

Frequently asked questions

What are Geogrids ?

Geogrids are geosynthetic material made from polymers such as polypropylene, polyethylene or polyester and are used widely in Civil Engineering applications to provide tensile reinforcement of soil. They are in the form of open grids so that soil can strike through the apertures and the two materials interlock together to give composite behaviour. They are used in the construction of retaining walls, steep slopes, roadway bases and foundations.

What functions can a Geogrid perform ?

The primary function a geogrid will perform is reinforcement. Depending on the application under consideration either a uniaxial (strength in one direction) or biaxial (strength in all directions) geogrid will be required.

Why use a Geogrid ?

The correct use of a geogrid can offer many benefits to a scheme such as increasing the speed of construction, and/or reducing the quantity of soil that needs to be exported from / imported to a site. Common uses of geogrids include increasing the amount of usable land on a site by enabling construction of steep green slopes or walls, enabling construction of a road over poor ground conditions or decreasing the thickness of fill required to construct a road.

How are Geogrids manufactured and does this make a difference ?

Currently there are three categories of geogrids available:

The first, and 'original', geogrids are commonly referred to as 'punched and drawn' geogrids. A sheet of either HDPE or Polypropylene has holes punched into it in a regular pattern and the sheet is then 'drawn' or 'stretched' into the finished product. The drawing is done under controlled conditions of temperature and strain rates to avoid fracture whilst allowing ductile flow of the molecular chains. This operation aligns the molecular chains in the direction of drawing to convert low-strength polymer into high-strength grids.

The second category of geogrids is 'coated yarn' types. They are, in fact, technical textiles in the form of grids and use bundles of fibres (most commonly Polyester) as the reinforcing component that are then coated to provide protection during installation and in service. The grid structure is formed by knitting or intertwining the transverse and longitudinal bundles of fibres.

The third category of geogrids is made by laser or ultrasonically welding together polyester or polypropylene rods or straps (as used in packaging / shipping) in a gridlike pattern.

What ranges of Geogrids do Wrekin offer?

Wrekin currently offer two ranges of geogrid. The first range is our E'Grid geogrids which are 'punched and drawn' geogrids. The second range is our MULTIGRID geogrids which are formed from laser welding polypropylene bars together.

Please contact us for advice on the most suitable type of geogrid for your application.

Does the method of manufacture make a difference ?

Yes. The different methods of manufacture create products that look and feel quite different. It therefore follows that the different forms of geogrid will work with the soil to perform the reinforcing function in differing ways.

There have been numerous studies into the performance of geogrids. These have concluded that whilst there are a number of mechanisms which enable a geogrid to function, the principal and most effective mechanism is lateral restraint or confinement of the compacted fill that is interlocked within the grid.

The best type of geogrid for mobilising this mechanism is a 'punched and drawn' geogrid such as E'Grid geogrid.

How are Geogrids specified?

Geogrids will either be uniaxial or biaxial and can be specified either by a number of performance properties (e.g. tensile strength, junction efficiency), or trade name and grade (e.g. E'GRID 3030).

The most common method of specification in the UK is by trade name for which Wrekin have a range of equivalent, often superior, products against other trade names.

Wrekin are the only supplier in the UK that can offer true alternatives to the geogrids manufactured by the market leader, Tensar.

Can Wrekin assist in choosing the correct Geogrid for a particular scenario?

Yes. Wrekin can provide technical assistance to select the correct product and number of layers of geogrid required for a particular scheme.

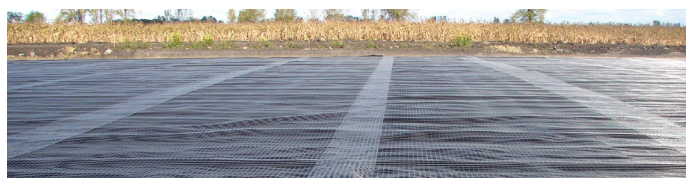
What are the key properties to ensure you have a quality geogrid that is 'fit for purpose'?

The key attributes to consider in selecting a geogrid are the height and thickness of the rib, the aperture area, the tensile loads at 2% and 5% strain, the junction efficiency, the open area percentage, the carbon black content, the quality of the raw material used, whether the product has a CE Mark with full traceability, and whether it has been manufactured under a certified ISO 9001 system.

Does the aperture shape make a difference?

No. For 25 years geogrids were constructed with square or rectangular apertures, however, since 2007 Geogrids with triangular apertures have been available. The introduction of a new aperture shape was purely a commercial decision by the manufacturer concerned. No data has been published to show superior performance of the triangular grid.

However, to evaluate the new product Wrekin and its manufacturer undertook comparative testing which concluded that E'Grid geogrid is at least as good as the triangular aperture TriAx geogrid.



Does the aperture size make a difference?

Yes. The geogrid needs to be designed to optimise the key physical attributes listed previously – essentially to get the best possible mix of the key attributes from a finite sheet of polymer. One of these key attributes is aperture size.

To ensure the best possible mechanical interlock with the soil particles Wrekin offer two different aperture sizes in their E'Grid geogrid range – standard and large aperture. Standard aperture E'Grid geogrid is used where the average particle size is a maximum of approximately 50-60mm. Beyond this the large aperture E'Grid products should be used.

Does the rib height make a difference?

Yes. The prime mechanism for reinforcing the soil is mechanical interlock which is achieved by the soil particles pushing against the vertical face of the ribs. A higher rib is therefore better as it provides a larger surface to effectively transfer the stresses from the soil to the geogrid.

E'Grid geogrids have been designed to optimise the rib height. Lesser quality geogrids will have shallower ribs and may not state this parameter on their data sheets to conceal this inferiority.

Does the rib width make a difference?

Yes. The width of a geogrid rib is a key factor in the ability of the geogrid to adequately survive the not insignificant stresses when the granular material is spread over the geogrid and then mechanically compacted. A narrower rib will clearly be more susceptible to installation damage thereby rendering the geogrid less able to perform its function during the service life.

The ribs which make the TriAx geogrid are narrower than those of E'Grid geogrids, and testing has shown that, as would be expected, they are far more susceptible to installation damage and potentially lose around 25% of their original strength.

Is the junction efficiency important?

Yes. Junction efficiency is a measure of the strength of the node compared to the strength of the rib (expressed as a %). Both the rib strength and the junction strength are important since the soil particles will impart load against the transverse ribs which will then be transmitted to the longitudinal ribs through the junctions and vice versa.

E'Grid geogrids have been designed to have excellent junction efficiency $\geq 95\%$

What is tensile strength?

Tensile strength is measured by clamping a sample of product and pulling it in opposing directions. The strength is then recorded in kN/m either at break (Ultimate Tensile Strength) or at varying elongations. Certain applications may require strengths to be reported prior to the product breaking. In particular, for the low strain conditions in road construction, the load measured at 2% strain is a good indicator of performance potential.

What is elongation?

Elongation is a measure of how much a sample of product has stretched from its original length when it is loaded. This is recorded as a % increase (strain).

Elongation values will vary widely between different geogrids and can be an important factor in selecting the correct product.



Are all Geogrid tests standardised?

The principal test methods for comparing geogrids are standardised. These include tensile strength, creep tests, junction efficiency and physical dimensions. With the exception of the Junction Efficiency test, which is a USA ASTM test, the test methodologies for products used in the UK market should be EN ISO tests.

However, the triangular aperture grid introduced in 2005 cannot be tested using conventional and established methods for tensile strength to give meaningful results. Its performance can therefore not be measured against other products.

To address this issue, Wrekin and its geogrid manufacturer have developed a test that can measure the omni-axial performance in the X-Y plane of any grid, irrespective of its aperture shape. Additionally the test better represents the plate loading effect of a wheel on a carriageway in a real scenario.

Is the Geogrid weight important?

Whilst the weight of a geogrid will have an impact on the various mechanical properties of a particular geogrid, it does not itself provide values that can be used in a design or for checking quality. Generally, lower quality geogrids will have higher weight for a given strength than higher quality products.

Should I use a Geogrid manufactured from recycled material?

No. A product made (or part made) from recycled material will not provide the optimum parameters for a given application and will therefore be less efficient. The variable quality of post-consumer re-cycle material prevents the manufacture of high strength materials with uniform molecular alignment.

Which type and grade of Geogrid should I use for my project?

Wrekin can offer technical guidance on which grade and type of geogrid to use.

If the geogrid is to be used in a uniaxial application then factors such as height of slope, surcharge loads, and soil parameters will be relevant to establish the correct product.

Alternatively, if the geogrid is to be used in a biaxial application then axle loadings, the CBR of the subgrade and the size of granular fill to be used will be relevant.

How can Geogrids be joined?

Depending on the application geogrids may need to be joined. This is particularly the case when using uniaxial geogrids and a common way of doing this is by means of a 'bodkin' joint.

When biaxial geogrids are used by far the most common procedure is to have a simple overlap on adjoining edges of 300-500mm. In certain applications a larger overlap (or bond length) may be required by the design.

