



Pietrucha
Established 1960

The PolGrid Geogrids

Soil reinforcement and stabilization



www.pietrucha.pl

Designer 3.0

by Pietrucha

Visit Designer 3.0, our online calculation platform which comprises three calculation tools, product manuals, information materials and case studies dedicated to the products from the Group portfolio. Designer 3.0 is dedicated to civil engineering specialists to facilitate civil engineering calculations of cut-off and retaining walls parameters, required soil stabilization and flood prevention solutions.

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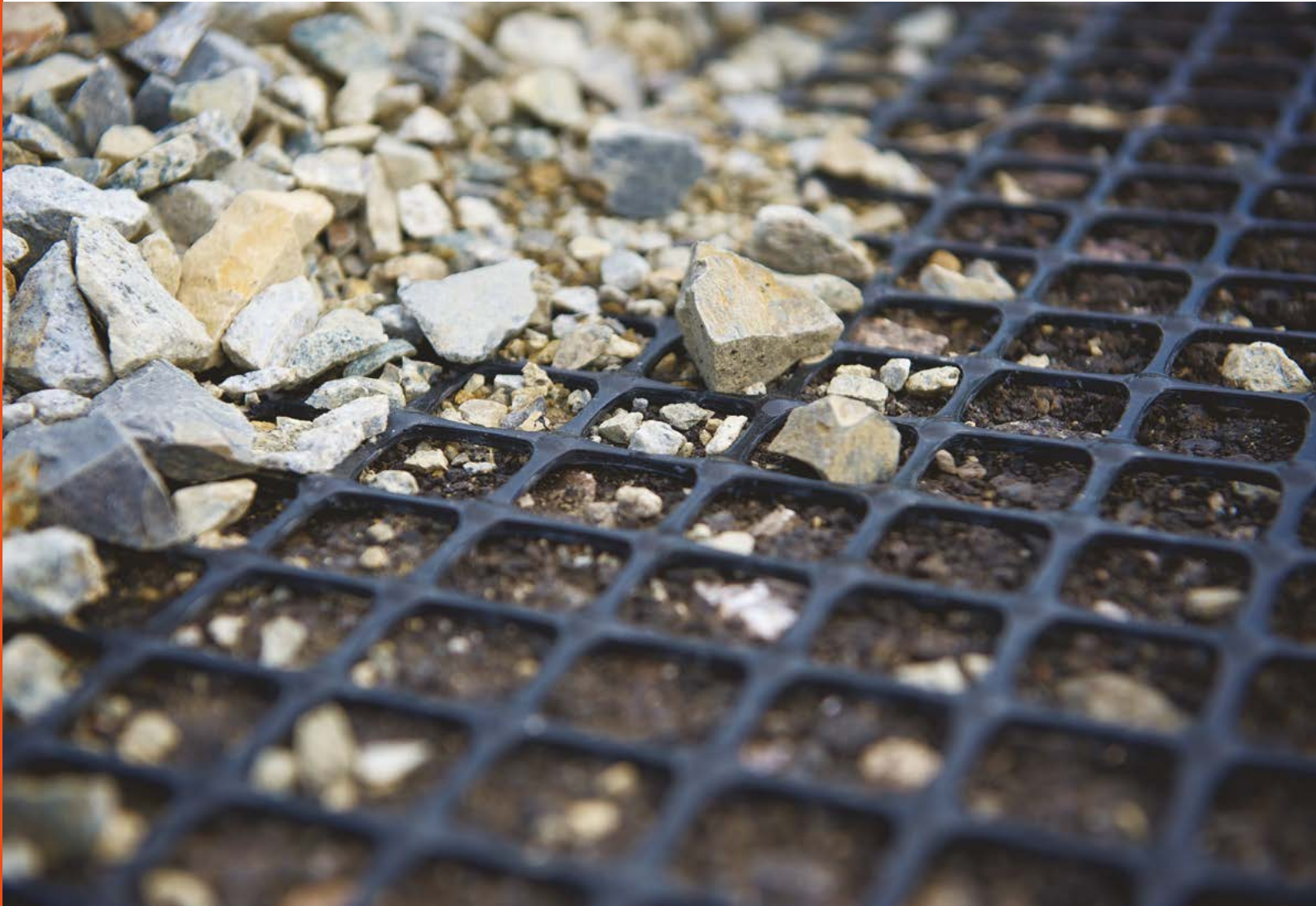
The Pietrucha Group

Proudly Polish, Truly International

The Pietrucha Group is an efficiently managed, competitive and innovative group of companies which specializes in the manufacturing and distribution of top-class geosynthetic products as well as providing a comprehensive range of geotechnical services broadly used in civil engineering.

Geosynthetic products manufactured by the Pietrucha Group are delivered to nearly 3500 customers in 40 countries on 5 continents, especially in regions sensitive to the impact of climate change. Despite the scope and global reach of our operations, the Pietrucha Group has remained a family business, managed by a third generation of entrepreneurs.

We comply with the ISO 9001:2015 standards in terms of manufacturing, design and sales of the geosynthetic and plastic products from our portfolio.



The PolGrid geogrid used to reinforce and stabilize aggregate.

The PolGrid Geogrids Advantages

The Pietrucha Group is the manufacturer of the PolGrid geogrids, specialized geosynthetics widely used in the civil engineering projects to stabilize and reinforce land or to separate the substrate layers with varying graining.

Geogrids are used in transport construction projects and other geotechnical works. PolGrid products are quick and easy to install and allow for the reduction of the use of materials, thus saving investment costs and time.

Immediate stabilization and separation

- The semi-stiff composite aggregate scheme allows for the reinforcement of aggregate, even on extremely low load-bearing surfaces.
- Increased load-bearing capacity owing to the rigid construction based on non-movable nodes, which immediately responds to pressure, preventing aggregate shifts.
- Increased reinforcement of road structure preventing horizontal displacement and penetration (propagation) of aggregate grains into the weak substrate and the loss of stability of the foundation layer.
- Geogrid with stiff nodes placed between the road foundations and the subsoil prevents the mixing of materials with different grain size and load-bearing capacity.

Saving of costs and time

- Effective blocking of the aggregate efficiently reinforces the load-bearing capacity of the structure. By decreasing the soil replacement, geogrids allow for savings on the aggregate of up to 40.
- This method extends the durability of the structure and does not require any advanced preparatory earthwork, which reduces the construction time span.
- Thanks to a better load and pressure distribution in the road foundation, geogrids considerably reduce the amount of wheel ruts, even in extremely unfavorable soil conditions.

Easy and fast installation

- The specially adjusted width of the PolGrid sheets means geogrid rolls can be handled by two persons.
- The simplified installation consists in spreading the rolls of the geogrid on the prepared soil substrate.
- Geogrid with stiff integrated nodes do not require pre-tensioning or anchoring, and they work immediately once they are spread on or below the aggregate layers.
- High endurance of the geogrids guarantees resistance to installation damage.

Environmentally friendly solution

- As a result of considerable savings on the aggregate, the use of the PolGrid geogrids helps reduce the CO² emissions caused by construction works.
- The use of the PolGrid geogrids considerably extends the life performance of asphalt.
- The PolGrid geogrids have been proven to perform in extreme climate conditions which helps reduce the road maintenance costs.



The PolGrid Geogrids

How they work

Immediate stabilization and reinforcement of road structure

The semi-stiff composite aggregate scheme allows for the reinforcement of aggregate, even on extremely low load-bearing surfaces. Blocking of the aggregate by the geogrid is a key factor during the pre-compaction of the road foundation, as well as for the further behaviour of the road in lifetime. A high elastic modulus (stiffness of geogrid) is considered to be the main feature which enables effective restriction of movement of the aggregate and as a result, an effective reinforcement of structure.

Geogrids allow for savings on the aggregate layer used to construct a given road, without any impact to its load-bearing capacity.

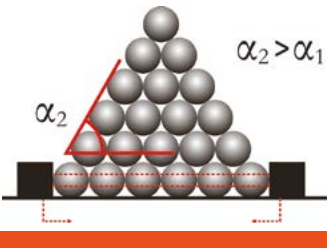


With geogrid

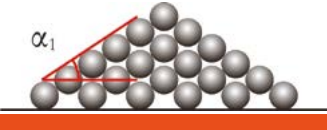
Without geogrid

Blocking and horizontal fixing of aggregate

Thanks to the rigid construction based on non-movable nodes, which immediately responds to pressure, the PolGrid geogrids prevent aggregate shifts. Used to reinforce the road structure, geogrids prevent horizontal displacement and penetration (propagation) of aggregate grains into the weak substrate and the loss of stability of the foundation layer.



With geogrid



Without geogrid

The square shape of rib gives better aggregate chocking in geogrid aperture than flat or rounded ribs.

Separation

The PolGrid geogrids placed between the road foundations and the subsoil work as a separator preventing the mixing of the materials with different grain size and load-bearing capacity. Geogrids help avoid the penetration (propagation) of aggregate into the weak substrate and the loss of stability of the foundation layer.

On boggy substructures or in case of materials of unfavourable grain size, where the separating function needs to be enhanced, geocomposites are used, i.e. geogrids combined with non-woven fabrics.

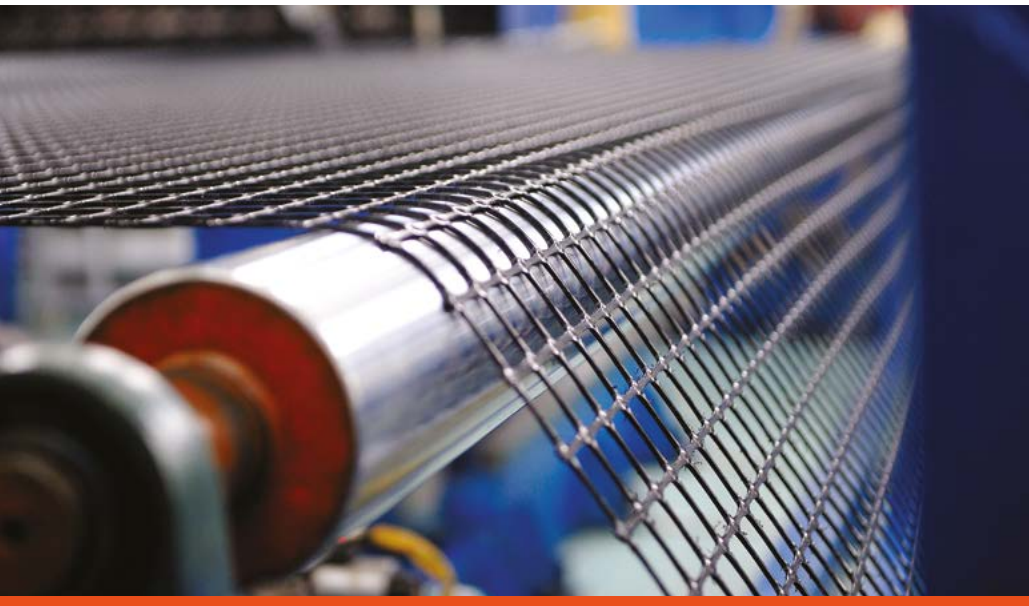


It has been proven that over time, geogrids considerably reduce the amount of wheel ruts, even in extremely unfavorable soil conditions.



The PolGrid Geogrids Technology

The key feature of the PolGrid products is their rigid construction with stiff and integrated nodes. The structure has no interconnecting junctions and the strength of the geogrid node is equal to the strength of the rib. PolGrid is manufactured on an automated 130 meter long technological line and it involves extruding a thermoplastic polypropylene plate, then perforating the calibrated plate and finally stretching the material in both directions.



The manufacturing technology as well as the used materials guarantee high quality of the product and its unvarying technical parameters.

Technology partners

The quality of the PolGrid geosynthetics is monitored at an in-house laboratory under the supervision of SKZ - Testing GmbH, one of the world's most acclaimed institutions certifying geotechnical products. The physio-mechanical parameters of the geogrids are subject to continuous monitoring by an in-house research center. The Pietrucha Group is also a member of the International Geosynthetic Society.



The PolGrid Geogrids Application

Tar roads



Reinforcement of aggregate substrate layers, reinforcement of embankments and dykes, geosynthetic layers at the base of embankments.

Railways



Reinforcement of substructures of the railway tracks, strengthening of railway embankments.

Forrest roads and technological roads



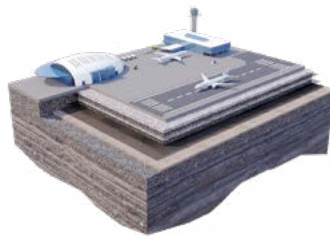
Construction of dirt roads with extended durability and resistant to the creation of wheel-ruts.

Temporary roads and working platforms



Quick construction of temporary roads made of unbound aggregate, i.e. technological roads, access roads to windfarms, working platforms.

Airports and landing pads



Reinforcement of runways, airstrips and technical roads.

Warehouses, carparks



Reinforcement of subsoil requiring higher load-bearing capacity, i.e. under manoeuvring squares, warehouse storage yards, parking lots.

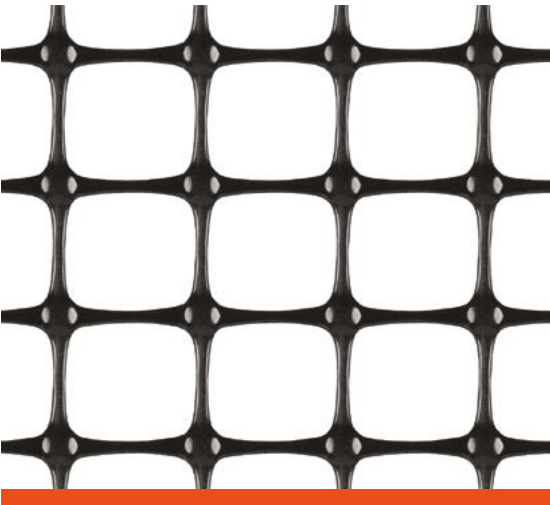
The PolGrid geogrids Product Range

The diverse PolGrid product range allows for the optimal selection of a given product to meet the requirements of individual projects and constructions. Depending on the functionality and the project requirements, a geosynthetic with a given composition and form is selected.

Biaxial geogrids

Geogrids with stiff nodes without any interconnecting junctions. In the manufacturing process, the perforated PVC plate is stretched biaxially. The monolithic construction with rectangular openings gives better support to the aggregate and allows for a considerable increase in the load-bearing capacity.

PolGrid BX



Application

- Reinforcement of road substructures
- Construction of temporary and technological roads
- Construction of forest roads
- Construction of access roads to wind-farms
- Construction of parking areas
- Reinforcement of substructures of railway tracks
- Reinforcement of embankments and dykes
- Reinforcement of building foundations
- Reinforcement of substructures under technical floors and mass storage areas

	units	BX 10/10	BX 15/15	BX 20/20	BX 25/25	BX 30/30	BX 40/40	BX 45/45
Polymer type		PP	PP	PP	PP	PP	PP	PP
Minimum carbon black	%	2	2	2	2	2	2	2
Peak tensile strength MD/CMD	kN/m	10/10	15/15	20/20	25/25	30/30	40/40	45/45
Junction efficiency	%	100	100	100	100	100	100	100
Aperture size - MD	mm	39 (±4)	39 (±4)	39 (±4)	39 (±4)	39 (±4)	35 (±3)	35 (±3)
Aperture size - CMD	mm	39 (±4)	39 (±4)	39 (±4)	39 (±4)	39 (±4)	35 (±3)	35 (±3)
Length in a roll	m	205	75	75	50	50	30	30
Roll width	m	4	4	4	4	4	4	4

PolGrid BX MAX



Application

- Reinforcement of railway track substructure
- Reinforcement of road foundations
- Construction of temporary and technological roads
- Construction of forest roads
- Construction of access roads to windfarms

	units	BX MAX 20/20	BX MAX 30/30	BX MAX 40/40
Polymer type		PP	PP	PP
Minimum carbon black	%	2	2	2
Peak tensile strength MD/CMD	kN/m	20/20	30/30	40/40
Junction efficiency	%	100	100	100
Aperture size - MD	mm	65 (±12)	65 (±12)	65 (±12)
Aperture size - CMD	mm	65 (±12)	65 (±12)	65 (±12)
Length in a roll	m	75	50	30
Roll width	m	4	4	4

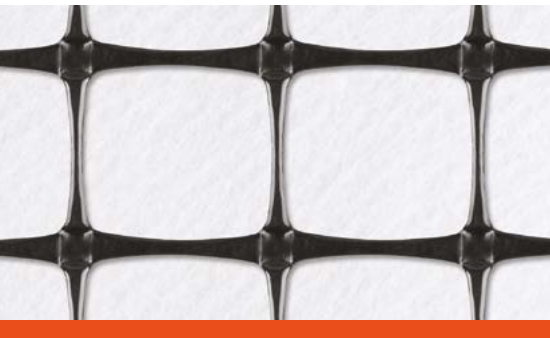
The size of the opening is extended to 65 mm, intended to be used with larger graining aggregate



Geocomposites

Geocomposites combine the advantages of a geogrids and non-woven geofabric for even higher reinforcement, filtration and separation. Geocomposites are used on boggy substructures or together with materials of unfavorable grain size. The type of the non-woven geofabric may be individually selected to meet the requirements of a given project.

PolGrid FSR BX



Geocomposite PolGrid FSR BX is the PolGrid BX or PolGrid BX MAX geogrid thermally combined with non-woven geofabric.

Application

- Reinforcement of road substructures
- Construction of temporary and technological roads
- Construction of forest roads
- Construction of access roads to windfarms
- Construction of parking lots
- Reinforcement of railway track substructures
- Construction of embankments on weak soil
- Reinforcement of building foundations



Biogeocomposite

PolGrid Bio is a practical and convenient method of turfing, greening, but also for securing slopes near roads and highways, railway embankments, flood embankments and industrial areas. It allows you to quickly cover and protect the soil surface of the slope, protecting it against erosion and near-surface landslides.

PolGrid Bio



Biogeocomposite PolGrid Bio

Intended use

- Roads and highways - for securing inclined areas and greening all adjacent areas.
- Slopes - to protect against erosion, landslides, leaching and blowing.
- Railway embankments - to protect against erosion, landslides, leaching and blowing.
- Flood embankments - to protect against landslides, leaching and blowing.
- Dunes - to protect against erosion, landslides, leaching and blowing.
- Sports grounds - for creating boards and covering of sports grounds.
- Recreational parks - for creating all green areas to improve the creation process.



PolGrid Bio is a highly efficient solution for soil strengthening and reinforcement. Depending on the project requirements, the appropriate type of the geogrid reinforcing the biotextile is selected.

Product advantages

- Safe for the environment and user friendly solution
 - Protection against water and wind erosion and near-surface landslide
 - Allows for even growth which is particularly important on sloping areas
- Prevents washing away of the seeds by rainwater
 - Efficient protection against moles and plucking the seeds by animals
 - Possibility of long-term storage

Biotextiles are geotextiles made of cotton and cotton-like waste with carefully selected grass seeds inside the non-woven fabric.

Technical parametres of the biotextile

Properties	Test method	Unit of measure	Value	Tolerance
Unit weight of the fabric's base	PN-ISO 3801	g/m ²	220	-
Unit weight of the grass seeds	AM F/5.4.1/01	g/m ²	30	-
Relative water absorbtion	PN-72/P-04734	%	498,83	-
Absolute water absorbtion	PN-72/P-04734	g/m ²	1,736	-
Decomposition	Not less than 6 months			






Completed projects



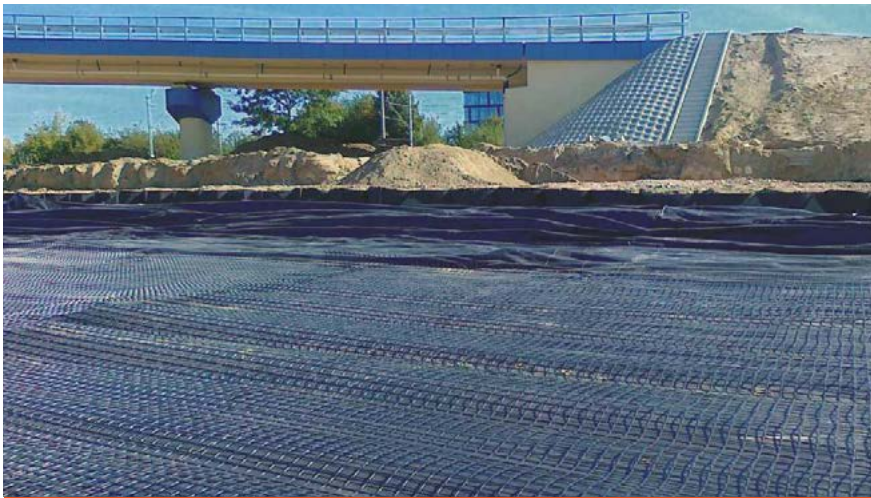
- Grotniki,
Nadleśnictwo Polesie
- **Construction
of a forest fire road**
- Polgrid BX 45/45
20.000 m²



- Knurów Szczygłowiec,
Poland
- **Reconstruction
of the road 924**
- Polgrid BX 30/30
57.000 m²



- Głębokie i Przejsław,
Poland
- **Construction of fire
road PN. „Poświętna”
in forestry**
- Polgrid BX 30/30
16.000 m²



Warsaw, Poland
Express road S2
Polgrid BX 30/30 and separating non-woven fabric 50.000 m²



Inczew, Poland
Construction of technical roads and access roads to windfarms and working platforms
Polgrid 30/30 180.000 m²



Cubin, Poland
Construction of a forest road
Polgrid 30/30 20.000 m²



Brzezinka Średzka, Poland
Reinforcement of a railway track substructure
Polgrid BX 30/30 and separating non-woven fabric 7.000 m²



Głubczyce, Poland
Construction of technical roads and access roads to windfarms
Polgrid 30/30 200.000 m²



Rzepin, Poland
Geosynthetic layer under a tar road
Polgrid BX 20/20 and Polgrid BX 45/45 25.000 m²



Chojna, Poland
Modernization of forest roads
Polgrid 30/30 and separating non-woven fabric 30.000 m²



Srokowo, Poland
Construction of a DW 650 road
Polgrid BX 30/30 and separating non-woven fabric 30.000 m²



Łódź, Poland
Reconstruction of the Stylowa Street
Polgrid BX 30/30 and separating non-woven fabric 10.000 m²



Kunów, Poland
Construction of a temporary road during reconstruction of a railway track
Polgrid BX 30/30 and separating non-woven fabric 7.000 m²



Kalisz, Poland
Reconstruction and reinforcement of the Wrocławska Street
Polgrid FSR BX 20/20 150PP 48.000 m²



Rzeszów, Poland
Reinforcement of an embankment during the construction of the S19 road
Polgrid BX 20/20 and separating non-woven fabric 35.000 m²



📍 Płock, Poland
📄 **Construction of the ringroad around Płock**
🔲 PolGrid BX30/30
82 000m²



📍 Kalisz, Poland
📄 **Geocomposite used to modernize and reinforce a city road**
🔲 Polgrid FSR BX20/20 150PP
14.400 m²



📍 Poznań, Poland
📄 **The PolGrid geocomposite in a road construction project**



📍 Góra Śląska, Poland
📄 **Forest inspectorate Góra Śląska forestry Siciny**
🔲 Polgrid BX 45/45
16.680 m²



📍 Poland
📄 **Geogrid used in a railway modernization project**
🔲 Polgrid BX 40/40
8760 m²



📍 Kępno (woj. wielkopolskie)
📄 **Construction of a road to the wind farm**
🔲 Polgrid BX 30/30
60.000 m²

The PolGrid geogrids

Frequently asked questions

What is a geosynthetic?

The ISO 10318 norm defines the geosynthetic as a product of which at least one component is produced from polymer (polyester, polypropylene, polyethylene or nylon), has the form of a sheet, strip or spatial form, and is used in contact with the soil (or other material) in geotechnical and civil engineering projects.

Geosynthetics belong to a large family of materials with a very wide range of applications, used primarily for reinforcement, stabilization, draining, filtration, separation and preventing erosion.

What are geogrids?

Geogrids are a special type of geosynthetics are used in civil engineering to physically reinforce and stabilize the soil. Geogrids interlock with aggregate and thus forms a composite. Geogrids are manufactured as openwork sheets in the shape of an orthogonal grid with high level of stiffness. PolGrid geogrids do not have any junctions (it is a monolith) and have unique features which other producers of other geogrids cannot boast.

What are the functions of a geogrid?

A geogrid works primarily as reinforcement, increasing the load-bearing capacity of the surface. Thanks to the use of geogrids, the structure is able to transfer increased tensile stress, like in the case of steel reinforcement in reinforced concrete structures.

Geogrids also act as a separator of materials with different grain size of load-bearing capacity, the soft subsoil and the material forming the structure, e.g. aggregate in the pavement of the road. It effectively prevents different particles from mixing and, consequently, prevents deterioration of the bearing capacity of the road and performance of the construction layers.

What is the manufacturing process of geogrids?

Geogrids are manufactured on a production line with the length of 130 m and this technology involves extruding a thermoplastic polypropylene sheet, which is then perforated and stretched lengthwise and crosswise. Carefully selected raw material, production parameters and perfected technology process means high-strength reproducible material can be obtained.

Is technology important for parameters of the geogrids?

Yes, it is. There are many types of geogrids on the market: extruded, welded or woven, which interact with soil in various ways. Many studies conducted around the world have proven that the best strengthening effect is achieved by using extruded, monolithic geogrids – there is no need for pre-tensioning and anchoring of this geogrid, because due to its rigidity it works as of the moment of instantly, resulting in a shorter time and lower costs of the construction works. In addition, they are highly resistant to damage during the laying and compaction of aggregate and the do not break even during compaction by heavy vibrating rollers. The Polgrid BX geogrid bears such properties.

What parameters should be used as a guide when choosing of geogrid?

The most important parameters characterizing the geogrids are tensile strength in both directions, the size of the tensile force at a strain of 2% and 5%, the efficiency of nodes, openings size, quality of raw materials used in manufacturing, and the CE mark with full identification.

Does the apertures shape make a difference?

No, it does not. On the market there are geogrids of square, rectangular and triangular (hexagonal) shape. Frequent comprehensive, independent studies have not confirmed the superiority of the triangular shape over the square. Introduction of patented geogrids with hexagonal apertures was purely a marketing move intended to reduce competition from other geogrids.

Does the ribs shape (cross section) make a difference?

Yes, it does. Polgrid geogrids have a specially designed shape of ribs formed on the basis of a concave rectangle and sharp edges. With this construction, geogrids interlock well with the aggregate and block the grains in the grid openings. This high cross-section, which has the proper thickness, is much more efficient in operation than the rib flat or rounded one.

Is the node's efficiency important?

It is very important. Efficiency (stiffness) of nodes is a measure of the node's strength compared to the strength of the ribs, as a percentage. This is extremely important, because the grains of the soil, working together with the geogrid, transmit external loads to the lateral and longitudinal ribs. The rigid node enables the whole geogrid to function efficiently, effectively preventing the movement of grains aggregate in the structure, creating a semi-rigid plate.

How should geogrids be joined?

Connections between the bands of geogrid both longitudinal and transverse, should be installed with overlap in width dependent on the ground conditions. In case of ground surface in the G2 and G3 group and the layer of aggregate of up to 30 cm, the overlap should be at least 40 cm; for ground surface in the G4 capacity standard and the layer of aggregate exceeding 30 cm, the overlap should be at least 50 cm. Where necessary, the geogrid can be cut with knife, scissors, shears or saw.

Can the Pietrucha Group help in selecting the best geogrid type for the specific project?

Of course. Our company provides technical support in choosing the appropriate type of geogrid and determining the thickness of the layer of aggregate as well as the number of layers of geosynthetics for a particular project. The Pietrucha Group offers comprehensive assistance in other matters related to geosynthetics.



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Established 1960

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