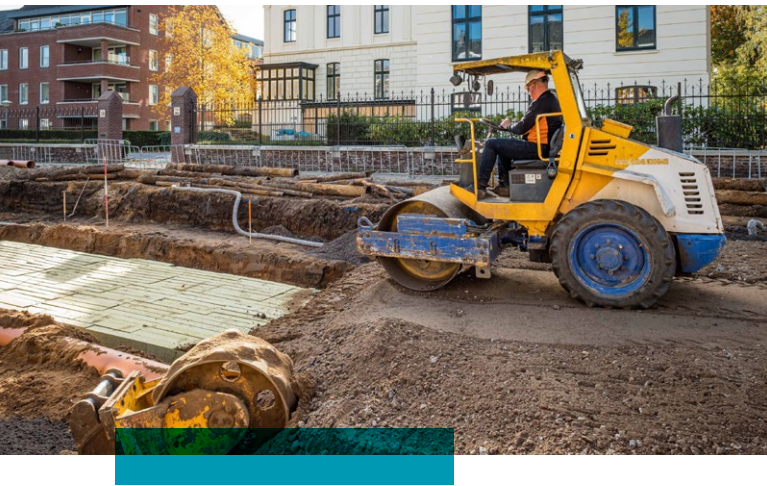


Rockflow attenuation and infiltration systems

High load-bearing capacity



One of the advantages of below ground water retention is it leaves space above ground for living, working, nature and traffic. However, to make this possible the infiltration system must be capable of bearing an imposed load without excess settlement ensuring it provides a reliable, stable foundation for many years. Rockflow was developed with these requirements in mind.



Rockflow can bear an axle loads of up to 20tonnes

Rockflow stone wool has a high load-bearing capacity and following its correct installation, can bear loads of up to 20tonnes axle load. This means Rockflow has the perfect properties for underground infiltration and attenuation applications. Roads, tramlines and car parks can be built above a Rockflow system without detrimental effects even for heavy traffic.

Options for correct road construction: 40-75 cm cover layer

The road make-up is selected to suit the traffic types/ axle loads. The primary variable is the depth of the cover layers: block paving or asphalt surface course, with a granular material (or sand) sub-base. For classes of traffic up to 10tonnes, a cover layer of 40cm is sufficient assuming block paving as surface course. For higher loads, the cover layer increases: 60cm for 15tonnes and 75cm for 20tonnes. Rockflow type WM2007 is also available and possesses more robust properties. In this case, a cover layer of 45cm is sufficient for an axle load of 20 tonnes.

Class of traffic Axle load	Minimum installation depth (top of buffer to finished ground level)	
	Rockflow WM2005	Rockflow WM2007
Green (pedestrians/ cyclists)	>300mm (sand)	NA
10 tonnes	400mm	400mm
15 tonnes	600mm	400mm
20 tonnes	750mm	450mm

- The pavement is typically constructed with the following layers:
- 80mm block paving; alternatively asphaltic surfacing may be used (see note below)
 - 300mm foundation of Type 1 granular material
 - A variable layer of sand

Note. When using the minimum installation depth, during the construction phase it may be necessary to consider the use of supplementary materials or an adapted construction method. This prevents the Rockflow system being overloaded during construction. Before applying asphalt, the sub-base should be sufficiently thick to support construction traffic.

A generous safety margin is incorporated in the design

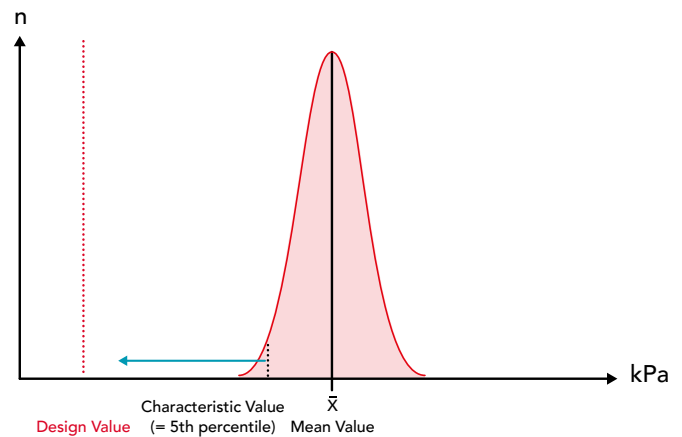
The minimum installation depths relative to class of traffic ensures a generous margin of safety. The calculation is based on extensive research including by independent research institute Deltares. Researchers determined Rockflow's strength (load-bearing capacity) by carrying out Unconfined Compression Strength tests (UCS) for WM2005 and WM2007. The reliability of Rockflow and the margins of safety we adopt ensures our system complies with the Dutch NEN standards.

Our approach ensures that the stone wool always complies with the requirements of the application. The final values we use for structural calculations of minimum installation depth are intentionally conservative. Rockflow's in-house engineers are always actively involved in your calculations and project solutions. We are present at every project during installation to give support and, if necessary, to advise the contractor.

Case Amsterdam: By tram over the Rockflow water infiltration system

During the full-width reconstruction of Nieuwezijds Voorburgwal, a street in central Amsterdam, climate adaptation measures were also taken. This was in the context of the Amsterdam Rainproof programme. One of these measures was the installation of a water retention and infiltration system under the tramline. The strength of Rockflow was the determining factor here since Rockflow forms the foundation for the tramline.

Basic principles



Mean Value = $\bar{x}$ (= Typical value)

Characteristic Value (= 5th percentile)

Design Value (based on 5th percentile and partial safety factor)

Partial Safety Factor

To determine the design value for the strength of Rockflow, we take the mean strength of Rockflow stone wool ($\bar{x}$) and apply a 5% reliability factor to the mean, also known as the 5th percentile. This allows us to take into account any variability in the results. We then apply another partial safety factor, resulting in the final design value for load-bearing capacity calculations.



Watch the video
about this project:



More information about the hydraulic behaviour of Rockflow.

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