

No limits with the **SECUGRID[®] RANGE**

Fast acceleration from 0 to the required tensile strength



SECUGRID® HS

Secugrid® HS is a laid and welded geogrid made of high tenacity polyester (PET) filaments with an extruded polyethylene (PE) protective coating used as reinforcement in many fields of civil engineering.



GENERAL ADVANTAGES

- ✓ High tensile strength
- ✓ Very good tensile modulus
- ✓ Very good stress strain behavior
- ✓ Low creep strain
- ✓ High creep rupture strength
- ✓ Robust & durable extruded polyethylene protective coating
- ✓ Very good chemical resistance
- ✓ High resistance against biological attack
- ✓ High resistance against UV radiation
- ✓ High resistance against hydrolysis (high pH)
- ✓ Robust against installation damage
- ✓ Quick and easy to install due to 4.75m wide rolls

Secugrid® HS

Secugrid® HS exhibits the primary strength in the machine direction with the ability to mobilise high tensile forces at low strains. The reinforcing bars are made of high tenacity polyester (PET) filaments with a co-extruded polyethylene (PE) protective coating. Where soil structures are to be constructed over soft foundations, Secugrid® HS high strength geogrids allow installation of fill layers without exceeding the low bearing capacity of the foundation soil.

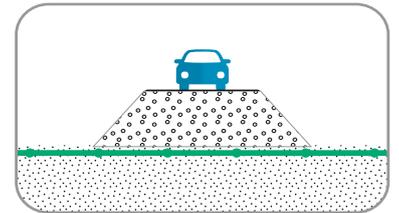
Typical applications for Secugrid® HS include:

Basal reinforced embankments on soft soil

Secugrid® HS is installed at the base of the embankment to avoid failure through excessive shear deformation and bearing capacity failure in the foundation.

Secugrid® HS offers the following advantages:

- Larger embankment heights possible
- Mitigation of differential settlements
- Accelerated staged construction (consolidation)
- Reduced overall project costs

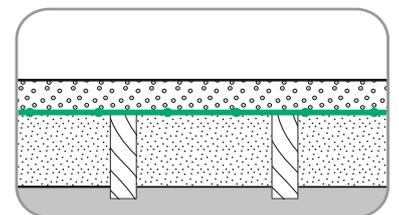


Load transfer platforms (LTP) over piles

In this application Secugrid® HS is installed at the base of an embankment within a load transfer platform (LTP) over piles to prevent settlements and failure through excessive shear deformation and bearing capacity failure in the foundation.

Secugrid® HS offers the following advantages:

- No excavation and soil replacement required
- Increase of pile spacing (reduced number of piles)
- Mitigation of differential settlements
- No waiting time for consolidation
- Rapid construction
- Reduced overall project costs

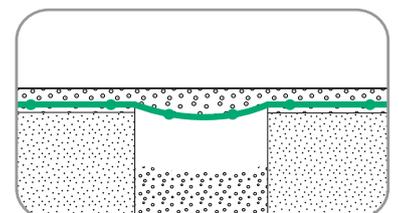


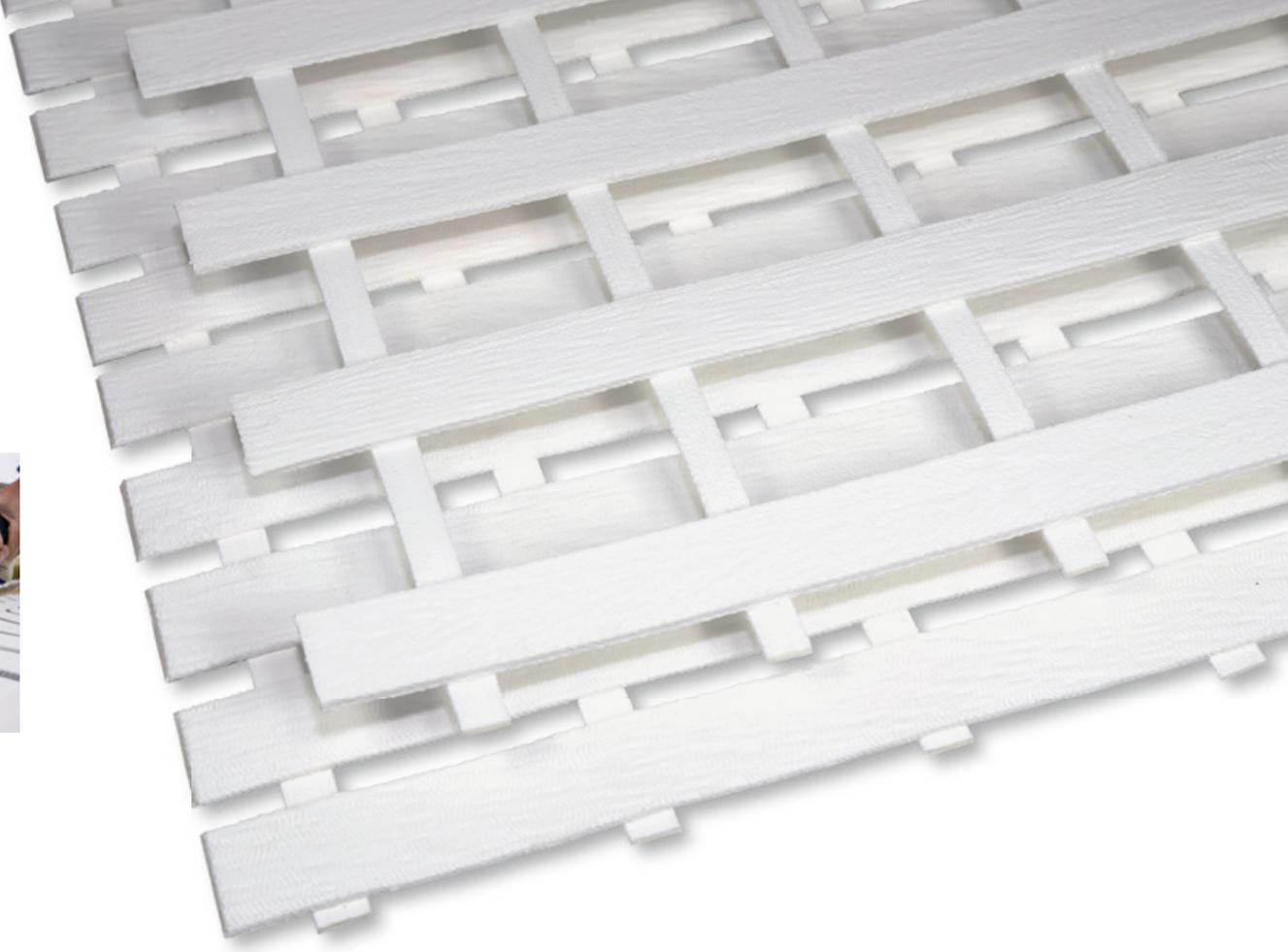
Bridging of mining voids and sinkholes

A layer of Secugrid® HS is installed at the base of an embankment to prevent total collapse of the foundation resulting from voids occurring below the ground surface. Subterranean voids can arise from natural processes (e.g. soil erosion in karstic areas) or from man-made processes (e.g. ground water pumping or underground mining).

Secugrid® HS offers the following advantages:

- Economic alternative to rigid raft foundations
- Mitigation of differential settlement
- Rapid construction
- Reduced overall project costs





SELECT ADVANTAGES OF SECUGRID® HS

Secugrid® HS offers convincing properties with regard to long-term durability. The selected polymer, combined with the used production technology, yields a robust and durable reinforcement product for applications where high strength is required over long design lives.

ADVANTAGE 1: STRESS (CREEP) RUPTURE STRENGTH

All polymers which are subject to sustained loading will suffer from strength loss over time due to creep effects. Creep is a function of stress level, time, temperature, and molecular structure of the used polymer. Table 1 shows a comparison of common reduction factors for polymer-specific geosynthetics (as given in EBGE0) compared to results from independently carried out creep-rupture tests (EN ISO 13431) for Secugrid® HS high-strength geogrids. The comparison documents the outstanding robustness of Secugrid® HS high-strength geogrids against strength loss due to creep effects.

ADVANTAGE 2: INSTALLATION ROBUSTNESS

Geogrids have to withstand installation-related stresses

caused by the placement of fill as well as the subsequent compaction. The resistance of geogrids to these stresses can be investigated using full-scale field trials, e.g. as suggested by the British Standards Institution (BS 8006) or the German Geotechnical Society (EBGE0). Results from independently carried out field trials with different grades of Secugrid® HS and varying soil types document the outstanding robustness of Secugrid® HS high-strength geogrids (see Table 2).



Table 2
Installation Damage
Reduction Factors of
Secugrid® HS

Table 1
Typical Creep
Reduction
Factors (EBGE0
2010) vs.
Secugrid® HS

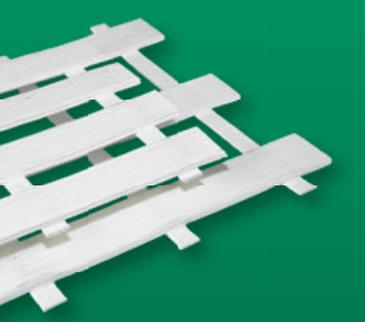
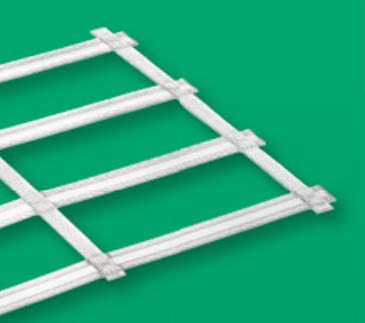
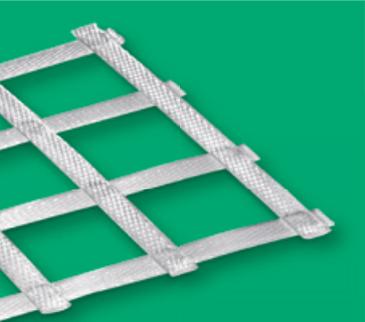
Raw Material	Common values for RF_{CR}	
	from	to
Aramid (AR)	1.5 ¹⁾	2 ¹⁾
Polyester (PET)	1.5 ¹⁾	2.5 ¹⁾
Polyvinylalcohol (PVA)	1.5 ¹⁾	2.5 ¹⁾
Polypropylene (PP)	2.5 ¹⁾	4 ¹⁾
Secugrid® HS (PET)	1.47 ²⁾	

¹⁾ EBGE0; 2nd Edition, German Geotechnical Society e.V. (2010)

²⁾ Reduction Factors of Secugrid® HS, Expert statement Dr.-Ing. J. Retzlaff (11/2015)

Grade	Installation Damage Reduction Factor RF_{ID}			
	Crushed Stone Fines ($d_{85} \leq 2\text{mm}$)	Gravelly Sand ($d_{85} \leq 8\text{mm}$)	Coarse Gravel ($d_{85} \leq 35\text{mm}$)	Crushed Stone ($d_{85} > 60\text{mm}$)
Secugrid® HS 400/100 R6 LA	1.03	1.03	1.03	1.06
Secugrid® HS 500/100 R6 LA	1.01	1.02	1.03	1.06
Secugrid® HS 600/100 R6 LA	1.01	1.01	1.03	1.06
Secugrid® HS 800/100 R6	1.03	1.03	1.03	1.06
Secugrid® HS 1000/100 R6	1.01	1.02	1.03	1.06
Secugrid® HS 1200/100 R6	1.01	1.01	1.03	1.06

Secugrid® is a structurally sound and stable geogrid for soil reinforcement, manufactured of extruded and drawn polypropylene (PP) or polyester (PET) pre-stressed bars with a continuous molecular structure, laid and welded solid together. The welding process that strongly joins the longitudinal and transverse reinforcement bars creates a firm, inherently rigid geogrid for use in base course reinforcement. Secugrid® geogrids achieve extraordinary high strengths at low strains.



SECUGRID® Q

Secugrid® Q is a biaxial geogrid that exhibits the same strength in both the machine and cross-machine direction. Secugrid® Q products provide a structurally sound and biaxial stable geogrid for long-term performance in road and railway base reinforcement, embankments, load transfer platforms over piles, and other challenging applications, where multi-axial strength transfer is required.

SECUGRID® R

Secugrid® R is a uniaxial geogrid that exhibits the primary strength in the machine direction with minimal strength in the cross-machine direction, enough to maintain the aperture structure. Secugrid® R products provide a structurally sound and uniaxial stable geogrid for long-term performance in mechanically stabilised earth (MSE) walls, veneer reinforcement, segmental retaining walls (SRW), basal reinforced embankments, load transfer platforms over piles, bridging of mining voids and sinkholes, construction over soft soils and other soil reinforcement applications where uniaxial strength transfer is required.

COMBIGRID®

Combigrid® is a composite reinforcement solution that embeds a Secutex® non-woven geotextile within a Secugrid® geogrid. This provides reinforcement, filtration, separation and drainage in a single composite product. The geogrid-non-woven geotextile geocomposite is primarily used on soft soils with low bearing capacity, such as with unbound, dynamically loaded layers that require filtration and separation support, such as in base and sub-base reinforcement for roads, railways, storage yards, container terminals, temporary working platforms, airport runways, sludge lagoons and tailings ponds.

SECUGRID® HS

Secugrid® HS is a uniaxial geogrid that exhibits the primary strength in the machine direction with the ability to mobilize high tensile forces at low strains. Secugrid® HS products provide a structurally sound and uniaxial stable geogrid for long-term performance in mechanically stabilised earth (MSE) walls, segmental retaining walls (SRW), veneer reinforcement, basal reinforced embankments, load transfer platforms over piles, bridging of mining voids and sinkholes, construction over soft soil and other demanding soil reinforcement applications where extraordinary high uniaxial strength is required.



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