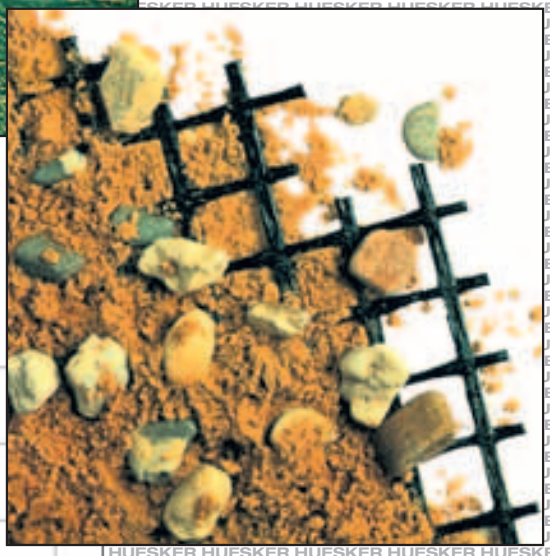
# Fortrac®

## Geogrids from new polymers



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Engineering with geosynthetics

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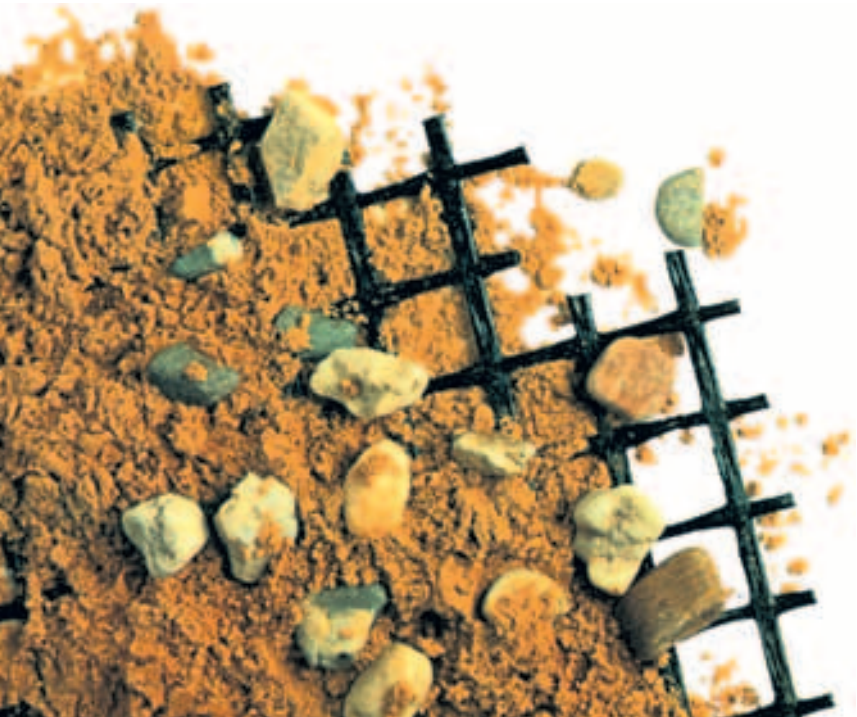
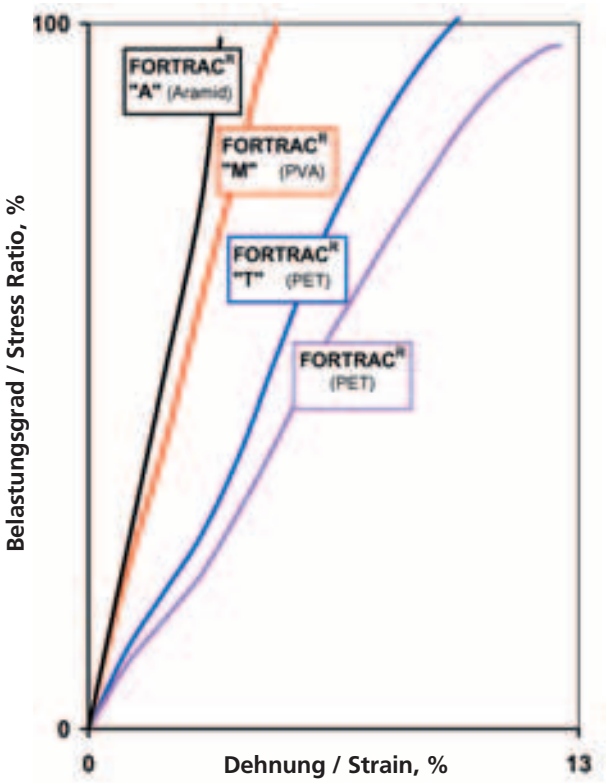
## Geogrids from new polymers

Further developments in raw materials combined with refined production processes are opening up new perspectives for civil engineers in project-specific reinforcement. Materials such as aramid (AR) or polyvinyl alcohol (PVA) offer interesting technical properties for new types of geogrids that up to now could not be realised. Just as much as the processing of the raw materials into geogrids, the polymer used is critical in defining the characteristics of geosynthetic reinforcement. HUESKER continuously finds, evaluates and tests new raw and engineering materials for their suitability for use in construction.
We compare them all with what we consider are the characteristics of the ideal geosynthetic reinforcement:

- optimal high tensile moduli (force/extension) to suit the soil type, earthworks design and area of application
- negligible tendency to creep, high long-term strength, minimum creep deformation and the permanent retention of tensile force
- high composite action coefficients with soils, which means a relatively short anchorage length and good interaction of the reinforcement with the soil
- high water permeability and therefore practically no hydraulic resistance or fluid pressure problems
- robust and resistant to the installation process and the effects of compaction plant
- high chemical and biological stability in all conceivable environments
- and all that must come at very little cost!





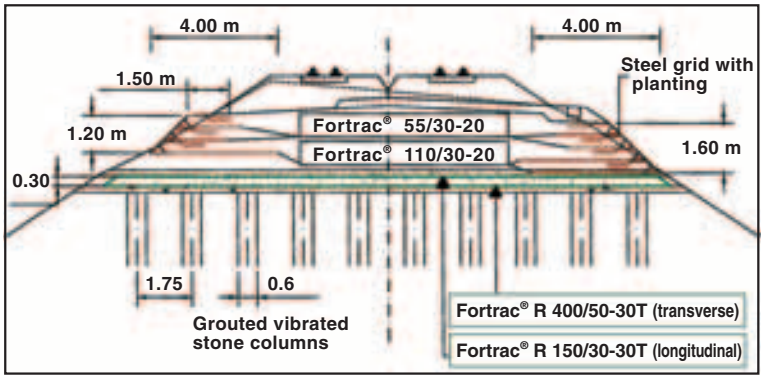

## Geogrids supplied with special performance characteristics

Over the last 15 years, high strength polyester (PET), high density polyethylene (HDPE) and polypropylene (PP) have established themselves - with all their advantages and disadvantages - as the most popular raw materials for use in standard products in Germany and world-wide.

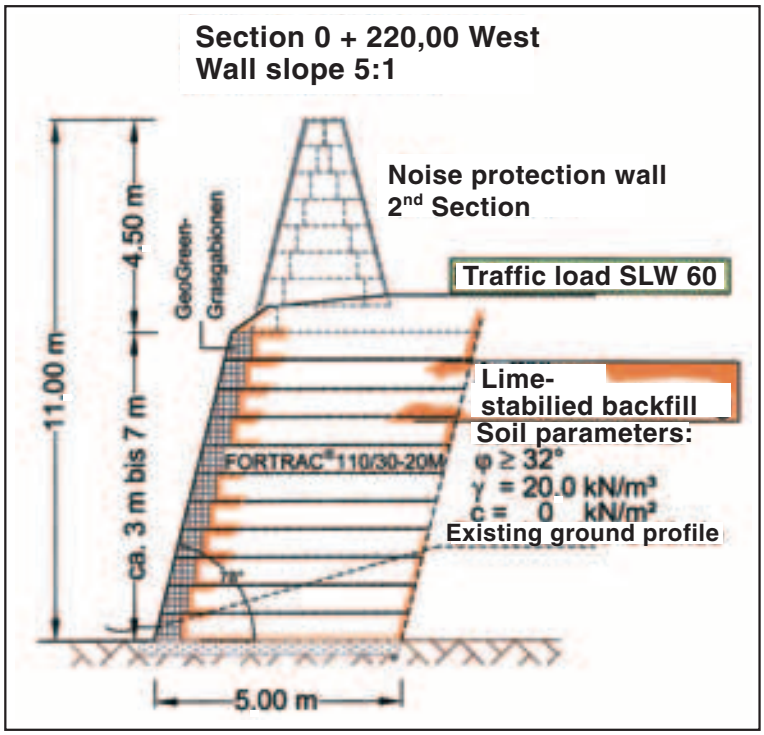
A prerequisite for high quality plastic products made from these raw materials is the use of high quality members of the appropriate polymer family.
A polyester (PET), for example, must be a polymer with a high molecular weight (>25000) and few carboxyl end groups (<30). From the polyolefins (HDPE and PP) we require high grade anti-oxidation stabilisers and, where appropriate, good stretch/draw performance.

Large mesh widths for geogrids have fundamental advantages over woven narrow-mesh geotextiles. Above all, they are preferred because of their high composite action coefficients and very good water permeability as well as their better environmental stability compared to uncoated fabric.

## German Railways Extension Line 51 Uelzen-Stendal reinforced with Typ Fortrac® T (PET) geogrid




## Fortrac® M (PVA) - Reinforcement in lime-stabilised soil




**Projekt: Unterkaka (near Leipzig)**

## Polymer properties

In recent years the market from ever more diverse construction projects has demanded geogrids with particularly high tensile moduli and a very low tendency to creep combined with high chemical and biological stability.

As a result of this trend, HUESKER has been developing new types of geogrids made from aramid (AR) and polyvinyl alcohol (PVA) and some of these have very high tensile strengths. Due to their low tendency to creep, these high performance materials excel because of their high tensile moduli, very good stability in various media and competitive price.

HUESKER's skill in developing the materials and production processes for geosynthetic reinforcement provides the construction engineer with new project-specific options to make best use of reinforcement.

| | PET | PP HDPE | AR | PVA |
|---|---|---|---|---|
| Tensile modulus | ● | ● | ● | ● |
| Tendency to creep | ○ | ● | ○ | ○ |
| Composite action coefficient with soil | ● | ● | ● | ● |
| Water permeability | ● | ● | ● | ● |
| Damage during installation | ○ | ○ | ○ | ○ |
| Chemical stability | ● | ● | ● | ● |
| Cost | ○ | ○ | ● | ○ |

○ low ● high ● very high

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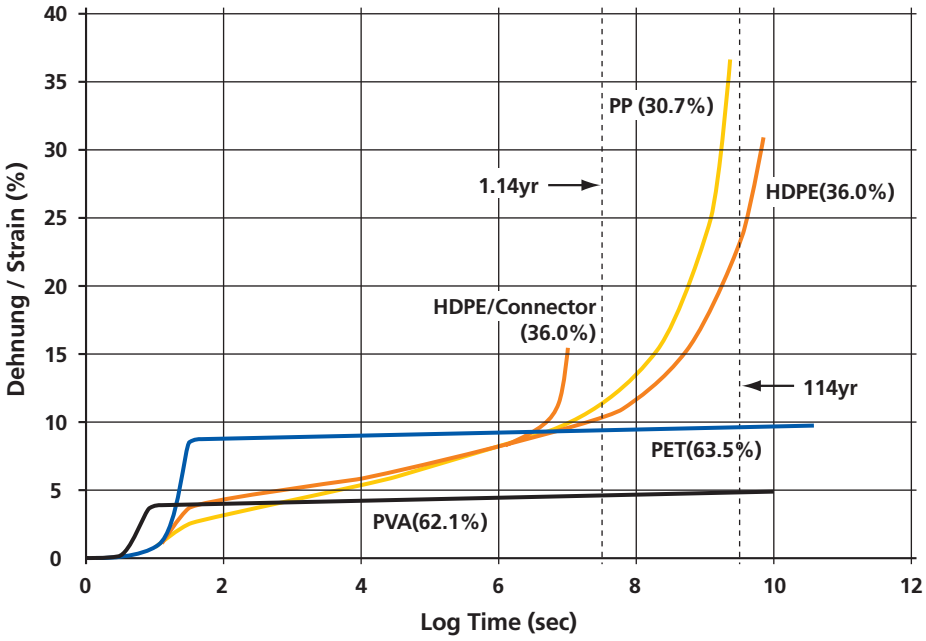
## Long-term loading behaviour of geogrids (for different polymers)




## Greater tensile strength - lower strain

The advantages of the new engineering materials lie in the much-increased tensile strength and lower strain. Compared to conventional PET geogrids, where the tensile strength can be up to 1000 kN/m, PVA geogrids can achieve up to 1200 kN/m. The strain for PVA is a maximum of about 6%. The chemical and biological stability of PVA is very high.

Aramid geogrids have tensile strengths of up to about 2000 kN/m. The tendency to creep is as low as with polyester geogrids. Their composite action coefficient with soils and their water permeability performance are correspondingly high.

Aramid (AR) and polyvinyl alcohol (PVA) have been extensively researched and tested by HUESKER. The Applications Technology Department has designed and supervised many construction projects reinforced with aramid or polyvinyl alcohol yarn geogrids.

The list of completed projects contains construction works from all over the world.

All technical product data presented in data sheets are based on ISO or/and EN standards.



## Waiting to hear from you . . .

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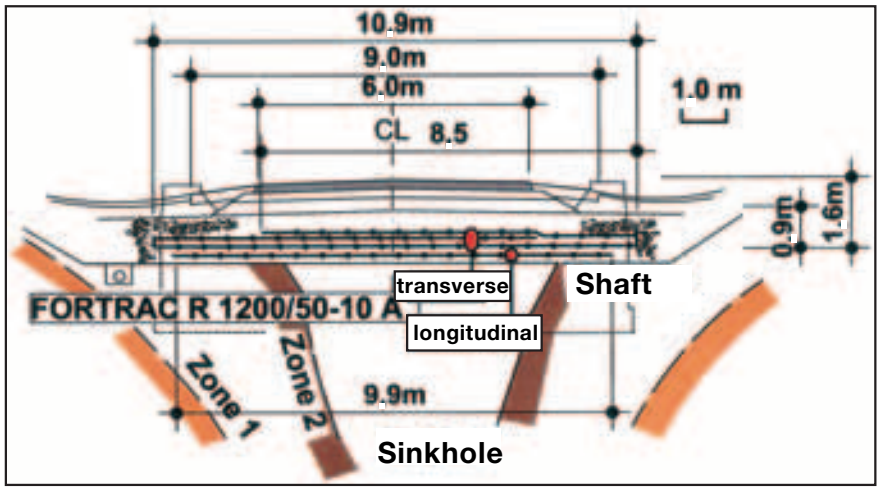
# B 180 at Eisleben: Bridging underground cavities with Fortrac® A (Aramid) geogrid

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Engineering with geosynthetics

HUESKER Synthetic GmbH is certified by:

HUESKER offers a wide range of technically demanding solutions relying on our many years' experience. Our solutions are economical, reliable and up-to-date and used in:

**Earthworks and foundation engineering, landfill construction, hydraulic engineering, road construction**

Technical assistance, planning, support - worldwide

Reliable and advanced techniques characterise our products in many applications:

**Fortrac®** - a flexible, high modulus and low-creep geogrid for soil reinforcement

**HaTelit®** – a flexible, high-modulus and temperature resistant grid for asphalt reinforcement

**Stabilenka®** – a high-modulus polyester woven for reinforcement and separation of soils

**Fornit®** – a biaxial geogrid for subbase reinforcement

**Comtrac®** – a geocomposite for reinforcement, separation and filtration of soils

**NaBento®** – geosynthetic clay liner for sealing

**Incomat®** – a concrete- or sand-mat for sealing and erosion control

**Ringtrac®** – geotextile tube for reinforcement and soil containment

**HaTe®** – wovens and nonwovens for separation, filtration, drainage and protection

**Geosynthetics made by HUESKER**

**-reliability by experience!**


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