Prüf- und Entwicklungsinstitut für Abwassertechnik
an der RWTH Aachen e.V.

Standardisation of On-site Treatment in Europe

Dr.-Ing. Elmar Dorgeloh

みなさんこんにちは。

Workshop on On-site Wastewater Treatment in Asia

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RHEINISCH-
WESTFÄLISCHE
TECHNISCHE
HOCHSCHULE
AACHEN

PIA e.V.

Centre for Development and Assessment in Wastewater Technology

PIA GmbH

Testing Institute for Wastewater Technology

Prüf- und Entwicklungsinstitut für Abwassertechnik
an der RWTH Aachen e.V.

研究

R&D-Projects:
„Decentralised Wastewater treatment by using membrane-based concepts“

- Wastewater treatment on board Passenger Ships
- Wastewater reuse on Recreation Sites

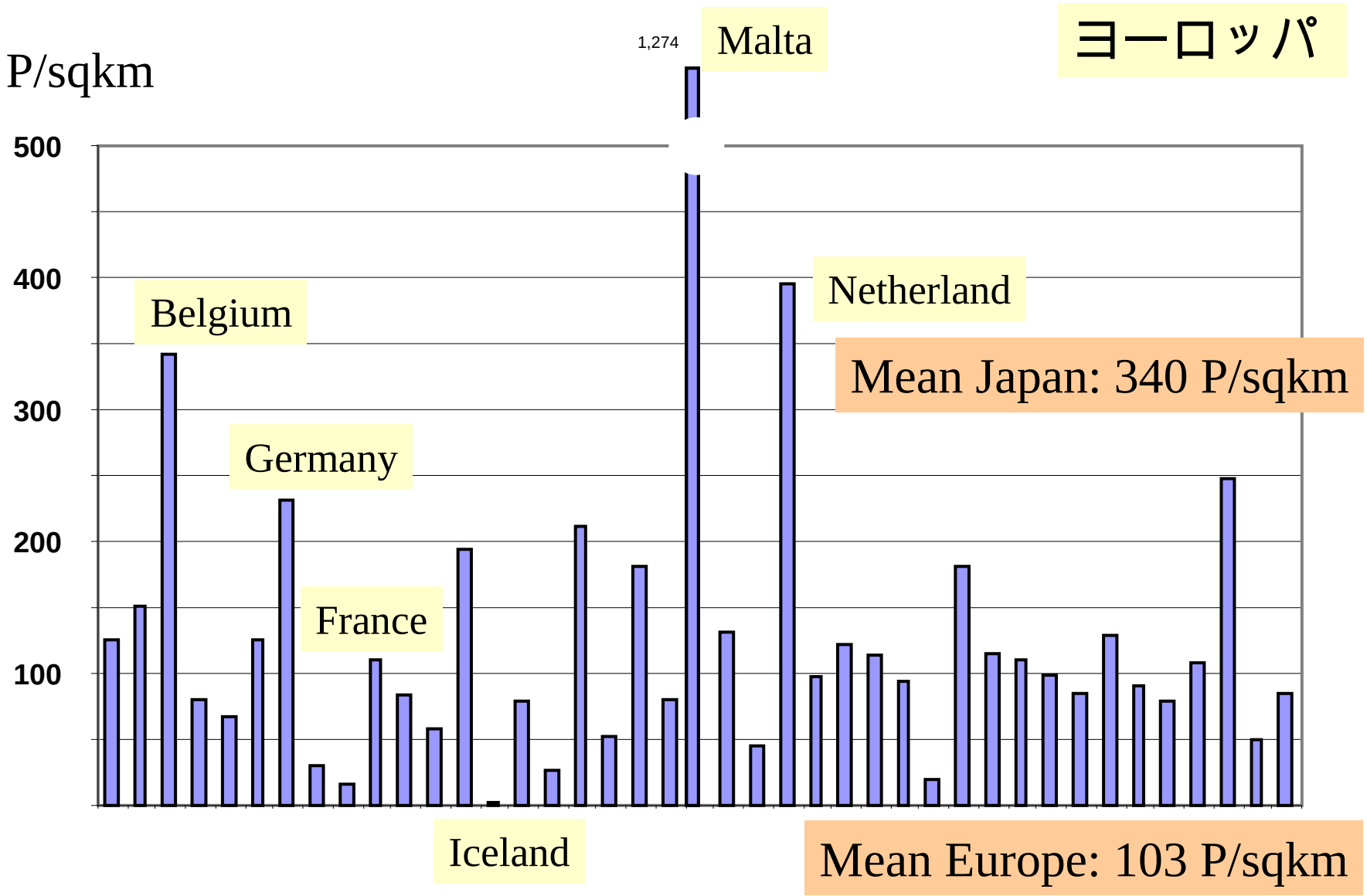
PIA - Testing Institute for Wastewater Technology

Prüf- und Entwicklungsinstitut für Abwassertechnik an der RWTH Aachen e.V.

テスト

- Testing of small wastewater treatment systems according to international standards
- Testing of ship wastewater treatment systems
- Testing of greywater treatment systems
- Testing of wetlands
- Testing wastewater pumping stations
- Testing of septic tanks
- Testing and calibration of flow measurement systems
- Consulting and information concerning CE-Marking of wastewater products

Basic Conditions: Population density

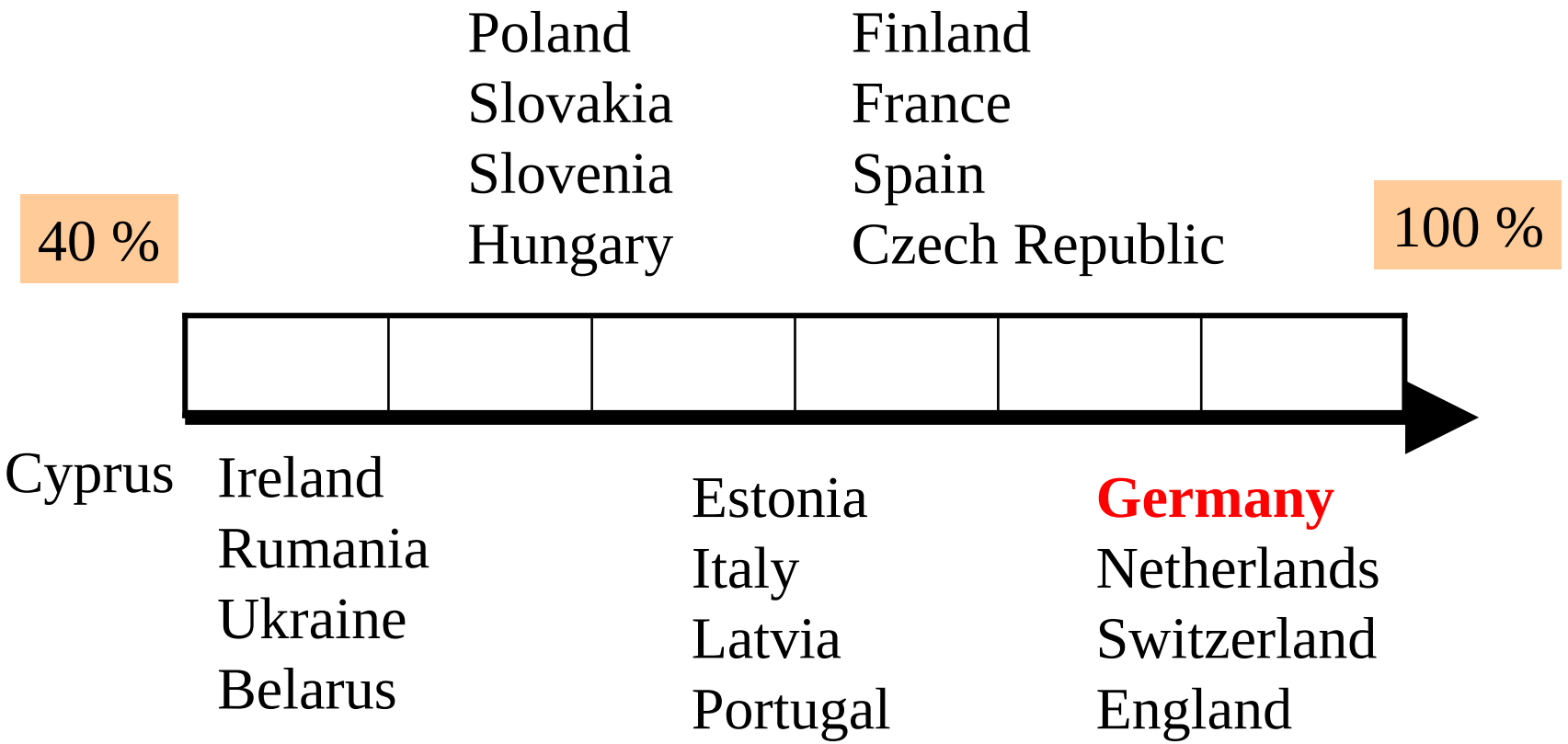


Basic Conditions: Water level

Google earth

Europe – connection to sewer system

ヨーロッパ



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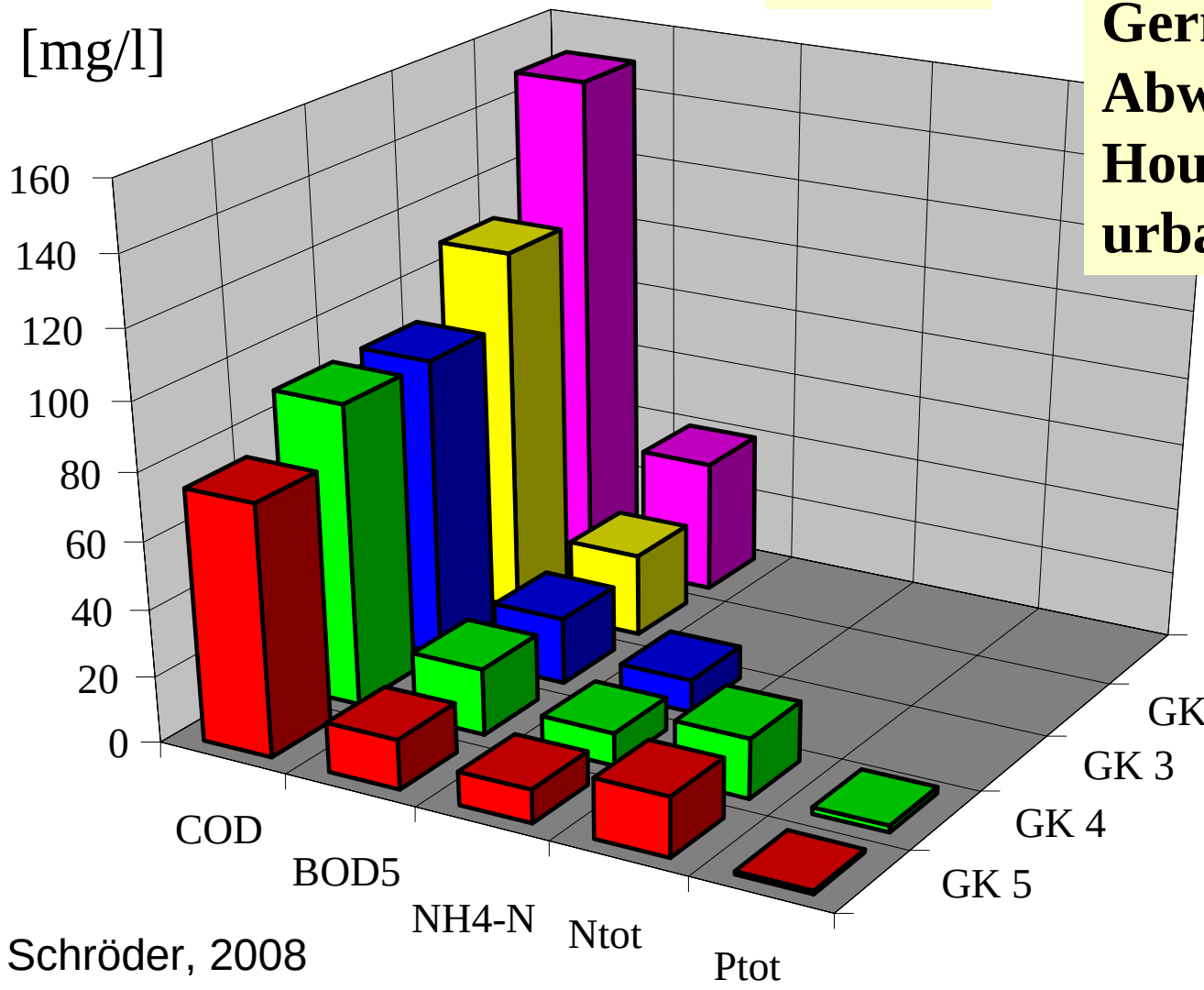
Effluent Quality

[mg/l]

ドイツ

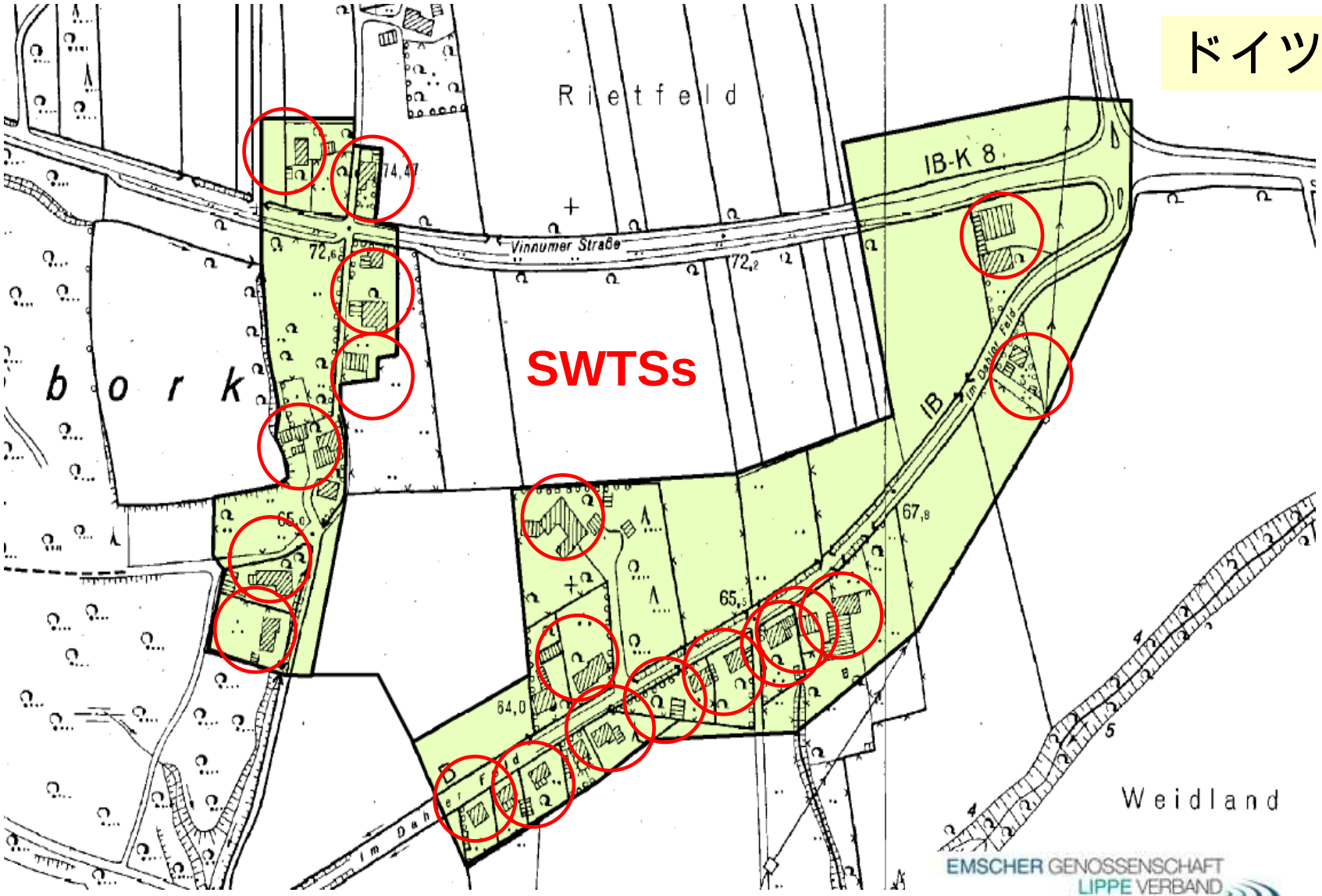
Germany
AbwV Annex 1:
Household and urban Wastewater



GK 1	<	1,000 PT
GK 2	<	5,000 PT
GK 3	<	10,000 PT
GK 4	<	100,000 PT
GK 5	>	100,000 PT

Schröder, 2008

Decentralised Systems



Small Wastewater Treatment Systems

浄化槽

- Aerated sludge reactor
- Fixed film reactor
- Moving bed reactor
- SBR
- Trickling filter
- Membrane bioreactor
- Constructed wetland

Tank

Reactor

Construction products

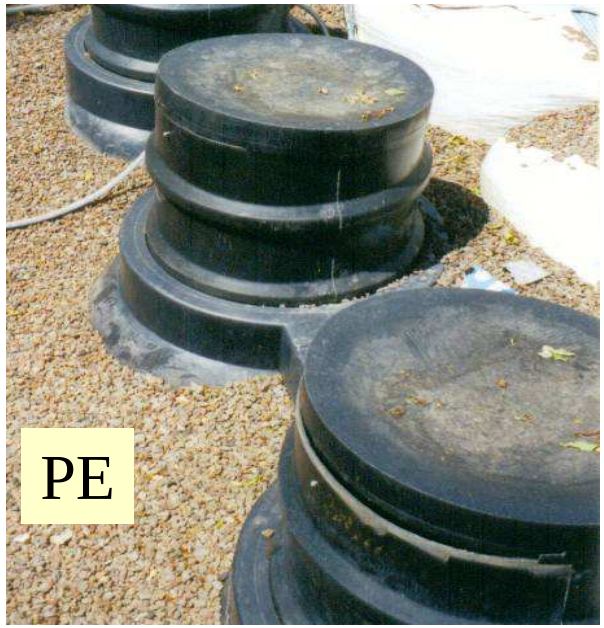
Machine

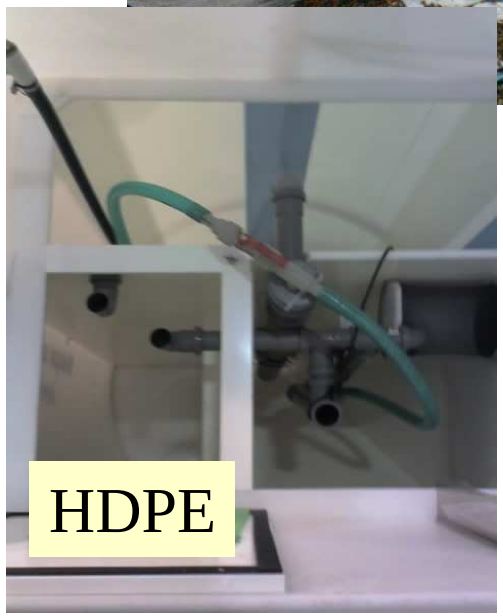
浄化槽

SWTS: Materials


Steel


Concrete


PE


HDPE


GRP

Small Wastewater Treatment Systems up to 50pe

European Standards EN 12566

Standard	Use
EN 12566-1+A1	Prefabricated septic tanks
CEN/TS 12566-2	Soil infiltration systems
EN 12566-3+A2	Packaged and/or site assembled domestic wastewater treatment plants
EN 12566-4	Septic tanks built in situ from prefabricated kits
CEN/TS 12566-5	Pre-Treated Effluent Filtration systems
EN 12566-6	Prefabricated treatment units used for septic tank effluent
EN 12566-7	Prefabricated Tertiary treatment units

EN 12566-3: Small wastewater treatment systems

Testing Requirements	Models to be tested	
Overall dimensions, Volume Inlets, Outlets and Connections, Accessibility	**each**	
Watertightness	**each**	
Structural behaviour		**biggest**
Treatment efficiency		**smallest**
Durability of materials		**properties must be known**

EN 12566-3: Overall dimensions, Accessibility

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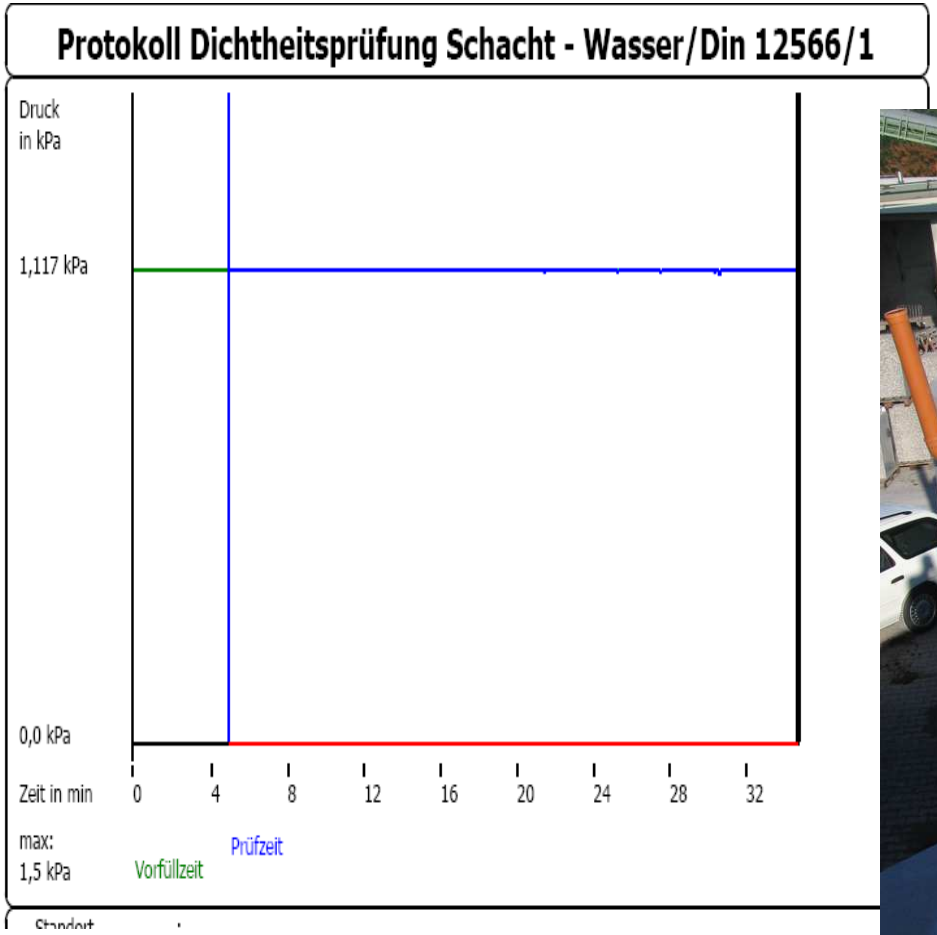
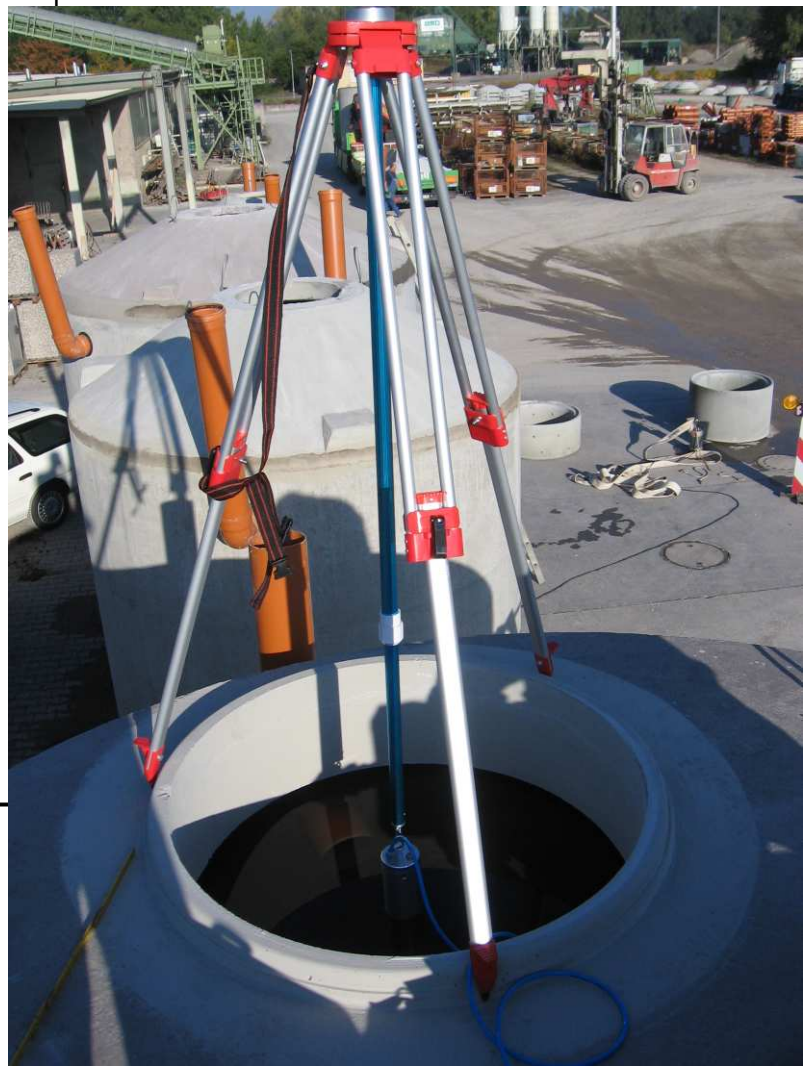
EN 12566-3: Water tightness





EN 12566-3: Structural behaviour

Vertical load test

dry conditions

Maximum loading: 75 kN

Load to collapse: 220 kN

PP – tank

EN 12566-3: Structural behaviour

dry and wet conditions

Pit -test

all materials:
Concrete, GRP, PE, PP PVC-U, Steel

EN 12566-3: Treatment efficiency

Test House

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EN 12566-3: Treatment efficiency

Sequences	Time [Weeks]	Sampling	Measure-ments
Biomass establishment	X	Grab samples	X
Nominal 100 %	6	24 h-Mix samples	4
Underloading 50 %	2	24 h-Mix samples	2
Nominal 100 % Power breakdown (24 h)	6	24 h-Mix samples	5
Low occupation stress	2	24 h-Mix samples	(0)
Nominal 100 %	6	24 h-Mix samples	3
Nominal 100 % and Overloading (48 h)	2	24 h-Mix samples	2
Nominal 100 % Power breakdown (24 h)	6	24 h-Mix samples	5
Underloading 50 %	2	24 h-Mix samples	2
Nominal 100 %	6	24 h-Mix samples	3
Sum	38 + X Weeks		26 + X

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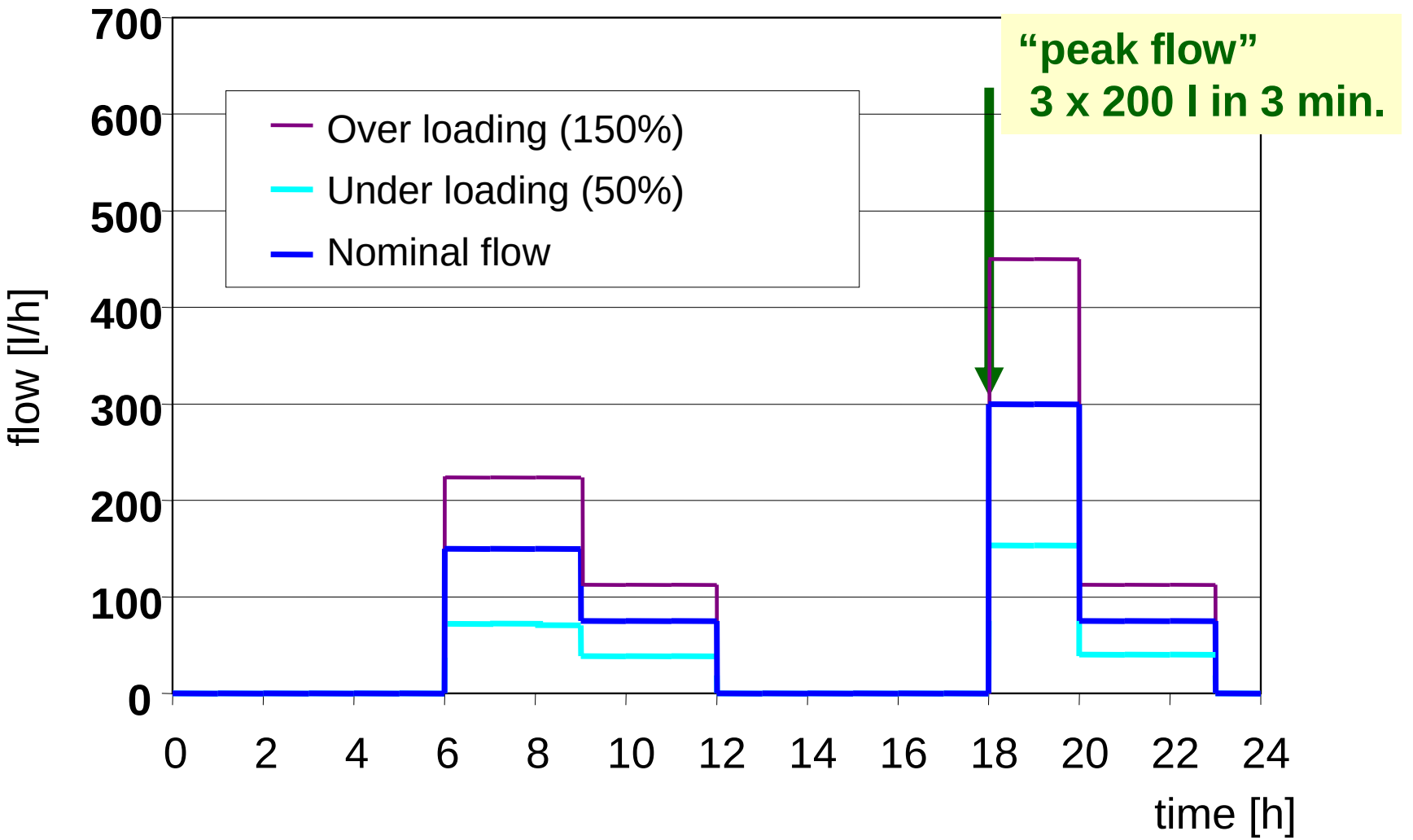
EN 12566-3: Treatment efficiency

Daily flow pattern

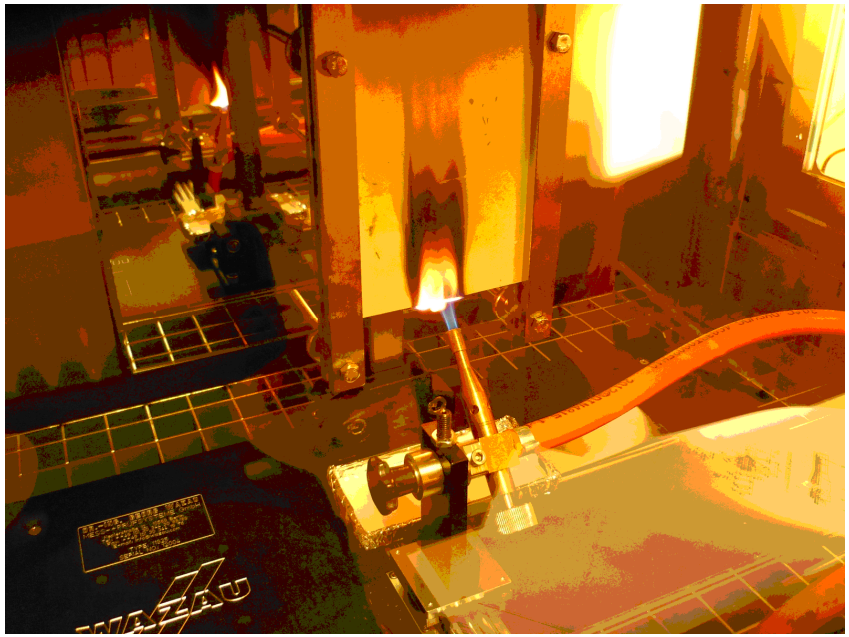
SWTS 10 PE

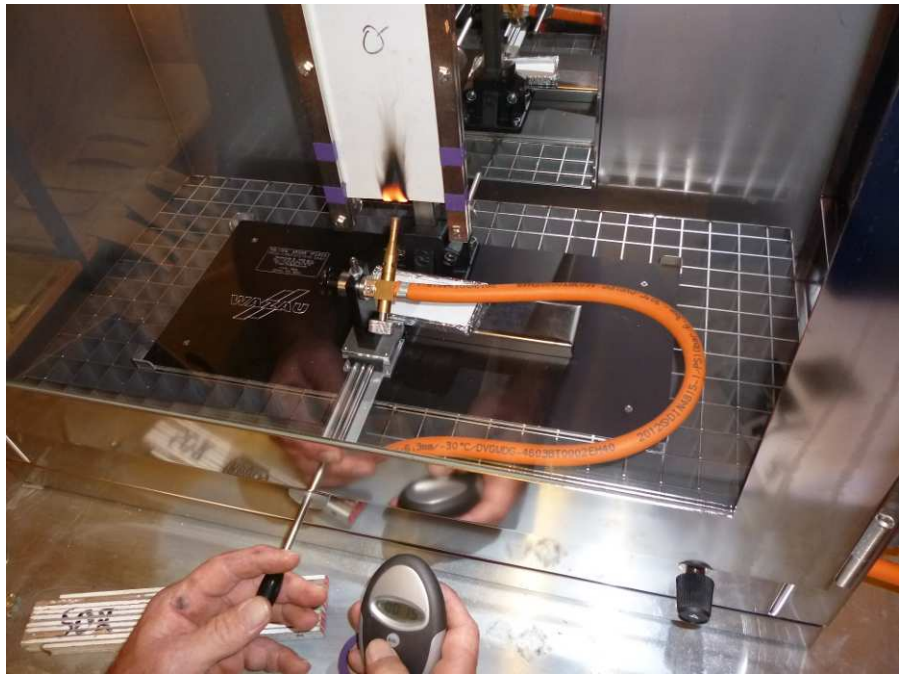


“peak flow”
3 x 200 l in 3 min.

EN 12566-3: Reaction to fire

Single Burning Item Test
EN ISO 11925-2





Classification by testing
to a single flame:
15 sec or 30 sec

SWTS: CE-Conformity Marking

CE	
Any Co Ltd. P.O. Box 21, B–1050	
13	
EN 12566-3 Vorgefertigte Kläranlage zur Behandlung von häuslichem Schmutzwasser	
– Referenznummer des Produktes: „BWV 714" – Material: BETON	
Wirksamkeit der Behandlung:	
Wirkungsgrad der Reinigungsleistung (bei einer geprüften organischen Tagesschmutzfracht BSB_5 = 0,9 kg/d)	CSB: 80 % BSB_5: 80 % SS: 80 % P: NPD KN: 30%
Reinigungskapazität (nominale Bemessung):	
– Nominale organische Tagesschmutzfracht (BSB_5)	1,2 kg/d
– Nominaler Tageszufluss (Q_N)	3 m³/d
Wasserdichtheit: (Prüfung mit Wasser)	Bestanden
Standsicherheit: (Grubenprüfung)	Höhe der Erdüber-deckung: 0,5 m WET: 1,20 m
Dauerhaftigkeit	Bestanden
Brandverhalten	A1
Freisetzung gefährlicher Stoffe	NPD

EU directive 93/68/EWG

Name/Address of manufacturer

Year of CE marking

EN 12566-1, -3 oder -4

Product - Information

Treatment efficiency

Dimensioning

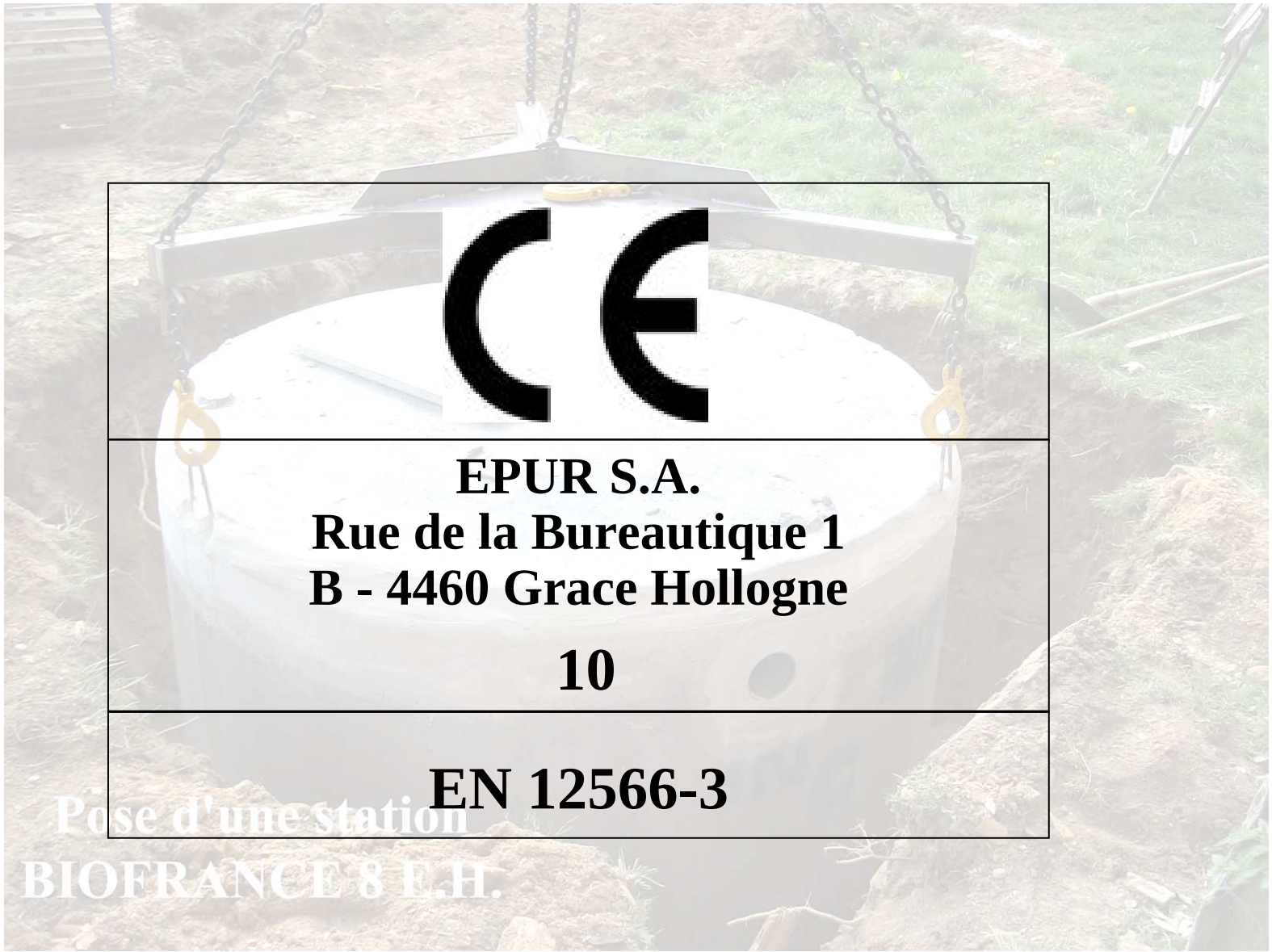
Water tightness

Structural behavior

Durability

Reaction to fire, dangerous substances

SWTS: CE-Conformity Marking



Efficiency classes of SWTS in Germany *

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Efficiency classes		Class
1	Carbon removal	Class C
2	Carbon removal and nitrification	Class N
3	Carbon removal, nitrification and denitrification	Class D
+	Additional phosphorus removal	Class C / N / D **+ P**
+	Additional wastewater disinfection	Class C / N / D **+ H**

** according to Deutsches Institut für Bautechnik (DIBT)*

Effluent requirements for SWTS in Germany

ドイツ

SWWTP	Class	C	N	D	+P	+H
	Sampling					
COD	grab sample	150	90	90		
mg/l	24h comp. sample	100	75	75		
BOD_5	grab sample	40	20	20		
mg/l	24h comp. sample	25	15	15		
SS	grab sample	75	50	50		
mg/l	24h comp. sample					
NH_4-N	grab sample					
mg/l	24h comp. sample		10	10		
N_{inorg}	grab sample					
mg/l	24h comp. sample			25		
P_{tot}	grab sample					
mg/l	24h comp. sample				2	
Coli	grab sample					100
1/100ml	24h comp. sample					

+ H
Disinfection

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Thank you!

ありがとうございます。

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RWTH AACHEN UNIVERSITY

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