# Design guide / warranty terms and conditions

## Hydrorock installation instructions

Hydrorock is the manufacturer of water management products used alongside or under roads, paved areas, around buildings and in gardens. Hydrorock prevents flooding in areas where rainwater is separated from the existing sewage systems or in places where either a rainwater or sewage system is too costly, not present or not desirable.

'D' blocks consist of a solid core of compressed mineral wool encased by a geotextile filter membrane, which also applies to 'BD' blocks. 'BD' blocks come with a perforated pipe inside for connecting to rainwater discharge, gullies, drains, pipes, gutters, etc. The blocks should be positioned vertically, note the 'this side up' sticker. This is recommended in regard to the load bearing capacity of the blocks. Should the carrying capacity be of minor importance, in this case the blocks can also be applied horizontally. (for drainage purposes)

Permissible load bearing capacity in traffic situations in accordance with DIN -EN 1433 can be achieved to a maximum of 37,5 kN (40 Tonnes) this is applicable to vertically placed blocks positioned in accordance with the Hydrorock product data sheet 2019. Load bearing capacity increases in combination with installation depth and overburden on top of the blocks.



### Hydrorock "D" Rainwater Drainage, Buffer and infiltration System

Application: Rainwater Drainage, buffering, and infiltration around buildings, roads, paved areas,land scaping and gardens.



### Hydrorock "BD" Rainwater Separation: Buffer attenuation system or Buffer Infiltration System

Application: Separating rainwater runoff from roofs, carparks, roads and other paved surfaces.

BD blocks Include a Ø 100 perforated internal tube

Using a Hydrorock silt/sand trap/leaf separator is mandatory in order to keep the blocks and pipes free from debris. Please see our available models.

## Volume design and specifications :

### Hydrorock water absorption capacity in time

The speed at which Hydrorock absorbs water depends on the way in which the water can reach the blocks. The water properties and permeability of our massive core of compressed natural mineral stone wool material is >200m/24 hrs and this compares to gravel. When water reaches the blocks through a porous layer such as sand, it has a retardant effect, which is also then regarded as normative.

In our basic configurations we have modules 3 blocks wide and X blocks in length.

The outside blocks are the filling blocks and the center blocks are for air venting in and out. These modules are connected to our specially designed filter gullies on either side filling the blocks. Maximum capacity of largest standard module is 40.000 liter (2 gullies with a number of blocks in between) The following design criteria are based on this principal.

## Filling the blocks:
- 1,2 m1 perforated pipe inside a block fills the block with V=864 liter per hour and that is V = 0,24 l/s per 1,2 m1
- 1 m1 perforated pipe inside a block fills the block with V=720 liter per hour and that is V = 0,20 l/s per m1
- In our basic setup we have 2 filling lines (for example 20 m1 combined) so the blocks fill this module at 4 l/s (with air vents)
- In 1 hour 20 m1 perforated pipe will fill 14.400 liter of blocks

## Emptying the blocks:
- 1,2 m1 perforated pipe at the bottom of the block will empty the block with V=216 liter per hour and that is V = 0,06 l/s
- 1 m1 perforated pipe at the bottom of the block will empty the block with V=180 liter per hour and that is V = 0,05 l/s per m1
- 10 m1 of perforated pipe at the bottom of the block will release 1800 liters per hour

## Preparation, Installation and positioning instructions:
1. Dig a trench to match the width of the number of blocks measured side by side + an additional 20 cm, Length of the trench is determined by the number of blocks to be placed behind each other; this is always a multiple of 120 cm. (standard length of the blocks is 120 cm) If the blocks will be placed in a poor permeable soil type, the trench depth should be increased by an additional 10cm to allow for a drainage sand layer with a 10cm thickness to improve infiltration rates. Depth of the trench is based on the load bearing requirements of the solution.
2. After placing the blocks in the trench: For BD blocks connect the blocks internal pipes to each other by using the snap together connector pieces.
3. backfilling: the sides between the blocks and the trench should now be filled with drainage or street sand, compact this layer until it is at an even height with the top of the blocks.
4. Backfill the trench on top of the blocks with variable layer thicknesses of sand and/or rubble granulate until you reach the desired height on which the finished layer(s) asphalt, paving, tiling, grass or gravel can be build. Compact each next 20 cm thick layer of sand individually through vibration or watering. Machines used for this compacting process should not exceed 2000 kg/m$^2$ in weight.



Picture above shows installation of multiple buffers with spacing in between for maximum infiltration capacity.

## Installation and positioning instructions for large buffer/infiltration or attenuation fields wherein a large number of blocks are placed side by side and behind each other (large volumes):

For larger solutions, the manufacturer (Hydrorock) will provide tailored advice. The performance and functionality of the blocks will be advised in accordance with the specific environmental circumstances, expected performance and functionality.

## Installation and positioning instructions for buffers directly next to buildings or roads.

As all Hydrorock blocks have a massive core of compressed natural mineral stone wool material and therefore after installation do not create a void underground, it is for this very reason very possible to position the blocks next to a building, construction, roads or other paved surfaces. Depending on the specific situation and possible load bearing the blocks have to be able to withstand we provide tailored advice for these situations.

### THE DYNAMIC CAPACITY OF HYDROROCK FURTHER EXPLAINED:

Unique and unmatched is the dynamic capacity of the Hydrorock blocks in varies soil types. During filling of the blocks simultaneously the infiltration starts taking place allowing a volume to be handled significantly larger than the external volume of the block itself.

In the table below the "dynamic capacity" of a single block type is listed. As the blocks infiltrate from 5 sides ( 4 sides and the bottom) and over its lifespan continuous to do so the numbers to be used for designing the total capacity of a hydrorock module are the actual capacity figures. During infiltration from the sides of the blocks water does move horizontally but under an angle, here for only 50% of the side contact surface can be calculated.

### HYDROROCK STATIC & DYNAMIC CAPACITY PER BLOCK TYPE IN VARIOUS SOIL TYPES

**CALCULATIONS BELOW ARE BASED ON ACTUAL CAPACITY , BOTTOM INFILTRATES 100% & SIDES INFILTRATE 50%**

| | **34** | **45** | **112** | **170** | **220** | **340** | **440** |
|---|---|---|---|---|---|---|---|
| Type of block / Static Capacity in Liters | **34** | **45** | **112** | **170** | **220** | **340** | **440** |
| Total external surface area including bottom in m2 ( 6 sides ) | 0,9 | 1,04 | 1,72 | 2,22 | 2,56 | 3,72 | 4,16 |
| **Effective Infiltrating surface area incl bottom in m2 (Bottom 100% , sides 50%)** | 0,45 | 0,52 | 0,86 | 1,11 | 1,28 | 1,86 | 2,08 |
| K-value 5,0 / dynamic capacity in Liters per block per hour | 128 | 153 | 291 | 401 | 486 | 727 | 873 |
| K-value 2,5 / dynamic capacity in Liters per block per hour | 81 | 99 | 201 | 285 | 353 | 533 | 656 |
| K-value 1,0 / dynamic capacity in Liters per block per hour | 53 | 67 | 148 | 217 | 274 | 418 | 527 |
| K-value 0,5 / dynamic capacity in Liters per block per hour | 43 | 56 | 130 | 193 | 247 | 379 | 484 |
| K-value 0,1 / dynamic capacity in Liters per block per hour | 36 | 47 | 115 | 174 | 225 | 347 | 448 |

**CALCULATIONS BELOW ARE BASED ON THEORETICAL CAPACITY , BOTTOM INFILTRATES 100% & SIDES INFILTRATE 100%**

| | **34** | **45** | **112** | **170** | **220** | **340** | **440** |
|---|---|---|---|---|---|---|---|
| Block type / Statistic capacity in Liters | **34** | **45** | **112** | **170** | **220** | **340** | **440** |
| External surface area inlcuding bottom in m2 ( 6 sides ) | 0,9 | 1,04 | 1,72 | 2,22 | 2,56 | 3,72 | 4,16 |
| Effective infiltrating surface area incl bottom in m2 (Bottom 100% , Sides 100% | 0,72 | 0,8 | 1,36 | 1,86 | 2,08 | 3,36 | 3,68 |
| K-value 5,0 / dynamic capacity in Liters per block per hour | 184 | 211 | 395 | 557 | 653 | 1039 | 1205 |
| K-value 2,5 / dynamic capacity in Liters per block per hour | 109 | 128 | 253 | 363 | 436 | 689 | 823 |
| K-value 1,0 / dynamic capacity in Liters per block per hour | 64 | 79 | 169 | 248 | 307 | 481 | 595 |
| K-value 0,5 / dynamic capacity in Liters per block per hour | 49 | 62 | 141 | 209 | 264 | 411 | 517 |
| K-value 0,1 / dynamic capacity in Liters per block per hour | 37 | 48 | 117 | 177 | 228 | 353 | 455 |

## Warranty terms and warranty period:

The warranty on Hydrorock products applies for a period of 10 years whereby the manufacturer guarantees performance, shape retention and functionality. Warranty is applicable if these requirements and methods are adhered to:

1. The water absorption of the blocks remains between 88% and 94% of the block volume;
2. The water delivery to the soil, if the conditions have remained unchanged;
3. The carrying capacity;
4. The shape retention;
5. The composition of the product.

Hydrorock water management products offer a wide range of possibilities and applications. Is your intended use or application not mentioned in this document? Then please contact Hydrorock to discuss your situation. Are there uncertainties about how to operate, apply or implement Hydrorock blocks? Then please contact us so we can advise you accordingly.

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