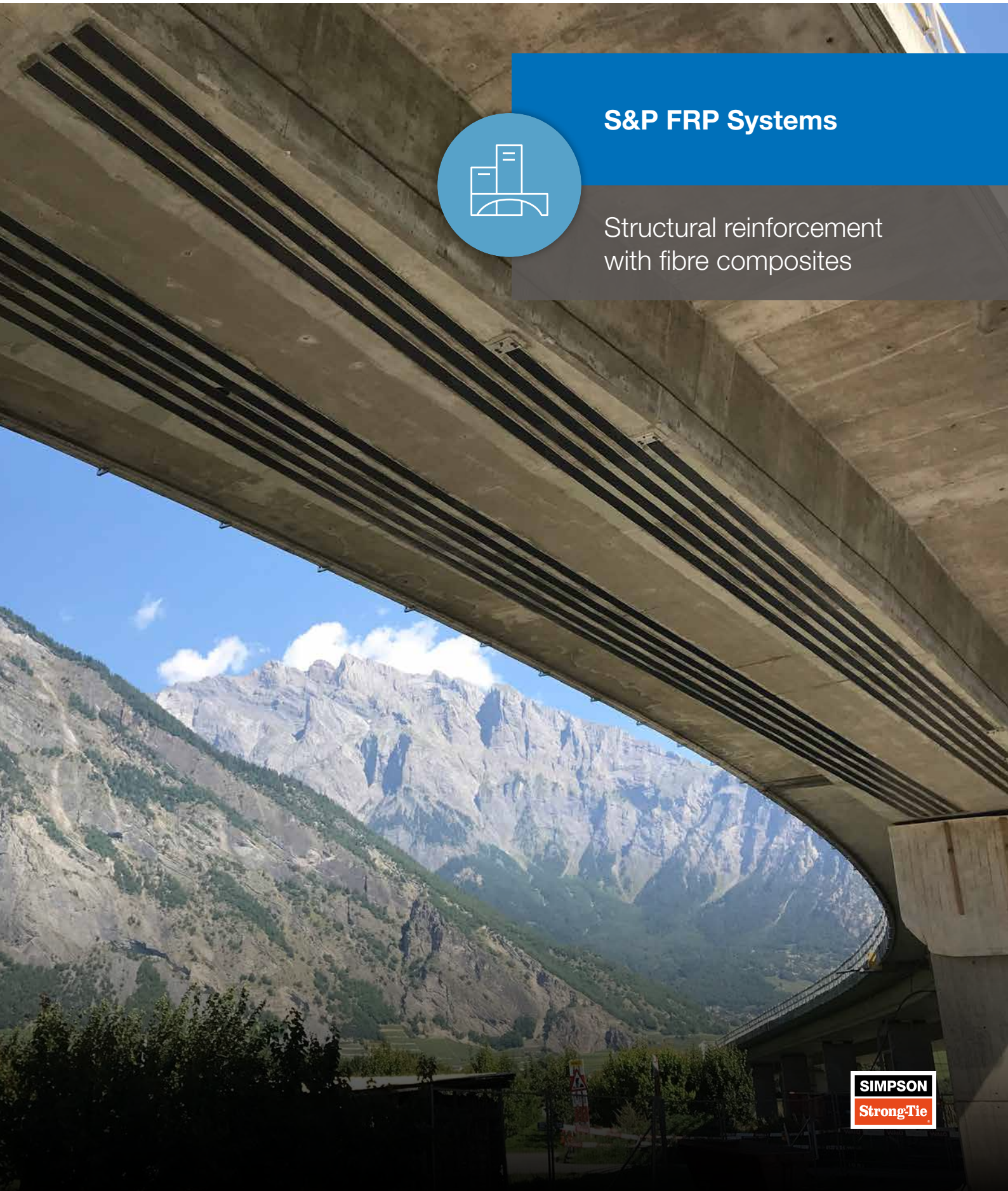
A Simpson Strong-Tie® Company



S&P FRP Systems

Structural reinforcement with fibre composites

SIMPSON Strong-Tie

S&P FRP Systems

S&P FRP Systems, which have been tried and tested for decades, are used for the reinforcement of civil engineering structures in the case of conversions, system adaptations or structural upgrades. FRP systems consist of fibre reinforced polymers such as carbon, aramid and glass fibres, which are installed with tested epoxy resin adhesives.
They are suitable for use on structures made from concrete, masonry, steel or wood. Depending on the situation and requirements, laminates, rods, scrims or fabrics are used. The high-strength, lightweight and corrosion resistant reinforcements are therefore versatile.

S&P FRP SYSTEM PROPERTIES

- Very high tensile strength
- Durable and corrosion resistant
- Extremely light and thin material
- Various dimensions available
- Excellent fatigue behaviour
- Simple, flexible and economical reinforcement technology
- No significant change to existing structure

S&P FRP SYSTEM ADVANTAGES

- Special cross-sections and E-Modulus available on request
- Consulting and engineering throughout the project
- Own production facilities
- Tested solutions with complete systems
- Processing aids and accessories available
- Everything from a single source
- Special parts made from steel and aluminium
- High availability of all components
- Cutting service available if required

Application Areas

Flexural reinforcement with externally bonded S&P C-Laminate

Flexural reinforcement with near surface mounted (NSM) S&P C-Laminate

Shear reinforcement with pre-stressed S&P C-Laminate

Shear reinforcement with S&P C-Sheet 640

Axial column reinforcement with S&P C-Sheet 240

Seismic reinforcement with S&P G-Sheet and S&P C-Laminate

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Products

Carbon Fibre Reinforced Polymer (CFRP) Laminates

Type	S&P C-Laminate SM (150/2000)	S&P C-Laminate HM (200/2000)
E-Modulus	≥ 170 kN/mm²	≥ 205 kN/mm²
Cross-sections	10/1.4 to 150/1.4 mm	20/1.4 to 150/1.4 mm
Delivery form	Rolls of 100 m or 150 m Cut to size on request	

Carbon, Glass or Aramid Fibre Sheets

Types	S&P C-Sheet 240, S&P C-Sheet 640, S&P A-Sheet 120, S&P G-Sheet E/AR 50/50, S&P G-Sheet E/AR 90/10
Weight	from 200 g/m² to 800 g/m² in main fibre direction
Roll lengths	50 m oder 100 m or cut to size on request
Roll widths	300 / 600 / 670 mm depending on the type

Epoxy Resin Adhesive

S&P Resin 55 HP (laminating resin), S&P Resin 220 HP (paste adhesive), S&P Resicem HP (improved vapour permeability resin), S&P Resin 230 HP (re-profiling mortar)

Delivery form	In sets from 5 to 30 kg, individual or complete pallets

Anchoring

Type	S&P End Anchor	S&P C-Anchor
Material	Aluminium, raw	Carbon fibres
Application	S&P C-Laminate, up to 150 mm	S&P Sheets
Delivery form	Individual, incl. installation aids	Individual, 100 per box

Devices and Installation Aids

S&P roll dispenser for laminates, S&P adhesive forming unit, S&P wet-lay-up machine, S&P rubber spatula, S&P press roller, S&P aramid scissors

Availability	To buy and/or to rent

Dimensioning Software

FRP Lamella	Design programme for bending and shear reinforcement of the S&P FRP system
FRP Colonna	Design programme for the reinforcement of centrically loaded reinforced concrete columns by wrapping with S&P Sheets

Systems and Applications

Externally Bonded Reinforcement (EBR)

Core products	S&P C-Laminate, S&P Resin 220 HP
Useful tools and accompanying products	S&P Adhesive-forming unit, S&P Cleaner, S&P End-Anchor, S&P Press roller, S&P Resin 230 HP, S&P Roll dispenser for laminates, S&P Tecnogrout-FIB, S&P Tecnogrout-K
Description	Externally Bonded Reinforcement (EBR) applications of S&P C-Laminate is the most common form of bonding carbon fibre reinforced polymer (CFRP) laminates. The S&P system comprises of a pre-cured carbon fibre reinforced polymer plate S&P C-Laminate which is bonded to the surface using an epoxy paste adhesive S&P Resin 220 HP.

Discover more:
www.sp-reinforcement.eu/en-EU/ebr-sp-frp-laminates

Discover more:
www.sp-reinforcement.eu/en-EU/ebr-sp-frp-sheets

Externally Bonded Reinforcement (EBR)

Core products	S&P C-Sheet, S&P Resin 55 HP, S&P Resicem HP
Useful tools and accompanying products	S&P Wet-lay-up machine S&P Cleaner, S&P Rubber spatula, S&P Press roller, S&P Resin 230 HP, S&P C-Anchor, S&P Tecnogrout-FIB, S&P Tecnogrout-K
Description	Externally Bonded Reinforcement (EBR) applications with S&P C-Sheet is a highly versatile method of reinforcement, as the system does not include any pre-cured composite components. The S&P system comprises of a uni-directional carbon fibre fabric S&P C-Sheet, which is subsequently saturated with a laminating resin and ultimately bonded to the substrate.

Near Surface Mounted (NSM)

Core products	S&P C-Laminate, S&P C-Rod, S&P Resin 220 HP, S&P Resin 55 HP
Useful tools and accompanying products	S&P Cleaner, S&P Resin 230 HP, S&P Roll dispenser for laminates, S&P Tecnogrout-FIB, S&P Tecnogrout-K
Description	Near Surface Mounted (NSM) applications, sometimes referred to as engraved or slot-applied, is a smart way to reinforce and strengthen a structure with FRP, as the FRP system can be completely hidden within the substrate. The S&P system for NSM applications differs depending on the application.

Discover more:
www.sp-reinforcement.eu/en-EU/nsm-applications-sp-frp-laminates-and-rods

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Project Examples

AABACH BRIDGE, SWITZERLAND

In Europe, almost 70 % of all steel bridges are over 50 years old, and about 30 % are even more than 100 years old.
On this project in Switzerland, S&P worked with various industry partners to develop a specialised pre-stressed S&P FRP system. The unbonded system was comprised of carbon rods and pre-tensioning devices, resulting in the optimum corrosion free solution for this project.

COURTINEAU VIADUCT, FRANCE

As part of the work to modernise the A10 motorway, bridge structures have been doubled to allow an increase in the number of traffic lanes. Older engineering structures, such as the Courtineau viaduct, have also been modernised.
In particular, this bridge has been fitted with new anti-noise panels, for which a tailor-made solution had to be implemented.

FLUELEN SCHOOL, SWITZERLAND

When renovating older buildings, improving seismic safety is often a challenge. With the help of the S&P FRP system and the expertise of the engineers and all those involved, a school building in the canton of Uri was efficiently and professionally strengthened, thanks to a wide variety of S&P products - including S&P resins, S&P G-Sheet and S&P C-Laminate.

FARUM SWIMMING HALL, DENMARK

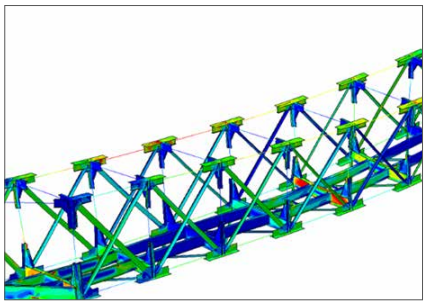
Farum municipality wanted to make their swimming pool more energy efficient by replacing the roof structure and installing solar panels on the roof. The added deadloads meant that the structure needed strengthening - in this case with an S&P system designed for the structure. The use of S&P C-Laminate was paticularly critical due to the thinness of the material resulting in aesthetically pleasing results.

Find all of these projects and many more:
sp-reinforcement.eu/en-EU/projects

Services

REINFORCEMENT CONCEPTS

Our experienced engineers support planners, contractors as well as clients in developing and reviewing concepts for structural strengthening in the fields of: Infrastructure, buildings, seismic safety, tunnels and canals.

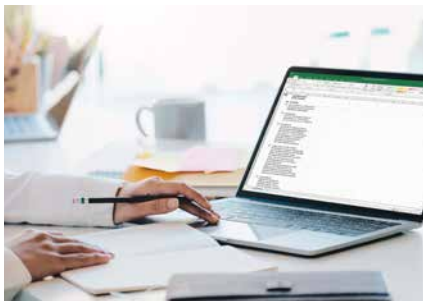


DIMENSIONING

Thanks to our extensive resources, international partnerships and close contacts with a wide variety of research institutes across the world, we can also carry out individual dimensioning for special projects. This enable us to develop the appropriate reinforcement solution for specific and challenging problems.

TECHNICAL ADVICE

Our engineers and application experts are readily available for technical advice on site or during planning. This ensures that the right reinforcement solution is used, which is also feasible and meets the high quality requirements of our clients.



TENDER DOCUMENTS

We advise building owners and planners on the tendering of structural reinforcements and concrete repairs. Corresponding specification texts are available from our various branches across Europe, therefore making the tendering process much simpler.

QUALITY ASSURANCE

In order to guarantee an adequate basis for the installation of the reinforcement solutions and to check the quality of the assembly, we are happy to advise on what quality controls should be carried out on site.

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PRE-STRESSED S&P FRP SYSTEM

For special requirements in the strengthening of steel and reinforced concrete structures, S&P has developed a special procedure to pre-stress S&P C-Laminate, as well as S&P C-Rod with up to 140 kN. The procedure requires appropriate planning, preparation and execution. Therefore, it is exclusively applied and accompanied by our engineers and application technicians. The pre-stressing system has proven itself worldwide and is suitable for a wide range of applications. These applications include the following possibilities:

- Reinforcement of overloaded structural elements
- Reinforcement of structures with corroded and/or defective tensioning cables
- Rehabilitation of coupling joints
- Limitation of deflections
- Reduction of crack widths
- Relief of joints

Watch video:
www.sp-reinforcement.eu/en-EU/videos/pre-stressed-frp-carbon-laminates-project-brunnen-switzerland-impressions

COURSES

We regularly hold training courses for the design and installation of FRP solutions. At our headquarters in Seewen SZ, we have spacious facilities for theoretical and practical training. We are also happy to put together individual programmes tailored to the needs of our customers. In order to save time and costs, we can also conduct the training at a location of your choice or even directly on the construction site, just ask us!

Contact us:
www.sp-reinforcement.eu/en-EU/contact

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www.sp-reinforcement.eu

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Portugal
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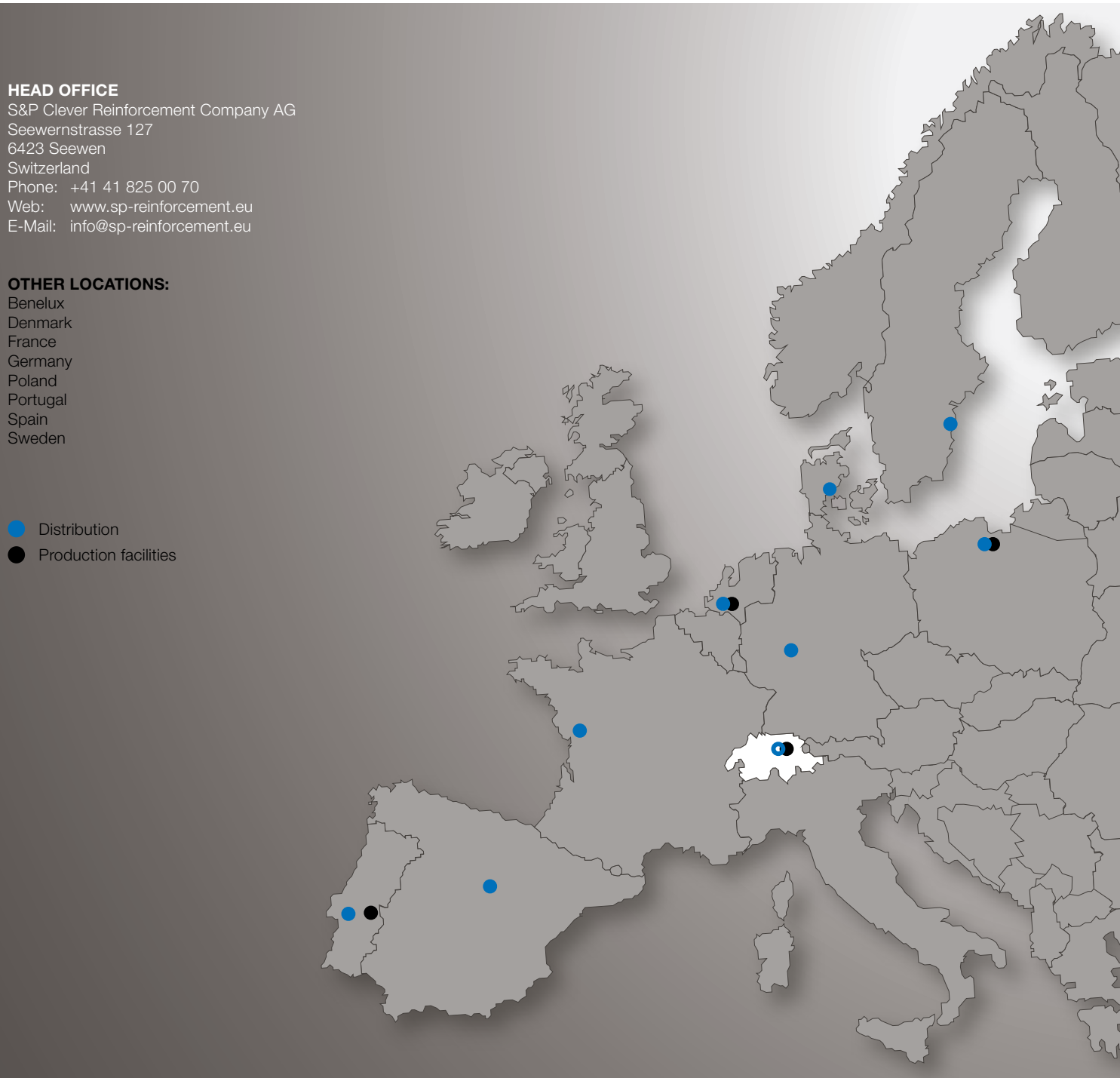
Sweden



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.

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