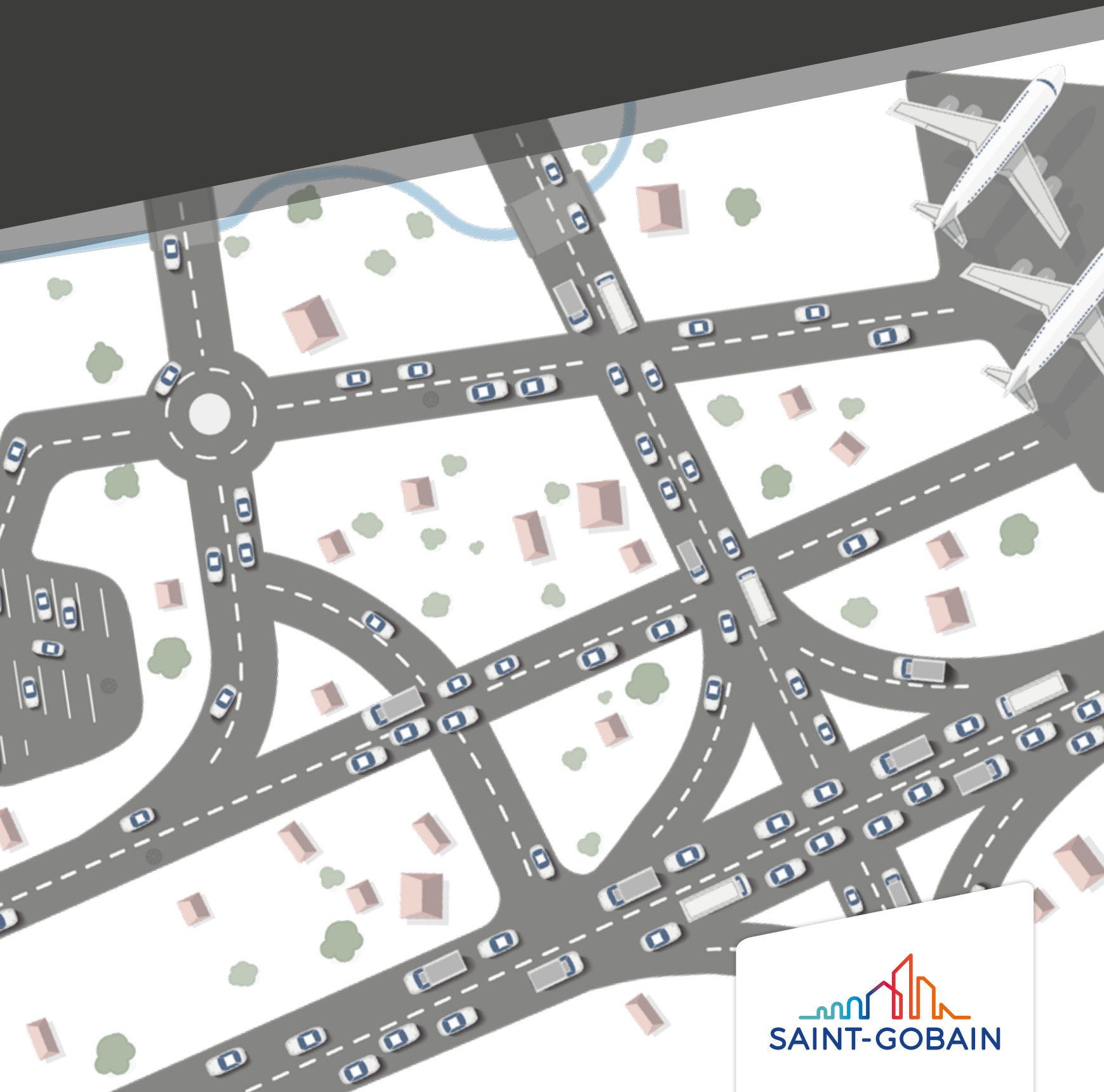


Pavement reinforcement system **GlasGrid®**





ADFORS produces **GlasGrid** for more then **30 years**



ADFORS GlasGrid saves money and extends pavement life up to 300 %



ADFORS offers customer service and support in **7 languages** & flexible **delivery worldwide**

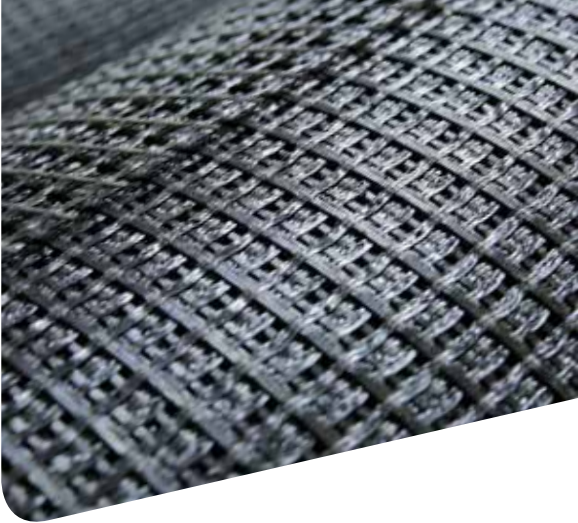


ADFORS GlasGrid provides **easy and fast installation** up to **6 000 m² / hour** with dedicated installation tractor

Product Range

ADFORS GlasGrid product line offers several styles of pavement reinforcement grids designed to reinforce asphalt concrete overlays. They retard reflective cracking by a factor of 2 to 3 times by turning stresses horizontally in order to dissipate them.

The grid configuration features fiberglass strands coated with an elastomeric polymer. Each strand has a remarkably high tensile strength, as well as a high modulus of elasticity at low elongation – making ADFORS GlasGrid stronger than steel by weight.



ROADS



HIGHWAYS



AIRPORTS



PARKING LOTS



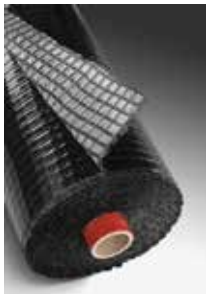
BRIDGES



MANHOLES



GlasGrid GG



GlasGrid TF



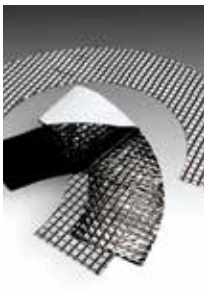
GlasGrid CG



GlasGrid CGL



GlasGrid PG



GlasGrid PM



GlasGrid GP



GlasGrid IM

		GG	TF	CG	CGL	PG	PM	GP	IM
Classification EN 15381 ^{*1}	Flat surface/ Leveling course	R	R	R/STR/B	R/STR	R/STR/B	R/STR/B	R/STR/B	-
	Milled surface	-	-	R/STR/B	R/STR	R/STR/B	R/STR/B	R/STR/B	-
Characteristics	Self-adhesive	✓	✓			✓	✓		✓
	Non-woven fabric layer			✓	✓	✓	✓	✓	
	Bitumen layer					✓	✓		
	Tack Film ^{*2}		✓						

^{*1} Function classification in accordance with EN 15381.
^{*2} Tack Film = the film is designed to replace a need for the tack coat in the interlayer.

R = reinforcement | STR = stress relief | B = interlayer barrier

The key Advantages for You

- High-modulus and tensile fiberglass grid due to consistent impregnation of each glass filament
- Patented polymer coating improving compatibility with bitumen
- Made from mineral raw materials
- Excellent layers' bonding
- Quick and efficient installation
- Good trafficability
- Easy cutting
- Excellent milling performance
- Measured unlimited recyclability & enhanced properties in Reclaimed Asphalt Pavement (RAP)
- Edge marking for easy overlapping
- Thermal and chemical stability
- Various strengths available 25 - 200 kN/m

Based on 30 years of successful installations around the world, ADFORS GlasGrid extends pavement life up to 300% and typically provides a 50% reduction in future investment cost (e.g. maintenance, rehabilitation and use costs) over the life of an average road.

ADFORS GlasGrid turns crack stresses horizontally and dissipates the stress.



Without ADFORS GlasGrid®

Stress travels uninterrupted, causing cracks



With ADFORS GlasGrid®

Stress is redirected horizontally and is dissipated, minimizing cracks

Tested in the lab,
proven in the field

IFSTTAR full scale tests on ADFORS GlasGrid reinforced flexible pavements



The objective of this research was to evaluate the effect of the reinforcement by a fiberglass grid ADFORS GlasGrid GG100 - 100 kN/m on the performance of a new flexible pavement, with a relatively thin bituminous wearing course (80 mm). For that purpose, one reinforced pavement section, and one reference section, without reinforcement, have been tested on the IFSTTAR accelerated pavement testing facility. They were submitted to a traffic consisting of 1 million dual wheel 65 kN load cycles (representing the French standard axle load), and then 200 000 additional cycles, with loads increased to 70 kN.

The conclusions of the study indicate a very positive effect of the fibreglass grid on the resistance to cracking of flexible pavements:

- Cracking appeared first on section without grid after 800 000 cycles. At the end, 70% of the section was cracked.
- Section with grid presents no cracking until the end of the test (1,2 M cycles).

Milling Performance and Recyclability – RWTH Aachen University



In this test, ADFORS GlasGrid GG200 - 200 kN/m was installed on an existing binder course AC 16 B S and covered with 4cm thick top layer SMA 8 S. The upper part of the binder course including the reinforcement grid were picked up by the milling machine in a single step. No adverse effects were realized and milling depth was not affected.

A second test, the Cycling Tension test, concluded that the partial reuse of milled asphalt granulate (including glass fibers) in a new asphalt mixture improved the fatigue behaviour of the recycled asphalt.

The Hidden Strength in the Runway

Lower lifecycle costs of airfield asphalt overlays by up to 20–30 %

Centralia Airport, Exeter,
Ontario, Canada →



State of the pavement
before the repair in 1992
safety compromised



State of the pavement after
20 years in service
(photo May 2012)

Heathrow International Airport London, UK

Project: Pink Elephant Car Park
Product: ADFORS GlasGrid GG50
Quantity: 45.000 m²
Installation date: June 2005

Overlay design:

40 mm surface course
ADFORS GlasGrid GG50 + fixing coat
30 mm leveling course
Existing PCC panels

Project details:

At Heathrow Airport in London, the PCC pavement of an existing taxiway needed to be converted into an asphalt paved parking lot. The budget was tight, but the client wanted to prevent reflective cracking to maintain the visual conditions and prevent the detrimental effect of moisture ingress in the structure. Using GlasGrid and a fixing coat of Sealoflex® polymer modified bitumen, a limited overlay thickness was provided. Inspection of the project in 2009 showed that this solution was very effective in addressing reflective cracking, as only one crack had reflected.

Atatürk International Airport Istanbul, Turkey

Project: Atatürk International Airport
Runway Rehabilitation
Product: ADFORS GlasGrid GG100
Quantity: 300.000 m²
Installation date: May 2010

Overlay design:

4 cm SMA-19 mm nominal
6 cm HMA-19 mm nominal
6 cm HMA-19 mm nominal
ADFORS GlasGrid GG100
10 cm CRL-19 mm nominal

Project details:

A major overall reinforcement and expansion of the runway, which included significant volumes of fill to correct the pavement profile, needed to be completed. The old PCC was removed and reinstated with GlasGrid reinforced ACC. The result was a longer and wider runway that has the ability to handle heavier aircraft loadings.



Technical Data Sheet 1/2

General Description

ADFORS GlasGrid GG Full Lane Width Pavement Reinforcement System is manufactured at a Saint-Gobain ADFORS facility that has achieved ISO 9001:2015 certification and meets the requirements of EN 15381. ADFORS GlasGrid is a high strength, open fiberglass grid custom knitted in a stable construction and coated with a patented elastomeric polymer and self-adhesive glue. Every component of the matrix shall be stabilized against ultraviolet degradation and inert to chemicals normally found in a natural soil environment. ADFORS GlasGrid conforms to the property values listed below, which have been derived from quality conformance testing performed by a laboratory:

Technical Characteristics

Property	Unit	GG 50	GG 100	GG 200	Test Method
Tensile Strength (MD x XD) Ultimate	kN/m	(55 x 55) - 5	(115 x 115) - 15	(115 x 215) - 15	EN ISO 10319
Tensile Elongation Ultimate	%	2,5 ± 0,5	2,5 ± 0,5	2,5 ± 0,5	EN ISO 10319
Tensile Resistance @ 2% Strain (MD x XD)	kN/m	(46 x 46) ± 10	(95 x 95) ± 20	(95 x 180) ± 20	EN ISO 10319
Secant Stiffness EA @ 1% Strain (MD x XD)	N/mm	(2.200 x 2.200) ± 200	(4.600 x 4.600) ± 600	(4.600 x 8.600) ± 600	EN ISO 10319
Young's Modulus E	MPa	73.000	73.000	73.000	
Mass per Unit Area	g/m ²	205	405	603	EN ISO 9864
Melting Point Coating	°C	>232	>232	>232	ASTM D 276
Roll Length	m	150	100	70	
Roll Width	m	1,0; 1,5; 2,0; 3,0	1,0; 1,5; 2,0; 3,0	1,5; 3,0	
Roll Area	m ²	150, 225, 300, 450	100, 150, 200, 300	105, 210	
Adhesive Backing		Pressure sensitive	Pressure sensitive	Pressure sensitive	
Grid Size (Center to Center of Strand)	mm	25 x 25	12,5 x 12,5 (type 8501) 25 x 25 (type 8511)	25 x 19	
Material	Fiberglass reinforcement with modified polymer coating and pressure-sensitive adhesive backing.				

Properties

- High grid stiffness provides a wrinkle-free installation and a direct load transmission
- Low elongation
- Thermal and chemical stability
- Excellent milling performance



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Installation

- Complete all crack sealing, pothole filling, base repairs, leveling course application. Road surface must be dry, clean and dust-free with temperature 5 °C - 60 °C.
- Unroll the geogrid with the sticky side face down on the flat layer/leveling course.
- Respect the overlap of end roll joints 10 – 15 cm and longitudinal joints at minimum 5 cm.
- Press the grid to the layer to activate glue and ensure bonding between the lower surface and grid.
- Apply tack coat per project requirements. (See application tack coat rate formula in Installation manual page 4).
- Permit the tack to completely cure prior to proceeding.
- Apply asphalt over layer.

See document Installation Procedures for detailed steps available on our website or watch the video on YOUTUBE ADFORS TV channel.



Benefits

- Quick and efficient installation due to self-adhesive backing
- High grid stiffness providing a wrinkle free installation
- Easy cutting
- Good trafficability (suppliers, trucks, paver)
- Thermal and chemical stability
- Excellent milling performance
- Measured unlimited recyclability & enhanced properties in Reclaimed Asphalt Pavement (RAP)

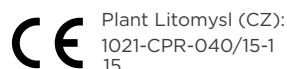


Palletization

Product	Roll width	Roll area	Roll weight	Core inner diameter	No of rolls on pallet	Total area
GG 50	1 m	150 m ²	35 kg	76 mm	12	1 800 m ²
	1,5 m	225 m ²	51 kg	76 mm	12	2 700 m ²
	2 m	300 m ²	69 kg	76 mm	6	1 800 m ²
	2 m	300 m ²	69 kg	76 mm	10	3 000 m ²
	3 m	450 m ²	104 kg	100 mm	6	2 700 m ²
GG 100	3 m	450 m ²	104 kg	100 mm	10	4 500 m ²
	1 m	100 m ²	45 kg	76 mm	12	1 200 m ²
	1,5 m	150 m ²	67 kg	76 mm	12	1 800 m ²
	2 m	200 m ²	90 kg	76 mm	6	1 200 m ²
	2 m	200 m ²	90 kg	76 mm	10	2 000 m ²
GG 200	3 m	300 m ²	135 kg	100 mm	6	1 800 m ²
	3 m	300 m ²	135 kg	100 mm	10	3 000 m ²
	1,5 m	105 m ²	69 kg	76 mm	12	1 260 m ²
	3 m	210 m ²	140 kg	100 mm	6	1 260 m ²
	3 m	210 m ²	140 kg	100 mm	10	2 100 m ²



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ADFORS GlasGrid® is a registered trademark of Saint-Gobain ADFORS. U.S. Patent 8,038,364; 8,349,431 and 8.882.385. Additional patents pending.
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General Description

ADFORS GlasGrid GG non-adhesive is the product for special application on surfaces covered by mastic asphalt. The product is manufactured at a Saint-Gobain ADFORS facility that has achieved ISO 9001:2015 certification and meets the requirements of EN 15381. ADFORS GlasGrid is a high strength, open fiberglass grid custom knitted in a stable construction and coated with a patented elastomeric polymer. Every component of the matrix shall be stabilized against ultraviolet degradation and inert to chemicals normally found in a natural soil environment. ADFORS GlasGrid conforms to the property values listed below, which have been derived from quality conformance testing performed by a laboratory:

Technical Characteristics

Property	Unit	GG 50 NA	Test Method
Tensile Strength (MD x XD) Ultimate	kN/m	(55 x 55) - 5	EN ISO 10319
Tensile Elongation Ultimate	%	2,5 ± 0,5 %	EN ISO 10319
Tensile Resistance @ 2% Strain (MD x XD)	kN/m	(46 x 46) ± 10	EN ISO 10319
Secant Stiffness EA @ 1% Strain (MD x XD)	N/mm	(2.200 x 2.200) ± 200	EN ISO 10319
Young's Modulus E	MPa	73.000	
Mass per Unit Area	g/m ²	205	EN ISO 9864
Melting Point Coating	°C	>232	ASTM D 276
Roll Length	m	150	
Roll Width	m	1,5	
Roll Area	m ²	225	
Grid Size (Center to Center of Strand)	mm	25 x 25	
Material	Fiberglass reinforcement with modified polymer coating		

Properties

- High grid stiffness provides a wrinkle-free installation and a direct load transmission
- Low elongation
- Thermal and chemical stability
- Excellent milling performance



The values and tolerances given are obtained in our laboratories and in accredited testing institutions. The information given in this data sheet is to the best of our knowledge true and correct. However new research and practical experience can make revisions necessary. We reserve the right to make changes at any time. Statements concerning possible use of our product are not intended as recommendations for their use in the infringement of any patent. No patent warranty of any kind, expressed or implied, is made or intended.

Installation

- Unroll and lay the geogrid on dry and clean flat layer/leveling course.
- Respect the overlap of end roll joints 10 – 15 cm and longitudinal joints at minimum 5 cm.
- Apply mastic asphalt layer min. 4 cm.

Benefits

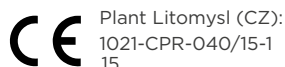
- Elimination of flowing of mastic asphalt during the hardening
- Protection against microcracking in mastic asphalt
- Quick and efficient installation
- Easy cutting
- Thermal and chemical stability
- Excellent milling performance
- Measured unlimited recyclability & enhanced properties in Reclaimed Asphalt Pavement (RAP)

Palletization

Product	Roll width	Roll area	Roll weight	Core inner diameter	No of rolls on pallet	Total area
GG 50 NA	1,5 m	225 m ²	51 kg	76 mm	12	2 700 m ²



In as much as Saint-Gobain ADFORS has no control over installation design, installation workmanship, accessory materials, or conditions of application, Saint-Gobain ADFORS does not warrant the performance or results of any installation or use of ADFORS GlasGrid GG. This warranty disclaimer includes all implied warranties, statutory or otherwise, including the warranty of merchantability and of fitness for a particular purpose. The purchaser and/or user should perform its own tests to determine the suitability and fitness of the product for the particular purpose desired in any given situation.



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 ADFORS GlasGrid® is a registered trademark of Saint-Gobain ADFORS. U.S. Patent 8,038,364; 8,349,431 and 8.882.385. Additional patents pending.
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General Description

ADFORS GlasGrid TF (Tack Film) Full Lane Width Pavement Reinforcement System is manufactured at a Saint-Gobain ADFORS facility that has achieved ISO 9001:2015 certification and meets the requirements of EN 15381. ADFORS GlasGrid TF is a high strength, fiberglass grid custom knitted and coated with a patented elastomeric polymer and self-adhesive glue. The grid is combined with a patented multilayer tack film designed to enhance the bond between layers of asphalt and replace conventional tack coats. Every component of the matrix shall be stabilized against ultraviolet degradation and inert to chemicals normally found in a natural soil environment. ADFORS GlasGrid TF conforms to the property values listed below, which have been derived from quality conformance testing performed by a laboratory:

Technical Characteristics

Property	Unit	TF 100	TF 200	Test Method
Tensile Strength (MD x XD) Ultimate	kN/m	(115 x 115) - 15	(115 x 215) - 15	EN ISO 10319
Tensile Elongation Ultimate	%	2,5 ± 0,5	2,5 ± 1,5	EN ISO 10319
Tensile Resistance @ 2% Strain (MD x XD)	kN/m	(95 x 95) ± 20	(95 x 180) ± 20	EN ISO 10319
Secant Stiffness EA @ 1% Strain (MD x XD)	N/mm	(4.600 x 4.600) ± 600	(4.600 x 8.600) ± 600	EN ISO 10319
Young's Modulus E	MPa	73.000	73.000	
Mass per Unit Area	g/m²	467	691	EN ISO 9864
Melting Point	°C	>232	>232	ASTM D 276
Roll Length	m	100	60	
Roll Width	m	1,5	1,5; 2,0	
Roll Area	m²	150	90, 120	
Adhesive Backing		Pressure sensitive	Pressure sensitive	
Grid Size (Center to Center of Strand)	mm	12,5 x 12,5 (type 8501) 25 x 25 (type 8511)	25 x 19 mm	
Film Type		100% Polymer	100% Polymer	
Film Softening Point	°C	99	99	
Material	Fiberglass reinforcement with modified polymer coating and pressure-sensitive adhesive backing bonded to polymer tack film			

Properties

- High grid stiffness provides a wrinkle-free installation and a direct load transmission
- Low elongation
- Thermal and chemical stability
- Excellent milling performance
- Patented tack film replacing tack coat



The values and tolerances given are obtained in our laboratories and in accredited testing institutions. The information given in this data sheet is to the best of our knowledge true and correct. However new research and practical experience can make revisions necessary. We reserve the right to make changes at any time. Statements concerning possible use of our product are not intended as recommendations for their use in the infringement of any patent. No patent warranty of any kind, expressed or implied, is made or intended.

Installation

- Complete all crack sealing, pothole filling, base repairs, leveling course application. Road surface must be dry, clean and dust-free with temperature 21 °C - 60 °C.
- Unroll the geogrid with the sticky side face down and film up on the flat layer/ leveling course.
- Respect the overlap of end roll joints 10 - 15 cm and longitudinal joints at 2,5 - 5 cm.
- Press the grid to the layer to activate glue and ensure bonding between the lower surface and grid.
- Apply asphalt over layer.

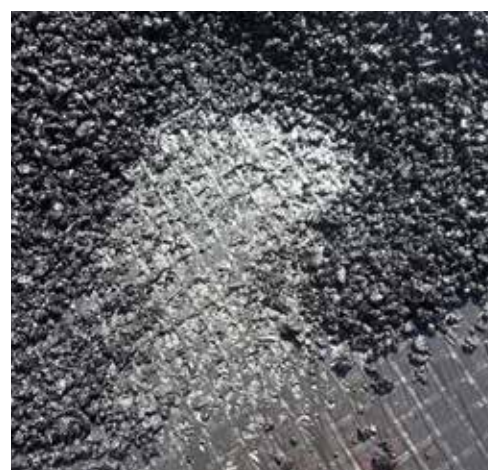
See document Installation Procedures for detailed steps available on our website or watch the video on YOUTUBE ADFORS TV channel.

Benefits

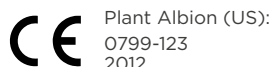
- Quick and efficient installation due to self-adhesive backing
- High grid stiffness providing a wrinkle free installation
- Easy cutting
- Reduced curing time allows for faster paving construction
- Good trafficability (suppliers, trucks, paver)
- Thermal and chemical stability
- Excellent milling performance
- Measured unlimited recyclability & enhanced properties in Reclaimed Asphalt Pavement (RAP)
- Fewer emissions during installation

Palletization

Product	Roll width	Roll area	Roll weight	Core inner diameter	No of rolls on pallet	Total area
TF 100	1,5 m	150 m ²	73 kg	76 mm	9	1 350 m ²
TF 200	1,5 m	90 m ²	65 kg	76 mm	9	810 m ²
	2 m	120 m ²	87 kg	76 mm	9	1 080 m ²



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Plant Albion (US):
0799-123
2012

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Technical Data Sheet 1/2

General Description

ADFORS GlasGrid CompoGrid Pavement Reinforcement System and Moisture Barrier System is manufactured at a Saint-Gobain ADFORS facility that has achieved ISO 9001:2015 certification and meets the requirements of EN 15381. CompoGrid is a composite material consisting of fiberglass reinforcement grid coated in a patented elastomeric polymer, bonded to a non-woven paving geotextile. The non-woven geotextile is a staple fiber, needlepunched and manufactured from fibers that are needed to form a stable network and retain dimensional stability relative to each other. CompoGrid is resistant to ultraviolet degradation and to biological and chemical environments normally found in soils. CompoGrid conforms to the property values listed below, which have been derived from quality conformance testing performed by a laboratory:

Technical Characteristics

Property	Unit	CG 50	CG 100	CG 200	Test Method
Tensile Strength (MD x XD) Ultimate	kN/m	(55 x 55) - 5	(115 x 115) - 15	(115 x 215) - 15	EN ISO 10319
Tensile Elongation Ultimate	%	2,5 ± 0,5	2,5 ± 0,5	2,5 ± 0,5	EN ISO 10319
Tensile Resistance @ 2% Strain (MD x XD)	kN/m	(46 x 46) ± 10	(95 x 95) ± 20	(95 x 180) ± 20	EN ISO 10319
Secant Stiffness EA @ 1% Strain (MD x XD)	N/mm	(2.200 x 2.200) ± 200	(4.600 x 4.600) ± 600 N/mm	(4.600 x 8.600) ± 600 N/mm	EN ISO 10319
Young's Modulus E	MPa	73.000	73.000	73.000	
Mass per Unit Area	g/m²	335	535	733	EN ISO 9864
Melting Point Coating	°C	>232	>232	>232	ASTM D 276
Roll Length	m	100	70	60	
Roll Width	m	1,0; 1,5; 2,0; 3,0	1,0; 1,5; 2,0; 3,0	1,5	
Roll Area	m²	100, 150 200, 300	70, 105 140, 210	90	
Grid Size (Center to Center of Strand)	mm	25 x 25	25 x 25	25 x 19	
Material	Fiberglass reinforcement with modified polymer coating bonded to a non-woven textile specifically engineered for asphalt overlays.				

Properties

- High grid stiffness provides a wrinkle-free installation and a direct load transmission
- Low elongation
- Thermal and chemical stability



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Installation

- CompoGrid can be installed on an old asphalt surface or evenly milled surface. Fill cracks and depressions wider than 6 mm. Road surface must be dry, clean and dust-free with temperature 5 ° - 60 °C.
- Apply tack coat per project requirements. (See application tack coat rate formula in Installation manual page 3).
- Unroll the geogrid with the non-woven fabric side face down immediately after tack coat spraying. Respect the overlap of end roll joints 10 – 15 cm and longitudinal joints at minimum 5 cm. Ensure sufficient amount of tack is applied at the overlap, in order that both layers of materials become fully saturated.
- Press the grid to a layer to ensure a saturation of bitumen into the fabric.
- Permit the tack to completely cure prior to proceeding.
- Apply asphalt over layer.

See document Installation Procedures for detailed steps available on our website or watch the video on YOUTUBE ADFORS TV channel.



Benefits

- Universal application on milling surface or over existing pavement surfaces
- Quick and efficient installation
- Efficient moisture barrier due to the non-woven fabrics
- High grid stiffness providing a wrinkle free installation
- Easy cutting
- Good trafficability (suppliers, trucks, paver)
- Thermal and chemical stability
- Excellent milling performance
- Measured unlimited recyclability & enhanced properties in Reclaimed Asphalt Pavement (RAP)

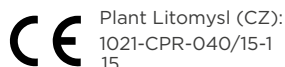


Palletization

Product	Roll width	Roll area	Roll weight	Core inner diameter	No of rolls on pallet	Total area
CG 50	1 m	100 m ²	36 kg	76 mm	12	1 200 m ²
	1,5 m	150 m ²	53 kg	76 mm	12	1 800 m ²
	2 m	200 m ²	72 kg	76 mm	6	1 200 m ²
	2 m	200 m ²	72 kg	76 mm	10	2 000 m ²
	3 m	300 m ²	108 kg	100 mm	6	1 800 m ²
	3 m	300 m ²	108 kg	100 mm	10	3 000 m ²
CG 100	1 m	70 m ²	40 kg	76 mm	12	840 m ²
	1,5 m	105 m ²	59 kg	76 mm	12	1 260 m ²
	2 m	140 m ²	80 kg	76 mm	6	840 m ²
	2 m	140 m ²	80 kg	76 mm	10	1 400 m ²
	3 m	210 m ²	120 kg	100 mm	6	1 260 m ²
	3 m	210 m ²	120 kg	100 mm	10	2 100 m ²
CG 200	1,5 m	90 m ²	72 kg	76 mm	12	1 080 m ²



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Technical Data Sheet 1/2

General Description

CompoGrid Lite Pavement Reinforcement System and Moisture Barrier System is manufactured at a Saint-Gobain ADFORS facility that has achieved ISO 9001:2015 certification and meets the requirements of EN 15381. CompoGrid is a composite material consisting of fiberglass reinforcement grid coated in a patented elastomeric polymer, bonded to a non-woven textile. CompoGrid Lite is resistant to ultraviolet degradation and to biological and chemical environments normally found in soils. ADFORS GlasGrid CGL conforms to the property values listed below, which have been derived from quality conformance testing performed by a laboratory:

Technical Characteristics

Property	Unit	CG 50L	CG 100L	CG 200L	Test Method
Tensile Strength (MD x XD) Ultimate	kN/m	(55 x 55) - 5	(115 x 115) - 15	(115 x 215) - 15	EN ISO 10319
Tensile Elongation Ultimate	%	2,5 ± 0,5	2,5 ± 0,5	2,5 ± 0,5	EN ISO 10319
Tensile Resistance @ 2% Strain (MD x XD)	kN/m	(46 x 46) ± 10	(95 x 95) ± 20	(95 x 180) ± 20	EN ISO 10319
Secant Stiffness EA @ 1% Strain (MD x XD)	N/mm	(2.200 x 2.200) ± 200	(4.600 x 4.600) ± 600	(4.600 x 8.600) ± 600	EN ISO 10319
Young's Modulus E	MPa	73.000	73.000	73.000	
Mass per Unit Area	g/m²	239	439	637	EN ISO 9864
Melting Point Coating	°C	>232	>232	>232	ASTM D 276
Roll Length	m	150	100	70	
Roll Width	m	1,0; 1,5; 2,0; 3,0	1,0; 1,5; 2,0; 3,0	1,0; 1,5; 3,0	
Roll Area	m²	150, 225, 300, 450	100, 150, 200, 300	70, 105, 210	
Grid Size (Center to Center of Strand)	mm	25 x 25	25 x 25	25 x 19	
Material	Fiberglass reinforcement with modified polymer coating and bonded to a non-woven textile specifically engineered for asphalt overlays.				

Properties

- High grid stiffness provides a wrinkle-free installation and a direct load transmission.
- Low elongation
- Thermal and chemical stability
- Excellent milling performance



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Installation

- CompoGrid Lite can be installed on an old asphalt surface or evenly milled surface. Fill cracks and depressions wider than 6 mm. Road surface must be dry, clean and dust-free with temperature 5 ° - 60 °C.
- Apply tack coat per project requirements. (See application tack coat rate formula in Installation manual page 3).
- Unroll the geogrid with the non-woven fabric side face down immediately after tack coat spraying. Respect the overlap of end roll joints 10 – 15 cm and longitudinal joints at minimum 5 cm. Ensure sufficient amount of tack is applied at the overlap, in order that both layers of materials become fully saturated.
- Press the grid to a layer to ensure a saturation of bitumen into the fabric.
- Permit the tack to completely cure prior to proceeding.
- Apply asphalt over layer.

See document Installation Procedures for detailed steps available on our website or watch the video on YOUTUBE ADFORS TV channel.



Benefits

- Universal application on milled surface or over existing pavement surfaces
- Quick and efficient installation
- Optimum asphalt retention of the nonwoven
- High grid stiffness providing a wrinkle free installation
- Easy cutting
- Good trafficability (suppliers, trucks, paver)
- Thermal and chemical stability
- Excellent milling performance
- Measured unlimited recyclability & enhanced properties in Reclaimed Asphalt Pavement (RAP)

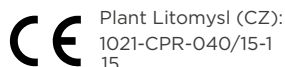


Palletization

Product	Roll width	Roll area	Roll weight	Core inner diameter	No of rolls on pallet	Total area
CG 50L	1 m	150 m ²	38 kg	76 mm	12	1 800 m ²
	1,5 m	225 m ²	57 kg	76 mm	12	2 700 m ²
	2 m	300 m ²	77 kg	76 mm	6	1 800 m ²
	2 m	300 m ²	77 kg	76 mm	10	3 000 m ²
	3 m	450 m ²	115 kg	100 mm	6	2 700 m ²
	3 m	450 m ²	115 kg	100 mm	10	4 500 m ²
CG 100L	1 m	100 m ²	46 kg	76 mm	12	1 200 m ²
	1,5 m	150 m ²	69 kg	76 mm	12	1 800 m ²
	2 m	200 m ²	93 kg	76 mm	6	1 200 m ²
	2 m	200 m ²	93 kg	76 mm	10	2 000 m ²
	3 m	300 m ²	139 kg	100 mm	6	1 800 m ²
	3 m	300 m ²	139 kg	100 mm	10	3 000 m ²
CG 200L	1 m	70 m ²	47 kg	76 mm	12	840 m ²
	1,5 m	105 m ²	70 kg	76 mm	12	1 260 m ²
	3 m	210 m ²	141 kg	100 mm	6	1 260 m ²
	3 m	210 m ²	141 kg	100 mm	10	2 100 m ²



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Technical Data Sheet 1/2

General Description

The patch repair system ADFORS GlasGrid PG (Patch Grid) is manufactured at a Saint-Gobain ADFORS facility that has achieved ISO 9001:2015 certification and meets the requirements of EN 15381. ADFORS GlasGrid PG consists of a high stiffness fiberglass grid coated with a patented polymer coating. The product is specifically developed for the manual repair of small areas and can be installed directly on the milled surface without additional preparation. ADFORS GlasGrid PG conforms to the property values listed below, which have been derived from quality conformance testing performed by a laboratory:

Technical Characteristics

Property	Unit	PG 100	PG 200	Test Method
Tensile Strength (MD x XD) Ultimate	kN/m	(115 x 115) - 15	(115 x 215) - 15	EN ISO 10319
Tensile Elongation Ultimate	%	2,5 ± 0,5	2,5 ± 0,5	EN ISO 10319
Tensile Resistance @ 2% Strain (MD x XD)	kN/m	(95 x 95) ± 20	(95 x 180) ± 20	EN ISO 10319
Secant Stiffness EA @ 1% Strain (MD x XD)	N/mm	(4.600 x 4.600) ± 600	(4.600 x 8.600) ± 600	EN ISO 10319
Young's Modulus E	MPa	73.000	73.000	
Mass per Unit Area	g/m²	1.450 ± 150	1.830	EN ISO 9864
Melting Point Coating	°C	>232	>232	ASTM D 276
Roll Length	m	20	20	
Roll Width	m	1	1,2	
Roll Area	m²	20	24	
Grid Size (Center to Center of Strand)	mm	25 x 25	25 x 19	
Material	Fiberglass reinforcement with modified polymer coating and bonded to a self-adhesive bitumen layer specifically engineered for asphalt overlays.			

Properties

- High grid stiffness provides a wrinkle-free installation and a direct load transmission
- Self-adhesive bitumen layer
- Low elongation
- Thermal and chemical stability
- Excellent milling performance



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Installation

- Patch Grid can be installed on an old asphalt surface or evenly milled surface without additional preparation. Road surface must be dry, clean and dust-free with temperature 5 ° - 60 °C.
- Unroll the geogrid removing the protection film on the back and place the geogrid non-woven fabric side face up. Respect the overlap of end roll joints 10 - 15 cm and longitudinal joints at minimum 5 cm.
- Press the grid to a layer to ensure a bonding.
- Apply asphalt over layer.

See document Installation Procedures for detailed steps available on our website.

Benefits

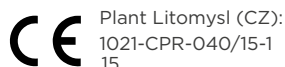
- Universal application on milled surface or over existing pavement surfaces
- Reinforcement of joint superstructures, single cracks and small asphalt areas
- Fast and easy manual installation
- Self-adhesive bitumen layer
- No heating necessary
- High grid stiffness providing a wrinkle free installation
- Easy cutting
- Good trafficability (suppliers, trucks, paver)
- Thermal and chemical stability
- Excellent milling performance
- Measured unlimited recyclability & enhanced properties in Reclaimed Asphalt Pavement (RAP)

Palletization

Product	Roll width	Roll area	Roll weight	No of rolls on pallet	Total area
PG 100	1 m	20 m ²	28 kg	12	240 m ²
PG 200	1,2 m	24 m ²	45 kg	12	288 m ²



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Technical Data Sheet 1/2

General Description

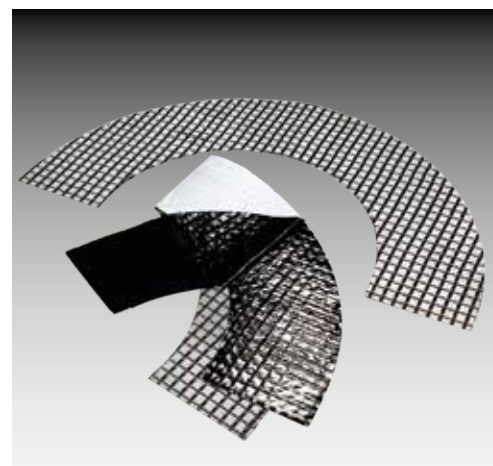
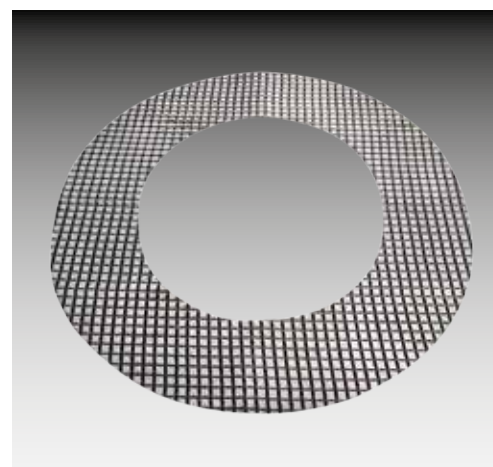
The Manhole Patch Solution ADFORS GlasGrid PM (Patch Manhole) is manufactured at a Saint-Gobain ADFORS facility that has achieved ISO 9001:2015 certification and meets the requirements of EN 15381. ADFORS GlasGrid PM consists of a high stiffness fiberglass grid coated with a patented polymer coating. The product is specifically developed for the manual repair around ironwork structures and can be installed directly on the milled surface without additional preparation. ADFORS GlasGrid PM conforms to the property values listed below, which have been derived from quality conformance testing performed by a laboratory:

Technical Characteristics

Property	Unit	PM 100	Test Method
Tensile Strength (MD x XD) Ultimate	kN/m	(115 x 115) - 15	EN ISO 10319
Tensile Elongation Ultimate	%	2,5 ± 0,5	EN ISO 10319
Tensile Resistance @ 2% Strain (MD x XD)	kN/m	(95 x 95) ± 20 kN/m	EN ISO 10319
Secant Stiffness EA @ 1% Strain (MD x XD)	N/mm	(4.600 x 4.600) ± 600	EN ISO 10319
Young's Modulus E	MPa	73.000	
Mass per Unit Area	g/m²	1.450 ± 150	EN ISO 9864
Melting Point Coating	°C	>232	ASTM D 276
Grid Size (Center to Center of Strand)	mm	25 x 25	
Internal Diameter	mm	785	
Standard Number of Pieces in Box		5	
Material	Fiberglass reinforcement with modified polymer coating and bonded to a self-adhesive bitumen layer specifically engineered for asphalt overlays.		

Properties

- High grid stiffness provides a wrinkle-free installation and a direct load transmission
- Low elongation
- Thermal and chemical stability
- Excellent milling performance



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Installation

- Patch Manhole can be installed on an old asphalt surface or evenly milled surface without additional preparation. Road surface must be dry, clean and dust-free with temperature 5 ° - 60 °C.
- Remove the protection film on the back and place the grid non-woven fabric side face up. The overlap of the two halves of the material are necessary (minimum 1 cm).
- Press the grid to a layer to ensure a bonding.
- Apply asphalt over layer.

See document Installation Procedures for detailed steps available on our website.

Benefits

- Universal application on milled surface or over existing pavement surfaces
- Crack mitigation around manholes, road gulleys, hydrant caps and slide bars
- Fast and easy manual installation
- Self-adhesive bitumen layer
- No heating necessary
- High grid stiffness providing a wrinkle free installation
- Easy cutting
- Good trafficability (suppliers, trucks, paver)
- Thermal and chemical stability
- Excellent milling performance
- Measured unlimited recyclability & enhanced properties in Reclaimed Asphalt Pavement (RAP)

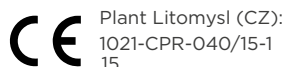
Palletization

Product	Internal Diameter	Number of pieces in box	Box dimensions	Box weight	No of boxes on pallet
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PM 100	785 mm	5	60x60x10 cm	5 kg	20
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Technical Data Sheet 1/2

General Description

ADFORS GlasGrid GP (GlasPave™) is manufactured at a Saint-Gobain ADFORS facility that has achieved ISO 9001:2015 certification and meets the requirements of EN 15381. ADFORS GlasGrid GP is constructed of high strength, continuous fiberglass fibers, coated in a patented elastomeric polymer and embedded between two spun bond polyester textiles conforming to the following test methods and physical properties. Every component of the matrix shall be stabilized against ultraviolet degradation and inert to chemicals normally found in a natural soil environment. ADFORS GlasGrid GP conforms to the property values listed below, which have been derived from quality conformance testing performed by a GAI-LAP accredited laboratory:

Technical Characteristics

Property	Unit	GP 25	GP 50	Test Method
Tensile Strength (MD x XD) Ultimate	kN/m	(30 x 30) - 5	(60 x 60) - 10	ASTM D5035
Tensile Elongation Ultimate	%	3,5 ± 1,5	3,5 ± 1,5	ASTM D5035
Secant Stiffness EA @ 1% Strain (MD x XD)	N/mm	(855 x 855) ± 200	(1.715 x 1.715) ± 430	ASTM D6637
Young's Modulus E	MPa	73.000	73.000	
Mass per Unit Area	g/m²	136	237	ASTM D5261
Asphalt Retention	l/m²	0,47	0,47	ASTM D6140 EN 15381 Annex C
Melting Point	°C	>232	>232	ASTM D 276
Roll Size	m	1,27 x 228,60 1,91 x 228,60 1,91 x 914,40 3,05 x 109,73 3,05 x 548,64 3,81 x 109,73 3,81 x 548,64	1,91 x 109,73 3,05 x 65,84 3,05 x 274,32 3,81 x 65,84 3,81 x 274,32	
Roll Area	m²	290 437 1 747 335 1 673 418 2 090	210 201 837 251 1 045	

GlasPave™ is designed to meet ASTM D7239, "Hybrid Geosynthetic Paving Mat for Highway Applications" Type 1

Properties

- High grid stiffness provides a wrinkle-free installation and a direct load transmission.
- Waterproofing paving mat
- Low elongation
- Thermal and chemical stability
- Excellent milling performance



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Installation

- GlasPave can be installed on an old asphalt surface or evenly milled surface. Fill cracks and depressions wider than 6 mm. Road surface must be dry, clean and dust-free with temperature 5 ° - 60 °C.
- Apply tack coat per project requirements. The general recommended rate of distribution shall be 0.7 l/m².
- Unroll the geogrid with lighter colored side of fabric down immediately after tack coat spraying. Respect the overlap of end roll joints 10 – 15 cm and longitudinal joints at minimum 5 cm. Ensure sufficient amount of tack is applied at the overlap, in order that both layers of materials become fully saturated.
- Press the grid to a layer to ensure a saturation of bitumen into the fabric.
- Permit the tack to completely cure prior to proceeding.
- Apply asphalt over layer.

See document Installation Procedures for detailed steps available on our website or watch the video on YOUTUBE ADFORS TV channel.



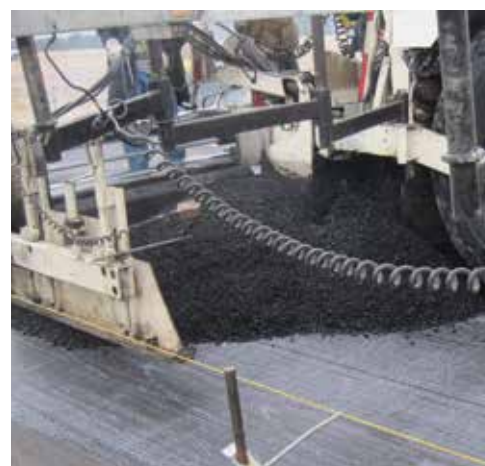
Benefits

- Strong and effective moisture-resistant membrane
- Universal application on milled surface or over existing pavement surfaces
- Quick and efficient installation
- Lower level of asphalt binder required and smaller project carbon footprint
- High-tensile strength product
- Easy cutting
- Good trafficability (suppliers, trucks, paver)
- Thermal and chemical stability
- Excellent milling performance
- Measured unlimited recyclability & enhanced properties in Reclaimed Asphalt Pavement (RAP)



Palletization

Product	Roll width	Roll area	Roll weight	Core inner diameter	No of rolls in a pack	Total area
GP 25	1,27 m	290 m ²	45 kg	102 mm	3	870 m ²
	1,91 m	437 m ²	68 kg	102 mm	3	1 311 m ²
	1,91 m	1 747 m ²	272 kg	102 mm	3	5 241 m ²
	3,05 m	335 m ²	48 kg	102 mm	3	1 005 m ²
	3,05 m	1 673 m ²	238 kg	102 mm	3	5 019 m ²
	3,81 m	418 m ²	68 kg	102 mm	3	1 254 m ²
GP 50	3,81 m	2 090 m ²	340 kg	102 mm	3	6 270 m ²
	1,91 m	210 m ²	68 kg	102 mm	3	630 m ²
	3,05 m	201 m ²	54 kg	102 mm	3	602 m ²
	3,05 m	837 m ²	227 kg	102 mm	3	2 511 m ²
	3,81 m	251 m ²	68 kg	102 mm	3	753 m ²
	3,81 m	1 045 m ²	284 kg	102 mm	3	3 153 m ²



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Plant Albion (US):
0799-123
2012

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General Description

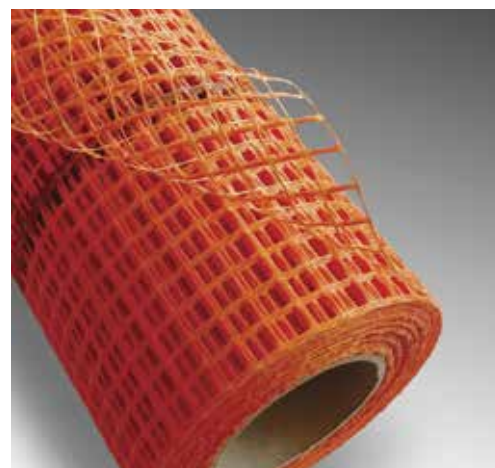
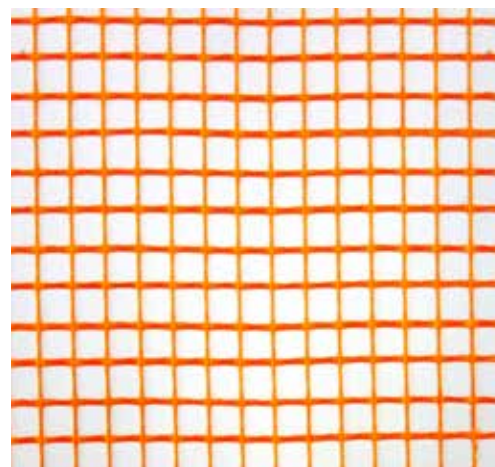
GlasGrid IM is manufactured at a Saint-Gobain ADFORS facility that has achieved ISO 9001:2015 certification. ADFORS GlasGrid IM is fluorescent orange mesh specifically engineered for protection of sensitive waterproofing membrane against damage during the milling process. ADFORS GlasGrid IM conforms to the property values listed below:

Technical Characteristics

Property	Unit	Metric
Tensile Strength (MD x XD) Ultimate	kN/m	18 x 40
Melting Point	°C	850
Mesh Size	mm	10 x 10
Mass per Unit Area	g/m²	172
Thickness	mm	0,8
Roll Length	m	100
Roll Width m	m	1,1
Roll Area	m²	110
Adhesive Backing		Pressure sensitive
Colour		Fluorescent orange
Material	Fluorescent reinforcing mesh with pressure-sensitive adhesive backing.	

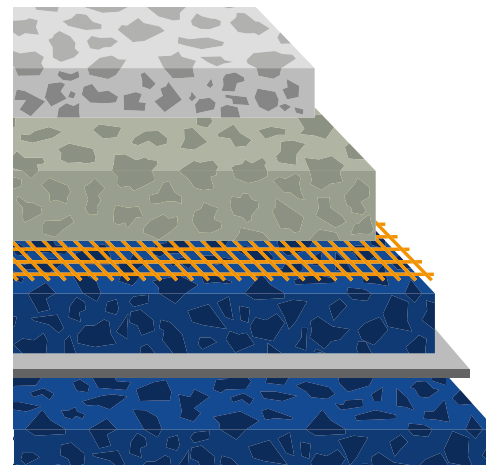
Properties

- High dimensional stability
- Thermal and chemical stability
- Excellent milling performance



Installation

- Complete all crack sealing, pothole filling, base repairs, leveling course application. Road surface must be dry, clean and dust-free with temperature 5 ° - 60 °C.
- Unroll the geogrid with the sticky side face down on the flat layer/leveling course.
- Respect the overlap of end roll joints 10 – 15 cm and longitudinal joints at minimum 5 cm.
- Press the grid to the layer to activate glue and ensure bonding between the lower surface and grid.
- Apply tack coat per project requirements.
- Wait until tack coat will be completely cured.
- Apply asphalt over layer.



Benefits

- Quick and efficient installation due to self-adhesive backing
- Easy cutting
- Good trafficability (suppliers, trucks, paver)
- Easy visibility during the milling process eliminating the risk of damaging the extremely sensitive waterproofing membrane
- Thermal and chemical stability
- Excellent milling performance
- A cost-effective alternative saving up to 20% when compared to red sand asphalt



Palletization

Product	Roll width	Roll area	Roll weight	Core inner diameter	No of rolls on pallet	Total area
IM	1,1 m	110 m ²	16 kg	76 mm	12	1 320 m ²



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Saint-Gobain ADFORS

World-class capabilities.
Worldwide reach.

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Saint-Gobain ADFORS is a global company within the Innovative Materials Branch of Compagnie de Saint-Gobain. We are an industry leader in the manufacture and distribution of a wide range of reinforcement fabrics. We offer a diverse selection of products, including some of the world's best-known reinforcement brand names.

Our worldwide manufacturing plants ensure reliability, quality and cost-effective material supply, while our research facilities and global sales offices deliver world-class service. We are committed to providing innovative solutions to your challenges and to developing breakthrough products.

Final Consideration

The installation of any asphalt reinforcement interlayer shall follow the local regulations for asphalt road construction.

If you have any questions or unique installation parameters, do not hesitate to contact us.

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Learn more about how ADFORS GlasGrid Pavement Reinforcement System products can increase the life of your paving projects.

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eu.adfors.com**

Save money and extend pavement life up to 300% with ADFORS GlasGrid®.

Learn more about how ADFORS GlasGrid Pavement Reinforcement
System products can increase the life of your paving projects.

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TROUBLE WITH YOUR ROAD?

Try the GlasGrid app
to fix it!



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CE Plant Litomyšl (CZ):
1021-CPR-040/15-1
15

CE Plant Albion (US):
0799-123
2012



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IKRAM PAVES SDN BHD

PAVEMENT LABORATORY



MS 150/IEC 17025

TESTING

SAMM No. 762

LABORATORY TEST REPORT COVER PAGE

Report No.:

E2322

Total Pages : TWO (Excluding this page)

Date Issued:

19/7/2022

Customer

DJX SOLUTIONS SDN BHD

Prepared For

-

Project Title

PLUS HIGHWAY



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IKRAM PAVES SDN BHD
PAVEMENT LABORATORY



MS ISO/IEC 17025
TESTING
SAMM No. 762

LABORATORY TEST REPORT

Report No.	E2322	Date Issued:	19-Jul-22
Total No. of Pages	2	Page No.	1 of 2
Name And Address of Customer (As Given By Customer)	DJX SOLUTIONS SDN BHD UNIT 5 - 3, DATARAN MUTIRA, JALAN 7/4 SERDANG JAYA, 43300 SRI KEMBANGAN SELANGOR DARUL EHSAN TEL : 019 9860958 EMAIL: -		
Title of Report (As Given By Customer)	PLUS HIGHWAY		
Request No.	E2322		
Sample Received Date	6/7/2022		
Received by	RACMAWATI BINTI OTHMAN		
Test Commencement Date	6-Jul-22		
Test Completion Date	19-Jul-22		
Tested by	RACMAWATI BINTI OTHMAN		
Particulars Of Sample (As Given by Customer)			
No.	Material (s)	Grade	Type
1	BITUMEN EMULSION	CG-BOND	LIQUID
		Qty.	3 Ltr
		Sample Marking	GC-1, GC-2, GC-3, GC-4, GC-5, GC-6, GC-7, GC-8, GC-9, GC-10 P-1, SP-1
		Pavement Laboratory	Sample ID
			E/S/1/C/1-1/23/22
Laboratory Testing(s)			
Test(s) Carried Out		Test Method(s)	
1 STANDARD TEST METHOD FOR WATER CONTENT*		1. -	
2 STANDARD TEST METHOD FOR SETTLEMENT & STORAGE STABILITY OF EMULSIFIED ASPHALT - OVEN TEST METHOD		2. ASTM: D6930 - 19	
3 STANDARD TEST METHOD FOR SAYBOLT FUROL VISCOSITY*		3. ASTM: D 244 CLAUSE 24-25	
4 STANDARD TEST METHOD FOR SIEVE TEST (RESIDUE ON 850um)*		4. ASTM: D 244 CLAUSE 40-43	
5 STANDARD TEST METHOD FOR PARTICLE CHARGE*		5. ASTM: D 244 CLAUSE 23-26.6	
6 STANDARD TEST METHOD FOR PENETRATION OF BITUMINOUS MATERIALS		6.ASTM:D5 / D5M-20 (2020)	
7 STANDARD TEST METHOD FOR SOFTENING POINT OF BITUMEN (RING AND BALL APPARATUS)		7. ASTM:D36/ D 36M - 14(2020)	
Remarks: 1. * NOT SAMM ACCREDITED SCOPE 2. The test results apply to the sample as received from customer			

IKRAM PAVES SDN BHD (Pavement Laboratory)
Approved Signatory


MOHD NASIR BIN REBU
Technical Manager

STATEMENTS OF CONFORMITY

"Statements of conformity (e.g. Pass/Fail/Indeterminate) to specifications are made in the laboratory test report by taking Measurement Uncertainty into account. Where statements of conformity are made in the laboratory test report, the following decision rules are applied:

PASS: Results ± expanded uncertainty within limits/specifications
FAIL: Results ± expanded uncertainty exceeds limits/specifications
INDETERMINATE: Results ± expanded uncertainty overlaps limits/specifications"

This laboratory test report covers test samples, which were received and tested by Pavement Laboratory of IKRAM PAVES SDN. BHD. ONLY and this report IS NOT an approval certificate. This laboratory test report, except in full, shall not be reproduced without prior written approval from the General Manager (Pavement Laboratory) of Ikram Paves Sdn. Bhd.

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IKRAM CENTRE OF EXCELLENCE (ICE)
for TOTAL INFRASTRUCTURE SOLUTIONS

LABORATORY TEST REPORT

Test Report No.	E2322	Request No.	E2322
Test Commencement Date:	6-Jul-22	Test Completion Date	19-Jul-22
Title of Report:	PLUS HIGHWAY		

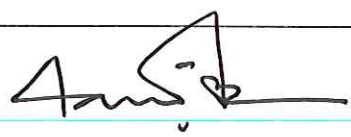
STANDARD TEST METHOD FOR WATER CONTENT*
STANDARD TEST METHOD FOR SETTLEMENT & STORAGE STABILITY OF EMULSIFIED ASPHALT - OVEN TEST METHOD
STANDARD TEST METHOD FOR SAYBOLT FUROL VISCOSITY*
STANDARD TEST METHOD FOR SIEVE TEST (RESIDUE ON 850um)*
STANDARD TEST METHOD FOR PARTICLE CHARGE*
STANDARD TEST METHOD FOR PENETRATION OF BITUMINOUS MATERIALS
STANDARD TEST METHOD FOR SOFTENING POINT OF BITUMEN (RING AND BALL APPARATUS)

Test No.	Material	Sample ID	Specimen Marking	Test	Test Method	Result	Specification own by manufacturer	
							Min.	Max.
1	Bitumen Emulsion CG-BOND	E/S/1/C/1-1/23/22	GC-1, GC-2, GC-3	Water Content, %	-	Avg: 25.0 %	-	40%
2	Bitumen Emulsion CG-BOND	E/S/1/C/1-1/23/22	GC-4, GC-5	Storage Stability 24h, %	ASTM: D-6930-19	0.07 %	-	-
3	Bitumen Emulsion CG-BOND	E/S/1/C/1-1/23/22	GC-6	Saybolt Furol Viscosity (s), 25°C	ASTM: D 244	29.68 s	15	50
4	Bitumen Emulsion CG-BOND	E/S/1/C/1-1/23/22	GC-7	Sieve Test, % (Residue on 850um)	ASTM: D-244	0.026 %	-	0.1
5	Bitumen Emulsion CG-BOND	E/S/1/C/1-1/23/22	GC-8	Particle Charge	ASTM: D244	Positive	Positive	
6	Bitumen Emulsion CG-BOND	E/S/1/C/1-1/23/22	GC-9, GC-10	Settlement, 5 day, %	ASTM: D6930-19(2019)	0.08 %	-	-
7	Bitumen Emulsion CG-BOND	E/S/1/C/1-1/23/22	P-1	Penetration, 25°C, 100g, 5s, dmm	ASTM: D5/D 5M-19a	43.6 dmm	40	90
8	Bitumen Emulsion CG-BOND	E/S/1/C/1-1/23/22	SP-1	Softening Point, 5°C	ASTM: D36	56.0 °C	54	-

Humidity/Temperature during testing (66 % / 28°C).

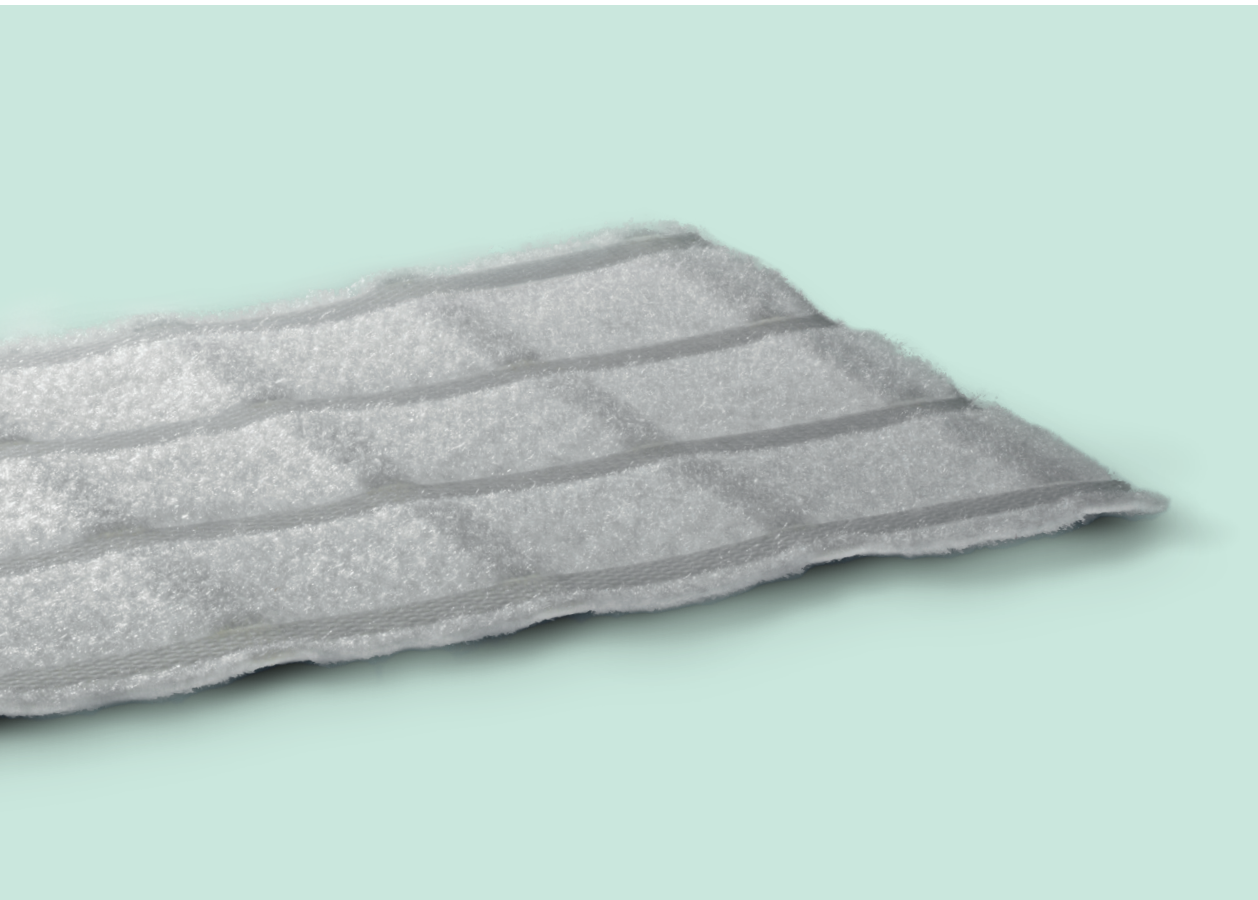
** The reported Measurement of Uncertainty is based on Standard Uncertainty of confidence level not less than 95% and subject to customer's request

* NOT SAMM ACCREDITED SCOPE

			
Name	: Shahabudin Mohd Saini	Nama	: Mohd Nasir bin Rebu
Designation	: Laboratory Engineer	Designation	: Laboratory Manager / Approved Signatory
Date:	: 19/7/22	Date	: 19/07/2022

Combigrid®

 Naue



naue.com

Building on sustainable ground.

Combigrig® is a composite of a laid geogrid made of stretched, monolithic flat bars with welded junctions and a mechanically bonded and calendered filter geotextile welded within the geogrid structure.

Combigrig® is used for stabilisation and reinforcement of soils in many fields of infrastructure, environmental protection, and hydraulic engineering applications.

TYPICAL FIELDS OF APPLICATION FOR COMBIGRID®

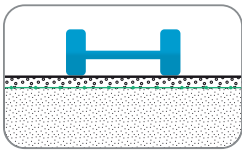


Figure 1:
Unpaved Roads

Unpaved Roads

Unpaved low volume roads are extensively used for either temporary or permanent transportation purposes, such as haul roads, access roads or rural roads. Combigrig® is used at the interface between soft subgrade and subbase course to improve the bearing capacity and prevent migration of fines from the subgrade into the coarse aggregate layer.

Advantages:

- Reduced surface deformation (less rutting)
- Reduced base course thickness (vs. unreinforced sections)
- Reduced maintenance cycles
- Extended service life

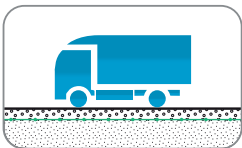
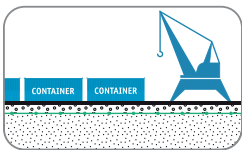


Figure 2:
Paved Roads &
Storage Yards

Paved Roads & Storage Yards

In paved roads or storage yard applications, Combigrig® is either used at the interface between soft subgrade and subbase or within the base or subbase course layer itself. This enables contractors to meet minimum compaction requirements and to reach the required bearing capacity for the overlying aggregate layers.

Advantages:

- Reduced surface deformation (less cracks)
- Reduced base course thickness (vs. unreinforced sections)
- Reduced maintenance cycles
- Extended service life

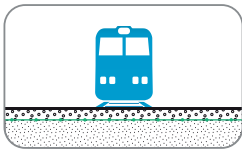


Figure 3:
Railway Construction

Railway Construction

If the railway track is not capable to absorb the stresses from the railway traffic without causing detrimental deformations, maintenance or rehabilitation of the track is required. The geogrid component of Combigrig® reduces movement and particle reorientation within the sub-ballast and ballast layers. The geotextile component of Combigrig® prevents the subgrade from being pumped into the sub-ballast and ballast layer, thereby maintaining structural integrity of the track.

Advantages:

- Reduced surface deformation (less cracks)
- Reduced base course thickness (vs. unreinforced sections)
- Reduced maintenance cycles
- Extended service life

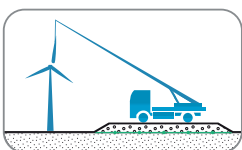


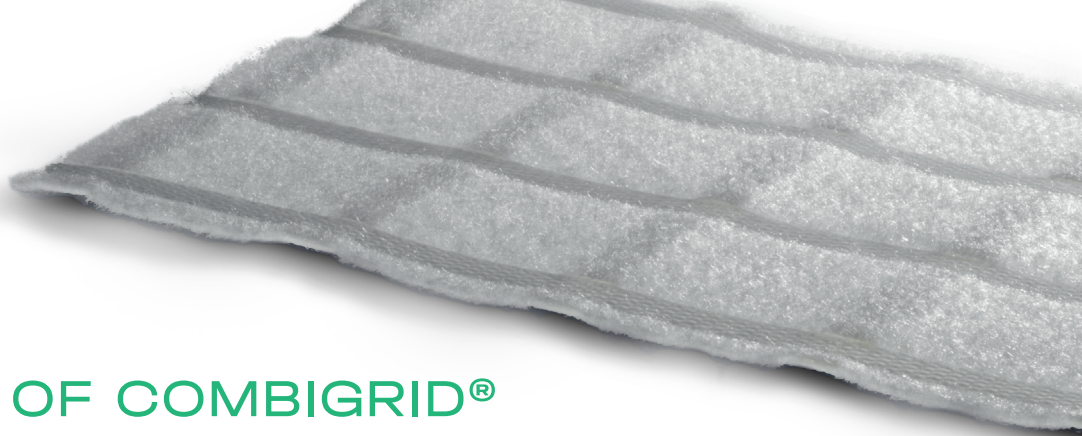
Figure 4:
Working Platforms

Working Platforms

Working platforms are temporary geotechnical structures providing a stable working surface for piling rigs, mobile cranes, and other heavy construction equipment. Many working platforms are built on soft, compressible subgrades, providing inadequate support for the expected loads of the construction plant. Combigrig® can be used to stabilise and reinforce working platforms and to increase their strength and durability.

Advantages:

- Improved bearing capacity on soft ground
- Reduced surface deformation (less differential settlement)
- Reduced base course thickness (vs. unreinforced sections)
- Economic alternative to deep foundation solutions (e.g., piles)



ADVANTAGES OF COMBIGRID®

Combigrd® is a geocomposite stabilisation and reinforcement solution. The unique manufacturing process produces structured, high strength, monolithic, pre-stressed polypropylene or polyester bars with a continuous molecular orientation. The extraordinary high extensional stiffness of Combigrd® efficiently reduces deformations in the subgrade which extends the service life of modern infrastructure.

Stress-strain behaviour

Geocomposites like Combigrd® are used wherever high strength is required at low elongation. The stress-strain behaviour (also known as tensile stiffness) of the geogrid is important when selecting, which type of geogrid is to be used. Geogrids will typically have a maximum elongation at break of 6% up to 15%, depending on the choice of polymer and manufacturing technology. However, the internal angle of friction of medium to densely compacted soils is reduced when the soil is subjected to axial strains of less than 2%. It is necessary to align the stress-strain behaviour of the installed geogrid with the strain behaviour of the soil.

The performance of the geogrid at strain levels around 2% is therefore important and here Combigrd® shows its strength. Combigrd® provides excellent tensile strength properties at low elongations and demonstrates its advantages to hold the soil particles together at this important strain range.

Soil separation

The three-dimensional fibre matrix of the needle-punched Secutex® non-woven, acts as separation layer between fine grained subgrade soil and coarse aggregate base course layers and ensures long-term filter stability. The properties of separation, filtration and reinforcement are combined in the product Combigrd®.

Tests to simulate the traffic passages on an unreinforced base course resulted in 3 inch (75mm) deep ruts after 20 load cycles, and it took 540 load cycles when Secugrid® 20/20 Q1 was used. However, when Combigrd® was used, the maximum rut depth of 3 inches was not reached even after 100,000 load cycles. Using a composite product made of a geogrid and a needle-punched nonwoven firmly bonded between the longitudinal and cross bars at the interface between soft subgrade and base course layer worked really well. Combigrd® - not just a geogrid. The solution for infrastructure projects on low bearing capacity subsoil.

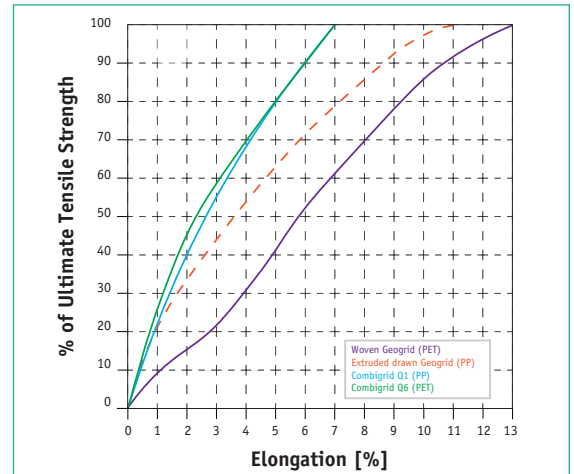


Figure 5:
Stress-strain curves of different geogrids

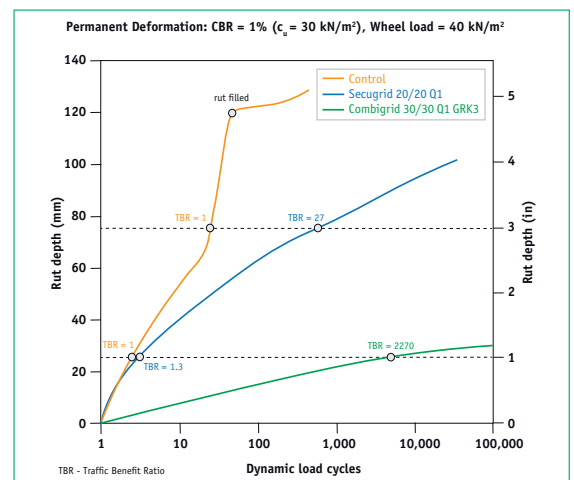


Figure 6:
Combigrd® and Secugrid® traffic benefit ratio (TBR) over a very weak subsoil, compared to an unreinforced section (for subsoils CBR 1%, for details see EuroGeo4, paper 229)



Figure 7:
Combigrd® and Secugrid® installation

Approvals for the Naue Group

