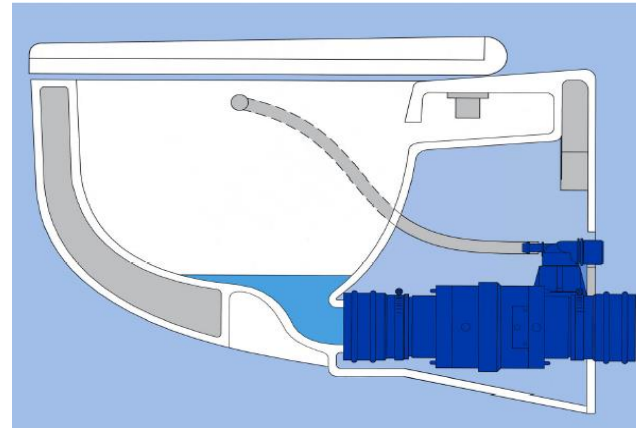
3. Vacuum station
Creates vacuum and is the central collection unit (only power point in the system)



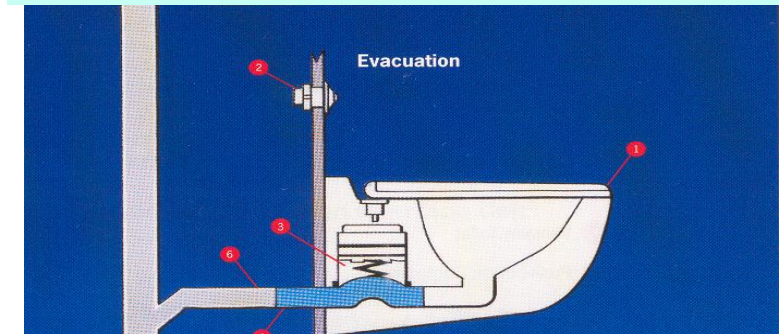




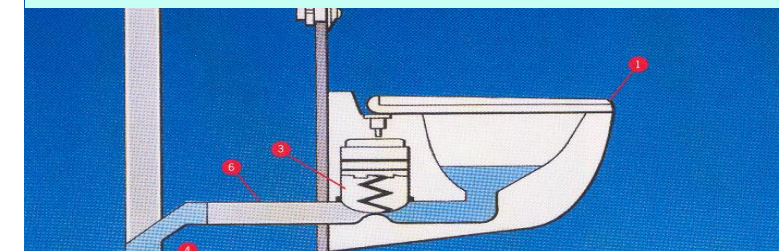
Scheme of a vacuum toilet



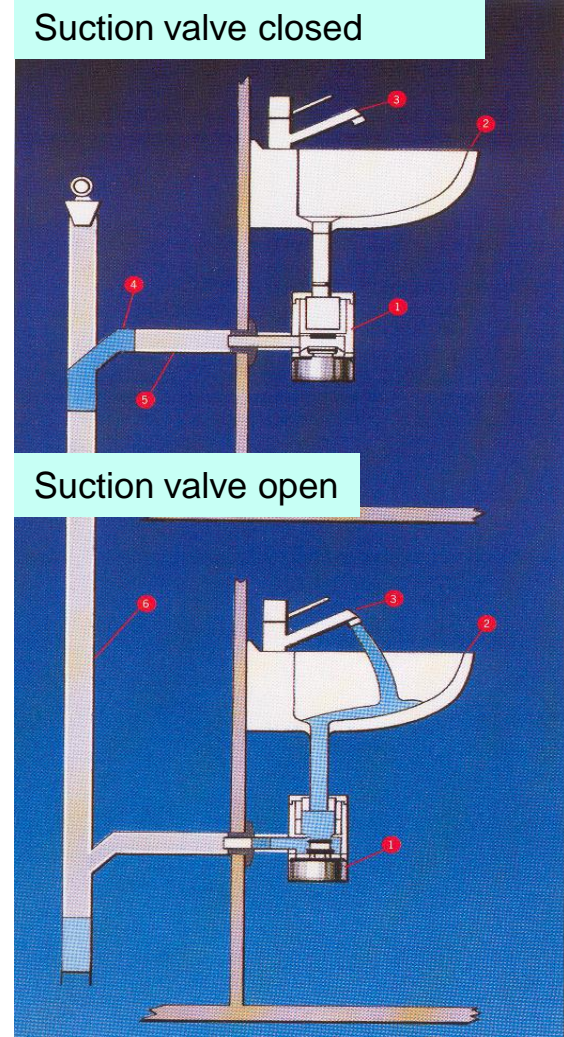
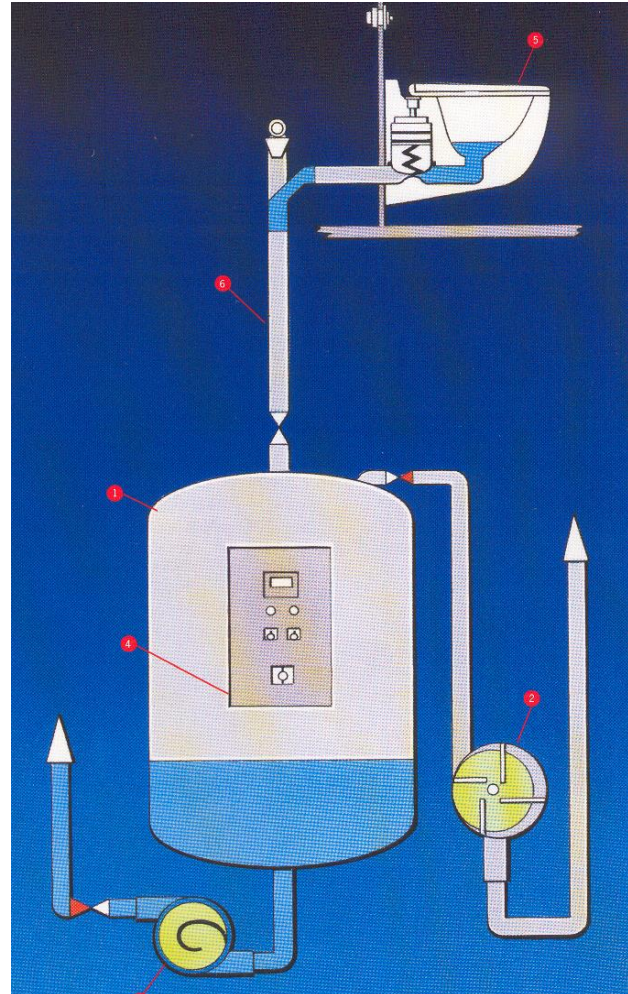
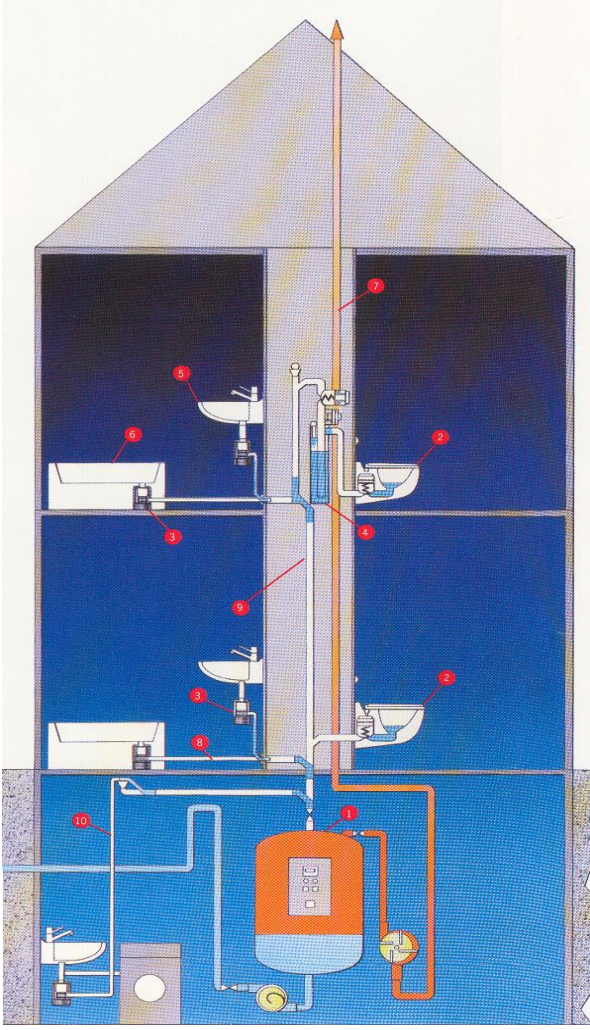
After using the toilet, press the button to flush

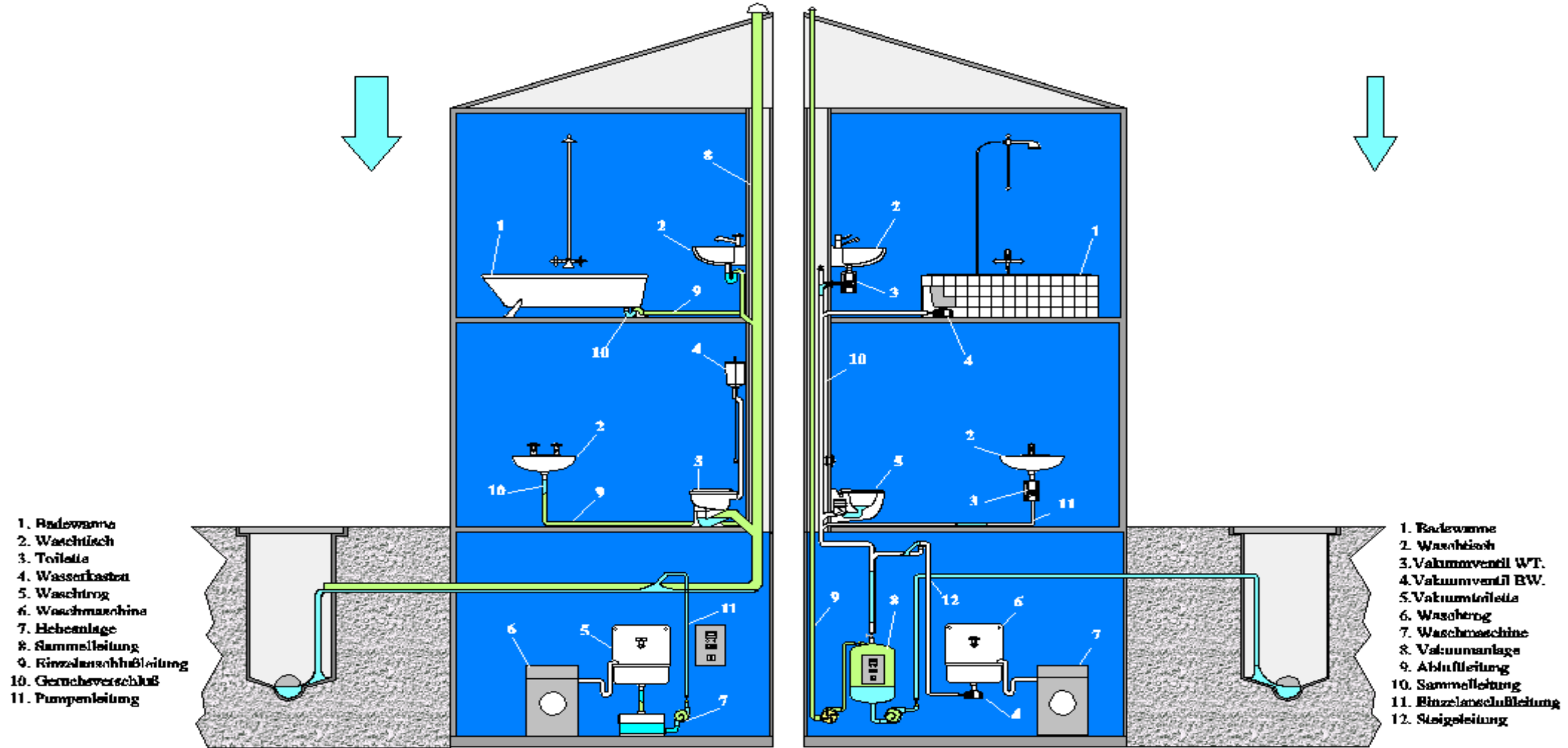


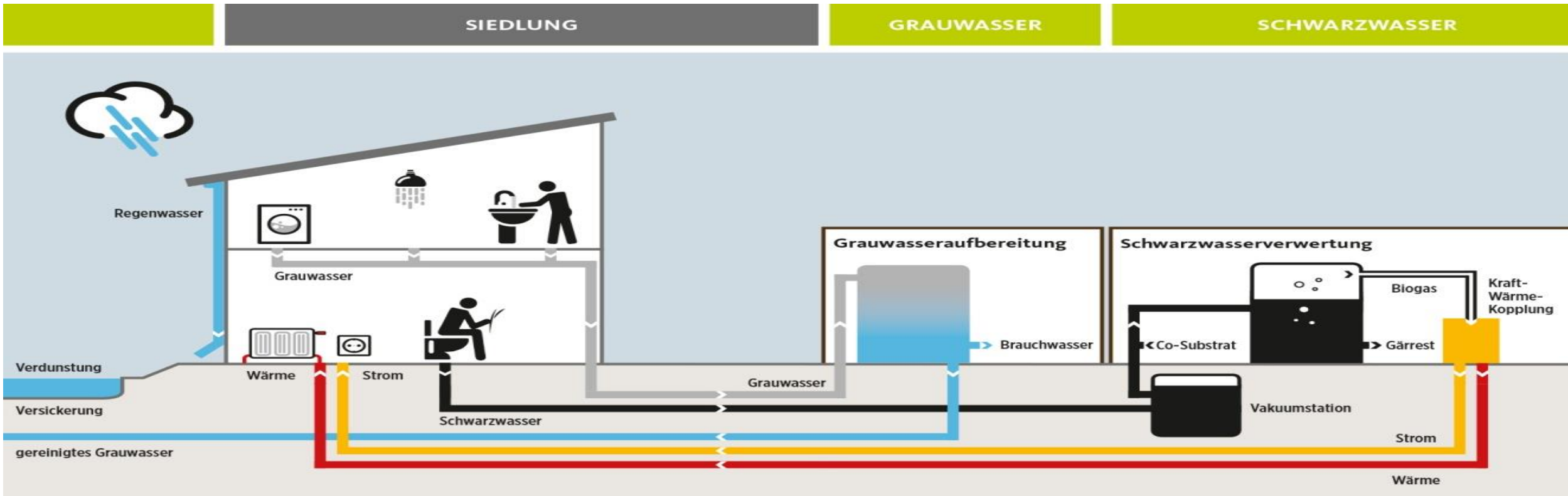
The suction valve opens pneumatically for approx. 4 seconds and the bowl is flushed with approx. 1 liter of water.

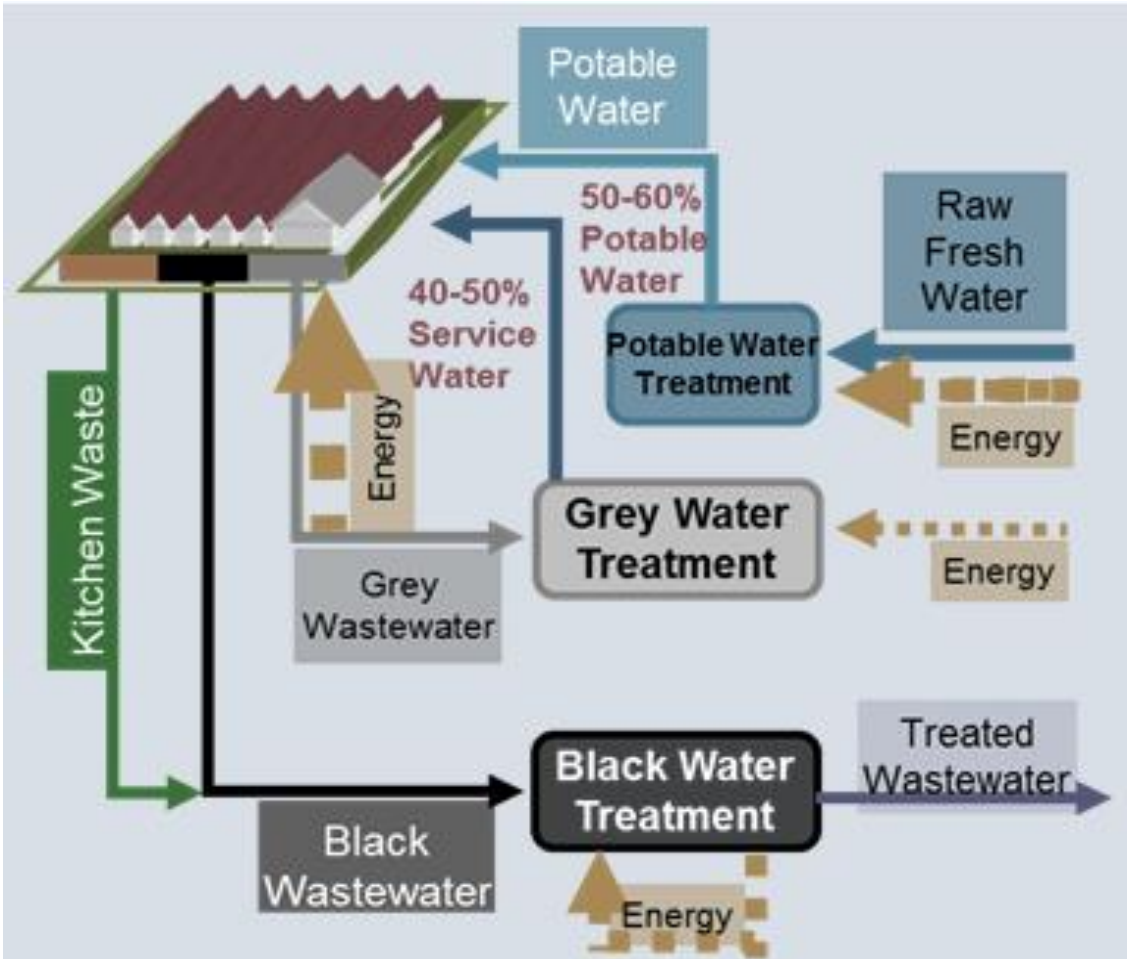


After flushing and suction, the toilet bowl is again filled with a water seal.









Vacuum-Sanitary Technology Advantages

Small pipe diameters

Flexible installation allows flexible floor plans

Adaptability to redesign e.g. during construction phase

Joint installation with other media in one channel

Autonomous/in closed system

Peak times/peaks can be buffered

Heights up to 4.50m can be covered

Easy installation in the floor or ceiling

Multiple use possible

Retrofitting and demounting possible

Planning and coordination effort lower

Pipe routing is gradient independent and flexible






Easy integration of subsequent sanitary rooms

Low sewage volume (waste water reduction up to 90 %)

Low water usage (water reduction up to 90 %)

Roediger® Vacuum Sanitary Technology

Advantages

-  Only 1 liter of water consumption per flush
-  Slick bowl without unhygienic flushing rim
-  Cleaning via noozles
-  Suction suckes away the odour smell
-  No optical difference to „normal“ toilets



Floor model - Wall model - Porcelain - Stainless steel

Wall-mounted vacuum toilet with a large mounting plate for good accessibility (maintenance). Spray lances for easy cleaning without cross-contamination.



Roediger[®] Vacuum-Sanitary Technology Comparison to gravity

Roediger Sanitary Systems

Passes easy around obstacles - including up-and-downs

Re-planning during the construction phase is simple to implement - without additional technique

Additional new connections or change of junctions is simple

Conversion during on-going operation possible-floor by floor- no new down pipes

Repair, conversion and dismantling of existing plants simple

Gravity drainage

Crossing obstacles is difficult - rising only by pump technique

Re-planning during the construction phase is expensive; implementation often only possible with additional technique

New connections or relocation of junctions is difficult

Pipe-laying in floors below, and new down pipes affect all floors

Repair, conversion and dismantling of existing installations often very expensive

Roediger Sanitary Systems

Simple, free, floor by floor planning - parallel to irrigation lines

Small-diameter pipes, no real slope - ideal for little suspended ceiling and raised floors

Elimination of additional core drillings, fireproof bulkheads and statics measures – floor space gain

No additional pump stations; no backflow protection required

Gravity drainage

Elaborate planning, bound to down pipes and achievable slope

Larger pipe diameter, slope for longer collection lines requires higher ceiling suspension

Often additional core drillings, fire partition slots and static measures required - floor space loss

Often pump stations and backflow protection required

Roediger Sanitary Systems

Separation of waste water, black, gray, grease wastewater is easy

In case of line damage waste water hardly escapes - low damage potential

Immediate detection of malfunctions and easy location of leakages

Low odor, or noise emissions in the pipe network - tight system

No flushing rim; effective injection nozzles and efficient waste water suction -
better hygiene, requires less cleaning

Gravity drainage

Separate collection of waste waters is difficult

In case of line damage waste water escapes - high damage potential

Disorders (e.g. blocked manifold) are detected late

Odor - and noise emissions in the pipe network - open system

Flushing rim, dirt and bacteria sediments inefficient flushing - poor hygiene, high cleaning demand

Roediger Sanitary Systems

Toilet water consumption 1 l / flush
Urinal water consumption 0.5 l / flush
low resource waste

Water splash technique - no stress on the sewer system - water-saving technology without loading the public

Waste water separation
value of material utilization
conservation of resources
multifunctional buildings
- high future viability

Gravity drainage

Toilet water consumption 6-9 l / flush
Urinal water consumption 3-4 l / flush
high resource waste

Unilateral water-saving technology additional burden of the sewer system thus cost-shifting to the general public

Combined sewer technology
dilution of recyclables
waste of resources
building usage specified
- low future viability

Roediger® Vacuum Sanitary Technology References



Key Figures

Completion:	2018
No. of users:	25,000 PE

Scope of supply and services

- 2 Vacuum stations
- 60 Vacuum toilets

The stadium is located next to the river Insar with a high ground water table.

Both basement floors are equipped with a Roediger® Vacuum System. The unique flexibility of this vacuum network **enables an evacuation on virtually any spot** of the stadium.



Key Figures

- Completion: 2019
- No. of users: 1480 PE

Scope of supply and services

- 520 Vacuum toilets and USPH freshwater connections

Total retrofit of the passenger cabins.



Flexibility
Horizontal Transport
Grease Wastewaterc

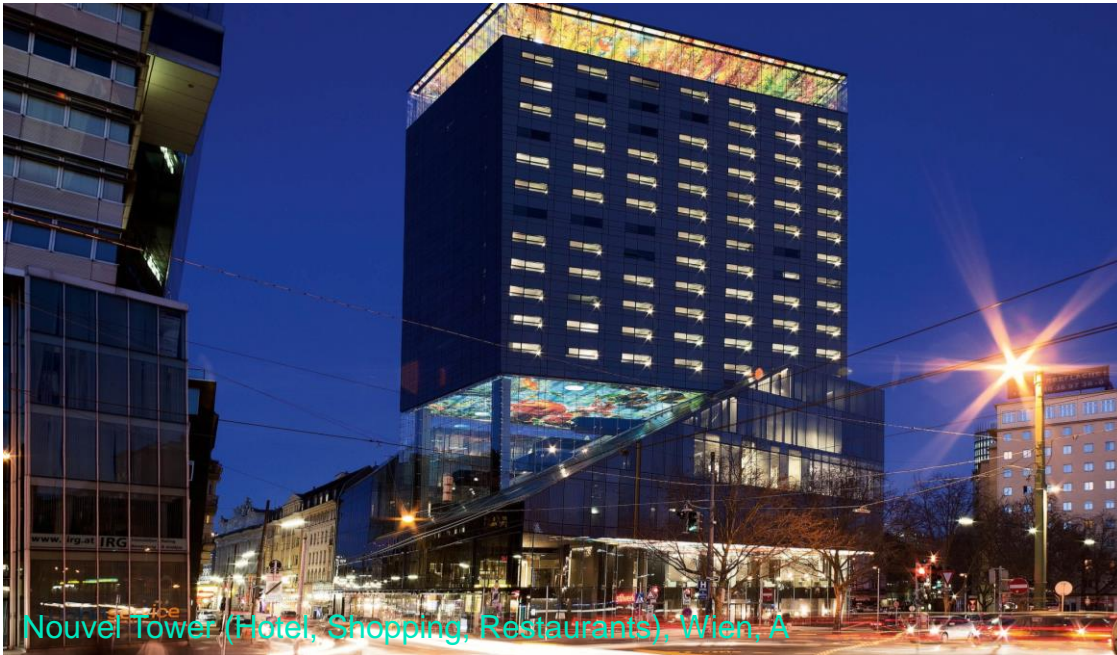


Flexibility
Horizontal Transport
Grease Wastewaterc





Flexibility
Emergency Water
Connection of buildings





Flexibility
Heritage Protection
Horizontal Transport



Grease Wastewater



Flexibility
Emergency Water
Connection of buildings



Hamburg Jenfeld, DE

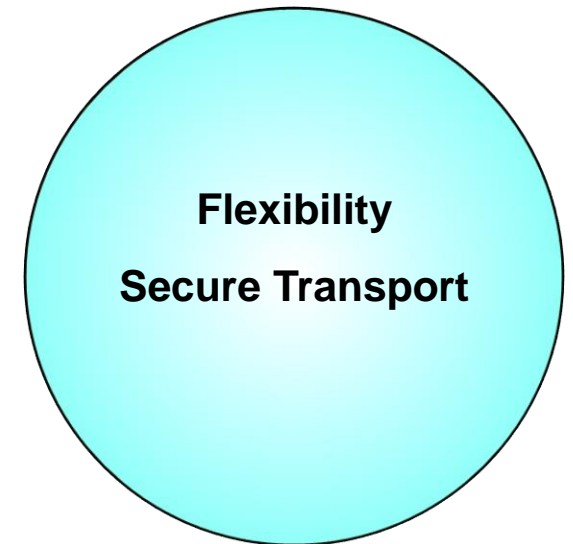


Sneek, NL

Water Saving
Source Separation
Blackwater Digestion



Flexibility
Secure Transport
Decay





Flexibility
Secure Transport



Flexibility
Grease Water



**Water Saving
Source Separation**



**Water Saving
Flexibility**

Project Management – 360°Service



- Project questionnaire
- Cost estimation (depending on project status)
- CAPEX/OPEX calculations - amortization
- Drawing support
- Tender texts
- Installation training
- Installation guidance and monitoring
- Commissioning
- Supervisor Training
- Maintenance and after sales support

Global Business Unit Vacuum Technology



Roediger® Sanitation Solutions Project-Questionnaire

Your contact data:

Mr./Mrs.

Company

Telephone Telefax

email

Your Project

Title Start

Location New building Renovation

Water/waste water price /l/m

Building

Office Industry/trade Hotel

Residential Hospital Others

No. of floors space m²

Drainage

Does a conventional water supply and drainage require:

Waste water lifting device Booster station

No. of downpipes Ceiling suspension height

Planning a Roediger® Sanitation system
Location for the Vacuum station

Basement Ground floor different building

Other



Budget 1

For your project **Office Tower**

the following costs will occur for the implementation of our Roediger Vacuum System

	No.	Price/Unit	Price/total
Vacuum Stations Typ 360	2	54.000 	108.000
Toilets Laufen	588	1.250 	735.000
Evacuation Units PE 7	214	985 	210.790
	BA	10	8.000
Monitoring	1	65.000 	65.000
Total			1.126.790

Please note that this is a first non binding budget.

Hanau,

Henning Sälzer
Aqseptence Group GmbH
Sales Manager Vacuum Sanitation

Aqseptence Group GmbH
Vacuum Sewerage & Recovery Systems
Kinzigheimer Weg 104-106
D-63450 Hanau
Tel: +49(0)6181 309-275
Fax: +49(0)6181 309-280
info.roediger.water@aqseptence.com



TOO "MIDES STROY"
Tole Bi str. 210/3
050990 ALMATY
KAZAKHSTAN

Quotation 20030390

Date : 13.10.2016
Validity Period : 31.03.2017
Customer N° : 2559
Ref. / date : per Mail / 12.10.2016
Entered by : Dominic Wittig
Mail : dominic.wittig@aqseptence.com
Phone : 06181309-231
Proj. Manager: Marc Veit
Phone : +496181309284
Fax : +496181309280
Email : marc.veit@aqseptence.com
Representative : Gero Steigerwald

Export free of Tax

Equipment for vacuum system for Astana Expo outdoor project

Dear Ladies and Gentlemen,

thank you for your inquiry. We are quoting for the following equipment and offer due to our Terms and Conditions for the commercial business - 2010 edition (see <http://water.aqseptence.com>, sub menu "Download"), as follows:

Item	Material no. Description	Qty	UoM	Unit Price in EUR	Value in EUR
000100	410001736 ROEDIGER Vacuum Station Type 85, Vacuum pump in AQUA version, ready for connection as machinery compact plant	1,000	PC	51.601,08	51.601,08
Dimensions:					
Length : approx. 2.400 mm					
Width : approx. 1.350 mm					
Height : approx. 2.050 mm					
Empty weight: approx. 1.100 kg					
Performance characteristics:					

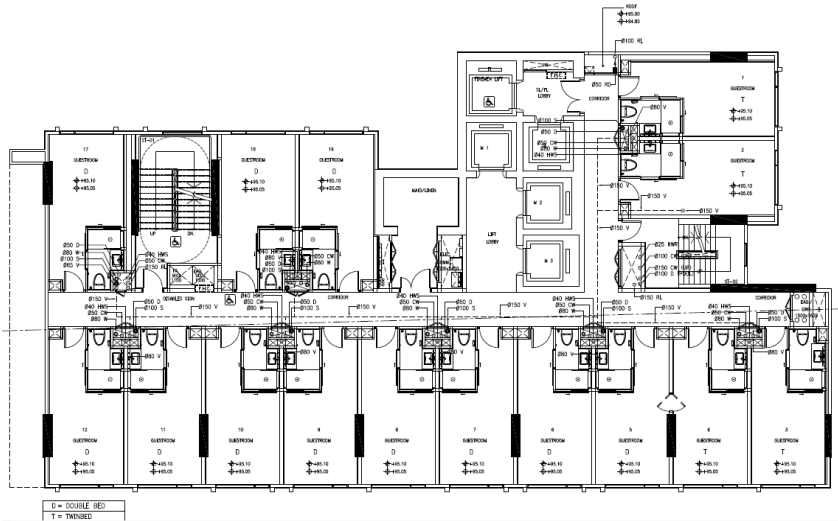
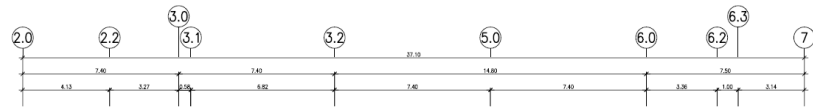
Corporate Headquarters:
45226 Ansbach, Germany
<http://www.aqseptence.com>
email: info@water.aqseptence.com

Managing Directors:
Joachim Festerer
Rudolf Bognal
Balthasar La Grotto
Mark Steigerwald
Rosario Eduardo Yaglavari

Registered in:
Wiesbaden - HRB 10069
USt-ID-DE 913 133 633
SIRE: 640 251 05461
Finanzamt Wiesbaden I

Bank details:
Commerzbank AG Wiesbaden
IBAN DE 30 1101 0300 0130 1587 00
BIC: BFSW3333

Klicken Sie hier, um eine Fußnote hinzuzufügen



Project:		Office Tower		Level -1		
Evacuation units	Level -1	Sector 1	Sector 2	Sector 3	Sector 4	Summe
Vac. toilet		21	18	20	29	88
Bidet		13	7	6	10	36
Wash basins		27	24	26	34	111
Urinal						0
Shower		7	6	6	5	24
Bathtub		15	12	14	11	52
PE 7 connected 1 Shower, 1 Bidet		8	3	3	5	19
PE 7 connected 1 Bathtub, 2 Wash basins		6	3	3	5	17
PE 7 connected 1 Bathtub, 1 Wash basins		9	9	10	5	33
PE 7 connected 1 Shower, 1 Foot-Shower				1		1
PE 7 connected 8 Wash Basins						0
PE 7 connected 5 Wash Basins			1	1		2
PE 7 connected 2 Shower			1	1		2
PE 5 connected 1 Kitchen Sink (Prep)		7	4	3		14
PE 5 connected 1 Wash basin, 1 Bidet		7	4	3		14
AE 25 connected 1 wash basin				1	7	8
Monitoring system		20	17	17	22	76
Sum evacuation units						421
Summary Toilets	88	Summary PE 5		28		
Summary PE 7	74	Summary AE 25		8		
Summary Monitor	76	Summary Floor Dr.		0		



Layout of the necessary Section Capacity
Q_{max} for the Vacuum Station SEWAGE WATER
FA 1 Floor - 1/-2/-3

Roediger
 Water Technology GmbH
 Rudolf-Messers-Str. 3
 Kriemhild-Strasse
 53111 Lutzerath
 Germany
 Tel: +49 2151 200-0
 Fax: +49 2151 200-100
 www.roediger.com

Hansu Jan, 31st 2014

Calculation of the size of the Vacuum Station of the project Office Tower*
 The Vacuum Station is meant for evacuating the black and grey water from the discharge places and the sanitary rooms of the building.

1.0 Charge of the Vacuum Station by the connected Sanitation Objects

1.1 Amount of Waste Water per use of Sanitation Objects

Vacuum toilet	2,0	Litres per use
Wash Basin	3,0	Litres per use
Bidet	3,0	Litres per use
Urinal	6,0	Litres per use
Floor Drain	3,0	Litres per use
Kitchen - Sink	10,0	Litres per use
Shower	48,0	Litres per use
Bathtub	135,0	Litres per use
Foot-Shower	10,0	Litres per use

1.2 Maximum evacuated Water-Air-Volume per use of Vacuum Toilet and Evacuation units

Vacuum Toilet	2,0	l Waste water +	60,0	l Air -	62,0	Litres
Floor Drain Evacuation unit BA	5,0	l Waste water +	20,0	l Air -	25,0	Litres
Evacuation unit AE 25	0,5	l Waste water +	20,0	l Air -	20,5	Litres
Evacuation unit with Tank Type PE 5	5,0	l Waste water +	70,0	l Air -	75,0	Litres
Evacuation unit with Tank Type PE 7	7,5	l Waste water +	70,0	l Air -	77,5	Litres

1.3 Maximum Frequency of use of the Sanitation Objects

Vacuum toilet	Uses per hour	4,0	times
Wash Basin	Uses per hour	4,0	times
Bidet	Uses per hour	4,0	times
Urinal	Uses per hour	4,0	times
Floor Drain	Uses per hour	2,0	times
Kitchen - Sink	Uses per hour	2,0	times
Shower	Uses per hour	3,0	times
Bathtub	Uses per hour	1,0	times
Foot-Shower	Uses per hour	2,0	times

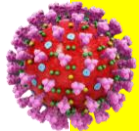
Investition Vakuum-Sanitärtechnik	1.030.000 €
Reduzierung der Baukosten am Gebäude (Schätzung)	560.000 €
Mehrkosten	470.000 €
Einsparung Wasser/Abwasser m ³ p.a.	10.000 m ³
Einsparung Wasser/Abwasser € p.a.	36.600 €
Betriebskosten € p.a.	5.200 €
Amortisation	> 6,5 years

Invest Vacuum sanitary	1.030.000 €
Costs deductible building	560.000 €
Cost surplus	470.000 €
Savings Water/Wastewater m ³ p.a.	10.000 m ³
Savings Water/Wastewater € p.a.	36.600 €
Operational Costs € p.a.	5.200 €
Amortisation dyn.	> 6,5 years

Vacuum Sanitary Technology Bathroom Hygienic

Facts about the transmission of bacteria and viruses

- Transmitted via human-to-human contact
- Transmitted via droplets
- Droplets occur through sneezing, coughing but also while speaking (therefore keep the distance!)
- Droplets also occur during dental or oral care treatments



COVID-19 viruses can survive several hours on different surfaces outside the human body

COVID-19 viruses are found in human faeces

The "toilet plume" spreads viruses and bacteria (but also those from previous users!) - so as soon as toilets are used by several people, there is a risk of transmission!
Example. Transmission via defective sewage systems (ventilation pipes) - as with SARS Hong Kong 2012

Facts about gravity sanitation systems

- ❑ Flush toilets flush down a drain filled with water and air
- ❑ **Flush toilets produce a vortex**
- ❑ **The middle of this vortex air will escape upwards and forms **droplets** containing water, faeces, bacteria and viruses particles**
- ❑ Beneath this bigger droplets there is also the formation of smaller airborne particles, so-called **aerosols** – that spread in the room – they are as well able to transmit bacteria and viruses*

*(tested and proved for SARS and MERS viruses (Corona Viruses))

Therefore watch out for the following in your bathroom:

The spread of vacuum toilets is negligible - in Germany, for example, it is in the per mille range!

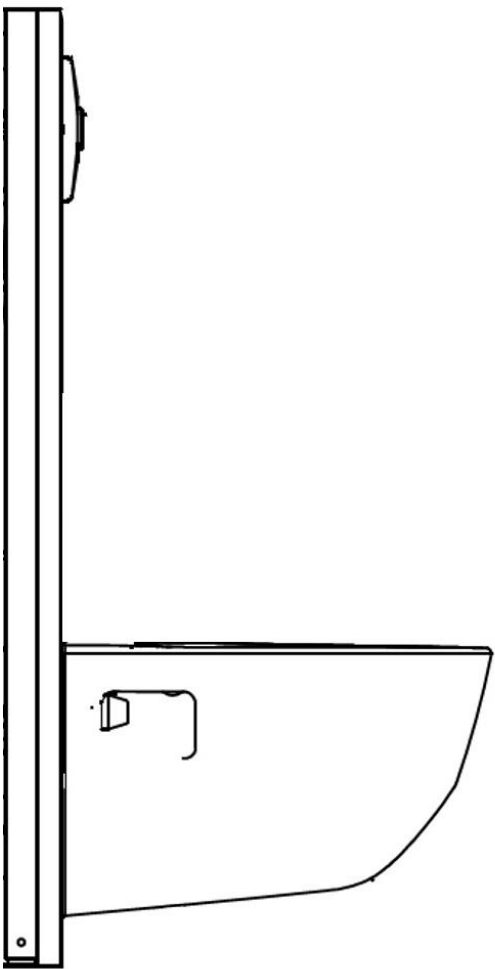
Face masks are often mistakenly understood as protection from the environment - but it is actually the other way round – they protect from the aerosols being emitted. The toilet works similar. Toilet = aerosol producer



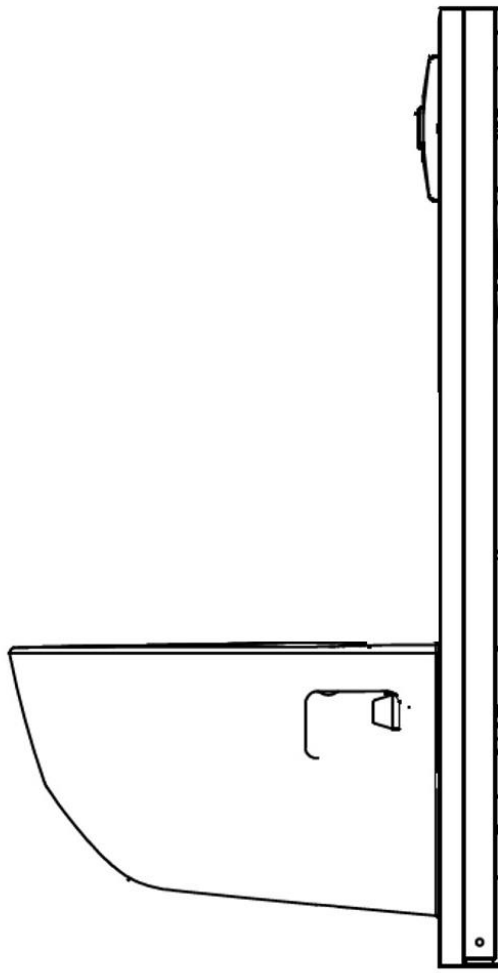
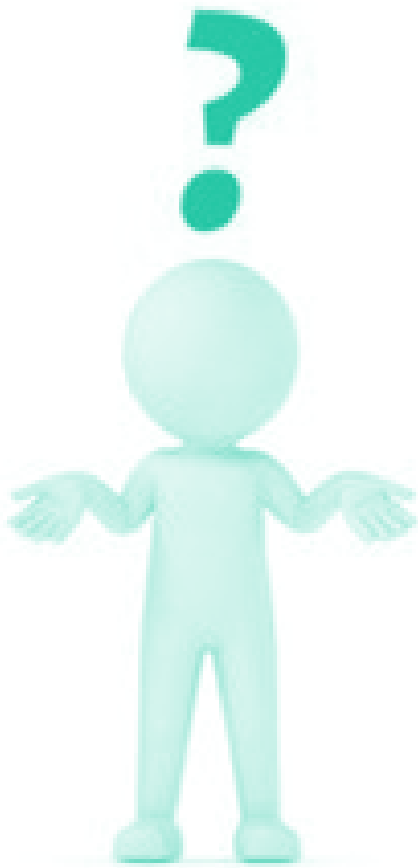
... a spray protection – that guards you from direct contact to viruses and bacteria while flushing!

Why?

This is what we want to demonstrate you in our comparison



Roediger® Vacuum Toilet

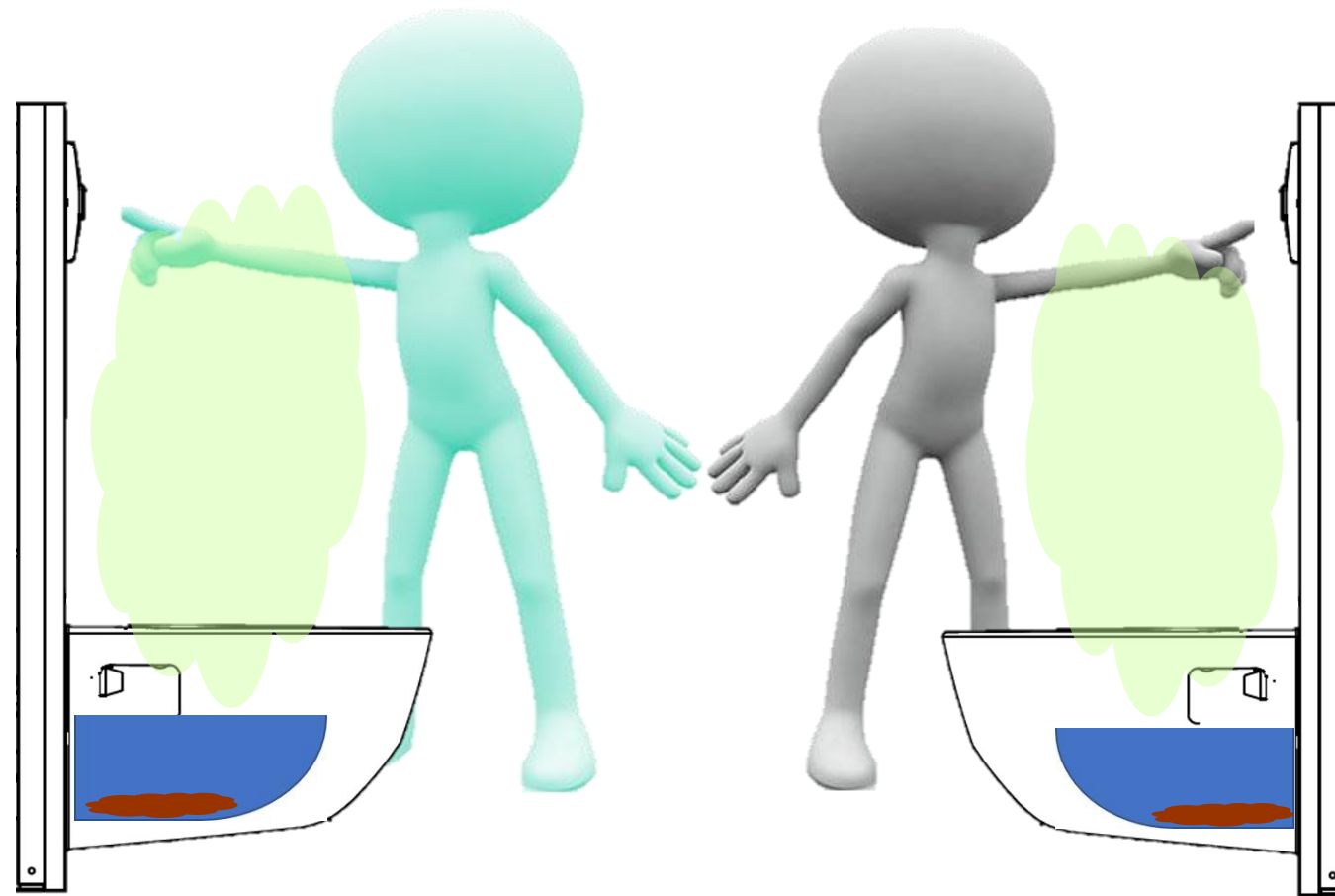


„Standard“ gravity toilet

There is “always” a cloud of odour after a toilet use

Good early warning system:
Smell=Danger= Distance!

Then the flushing process starts



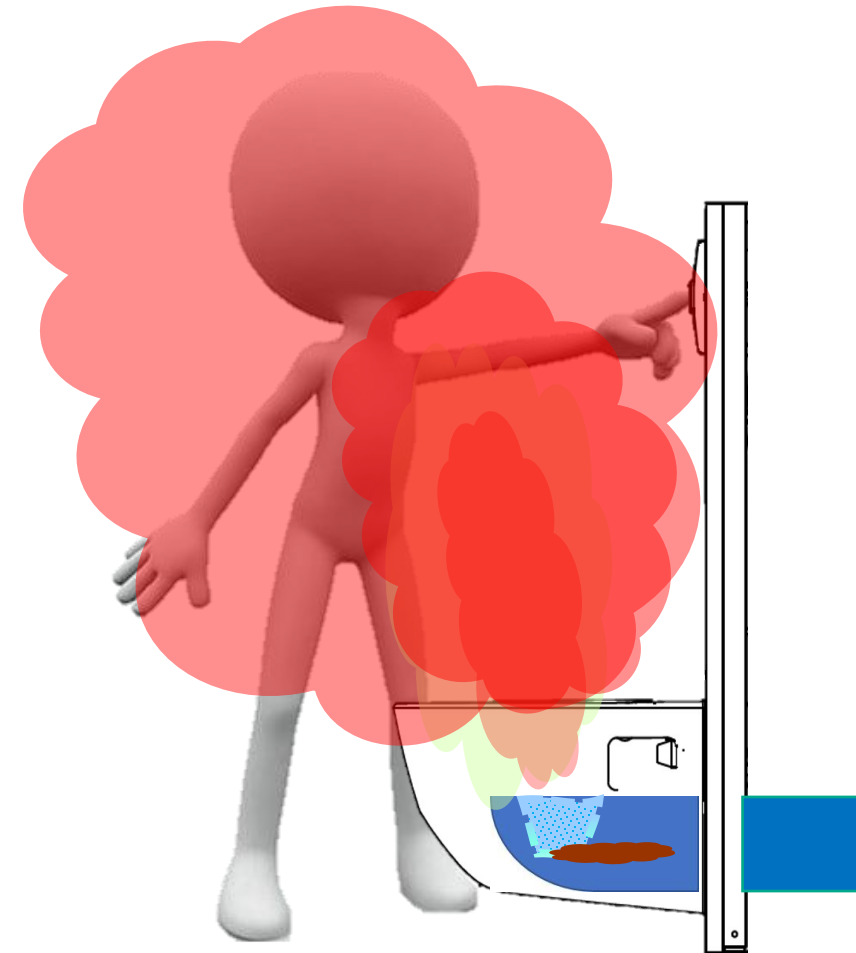
Roediger® Vacuum Toilet

„Standard“ Toilet

Combination of droplets
and aerosols - both
infectious!

Standard „flush“ toilet

- ❏ Flushes with appr. 6 liters of water/flush
- ❏ Forms a vortex while being flushed
- ❏ Vortex air from the drain is pushed upwards
- ❏ Air- and water particles form an aerosol cloud contaminated with bacteria and viruses
- ❏ Germ contamination spreads across the room
- ❏ Contaminated wastewater is flushed into an open drainage system



Flush system = open sewer system (meaning air circulation - polluted air can escape from the ducts).
Flush toilet spreads bacteria and viruses!

Standard „flush“ toilet

- ❏ Exfiltration in open drainage system possible
- ❏ Possibility of cross contaminations
- ❏ Formation of aerosol clouds
- ❏ Transmission and spread of bacteria and viruses
- ❏ Viral COVID-19 and SARS Virus have been found in human faeces and wastewater



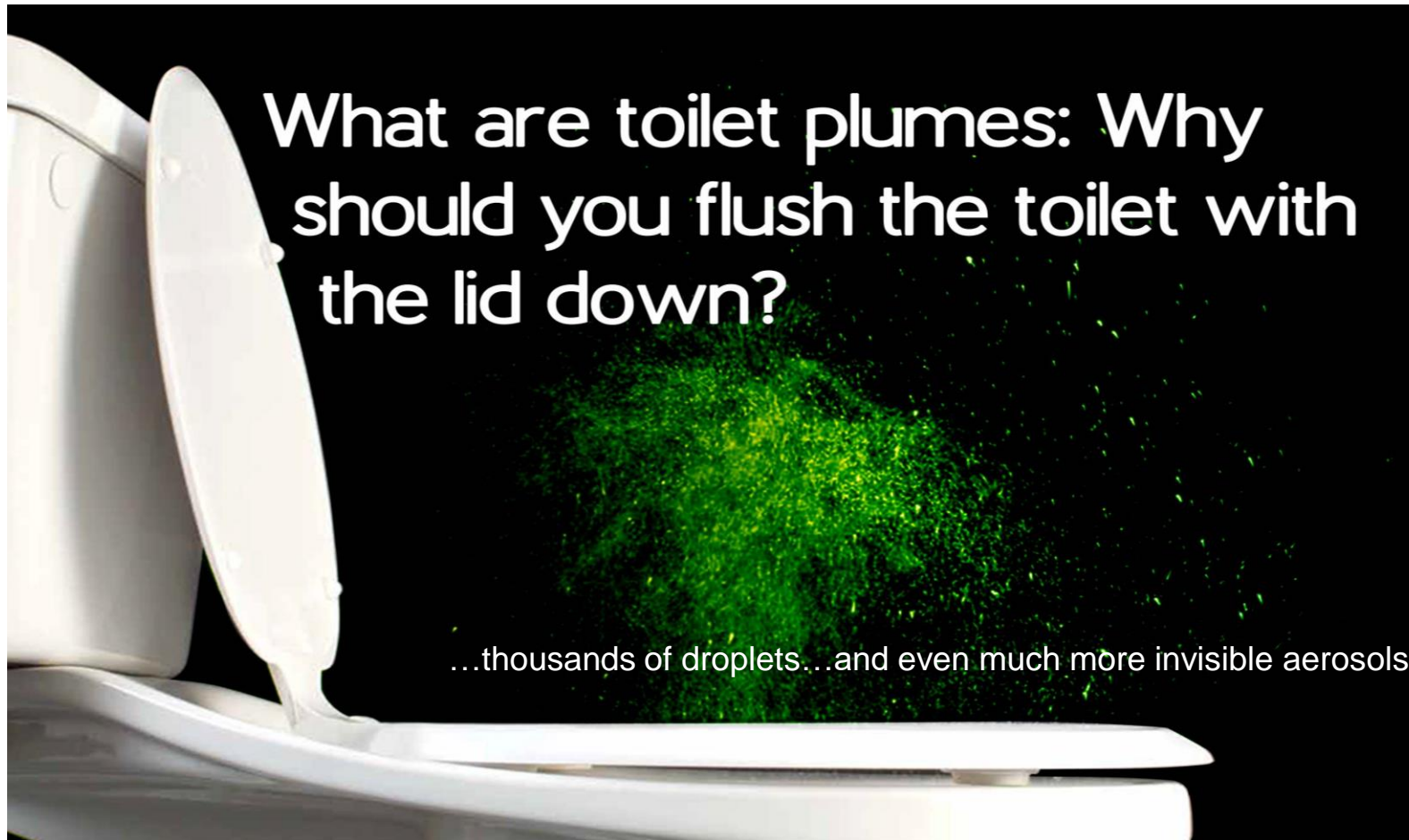
A closed toilet lid is not a 100% protection but still the best possible protection.

Disinfect/clean the toilet lid regularly!
Ventilate toilet rooms! - strongly recommended

Never hold your head over the toilet, brush and flush.
Toilet brushes are mostly only used in Europe.



**Beware of the toilet plume!
Always close the toilet cover
before flushing and never
FLUSH AND BRUSH AT THE
SAME TIME!**



<https://www.hygienicconcepts.co.uk/what-is-coronavirus-and-how-does-it-spread/>

Vacuum toilets extract everything
- no droplet formation and
suspended particles

Closed system = no exfiltration
(neither wastewater nor air can
escape!)

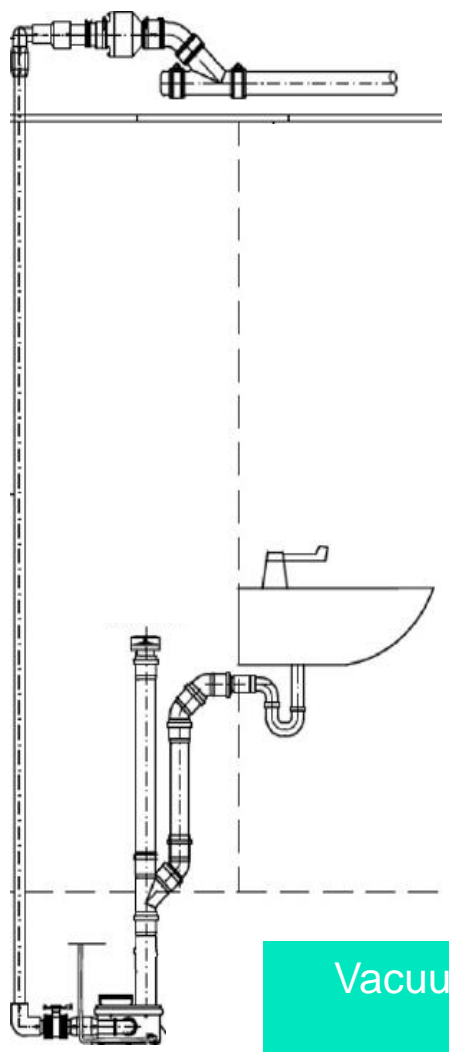
No transfer from one toilet to
another possible = no cross-
contamination (no ventilation pipe
through which gases can be
spread)



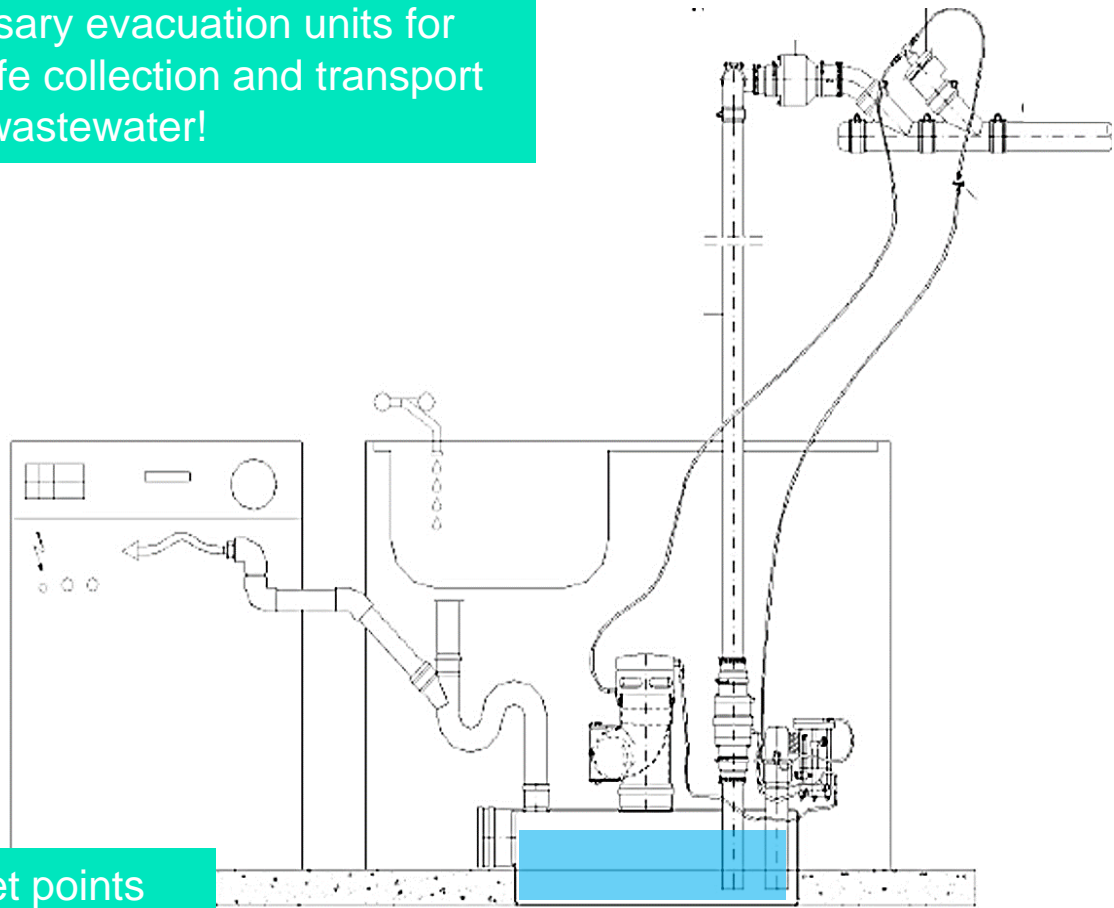
Roediger® Vacuum Toilet

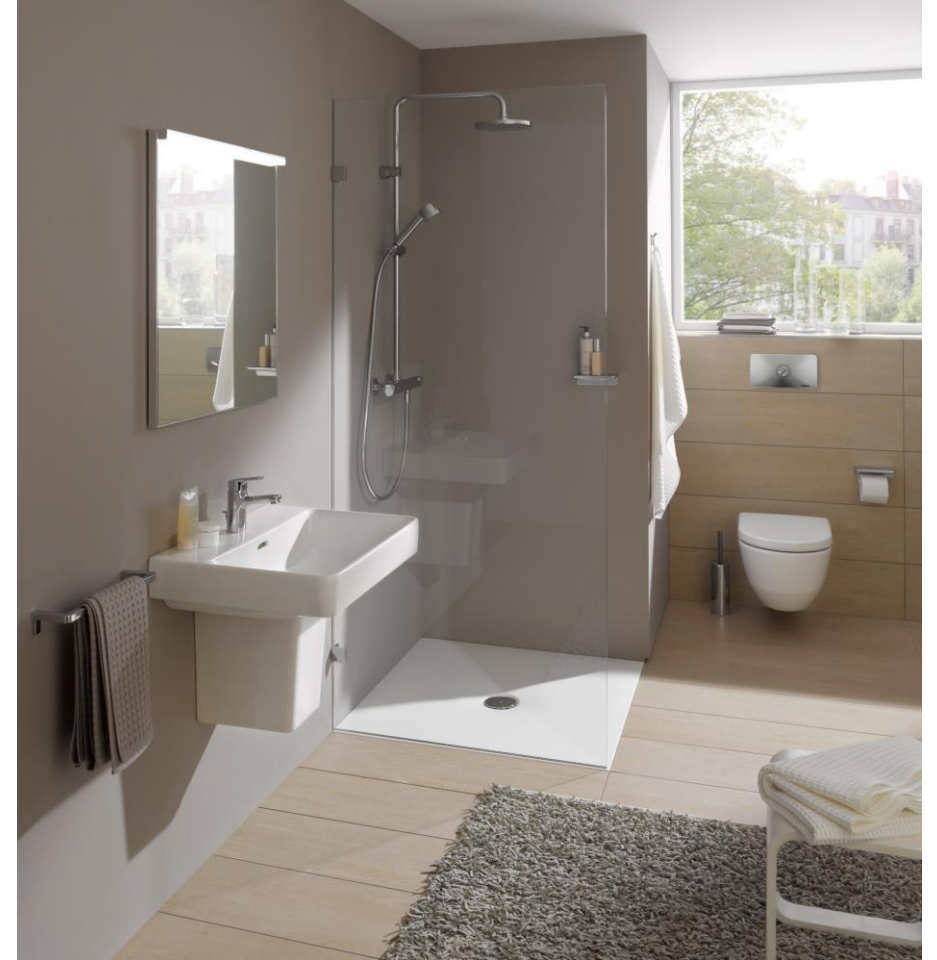
- ❏ Flushes wastewater with 1 liter water / flush
- ❏ Sucks away smelly air (appr. 60-70 liter/flush)
- ❏ Wastewater is transported in a closed airtight system
- ❏ Vacuum in the network ensures that no droplets or aerosols remain in the near distance atmosphere
- ❏ Safe one-way-route for any kind of contaminated wastewater

Roediger® offers all the necessary evacuation units for the safe collection and transport of all wastewater!



Vacuum prevents a backflow effect at all water inlet points ("one-way street" = better hygiene!)





Medscape: COVID-19: What do we know about transmission routes

<https://www.medscape.org/viewarticle/927708>

Environmental Engineers and Scientists have important roles to play in stemming outbreaks and pandemics caused by enveloped viruses

<https://doi.org/10.1021/acs.est.0c01476>

The airborne and gastrointestinal Coronavirus SARS COV-2 pathways

<https://www.preprints.org/manuscript/202004.0133/v1>

CUHK Finds that the Coronavirus can persist in stool

<https://www.med.cuhk.edu.hk/press-releases/cuhk-finds-that-the-coronavirus-can-persist-in-stool-after-its-clearance-in-respiratory-tract-will-conduct-stool-test-for-people-in-quarantine-camps-for-early-identification>

Harvard Gazette: How building, masks can be barriers to coronavirus

<https://medicalxpress.com/news/2020-04-masks-barriers-coronavirus.html>

SARS_CoV-2 Medical reports and scientific studies

<https://www.bespokecontentservices.com/blog/sars-cov-2-medical-reports-and-scientific-studies>

Can the Coronavirus spread from the toilet

<https://www.engineering.com/DesignerEdge/DesignerEdgeArticles/ArticleID/20127/Can-the-Coronavirus-Spread-from-the-Toilet.aspx>

Aerosol Generation by Modern Flush Toilets
<https://doi.org/10.1080/02786826.2013.814911>

Lifting the lid on toilet plume aerosols
<https://www.ncbi.nlm.nih.gov/pubmed/23040490>

Evidence of Airborne Transmission of the Severe Acute Respiratory Syndrome Virus
<https://www.nejm.org/doi/full/10.1056/NEJMoa032867>

Bioaerosol concentrations generated from toilet flushing in a hospital-based patient care setting
<https://aricjournal.biomedcentral.com/articles/10.1186/s13756-018-0301-9>

COVID-19: mitigating transmission via wastewater plumbing systems
[https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(20\)30112-1/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30112-1/fulltext)

SARS-CoV-2 titers in wastewater are higher than expected from clinically confirmed cases
<https://www.medrxiv.org/content/10.1101/2020.04.05.20051540v1>

How sewage could reveal true scale of coronavirus outbreak
<https://www.nature.com/articles/d41586-020-00973-x>

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We Build Responsibility