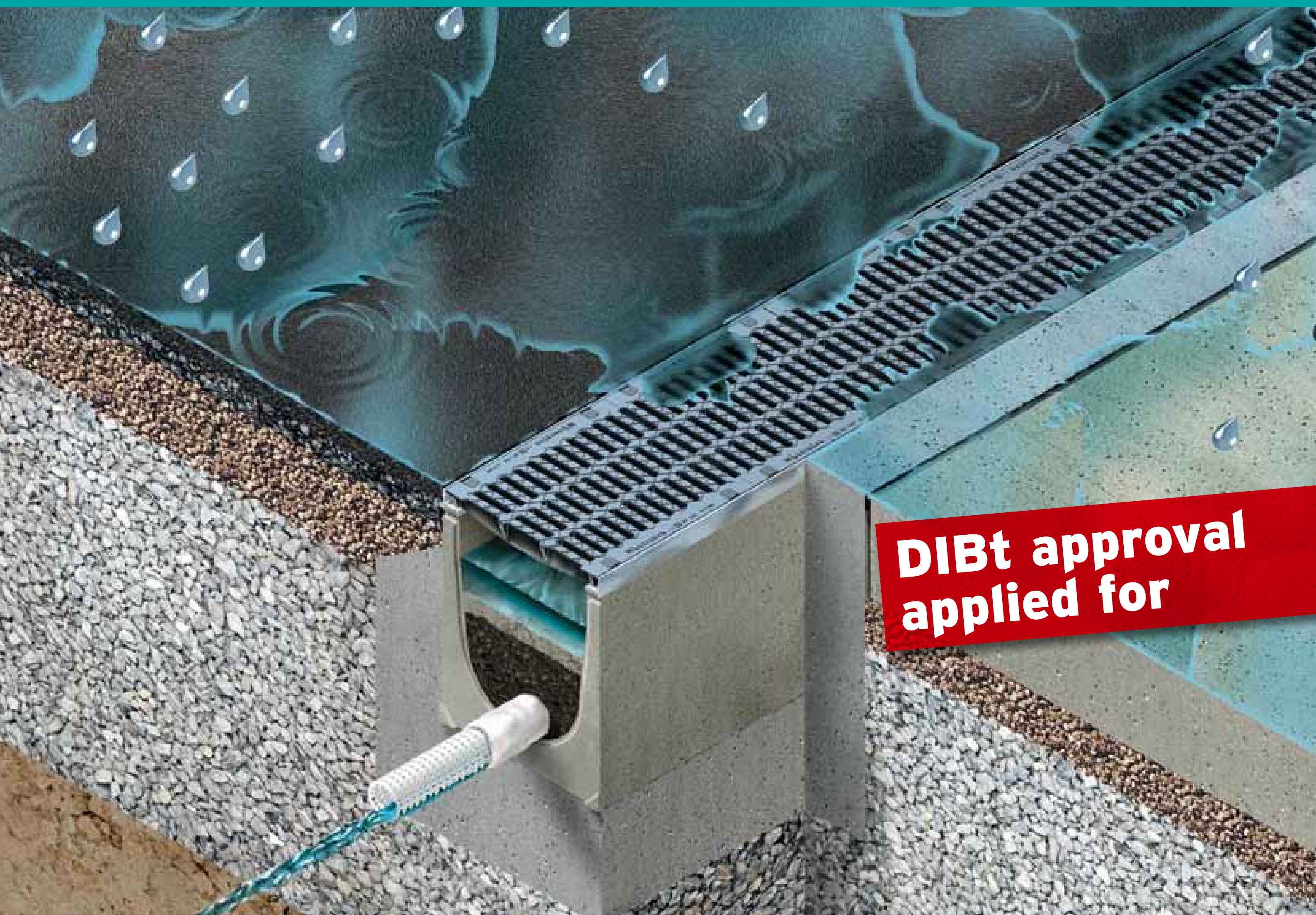
CIVILS | LANDSCAPING | AQUA | SPORT

DRAINFIX®CLEAN

Rainwater treatment using filter substrate channel



DRAINFIX®CLEAN

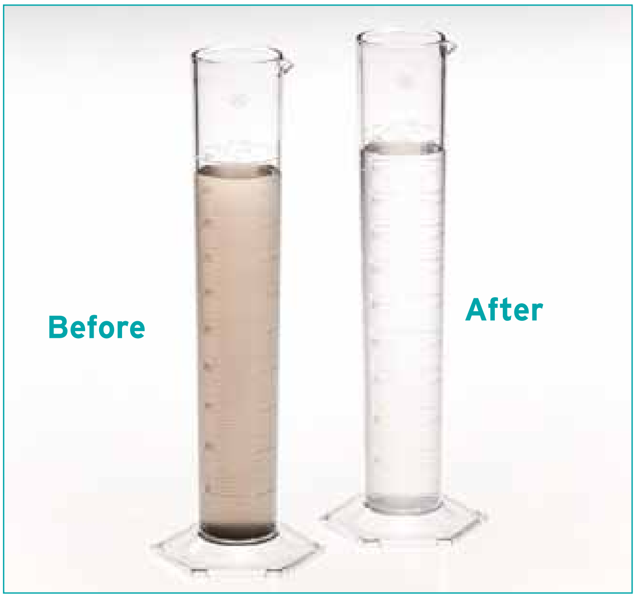
Application areas

For the treatment of polluted stormwater from surfaces exposed to traffic, e.g.:

- ☐ parking lots
- ☐ yards
- ☐ trading estates
- ☐ roads with heavy traffic

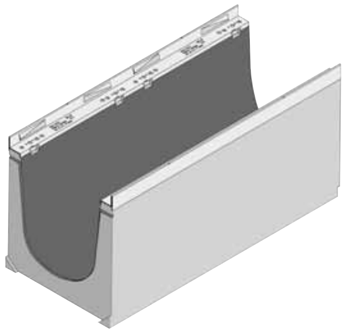
Ideal in situations where space is at a premium.

Due to its large retention space, the system is also suitable for heavy rain events.



Function

- ☐ Based on the surface filtration principle
- ☐ good cleaning capacity
- ☐ Reduction of the particular fractions of > 90 %
- ☐ Long service intervals due to the large filter surface; servicing is easy and fast
- ☐ The channel filters can be exposed to traffic loads of up to class F 900



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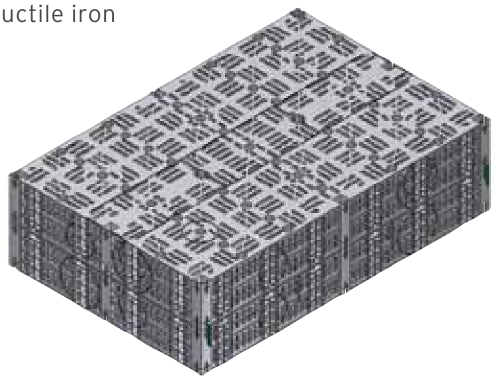
- **FASERFIX**®SUPER 300 type 01H or 400 type 0 1H according to EN 1433
- usable height 505 mm
- retention volume 75 to max. 110 litres
- channel made of fibre-reinforced concrete
- boltless locking system SIDE-LOCK
- very strong – up to loading capacity F 900
- high bending tensile strength
- Angle housings made of galvanised or stainless steel or ductile iron



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- Percolation block with high storage capacity (> 90%)
- for loads of up to SLW 60
- suitable for installation below trafficked areas
- complete system with manholes
- DWA-A 138

5

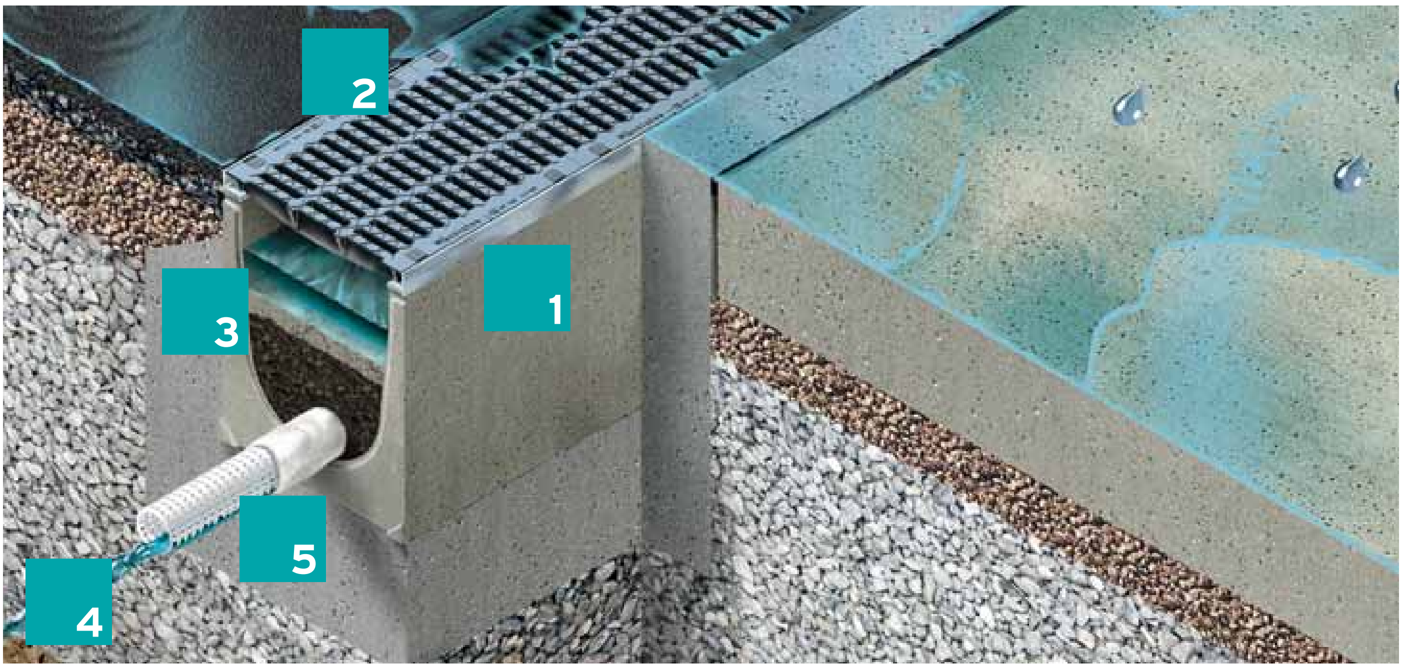
- drainage pipe made of highly durable PEHD
- diameter 100 mm
- filter mesh wrapped in geotextile

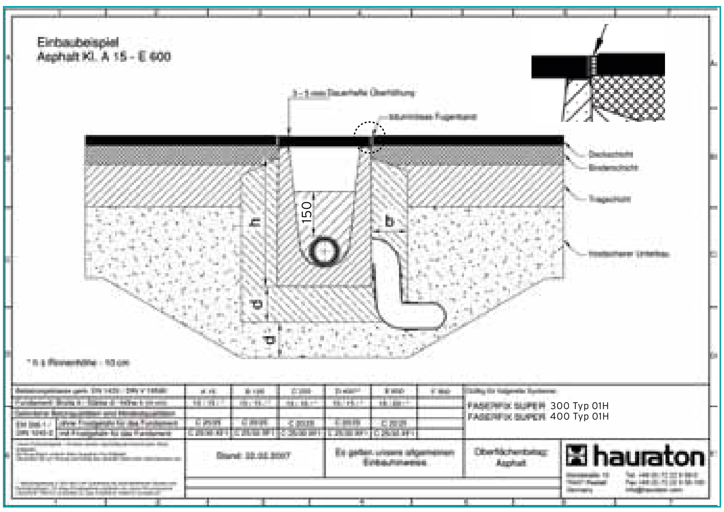
2

- complies with EN 1433
- different grating options
- spherical ductile iron; KTL coating optional
- loading capacities from D 400 up to F 900

3

- filter substrate contains carbonate
- high carbonate content (lasts many decades)
- precipitation / fixation of dissolved heavy metals
- strong filtering effect; retention of very fine particles (0.006 to 0.060 mm)
- cleaning performance is equivalent to a 30 cm thick layer of unsaturated groundzones





Installation instructions

- ☐ channels are installed in concrete base
- ☐ resistant to frost and salt
- ☐ suitable for exposure to heavy loads
- ☐ suitable for asphalt, concrete or paving finishes

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Hydraulic performance

The **draining performance** achieved depends primarily on the resistance factor (k_f) of the filter substrate and the retention volume of the channel. However, installation location and situation also play important part for the correct hydraulic sizing of the filter system.

The quantities of water to be handled by the system can be determined with the help of the precipitation data for the locality as per KOSTRA-DWD 2000.

However, different installation situations also result in variations in the solids carried by the wastewater. These build up a filter cake in the substrate which increasingly affects the filter permeability.

It is quite possible that an initial high permeability of $5*10^{-4}$ m/s (3.0 cm/min) is reduced to values of $4*10^{-5}$ m/s (0.24 cm/min). The cleaning effect increases accordingly.

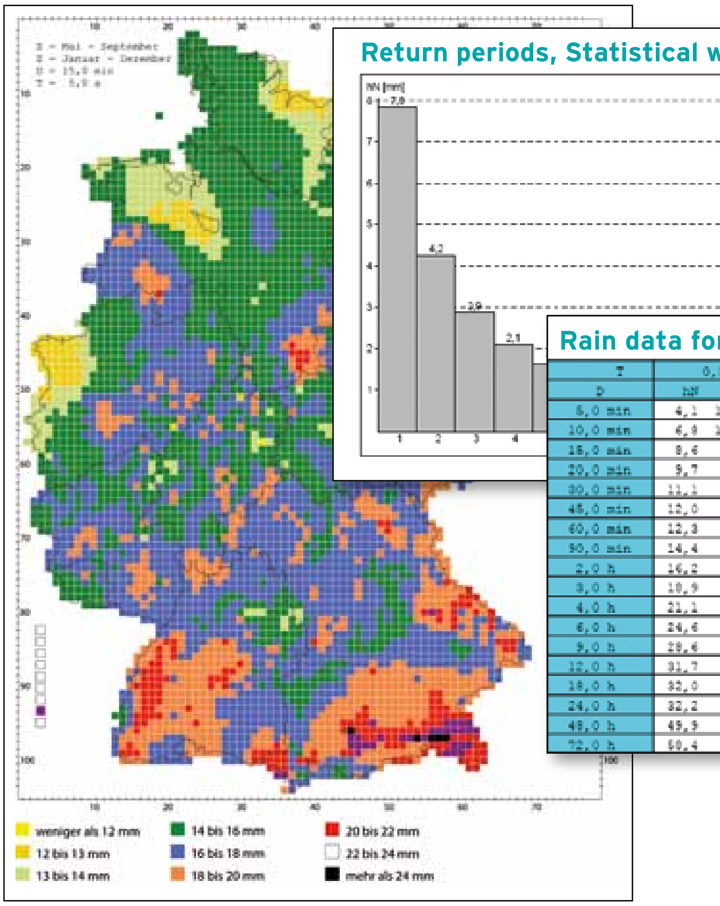
As we calculate the hydraulic performance of our channels to reduced adapted values rather than the high initial value for permeability, the channels achieve reliable long-term drainage.

Extreme precipitation volumes are reliably stored in the large **retention volume** of up to 110 litres in the filter substrate channel.

With this retention volume it is possible to take up, store and complete clean through the filter substrate the run-off from 5 minutes of even the heaviest rainfalls, for example with a yield of over 520 l/(s*ha) with an area of 7.5 m² per linear m of channel to be drained.

Hydraulic dimensioning of the channel filter system in accordance with

- KOSTRA-DWD 2000: intensity and distribution of precipitation
- DIN EN 752: land drainage
- DWA-A 138, DWA-M 153: recommended run-off factors (ψ) and calculation methods
- Ideal in situations where space is at a premium since no additional space is needed

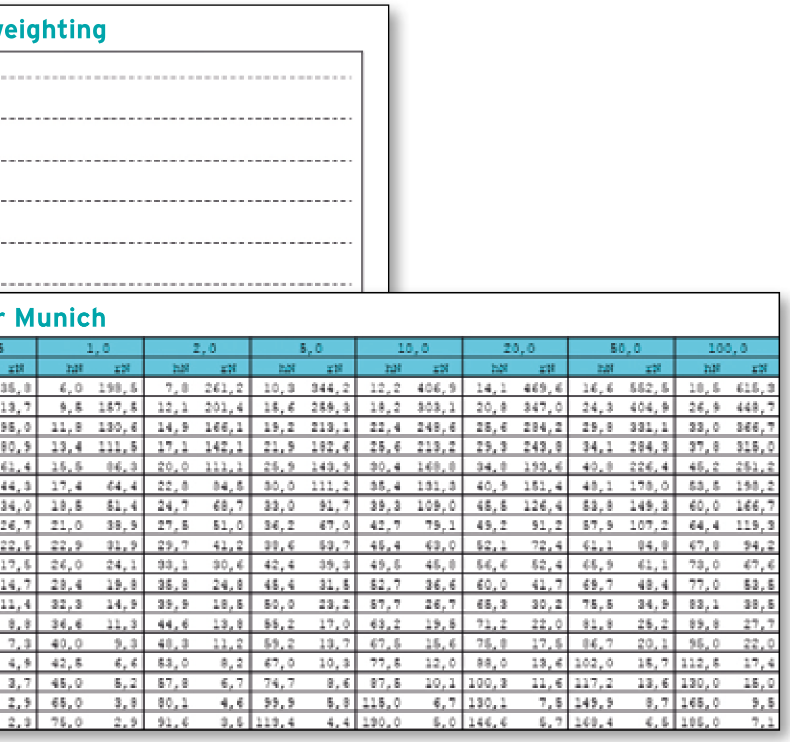


Example:
area to be connected (A_E):

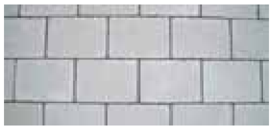
With a permeability value k_f of $4*10^{-5}$ m/s in the filter the run-off from a drained area of 7.5 m² (asphalt / concrete) can be reliably drained with one metre length of DRAINFIX CLEAN filter substrate channel under precipitation conditions as in Munich; and this even in the case of heavy rainfalls which occur only once in 2 years.

The run-off factor ψ determines the part of the precipitation which arrives at the drainage channel.

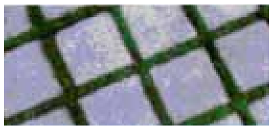
As with the calculation of standard drainage channels, the quantity of precipitation arriving at the DRAINFIX CLEAN filter substrate channel needs to be calculated. The total quantity is the sum of the individual run-off quantities of connected areas with different surface finishes, based on their run-off factors and the selected rainwater yield or precipitation sequence.



Paving
with closed joints $\psi = 0{,}75$



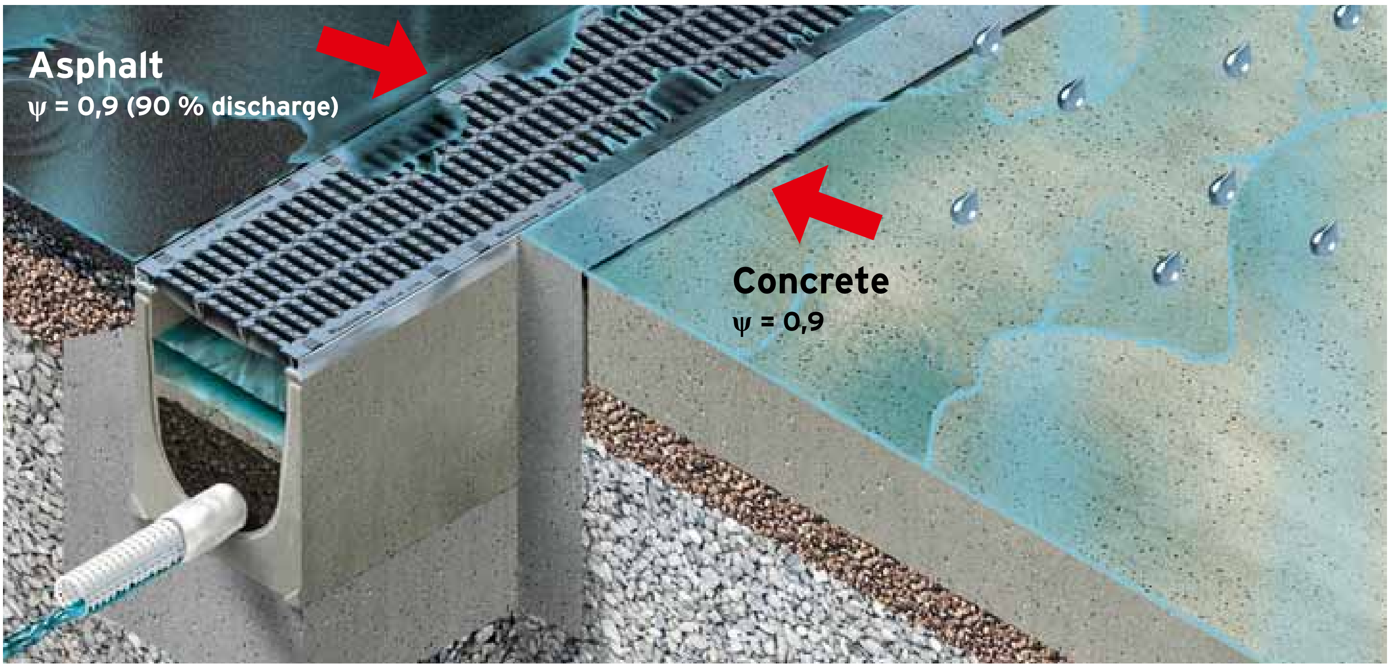
Paving
with open joints $\psi = 0{,}50$



Turf honeycombs $\psi = 0{,}15$

Run-off factors as listed in DWA-A 138

Roads, pathways public open spaces	Asphalt, concrete without joints, paving with sealed joints	0,90
	Paving with closed joints up to 1.5 cm wide	0,75
	Paving with open joints wider than 1.5 cm	0,50
	Gravel, turf on ballast	0,30
	Interlocking pavers with open joints, ridged pavers	0,25
	Turf honeycombs	0,15



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Principles of rainwater treatment

Pollutants (e.g. heavy metals) are mostly attached to very fine particles. The only way to retain these reliably is through filtration. The substrate has to be designed for this task!

The determining factor for the long-term hydraulic performance of filtration depends on the formation of the filter cake. The permeability of the filter substrate is only important at the beginning.

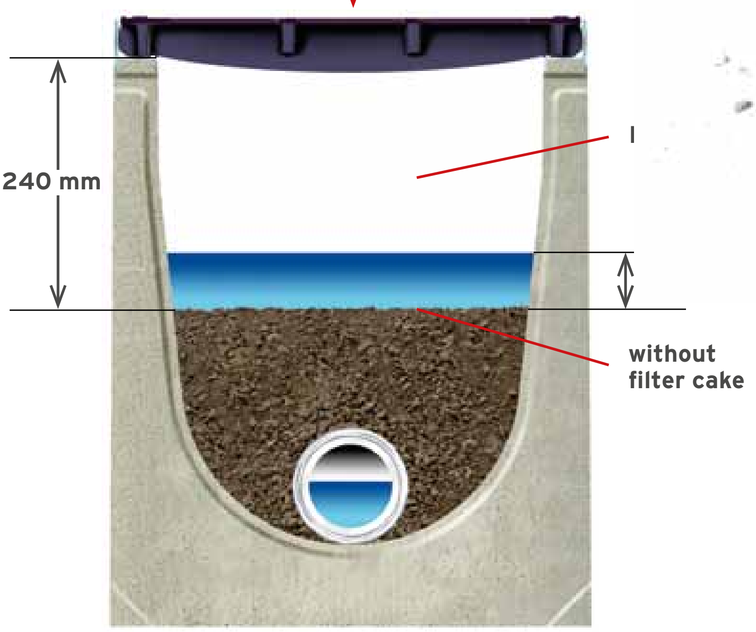
In order to ensure that the filter cake remains permeable for prolonged periods, it is necessary for the filter system to be able to dry out; when it dries out, the filter cake forms cracks, whereas it will clog up if kept permanently wet!

A large retention volume must be available. When there is not sufficient space, there will either be back-pressure or the rainwater will overflow unfiltered.

after 4 weeks
the first particles
can be detected

after the first rain

Intake: 81 litres



Discharge: 48 litres
$k_f = 4 * 10^{-4}$ [m/s]
Initial condition

Retention of pollutants

Large retention volume available

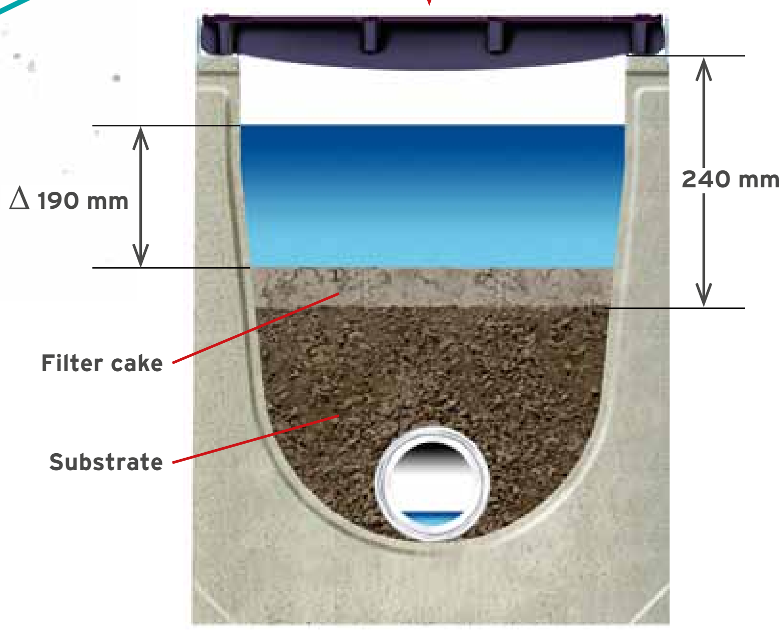
after 10 weeks
substrate is clogged up
down to its base

after 15 weeks
filter cake starts
to form

after 20 weeks
drying cracks in the filter
cake on intact substrate

Substrate as delivered

Intake: 81 Liter



Discharge: 4,8 litres
$k_f = 4 * 10^{-5}$ [m/s]
heavily contaminated substrate

Example:

Connected area: **10 m² per 1 m - channel with NW 400**
Initial situation: **substrate saturated wet**
Rain yield: **270 l/[ha*s]; run-off coefficient: ψ = 1,0**
Duration of rainfall: **5 min**

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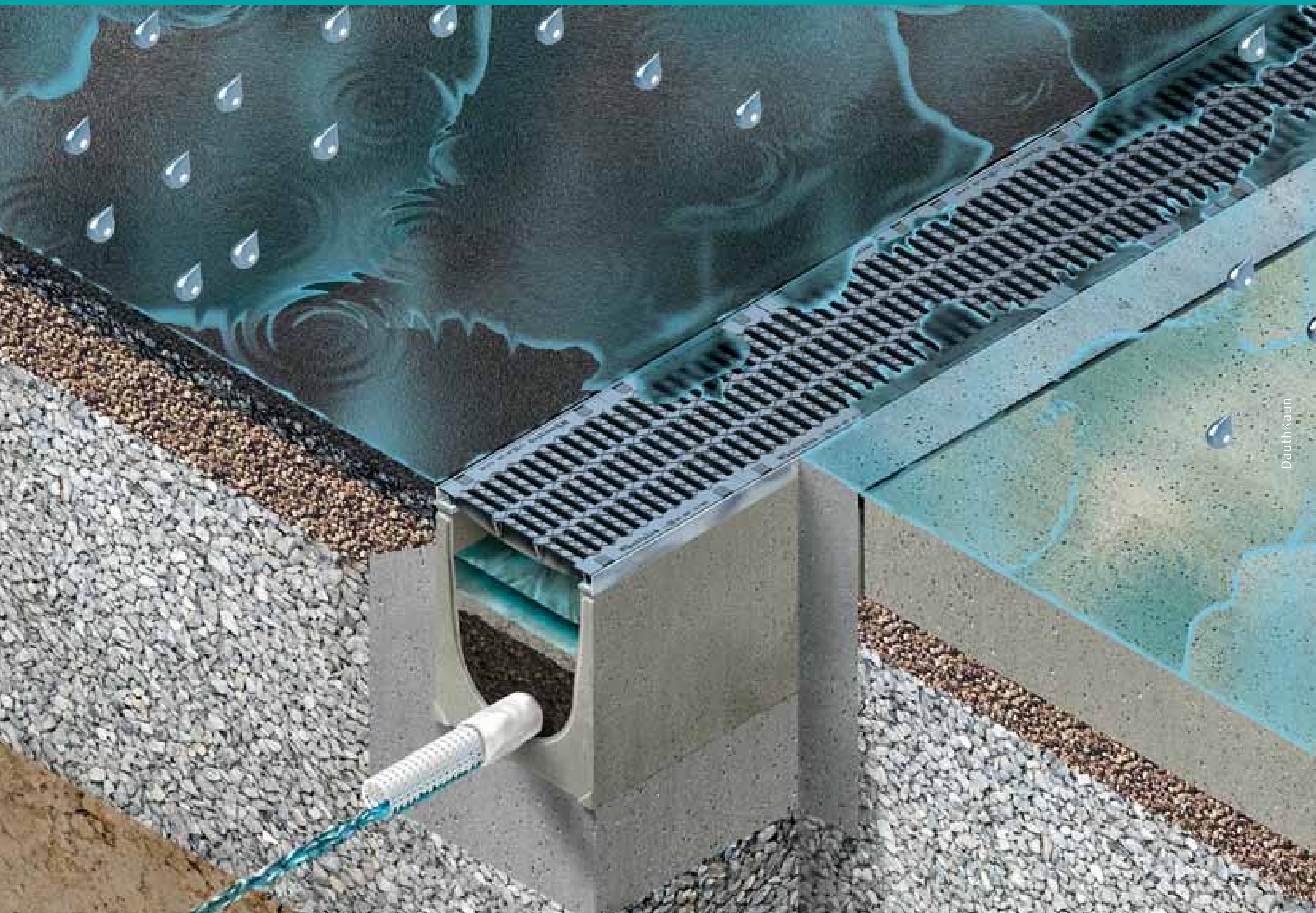

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