

GREEN ROOF

GREEN ROOFING SOLUTIONS



GreenROOF

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The advantages



THERMAL INSULATION and ENERGY SAVING

The green roof represents technology with the best benefit-cost ratio to reduce roof temperatures, with reductions of up to 40°C, as well as to produce a greater phase shift and damping of the thermal flow.



ACOUSTIC INSULATION

The sound-absorbing properties of vegetation and the materials used for the Isopan Greenroof systems favour a significant reduction in environmental noise and allow noise pollution to be reduced, thereby guaranteeing sound absorption and insulation that have a positive impact on the health and well-being of users.



ECOCLIMATE IMPROVEMENT and ENVIRONMENTAL IMPACT

A green roof is considered a valid tool to limit the "urban heat island" phenomenon and to obtain a climatic improvement of the entire urban ecosystem. It also safeguards the biodiversity of the biological mass that can fail due to cementation.



HIGH WATER RETENTION

The high water storage capacity of the FSD elements and the substrates allow up to 80% of the annual rainfall to be retained on the roof, thereby reducing the flow of water towards the drains. The efficiency of the systems is verified and certified according to the methods set forth in UNI 11235/15 Standards.



DUST RETENTION

Green roofs lead to a reduction in fine dust in the air thanks to the properties of the vegetative mass to capture the particles, retaining them and then releasing them on the substrate, where they lose their hazardous effect. A green roof also decreases the circulation of fine dust in the atmosphere, thereby reducing overheating of the surfaces and decreasing the formation of updrafts.



ROOF PROTECTION

A green roof protects the thermal insulation and waterproofing solutions, extending their duration and preserving their functionality, as they protect them from U.V. rays, from atmospheric events, and from chemical agents.



USABLE SURFACES

The exploitation of unused areas is one of the most interesting aspects linked to using a green roof. Recreating spaces to increase quality of life is an increasingly important prerogative in modern life, and Isopan Greenroof solutions provide great design freedom. Green also allows users to enjoy enhanced psychophysical well-being.



ENHANCING THE BUILDING

Using a green roof improves the architectural appearance, and the functionality of the available areas increases. As a result, it acts as a strong distinctive and enhancement element of the building.

GreenROOF

The Isopan solution

The Isopan GreenROOF solutions consist in the integration of the green roof system on flat roofs made with corrugated sandwich panels. The external sheet is covered with a specific protective and waterproof synthetic layer, in PVC or in TPO (olefin-based thermoplastic elastomers). Thermal insulation is guaranteed by the insulating core in polyurethane foam or mineral wool.

Depending on the design features, various Isopan GreenROOF solutions can be implemented.

GreenROOF Estensivo

Suitable for large buildings, sloping roofs and existing roofs due to their low substrate thickness (approx. 3 to 15 cm), with a maximum weight of 100 kg/m²; the colonising vegetation is very resistant (mosses, grasses, succulents) and does not require frequent maintenance (watered only in case of prolonged drought). The height of the plants does not exceed 25 cm and the combination of several varieties gives these roofs a multi-coloured appearance that varies with the seasons. This type of roof cannot be walked on and cannot be cultivated.

GreenROOF Intensivo

Suitable for small and medium surfaces. The thickness of the substrate is greater (approx. 15 to 30 cm) and the overload weight is between 120 and 350 kg/m² (at maximum capacity in water). It allows the vegetation to have a strong root and aerial horticulture type such as grasses, turf, lively plants or shrubs. Moderate maintenance and regular watering are necessary. Comparable to traditional gardens, it is possible to sow or cultivate all types of vegetation.

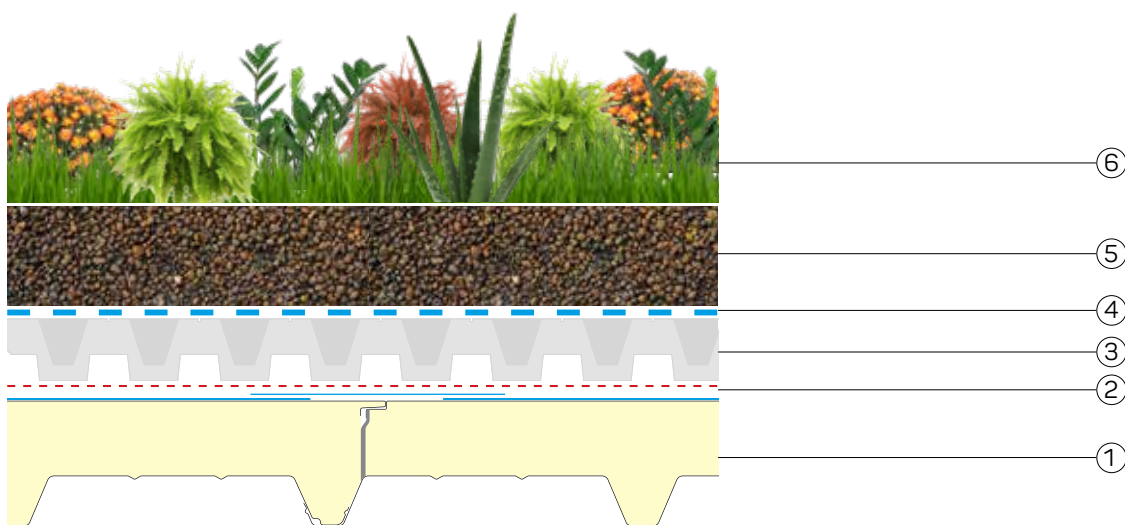
In the case of green roofs, due to the high loads which the roof is subjected to, careful design plays a fundamental role in guaranteeing the perfect functionality and integrity of the structures. The capacity data in the load tables on the following pages represent an estimate, in standard conditions of use, and are not to be considered as design data. It will be up to the Designer to examine and verify them, in order to correctly size the load-bearing substructures.



Photo courtesy of DAKU ITALIA S.r.l.

e-Base

System for a green roof on flat roofs with limited structural capacity and reduced thickness. The system is set up with technical purposes, able to add significant functional advantages to the building, the usable plant species are reduced and must have very high drought resistance characteristics.



COMPOSITION OF THE SYSTEM

1. ISOPAN corrugated sandwich panel with waterproof protective film
2. Anti-root membrane
3. Mechanical protection layer, draining and water storage element DAKU FSD 10, in sintered expanded polystyrene, with raw mass 25 kg/m^3 approx., 47 mm thickness and water storage capacity equal to approx. 5 l/m^2 .
4. DAKU filter element, stabilising geotextile in polypropylene fibres, 1.35 mm thick.
5. DAKU cultivation layer consisting of DAKU and a mix of volcanic aggregates, having a granulometry within the limits defined by UNI 11235/2015 grain size and the apparent dry density between 650 and 750 kg/m^3 , and the substrate weight, when saturated, is lower than $1,072 \text{ kg/m}^3$. 8 cm settled thickness.
6. DAKU vegetative layer consisting of herbaceous perennial ground cover; the mixture in cuttings is composed of different species of Sedum in varying proportions and lengths; planting at a minimum rate of 80 gr/m^2 .





NOMINAL THICKNESS Sandwich Panel	mm	80	100	120	150
TOTAL THICKNESS	mm	262	282	302	332

POLYURETHANE FOAM insulation
 Sheet thickness: 0.8 mm (external) + 0.8mm (internal)



Technical Data					
Transmittance	W/m²K	0.197	0.166	0.145	0.121
Phase shift (Winter)	h : mm	05:08	05:42	06:20	07:22
Phase shift (Summer)	h : mm	05:29	06:03	6.41	07:43
Loads permanent + accidental		l = Maximum Span - cm			
Permanent loads 100 Kg/m²	80 Kg/m²	330	380	420	480
	120 Kg/m²	300	330	380	430
	160 Kg/m²	270	310	340	370

MINERAL WOOL insulation
 Sheet thickness: 0.8 mm (external) + 0.8mm (internal)



Technical Data					
Transmittance	W/m²K	0.293	0.256	0.228	0.195
Phase shift (Winter)	h : mm	04:59	05:30	06:05	07:01
Phase shift (Summer)	h : mm	05:19	05:50	06:25	07:21
Loads permanent + accidental		l = Maximum Span - cm			
Permanent loads 100 Kg/m²	80 Kg/m²	230	260	330	400
	120 Kg/m²	190	230	270	340
	160 Kg/m²	160	200	230	280

IRRIGATION AND WATER RESERVE

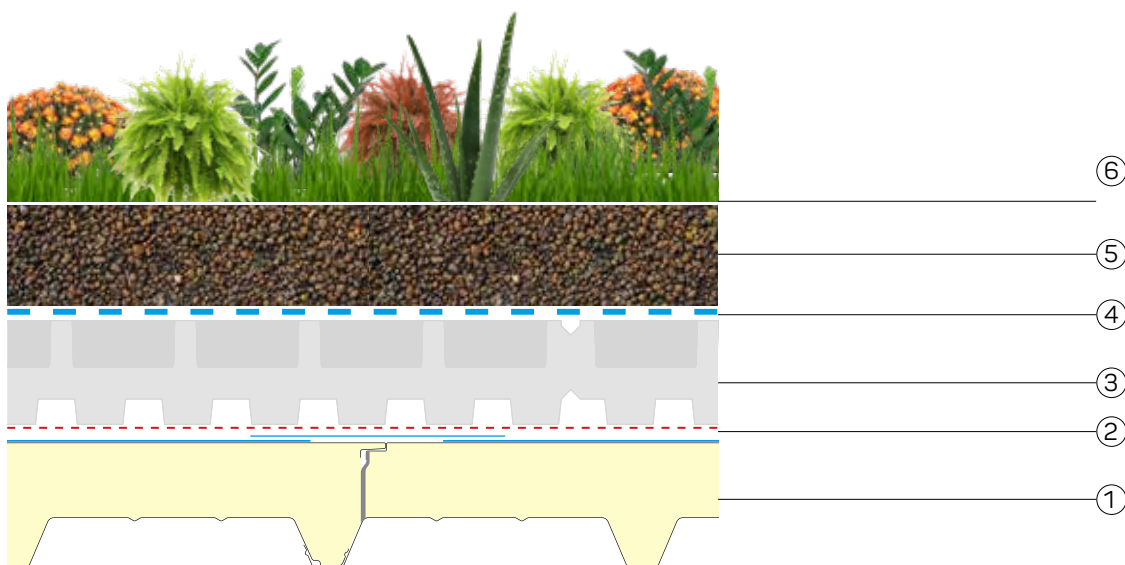
The water reserve of the calculated water storage element to allow Sedum-based vegetation to overcome **dry periods of about three weeks** in the Mediterranean climate area.

If the critical moments last longer than the three weeks, it is necessary to intervene with emergency irrigation. Irrigation must be moderate and carefully assessed to keep the presence of weeds controlled and reduced. The System must be integrated with an emergency irrigation system if exposure, latitude, the geomorphological context and the standard local average rainfall make it advisable.

GreenROOF | Estensivo

e-Std

System that guarantees an excellent compromise between weight, thickness and water self-sufficiency. A green roof that is set up with technical purposes able to add significant functional advantages to the building. The usable plant species are greater than the BASE System and must have very high drought resistance characteristics.



COMPOSITION OF THE SYSTEM

1. ISOPAN corrugated sandwich panel with waterproof protective film
2. Anti-root membrane
3. Mechanical protection layer, draining and water storage element DAKU, in sintered expanded polystyrene, with raw mass 25 kg/m^3 approx., 82 mm thickness and water storage capacity equal to approx. 13.1 l/m^2 .
4. DAKU filter element, stabilising geotextile in polypropylene fibres, 1.35 mm thick.
5. DAKU cultivation layer consisting of DAKU and a mix of volcanic aggregates, having a granulometry within the limits defined by UNI 11235/2015 grain size and the apparent dry density between 650 and 750 kg/m^3 , and the substrate weight, when saturated, is lower than $1,072 \text{ kg/m}^3$. 8 cm settled installation.
6. DAKU vegetative layer consisting of herbaceous perennial ground cover; the mixture in cuttings is composed of different species of Sedum in varying proportions and lengths; planting at a minimum rate of 80 gr/m^2 .





NOMINAL THICKNESS Sandwich Panel	mm	80	100	120	150
TOTAL THICKNESS	mm	297	317	337	367

POLYURETHANE FOAM insulation
 Sheet thickness: 0.8 mm (external) + 0.8mm (internal)



Technical Data					
Transmittance	W/m²K	0.197	0.166	0.145	0.121
Phase shift (Winter)	h : mm	05:08	05:42	06:20	07:22
Phase shift (Summer)	h : mm	05:29	06:03	6.41	07:43
Loads permanent + accidental		l = Maximum Span - cm			
Permanent loads 110 Kg/m²	80 Kg/m²	320	370	400	460
	120 Kg/m²	290	320	360	410
	160 Kg/m²	260	300	330	350

MINERAL WOOL insulation
 Sheet thickness: 0.8 mm (external) + 0.8mm (internal)



Technical Data					
Transmittance	W/m²K	0.293	0.256	0.228	0.195
Phase shift (Winter)	h : mm	04:59	05:30	06:05	07:01
Phase shift (Summer)	h : mm	05:19	05:50	06:25	07:21
Loads permanent + accidental		l = Maximum Span - cm			
Permanent loads 110 Kg/m²	80 Kg/m²	220	250	320	390
	120 Kg/m²	180	220	260	330
	160 Kg/m²	150	190	220	270

IRRIGATION AND WATER RESERVE

Although the weight and thickness are limited, the great water storage capacity of the System allows the essences used to have optimal vegetation conditions even in long dry periods.

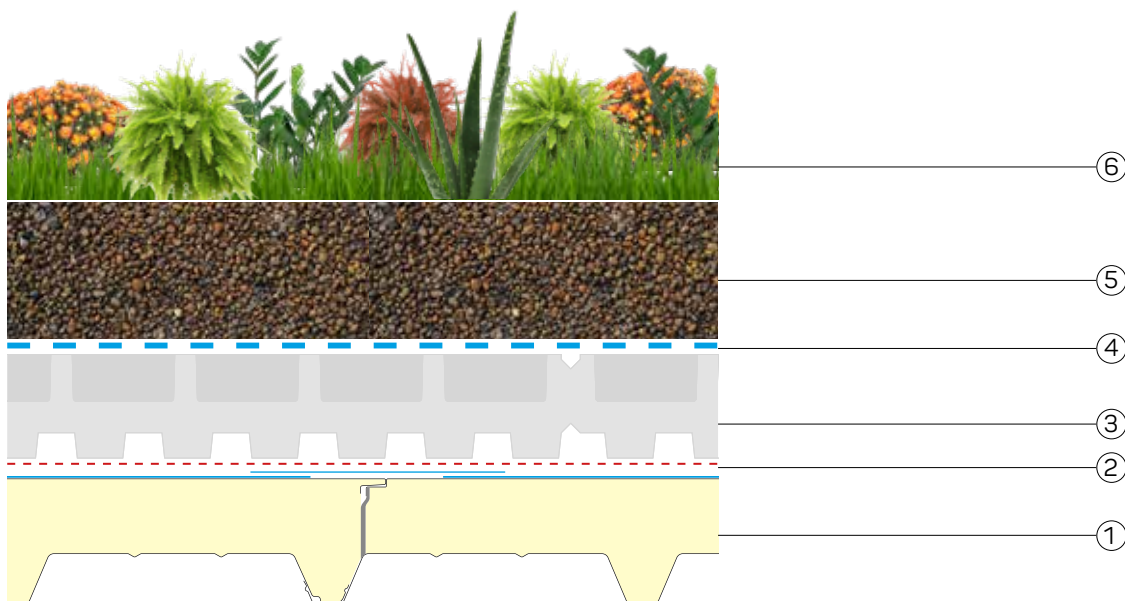
The water alone of the water reserve, which returns to the vegetation through a timely process of capillary rising, guarantees the system to overcome **about seven weeks without rainfall** in the Mediterranean climate area.

With rare exceptions, the System is offered without the irrigation system.

GreenROOF | Estensivo

e-Plus

It combines excellent performance of water efficiency with a varied and attractive appearance thanks to the multiple plant species, mostly autochthonous, which increase the ecological value of the roof.



COMPOSITION OF THE SYSTEM

1. ISOPAN corrugated sandwich panel with waterproof protective film
2. Anti-root membrane
3. Mechanical protection layer, draining and water storage element DAKU, in sintered expanded polystyrene, with raw mass 25 kg/m^3 approx., 82 mm thickness and water storage capacity equal to approx. 13.1 l/m^2 .
4. DAKU filter element, stabilising geotextile in polypropylene fibres, 1.35 mm thick.
5. DAKU cultivation layer consisting of DAKU and a mix of volcanic aggregates, having a granulometry within the limits defined by UNI 11235/2015 grain size and the apparent dry density between 650 and 750 kg/m^3 , and the substrate weight, when saturated, is lower than $1,072 \text{ kg/m}^3$. 10 cm settled installation.
6. DAKU vegetative layer consisting of herbaceous perennial ground cover; the mixture in cuttings is composed of different species of Sedum in varying proportions and lengths; planting at a minimum rate of 80 gr/m^2 .





NOMINAL THICKNESS Sandwich Panel	mm	80	100	120	150
TOTAL THICKNESS	mm	317	337	357	387

POLYURETHANE FOAM insulation
 Sheet thickness: 0.8 mm (external) + 0.8mm (internal)



Technical Data					
Transmittance	W/m²K	0.197	0.166	0.145	0.121
Phase shift (Winter)	h : mm	05:08	05:42	06:20	07:22
Phase shift (Summer)	h : mm	05:29	06:03	6.41	07:43
Loads permanent + accidental		l = Maximum Span - cm			
Permanent loads 130 Kg/m²	80 Kg/m²	310	360	390	430
	120 Kg/m²	290	310	350	380
	160 Kg/m²	290	290	310	330

MINERAL WOOL insulation
 Sheet thickness: 0.8 mm (external) + 0.8mm (internal)



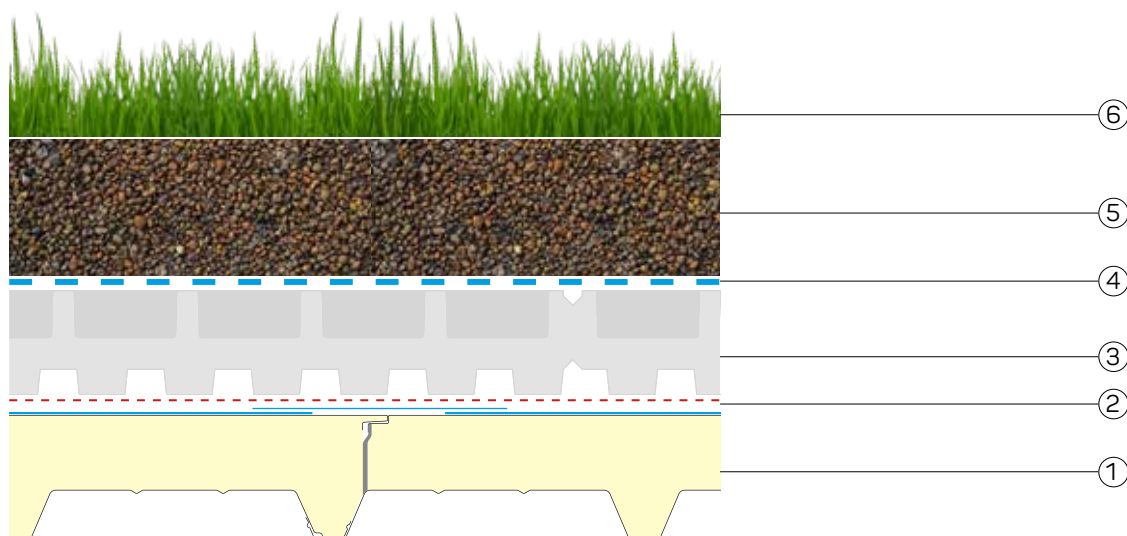
Technical Data					
Transmittance	W/m²K	0.293	0.256	0.228	0.195
Phase shift (Winter)	h : mm	04:59	05:30	06:05	07:01
Phase shift (Summer)	h : mm	05:19	05:50	06:25	07:21
Loads permanent + accidental		l = Maximum Span - cm			
Permanent loads 130 Kg/m²	80 Kg/m²	200	230	290	360
	120 Kg/m²	170	200	240	310
	160 Kg/m²	140	180	210	260

IRRIGATION AND WATER RESERVE

Irrigation system: programmable automatic system, with static or dynamic shower sprinklers. Adopting an irrigation system allows a wider variety of species to be used.

i-Std

System used to set up roof gardens on flat roofs with limited weight and thickness. It is a fully usable green roof where the grassy turf and small and medium ornamental shrubs help to enhance the aesthetic value of the garden.



COMPOSITION OF THE SYSTEM

1. ISOPAN corrugated sandwich panel with waterproof protective film
2. Anti-root membrane
3. Mechanical protection layer, draining and water storage element DAKU, in sintered expanded polystyrene, with raw mass 25 kg/m^3 approx., 82 mm thickness and water storage capacity equal to approx. 13.1 l/m^2 .
4. Filter element: DAKU, stabilising geotextile in polypropylene fibres, 1.50 mm thick.
5. Cultivation layer: DAKU, consisting of DAKU and a mix of volcanic aggregates, having a granulometry within the limits defined by UNI 11235/2015 grain size and the apparent dry density between 700 and 800 kg/m^3 , and the substrate weight, when saturated, is lower than $1,175 \text{ kg/m}^3$. 15 cm settled installation.
6. turf consisting of "microtherm" grass species for grassing with immediate effect, including levelling and rolling.





NOMINAL THICKNESS Sandwich Panel	mm	80	100	120	150
TOTAL THICKNESS	mm	367	387	407	437

POLYURETHANE FOAM insulation
 Sheet thickness: 0.8 mm (external) + 0.8mm (internal)



Technical Data					
Transmittance	W/m²K	0.197	0.166	0.145	0.121
Phase shift (Winter)	h : mm	05:08	05:42	06:20	07:22
Phase shift (Summer)	h : mm	05:29	06:03	6.41	07:43
Loads permanent + accidental		l = Maximum Span - cm			
Permanent loads 200 Kg/m²	80 Kg/m²	240	270	290	350
	120 Kg/m²	230	240	270	310
	160 Kg/m²	210	230	240	270

MINERAL WOOL insulation
 Sheet thickness: 0.8 mm (external) + 0.8mm (internal)



Technical Data					
Transmittance	W/m²K	0.293	0.256	0.228	0.195
Phase shift (Winter)	h : mm	04:59	05:30	06:05	07:01
Phase shift (Summer)	h : mm	05:19	05:50	06:25	07:21
Loads permanent + accidental		l = Maximum Span - cm			
Permanent loads 200 Kg/m²	80 Kg/m²	150	170	210	260
	120 Kg/m²	130	160	190	240
	160 Kg/m²	120	150	170	210

IRRIGATION AND WATER RESERVE

The system needs an irrigation system, the management and maintenance costs are comparable to those required for a traditional garden on the ground.

Specifications

GREENROOF ESTENSIVO E-BASE SYSTEM

Set-up of the Isopan GreenROOF - Estensivo e-Base system, a green roof with Sedum vegetative finish in compliance with the requirements of UNI 11235/2015. The system is to be installed on the Isopan Isoleck PVSteel panel and must fulfil the following efficiency and sustainability parameters:

- Settled thickness of the system (excluding vegetation) not exceeding 13 cm approx.
- The substrate weight, when saturated at pF1 (excluding vegetation) does not exceed 93 kg/m²
- System air volume at pF1 not less than 46.5 l/m²
- MT (maximum water retained by the system) not less than 38.5 l/m²
- CI (intermediate content = water retained by porous materials at pF2) not less than 27.5 l/m²
- ATD (total water available = MT-PA) not less than 30.5 l/m²
- UT (usability ratio = ATD/MT) not less than 0.79
- EF (efficiency ratio = APD/ATD) not less than 0.64
- System flow coefficient (certified according to UNI11235/2015 - FLL test) not exceeding 0.51

The Isopan GreenROOF - Estensivo e-Base system consists of:

- A mechanical protection layer, drainage element and Daku water storage: in sintered expanded polystyrene, with a raw mass of 25 kg/m³ approx., 47 mm thick and water storage capacity of 5 l/m² approx. Surface drainage capacity at 20 kPa (i=0.01) not less than 1.44 l/ms; Vertical drainage capacity not less than 14.74 l/m²s; Free air volume with maximum water storage of not less than 18.8 l/m².

- DAKU filter element, stabilising geotextile in polypropylene fibres, 1.35 mm thick (at 2kPa), weight 220 g/m² (±10%). Speed index VIH=50 of 85 mm/s (-30%), with a characteristic pore opening d=90% of 0.08 mm (±30%).

- DAKU cultivation layer: consisting of compost and a mix of volcanic aggregates, having a granulometry within the limits defined by UNI 11235/2015 grain size and the apparent dry density between 650 and 750 kg/m³, and the substrate weight, when saturated, is lower than 1,072 kg/m³, PH between 7 and 8, CSC not less than 16.3 m²/100g, water retention capacity (pF07) not less than 40% v/v, available water not less than 30% v/v; 8 cm settled installation.

- Daku completion fertiliser: slow and gradual release of nutrients, in coated granules, at a rate of 8 g/m² for every cm of substrate; total nitrogen 14%, phosphorus pentoxide (water soluble) 13%, and potassium oxide 12%.

- Daku Estensivo e-Base vegetative layer: consisting of herbaceous perennial ground cover; the mixture in cuttings is composed of different species of Sedum in varying proportions and lengths; planting at a minimum rate of 80 g/m².

- Ballasting bands: protection layer and safety perimeter drainage (width 50 cm approx.) in round, washed gravel, with a grain size of 20 - 30 mm, for a maximum thickness that is equal to that of the stabilised substrate.

The Isopan GreenROOF - Estensivo e-Base system must be integrated accordingly with an emergency irrigation system if exposure, latitude, the geomorphological context and the local average rainfall make it necessary; all the products used conform to the requirements of UNI 11235/2015. The Certification of efficiency and sustainability of the system will only be issued if Isopan SpA instructions regarding the materials used and the installation methods are observed.

GREENROOF ESTENSIVO E-PLUS SYSTEM

Set-up of the Isopan GreenROOF – Estensivo e-Plus system, a green roof with mixed vegetative finish including Sedum, herbaceous perennials/grasses, in compliance with the requirements of UNI 11235/2015. The system is to be installed on the Isopan Isodeck PVSteel panel and must fulfil the following efficiency and sustainability parameters:

- Settled thickness of the system (excluding vegetation) not exceeding 18 cm approx.
- The substrate weight, when saturated, at pF1 (excluding vegetation) does not exceed 123 kg/m²
- System air volume at pF1 not less than 56.5 l/m²
- MT (maximum water retained by the system) not less than 55 l/m²
- CI (intermediate content = water retained by porous materials at pF2) not less than 41 l/m²
- ATD (total water available = MT-PA) not less than 45 l/m²
- UT (usability ratio = ATD/MT) not less than 0.82
- EF (efficiency ratio = APD/ATD) not less than 0.69
- System flow coefficient (certified according to UNI11235/2015 - FLL test) not exceeding 0.47

The Isopan GreenROOF - Estensivo e-Plus system consists of:

- A mechanical protection layer, drainage element and Daku water storage: in sintered expanded polystyrene, with a raw mass of 25 kg/m³ approx., 82 mm thick and water storage capacity of 13.1 l/m² approx. Surface drainage capacity at 20 kPa (i=0.01) not less than 1.44 l/ms; Vertical drainage capacity not less than 0.73 l/m²s; Free air volume with maximum water storage of not less than 21.5 l/m².
- DAKU filter element, stabilising geotextile in polypropylene fibres, 1.35 mm thick (at 2kPa), weight 220 g/m² (±10%). Speed index VIH=50 of 85 mm/s (-30%), with a characteristic pore opening d=90% of 0.08 mm (±30%).
- DAKU cultivation layer: consisting of compost and a mix of volcanic aggregates, having a granulometry within the limits defined by UNI 11235/2015 grain size and the apparent dry density between 650 and 750 kg/m³, and the substrate weight, when saturated, is lower than 1,072 kg/m³, PH between 7 and 8, CSC not less than 16.3 m²/100g, water retention capacity (pF07) not less than 40% v/v, available water not less than 30% v/v; 10 cm settled installation.
- Daku completion fertiliser: slow and gradual release of nutrients, in coated granules, at a rate of 8 g/m² for every cm of substrate; total nitrogen 14%, phosphorus pentoxide (water soluble) 13%, and potassium oxide 12%.
- Daku Estensivo e-Plus vegetative layer: consisting of a basic mixture composed of different species of Sedum in varying proportions and lengths; planting at a minimum rate of 80 g/m² and herbaceous perennials/grasses at a rate of 3 plants/m², provided in a 9 cm diameter pot, on 30% of the green surface.
- Ballasting bands: protection layer and safety perimeter drainage (width 50 cm approx.) in round, washed gravel, with a grain size of 20 - 30 mm, for a maximum thickness that is equal to that of the stabilised substrate.
- Irrigation system: programmable automatic system, with static or dynamic shower sprinklers.

All Isopan products used conform to the requirements of UNI 11235/2015. The Certification of efficiency and sustainability of the system will only be issued if Isopan SpA instructions regarding the materials used and the installation methods are observed.

Specifications

GREENROOF ESTENSIVO E-STD SYSTEM

Set-up of the Isopan GreenROOF – Estensivo e-Std system, a green roof with Sedum vegetative finish in compliance with the requirements of UNI 11235/2015. The system is to be installed on the Isopan Isoleck PVSteel panel and must fulfil the following efficiency and sustainability parameters:

- Settled thickness of the system (excluding vegetation) not exceeding 16 cm approx.
- The substrate weight, when saturated, at pF1 (excluding vegetation) does not exceed 101 kg/m²
- System air volume at pF1 not less than 49.5 l/m²
- MT (maximum water retained by the system) not less than 46.5 l/m²
- CI (intermediate content = water retained by porous materials at pF2) not less than 35.5 l/m²
- ATD (total water available = MT-PA) not less than 38.5 l/m²
- UT (usability ratio = ATD/MT) not less than 0.83
- EF (efficiency ratio = APD/ATD) not less than 0.71
- System flow coefficient (certified according to UNI11235/2015 - FLL test) not exceeding 0.51

The Isopan GreenROOF – Estensivo e-Std system consists of:

- A mechanical protection layer, drainage element and Daku water storage: in sintered expanded polystyrene, with a raw mass of 25 kg/m³ approx., 82 mm thick and water storage capacity of 13.1 l/m² approx. Surface drainage capacity at 20 kPa (i=0.01) not less than 1.44 l/ms; Vertical drainage capacity not less than 0.73 l/m²s; Free air volume with maximum water storage of not less than 21.5 l/m².

- DAKU filter element, stabilising geotextile in polypropylene fibres, 1.35 mm thick (at 2kPa), weight 220 g/m² (±10%). Speed index VIH=50 of 85 mm/s (-30%), with a characteristic pore opening d=90% of 0.08 mm (±30%).

- DAKU cultivation layer: consisting of compost and a mix of volcanic aggregates, having a granulometry within the limits defined by UNI 11235/2015 grain size and the apparent dry density between 650 and 750 kg/m³, and the substrate weight, when saturated, is lower than 1,072 kg/m³, PH between 7 and 8, CSC not less than 16.3 m²/100g, water retention capacity (pF07) not less than 40% v/v, available water not less than 30% v/v; 8 cm settled installation.

- Daku completion fertiliser: slow and gradual release of nutrients, in coated granules, at a rate of 8 g/m² for every cm of substrate; total nitrogen 14%, phosphorus pentoxide (water soluble) 13%, and potassium oxide 12%.

- Daku Estensivo e-Std vegetative layer: consisting of herbaceous perennial ground cover; the mixture in cuttings is composed of different species of Sedum in varying proportions and lengths; planting at a minimum rate of 80 g/m².

- Ballasting bands: protection layer and safety perimeter drainage (width 50 cm approx.) in round, washed gravel, with a grain size of 20 - 30 mm, for a maximum thickness that is equal to that of the stabilised substrate.

The Isopan GreenROOF – Estensivo e-Std system must be integrated accordingly with an emergency irrigation system if exposure, latitude, the geomorphological context and the local average rainfall make it necessary; all the Isopan products used conform to the requirements of UNI 11235/2015. The Certification of efficiency and sustainability of the system will only be issued if Isopan SpA instructions regarding the materials used and the installation methods are observed.

GREENROOF INTENSIVO I-STD SYSTEM

Set-up of the Isopan GreenROOF – Intensivo i-Std system with a lawn-type vegetative finish in compliance with the requirements of UNI 11235/2015. The system is to be installed on the Isopan Isodeck PVSteel panel and must fulfil the following efficiency and sustainability parameters:

- Settled thickness of the system (excluding vegetation) not exceeding 23 cm approx.
- The substrate weight, when saturated, at pF1 (excluding vegetation) does not exceed 192 kg/m²
- System air volume at pF1 not less than 64.5 l/m²
- MT (maximum water retained by the system) not less than 82.5 l/m²
- CI (intermediate content = water retained by porous materials at pF2) not less than 62 l/m²
- ATD (total water available = MT-PA) not less than 69 l/m²
- UT (usability ratio = ATD/MT) not less than 0.84
- EF (efficiency ratio = APD/ATD) not less than 0.7
- System flow coefficient (certified according to UNI11235/2015 - FLL test) not exceeding 0.36

The Isopan GreenROOF – Intensivo i-Std system consists of:

- A mechanical protection layer, drainage element and Daku water storage: in sintered expanded polystyrene, with a raw mass of 25 kg/m³ approx., 82 mm thick and water storage capacity of 13.1 l/m² approx. Surface drainage capacity at 20 kPa (i=0.01) not less than 1.44 l/ms; Vertical drainage capacity not less than 0.73 l/m²s; Free air volume with maximum water storage of not less than 21.5 l/m².
- DAKU filter element, stabilising geotextile in polypropylene fibres, 1.5 mm thick (at 2kPa), weight 260 g/m² (±10%). Speed index VIH=50 of 75 mm/s (-30%), with a characteristic pore opening d=90% of 0.07 mm (±30%).
- DAKU cultivation layer: consisting of compost and a mix of volcanic aggregates, having a granulometry within the limits defined by UNI 11235/2015 grain size and the apparent dry density between 700 and 800 kg/m³, and the substrate weight, when saturated, is lower than 1,175 kg/m³, PH between 7 and 8, CSC not less than 18.4 m²/100g, water retention capacity (pF07) not less than 45% v/v, available water not less than 35% v/v; 15 cm settled installation.
- Daku completion fertiliser: slow and gradual release of nutrients, in coated granules, at a rate of 5 g/m² for every cm of substrate; total nitrogen 13%, phosphorus pentoxide (water soluble) 20%, and potassium oxide 9%.
- Daku Intensivo I-Std vegetative layer: turf consisting of "microtherm" grass species for grassing with immediate effect, including levelling and rolling.
- Irrigation system: programmable automatic system, with static or dynamic shower sprinklers.

All Isopan products used conform to the requirements of UNI 11235/2015. The Certification of efficiency and sustainability of the system will only be issued if Isopan SpA instructions regarding the materials used and the installation methods are observed.

Specifications

ISODECK PVSTEEL MW PANEL

Self-supporting double-sheet sandwich panel for flat or slightly sloping roofs, consisting of an external pre-painted galvanised steel sheet with Sendzimir process, flat finish coupled with a waterproof membrane in PVC or TPO; internal pre-painted galvanised steel sheet with Sendzimir process with a 5-rib profile, 40 mm rib height, and 250 mm pitch. Insulation consisting of mineral wool with perpendicular fibres to the panel thickness in staggered strips, density 100 kg/m³ ±10%, and thermal conductivity $\lambda = 0.04$ W/mK.

ISODECK PVSTEEL PU PANEL

Self-supporting double-sheet sandwich panel for flat or slightly sloping roofs, consisting of an external pre-painted galvanised steel sheet with Sendzimir process, flat finish coupled with a waterproof membrane in PVC or TPO; internal pre-painted galvanised steel sheet with Sendzimir process with a 5-rib profile, 40 mm rib height, and 250 mm pitch. Insulation consists of rigid expanded polyurethane with high insulating power, density 40 kg/m³ ±10%, thermal conductivity $\lambda = 0.022$ W/mK.

IMPORTANT

The panel must be supplied in combination with the appropriate fixing systems (depending on the thickness of the substructure) and appropriate bridging strips. Both are suitable and supplied by Isopan.

GreenROOF |

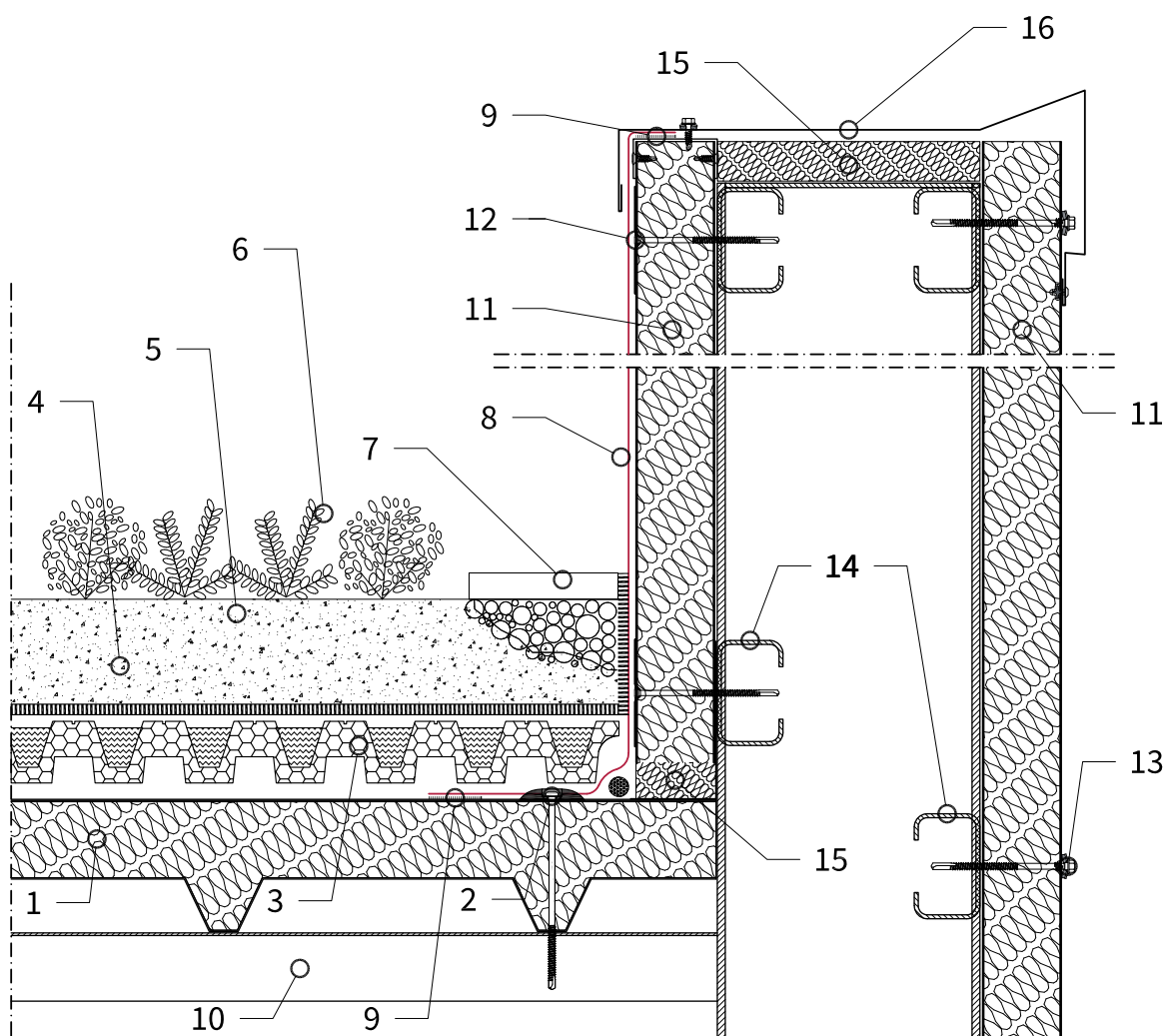
Projects



Photo courtesy of DAKU ITALIA S.r.l.

e-Base

ATTENTION: the proposed solution does not constitute the project, and must be firstly assessed and evaluated by the designer and construction supervision. The designer is responsible for assessing the need to insert additional gasket and/or closing elements, even when not indicated in the drawing details. The property rights of this document belong to ISOPAN S.p.a.. The contents can't be reproduced without prior written permission by the author. To choose the type of fastening, please refer to the screw type choice sheet; to choose the screw length, please refer to the data sheet for the correct screw length).



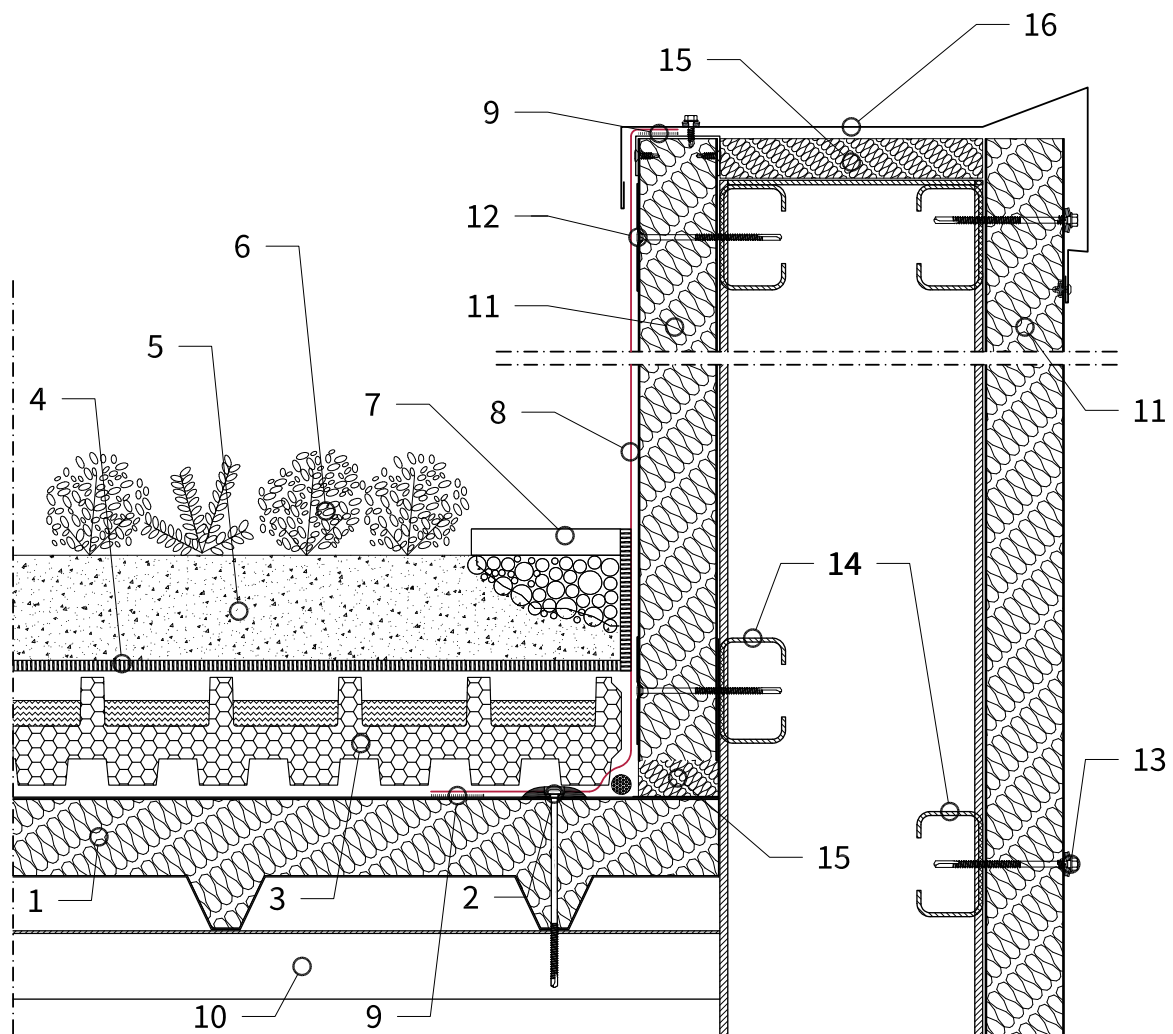
Legend

01	ISOPAN Flat Roof Panel (PVC/TPO)	09	5 cm welding
02	Flat roof fastening system	10	Steel support
03	Sintered polystyrene panel	11	ISOPAN Wall Panel
04	Geotextile	12	Fixing screw with plate
05	Roof soil	13	Wall panel fixing screw
06	Sedum mixture	14	Stell support
07	Gravel	15	Proper on site insulation
08	Waterproofing membrane	16	Custom flashing

GreenROOF | Technical details

e-Std

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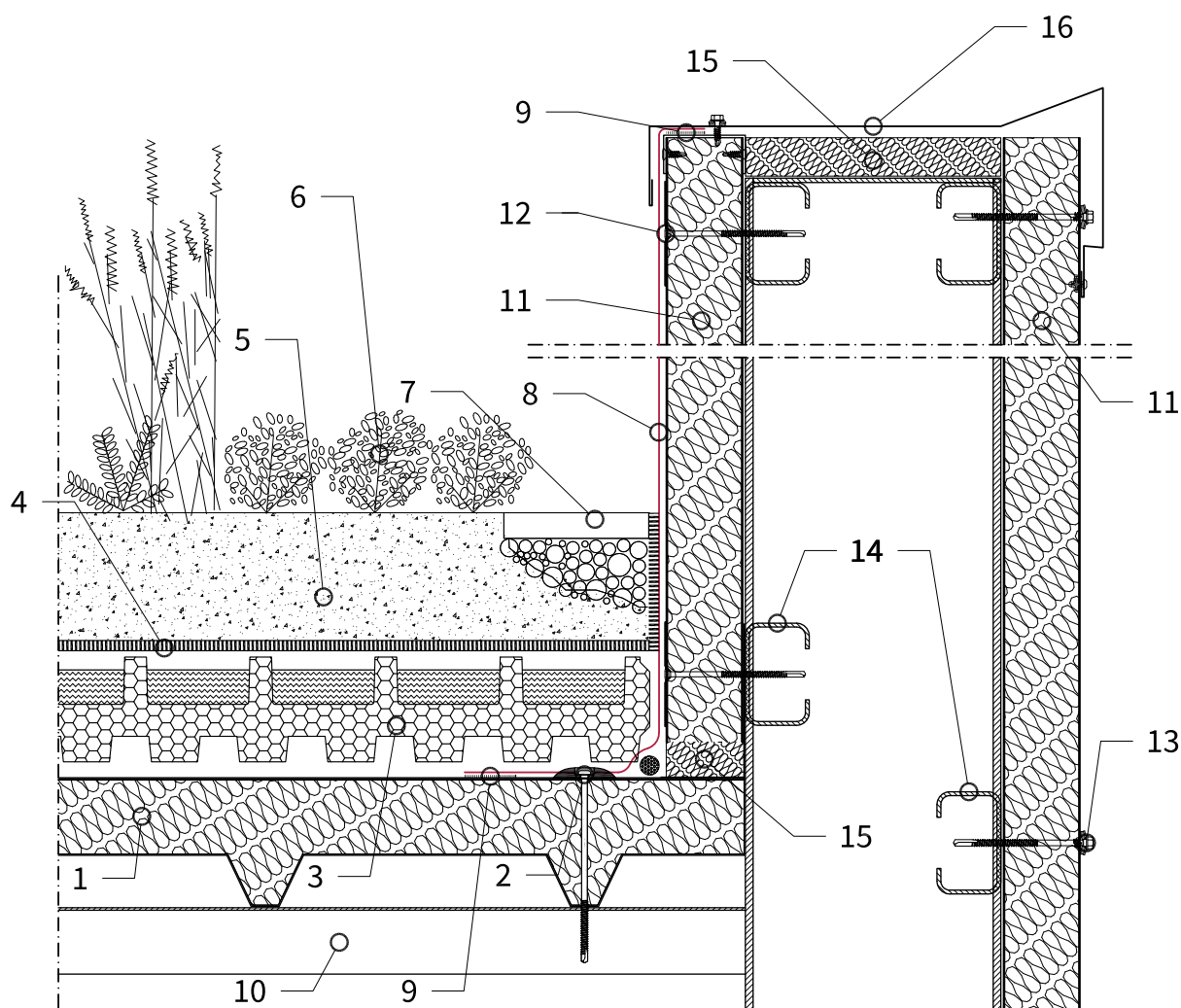


Legend

01	ISOPAN Flat Roof Panel (PVC/TPO)	09	5 cm welding
02	Flat roof fastening system	10	Steel support
03	Sintered polystyrene panel	11	ISOPAN Wall Panel
04	Geotextile	12	Fixing screw with plate
05	Roof soil	13	Wall panel fixing screw
06	Sedum mixture	14	Stell support
07	Gravel	15	Proper on site insulation
08	Waterproofing membrane	16	Custom flashing

e-Plus

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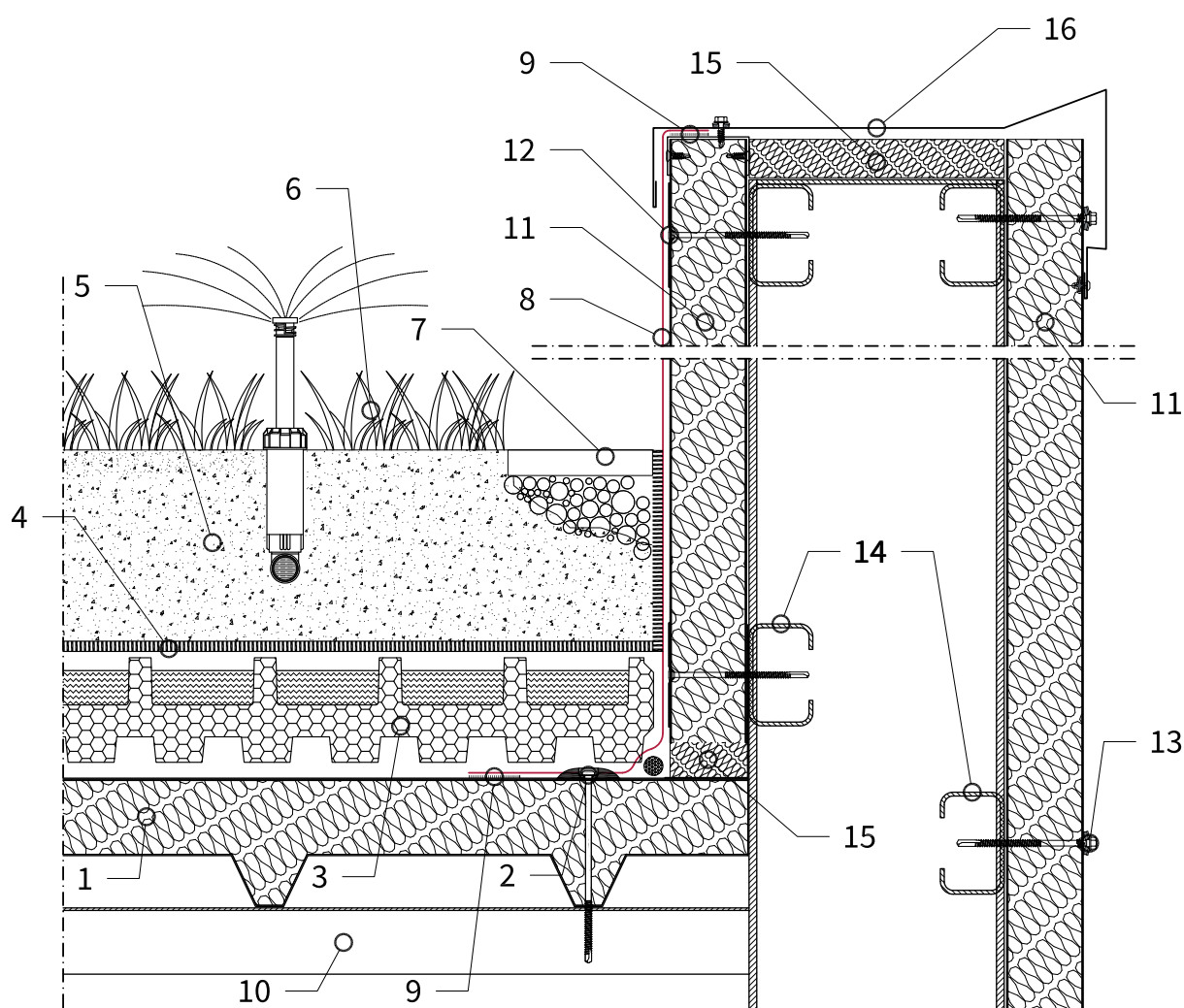


Legend

01	ISOPAN Flat Roof Panel (PVC/TPO)	09	5 cm welding
02	Flat roof fastening system	10	Steel support
03	Sintered polystyrene panel	11	ISOPAN Wall Panel
04	Geotextile	12	Fixing screw with plate
05	Roof soil	13	Wall panel fixing screw
06	Sedum mixture	14	Stell support
07	Gravel	15	Proper on site insulation
08	Waterproofing membrane	16	Custom flashing

i-Std

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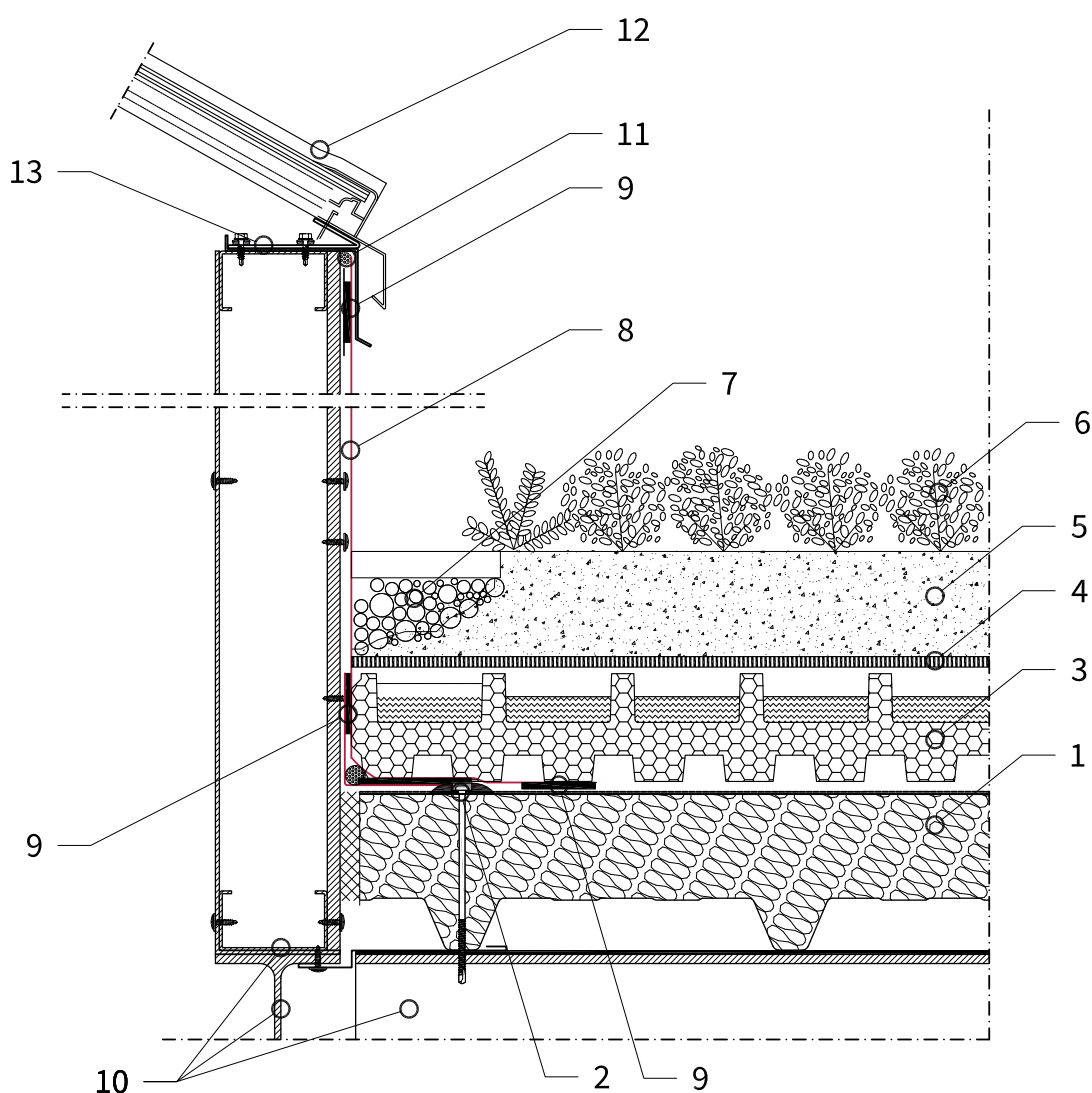


Legend

01	ISOPAN Flat Roof Panel (PVC/TPO)	09	5 cm welding
02	Flat roof fastening system	10	Steel support
03	Sintered polystyrene panel	11	ISOPAN Wall Panel
04	Geotextile	12	Fixing screw with plate
05	Roof soil	13	Wall panel fixing screw
06	Sedum mixture	14	Stell support
07	Gravel	15	Proper on site insulation
08	Waterproofing membrane	16	Custom flashing

Skylight

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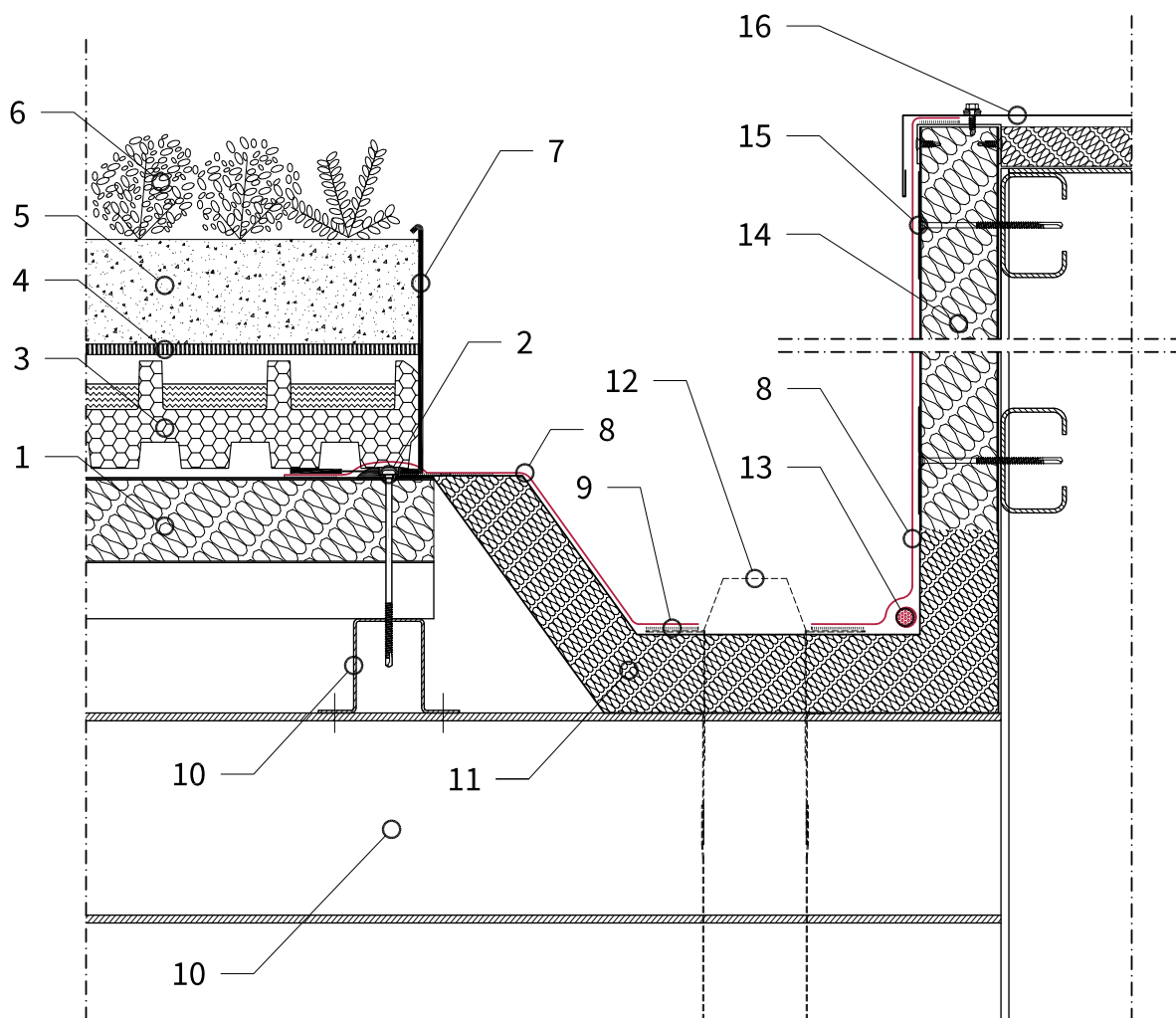


Legend

01	ISOPAN Flat Roof Panel (PVC/TPO)	09	5 cm welding
02	Flat roof fastening system	10	Steel support
03	Sintered polystyrene panel	11	Elastic non acetic sealent
04	Geotextile	12	Skylight
05	Roof soil	13	Custom flashing
06	Sedum mixture	14	
07	Gravel	15	
08	Waterproofing membrane	16	

Gutter

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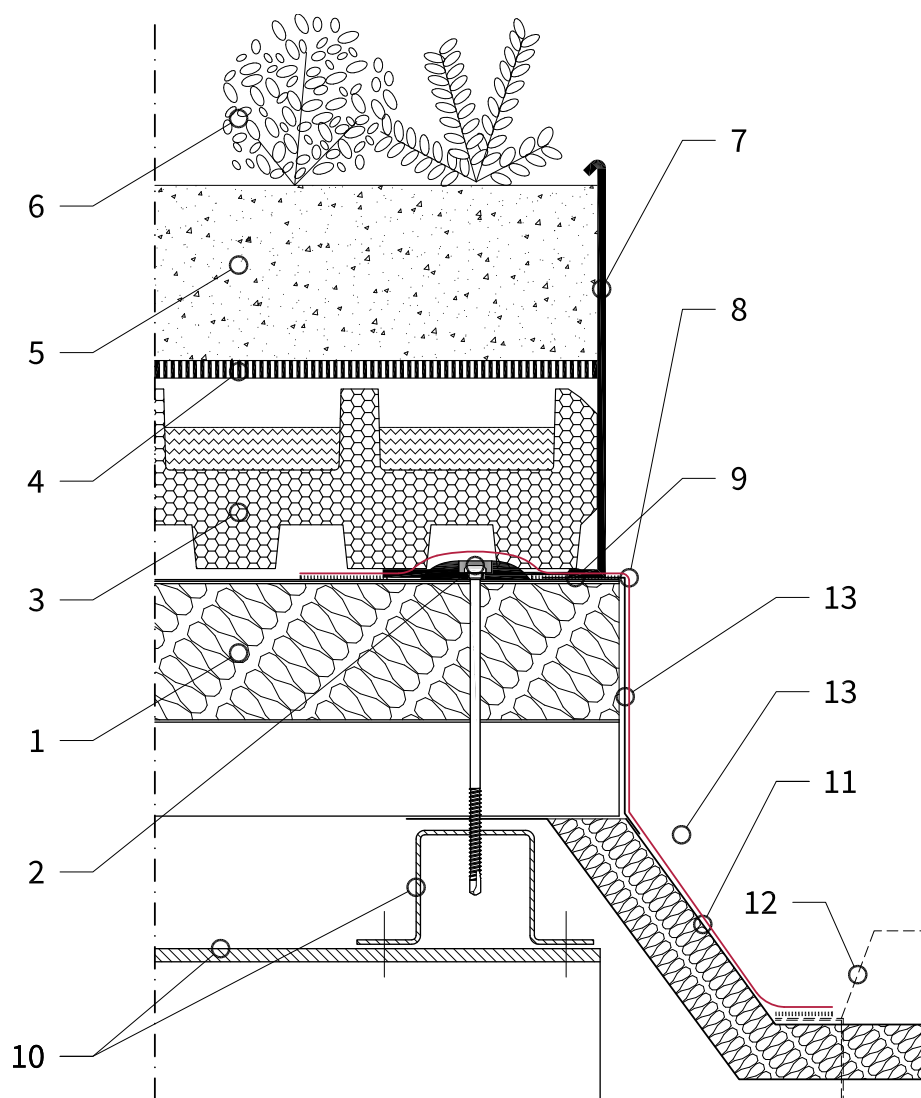


Legend

01	ISOPAN Flat Roof Panel (PVC/TPO)	09	5 cm welding
02	Flat roof fastening system	10	Steel support
03	Sintered polystyrene panel	11	Custom insulated drain with proper insulation
04	Geotextile	12	Drainpipe
05	Roof soil	13	Compressible curb
06	Sedum mixture	14	ISOPAN Wall Panel
07	Edge Green Roof flashing	15	Wall panel fixing system
08	Waterproofing membrane	16	Custom flashing

Internal gutter

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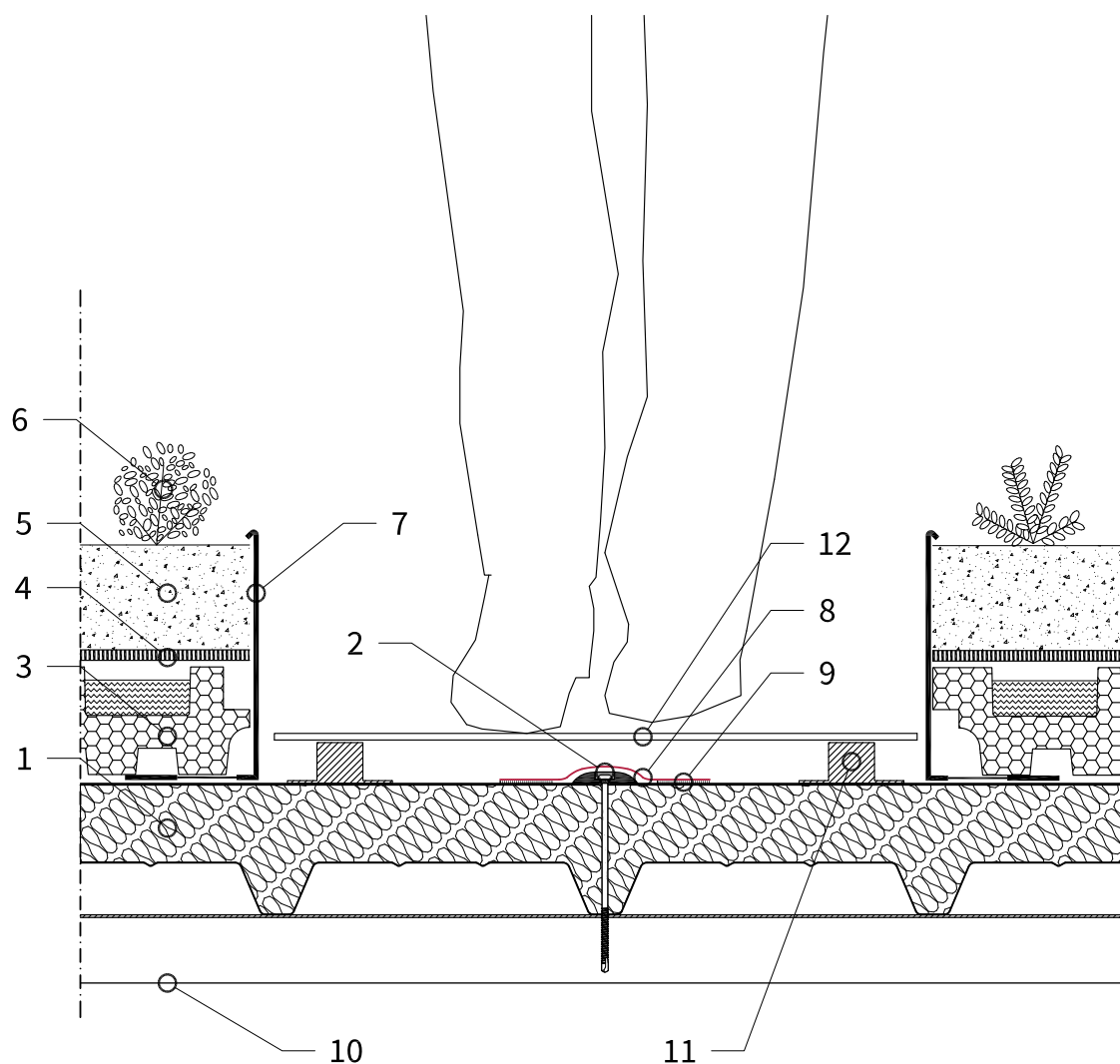


Legend

01	ISOPAN Flat Roof Panel (PVC/TPO)	09	5 cm welding
02	Flat roof fastening system	10	Steel support
03	Sintered polystyrene panel	11	Custom insulated drain with proper insulation
04	Geotextile	12	Drainpipe
05	Roof soil	13	Custom flashing
06	Sedum mixture	14	
07	Edge Green Roof flashing	15	
08	Waterproofing membrane	16	

Flooring

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Legend

01	ISOPAN Flat Roof Panel (PVC/TPO)	09	5 cm welding
02	Flat roof fastening system	10	Steel support
03	Sintered polystyrene panel	11	Flat roof bridging bar
04	Geotextile	12	Flat roof walkway
05	Roof soil	13	
06	Sedum mixture	14	
07	Edge Green Roof flashing	15	
08	Waterproofing membrane	16	



PART OF
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