

Product Data Sheet

HYDROSOIL® PLUGPLANT EXTENSIVE LIVING ROOF

Comprising a water retention and drainage layer with bonded filter fleece, engineered growing medium and mixed plug plants

Axter's living or green roof systems are designed to accommodate the most varied ecological and environmental requirements. The combination of long-term system performance with horticultural expertise ensures full compliance with national, local and project specific environmental biodiversity and attenuation criteria.

A living roof, as well as being an aesthetically pleasing addition to a building, offers many other advantages:

- Increased biodiversity, creating habitat for birds, bees and invertebrates
- More usable space on the roof (e.g. for gardens, amenity, play and educational areas)
- Less urban heat island effect
- Reduced rainwater run off flow rates
- Better air filtration
- Increased sound insulation and thermal efficiency



Extensive living roofs are not usually trafficked but are intended to be visual or ecological features. Typically, they have thin substrate layers to minimise depth and weight and are designed to be low maintenance with slow growing vegetation. They are often created to provide habitat for flora or fauna and to enhance building performance by reducing rainwater flow rates and increasing thermal efficiency..

Key benefits

- Provides biodiversity for flora and fauna
- Visually appealing; minimal maintenance required
- Can be installed on flat or sloping roofs
- Thin soil substrate
- Self-sustaining vegetation such as succulents, grasses and wildflowers

Soils or substrates for extensive living roofs are usually of a low nutrient type thus suppressing the growth of invasive weed species and of minimal thickness. Plants are selected for their ability to thrive in such conditions and to establish a self-sustaining living roof. Sedum and wildflower mats, pre-grown trays or plug plants can all be incorporated into an extensive design.

Hydrosoil® Extensive Living Roof options:

HYDROSOIL® PLUGPLANT

HYDROSOIL® WILDFLOWER

HYDROSEED®

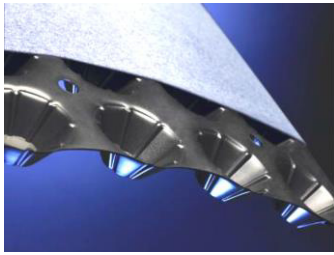
HYDROSOIL® SEDUM

HYDROSOIL® MIXED PLUG PLANT EXTENSIVE LIVING ROOF

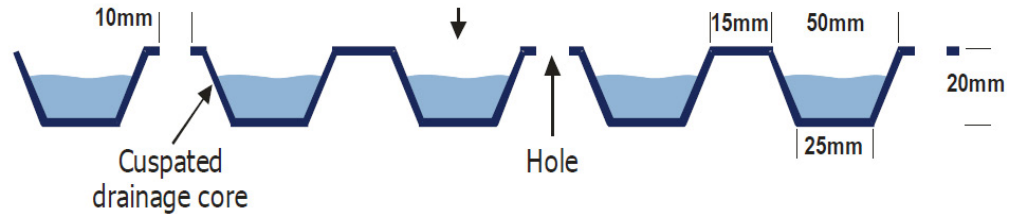
- Water retention and drainage layer (20mm)
- Filter layer (1mm)
- Substrate layer (80mm)
- Mixed plug plants (18 / 20 plugs/m² –
sedum, mixed wildflowers)



Water retention and drainage layer (20mm)



High compressive strength, rigid HDPE board acting as both drainage and water retention layer, with a geotextile filter layer bonded to one side. The board contains high capacity dimples (height approx. 20mm) for water retention and perforations to drain surplus water. It is resistant to root penetration and to chemicals.



Drainage sheet (cusped, perforated)	Test Standard	Units	Value
Polymer	High Density Polyethylene		
Cusate height		mm	20
Compressive strength	EN ISO 25619-2	kPa	115
Tensile strength (MD/CMD)	EN ISO 10319	kN/m	17
Static Puncture (CBR)	EN ISO 12236	kN	2.6
Perforations per m ²			49
Perforations diameter		mm	10
Thickness @ 2kPa	EN ISO 9863-1	mm	21
Water flow through perforations	EN ISO 11058	l/(m ² .s)	24
Water storage capacity		l/m ²	4
Roll dimensions		m	0.97 x 50
Roll diameter (approx.)		m	1.1
Roll weight (approx.)		kg	60

Geotextile

Polymer	Polypropylene		
Water permeability (V _{H50})	EN ISO 11058	l/(m ² .s)	100
Apparent opening size	EN ISO 12956	µm	80

Filter layer (1mm)

Fleece filter layer for use on all sedum and biodiverse living roof systems. Manufactured using UV stabilised polypropylene, it provides high tensile properties and excellent durability. Its high density and strength, resulting from re-orientation of the molecules within the fibres during manufacturing, increase its environmental resistance and mechanical properties. It is resistant to root penetration and to chemicals.

The filter layer should be covered within one month of installation.

Expected durable service life of the material is up to 50 years in soils with $4 \leq \text{pH} \leq 9$ and soil temperatures $\leq 25^\circ\text{C}$, based on a durability assessment.



Physical properties	
Composition	Non-woven geotextile made from 100% virgin polypropylene high tenacity fibres, heat treated, needle punched, containing UV inhibitor
Weight (g/m ²)	123
Colour	White
Unit supplied	Rolls: Unit width (Im) 1.13 x Unit length (Im) 100
Roll weight (kg)	14
Thickness @ 2kPa (mm)	0.8

Technical properties	Value	Standard
Tensile strength (kN/m) – MD/CMD	9.0 – 9.8	EN ISO 10319
Elongation at max load (%) MD/CMD	60 / 65	EN ISO 10319
CBR static puncture (kN)	1.4	EN ISO 12236
Cone drop penetration (mm)	32	EN ISO 13433
Apparent opening size (µm)	80	EN ISO 12956
Water permeability (l/m ² .s)	100	EN ISO 11058
Weathering 50 MJ/m ² (1 month)	>90% retained strength	EN ISO 12224

Substrate layer (80mm)

Moisture retentive, low nutrient and free draining; made from 100% recycled material. Suitable for use on extensive sedum roof systems and all plant finishes. Allows root penetration. Organic material PAS100 certified.

Physical properties	
Composition	Recycled crushed brick/mineral and organic material (green waste)
Brick grading	Various grading of brick suitable for extensive green roofs
Colour	Dark brown
Suggested depth	50 - 100 mm
Sizes	25 litre sacks and bulk bags

Technical properties	
Weight (dry)	750 kg/m ³
Weight (saturated)	920 kg/m ³
Compaction	Approx 15% (+/-3%)
pH	7.5 – 8.5

Recommended minimum substrate depth is 80mm.
Hydrosoil Mixed Plug Plant with 80mm Substrate is 110kg/m² wet.

Mixed Plug Plants (18-20/m², sedum, mixed flowers as standard)

The mixed plug plants combine pre-cultivated, propagated sedum and wildflower plugs planted directly into substrate growing medium.

Sedum plug plants

Plants are from UK seed stock and are propagated and germinated in UK nurseries resulting in them being acclimatised for use on living roofs in the UK. The plants are frost, wind and drought tolerant and will gradually provide an even cover of vegetation over the roof area.

The broad mix available enables credits to be secured from BREEAM and Sustainable Homes codes the 'Land Use and 'Ecology' section by improving the land ecology value of the site.



Physical properties	
Material	Propagated and germinated in recycled brick sedum substrate in a controlled environment, promoting stronger plant development.
Unit size	40 x 40 x 60mm
Plugs per tray	84
Recommended substrate	70-100mm.
Recommended planting	20 per m ²
Colour	Seasonal variation

Sedum plug plant species

15 sedum species (subject to seasonal variations).

Sedum acre	Sedum montanum
Sedum acre octoberfest	Sedum reflexum
Sedum album	Sedum selskianum
Sedum ellacombianum	Sedum sexangulare
Sedum floriferum	Sedum spurium
Sedum forsterianum	Sedum Oreganum
Sedum hybridum	Sedum Pulchellum
Sedum kamtschaticum	

Wildflower plug plants

The plug plants combine a mixture of 34 native species for use on living roofs – extensive, intensive, landscaping projects and podiums. The species chosen provide a variety of colour and habitat to attract pollinators and a long flowering season from Spring to late Autumn. They are propagated and germinated in UK nurseries resulting in them being acclimatised for use on living roofs in the UK.

The wildflower plugs can be used to meet local and national biodiversity action plans and BREEAM ecology credits.



Physical properties	
Material	Propagated and germinated in recycled green waste and mineral blend growing medium in a controlled environment, promoting stronger plant development.
Unit size	40 x 40 x 60mm
Plugs per tray	84
Recommended substrate	80-100mm
Recommended planting	20 per m ² . Substrate must be watered before and after planting and kept moist for at least 3 months following installation and in accordance with weather conditions.
Colour	Seasonal variation

Wildflower plug plant species

34 wildflower and grass species (UK provenance).
Subject to seasonal variations.

Agrimony (<i>Agrimonia Eupatoria</i>),	Vipers Bugloss (<i>Echium Vulgare</i>)
Bird's Foot Trefoil (<i>Lotus Corniculatus</i>)	Wild Marjoram (<i>Origanum Vulgare</i>)
Bladder Campion (<i>Silene Vulgaris</i>)	Thyme (<i>Thymus Polytrichus</i>)
Common Sorrel (<i>Rumex Acetosus</i>)	Yarrow (<i>Achillea Millefolium</i>)
Common Toadflax (<i>Linaria Vulgaris</i>)	Common Poppy (<i>Papaver Rhoeas</i>)
Cowslip (<i>Primula Veris</i>)	Cluster Bellflower (<i>Campanula Glomerata</i>)
Hoary Plantain (<i>Plantago Media</i>)	Harebell (<i>Campanula Rotundifolia</i>)
Kidney Vetch (<i>Anthyllis Vulneraria</i>)	Lesser Knapweed (<i>Centaurea Nigra</i>)
Lady's Bedstraw (<i>Galium Verum</i>)	Black Medic (<i>Medicago Lupulina</i>)
Ox-Eye Daisy (<i>Leucanthemum Vulgare</i>)	Red Campion (<i>Silene Dioica</i>)
Perforate St John's Wort (<i>Hypericum Perforatum</i>)	Betony (<i>Stachys Officinalis</i>)
Red Clover (<i>Trifolium Pratense</i>)	Catsear (<i>Hypochaeris</i>)
Rough Hawkbit (<i>Leontodon Hispidus</i>)	Yellow Rattle (<i>Rhianthus Minor</i>)
Salad Burnett (<i>Sanguisorba Minor</i>)	Field Scabious (<i>Knautia Arvensis</i>)
Self Heal (<i>Prunella Vulgaris</i>)	Meadow Buttercup (<i>Ranunculus Acris</i>)
Small Scabious (<i>Scabiosa Columbaria</i>)	Cornflower (<i>Centaurea Cyanus</i>)
Sweet Vernal Grass (<i>Anthoxanthum Odoratum</i>)	Corn Marigold (<i>Chrysanthemum Segetum</i>)

Maintenance

An annual maintenance programme for mixed plug plant living roofs is recommended, to include two visits per year, one in the Spring (remedial to remove invasive/unwanted species to ensure system sustainability and functionality) and one in the Autumn (strimming of wildflowers after flowers have seeded).

The substrate must be watered before and after planting and the plants should be kept moist for at least three months after installation and as weather conditions require. Further information is available in the Axter Living Roof Maintenance Guide.

Design Considerations

A living roof calls for a robust waterproofing system able to withstand the increased loads and suitable for the building structure.

Axter has an extensive choice of BBA / ETA certified, tried and test, high performance waterproofing systems designed to fulfil this function (Cityflor, Wilotekt-Plus, Force 3000 Trafic, Force 4000 Dalle Trafic and Starcoat PMMA).

Each living roof is different, so we design bespoke solutions drawing on our many waterproofing options and including in the specification the planting selections best suited to the environment to ensure all roof and surrounding area criteria are met.

The following points must be included in the living roof design:

- Roof to be capable of supporting the design load
- Adequate provision to drain excess rainwater
- Safe access for maintenance
- Robust and durable roof waterproofing
- Root resistant membranes must be considered

For further assistance with living roof design, specification, installation and maintenance, contact Axter.

Axter Ltd reserves the right to make changes without notice at any time to the above products. The values given are indicative and correspond to nominal results obtained in laboratories and testing institutes. Any additional installations must be discussed with Axter prior to their implementation.

Final determination of the suitability of any information is the sole responsibility of the user. Consult Axter to discuss the use of this or any other product but responsibility for selection of a material and its application in any specific project remains with the user.