BASELOK™

BY INDUSTRIAL FABRICS, INC.

FABGRID™

OVERVIEW / INSTALLATION

PROVEN TECHNOLOGY

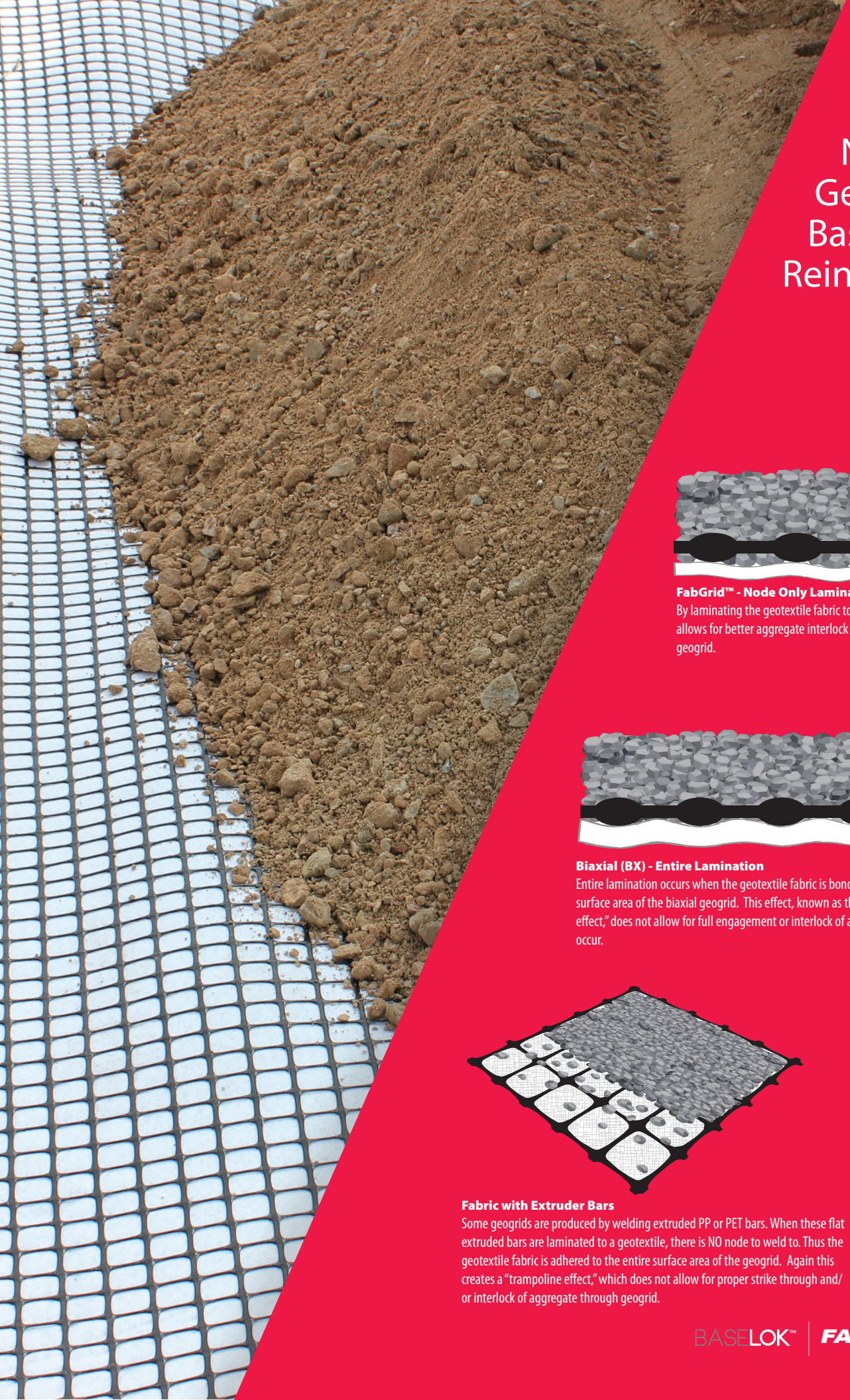
Our products stand the test of time, and BaseLok™ FabGrid™ is no exception. It was specifically developed to be the most reliable, highest quality grid fabric composite available. It all starts with our lamination method:

BaseLok™ FabGrid™ is preferable in the market due to our highly effective node-only Lamination which allows for improved aggregate interlock through the apertures of BaseLok™ GeoGrid. When compared to similar fabrics and biaxial geogrids, this lamination process enables FabGrid™ to outclass the competition.

BASELOK™ FABGRID™

Stabilization of paved and unpaved surfaces requires consideration of not only the most suitable geogrid and granular fill thickness, but also if optimal separation and filtration of disparate materials will be preserved throughout the structure's life. BaseLok™ GeoGrid™ often provides enough confinement to achieve separation and filtration; however, sometimes a geotextile combined with a geogrid is necessary. The proven technology of BaseLok™ allows FabGrid™ to provide better performance with the advantage of a non-woven geotextile, creating an all-in-one composite product.

- **Multi-Purpose:** Allows aggregate separation, filtration, and stabilization
- **Cost-Effective:** Save time and money with optimal structural thickness
- **Environmentally Friendly:** Safe and permanent alternative to chemical stabilization agents
- **Efficient and Easy:** Save yourself the trouble of reduce labor and time by deploying a single layer of BaseLok™ FabGrid™



FabGrid™ Next Generation Base Reinforcement

FabGrid™ - Node Only Lamination
By laminating the geotextile fabric to the nodes only, FabGrid™ allows for better aggregate interlock through the apertures of biaxial geogrid.

Biaxial (BX) - Entire Lamination
Entire lamination occurs when the geotextile fabric is bonded to the entire surface area of the biaxial geogrid. This effect, known as the "trampoline effect," does not allow for full engagement or interlock of aggregate to occur.

Fabric with Extruder Bars
Some geogrids are produced by welding extruded PP or PET bars. When these flat extruded bars are laminated to a geotextile, there is NO node to weld to. Thus the geotextile fabric is adhered to the entire surface area of the geogrid. Again this creates a "trampoline effect," which does not allow for proper strike through and/or interlock of aggregate through geogrid.

APPLICATIONS

- Petrochemical
- Oil & Gas
- Rail
- Mining
- Waste Management
- Roads & Highways
- Wind Farms
- Electrical Distribution
- Port & Intermodal Facilities
- Government Infrastructure
- Federal EPA Hazmat Sites
- Airports
- Coastal / Waterways

BaseLok™ FabGrid™ excels in fighting weak soils and strengthening pavement. Read on to discover how FabGrid™ can take your project to the next level.

SUBGRADE REINFORCEMENT

Many unpaved sites experience issues with weak soils, including railways, storage yards, haul roads, staging areas, working surfaces, and more. BaseLok™ FabGrid™ reduces subgrade stress and fortifies the granular platform in one straightforward solution, greatly decreasing future maintenance and up-front expenses.

PAVEMENT STRENGTHENING

Early failure is common in paved areas due to weakening of the granular base course and progressive lateral displacement. You can bolster the overall stiffness of any paved structure by installing BaseLok™ FabGrid™, including parking lots, roadways, runways, intermodal facilities, aprons, and any surface with vehicular traffic. Experience reduced life-cycle and maintenance costs on both rigid and flexible pavements.

Approved for use by the American Railroad Engineering and Maintenance-of-way Association (AREMA)

The superior effectiveness of FabGrid™ is made even better thanks to our BaseLok™ team's proficiency and technical support. We believe a solution is more than just a product we manufacture or sell; you deserve an attentive and knowledgeable team of professionals working alongside you every step of the way. Our experienced engineers and sales team are fully equipped to cater to your every need, no matter the project.

ADVANTAGES

- **Multi-Purpose**
- **Cost-Effective**
- **Environmentally Friendly**
- **Efficient and Easy**

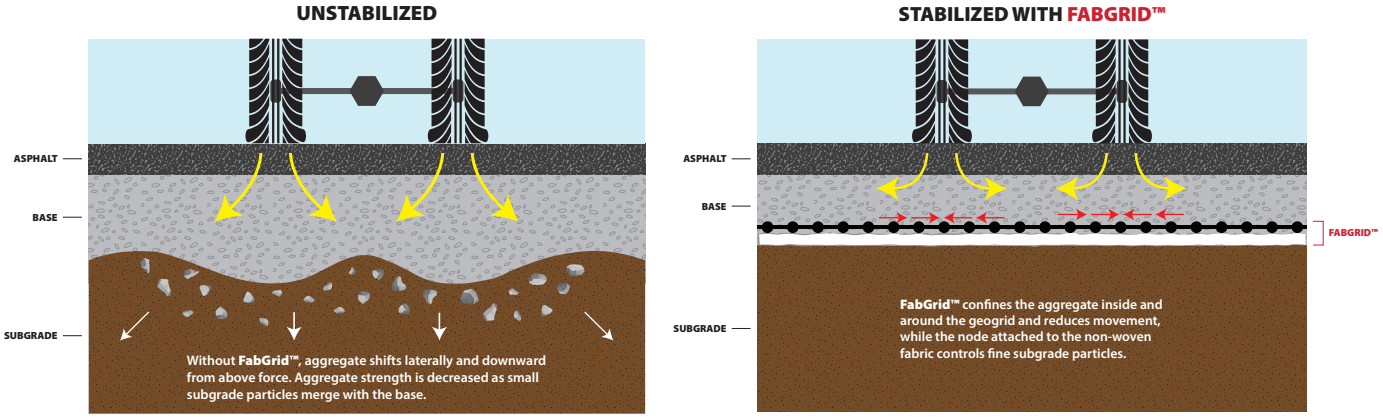
ENGINEERING ASSISTANCE

Our BaseLok™ team provides in-house engineers and design assistance. Contact us today for more about our engineering support.

For more information on FabGrid™, please call 800 848 4500, or visit us at www.ind-fab.com.

> Snowshoe Effect:
Force distribution causes a fusion of aggregate and GeoGrid, distributing bulky weights over soft subgrades.

UNSTABILIZED VS STABILIZED AGGREGATE



The **Californian Bearing Ratio (CBR)** test is a penetration test used to evaluate the sub-grade strength of roads and pavements. The results of these tests are used with the curves to determine the thickness of pavement and its component layers. This is the most widely used method for the design of flexible pavement.[1]

The CBR test was developed by the California Division of Highways to classify and evaluate soil-sub grade and base coarse materials for flexible pavements. An empirical test, the CBR test has been used to determine the material properties for pavement design. Empirical tests measure the strength of the material and are not a true representation of the resilient modulus.[clarification needed][2] It is a penetration test in which a standard piston, with a diameter of 50 mm (1.969 in), is used to penetrate the soil at a standard rate of 1.25 mm/minute. The pressure up to a penetration of 2.5 mm is measured and its ratio to the bearing value of a standard crushed rock is termed as the CBR.

Although the force increases with the depth of penetration, in most cases, it does not increase as quickly as it does for the standard crushed rock, so the ratio decreases. In some cases, the ratio at 5 mm may be greater than that at 2.5 mm. If this occurs, the ratio at 5 mm should be used. The CBR is a measure of resistance of a material to penetration of a standard plunger under controlled density and moisture conditions. The test procedure should be strictly adhered to if a high degree of reproducibility is desired. The CBR test may be conducted on a remolded or undisturbed specimen in the laboratory. The test is simple and has been extensively investigated for field correlations of flexible pavement thickness requirement.

The laboratory CBR apparatus consists of a mould of 150 mm diameter with a base plate and a collar, a loading frame and dial gauges for measuring the penetration values and the expansion on soaking. If a soaked (wet) measurement is desired, the specimen in the mold is soaked in water for four days and the swelling and water absorption values are noted. The surcharge weight is placed on the top of the specimen in the mould and the assembly is placed under the plunger of the loading frame.

Load is applied on the sample by a standard plunger with diameter 50 mm at the rate of 1.25 mm/min. A load penetration curve is drawn. The load values on standard crushed stones are 1,370 kgf (13.44 kN) and 2,055 kgf (20.15 kN) at 2.5 mm and 5.0 mm penetrations respectively.

The CBR value is expressed as a percentage of the actual load causing the penetrations of 2.5 mm or 5.0 mm to the standard loads mentioned above. The CBR can therefore be mathematically expressed as:

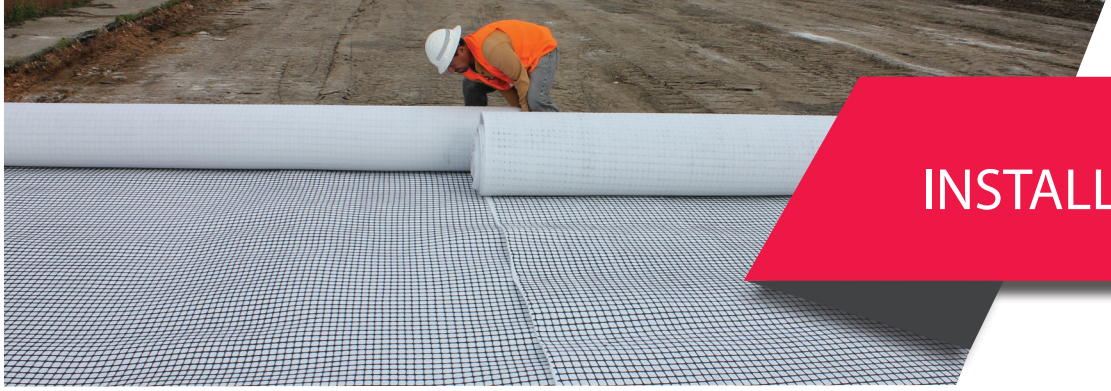
$$CBR = \frac{p}{p_s} \cdot 100\%$$

p = measured pressure for site soils [N/mm^2]
p_2 = pressure to achieve equal penetration on standard soil [N/mm^2]

The area of the standard piston is 3.04 in2, so the results are sometimes converted to pounds per square inch by dividing by 3.

References

California Bearing Ratio Test
Jamal, Haseeb. "CBR Test". AboutCivil.Org. Retrieved 23 September 2019.



INSTALLATION

> SURFACE AND SITE PREPARATION

The site should be cleared of all debris, stumps, plant growth, topsoils, stones and other deleterious materials. It is mandatory to remove all materials that may puncture or damage the geotextile fabric part of the FabGrid™ System.

In some instances where very low CBR subgrades (CBR < 0.5) are present, it may be beneficial to leave some vegetation, topsoils, and fine root mats in place. Where moderate CBR subgrades (CBR > 2) are present, a light proof roll is recommended to locate unsuitable areas. Unsuitable areas will need to be excavated and backfilled with suitable material before proper installation can take place.

The proper equipment should be used to smooth and compact the subgrade to the specified requirements. Check with the engineer for subgrade compaction requirements.

The Californian Bearing Ratio (CBR) test is a penetration test used to evaluate the subgrade strength of roads and pavements. The results of these tests are used with the curves to determine the thickness of pavement and its component layers. This is the most widely used method for the design of flexible pavement.

Subgrade CBR Value	Recommended Minimum Overlap
< 1	3 ft.
> 1 to 2	2.5 ft.
> 2	1.5 ft.

> LAYOUT, OVERLAP, AND PLACEMENT

The layout of your FabGrid™ rolls should be predetermined before you begin placement of the rolls. FabGrid™ rolls are commonly rolled parallel with the roadway system. However, where conditions present very soft subgrades (CBR < 0.5), and/or where lateral spreading and separation of overlaps is a concern, it may be beneficial to layout FabGrid™ rolls perpendicular to the road. Consult with your engineer and FabGrid™ representative to determine the best FabGrid™ layout for your project.

FabGrid™ should extend at least 1 foot beyond the toe of the aggregate on all sides. For proper installation, the rolls should be overlapped side to side and end to end. The overlapping should be in the same direction as the aggregate placement. The recommended overlap varies from 1.5 feet to 3 feet based on subgrade strength. Recommendations for general overlaps can be found in the table above. However, your engineer should be consulted to determine the proper overlap to be used.

To accommodate curved sections in your layout plan, FabGrid™ should be cut and overlapped. Cutting of FabGrid™ may be done with sharp shears and other handheld power shear type cutting devices. It is mandatory that the proper safety equipment be used while cutting and installing FabGrid™. FabGrid™ may also be cut to accommodate other immovable protrusions such as manhole covers or similar.

> ROLLING OUT FABGRID™

Once layout and overlap requirements have been determined, you can prepare to roll out your FabGrid™. FabGrid™ should begin to be rolled out from an area easily accessible to construction equipment while complying with the layout plan. For very soft subgrades, the layout should begin on firm soils on the perimeter of the project. This will act as an anchor point from which you can roll FabGrid™ onto softer sections. Frequently check to make sure your alignment is being maintained throughout your FabGrid™ installation process.

At the time of installation, FabGrid™ shall be rejected if defects, rips, holes, flaws, deterioration or damage occurred during manufacturing, transportation, or storage. FabGrid™ should be protected at all times before and during construction to ensure its original chemical and physical properties are unchanged.

> TENSIONING AND ANCHORING

While unrolling FabGrid™, maintain alignment and pull taut to remove slack and wrinkles. Be sure to anchor the beginning of each roll at the center and corners before full unrolling. To hold FabGrid™ in place prior to aggregate placement; soil, rocks, or other weights may be used to hold FabGrid™ edges and overlaps in place. Small shovel piles of aggregate are commonly used along overlaps, edges, and corners. If allowed, anchor pins or sod staples may also be used.

> AGGREGATE PLACEMENT

The aggregate is placed and spread over FabGrid™ using normal construction methods and equipment. The aggregate is normally back dumped. To prevent damage, the height of the drop shall be limited to less than 1 foot. After the aggregate is back dumped, it is then spread out over the FabGrid™. Tracked bulldozers are commonly used for spreading of the aggregate. For soft subgrade conditions (CBR < 1.5), low ground pressure models are recommended.

Unless relatively competent subgrades (CBR > 4) exist, trucks and other construction vehicles should not be driven directly over FabGrid™. Where competent subgrades (CBR > 4) do exist, standard rubber-tired vehicles may drive over FabGrid™ at very slow speeds of less than 5 mph. A test section should be evaluated to determine the possible damage from direct vehicle contact. If acceptable, aggregate may be dumped as the vehicle advances. Sudden starts, stops, and turns should be avoided when operating equipment directly over FabGrid™. Tracked construction equipment should not be operated directly on FabGrid™. The turning or pivoting of tracked equipment over installed aggregate should be kept to a minimum to prevent tracks from displacing the aggregate and damaging the FabGrid™.

INSTALLATION

> SOFT SUBGRADES

For softer subgrades (CBR < 4), aggregate should be dumped from the edge of previously placed material. For very soft subgrades (CBR < 0.5), consult with your engineer and FabGrid™ representative to determine the best method of aggregate placement.

Lift thicknesses are generally not less than 6 inches. The initial lift may be as thick as necessary to prevent rutting or failure of the subgrade soils. During spreading, the bulldozer blade should raise gradually as each lift is spread over the FabGrid™. Take caution not to catch the bulldozer blade or any other equipment on the FabGrid™.

The shoving action from bulldozers or other aggregate spreading equipment may cause waves in the FabGrid™ layout ahead of the fill. The anchors used ahead may trap these waves from dissipating and force the FabGrid™ upwards where it could be damaged by spreading equipment. If significant waving occurs during spreading, it may be necessary to remove the anchors at the end of the roll and re-tension to dissipate the waves.

> COMPACTION

Compaction requirements should be obtained from the project's specifications. Unless very soft soils are present, standard compaction methods can be used. Rutting or pumping of the subgrade experienced during compaction should be immediately addressed. Consult with the engineer to determine corrective actions required such as additional aggregate to strengthen the section. In wet condition cases it may be necessary to cease operations to allow pore pressures to dissipate from the subgrade and reduce moisture content. Weak areas found during final compaction commonly indicate inadequate aggregate thicknesses at those locations. These areas should be filled with additional aggregate and compacted to the project specifications.

> REPAIRS

If FabGrid™ is damaged during or after installation, it can be repaired by patching the area. To repair the damaged FabGrid™ section, first excavate the fill from the damaged area extending 3 feet in all directions of the damage. Place a FabGrid™ patch over the damage, extending at least 3 feet in all directions, and replace the excavated material and re-compact.

Roll Sizes

BaseLok™ FabGrid Roll Characteristics						
Type	Roll Width*		Roll Length		Roll Area	
	(m)	(ft)	(m)	(ft)	(m^2)	(yd^2)
FG 1515	4	13.1	75	246	300	358
FG 1100	4	13.1	75	246	300	358
FG 2020	4	13.1	50	164	200	239
FG 1200	4	13.1	50	164	200	239
FG1500	4	13.1	50	164	200	239
FG 3030	4	13.1	50	164	200	239
FG 3030L	4	13.1	50	164	200	239

* Custom Rolls: 16' width available upon request.

Selection Guide

Product Properties[1]	Test Method	Units		FG1515	FG1100	FG2020	FG1200	FG1500	FG3030	FG3030L
Aperture Dimensions		in (mm)	MD	1.5 (38)	1 (25)	1.5 (38)	1 (25)	1 (25)	1.3 (34)	2.2 (57)
			XD	1.5 (38)	1.3 (33)	1.5 (38)	1.3 (33)	1.06 (27)	1.3 (34)	2.2 (57)
Minimum Rib Thickness[2]		in (mm)	MD	0.035 (0.9)	0.03 (0.76)	0.04 (1.1)	0.05 (1.27)	0.07 (1.78)	0.07 (1.78)	0.06 (1.5)
			XD	0.025 (0.6)	0.03 (0.76)	0.03 (0.8)	0.04 (1.1)	0.06 (1.5)	0.04 (1)	0.04 (0.9)
Tensile Strength at 2% Strain	ASTM D6637	lb/ft (kN/m)	MD	340 (5)	280 (4.1)	450 (6.5)	410 (6)	580 (8.5)	690 (9.36)	710 (9.63)
			XD	340 (5)	450 (6.6)	450 (6.5)	620 (9)	690 (10)	690 (9.36)	710 (9.63)
Tensile Strength at 5% Strain	ASTM D6637	lb/ft (kN/m)	MD	750 (11)	580 (8.5)	890 (13)	810 (11.8)	1,200 (17.5)	1,390 (18.85)	1,430 (19.4)
			XD	750 (11)	920 (13.4)	890 (13)	1,340 (19.6)	1,370 (20)	1,390 (18.85)	1,430 (19.4)
Ultimate Tensile Strength	ASTM D6637	lb/ft (kN/m)	MD	1030 (15)	849 (12.4)	1370 (20)	1,310 (19.2)	1,850 (27)	2,050 (30)	2,050 (30)
			XD	1030 (15)	1,300 (19)	1370 (20)	1,970 (28.8)	2,050 (30)	2,050 (30)	2,050 (30)
Roll Size Standard*		ft (m)		13.1 x 246 (4 x 75)	13.1 x 246 (4 x 75)	13.1 x 164 (4 x 50)	13.1 x 164 (4 x 50)	13.1 x 164 (4 x 50)	13.1 x 164 (4 x 50)	13.1 x 164 (4 x 50)
Structural Integrity										
Junction Efficiency[3]	ASTM D7737	%		93	93	93	93	90	93	93
Flexural Stiffness	ASTM D7748	mg-cm		250,000	250,000	700,000	750,000	2,000,000	2,000,000	450,000
Aperture Stability	USACOE	m-N/deg		0.38	0.32	0.45	0.65	0.6	0.9	0.58
Durability										
Resistance to Installation Damage	ASTM D5818	%SC / %SW / %GP		95 / 93 / 90	95 / 93 / 90	95 / 93 / 90	95 / 93 / 90	95 / 93 / 90	95 / 93 / 90	75% GP
Resistance to Long Term Degradation[4]	EPA 9090	%		100	100	100	100	100	100	100
Resistance to UV Degradation[5]	ASTM D4355	%		100	100	100	100	100	100	100
Geotextile Hydraulic Properties[1]	**Test Method**									
Apparent Opening Size (AOS)	ASTM D-4751		English	70 US Std. Sieve						
			Metric	0.212 mm						
Permittivity	ASTM D-4491			1.5 sec^{-1}						
Water Flow Rate	ASTM D-4491		English	110 gpm/ft^2						
			Metric	4479 $1/min/m^2$						

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Dimensions & Delivery

The BaseLok™ geogrid shall be delivered to the job site in roll form with each roll individually identified and nominally measuring 4m (13.1-FT) in width and 50m (164-FT) or 75m (246-FT) in length. FABGRID™ is also available in 16-FT width.

Notes

1. Unless indicated otherwise, values shown are minimum average roll values determined in accordance with ASTM D4759. Brief descriptions of test procedures are given in the following notes.
2. Nominal dimensions.
3. Load transfer capability determined in accordance with ASTM D6637 and ASTM D7737 and expressed as a percentage of ultimate tensile strength.
4. Resistance to loss of load capacity or structural integrity when subjected to chemically aggressive environments in accordance with EPA 9090 immersion testing.
5. Resistance to loss of load capacity or structural integrity when subjected to 500 hours of ultraviolet light and aggressive weathering in accordance with ASTM D4355.

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