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European Technical Assessment

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General Part

Technical Assessment Body issuing the European Technical Assessment: Itecons - Instituto de Investigação e Desenvolvimento Tecnológico para a Construção, Energia, Ambiente e Sustentabilidade	
Trade name of the construction product	*LECA® NUTROFERTIL GREEN ROOF D*
Product family to which the construction product belongs	Kits for green roofs Product area code: 22
Manufacturer	Leca Portugal, S.A. Estrada Nacional 110, S/N 3240-356 Avelar Portugal
Manufacturing plant	Leca Portugal, S.A. Estrada Nacional 110, S/N 3240-356 Avelar Portugal
This European Technical Assessment contains	8 pages
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	EAD 220009-00-0401 - *kits for Green Roofs*

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Specific parts

1. Technical description of the product

The product assessed, *LECA® NUTROFERTIL GREEN ROOF D*, is a kit for green roofs consisting of the following layers (from bottom up):

- Protection layer: provides protection against mechanical damage of the waterproofing layer and can also retain moisture;
- Drainage layer: absorbs surplus water and drains it off to the gutters;
- Filter layer: stops the passage of fines from the vegetation layer;
- Vegetation support layer: provides the root area for the plants and provides water and nutrients.

The kits for green roofs are placed on flat roofs or sloped roofs, with a roof pitch of a maximum of 15°. The waterproofing layer and the plants are not part of the kit.

The components of the *LECA® NUTROFERTIL GREEN ROOF D kit* are specified in Table 1.

Table 1: Definition of the kit components

Component		Material	Properties
Protection layer	Ecofelt PES-SB300	Reclaimed polyester fibers	Thickness: 1.12 mm Dimensions: 2m x 100 m Mass per unit area: 300 g/m^2
Drainage layer	Leca®D	Lightweight expanded clay aggregate	Aggregate size (d/D): 10/20 mm Bulk density (wet): 275 ± 15 kg/m^3 Layer thickness: ≥ 100 mm
Filter layer	Ecofelt PES-SB150	Reclaimed polyester fibers	Thickness: 0.48 mm Dimensions: 2m x 100 m Mass per unit area: 150 g/m^2
Vegetation support layer	Nutreasy	Substrate made of organic compound, peat, pine bark 4/15 and expanded clay Leca® Hydro	Organic compound: 40-50% Density after production: 400 kg/m^3 Density at saturated field capacity: 700 kg/m^3

2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

2.1. Intended use

The *LECA® NUTROFERTIL GREEN ROOF D kit* is intended to be used in green roofs. The kit protects the waterproofing membrane against UV radiation, temperature differences, mechanical damage, reduces rain water run-off and thus costs for sewerage systems.

The provisions made in this European Technical Assessment are based on an assumed working life of 25 years as minimum according to the EAD, provided that the conditions lay down for the installation, packaging, transport and storage as well as appropriate use, maintenance and repair are met. 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 mean for choosing the right product 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

The assessment of *LECA® NUTROFERTIL GREEN ROOF D* kit according to the Basic Works Requirements (BWR) was carried out in compliance with EAD 220009-00-0401. The characteristics of the components shall correspond to the respective values laid down in the technical documentation of this ETA, checked by Itecons.

3.1. Performance of the assembled system (kit)

3.1.1. Mechanical resistance and stability (BWR 1)

Not applicable.

3.1.2. Safety in case of fire (BWR 2)

3.1.2.1. External fire performance of roofs

No performance assessed.

3.1.3. Hygiene, health and the environment (BWR 3)

Not applicable.

3.1.4. Safety and accessibility in use (BWR 4)

3.1.4.1. Coefficient of discharge/Runoff reference value

The assessed build up and the test result of the coefficient of discharge, C_s, of the *LECA® NUTROFERTIL GREEN ROOF D* kit are presented in Table 2.

Table 2: Coefficient of discharge

Assessed build up (bottom-up)		Test conditions	Coefficient of discharge[1] - C_s
LECA® NUTROFERTIL GREEN ROOF D	Ecofelt PES-SB300 Leca®D (thickness: 100 mm) Ecofelt PES-SB150 Nutreasy (thickness: 150 mm)	15 minute rainfall of r = 300 l/(s·ha) ≅ 27 l/m² roof gradient of 2%	0.37 ± 0.05

[1] - The test result is valid for roofs up to 5º roof pitch.

3.1.5. Protection against noise (BWR 5)

Not applicable.

3.1.6. Energy economy and heat retention (BWR 6)

3.1.6.1. Correction value for thermal transmittance

Not applicable.

3.2. Performance of the protection layer

3.2.1. Mechanical resistance and stability (BWR 1)

Not applicable.

3.2.2. Safety in case of fire (BWR 2)

3.2.2.1. Reaction to fire

No performance assessed.

3.2.3. Hygiene, health and the environment (BWR 3)

Not applicable.

3.2.4. Safety and accessibility (BWR 4)

3.2.4.1. Protection efficiency

No performance assessed.

3.2.4.2. Static puncture behaviour

The static puncture behaviour, F_p, of the protection layer Ecofelt PES-SB300 is 0.55 kN according to EN ISO 12236.

3.2.4.3. Durability

No performance assessed.

3.2.5. Protection against noise (BWR 5)

Not applicable.

3.2.6. Energy economy and heat retention (BWR 6)

Not applicable.

3.3. Performance of the drainage layer (without thermal insulating properties)

3.3.1. Mechanical resistance and stability (BWR 1)

Not applicable.

3.3.2. Safety in case of fire (BWR 2)

3.3.2.1. Reaction to fire

The drainage layer Leca® D is considered to satisfy the requirements for performance Class A1 of the characteristic reaction to fire, in accordance with the provisions of the Commission Decision 96/603/EC (as amended), without the need for further testing on the basis of its listing in the said Decision.

3.3.3. Hygiene, health and environment (BWR 3)

Not applicable.

3.3.4. Safety and accessibility in use (BWR 4)

3.3.4.1. Water flow capacity of the drainage layer in the plane

The water flow capacity of the drainage layer Leca® D (thickness: 100 mm) was determined according to EN ISO 12958. The boundary conditions were rigid (lower)/soft (upper) and the applied load was 20 kPa. The results are presented in Table 3.

Table 3: Water flow capacity in the plane of the drainage layer Leca® D

Hydraulic gradient [m/m]	Water flow capacity [l/(m.s)]
0.01	0.732
0.02	0.934
0.1	2.274
0.4	5.200
1.0	8.573

3.3.4.2. Water permeability

The water permeability of the drainage layer Leca® D is 240 mm/min.

3.3.4.3. Compression behaviour

Not relevant.

3.3.4.4. Compressive creep

Not relevant.

3.3.4.5. Durability

Not relevant.

3.4. Performance of the filter layer

3.4.1. Mechanical resistance and stability (BWR 1)

Not applicable.

3.4.2. Safety in case of fire (BWR 2)

3.4.2.1. Reaction to fire

No performance assessed.

3.4.3. Hygiene, health and the environment (BWR 3)

Not applicable.

3.4.4. Safety and accessibility (BWR 4)

Not applicable.

3.4.5. Protection against noise (BWR 5)

Not applicable.

3.4.6. Energy economy and heat retention (BWR 6)

Not applicable.

3.5. Performance of the vegetation support layer

3.5.1. Mechanical resistance and stability (BWR 1)

Not applicable.

3.5.2. Safety in case of fire (BWR 2)

3.5.2.1. Reaction to fire

No performance assessed.

3.5.3. Hygiene, health and the environment (BWR 3)

Not applicable.

3.5.4. Safety and accessibility (BWR 4)

3.5.4.1. Particle size distribution

The particle size distribution of the vegetation support layer Nutreasy (D = 14 mm) was determined according to EN 933-1. The results are presented in Table 4.

Table 4: Particle size distribution of the support layer Nutreasy – typical grading

Sieve aperture size (mm)	Cumulative percentage passing, in mass
16	100
14 (D)	99 (±5)
8 (D/2)	93 (±20)
4	58 (±15)
0.063	3.8 (±4)

3.5.4.2. Bulk density of loose fill material

The bulk density under dry conditions of the vegetation support layer Nutreasy, determined according to EN 1097-3, is 0.289 ± 0.050 Mg/m^3.

3.5.4.3. Determination of pH

The pH (H_2O) of the vegetation support layer Nutreasy, determined according to EN 13037, is 6.0 – 7.5.

3.5.4.4. Organic content

The organic content of the vegetation support layer Nutreasy, determined according to EN 13039, is <60 % (w/w) dry matter.

3.5.4.5. Nutrient content

The nutrient content of the vegetation support layer Nutreasy is presented in Table 5.

Table 5: Nutrient content of the vegetation support layer Nutreasy

Test method	Nutrient	Result	Units
EN 13651[1]	$N\text{-}NH_4$	5.5	mg $N\text{-}NH_4$/l sample
	$N\text{-}NO_3$	<2.3	mg $N\text{-}NO_3$/l sample
	P_2O_5	142	mg P_2O_5/l sample
	K_2O	600	mg K_2O/l sample
	Mg	170	mg Mg/l sample
EN 13652[2]	$N\text{-}NH_4$	<1.5	mg $N\text{-}NH_4$/l sample
	$N\text{-}NO_3$	3.0	mg $N\text{-}NO_3$/l sample
	P_2O_5	69	mg P_2O_5/l sample
	K_2O	264	mg K_2O/l sample
	Mg	5.0	mg Mg/l sample

[1] Extraction with CaCl2/DTPA solution

[2] Extraction with water

3.5.4.6. Salt content/Electrical conductivity

The electrical conductivity of the vegetation support layer Nutreasy, according to EN 13038, is ≤0.8 mS/cm.

3.5.4.7. Water permeability

The water permeability of the vegetation support layer Nutreasy, determined according to Annex 2 of the “Green Roofing Guideline" - Guideline for the Planning, Construction and Maintenance of Green Roofing (FLL), is 2 mm/min.

3.5.4.8. Maximum water capacity (water storage ability)

The maximum water capacity (water storage ability) of the vegetation support layer Nutreasy, determined according to Annex 2 of the “Green Roofing Guideline" - Guideline for the Planning, Construction and Maintenance of Green Roofing (FLL), is 58.6%.

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

According to the Decision 98/436/EC and 2001/596/EC of European Commission the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) applicable is 4.

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

The ETA is issued on the basis of agreed data/information, deposited at Itecons, which identifies the product that has been assessed and judged. It is the manufacturer’s responsibility to make sure that all those who use the kit are appropriately informed of specific conditions laid down in this ETA.

Changes to the kit for green roofs or the components or their production process should be notified to the Itecons before the changes are introduced. Itecons will decide whether or not such changes affect the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

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By

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