

Carbophalt™ G
Glasphalt™ G
Pavement Reinforcement Solutions



**Reinforcement Grid to
Combat Cracking and
Strengthen Asphalt
Pavement**

(800) 999-5099
strongtie.com

Reinforcement grid saturated with bitumen

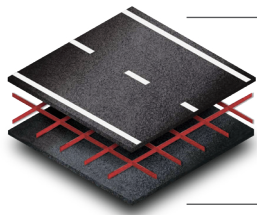
Carbophalt G and Glasphalt G asphalt reinforcement grids from Simpson Strong-Tie are a tested, proven and cost-effective way to extend the service life of roadways.

Key Features and Benefits

- **Strong:** Product provides high tensile strength and better load transfer to increase durability of pavement
- **Effective:** Open-grid design is fully saturated with bitumen for stronger bonding between layers of asphalt and better performance
- **Easy:** Cross-weave design accommodates curves with minimal overlap and allows the grid to conform to the shape of the surface; grid installation machine simplifies application
- **Versatile:** Ideal for new construction or resurfacing; performs in all climate zones and most pavement mix designs
- **Cost Effective:** Improved durability will increase the lifespan of the pavement, reducing costly and time-consuming maintenance and repaving
- **Proven:** Twenty-year use history
- **Supported:** We can offer extensive contractor training and jobsite/field sales specialists
- **Recyclable:** Roadways installed with these grids can be milled and recycled
- **Sustainable:** Grid-reinforced pavements provide extended life cycles



Grids are fully saturated with bitumen.



Wearing course or binder course

Asphalt reinforcement grid (Carbophalt G / Glasphalt G)

Tack coat

Base layer or bonding layer

Installation



1

Surface preparation, such as milling.



2

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



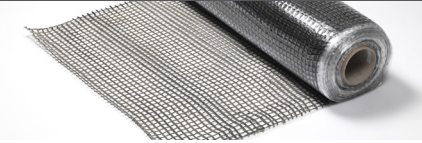
3

Grid application using the Simpson Strong-Tie grid installation machine.

Our products

Glasphalt G

For common anti-cracking applications

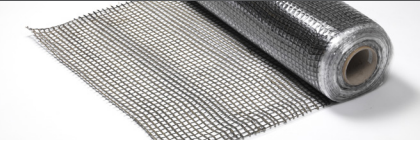


Glass/Glass fiber construction 120 x 120 kN

- Spot repairs on cracks, existing joints or complete surface
- Simple and efficient application also in curves with the grid application machine
- Saturated with bitumen to ensure bonding between layers and to reduce tack coat consumption
- Grid is trafficable by construction vehicles; immediate application of the asphalt layer is possible

Carbophalt G

For common crack prevention and reinforcement applications



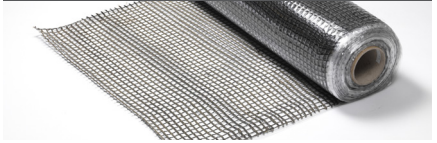
Glass/Carbon fiber construction 120 x 200 kN

In addition to the benefits of Glasphalt G, Carbophalt G provides:

- High strength and modulus properties of carbon fiber
- Reduction of stresses in the wearing course
- Structural reinforcement of the pavement

Carbophalt G 200/200

For application on heavy-duty pavements



Carbon/Carbon fiber construction 200 x 200 kN

In addition to the advantages of Glasphalt G and Carbophalt G, Carbophalt G 200/200 provides:

- High strength and modulus properties of carbon fiber in both directions
- Reduction of stresses in the wearing course in both directions
- Greater structural reinforcement effect of pavement
- Suitability particular to reducing fatigue phenomena in pavements (bus lanes, logistics platforms, port and airport pavements, etc.)

Minimum asphalt overlay thickness of $\geq 1.5''$ (4 cm)

Minimum asphalt overlay thickness of $\geq 0.75''$ (2 cm)

Minimum asphalt overlay thickness of $\geq 0.75''$ (2 cm)

Roll Dimensions

Product Name	Width	Length	Model No.
Glasphalt G	3.18 ft. (0.97 m)	164 ft. (50 m)	GLG0097120
	4.92 ft. (1.5 m)	164 ft. (50 m)	GLG0150120
	6.40 ft. (1.95 m)	164 ft. (50 m)	GLG0195120
Carbophalt G	3.18 ft. (0.97 m)	164 ft. (50 m)	CAG0097200
	4.92 ft. (1.5 m)	164 ft. (50 m)	CAG0150200
	6.40 ft. (1.95 m)	164 ft. (50 m)	CAG0195200
Carbophalt G 200/200	3.18 ft. (0.97 m)	164 ft. (50 m)	CAG0097200200
	4.92 ft. (1.5 m)	164 ft. (50 m)	CAG150200200
	6.40 ft. (1.95 m)	164 ft. (50 m)	CAG195200200

Please visit our website strongtie.com/asphalt for more information: references, technical data sheets, research reports, publications, consultation documents and application guides.



4

Grid is heated as it passes through the installation machine activating the bitumen.



5

Same-day asphalt overlay installation.

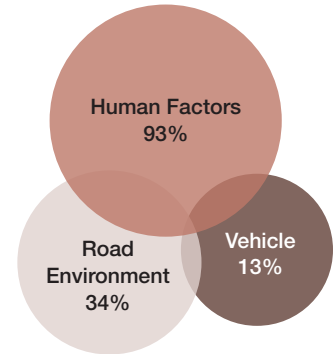
Challenges for the future

Safety and comfort

An 18-month study conducted by the Pacific Institute for Research and Evaluation examined information from the National Highway Traffic Safety Administration, Federal Motor Carrier Safety Administration and other government agencies and concluded that road problems like potholes and iced-over stretches of highway cause more than 42,000 deaths a year.

Road damage can lead to accidents:

Defects	Consequences
Road Deformation / Rutting	Water retention = Hydroplaning
	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
Fatigue cracking	Loss of bearing capacity = Rapid deterioration of the pavement



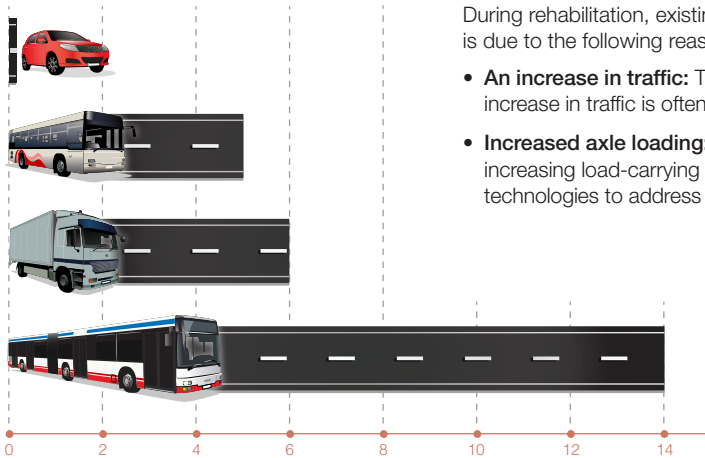
Adding reinforcing grids is a proactive preventive solution to address these common conditions. Reinforced pavements last longer, require less maintenance and create safer, cost-effective roads.

Asphalt pavements are continually subjected to pounding traffic and weather extremes. This relentless assault can lead to premature failures that cause the roadway to become hazardous. Defects will begin to appear in the form of cracks, developing into potholes and rutting, causing loss of traction, hydroplaning and increased braking distances. Along with reduced safety, defective roads require costly maintenance and increased traffic interruptions to the traveling public.

Corrective repairs are available that will provide increased traction and drainage, but this does not correct the underlying damage that has already occurred. While these repair strategies address the symptoms, they don't address the underlying issue that can be corrected with pavement reinforcement.

Increased demands on aging infrastructure

Heavily-loaded trucks accelerate relative pavement damage up to 2,500 times that of an average passenger vehicle.



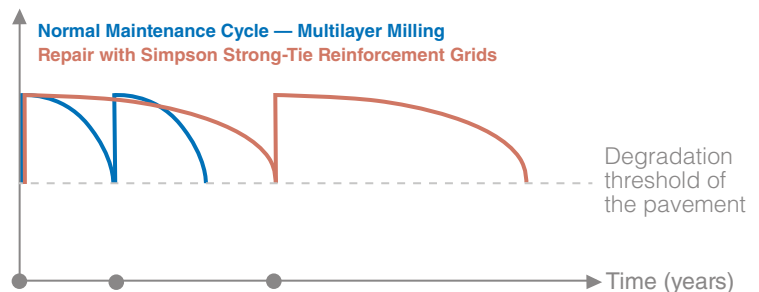
During rehabilitation, existing infrastructure is often found to be undersized/underdesigned. This is due to the following reasons:

- **An increase in traffic:** The number of vehicles on the road is constantly increasing. This increase in traffic is often underestimated during the design phase of the original project.
- **Increased axle loading:** The transportation industries have evolved over the years by increasing load-carrying capacities, causing stress on aging pavements. Finding new technologies to address these changes has always been challenging.

Simpson Strong-Tie provides reinforcement solutions for pavement structures that will meet these challenges.

Economic advantages

Simpson Strong-Tie® reinforcement solutions distribute the stresses caused by high wheel loads on asphalt pavement. By spreading out the load over a larger area, the likelihood of damage is considerably reduced. This results in an increased service life, extended renewal cycles and less frequent maintenance work. The reduction of traffic delays and reduced road closures keeps traffic moving, saving commuters time and money. Taking all these aspects into account, reinforced asphalt offers considerable savings due to greatly extended service life.



[Ref. : M. Safi "LCC & LCA, Simpson Strong-Tie Carbophalt G 200/200" – FOLKBRO folkbro.com/en – Stockholm]

Challenges for the future

Reclaimed Asphalt Pavement (RAP)

The ability of Carbophalt G and Glasphalt 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 reusing the materials, has been studied. When testing new asphalt layers using recycling materials containing Simpson Strong-Tie® Carbophalt G or Glasphalt G residue (up to 30% recycled material), no negative effects on deformation and rutting were discovered.

These results confirm that milled material, that includes Simpson Strong-Tie Carbophalt G or Glasphalt G residue, is 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 fiber 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 reinforcement grid residue.



Milling the test area.



Head of the milling machine after milling.



Milled fibers in reclaimed pavement.

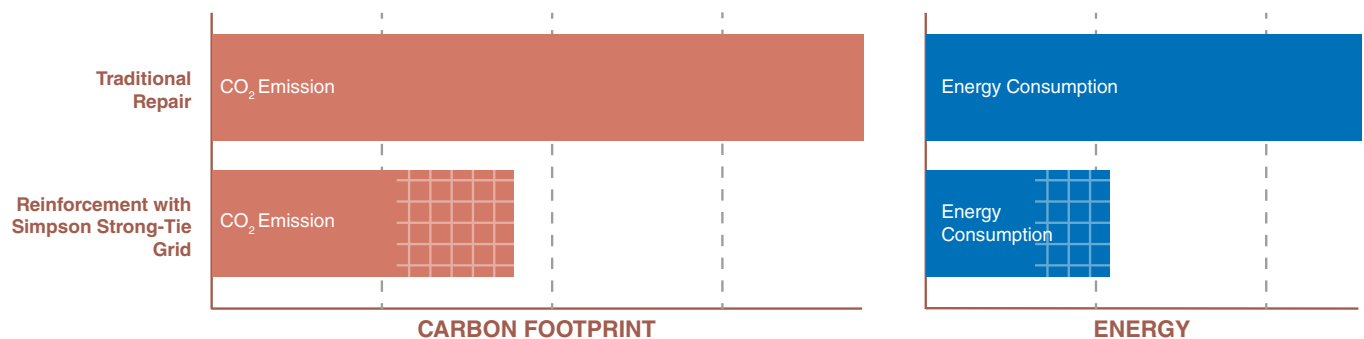
Carbon footprint

Environmental sustainability should also be considered when planning a pavement project.

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

- **Carbon footprint:** This is the analysis of CO₂ emissions based on the comparison of different solutions.
- **Energy:** This is a comparison of the energy required to carry out the different solutions.

Simpson Strong-Tie commissioned an independent specialist to analyze Simpson Strong-Tie asphalt pavement reinforcement solutions. A case study for heavily used roads revealed a reduction in carbon footprint and energy consumption.

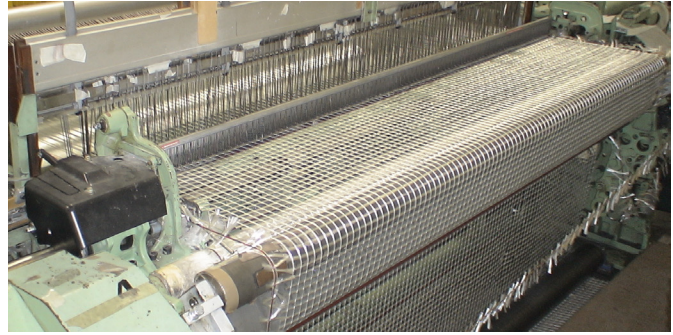


[Ref. : FOLKBRO folkbro.com/en – Stockholm]

Quality of the products

We have perfected the grid production process over the last 20 years in our factory in Europe.

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

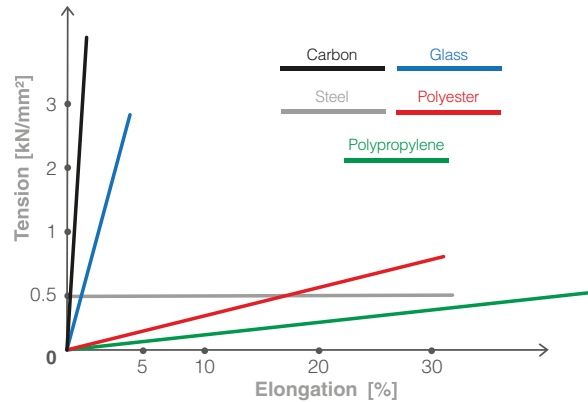


Quality of the materials

Laboratory and field tests showed that there were two important properties that reinforcement grids must be able to withstand:

- The fibers must be very rigid and have linear elastic properties, which is why Simpson Strong-Tie only uses glass and carbon fiber in its grid.
- A quality bitumen that can provide the adhesion necessary to transfer forces to the fiber.

Simpson Strong-Tie has decades of experience and also numerous test reports that demonstrate the effectiveness of its reinforcement grids.



Interlayer bonding

Achieving a strong bond between the different layers of asphalt is crucial for the durability and longevity of the pavement. The same applies to pavement reinforcement grids, which is why our product is made with an open grid design that ensures aggregate interlock between courses. As with reinforced concrete, the reinforcement must be bonded to the structure to

be effective at load transfer. Simpson Strong-Tie reinforcement grids are made from glass fibers and/or carbon fibers that are fully saturated with bitumen to create a strong bond between asphalt courses. The bitumen ensures that each strand is fully bonded to each course and available for maximum load transfer.

Simpson Strong-Tie Features	Benefits
Open cross-weave grid design	Allows application in curves without cutting or mechanical anchoring
	Allows aggregate interlock between layers
Saturated with bitumen in the factory	Complete impregnation of the grid ensures bonding between layers
	Eliminates the need for excessive tack coat application
Fuse film melted during application	Grid installation machine eliminates the 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, Simpson Strong-Tie offers the following:

- **Mechanical installation:** Simpson Strong-Tie has developed and manufactures its own product-specific installation machines.
- **Training applicators:** Simpson Strong-Tie trains the company's personnel to install its products to the required specifications and also to operate the product-specific installation machines.
- **Equipment rental:** The grid installation machine is available for rent or purchase; contact Simpson Strong-Tie for more information.

Application examples

Pavement repair



Degradation before repair.

A typical example is a road crossing into an urban area which is heavily used: channelled traffic, frequent acceleration/braking and intersections. Over time, the street was modified, widened and reloaded, and numerous trenches were dug 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 reappear fairly quickly.



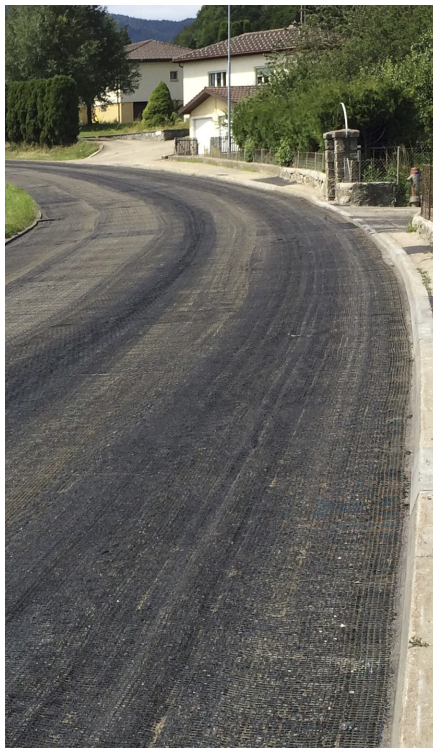
Complete surface application of Simpson Strong-Tie® reinforcement grid.

With Simpson Strong-Tie reinforcement solutions, 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 prevented from reaching the 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 repair) is reduced, and the repair is a longer-term solution.

Applications under heavy loads

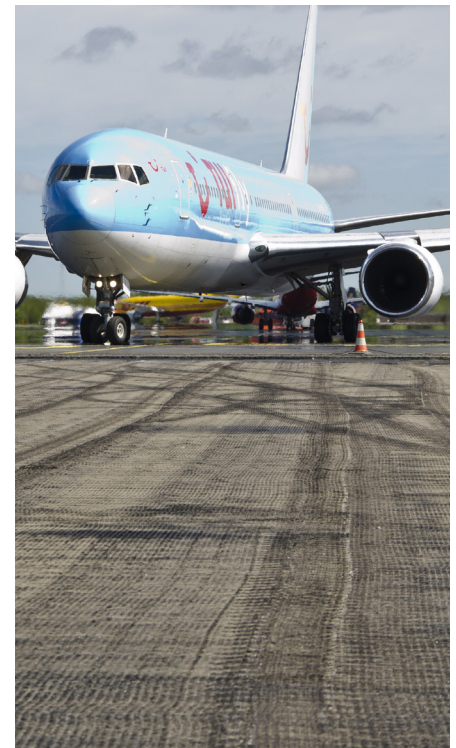
Due to their structure (cross-weave design) and composition (high stiffness materials), Simpson Strong-Tie reinforcement grids can be used for various applications that are subject to high stresses. The structure of Simpson Strong-Tie reinforcement grids allows them to be installed in curves without cutting and therefore without additional unnecessary overlaps. They are particularly suitable for unevenly loaded areas (roundabouts, curves, etc.), acceleration and braking zones (bus stops, etc.), as well as for heavy loads (bus lanes, airports, etc.).



Curves



Bus lanes/stops



Airports

Simpson Strong-Tie Limited Warranty

This Limited Warranty applies to all Simpson Strong-Tie Repair, Protection and Strengthening Systems and Products for Concrete, Masonry and Pavement Reinforcement ("RPS Products") purchased after the Effective Date while this Limited Warranty remains in effect, other than those Simpson Strong-Tie products that have a separate Limited Warranty applicable to such products. The duration of this Limited Warranty ("Warranty Period") for each RPS Product is set forth below. For future purchases, please consult www.strongtie.com/limited-warranties, as this Limited Warranty may be updated by Simpson Strong-Tie from time to time. All future purchases of RPS Products are subject to the terms of the Limited Warranty in effect as of the purchase date.

This Limited Warranty must be read in conjunction with all applicable notes for Repair, Protection and Strengthening Systems for Concrete, Masonry and Pavement Reinforcement, Technical And Installation Notes, Product Data Sheets, Product Safety Data Sheets (SDS), Building Codes, Corrosion Information, and Terms & Conditions of Sale, along with any other information or specifications published by Simpson Strong-Tie Company Inc. ("Simpson Strong-Tie") or available on the www.strongtie.com website ("Website") or on the product package, label or product manual. (All of this information is referred to collectively as the "Simpson Strong-Tie Documentation.") All applicable Simpson Strong-Tie Documentation must be carefully reviewed each time any RPS Product is used.

Simpson Strong-Tie warrants, to the original purchaser only, during the Warranty Period, that each RPS Product will be free from substantial defects in materials, manufacturing and design if properly specified, installed, and maintained, and when used in accordance with the design limits and the structural, technical, and environmental specifications in the Simpson Strong-Tie Documentation. This Limited Warranty is void and does not apply to any (a) RPS Product purchased from an unauthorized dealer, retailer or distributor, (b) RPS Product deterioration or damage due to environmental conditions or inadequate or improper handling, transportation, storage or maintenance, (c) cosmetic defects, including discoloration, (d) failure or damage caused by improper installation, application, mixing or preparation, (e) use of a RPS Product in temperatures or environmental conditions outside the ranges specified for such RPS Product in the Simpson Strong-Tie Documentation, (f) use of a RPS Product outside of its shelf-life specifications, (g) normal wear and tear, (h) failure or damage caused by the use of a RPS Product with any fasteners, pins, screwstrips, products or accessories other than authentic Simpson Strong-Tie products, (i) RPS Product that was subjected to negligence or excessive or improper use, including any use not in accordance with the Simpson Strong-Tie Documentation, (j) failure or damage caused by the building site, foundation, or any third-party products, building materials or components, (k) failure or damage caused by use of a RPS Product in a structure that has a design or other defect or that does not comply with all applicable building codes, laws, rules and regulations, (l) modified RPS Product, or any nonstandard use or application of a RPS Product, (m) failure or damage caused by corrosion, termites or other wood destroying organisms, animal or insect activity, wood fungal decay, rot, mold, mildew, exposure to chemicals or other hazardous substances, a corrosive environment or materials, inadequate moisture protection, or premature deterioration of building materials, (n) failure or damage caused by an act of God, including any hurricane, earthquake, tornado, lightning, ice, snow, high wind, flood or other severe weather or natural phenomena, (o) installation services or workmanship, including any failure or damage caused by installation of any RPS Product, whether or not in accordance with the Simpson Strong-Tie Documentation, or (p) failure or damage caused by the gross negligence, willful misconduct, or other acts or omissions of the builder, general contractor, installer or any third party, including the building owner. Notwithstanding the foregoing, Simpson Strong-Tie disclaims and does not provide any warranty related to the design of any custom-order or non-catalog RPS Product.

Although RPS Products are designed for a wide variety of uses, Simpson Strong-Tie assumes no liability for confirming that any RPS Product is appropriate for an intended use, and each intended use of a RPS Product must be reviewed and approved by qualified professionals. Each RPS Product is designed for the load capacities and uses listed in the Simpson Strong-Tie Documentation, subject to the limitations and other information set forth in the Simpson Strong-Tie Documentation.

Due to the particular characteristics of potential impact events such as earthquakes and high velocity winds, the specific design and location of the structure, the building materials used, the quality of construction, or the condition of the soils or substrates involved, damage may nonetheless result to a structure and its contents even if the loads resulting from the impact event do not exceed Simpson Strong-Tie's specifications and the RPS Products are properly installed in accordance with applicable building codes, laws, rules and regulations.

RPS Product demonstrations, training, operator examinations, technical and customer support and other services provided by Simpson Strong-Tie are based on Simpson Strong-Tie's present knowledge and experience, are conducted for illustrative or instructive purposes only, do not constitute a warranty of RPS Product capabilities, specifications or installation and do not modify the applicable Limited Warranty for RPS Products set forth herein. Any services provided by Simpson Strong-Tie are provided without any representation or warranty of any kind, and Simpson Strong-Tie assumes no liability for any representations or statements made as part of such RPS Product demonstrations, training, operator examinations or other similar services. In the event of any inconsistency between any information provided during any such demonstration or service, and the information in any applicable the Simpson Strong-Tie Documentation, the information in the Simpson Strong-Tie Documentation shall govern. In the event of any inconsistency between any information provided on the Website, and the information in any other Simpson Strong-Tie Documentation, the information on the Website shall govern.

ALL WARRANTY OBLIGATIONS OF SIMPSON STRONG-TIE SHALL BE LIMITED, AT SIMPSON STRONG-TIE'S ABSOLUTE DISCRETION, TO EITHER REPAIRING THE DEFECTIVE RPS PRODUCT OR PROVIDING A REPLACEMENT FOR THE DEFECTIVE RPS PRODUCT. THIS REMEDY CONSTITUTES SIMPSON STRONG-TIE'S SOLE OBLIGATION AND LIABILITY AND THE SOLE AND EXCLUSIVE REMEDY OF PURCHASER AND, WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, EXCLUDES ANY LABOR OR OTHER COSTS INCURRED IN CONNECTION WITH A WARRANTY CLAIM. PURCHASER ASSUMES ALL RISK AND LIABILITY ASSOCIATED WITH ANY USE OF THE RPS PRODUCT, INCLUDING BUT NOT LIMITED TO SUITABILITY FOR ITS INTENDED USE.

THE LIMITED WARRANTY HEREIN IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, AND, WHERE LAWFUL, SIMPSON STRONG-TIE DISCLAIMS ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND WARRANTIES ARISING FROM COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE. IN NO EVENT WILL SIMPSON STRONG-TIE BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR SPECIAL DAMAGES OR DIRECT OR INDIRECT LOSS OF ANY KIND, INCLUDING BUT NOT LIMITED TO PROPERTY DAMAGE, DEATH AND PERSONAL INJURY. SIMPSON STRONG-TIE'S ENTIRE LIABILITY IS LIMITED TO THE PURCHASE PRICE OF THE DEFECTIVE RPS PRODUCT. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

The Warranty Period for each RPS Product is set forth below:

RPS Product	Warranty Period
Simpson Strong-Tie Composite Strengthening System	5 years
Fabrics	5 years
Pavement Reinforcement Products	1 year
All other RPS Products	1 year

As used herein, the term "System" means a group of RPS Products that are used together in the same installation. In order for the Warranty Period for a System to apply, the System must be comprised exclusively of RPS Products and must be installed by a Simpson Strong-Tie trained installer. Otherwise, the Warranty Period applicable to fabrics, Pavement Reinforcement Products or all other RPS Products shall apply.

To obtain warranty service, you must contact Simpson Strong-Tie promptly at (800) 999-5099 or at Simpson Strong-Tie Company Inc., 5956 West Las Positas Boulevard, Pleasanton, CA 94588, regarding any potential claim, no later than sixty (60) days after you discover the potential claim. Upon request by Simpson Strong-Tie, you must provide Simpson Strong-Tie with: (a) proof of purchase and written records evidencing, in reasonable detail, the date and manner of installation, application, mixing and preparation of the RPS Products, as applicable, (b) a reasonable opportunity to inspect the site where the RPS Product was installed, and (c) samples of the RPS Products from the actual installation in sufficient quantities in order for Simpson Strong-Tie to perform testing to determine whether or not the RPS Product failed as set forth herein. Simpson Strong-Tie may, in its absolute discretion, request that you return the allegedly defective RPS Products to Simpson Strong-Tie, in which case Simpson Strong-Tie will issue a Return Materials Authorization (RMA), which must be completed and returned to Simpson Strong-Tie with the RPS Product. Simpson Strong-Tie is not responsible for any costs or expenses incurred in connection with any inspection (other than by Simpson Strong-Tie employees) or in connection with the return of RPS Products to Simpson Strong-Tie, but Simpson Strong-Tie shall bear all costs and expenses incurred in connection with the shipment of replacement RPS Products in the event that Simpson Strong-Tie determines that the RPS Product should be replaced in accordance with this Limited Warranty. If Simpson Strong-Tie elects to repair or replace the RPS Product, Simpson Strong-Tie shall have a reasonable time to do so. Any RPS Products repaired or replaced under this Limited Warranty are subsequently warranted only for the remaining unexpired portion of the Warranty Period applicable to the original RPS Product.

No one is authorized to change or add to this Limited Warranty. If at any time Simpson Strong-Tie does not enforce any of the terms, conditions or limitations stated in this Limited Warranty, Simpson Strong-Tie shall not have waived the benefit of said term, condition or limitation and can enforce it at any time. This Limited Warranty is extended only to the original purchaser and is not transferable. It is not intended nor shall it be construed to create rights in any third party.