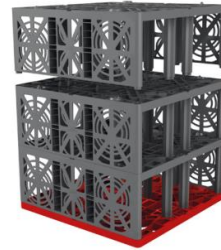


Instructions for installation GRAF EcoBloc Inspect flex

GRAF EcoBloc Inspect flex

Order-Nr. 402005



The points described in these instructions must be observed under all circumstances. All warranty rights are invalidated in the event of non-observance. Separate installation instructions are enclosed in the transportation packaging for all additional articles purchased from GRAF.

The Graf EcoBloc Inspect must be checked for any damage prior to installation under all circumstances.

Missing instructions can be downloaded on www.graf.info or can be requested from GRAF.

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1. General information

1.1 General

Detention/retention/attenuation and infiltration systems are usually subject to final approval by the local authority having jurisdiction. This should be investigated in the planning phase and approval sought if required. The statutory specifications and the requirements in the relevant literature, such as national standards and work sheets / data sheets of the national requirements standards, always apply.

Only authorised and qualified personnel should install and inspect the Graf EcoBloc Inspect system. The following safety and installation instructions should also be noted.

An infiltration/attenuation system is usually sized in accordance with national standards. You can request free sizing from Graf. In particular the permeability of the surrounding soil is of great significance and may result in problems with and damage to the Graf infiltration & attenuation system if calculated incorrectly.

1.2 Safety

All work should be undertaken in compliance with the relevant accident prevention regulations according to national standards. There is an increased risk of slipping on Graf EcoBloc Inspect in frosty and wet conditions.

GRAF provides an extensive range of accessories, which are all coordinated and can be combined to form complete systems. The use of accessories that have not been approved by GRAF results in the exclusion of the warranty/guarantee.

1.3 Information about operating the system

The supplementary document "Instructions for operating and maintaining the GRAF EcoBloc Inspect" contains more information about the guidelines and obligations of installers & operators of Graf infiltration & attenuation system.

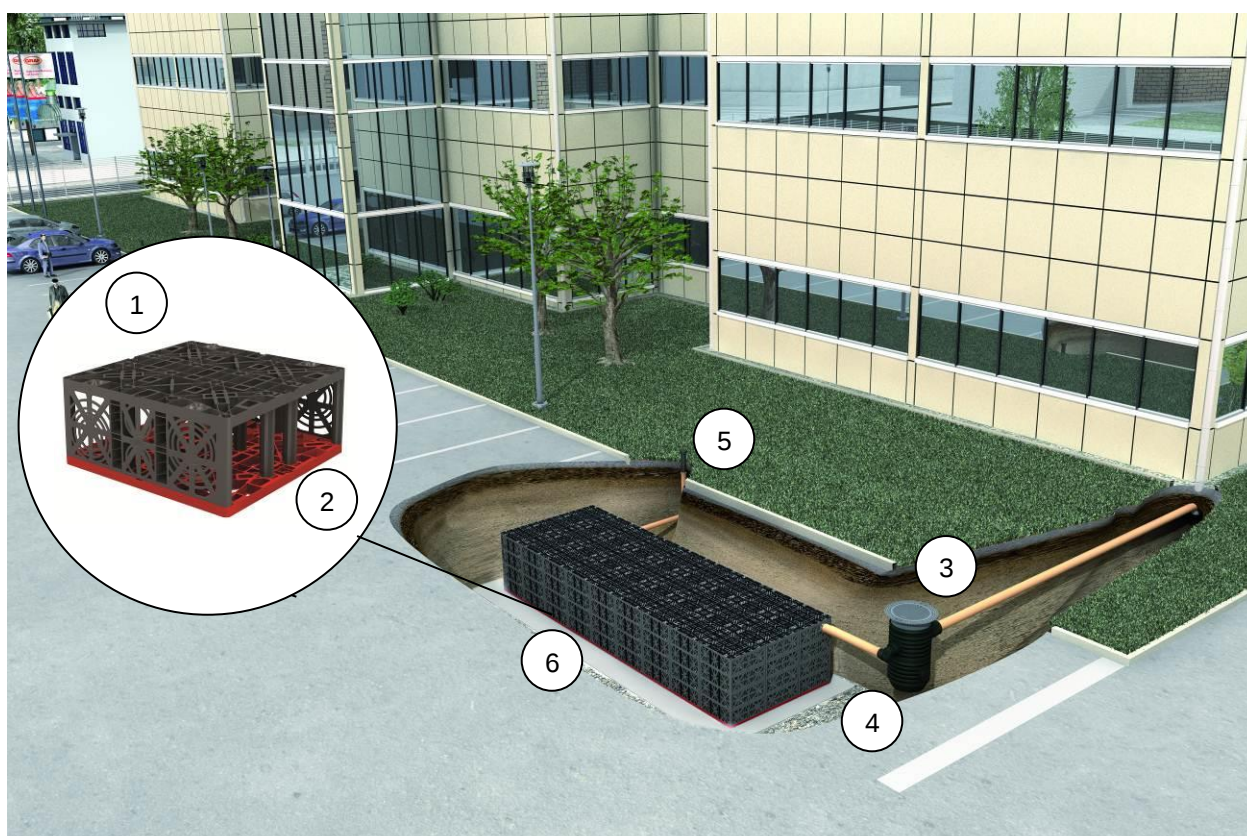
This document also contains information about the filter elements needed to pre-treat the surface & rain-water entering into the Graf infiltration & attenuation system.

2. General product information

2. General product information

Overview of range:

Product type		Description	Art.Nr.
Infiltration ditch elements			
	1	GRAF EcoBloc Inspect flex	402005
	2	GRAF EcoBloc Inspect baseplate	402006
		GRAF EcoBloc Inspect end plates	402002
		GRAF EcoBloc Inspect connecting elements, e.g. 10-piece set	420015
Shafts			
	3	GRAF VS inlet module DN 400 (15.75")	330339
		GRAF VS connecting piece DN 400 (15.75")	330341
	4	GRAF VS distributor module DN 400 (15.75")	330340
		GRAF VS inlet module DN 630 (23.6")	330360
		GRAF VS connecting piece DN 630 (23.6")	371003
		GRAF VS distributor module DN 630 (23.6")	330361
Accessories			
	5	DN 110 venting end	369017
		DN 200 Inspection end	340527
	6	GRAF-tex geo textile, material sold by metre, roll width 5m	231002



3. Technical data

3. Technical data

3.1 Technical data for the GRAF EcoBloc Inspect flex

Volume (gross/net)	205 litres/195 litres (54.2/51.5 US-gal.)
Dimensions (LxWxH)	800 x 800 x 320 mm (31.44" x 31.44" x 12.6")
Connections	4 x DN 200/DN 160/DN 110 + 4 x DN 110 (4 x 8"/6"/4" + 4 x 4")
Weight	8 kg (17.6 lbs)
Material	100 % polypropylene (PP), recycled material
Max. / min. earth coverage	see Table 1 – Earth coverings

3.2 Technical data for the GRAF EcoBloc Inspect flex base plate

Volume (gross/net)	25 litres/20 litres (6.6/5.3 US-gal.)
Dimensions (LxWxH)	800 x 800 x 40 mm (31.44" x 31.44" x 1.57")
Connections	-
Weight	4 kg (8.82 lbs)
Material	100 % polypropylene (PP), recycled material
Max. / min. earth coverage	see Table 1 – Earth coverings

4. Transport and storage

4. Transport and storage

4.1 Transport and storage

GRAF EcoBloc Inspect flex system elements are stored and transported in packaging units comprising 14 or 16 modules. The basic measurements of the packaging units are always 0.8 m x 0.9 m (2'-7.4" x 2'-11.5") GRAF EcoBloc Inspect flex ground plates are usually located on a separate pallet.

The Graf EcoBloc Inspect flex system elements can be transported to the installation location with a fork lift truck or similar equipment. At the installation location, the EcoBloc Inspect and baseplates can be moved manually or with light-duty equipment.

A level and stable surface should be used for intermediate storage. Please ensure correct storage. This means away from negative influences such as fuel, lubricants, chemicals and acids. Storage outdoors should not be for any longer than one year. The impact sensitivity of the elements also increases as temperature falls. In particular, impact during frosty weather could damage the elements.

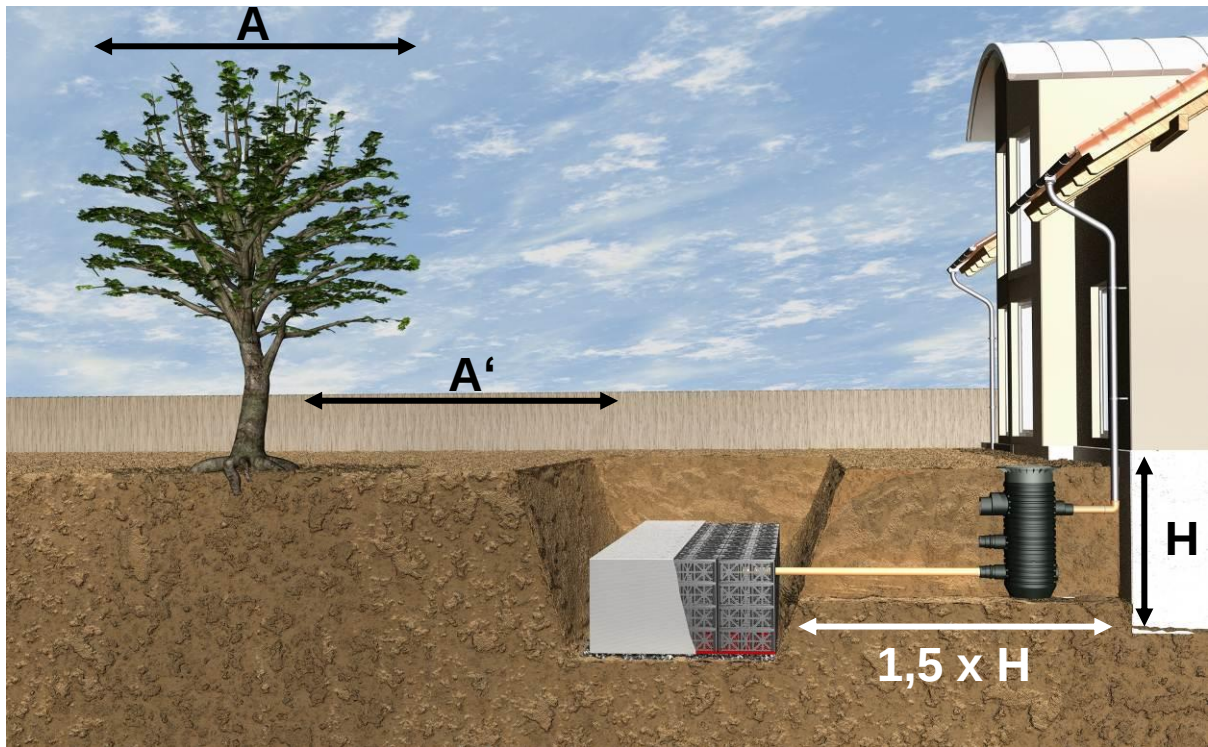
Before installation, the EcoBloc Inspect and ground plates should be checked for damage. Damaged or defective blocks must not be installed!

5. Location options

5. Location options

5.1 Location

The location of an infiltration system should be such that percolating water does not cause damage to buildings or other installations. To avoid erosion and accumulation, an infiltration system should be located at a distance of at least 1.5 times the installation depth.



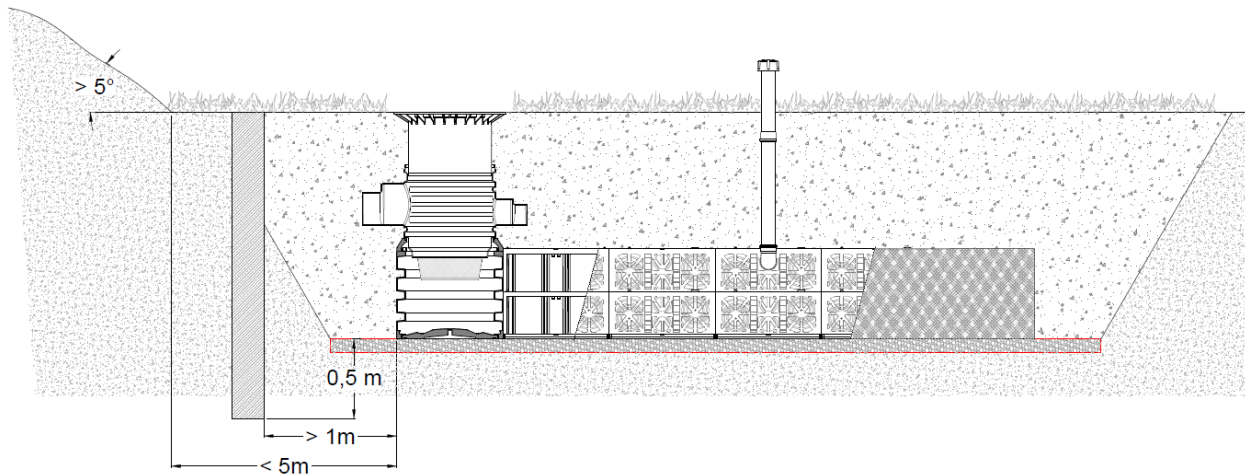
The distance between the installation base of an infiltration system and the average highest groundwater level expected must not fall below one metre (3'-3.4") according to most national standards. If this distance does fall below one metre (3'-3.4") approval must be sort from the relevant authorities.

Distance (A') to existing or planned trees must also be at least the expected crown diameter (A).

5. Location options

5.2 Slope

When installing a system at a distance of less than 5 m from a slope, mound or embankment with a gradient of $>5^\circ$, a statically calculated retaining wall must be erected to absorb the earth pressure. The wall must overhang the installation by at least 0.5 m in all directions and be erected at a minimum distance of 1 m from the system.



5.3 Pre-treatment

Surface and rainwater that enters the infiltration, retention or detention system always requires a treatment stage. This may be an oil separator, silt trap, filter shafts or simple filter which removes oil, dirt & debris from the incoming water. The ingress of dirt should be avoided at all times as this will settle within the infiltration or attenuation system causing reduced performance, blockage and possible system failure.

5. Location options

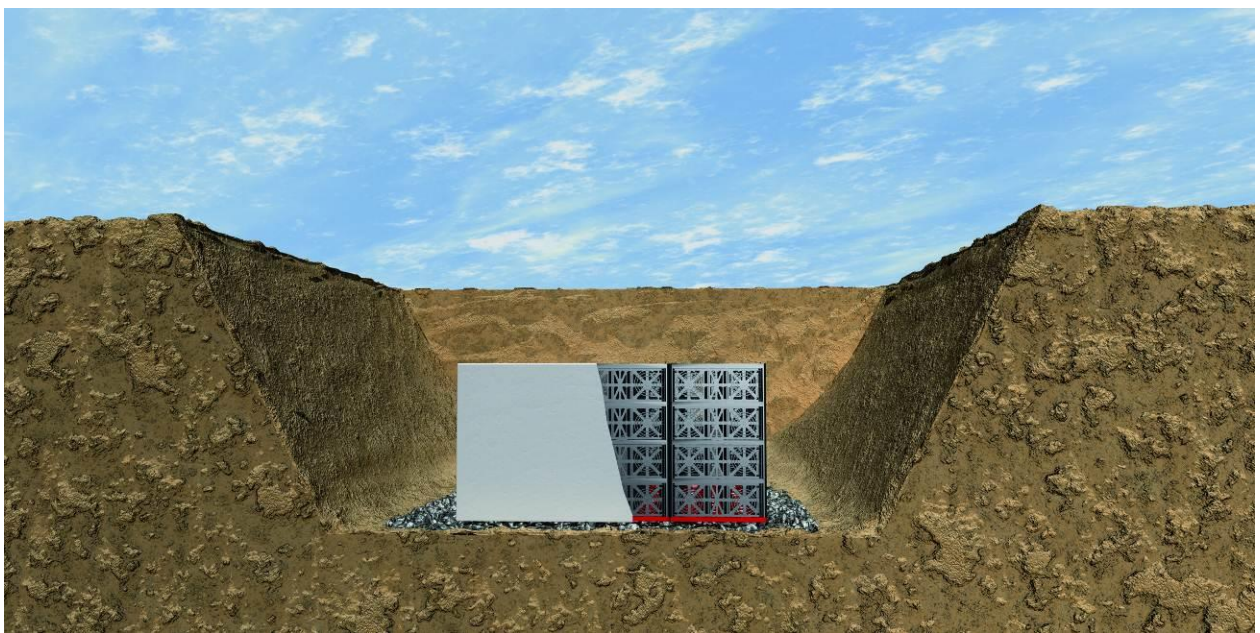
5.4 Installation dimensions

The excavation is sized according to national standards (refer to chapter 1.1). Please contact Graf or your local distributor for free sizing.

The dimensions of the excavation bed for good working practice are as follows:

- Excavation length (sizing) + 1 m (3'–3.4") working space (all round)
- Excavation width (sizing) + 1 m (3'–3.4") working space (all round)

The excavation height depends on the number of layers, traffic loading and planned connection heights / shafts.



The excavation must also be designed in accordance with "Excavation pits and trenches" or similar standards. In particular, this includes the slope angle that has to be selected depending on the soil type for depths of ≥ 1.25 m (4'–1.2").

6. Load classes

6. Load classes

6.1 Installation for pedestrian loading

When installing for pedestrian loading, vehicles of any kind must be prevented from driving over the surface through structural measures or cordoning off. The permissible installation depths and max. earth coverings are stated in Table 1 – Earth coverings.

6.2 Green spaces above the EcoBloc Inspect system

If a grass is planted above an infiltration system, the system should be covered with a **geotextile** or a layer of clay roughly 100 mm (3.93") thick, otherwise the grassed area may dry out more quickly than other areas.

6.3 Installation for vehicle loading

The minimum and maximum earth coverings **depend** on the various loading classes: car, lorry 12 (trucks), HGV (heavy goods vehicle) 30, HGV40 (HS-20) and HGV60 (HS-25).

The minimum and maximum earth coverings for the various loading classes are shown in Table 1. Deviating installation situations should always be discussed with GRAF.

System covering (reuse excavated material and/or gravel) with a maximum weight of unit volume of 20kN/m³ (124.86 lbs/ft³).

Table 1 - Earth coverings

Class	pedestrian loading	car	lorry12 (H-10, H-15)	HGV30	HGV40 (HS-20)	HGV60 (HS-25)
min. Earth covering	0.25 m (9.84")	0.25 m (9.84")	0.50 m* (19.68")	0.50 m* (19.68")	0.50 m** (19.68")	0.80 m** (2'-7.44")
max. Earth covering	2.75 m (9')	2.75 m (9')	2.75 m (9')	2.50 m (8'-2.4")	2.25 m (7'-4.5")	2.00 m (6'-6.7")

* Angle of friction $\phi \geq 30^\circ$ is required

** Angle of friction $\phi \geq 35^\circ$ is required

The installation depth depends on the loading classes and the angle of friction of the material used to cover the EcoBloc Inspect systems.

Table 2 - Maximum installation depths (bottom edge of block)

Class	pedestrian loading	car	lorry12 (H-10, H-15)	HGV30	HGV40 (HS-20)	HGV60 (HS-25)
max. Installation depth $\phi = 20^\circ$	3,00 m (9'-10")	3,00 m (9'-10")	3,00 m (9'-10")	2,75 m (9')	2,50 m (8'-2.4")	2,25 m (7'-4.5")
max. Installation depth $\phi = 30^\circ$	4,25 m (13'-10.8")	4,25 m (13'-10.8")	4,25 m (13'-10.8")	3,75 m (12'-3.6")	3,75 m (12'-3.6")	3.25m (10'-8.4")
max. Installation depth $\phi = 40^\circ$	5,00 m (16'-4.8")	5,00 m (16'-4.8")	5,00 m (16'-4.8")	5,00 m (16'-4.8")	5,00 m (16'-4.8")	5,00 m (16'-4.8")

For more information about installing EcoBloc Inspect system under traffic areas up to HGV60 (HS-25) please refer to chapters 9 and 10.

7. Installation

7. Installation

The size of the excavation depends on the dimensions of the EcoBloc Inspect system, leaving a working space of around one metre all the way round, see chapter 5.3.

7.1 Construction & installation of an infiltration tank

The excavation bed must always be prepared as a horizontal, level pit with load-bearing capacity. Sharp objects, larger stones or similar foreign objects should be removed.

A gravel (grit 8mm/16mm) (0.31"/0.63") base, around 80 mm (3.15") thick, is then applied. This is then drawn out flat and serves as a base for the next stages.



7.2 Covering with geotextile

Geotextile forms the protective layer for the EcoBloc Inspect system and prevents dirt from entering the system. Damage to the **geotextile** should be avoided.

The **geotextile** is placed lengthwise on the blinding. Ensure it overlaps sufficiently 300 mm (11.81") at the joints.

Since the entire EcoBloc Inspect system will be wrapped with the geo textile later on, sufficient coverage should be ensured at this stage!

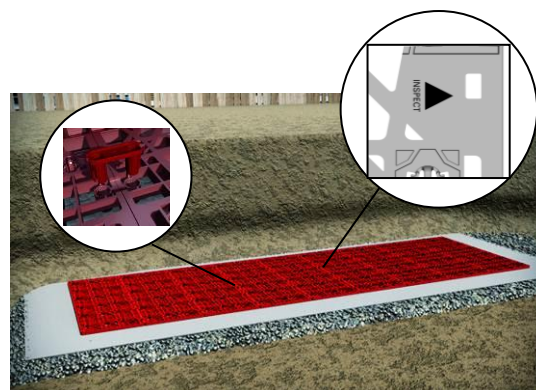


7.3 Positioning of EcoBloc Inspect ground plates

The ground plates are placed on the **geotextile**. Each joint between the ground plates is fixed with Eco connecting elements.

Attention:

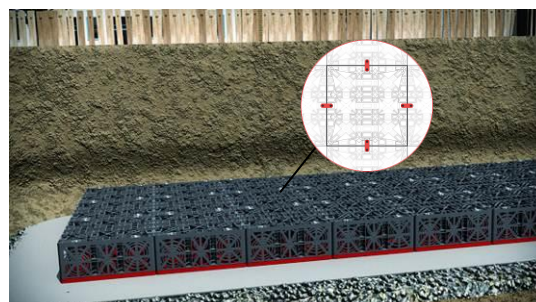
The direction of the ground plate defines the direction of the Inspection channel. There is an indication at the top side of the base plate.



7.4 Positioning the EcoBloc Inspect flex

The EcoBloc Inspect flex is placed on the ground plate. The Eco connecting elements are used to secure each layer.

The EcoBloc Inspect flex is preferably laid lengthwise with the Inspection channel (open side).

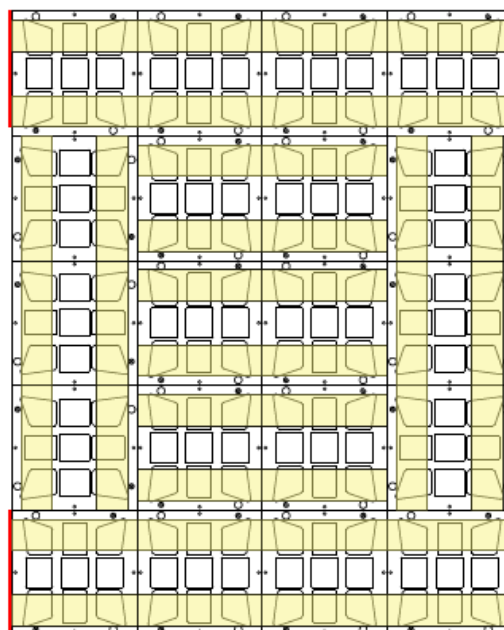


7. Installation

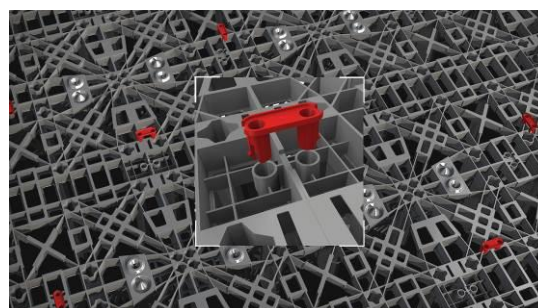
In order to reduce the number of end plates, the first and the last transverse rows have to be turned 90° in the longitudinal direction.

 End plate

 Inspection channel



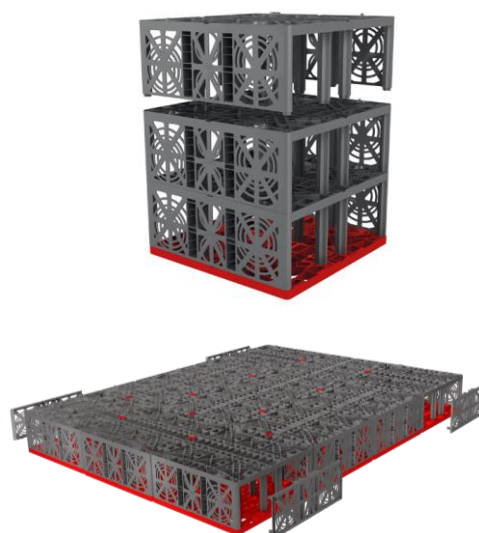
The Eco connecting elements are needed to fix in each layer of EcoBloc Inspect modules.



In the second and following layers, the modules are placed on top of modules already in place as shown.

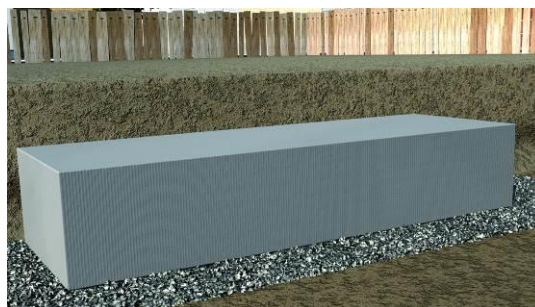
The modules must be arranged in one direction, laid in same direction creating Inspection tunnels. Through the integrated catches, the modules can only be positioned in one direction.

Then the end plates are fitted. These can simply be snapped into the opening on the EcoBloc Inspect flex. The end plates must be inserted, so that GRAF Logo is in accordance with the writing direction. DN 110 (4" pipe), DN 160 (6" pipe) or DN 200 (8" pipe) connections can be produced for inlets on the Eco end plate. A Dremel drill, jig saw or similar tool is used to **create pipe connections**.



7. Installation

Once all the blocks are positioned, the system is fully wrapped in **geotextile**. This prevents the ingress of dirt particles into the system.

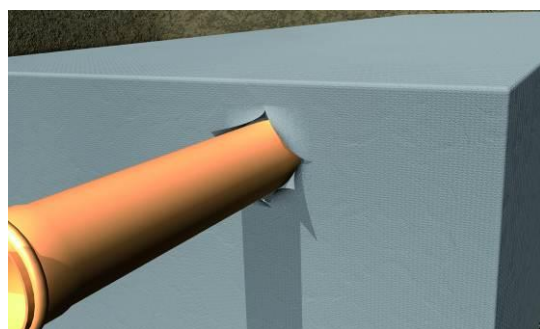


Please note:

There is an increased risk of slipping on EcoBloc Inspect system in frosty and wet conditions.

7.5 Fitting inlet

On the inlet surface, an X is cut into the geo textile. The **fitting around inlet** is slid in around 200 mm (7.87") and the rest of the X cut glued or **solvent weld** to the pipe.



The vents needed are produced in the same way. The vertically aligned vents can be produced on the horizontal drill surface using a 90° bend (plastic pipe bend).



7.6 Connecting Inspection channel

The bases of the EcoBloc Inspect system can be Inspected and driven on. Please use the bottom connections in the end plates of the EcoBloc Inspect to connect the Inspection channel.

7. Installation

7.7 Covering the EcoBloc Inspect system

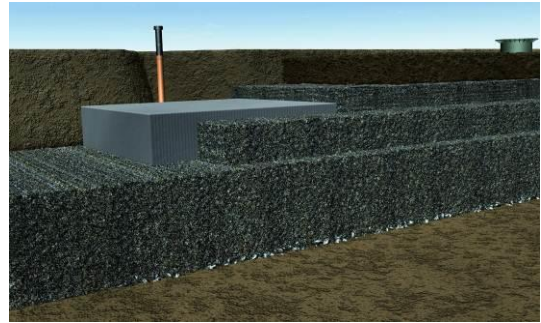
Before filling the installation, all inlets, vents and shafts must be connected. Before backfilling ensure that the **geotextile** is not pulled apart. Overlaps must remain in place when filling.

The EcoBloc Inspect system must not be driven over directly with construction machinery.

When backfilling the excavation pit, the installation conditions described in Chapter 6.3 must always be observed and followed.

If the installation situation does not require any special backfill materials, the EcoBloc Inspect installation is filled with non-cohesive, compressible loose rock (gravel, crushed stone, sand, etc.) at least up to the top edge of the EcoBloc Inspect system.

If applicable, the excavated soil or similar can be used above the top edge to cover the EcoBloc Inspect system. Sharp objects, larger stones or similar foreign objects should be removed.



8. Construction & installation of attenuation tank

8. Construction & installation of attenuation tank

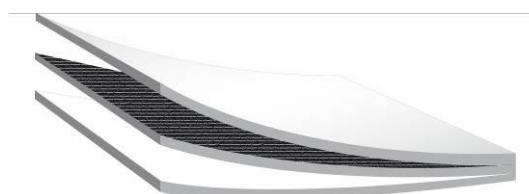
8.1 Installation of attenuation tank

Chapters 7.1 and 7.2 describe how to prepare the excavation and lay the first layer of **geotextile**.

8.2 Laying geomembrane and geotextile

Further steps follow laying the first layer of **geotextile**.

The water-impermeable membrane is placed on the first sheet of **geotextile**, followed by another layer of **geotextile**. This three-layered surround provides protection and a water-tight shell.



GRAF and your local trading partner remain at your service for any further information or advice concerning waterproof film.

8.3 Construction & installation of attenuation tank

For use as a retention tank, a flow controller or a drainage throttle should be installed in a separate shaft.

GRAF and your local trading partner remain at your service for any further information or advice.

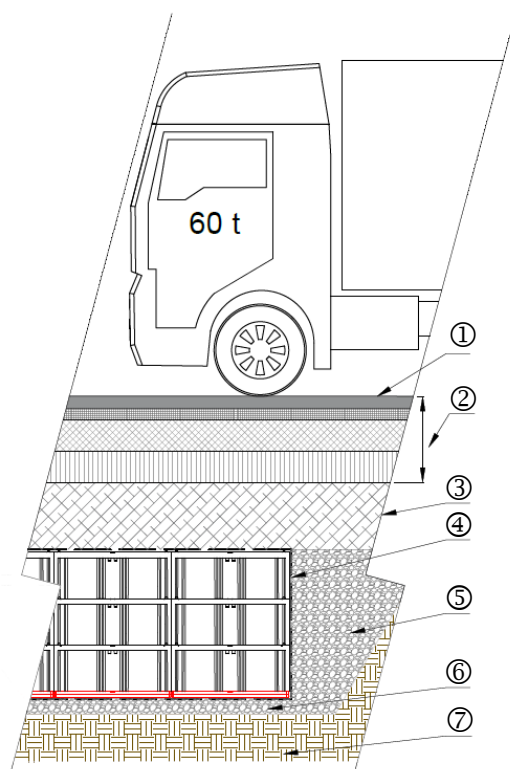
Please note:

When setting up a retention tank, it is essential to note the groundwater level. An accumulation of groundwater may cause uplift, resulting in damage to the system and its surroundings. If you intend to install in groundwater, please consult with GRAF beforehand. Please provide GRAF with the necessary information about the construction project (soil cover, groundwater level, loading etc.) and consult on this.

Depending on the soil type, heavy rainfall may cause local rises in standing groundwater, particularly in the filling material of the trench. When installing the retention system, check again that no compression of the subsoil or silting-up has taken place during the construction phase. It may be necessary to install extra drainage. GRAF will be happy to provide advice on this.

9. Installation under traffic areas for driving up to SLW60

9. Installation under traffic areas for driving up to SLW60



Notes:

- The infiltration crates are installed and connected in accordance with chapter 6 and 7. Ventilation pipes must be installed in green areas.
- The backfill materials for the different soil layers must not exceed a maximum density of 20 kN/m³ [124.86 lbs/ft³].
- The soil layers must be installed evenly all around and compacted in layers of max. 300 mm with light or medium compaction units. A compaction degree Dpr of ≥ 97% should be reached.
- Use of compaction units with activated vibration is not permitted.
- Sudden backfilling with large amounts of soil is not permitted.

Figure 1: Installation under traffic areas used for driving up to SLW60

	Designation	Depth	Properties
1	Traffic area	_____	
2	Superstructure in accordance with the applicable directives, e.g. RStO 12	In accordance with the applicable directives	• The local situation must be observed for frost-free installation depth
3	Upper levelling layer	Min. 400 mm	• Gravel carrying layer • Free of foreign bodies • $E_{v2} \geq 45 \text{ MN/m}^2$
2+3		Min. 800 mm Max. 2000 mm	
4	Geotextile/plastic sealing lane	_____	• Infiltration application: wrapped completely in geotextile in order to prevent the ingress of dirt through the surrounding soil • Retention application: 3-layered structure (geotextile-sealing lane-geotextile) to protect the sealing lane and waterproof the tank
5	Lateral backfilling	To the upper edge of the blocks	• Gravel 8/16 mm [0.31/0.63"] • Free of foreign bodies (such as roots, shards, garbage or organic material) • Permeability of the lateral backfilling should at least correspond to that of the adjacent soil.
6	Granular subbase	80 – 100 mm	• Gravel 8/16 mm [0.31/0.63"] • Plane layer, without pointed objects, larger stones or similar foreign bodies • $E_{v2} \geq 45 \text{ MN/m}^2$
7	Construction pit bottom	_____	• Horizontal, level and loadbearing planum made of infiltration-capable subsoil

10. Use of construction machinery in the installation phase

10. Use of construction machinery in the installation phase



Various construction machinery may be used to fill the excavation. Given the additional dynamic loads they cause, compression equipment must not be driven directly over the EcoBloc Inspect system and compression equipment with activated vibration motors must not be taken over the area.

Table 3 Compression equipment

Earth covering in [m]	Properties	Max. approvals
min. 0.1 m (3.93")	<i>Lightweight walk-behind roller</i> Total weight: Distributed: Dimension:	approx. 700 kg (1,543 lbs) evenly, over 2 rollers 0.9 m x 0.7 m (2' -11.4" x 2'-3.6")
min. 0.2 m (7.87")	<i>Lightweight earthwork roller</i> Total weight: Distributed: Dimension:	approx. 2.5 t (5,511 lbs) evenly, over 2 rollers 1.2 m x 3.2 m (3'-11.28" x 10'-6")
min. 0.5 m (1'-7.68")	<i>Roller compact, excavator</i> Total weight: Distributed: Dimension:	approx. 12t (26,455 lbs) evenly, over 2 rollers 5.9 m x 2.3 m (19'-4.32" x 7'-6")
min. 0.8 m (2'-7.44")	<i>HGV60 (HS-25)</i>	

Please contact GRAF in the event of deviation from the materials and equipment stated here.

11. Other applications

This documentation only relates to use of the GRAF EcoBloc Inspect flex for infiltration and attenuation systems for retaining, storing or infiltrating surface or rainwater. Any other use of the EcoBloc Inspect system must be agreed with Otto GRAF GmbH from a technical, material and/or static consideration.

Should special requirements apply, we would also recommend contacting architects or planners with knowledge of hydrology and geology.