



A Simpson Strong-Tie® Company

## S&P CARBOPHALT® S&P GLASPHALT®



Reinforcement grids for the  
reinforcement of pavements

**SIMPSON**  
**Strong-Tie**



## Reinforcement grids pre-impregnated with bitumen

### SIMPLE AND EFFECTIVE APPLICATION FOR A WIDE VARIETY OF CONSTRUCTION SITES

S&P CARBOPHALT® G and S&P GLASPHALT® G reinforcement grids combat cracking and strengthen pavements.

**S&P solutions are developed with sustainability in mind and can be utilised on environmentally sensitive projects (economic and natural resource savings, recyclable, pollution control, etc.)**

S&P's reinforcement grids are made from carbon fibres or glass fibres. They are flexible and pre-impregnated with bitumen to assist the installation and ensure perfect bonding between layers of asphalt. The technology involved has been specially developed for this use, and has proven to be effective for decades in many countries globally.

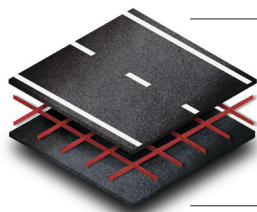
S&P's reinforcement grids limit the chances of reflection of different types of cracks (thermal, fatigue, construction joints, etc.): they therefore not only increase the service life of the wearing course, but also of the structure as a whole by ensuring mechanical continuity and limiting water penetration.

These solutions are extremely economical by eliminating spot interventions (crack bridging) and the widening of complete wearing course refurbishments.

S&P reinforcement grids do not pose any problems during future milling procedures, as the milled material is perfectly recyclable.



### SYSTEM CONCEPT



Binder course or wearing course

Reinforcement grid (S&P Carbophalt® G / S&P Glasphalt® G)  
Tack coat

Base layer or bonding layer

### Application in six steps



1 Preparation of the substrate by milling and/or cleaning with high pressure water



2 Application of the tack coat on the dry and dust-free surface



3 Mechanical application with heating of the S&P reinforcement grid on the complete surface after the breaking of the emulsion

## Our products

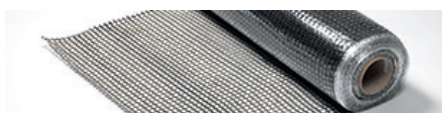
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### REINFORCEMENT LEVEL

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#### S&P GLASPHALT® G

For common anti-cracking applications



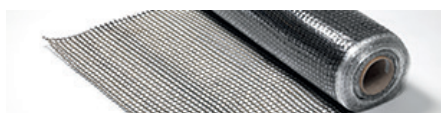
Glass / Glass fibres construction 120 x 120 kN

- Local application on cracks, existing joints or complete surface
- Simple and efficient application also in curves with the unrolling machine
- Adaptation of the grid structure by softening the knots under the effect of heat (no fixed knots)
- Pre-coated with bitumen to ensure perfect bonding between layers and to reduce the tack coat consumption
- Grid is trafficable by construction vehicles; immediate application of the asphalt layer possible

⇒ Optimal asphalt overlay thickness of  $\geq 4$  cm

#### S&P CARBOPHALT® G

For common crack prevention and reinforcement applications



Glass / Carbon fibres construction 120 x 200 kN

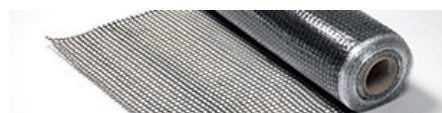
In addition to the benefits of S&P Glasphalt® G, S&P Carbophalt® G provides:

- The high strength and modulus properties of carbon fibres
- Reduction of stresses in the wearing course
- Structural reinforcement of the pavement

⇒ Optimal asphalt overlay thickness of  $\geq 2.5$  cm

#### S&P CARBOPHALT® G 200/200

For application on heavy duty pavements



Carbon / Carbon fibres construction 200 x 200 kN

In addition to the advantages of S&P Glasphalt® G and S&P Carbophalt® G, S&P Carbophalt® G 200/200 provides:

- The high strength and modulus properties of carbon fibres in both directions
- A reduction of stresses in the wearing course in both directions
- A greater structural reinforcement effect on the pavement
- Particularly suitable for reducing fatigue phenomena in pavements (bus lanes, logistics platforms, port and airport pavements, etc.)

⇒ Optimal asphalt overlay thickness of  $\geq 2.5$  cm

## Roll dimensions

S&P Glasphalt® G	S&P Carbophalt® G	S&P Carbophalt® G 200/200
Widths 0.97 / 1.50 / 1.95 m	Widths 0.97 / 1.50 / 1.95 m	Widths 1.95 m
Length 50 m	Length 50 m	Length 50 m

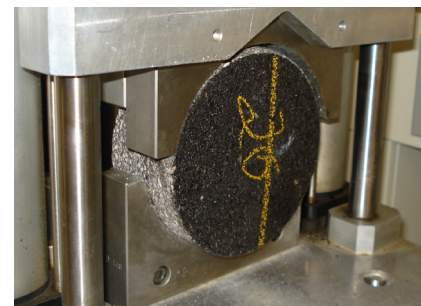
Please visit our website [www.sp-reinforcement.eu](http://www.sp-reinforcement.eu) for more information: references, technical data sheets, research reports, publications, consultation documents & application guides. All our products are manufactured in Europe in our ISO 9001 certified factories, according to the EN 15381 standard and are CE-marked.



4 Manual application of S&P reinforcement grid for local reinforcement



5 Same day asphalt overlay installation



6 Quality assurance / layer bonding tests

## Challenges for the future



### SAFETY AND COMFORT

«The total cost of road safety in France is estimated at nearly € 50 billion - or 2.2 % of GDP.»

[La sécurité routière en France - bilan 2016 - ONISR]

Road damages can lead to accidents:

Defects	Consequences
Road Deformation / Rutting	Water retention = Aquaplaning Ice = Slippery areas Potholes in the road surface = Dangerous areas
Cracking of the pavement	Crack bridging = Slippery areas Infiltration area = Rapid deterioration of the pavement
Crazing cracks	Loss of bearing capacity = Rapid deterioration of the pavement

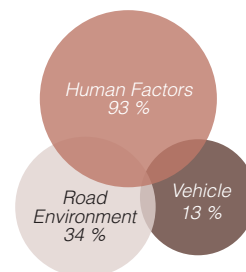
Rutting and crack bridging become slippery during and after rainfall. Therefore they lead to hazards - especially on curves. Deformations and damage to the wearing course lead to a loss of grip, which increases braking distances and promotes loss of control of the vehicle. Roads in poor condition degrade prematurely, making driving more dangerous while also increasing costs to road users.

New types of surfacing already exist to increase user safety and comfort: high adhesion surfaces, drainage surfaces, sounds absorbing

surfaces, etc.

However, whatever type of asphalt is installed, it will remain at the mercy of the defects previously mentioned, if the asphalt is not reinforced at the time of its repair, to avoid cracking, crazing and deformation.

S&P's reinforcement solutions provide answers to the safety and comfort of all road users, by already anticipating the deterioration of roads due to their uses and aggressive weather cycles over time.

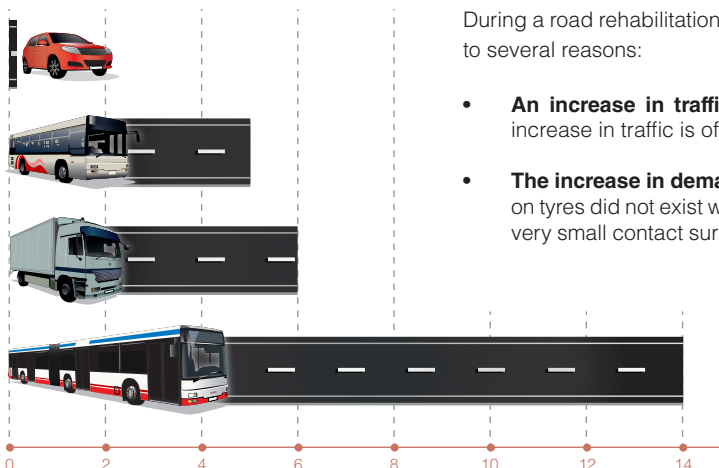


Contributing factors to accidents



### INCREASED DEMANDS

It has been proven that, in terms of traffic, a lorry uses up to 10,000 times more road space than a car.



During a road rehabilitation, it regularly happens that the infrastructures are undersized. This is due to several reasons:

- **An increase in traffic:** the number of vehicles on the road is constantly increasing. This increase in traffic is often underestimated.
- **The increase in demand:** new modes of transport such as BRT (Bus Rapid Transit) and trams on tyres did not exist when most roads were built. These vehicles have very high axle loads with very small contact surfaces. It is challenging to meet the requirements of these new demands.

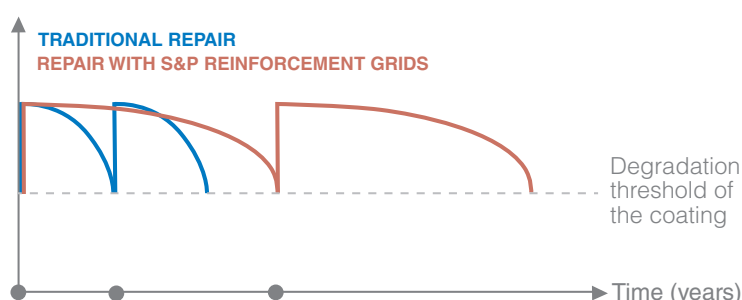
S&P incidentally provides pavement reinforcement solutions for structures that will meet these challenges.

Coefficient of aggressiveness ESAL (CH)



### ECONOMIC CHALLENGES

S&P's reinforcement solutions reduce stress peaks caused by high wheel loads on asphalt layers. **The degradation of the surface is therefore considerably reduced.** This results in an increased service life, lengthier renewal cycles and less frequent maintenance work. The reduction of traffic jams due to the works also represents advantages for the economy. Taking all these aspects into account, reinforced asphalt layers offer considerable cost advantages.



[Réf. : M. Safi "LCC & LCA, S&P Carbophalt® G 200/200" - FOLKBR - Stockholm]



## Challenges for the future



### RECYCLING

**The ability of S&P Glasphalt® G and Carbophalt® G grids to be milled and recycled has been proven in a large scale test.**

[Ref. : Dr.-Ing. D. Gogolin "Effectiveness and Sustainability of Asphalt Reinforcements" – INGENIEURGRUPPE PTM – Dortmund]

The entire process, from milling to re-using the materials, has been studied. When testing new asphalt layers using recycling materials containing S&P Glasphalt® G or S&P Carbophalt® G residue (up to 30 % recycled material), no negative effects on deformation and rutting were discovered.

These results confirm that milled material, that include S&P Glasphalt® G / S&P Carbophalt® G residue, are recyclable and fully compliant with environmental strategies.

Easy milling	No negative influence on the milling process
Cleaning of the milling machine	No additional work. No fibre residue was found on the milling heads.
Asphalt mixing plant	No impact on asphalt mixing plant processes. The milled material can be processed in the same way as standard milled material.
Recycling	No negative effect on deformation and rutting, even in the case of a wearing course containing 30 % aggregate from recycled materials including S&P reinforcement grid residue.



Milling the test area



Head of the milling machine after milling



Harmless fibre residue in the milled material



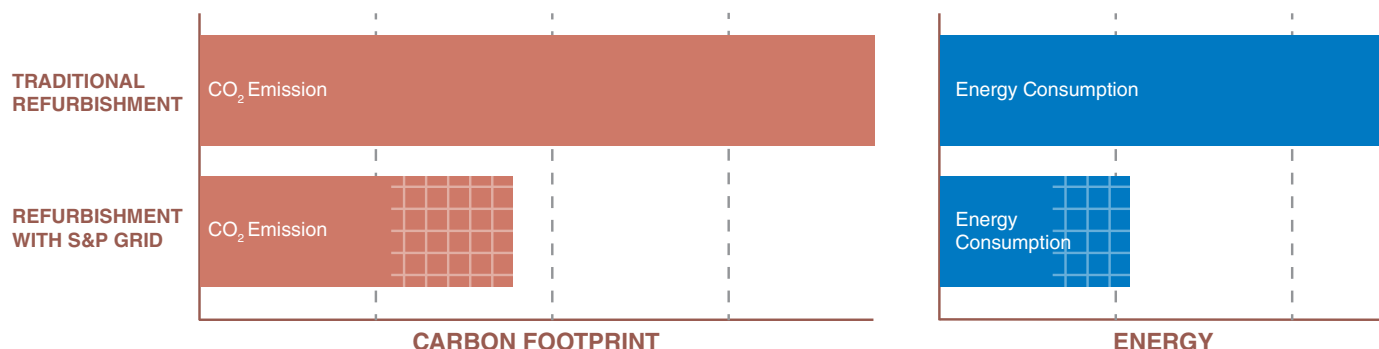
### CARBON FOOTPRINT AND ENERGY

**A reinforcement solution must also be environmentally sustainable.**

There are 2 factors to consider when conducting an environmental analysis:

- **Carbon footprint:** this is the analysis of CO<sub>2</sub> emissions based on the comparison of 2 different solutions.
- **Energy:** this is a comparison of the energy required to carry out the 2 different solutions.

S&P commissioned an independent specialist to analyse S&P solutions. A case study for heavily used roads revealed a reduction in carbon footprint and energy consumption.



[Ref. : M. Safi "LCC & LCA, S&P Carbophalt® G 200/200" – FOLKBR – Stockholm]

## Quality

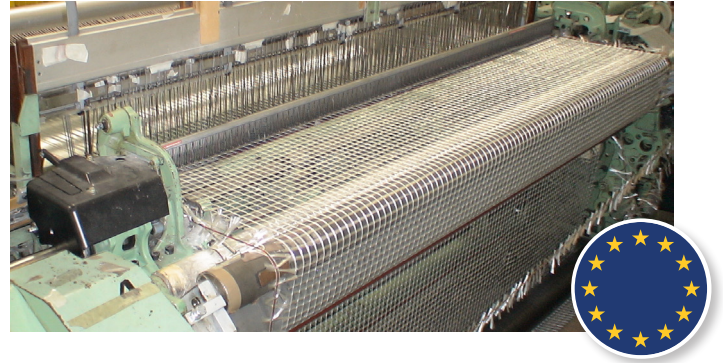
### QUALITY OF THE PRODUCTS

We have our own factories in Europe which allows us to fully control the quality of our production lines. All of our production sites are **ISO 9001** certified.



From the supply of raw materials to the last stage of their manufacture, our products are controlled. They are constantly subjected to rigorous tests carried out in our integrated laboratories.

All of our asphalt reinforcement grid products are CE-marked according to EN 15381.

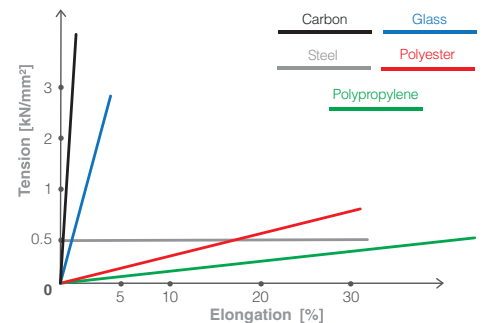


### QUALITY OF THE MATERIALS

Laboratory and in-situ tests showed that there were 2 important criteria for reinforcement to be able to withstand the stresses of a pavement:

- The fibres must be very rigid (high modulus of elasticity), which is why S&P only uses glass fibres and/or carbon fibres in its grids.
- The fibres must be able to adhere well to the asphalt layers.

S&P has decades of experience and also numerous test reports that demonstrate the effectiveness of its reinforcement grids. Do not hesitate to contact us for further details.



### INTERFACE BONDING QUALITY

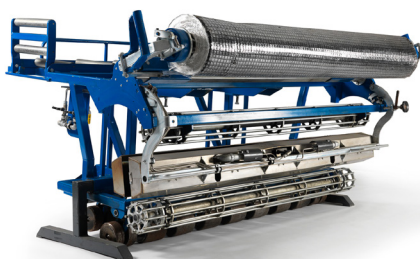
The bond between the different asphalt layers is crucial to guarantee the durability of the pavement. The same applies to pavement reinforcement. A grid only works if it is in a matrix that guarantees perfect bonding between the layers. **As with reinforced concrete, the reinforcement must be anchored to be effective.**

In some cases, poor bonding can lead to premature degradation of the asphalt layer above the reinforcement.

S&P's reinforcement grids are made from glass fibres and/or carbon fibres with non-fixed knots. They are pre-impregnated with bitumen and fixed onto a fusible film that is melted during installation.

S&P Features	Benefits
Non-fixed knots	Allows application in curves without cutting, covering or mechanical fixing Ensures mechanical anchoring by allowing the aggregates of the different layers to bond with each other
Pre-coating with bitumen in the factory	Ensures complete impregnation of the fibres and therefore the necessary bonding effect to assist with the bonding between layers Reduces the consumption of the tack coat
Fuse film melted during application	No need to remove film prior to application

### QUALITY OF APPLICATION



Only correct application guarantees the level of performance of the pavement reinforcement solutions. In order to control and assist with the installation, S&P offer the following:

- **Mechanical installation:** S&P has developed and manufacture its own product specific installation machines.
- **Training applicators:** S&P trains the company's personnel to install its products to the required specifications and also to operate the product specific installation machines.

S&P reinforcement grids have been designed to be trafficable. They are able to withstand certain amounts of traffic during the construction phase.

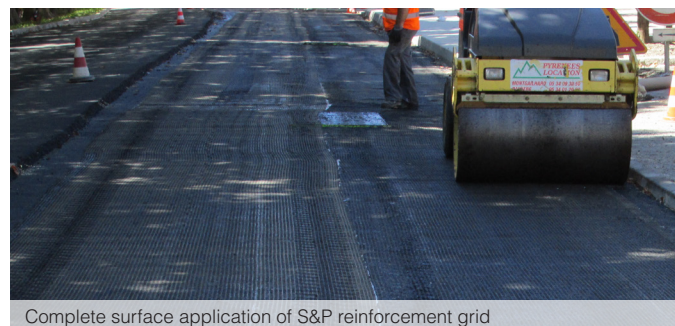


## Application examples

### PAVEMENT REPAIR - CROSSING AGGLOMERATION



Degradation before repair



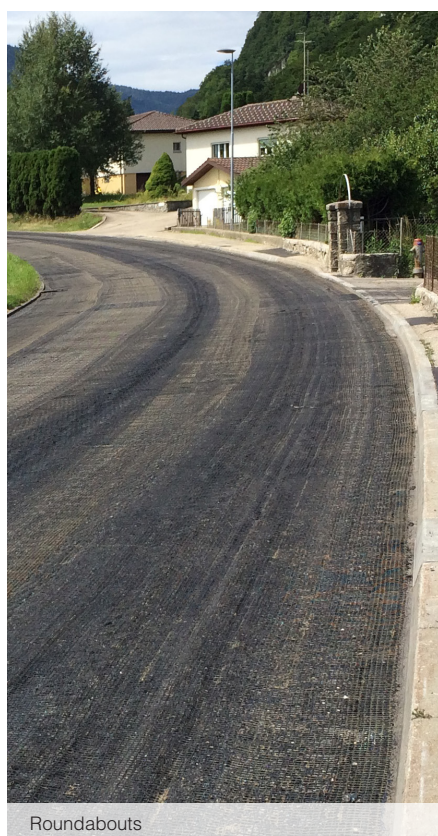
Complete surface application of S&P reinforcement grid

The departmental road crossing into an urban area which is heavily used: channelled traffic, acceleration/braking, intersections. The original structure is very old and diverse. Over time, the street was modified, widened, reloaded and numerous trenches were built for the various road networks in the surrounding area. This type of pavement generally presents the full range of deterioration. With a conventional milling repair followed by the application of a new surface course, it is common for cracks to re-appear fairly quickly.

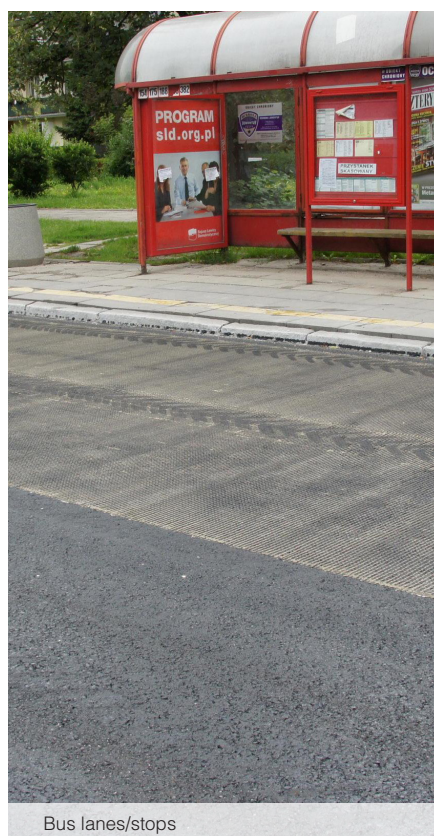
With S&P solutions, the stresses due to traffic, weather conditions and structural load-bearing differences, are much more evenly distributed, meaning that existing cracks in the substrate below are blocked off and can't reach surface. This greatly improves not only the service life of the wearing course, but also that of the structure as a whole. The need for routine maintenance (crack bridging) is reduced and the repair is a much more long term solution.

### APPLICATIONS UNDER HEAVY LOADS

Due to their structure (no fixed knots) and composition (high stiffness materials), S&P reinforcement grids can be used for various applications that are subject to high stresses. The structure of S&P reinforcement grids allows them to be installed in curves without cutting and therefore without additional unnecessary overlaps. They are particularly suitable for diversely loaded areas (roundabouts, curves, etc.), acceleration and braking zones (bus stops, etc.) as well as for heavy loads (bus lanes, airports, etc.)



Roundabouts



Bus lanes/stops



Airports

[www.sp-reinforcement.eu](http://www.sp-reinforcement.eu)

#### HEAD OFFICE

S&P Clever Reinforcement Company AG  
 Seewernstrasse 127  
 CH-6423 Seewen  
 Phone: +41 41 825 00 70  
 Fax: +41 41 825 00 75  
 Web: [www.sp-reinforcement.ch](http://www.sp-reinforcement.ch)  
 E-Mail: [info@sp-reinforcement.ch](mailto:info@sp-reinforcement.ch)

#### WESTERN SWITZERLAND

S&P Clever Reinforcement Company AG  
 Chemin de Prairies 12  
 CH-1630 Bulle  
 Phone: +41 26 321 50 30  
 Fax: +41 26 321 50 31  
 E-Mail: [info@sp-reinforcement.ch](mailto:info@sp-reinforcement.ch)

#### OTHER LOCATIONS:

Austria  
 Benelux  
 Denmark  
 France  
 Germany  
 Poland  
 Portugal  
 Spain  
 Sweden



Since 2012 S&P has been part of Simpson Strong-Tie, an international building products company based in California with multiple locations across Europe.

Simpson Strong-Tie was founded in 1956 and has established itself as the world-wide leader in wood-to-wood, wood-to-steel and wood-to-concrete structural connectors. The company is committed to helping customers succeed by providing exceptional code-listed products, full-service engineering and field support, product testing and training, and on-time product delivery. With the acquisition of S&P, Simpson Strong-Tie continues to expand its offering to include a full array of concrete repair, protection and strengthening solutions. By combining the strengths of our two brands, Simpson Strong-Tie and S&P can offer the highest level of quality and service to meet all your concrete repair, strengthening and restoration needs. We look forward to working with you on your next project.

