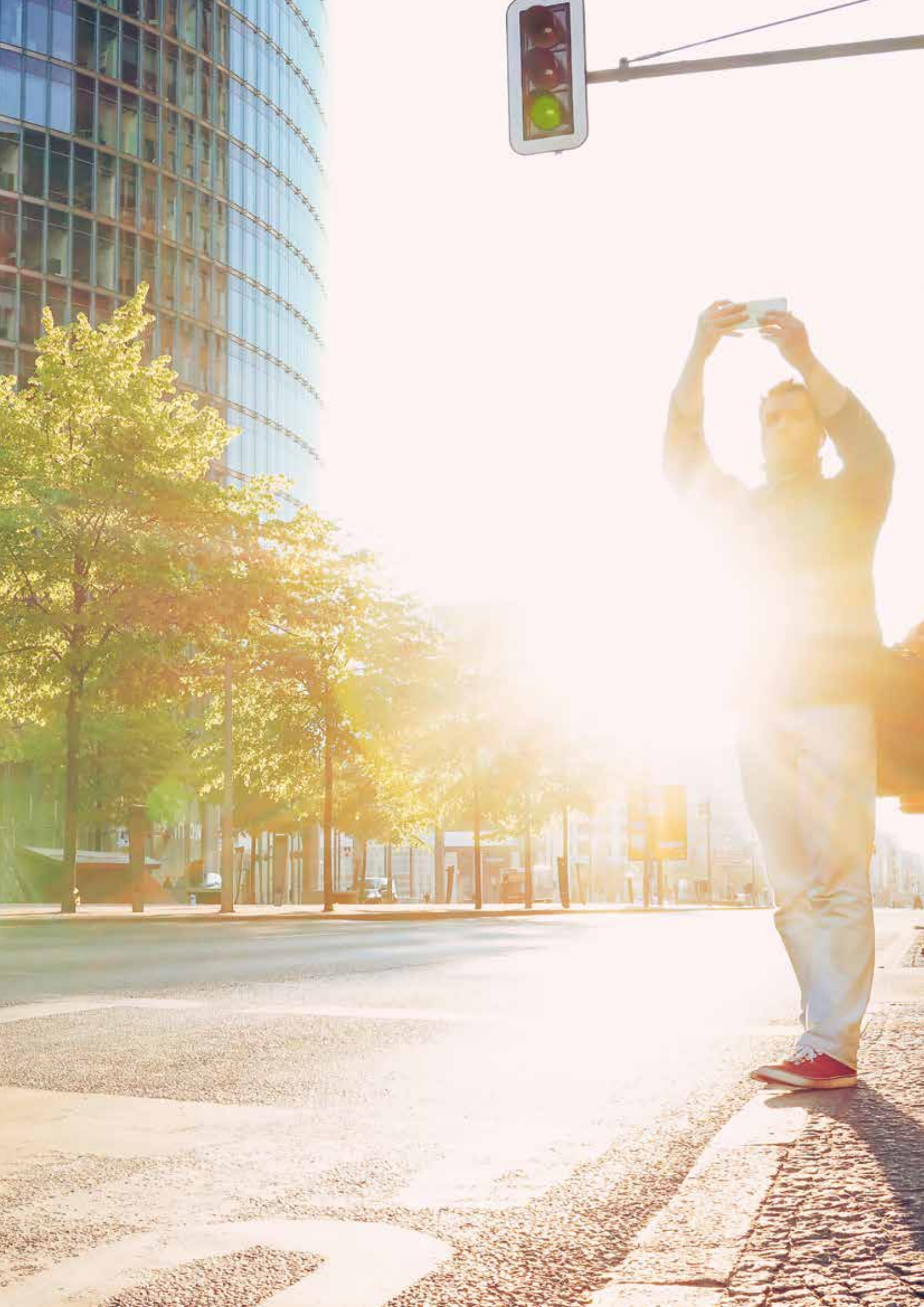
Tree

Substrates for
urban tree planting



Healthy growth under the toughest conditions

The trees on our streets are subject to great threats to their vitality. This makes it all the more important to choose the right tree substrate. The volcanic aggregates of all Vulkatree®products, with their open-pored, stable grain structure promote the air to water balance of the tree location and ensure the outgrowing and sustainable growth of the tree.

Tree planting

As long as the location lies within a park or a spacious garden, a greening compliant with DIN 18916 may still be sufficient. You should observe the FLL recommendations for planting trees if the areas are used as traffic spaces, for storing building materials, it becomes apparent that the soil has been filled with substances of unknown origin or the tree is planted in the pedestrian zone or generally in traffic areas along roads. For procedures 1 and 2 listed there we can always offer the right tree substrate for you from our Vulkatree® range.

What they all have in common are their natural volcanic aggregates, which with their open-pored, structure stable grain structure positively promote root growth and thereby the vitality of your trees.

For special cases and special tree species, we can also provide substrates that provide more than the FLL demands. Such as with the products Vulkatree® humin, Vulkatree® N or Vulkatree ® V/P.

With Vulkatree® Acidic we are the leading manufacturer who can supply a functional substrate for Quercus palustris, Acer rubrum or Liquidambar.

For all those interested in trees, we offer seminars on a regular basis throughout Germany. The current dates can be found under **www.vulkatec.de**

Urban trees to save the climate

Inner-city tree planting has become an integral part of sustainable development. More than ever before, cities are facing the challenge of taking measures to adapt to the effects of climate change.

Urban trees store carbon dioxide, produce oxygen, filter air, lower the ambient temperature and create inner-city habitats. They act as natural air conditioning systems and serve as retention areas for water (surface unsealing). Healthy urban trees in large numbers are therefore genuine climate savers.

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Product overview

Tree substrates

Vulkatree® 0–16 and 0–32

Tree substrate for FLL procedures 1 + 2 and grading curve A + B of the ZtV VegtraMü.

On pages 96 and 97

Vulkatree® L 0–32

Substrate for FLL procedure 2, increased load-bearing capacity and compaction resistance.

On page 98

Vulkatree® V/P

Tree substrate for FLL procedures 1 + 2; free from Verticillium and Phytophthora.

On page 99

Vulkatree® R 0–32

Tree substrate for FLL procedure 1 + 2.

On page 100

Vulka ST 16–32
Vulka ST 32–64

Cavity-rich storage substrate for water management with tree trenches.

On page 101

Vulkatree® acidic 0–32

Tree substrate for FLL procedures 1 + 2 with a lowered pH value.

On page 102

Vulkatree® Vital

Tree substrate for procedure 1

On page 103

Vulkatree® plus

Tree top substrate; substrate for establishing underplantings.

On page 104

Vulkatree® humin

Xylitol-enriched tree substrate for FLL procedures 1+2.

On page 107

Vulkatree® RDX and RDX Premium

Tree substrate enriched with biochar for FLL procedures 1+2.

On page 108

Sludge substrate

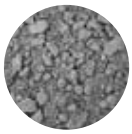
For procedures according to the Stockholm principle

On page 109

Arbortree®

Tree substrate for FLL procedure 1 + 2.
From regional raw materials.

On pages 110–111



Arbortree® Basalt 0–32

Tree substrate for procedures 1 + 2

On page 112

Arbortree® Lava 0–32

Tree substrate for procedures 1 + 2

On page 113

Accessories

Optistart®

Portioned tree starter for adding to the tree pit.

On page 117

RDX Bio

Soil additive based on biochar and porous framework materials.

On page 117

Vulka-Humin

Soil additive based on lignite fiber wood (xylitol).

On page 117

VulkaSense®

Tool for measuring soil moisture and temperature.

On pages 118–121

Vulkatree® 0–16

Substrate for procedures 1 and grading curve A of the ZtV VegtraMü.

Details:

- Low-salt, non-segregating
- The substrate shows good nutrient buffering, and is germination and growth-promoting
- Free of root-forming weeds
- Processable in the wet and in light frost
- Usable without any restrictions on layer thickness
- Produced in accordance with the stipulations of the FLL guideline and the Fertilizer Ordinance in its current version
- External monitoring as part of the RAL quality assurance

Procedure according to FLL:

Procedure 1

Composition:

Natural product (igneous stone mixture, topsoil/ subsoil of different classes) consisting of augite, olivine, magnetite, limonite, biotite and clays of different types

Application areas:

- **New planting of trees**
- **Establishment of underplantings**
- **Tree site restoration**
- **Root curtain**
- **Plant pot substrate for permanent planting of woody plants**
- **Tree planting on underground garages**

Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

www.vulkatec.de

Grain size (ø in mm)	**0–16**
Particle size distribution (percentage of total mass in %)	
Blowable components	10-20%
Fine / medium gravel	30–45%
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3, loose	1.05–1.15 t/m^3
At max. water capacity, compacted	1.60–1.80 t/m^3
Water/air balance, compacted	
Maximum water capacity	20–35 vol. %
Water permeability mod. K_f	0.3–20 mm/min
pH value	7.0–7.5
Salinity	10–50 mg/100g

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Vulkatree® 0–32

Substrate for FLL procedures 1 + 2 and grading curve B of ZtV VegtraMü.

Details:

- Low-salt, non-segregating, pressure-resistant
- The mixture is a porous structure, with a high total pore volume
- Load-bearing at 97% DPr. > 45 MPa
- Max. load bearing capacity of Vulkatree® 0–32 at > 97% DPr.: 70–100 MPa
- The substrate shows good nutrient buffering, and is germination and growth-promoting
- Free of root-forming weeds
- Processable in the wet and in light frost
- Usable without any restrictions on layer thickness
- Produced in accordance with the requirements of the FLL guideline and the Fertilizer Ordinance in its current version
- External monitoring as part of the RAL quality assurance

Procedure according to FLL:

Procedure 1 + 2

Composition:

Natural product (igneous stone mixture, topsoil/subsoil of different classes) consisting of augite, olivine, magnetite, limonite, biotite and clays of different types

Application areas:

- **Planting new trees, especially in spaces influenced by traffic and overbuilt areas**
- **Tree site restoration**
- **Root curtain**

Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

www.vulkatec.de

Grain size (ø in mm)	**0–32**
Particle size distribution (percentage of total mass in %)	
Blowable components	10-20%
Fine / medium gravel	30–40%
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3, loose	1.05–1.15 t/m^3
At max. water capacity, compacted	1.60–1.90 t/m^3
Water/air balance, compacted	
Maximum water capacity	20–35 vol. %
Water permeability mod. K_f	0.3-18 mm/min
pH value	7.0–7.5
Salinity	10–50 mg/100g

Vulkatree® L 0–32

Substrate for FLL procedures 1 + 2, increased load-bearing capacity and compaction resistance.

Details:

- Low-salt, non-segregating, pressure-resistant
- The mixture is a porous structure, with a high total pore volume
- Load-bearing at 97% DPr. > 45 MPa
- Max. load bearing capacity of Vulkatree® L 0–32 at > 97 % DPr.: 70–100 MPa
- Especially compression resistant (forgiving towards laying errors)
- The substrate shows good nutrient buffering, and is germination and growth-promoting
- Free of root-forming weeds
- Processable in the wet and in light frost
- Produced in accordance with the requirements of the FLL guideline and the Fertilizer Ordinance in its current version

Procedure according to FLL:

Procedure 1 + 2

Composition:

Natural product (igneous stone mixture, topsoil/subsoil of different classes) consisting of augite, olivine, magnetite, limonite, biotite and clays of different types

Application areas:

- **Planting new trees, especially in spaces influenced by traffic and overbuilt areas**
- **Tree site restoration**
- **Root curtain**

Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

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Grain size (ø in mm)	**0–32**
Particle size distribution (percentage of total mass in %)	
Blowable components	10-20%
Fine / medium gravel	30–40%
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3, loose	1.05–1.20 t/m^3
At max. water capacity, compacted	1.65–1.95 t/m^3
Water/air balance, compacted	
Maximum water capacity	20–35 vol. %
Water permeability mod. K_f	0.3-18 mm/min
pH value	7.0–7.5
Salinity	10–50 mg/100g

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Vulkatree® V/P

Mineral substrate that is free of tree-damaging Verticilium and Phytophthora spores and mycelium. The use of Vulkatree® V/P is recommended in particular for many verticillium-sensitive species such as Acer, Catalpa, Sorbus aucuparia, Prunus dulcis, Robinia and Cotinus coggygria. In damp locations, the use of Vulkatree® V/P produces good air circulation and eradicates Phytophthora fungi to reduce the damage caused by this growth.

Details:

- Low-salt, non-segregating
- Basic components: Lava and pumice, on request with fertilizer additive and enriched with humic substances or peat
- Open-pored, with a high total pore volume, pressure-resistant
- Good nutrient buffering, germination and growth-promoting
- Free from seeding and root weeds
- At < 95 % DPr. load-bearing > 45 MPa
- Processable in the wet and in light frost
- Usable without any restrictions on layer thickness
- Blowable = using silo trucks with an up to 150 m hose line

Procedure according to FLL:

Procedure 1 + 2

Composition:

Natural product; igneous rock mixture consisting of augite, olivine, magnetite, Limonite, biotite, clays of various types

Application areas:

- **New planting of trees particularly in areas influenced by traffic**
- **Tree site restoration**
- **Tree planting on underground garages**
- **Underplanting with prairie shrubs and small shrubs**
- **Permanent tub planting with perennials and shrubs**

Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

www.vulkatec.de

Grain size (ø in mm)	**0–12**
Particle size distribution (percentage of total mass in %)	
Blowable components	5–15 %
Fine / medium gravel	30–40%
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3, loose	0.90–1.00 t/m^3
At max. water capacity, compacted	1.40–1.60 t/m^3
Water/air balance, compacted	
Maximum water capacity	25–35 vol. %
Water permeability mod. K_f	1–60 mm/min
pH value	6.5–7.5
Salinity	10–50 mg/100 g

Vulkatree® R 0–32

Tree trench substrate for the creation of living soil zones. Suitable for surface water management using tree pits in accordance with FLL procedures 1+2.

Details:
- Low-salt, non-segregating, pressure-resistant
- The mixture is a porous structure, with a high total pore volume
- Load-bearing at 95 % DPr. > 45 MPa
- Max. load-bearing capacity Vulkatree® R 0–32 at > 95 % DPr.: 70–100 MPa
- Optimised for use as a living soil zone in tree trenches in accordance with DWA A138
- The substrate shows good nutrient buffering, and is germination and growth-promoting
- Free of root-forming weeds
- Processable in the wet and in light frost
- Produced in accordance with the requirements of the FLL guideline and the Fertilizer Ordinance in its current version

Procedure according to FLL:

Procedure 1 + 2

Composition:

Natural product (igneous rock mixture, top/undersoil in different classes) consisting of augite, olivine, magnetite, limonite, biotite, clays of different types

Application areas:

- **Living soil zone during production of tree trenches**

Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

www.vulkatec.de/vulkatree

Grain size (ø in mm)	**0–32**
Particle size distribution (percentage of total mass in %)	
Blowable components	10–20
Fine / medium gravel	30–40
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3	1.05–1.20
At max. water capacity, compacted	1.65–1.95
Water/air balance, compacted	
Maximum water capacity	20–30 vol. %
Water permeability mod. K_f	1–20 mm/min
pH value	7.0–7.5
Salinity	10–50 mg/100g

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Vulka ST 16–32
Vulka ST 32–64

Vulka ST is mineral, low-salt, pressure-stable and frost-resistant. Ideally suited as a storage substrate with lots of cavities. The rough surface ensures a good interlocking of the grains and in this way a secure positioning.

Details:
- High pressure stability; loadable up to 95 MPa in the EV2 plate load test
- Up to 67% pore volume; therefore optimally drained
- Up to 15% water storage
- Available as bulk material or packed in 1.0 or 1.5 m3 big bags and as 25 l sacks

Composition:

Natural product (igneous stone mixture) consisting of augite, olivine, magnetite, limonite and biotite

Application areas:

- **Infiltration trench body for trough infiltration and tree trenches**
- **Effectively draining and resilient filler for building spaces**
- **Air and water filtration**

Additional information:

- Certificates
- Product data sheets

This additional material is available for download at:

www.vulkatec.de

Grain size (ø in mm)	**16–32** **32–64**
Particle size distribution (percentage of total mass in %)	
Blowable components	< 10
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3	0.92–1.00
At max. water capacity, compacted	1.15–1.25
Water/air balance, compacted	
Maximum water capacity	8–15 vol. %
Water permeability mod. K_f	250–500 mm/min
Usable air void space	40–45 vol. %
pH value	6.8–7.5
Salinity	0.1–0.5 g/l

Vulkatree® acidic 0–32

Substrate for FLL procedures 1 + 2 and grading curve B of ZtV VegtraMü.

Details:

- Low-salt, non-segregating, pressure-resistant
- The mixture is a porous structure, with a high total pore volume
- Load-bearing at 97% DPr. > 45 MPa
- Max. load bearing capacity of Vulkatree® 0–32 at > 97% DPr.: 70–100 MPa
- The substrate shows good nutrient buffering, and is germination and growth-promoting
- Free of root-forming weeds
- Processable in the wet and in light frost
- Usable without any restrictions on layer thickness
- Produced in accordance with the requirements of the FLL guideline and the Fertilizer Ordinance in its current version
- External monitoring as part of the RAL quality assurance

Procedure according to FLL:

Procedure 1 + 2

Composition:

Natural product (igneous stone mixture, topsoil/subsoil of different classes) consisting of augite, olivine, magnetite, limonite, biotite and clays of different types

Application areas:

- **Planting new trees, especially in spaces influenced by traffic and overbuilt areas**
- **Tree site restoration**
- **Root curtain**

Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

www.vulkatec.de

Grain size (ø in mm)	**0–32**
Particle size distribution (percentage of total mass in %)	
Blowable components	10-20%
Fine / medium gravel	30–40%
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3, loose	1.05–1.15 t/m^3
At max. water capacity, compacted	1.60–1.90 t/m^3
Water/air balance, compacted	
Maximum water capacity	20–35 vol. %
Water permeability mod. K_f	0.3-18 mm/min
pH value	6.0–6.9
Salinity	10–50 mg/100g

Procedure according to FLL:

Procedure 1 + 2

Composition:

Natural product (igneous stone mixture, topsoil/subsoil of different classes) consisting of augite, olivine, magnetite, limonite, biotite and clays of various types, enriched with humic materials

Vulkatree® Vital

For vitalisation during completion and development maintenance. Optimised for planting in extreme locations.

Details:

- Low-salt, non-segregating, pressure-resistant
- The mixture is a porous structure, with a high total pore volume
- At 97 % DPr. EV2 plate load test > 45 MPa
- Max. load bearing capacity of Vulkatree® 0–32 at > 97% DPr.: 70–100 MPa
- The substrate has good nutrient buffering properties, promotes germination and growth based on optimum humic substance enrichment
- Significantly increased water capacity compared to other products on the market
- Simplifies care during development maintenance
- Free of root-forming weeds
- Processable in the wet and in light frost
- Usable without any restrictions on layer thickness
- Produced in accordance with the requirements of the FLL guideline and the Fertilizer Ordinance in its current version

Application areas:

- **Planting new trees, especially in spaces influenced by traffic and overbuilt areas**
- **Tree site restoration**
- **Root curtain**

Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

www.vulkatec.de

Grain size (ø in mm)	**0–32**
Particle size distribution (percentage of total mass in %)	
Blowable components	10-20%
Fine / medium gravel	25–40 %
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3, loose	1.0–1.1 t/m^3
At max. water capacity, compacted	Procedure 1: 1.55–1.75 t/m^3 Procedure 2: 1.70–1.85 t/m^3
Water/air balance, compacted	
Maximum water capacity	33-45 vol. %
Water permeability mod. K_f	0.3-18 mm/min
pH value	7.0–7.5
Salinity (KCL)	20–60 mg/100g

Vulkatree® Plus

Mineral-organic tree top/covering substrate:

- Low salt, non-segregating
- The substrate shows good nutrient buffering, and is germination and growth-promoting
- The mixture is porous, with a high total pore volume, pressure-resistant
- Free of root-forming weeds
- Processable in the wet and in light frost
- Usable up to 45 cm layer thickness
- Produced in accordance with the requirements of the FLL guideline and the Fertilizer Ordinance in its current version

Procedure according to FLL:

Tree top/covering substrate

Composition:

Natural product (igneous stone mixture, topsoil/subsoil of different classes) consisting of augite, olivine, magnetite, limonite, biotite, clays of various types, enriched with compost

Application areas:

- **New planting of trees as an upper substrate**
- **Establishment of underplantings**
- **Tree site restoration**
- **Root curtain**
- **Plant pot substrate for permanent planting of woody plants**
- **Tree planting on underground garages**

Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

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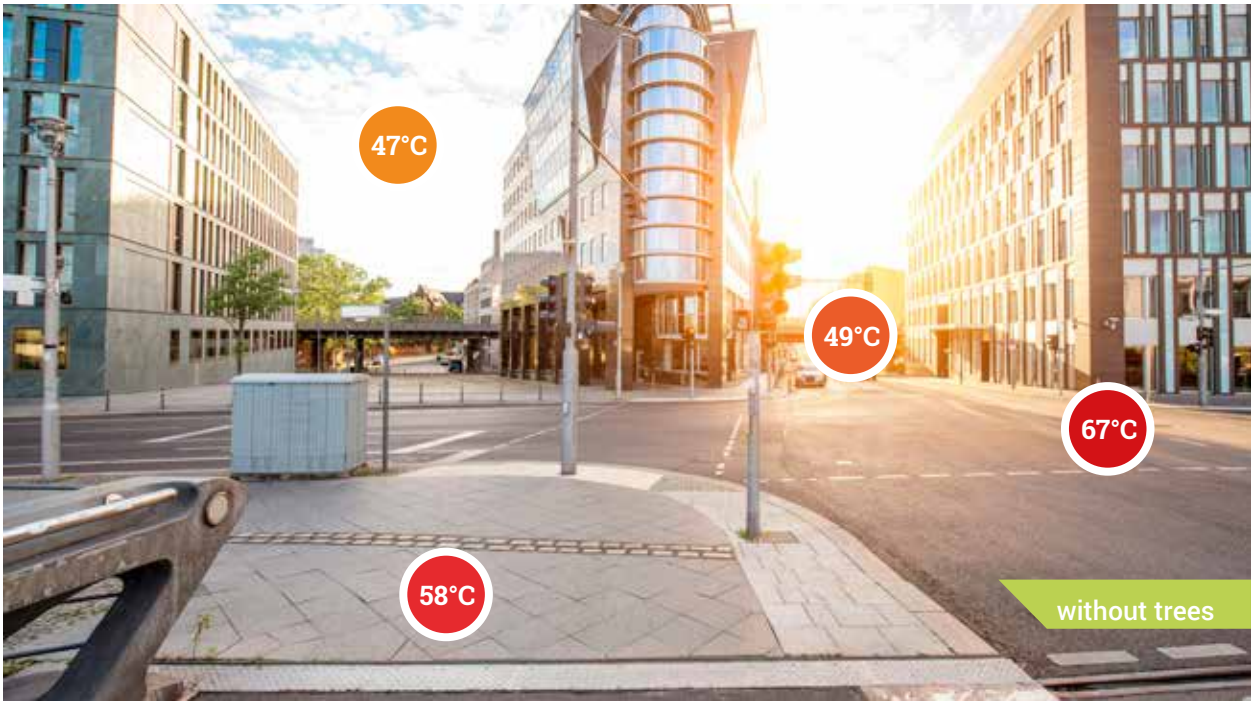
Grain size (ø in mm)	**0–16**
Particle size distribution (percentage of total mass in %)	
Blowable components	8–15 %
Fine / medium gravel	40–55 %
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3, loose	0.95–1.10 t/m^3
At max. water capacity, compacted	1.55–1.80 t/m^3
Water/air balance, compacted	
Maximum water capacity	35–50 vol. %
Water permeability mod. K_f	5–20 mm/min
pH value	6.5–7.5
Salinity	0.2–1.0 g/l

Wellbeing effect
Temperature reduction

The term urban refers to the combination of green roofs, underground parking garages, façades, green spaces and tree planting in urban and sealed environments.

The aim of this green infrastructure is to mitigate the consequences of climate change such as heat, water shortages, heavy rainfall, etc. and to create habitats that are suitable for people and animals. Urban trees play a key role in this context.

The figure illustrates the importance of urban trees both now and for the future. Vulkatec: From a green background.



Carbon-based substrates

Legal performance enhancement for trees.

Extended periods of drought and heat stress have increasingly affected our trees in recent years. Preparing the site is therefore all the more important, in addition to adequate care. This includes determining the geological layers at the beginning. Is the soil suitable for rooting? Parameters such as air and water flow, water retention capacity, pH value and pollutant load are important criteria.

If the soil is only suitable to a limited extent, soil additives such as Lavadrän and RDX Bio can improve the conditions for the tree. Vulkatree as a soil substitute is recommended if the local soil is unsuitable.

Vulkatree is now also available under the name Vulkatree RDX with added RDX Bio. RDX Bio is a blend of volcanic compounds, nutrients and biochar. The term Terra Preta is often used in the media. Biochar positively impacts the growth of beneficial soil bacteria. It is able to protect nutrients against leaching and preserve their availability for plants. Toxic soil substances such as organic pollutants and heavy metals are bound. Overall, this leads to healthier, more stress-tolerant plants due to induced resistance.

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Vulkatree® humin

Substrate for FLL procedures 1 + 2 enriched with permanent humic substance lignite fiber wood (xylitol).

Details:

- enriched with the permanent humic substance xylitol
- Low-salt, non-segregating, pressure-resistant
- The mixture exhibits a porous structure, with a high total pore volume
- Load-bearing at 97 % DPr. > 45 MPa DPr.: 70–100 MPa
- The substrate possesses good nutrient buffering, and is germination and growth-promoting
- Free of root-forming weeds
- Processable in the wet and in light frost
- Usable without any restrictions on layer thickness
- Produced in accordance with the requirements of the FLL guideline and the Fertilizer Ordinance in its current version
- External monitoring as part of the RAL quality assurance

Procedure according to FLL:

Procedure 1 + 2

Composition:

Natural product (igneous rock mixture, topsoil/ subsoil of various classes) consisting of augite, olivine, magnetite, limonite, biotite, clays of various types and lignite fiber wood (xylite)

Application areas:

- **Planting new trees, especially in spaces influenced by traffic and overbuilt areas**
- **Tree site restoration**
- **Root curtain**

Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

www.vulkatec.de

Grain size (ø in mm)	**0–16**	**0–32**
Particle size distribution (percentage of total mass in %)		
Blowable components	10-20%	10-20%
Fine / medium gravel	30–45%	30–40%
Volume weight (t/m^3)		
Delivery condition DIN EN 1097-3, loose	1.05–1.15 t/m^3	1.05–1.15 t/m^3
At max. water capacity, compacted	1.60–1.80 t/m^3	1.60–1.90 t/m^3
Water/air balance, compacted		
Maximum water capacity	20–35 vol. %	20–35 vol. %
Water permeability mod. K_f	0.3–20 mm/min	0.3–18 mm/min
pH value	7.0–7.5	7.0–7.5
Salinity (KCL)	10–50 mg/100g	10–50 mg/100g

Procedure according to FLL:

Procedure 1 + 2

Composition:

Natural product (igneous stone mixture, topsoil/subsoil of different classes) consisting of augite, olivine, magnetite, limonite, biotite and clays of various types: enriched with plant / biochar (Terra Preta).
Standard enrichment of 1% - the proportion can be adjusted if required.

Vulkatree® RDX
Vulkatree® RDX Premium

Substrate based on loess soil, lava, pumice and sand enriched with plant / biochar (Terra Preta) for FLL procedures 1+ 2.

Details:

- **Vulkatree RDX Premium** with charged biochar
- The mixture is a porous structure, with a high total pore volume
- Load-bearing at 97% DPr. > 45 MPa
- Free of root-forming weeds
- Processable in the wet and in light frost
- Produced in accordance with the requirements of the FLL guideline and the Fertilizer Ordinance in its current version
- Supports the development of mycorrhiza
- Increased fine root growth
- Buffering of nutrients and pollutants
- Improved vitality for increased stress tolerance in heat and drought
- Available as bulk material and in big bags

Application areas:

- **Planting new trees, especially in spaces influenced by traffic and overbuilt areas**
- **Tree site restoration**
- **Root curtain**

Grain size (ø in mm)	**0–32**
Particle size distribution (percentage of total mass in %)	
Blowable components	10-20%
Fine / medium gravel	30–40%
Volume weight (t/m^3)	
Delivery condition DIN EN 1097-3, loose	1.05–1.15 t/m^3
At max. water capacity, compacted	1.60–1.90 t/m^3
Water/air balance, compacted	
Maximum water capacity	20–35 vol. %
Water permeability mod. K_f	0.3-18 mm/min
pH value	7.0–7.5
Salinity	10–50 mg/100g

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Sludge substrate

Fine soil for slurrying in skeleton soils (macadam procedure). Enriched with charged biochar.

Details:

- High pressure stability
- Good slurrying patterns
- Supports the development of mycorrhiza
- Increased fine root growth
- Increased stress tolerance in heat and drought

Application areas:

- **Tree trench body in macadam procedure**
- **Soil additive to improve the soil structure and biology**

Grain size (ø in mm)	**0–2**
Particle size distribution (percentage of total mass in %)	
Blowable components	0.5
Fine sand	25
Medium sand	50
Coarse sand	0.5
Fine gravel	0.0
Content of organic matter	0.0
Content of carbonate (separation system)	10
Content of carbonate (mixed system)	25
Bulk weight according to DIN 4226	1.10 g/cm³
Permeability coefficient	1.5x10⁻⁴ m/s
pH value ($CaCl^2$)	7.7
Adsorption capacity	20 mmol eq/l

Arbortree®

From the region for the region

Made of regional raw materials
Regionality is on everyone's lips today. We are increasingly buying fruit, vegetables and meat at the market or from the farmer around the corner because we feel responsible for our ecological footprint. We have also thought about the regionalisation of our substrates to keep their supply routes short and reduce their environmental impact.
After extensive researching of raw materials and analysis of environmental impacts in the laboratory, we have now developed the new Arbortree® substrate. This combines ecology, vegetation technology and economics into a single package.

Available at the following locations, among others:

Location	Post code	State / Province
Fürstenwalde / Spree	15517	Brandenburg
Volkstorf	21397	Lower Saxony
Parensen	37176	Lower Saxony
Sande	26452	Lower Saxony
Kretz	56630	Rhineland-Palatinate
Aken / Elbe	06385	Saxony-Anhalt
Utrecht	NL 3542	Utrecht

Current status at **www.vulkatec.de**

Arbortree® 0–16
Arbortree® 0–32

Mineral tree substrate based on regionally available raw materials.

Details:

- Non-segregating
- The mixture is porous, with a high total pore volume, pressure-resistant
- The substrate shows good nutrient buffering, and is germination and growth-promoting
- Free of root-forming weeds
- Usable to a pit depth of 2 metres
- Produced in accordance with the stipulations of the FLL guideline and the Fertilizer Ordinance in its current version

Procedure:

FLL procedure 1 + 2

Composition:

Regionally sourced raw materials

Application areas:

- **New planting of trees particularly in road traffic-influenced areas**
- **As a substitute for unsuitable or highly compacted soils**
- **Tree site restoration**
- **Root curtain**

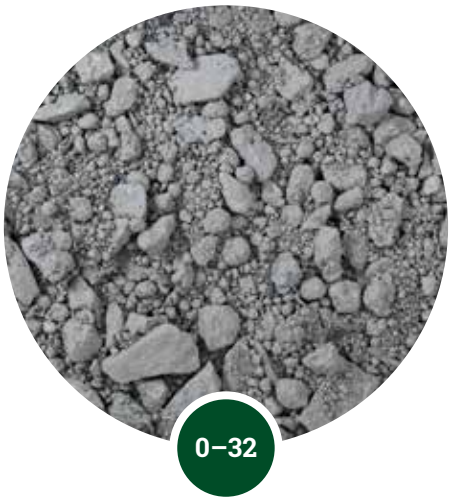
Additional information:

- Certificates
- Product data sheets
- Installation instructions

This additional material is available for download at:

www.vulkatec.de

	0–16	0–32
Particle size distribution (percentage of total mass in %)		
Blowable components	<- 25	<- 15
Fine/medium sand	>- 30	>- 30
Volume weight (t/m^3)		
At max. water capacity	Please request the value from the competent sales employee at the specific location	
Water/air balance		
Water permeability$_{kf}$	>- 0.3 mm/min	>- 0.3 mm/min
Water capacity	>- 25 vol. %	>- 25 vol. %
Air capacity at max. water capacity	>- 10 vol. %	>- 10 vol. %
Air capacity at pF 1.8	>- 15 vol. %	>- 15 vol. %
pH value	6.5–7.7	6.5–7.7
Salinity	<- 150 mg/100 g	<- 150 mg/100 g



Composition:

Natural product (igneous rock mixture, topsoil/ subsoil of various classes) consisting of basalt, augite, olivine, magnetite, limonite, biotite, clays of various types

Arbortree® Basalt 0-32

Tree substrate based on basalt and regionally available raw materials. With a high proportion of supporting grains in accordance with the Dutch manual for tree planting.

Details:

- Large pore volume, pressure-stable
- High load capacity
- The substrate is free of root weeds
- Good water and air management, which leads to stronger root development

Application areas:

- **New planting of trees**
- **Areas with high traffic volumes**
- **Redevelopment of tree locations**
- **As a replacement for unsuitable or compacted soils**

Grain size (ø in mm)	**0–32**
Grain size distribution (percentage of total mass in %)	
Blowable components	5–15 %
Fine / medium gravel	45–65 %
Volume weight (t/m³)	
At max. water capacity, compacted	1.65–1.95 t/m³
Water/air balance, compacted	
Maximum water capacity	20–35 vol. %
Water permeability mod. K_f	>- 0.3 mm/min
pH value	6.9–7.6
Salinity	<- 150 mg/100 g

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Composition:

Natural product (igneous rock mixture, topsoil/ subsoil of various classes) consisting of augite, olivine, magnetite, limonite, biotite, clays of various types

Arbortree® Lava 0–32

Tree substrate based on lava and regionally available raw materials. With a high proportion of supporting grains in accordance with the Dutch manual for tree planting.

Details:

- Large pore volume, pressure-stable
- High load capacity
- The substrate is free of root weeds
- Good water and air management, which leads to stronger root development

Application areas:

- **New planting of trees**
- **Areas with high traffic volumes**
- **Redevelopment of tree locations**
- **As a replacement for unsuitable or compacted soils**

Grain size (ø in mm)	**0–32**
Grain size distribution (percentage of total mass in %)	
Blowable components	5–15 %
Fine / medium gravel	45–65 %
Volume weight (t/m^3)	
At max. water capacity, compacted	1.60–1.85 $t/m3$
Water/air balance, compacted	
Maximum water capacity	20–35 vol. %
Water permeability mod. K_f	>- 0.3 mm/min
pH value	6.9–7.6
Salinity	<- 150 mg/100 g

Tree planting

Laying and care instructions according to FLL

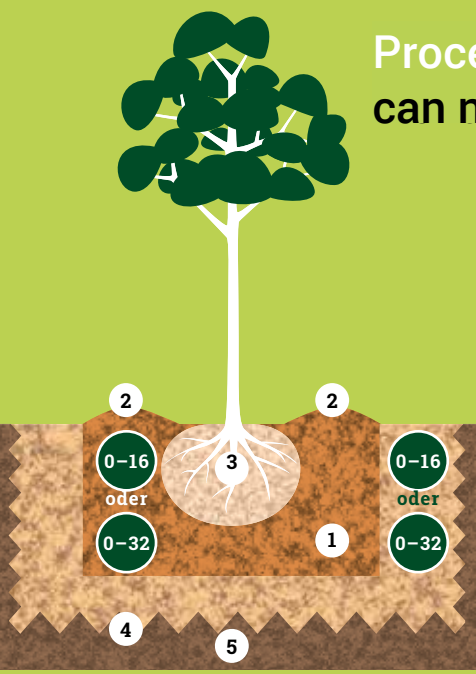
Substrates:

0–16 **Vulkatree® 0–16**
On page 73

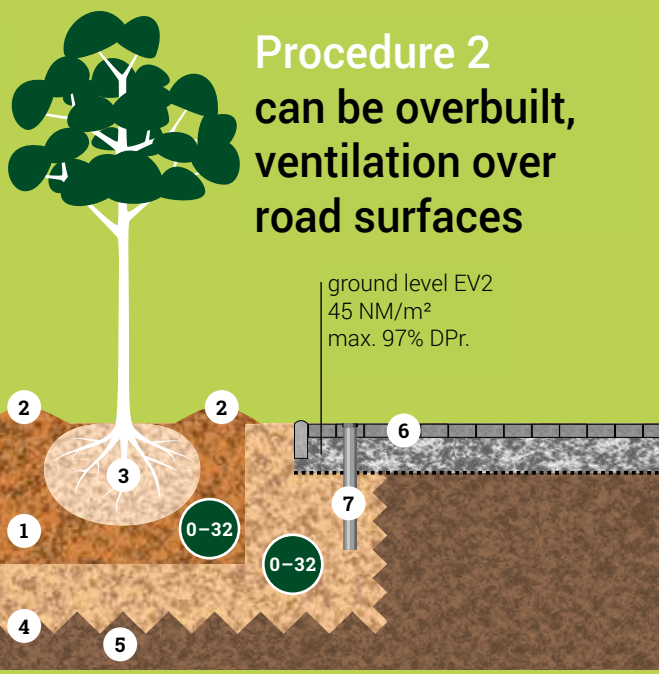
0–32 **Vulkatree®0-32**
On page 74

1. Planting hole according to DIN 18916
2. Watering rim
3. Root bale
4. Interlocking
5. Existing soil
6. Superstructure/ road surface
7. Aeration tubes
8. Gap/drain plaster

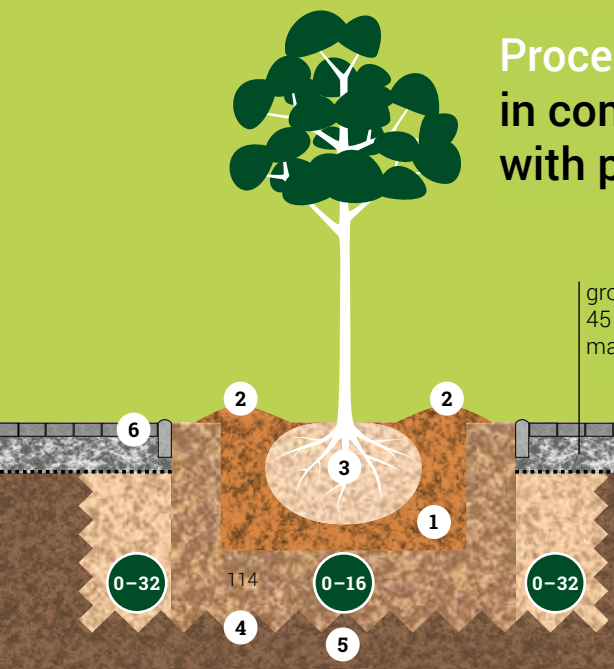
Procedure 1
can not be overbuilt



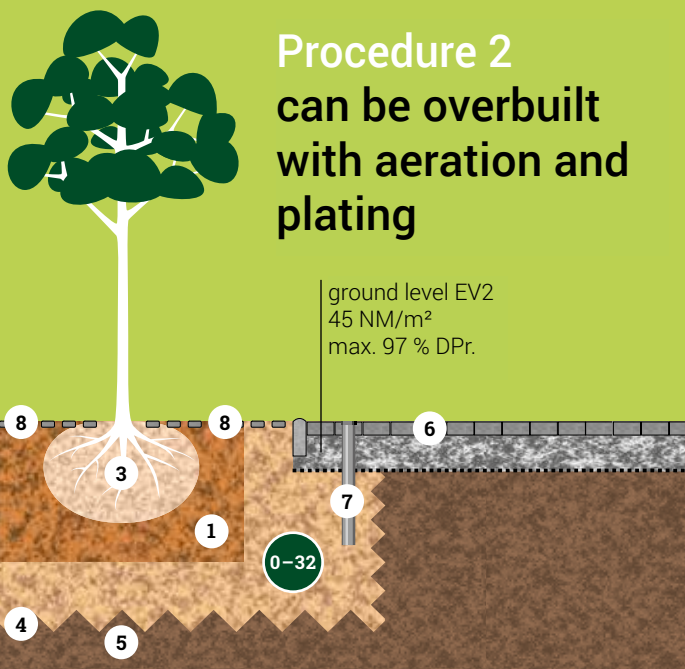
Procedure 2
can be overbuilt, ventilation over road surfaces



Procedure 2
in combination with procedure 1



Procedure 2
can be overbuilt with aeration and plating



	Procedure 1	Procedure 2
1. Preparation	Compaction and smearing of the surface of the pit wall and base are to be loosened to ensure a good interlocking between the substrate and the existing soil.	
2. Laying and compaction	The substrate is to be installed in layers of 20-30 cm and compacted to 85-87% DPr. This corresponds to the natural density and is intended to prevent sinkholing without unnecessarily destroying pore spaces. Higher compaction levels are not necessary or are even not permitted. The substrate layers must be interlocked with each other during laying.	The substrate is to be installed in layers of 20-30 cm. In the covered part of the pit, a value of 85–97 % DPr. and an EV2 value of 45–65 MPa must be compacted. Dynamic compressors may be used. Higher compression levels are not necessary or are even not permitted. If for logistical reasons the soil is compacted to 88-95% DPr. in the open part as well, it must then be loosened in the follow-up to 85-87% DPr so that the trees can then form deep roots. The substrate layers must be interlocked with each other during laying.
3. Planting	At the time of tree planting a planting hole of > 1.5 times the diameter of the root bale should be excavated. The planting hole excavation is to be enriched with about 10% compost or blended with 50% Vulkatree® plus. In addition, the planting hole is to be fertilized and possibly enriched with super absorbers (Stokosorb), Alginure and Mycorrhiza. A preferably encased depot fertilizer with a long duration of action, and positioned below the root bale, should be used. Quantity: 100–250 g/tree. For an optimal and FLL-compliant irrigation, a watering rim should be formed whose inner diameter should correspond to the outer diameter of the bale. If underplanting is planned, Vulkatree® plus can be applied in areas to promote rooting out from the root bale. The layer thickness depends on the height of the pots. When using underfloor anchors, the earth anchors must be hammered into grown soil. For this reason longer tie ropes and steering poles should be used. The alternative is to lay a construction steel mat Q335 below the root bale and to fix the tie ropes there. When using an axle stand, stakes at least 50 cm longer than usual are required. Since the substrate is not over-composted, in order to keep the environmental impact of leaching is as low as possible, a nutrient analysis in the substrate or on the leaves of the trees is advisable at the latest from the third year of standing.	
4. Fertilization	A possible later fertilization as liquid or mineral fertilizer can also take place.	A possible later fertilization as liquid or mineral fertilizer in the open part of the tree window or via the aeration openings of the overbuilt structures can also take place.
	In order to avoid a root conductive effect, the fertilizer should be watered.	

Accessories

Effective aids for healthy growth

The optimum start for young trees
During its first years a young tree requires special care. In addition to providing good ventilation and regular water during the growing phase, FLL and DIN 18916 already recommend further precautionary measures, such as the addition of fertilizer and superabsorbents for water storage during the planting phase.

Vulkatec Optistart represents a balanced blend of a long-term fertilizer, a superabsorbent and lava. The pack is supplied in 750 g portion bags. This prevents overdosing of the swelling superabsorbents and prevents the air-conducting soil pores from becoming blocked. Even unskilled workers can perform the mixing process.
Unused bags are suitable for reuse and stored for a longer period without clumping.

RDX Bio is a blend of volcanic compounds, nutrients and biochar. Biochar positively impacts the growth of beneficial soil bacteria. It is able to protect nutrients against leaching and preserve their availability for plants. Toxic soil substances, such as organic pollutants and heavy metals, are bound. Overall, this leads to healthier, more stress-tolerant plants due to induced resistance.

Vulka-Humin is produced in the same way as RDX Bio and acts as a soil additive based on lignite fiber wood (xylitol).

Additional tree accessories such as irrigation systems, ventilation systems, anchoring systems, crown protection and root zone extensions are available from our partners GEFA Produkte Fabritz GmbH at www.gefafabritz.de and Greenleaf at www.greenleaf.de

Optistart

Combination of long-term fertilizer, superabsorbent and lava in a 750 g bag.

Details:
- Dosage bags: no overdosing of superabsorbents
- Long term storage without clumping

Application areas:

- **New planting of trees**

Packaging Unit	4500 g (6 portioning bags of 750 g each)
Composition (percentage of total mass in %)	
Long-term fertilizer	3–15
Superabsorbent	45–70
Lava	1.0–2.0
Dosage:	
12-16 cm in circumference	1 bag (750 g)
16-25 cm in circumference	1½ bags (1125 g)
25–30 cm in circumference	2 bags (1500 g)

Additional information:

- Certificates
- Product data sheets
- Planting instructions
- Plant list

This additional material is available for download at:

www.vulkatec.de

RDX Bio
RDX Bio Premium

Soil additive based on plant / biochar and porous framework materials.

Details:
- **RDX Bio Premium** with charged biochar
- Increased fine root growth
- Buffering of nutrients and pollutants
- Improved vitality for increased stress tolerance in heat and drought
- Can be supplied in pure form or as an additive in the Vulkatree substrates
- Available as bulk material and in big bags

Application areas:

- **Planting new urban trees**
- **When planting perennial beds**
- **Restoration of old trees**
- **For preparing lawns**

Vulka-Humin

Soil additive based on lignite fiber wood (xylitol).

Details:
- Increased fine root growth
- Buffering of nutrients and pollutants
- Improved vitality for increased stress tolerance in heat and drought
- Can be supplied in pure form or as an additive in the Vulkatree substrates
- Available in big bags and as bulk material

Application areas:

- **Planting new urban trees**
- **When planting perennial beds**
- **Restoration of old trees**
- **For preparing lawns**

VulkaSense

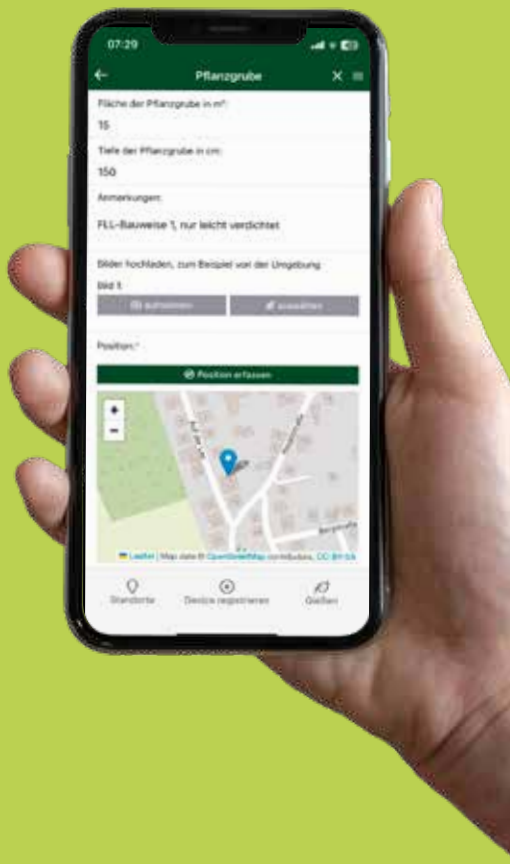
The future for vital urban trees

In addition to soil compaction, a lack of water has been one of the main reasons for the loss of vitality among urban trees in recent years. Irrigation is used to counteract this development. But when do I need to irrigate and how effective is the process? We can help you to answer these questions with VulkaSense.

VulkaSense is a combination of FDR sensors and NB-IOT wireless transmission to the cloud. A smartphone app automatically analyses and prepares the data in a clear presentation of the care situation. It can also be sent as an email notification or online on your PC.

VulkaSense is the perfect tool for planners, local authorities and landscaping companies involved in planting new trees in the city. Retrofitting in current buildings or use in the area of roof, façade and interior greening is also smooth and uncomplicated.

The VulkaSense app gives you automatically evaluated measurement data from your VulkaSense units at any time in a clear presentation on your smartphone.



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VulkaSense

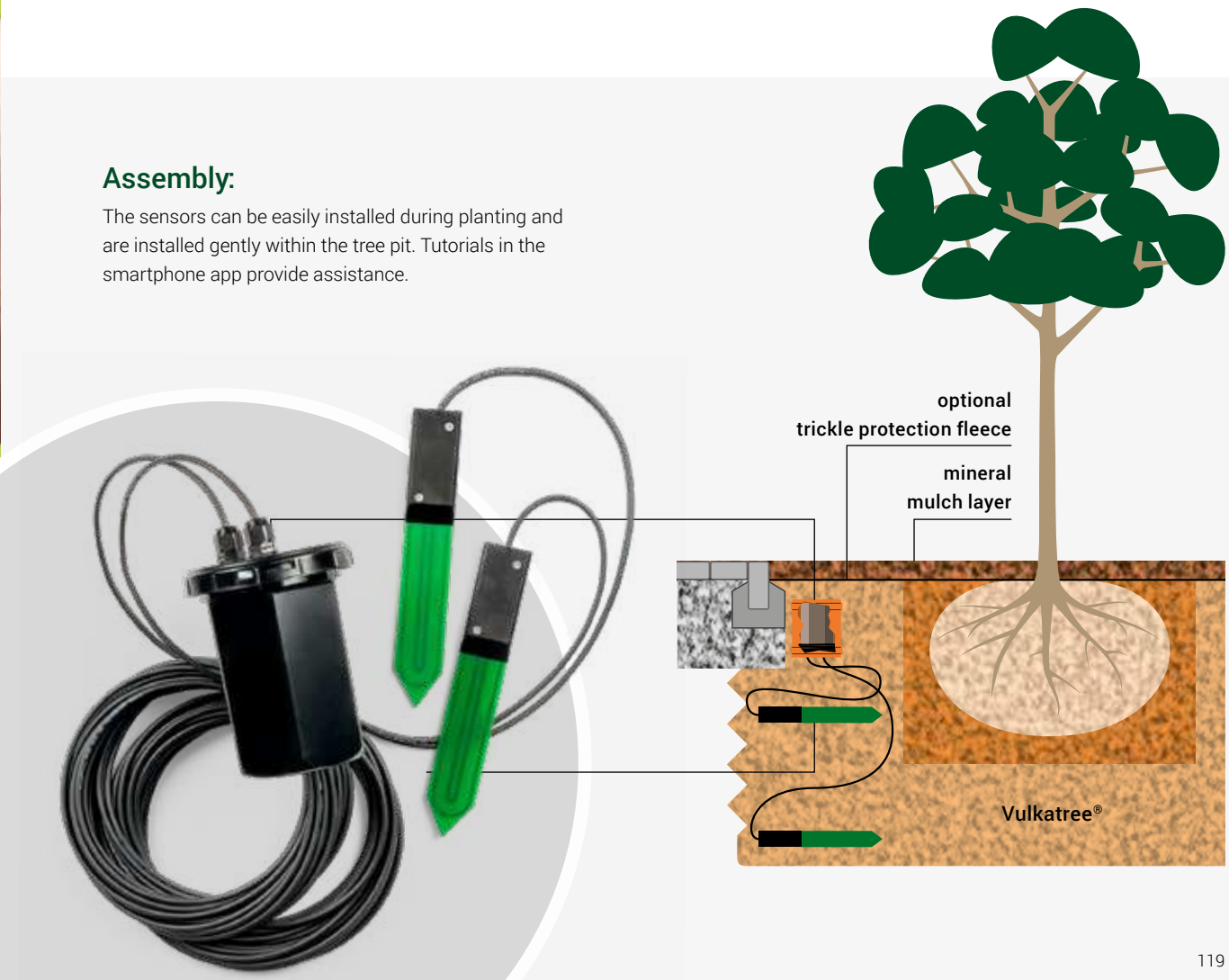
The digital traffic light for trees - to keep your tree vital

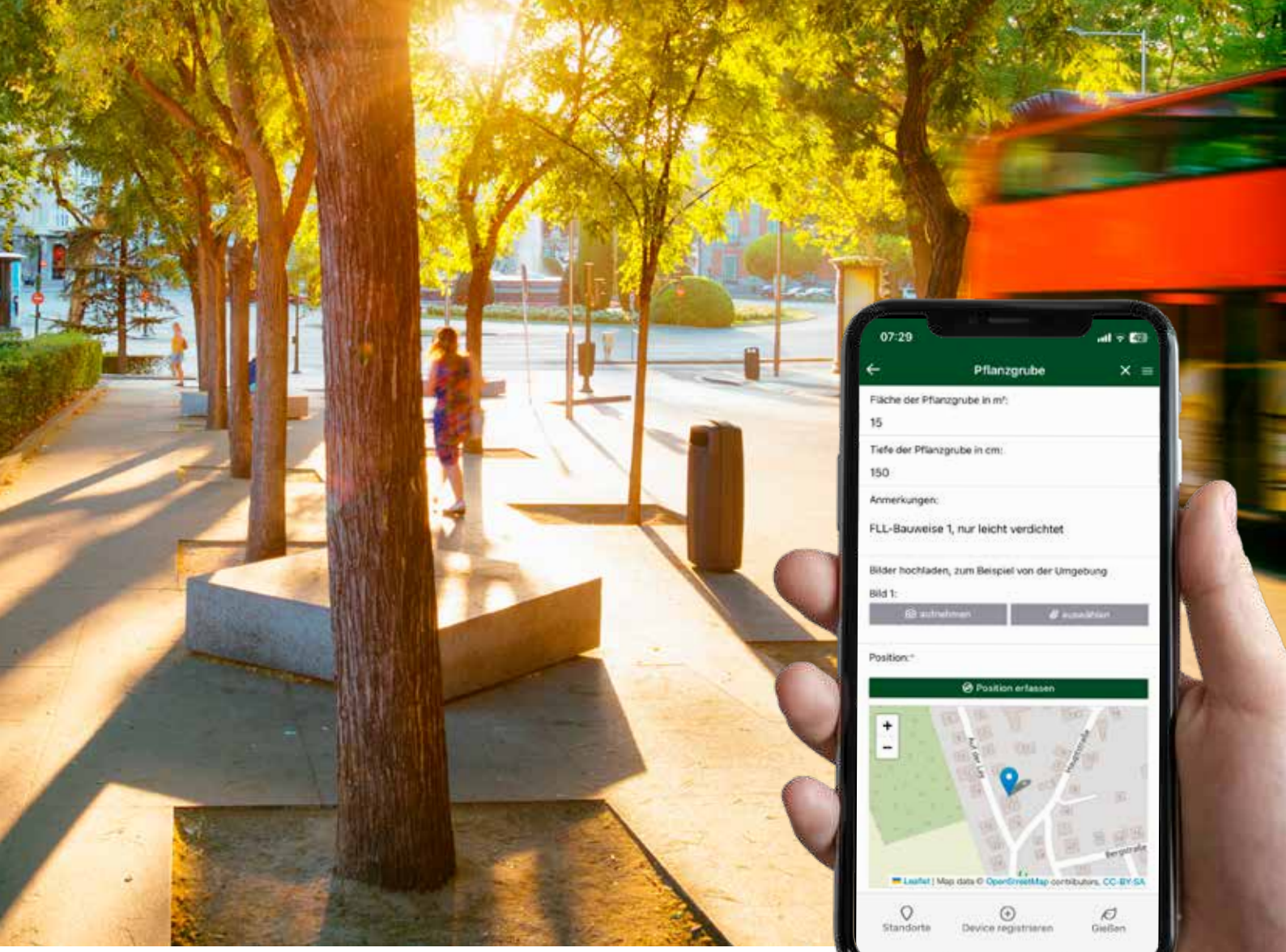
Advantages:

- Targeted information to help users optimise the irrigation strategy
- Early detection of drought stress at the precise location
- Integrated temperature measurement for substrates and soils
- Optimised timing for irrigation processes
- Information on soil moisture at different locations available at any time – easily available in the app or browser
- Monitoring of irrigation effectiveness
- Reduced personnel costs thanks to targeted irrigation
- Long-life battery with at least 5 years running time

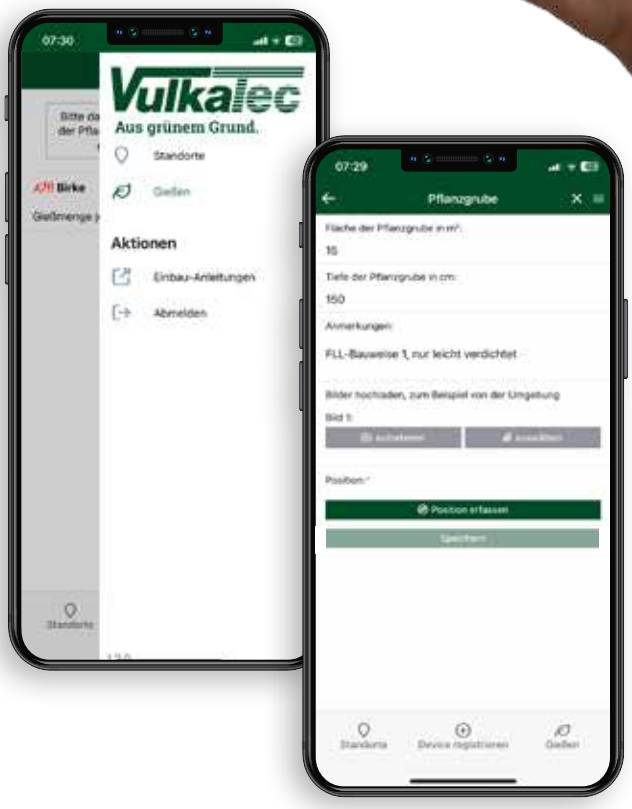
Assembly:

The sensors can be easily installed during planting and are installed gently within the tree pit. Tutorials in the smartphone app provide assistance.





Mobile app



Features of the mobile app:

- **Supported sensor installation in the field**
  - Creation of new locations
  - Register device
  - Automatic location detection
  - Query details sensor installation
  - Photo documentation
  - Soil sample information
  - Tutorials
- **Check the locations (humidity, irrigation requirements)**

Application homepage / portal

Features of the application homepage:

- **Same login details as the app**
- **For managing customer data and the measured values**
- **Management at customer level**
  - Management by the customer
  - Contact persons, test fields ...
  - Automated messages
  - Graphic presentation of the measured values
  - Download function for measured values
- **Management at administrator level**
  - Customer administration, password
  - Device entry prior to shipping to customers
  - Data acquisition
  - Data preparation
    - Calibration of the measured values
    - Standard curves of Vulkatec substrates integrated
    - Via soil samples sent in by users
      = Soil determination and, if necessary, analyses (water capacity, grading curve)
  - Measurement frequency

The digital traffic light

For comprehensive information and expert advice on the benefits and features of VulkaSense, please call **+49 2632 954812** or send an email to **peter.koenig@vulkatec.de**

References

Kameha Grand Bonn Hotel,

tree plantings, lawn greening and heaped hill for plantations surrounding the Bonner Bogen.

PDE, Luxembourg
Grown over plant pits

Bell foundry, Heidelberg
Tree planting and lawn greening of the roof of an underground garage.