Deutsches Institut für Bautechnik

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General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	"DIADEM SEDUM - ROOF" "DIADEM PARK - ROOF" "DIADEM GARDEN - ROOF"
Product family to which the construction product belongs	Kits for Green Roofs
Manufacturer	APP Kft. Fehérvári út 75 9028 GYÖR UNGARN
Manufacturing plant	APP Kft. Fehérvári út 75 9028 GYÖR UNGARN
This European Technical Assessment contains	14 pages including 1 annex which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 220009-00-0401

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Specific part

1 Definition of the construction product

This European Technical Assessment applies to the kits for green roofs with the following designations:

- Extensive Green Roof – Type 1 "Sedum-Dach" / "Sedum-Roof"
- Basic intensive Green Roof – Type 2 "Park-Dach" / "Park-Roof"
- Intensive Green Roof – Type 3 "Garten-Dach" / "Garden-Roof"

The kits consist of the components specified in table 1, which are factory-made by the approval holder or a supplier. The kits are manufactured on site from these components.

The European Technical Assessment has been issued for the products on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the products that have been assessed. The European Technical Assessment applies only to products corresponding to this agreed data/information.

The kits are placed above the roof covering on flat roofs and sloped roofs, respectively with a roof pitch of a maximum of 15°.

The roof covering and the optional root barrier layer and the greening (plants) are not included in the kit.

Table 1: Components of the kits for green roofs

	Components (bottom – up)	Kit (Type)	Type of material	Dimensions, Thickness, mass surface density
Protection mat	VLU-300	1,2	PES (recycled material)	2.00 m x 50.00 m; Thickness: approx. 1.8 mm; mass surface density: approx. 300 g/m²
	VLU-500	2,3	PES (recycled material)	2.00 m x 50.00 m; Thickness: approx. 2.5 mm; mass surface density: approx. 500 g/m²
	VLS-500	2,3	PES (recycled material)	2.00 m x 50.00 m; Thickness: approx. 4.0 mm; mass surface density: approx. 500 g/m²

	Components (bottom – up)	Kit (Type)	Type of material	Dimensions, Thickness, mass surface density
Drainage element	DiaDrain-25H	1,2,3	Polystyrol HIPS (recycled material)	1.10 m x 2.02 m; Thickness: approx. 25 mm; mass surface density: approx. 1.36 kg/m²
	DiaDrain-25HF-M	1,2,3	Polystyrol HIPS (recycled material)	1.10 m x 2.02 m; Thickness: approx. 25 mm; mass surface density: approx. 1.56 kg/m²
	DiaDrain-40H	1,2,3	Polystyrol HIPS (recycled material)	1.04 m x 2.04 m; Thickness: approx. 40 mm; mass surface density: approx. 1.96 kg/m²
	DiaDrain-60H	1,2,3	Polystyrol HIPS (recycled material)	0.94 m x 1.94 m; Thickness: approx. 60 mm; mass surface density: approx. 2.2 kg/m²
Filter fleece	VLF-150	1,2,3	Polypropylen (PP)	2.0 m x 100.0 m; Thickness: approx. 1.2 mm; mass surface density: approx. 155 g/m²
	VLF-200	1,2,3	Polypropylen (PP)	2.0 m x 175.0 m; Thickness: approx. 1.9 mm; mass surface density: approx. 200 g/m²
	VLF-110	1,2,3	Polypropylen (PP)	2.0 m x 100.0 m; Thickness: approx. 0.8 mm; mass surface density: approx. 105 g/m²
Vegetation support layer	Substrat SEM	1,2	Mineral aggregate	60 – 150 mm, approx. 54 – 240 kg/m²
	Substrat SIM	2,3	Mineral aggregate	150 – 800 mm, approx. 240 – 1280 kg/m²
	DIADEM SEM	1,2	Mineral aggregate	60 – 150 mm, approx. 96 – 240 kg/m²
	DIADEM SIM	2,3	Mineral aggregate	150 – 800 mm, approx. 240 – 1280 kg/m²

2 Specification of the intended use in accordance with the applicable European Assessment Document

The Kits are used for the production of green roofs. They protect the roof covering from UV radiation, temperature differences, and mechanical damage.

By the use of the Kits, a part of the incoming perceptible water can be held back and thus costs for the drainage systems will be reduced.

The selection of the Kits in conjunction with an appropriate planting depends on the concrete conditions at the place of installation and is not the subject of this European Technical Assessment.

The performance according to section 3 only applies if the Kits and the components are installed according to the manufacture's installation instructions and planning guidelines and according to annex A and if they are protected by appropriate measures (e.g. packaging or covering) from weathering, solar radiation (UV) and mechanical damage during transport, storage and installation.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the Kits of at least 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

For sampling, conditioning and testing the provisions of the EAD No. 220009-00-0401 "kits for green roofs" apply.

3.1 Performance of the assembled system / kit for green roofs

3.1.1 Mechanical resistance and stability (BWR 1)

Not applicable.

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
External fire performance	No performance assessed.

3.1.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	No performance assessed.

3.1.4 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Discharge coefficient / Runoff reference value C test acc. to Annex 2 of the "Green Roofing Guideline" - Guideline for the Planning, Construction and Maintenance of Green Roofing (FLL) ≥ 100 mm DIADEM SEM VLF-110 Dia-Drain-25H VLU-300	applicable to roof slopes ≤ 5° with the given roof build-up (up – bottom) C = 0.29 for rainfall with 300 l/(s x ha) / duration: 15 min

3.1.5 Protection against noise (BWR 5)

Not applicable.

3.1.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.1.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was investigated for this product.

3.2 Performance of the individual components

3.2.1 Protection mat

3.2.1.1 Mechanical resistance and stability (BWR 1)

Not applicable.

3.2.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	No performance assessed.

3.2.1.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	No performance assessed.

3.2.1.4 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Protection efficiency	No performance assessed.
Behaviour under point loads	No performance assessed.
Tensile strength	No performance assessed.
Durability	No performance assessed.

3.2.1.5 Protection against noise (BWR 5)

Not applicable.

3.2.1.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.2.1.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was investigated for this product.

3.2.2 Drainage element (without thermal insulating properties)

3.2.2.1 Mechanical resistance and stability (BWR 1)

Not applicable.

3.2.2.2 Safety in case of fire (BWR 2)

Essential characteristic	**Performance**
Reaction to fire test acc. to EN ISO 11925-2:2010	
DiaDrain-25-HF-M	Class E acc. to EN 13501-1:2007 + A1:2009
DiaDrain-25-H	No performance assessed.
DiaDrain-40-H	No performance assessed..
DiaDrain-60-H	Class E acc. to EN 13501-1:2007 + A1:2009

3.2.2.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	**Performance**
Content, emission and/or release of dangerous substances	No performance assessed.

3.2.2.4 Safety and accessibility (BWR 4)

Essential characteristic	**Performance**
Water flow capacity in the plane test acc. to EN ISO 12958:2010 (with the given boundary conditions)	
DiaDrain-25H and DiaDrain-25HF-M (rigid/rigid, 20 kPa)	i = 0.01 : 0.39 l/(m s) i = 0.02 : 0.57 l/(m s) i = 0.03 : 0.71 l/(m s) i = 0.05 : 0.91 l/(m s) i = 1.00 : 4.12 l/(m s)
DiaDrain-40H (rigid/rigid, 20 kPa)	i = 0.01 : 0.70 l/(m s) i = 0.02 : 1.01 l/(m s) i = 0.03 : 1.25 l/(m s) i = 0.05 : 1.63 l/(m s) i = 1.00 : 7.30 l/(m s)
DiaDrain-60H (rigid/rigid, 20 kPa)	i = 0.01 : 1.98 l/(m s) i = 0.02 : 2.53 l/(m s) i = 0.03 : 3.24 l/(m s) i = 0.05 : 4.42 l/(m s) i = 0.10 : 6.62 l/(m s) i = 0.30 : 11.45 l/(m s)

Essential characteristic	Performance
Compression behaviour test acc. to EN ISO 25619-2:2008 DiaDrain-25H DiaDrain-25HF-M DiaDrain-40H DiaDrain-60H	compressive strength ≥ 300 kPa ≥ 500 kPa ≥ 300 kPa No performance assessed.
Compressive creep	No performance assessed.
Durability	No performance assessed.
Tensile strength	No performance assessed.

3.2.2.5 Protection against noise (BWR 5)

Not applicable.

3.2.2.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.2.2.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was investigated for this product.

3.2.3 Filter fleece

3.2.3.1 Mechanical resistance and stability (BWR 1)

Not applicable.

3.2.3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	No performance assessed.

3.2.3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	No performance assessed.

3.2.3.4 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Characteristic properties acc. to EN 13252 test acc. to EN 13252:2016 **VLF-110** Tensile strength test acc. to EN ISO 10319 Static puncture test (CBR test) test acc. to EN ISO 12236 Dynamic perforation test test acc. to EN ISO 13433	 8 kN/m 1240 N 29 mm

Characteristic opening size test acc. to EN ISO 12956	120 µm
Water permeability characteristics (normal to the plane) test acc. to EN ISO 11058	140 l/(m² s)
Durability test acc. to EN 13252, Annex B	Maximum duration of exposure 1 month
VLF-150	
Tensile strength test acc. to EN ISO 10319	12 kN/m
Static puncture test (CBR test) test acc. to EN ISO 12236	1800 N
Dynamic perforation test test acc. to EN ISO 13433	22 mm
Characteristic opening size test acc. to EN ISO 12956	90 µm
Water permeability characteristics (normal to the plane) test acc. to EN ISO 11058	105 l/(m² s)
Durability test acc. to EN 13252, Annex B	Maximum duration of exposure 1 month
VLF-200	
Tensile strength test acc. to EN ISO 10319	16 kN/m
Static puncture test (CBR test) test acc. to EN ISO 12236	2350 N
Dynamic perforation test test acc. to EN ISO 13433	22 mm
Characteristic opening size test acc. to EN ISO 12956	110 µm
Water permeability characteristics (normal to the plane) test acc. to EN ISO 11058	120 l/(m² s)
Durability test acc. to EN 13252, Annex B	Maximum duration of exposure 1 month

3.2.3.5 Protection against noise (BWR 5)

Not applicable.

3.2.3.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.2.3.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was investigated for this product.

3.2.4 Vegetation support layer

3.2.4.1 Mechanical resistance and stability (BWR 1)

Not applicable.

3.2.4.2 Safety in case of fire (BWR 2)

Essential characteristic	**Performance**
Reaction to fire	No performance assessed.

3.2.4.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	**Performance**
Content, emission and/or release of dangerous substances	No performance assessed.

3.2.4.4 Safety and accessibility (BWR 4)

Essential characteristic	**Performance**
Particle size distribution test acc. to EN 933-1:2012 **DIADEM SEM and Substrat SEM** maximum particle size Fraction of particles ≤ 0,063 mm (plus ± 10 % tolerance) Fraction of particles > 4 mm (plus ± 10 % tolerance) **DIADEM SIM and Substrat SIM** maximum particle size Fraction of particles ≤ 0,063 mm (plus ± 10 % tolerance) Fraction of particles > 4 mm (plus ± 10 % tolerance)	 16.0 mm 7 % by mass 36 % by mass 16.0 mm 15 % by mass 40 % by mass
Bulk density test acc. to EN 1097-3:1998 DIADEM SEM and Substrat SEM DIADEM SIM and Substrat SIM	 1.10 – 1.20 g/cm³ 1.00 – 1.10 g/cm³
Determination of the pH-value test acc. to EN 13037:2011 DIADEM SEM and Substrat SEM DIADEM SIM and Substrat SIM	pH-value 6.0 – 8.5 6.0 – 8.5

Essential characteristic	**Performance**
Organic matter content test acc. to EN 13039:2011 DIADEM SEM and Substrat SEM DIADEM SIM and Substrat SIM	 ≤ 1.5 % by mass ≤ 2.5 % by mass
Soluble nutrients content test acc. to EN 13651:2001 **DIADEM SEM and Substrat SEM** N P_2O_5 K_2O Mg **DIADEM SIM and Substrat SIM** N P_2O_5 K_2O Mg	(plus ± 10 % tolerance) 5 mg/l 22 mg/l 75 mg/l 150 mg/l 5 mg/l 17 mg/l 79 mg/l 190 mg/l
Salt content test acc. to EN 13038:2011 DIADEM SEM and Substrat SEM DIADEM SIM and Substrat SIM	 ≤ 120 mS/m ≤ 140 mS/m
Water permeability test acc. to Annex 2 of the "Green Roofing Guideline" - Guideline for the Planning, Construction and Maintenance of Green Roofing (FLL) DIADEM SEM and Substrat SEM DIADEM SIM and Substrat SIM	 0.064 cm/s No performance assessed.
Maximum water capacity test acc. to Annex 2 of the "Green Roofing Guideline" - Guideline for the Planning, Construction and Maintenance of Green Roofing (FLL) DIADEM SEM and Substrat SEM DIADEM SIM and Substrat SIM	 36.0 % by volume No performance assessed.

3.2.4.5 Protection against noise (BWR 5)

Not applicable.

3.2.4.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.2.4.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was investigated for this product.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD No 220009-00-0401 "kits for green roofs" the applicable European legal act is:
Commission Decision 98/436/EC and 2001/596/EC (reaction to fire).

The following systems to be applied are:

Essential characteristic	System
Reaction to fire	3
Content, emission and/or release of dangerous substances	3
All other characteristics of the products	4

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 2. Oktober 2018 by Deutsches Institut für Bautechnik

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beglaubigt:
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Deutsches Institut für Bautechnik DIBt

ANNEX A

The given performances for the kits and the individual components in clause 3 apply, if the following conditions regarding the structural assembly are met:

It will be used only components which are specified in clause 1 and which are compatible with each other.

To protect the roof waterproofing from root penetration a root barrier layer will be arranged, provided that no "root-resistant" roof waterproofing was performed. The entire roof including connections to other building components, penetrations, etc. will be carried out root-resistant.

The root barrier layer will be covered immediately after laying in order to avoid a longer weathering. The joints of the layers will be connected in a suitable manner.

Depending on the roof waterproofing executed, a suitable protection mat will be used.

It will be used only substrate which not contain any significant impurities.

Depending on the compressive strength of the drainage elements, these will be protected during the execution such that they will not be damaged.

For the protection mats, filter fleece and drainage elements, the following maximum durations of exposure after installation will be observed:

Table 2: Maximum duration of exposure of the protection mats, filter fleece and drainage elements

Protection mat /drainage element / filter fleece	**Maximum duration of exposure**
VLU-300	No performance assessed.
VLU-500	No performance assessed.
VLS-500	No performance assessed.
DiaDrain-25H	No performance assessed.
DiaDrain-25HF-M	No performance assessed.
DiaDrain-40H	No performance assessed.
DiaDrain-60H	No performance assessed.
VLF-110	1 month
VLF-150	1 month
VLF-200	1 month

The roof will be equipped with an appropriate drainage. For roofs with a roof pitch less than 2 % special requirements for dewatering and drainage are required.

The roof will be designed such that no stagnant water will develop over a longer period of time. The roof structure, the roof pitch and the planting of the green roof will be coordinated.

The execution of the drainage will be carried out in accordance with EN 12056-3:2001 considering national provisions.

It will ensure that the roof system executed provides a sufficient resistance to wind load (wind suction), depending on the location of the building. The roof structure is designed such that it can transfer the additional loads from the green roof.

Only undamaged products will be used. The kits will be laid on surfaces which are sufficiently flat. The components will be laid single-layer.

When using plants with a strong rhizome growth (e.g. different types of bamboo), this will be taken into account by special measures in addition to the root barrier layer when executing.

Depending on the green roof carried out and the existing vegetation regular maintenance of the green roof is required (e.g. cleaning, removing unwanted vegetation, control of drainage, plant care).