

fischer 

**C-Fiber Force
Strengthening System.**
Increased safety.
Sustainable construction.



Preserve more. Build less.

Retrofitting and maintenance of existing civil engineering structures have become one of the main challenges in the construction industry, due to the increased demand for more sustainability. Building reutilization, material deterioration and the introduction of more stringent building codes present a clear need to restore or increase the load-bearing capacity of these structures. Other reasons for strengthening include poor material quality, construction execution errors and design flaws.

Carbon fiber reinforced, precured laminates (CFRP laminates) and carbon fiber fabrics (CF fabrics) from fischer increase the structural safety of reinforced concrete as well as pre-stressed concrete structures and extend their service life. These economical and easy-to-install fischer solutions can be used for diverse applications like in the infrastructure sector or for building construction.

To provide ultimate safety and flexibility for design engineers, our new fischer C-Fiber Force Strengthening System comes with state-of-the-art technical assessments: European Technical

Assessments for CFRP laminates in near surface mounted (NSM) and externally bonded (EB) applications (ETA-24/0281), ICC-ES Evaluation Report (ESR-4774) and GB Code Certificates.

Furthermore, the individual chemical products, such as the FRS-PC 11 concrete repair mortar, FRS-BA bonding agent and FRS-CP corrosion protection coating comply with the corresponding parts of the Europe-wide recognized standard EN 1504.



Your advantages at a glance

- Extended service life of existing structures due to increased structural resistance, crack width limitation
- Versatile solutions through combined applications of NSM and EB CFRP laminates, CF fabrics and steel plates
- Technical assessments for ultimate safety: ETA, DoPs acc. to EN1504-3;-4;-6;-7 for individual products, ICC-ES Evaluation Report, GB Code Certificates
- Interactive and user-friendly structural design with REINFORCE-FIX software including full-size, detailed documentation

Maintain infrastructure.

The assessment of existing bridges indicates the urgent need for restorative or preventive structural strengthening measures. The main reasons for this include the constantly increasing traffic density and traffic loads, as well as deterioration processes. Typical applications on existing reinforced concrete and on pre-stressed concrete structures are flexural or shear strengthening of bridge girders, the extension of bridge superstructures, tunnels, trough

structures, hydraulic structures, retaining structures and beyond. The combination of the individual products of the fischer C-Fiber Force Strengthening System covers a huge variety of applications, from standard cases to individual solutions. Since infrastructure applications are often exposed to moderate and aggressive environmental conditions, we also offer the FRS-SF protection coating against UV radiation.

Approvals



ETA-24/0281 as per
EAD 160086-01-0301
(EB & NSM)



EN 1504 certificates
for individual
chemical products



ICC-ES Evaluation
Report ESR-4774
as per AC125



GB Code
Certificates
as per GB 50728



Flexibility convert existing buildings.

Existing buildings often need to comply with new and more stringent building codes. Due to repurposing, structural members often need to withstand higher loads. fischer's C-Fiber Force strengthening product range offers easy-to-use and economical solutions for a wide range of applications – whether it is a new wall, or ceiling opening, flexural and / or shear strengthening of reinforced concrete members.












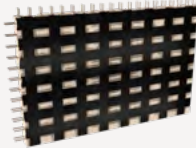







The products of the fischer C-Fiber Force Strengthening System were developed for optimized performance to provide maximum safety. For protection against fire and smoke development in indoor applications, fischer also offers a water-based FRS-FP fire protection coating. To prevent corrosion of externally applied steel stirrups that are typically used for shear strengthening, fischer provides the FRS-CP corrosion protection coating.



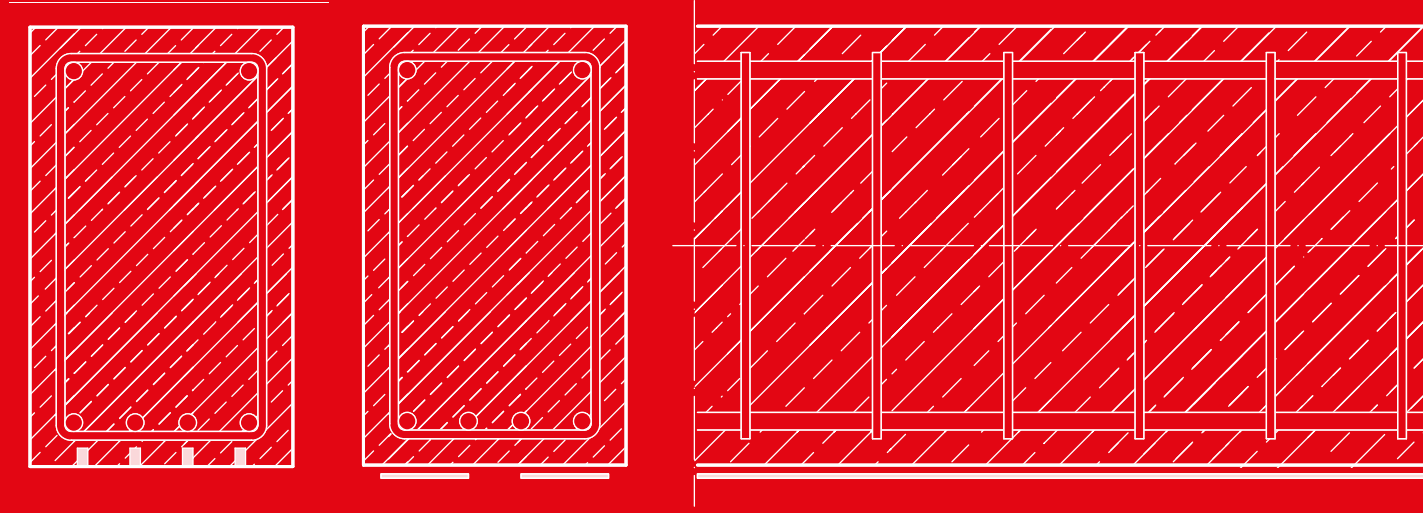
Learn more about the new
fischer C-Fiber Force
Strengthening System



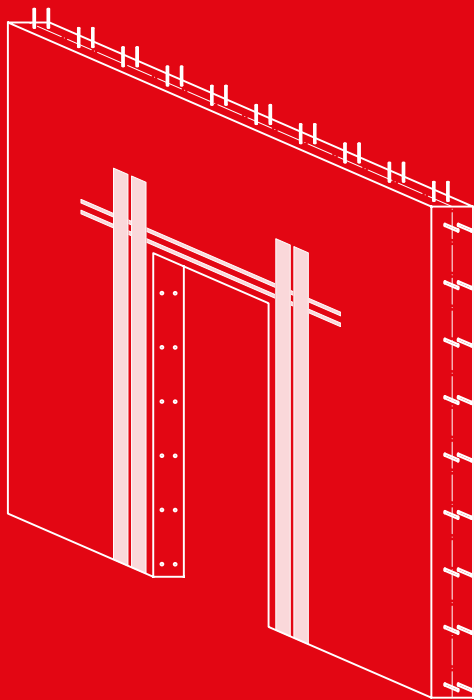
Strengthening solutions at a glance.

Strengthening System	fischer C-Fiber Force Strengthening System		
	 FRS-L-S and FRS-L-H Externally Bonded Laminate	 FRS-L-S NSM Near Surface Mounted Laminate	 FRS-W CF-Fabric
Concrete slabs			
Flexural strengthening	●	●	●
Concrete beam			
Flexural strengthening	●	●	●
Shear strengthening	-	-	●
Torsion	-	-	●
Concrete wall			
Flexural strengthening	●	●	●
Concrete columns		-	
Axial strengthening (confinement)	-	-	●
Advantages	<ul style="list-style-type: none"> · High alkali resistance (pH 13,7), water, fuel, and corrosion resistance · Laminate crossings for bi-axial strengthening · Minimal reduction of the interior height · Excellent durability (fatigue, sustained load, freeze-thaw) 	<ul style="list-style-type: none"> · Increased aesthetics, low visibility · Combination with externally bonded CFRP laminates for bi-axial strengthening · Increased safety against external damage · High alkali resistance (pH 13,7) 	<ul style="list-style-type: none"> · Suitable for the strengthening of convex concrete members · CF-Fabrics Crossings · Torsion strengthening · Combination with CFRP-Laminates · Suitable for aesthetic reasons because of minimal impact on the clearance profile and coverable
Assessments	 		 

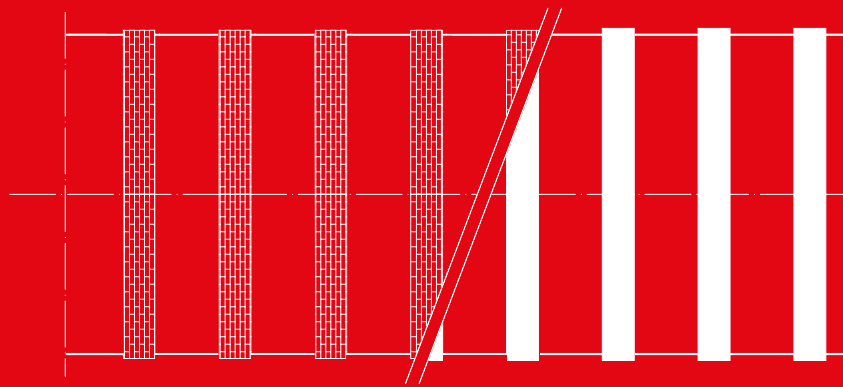
Typical applications.



Flexural strengthening of beams with externally bonded (EB) or near surface mounted (NSM) fischer FRS-L-S or FRS-L-H CFRP laminates



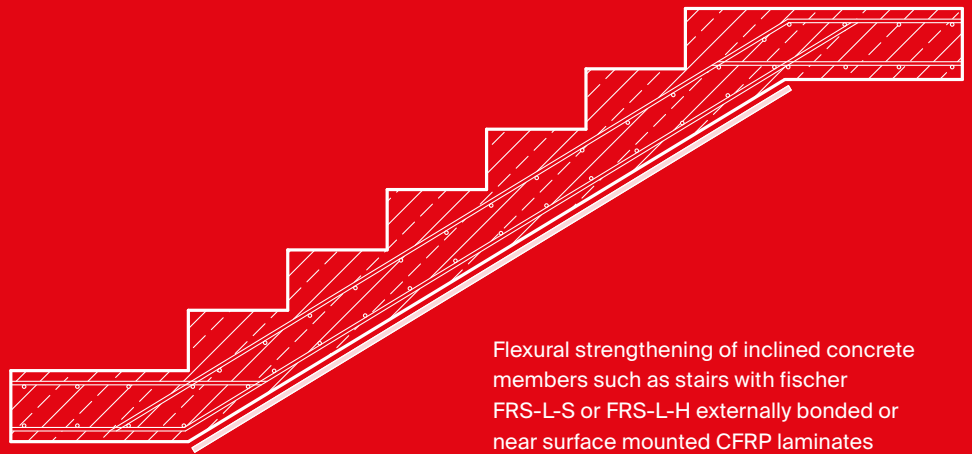
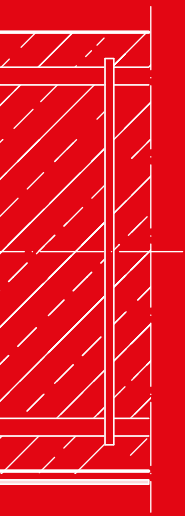
Strengthening of wall openings with fischer FRS-L-S or FRS-L-H externally bonded or near surface mounted CFRP laminates and/or with FRS-W CF fabrics



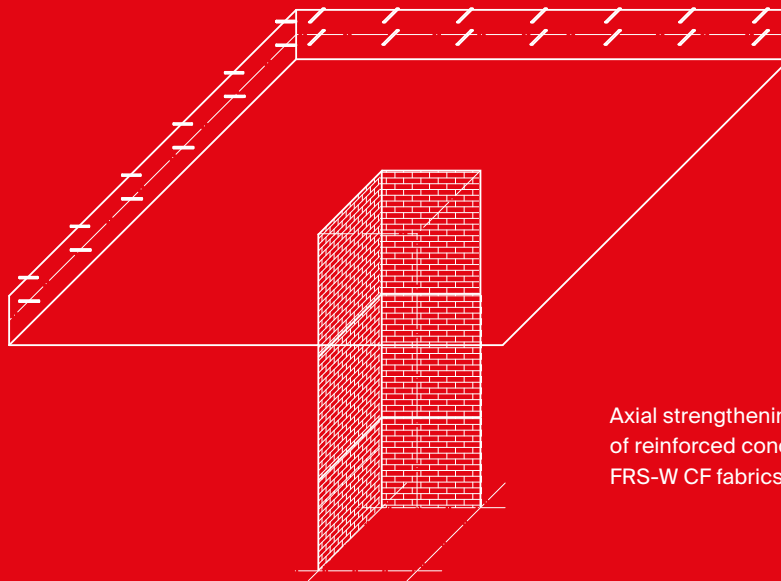
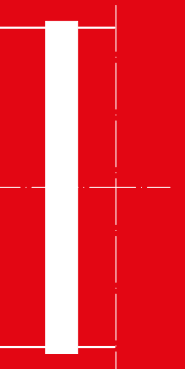
Shear strengthening of concrete beams with fischer FRS-W CF fabrics or with bonded steel plates, in combination with flexural strengthening



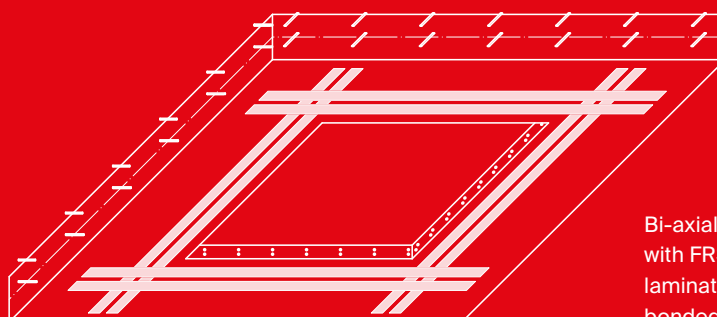
Flexural strengthening of beams, slabs with fischer FRS-L-S or FRS-L-H externally bonded or near surface mounted CFRP laminates and/or with FRS-W CF fabrics



Flexural strengthening of inclined concrete members such as stairs with fischer FRS-L-S or FRS-L-H externally bonded or near surface mounted CFRP laminates



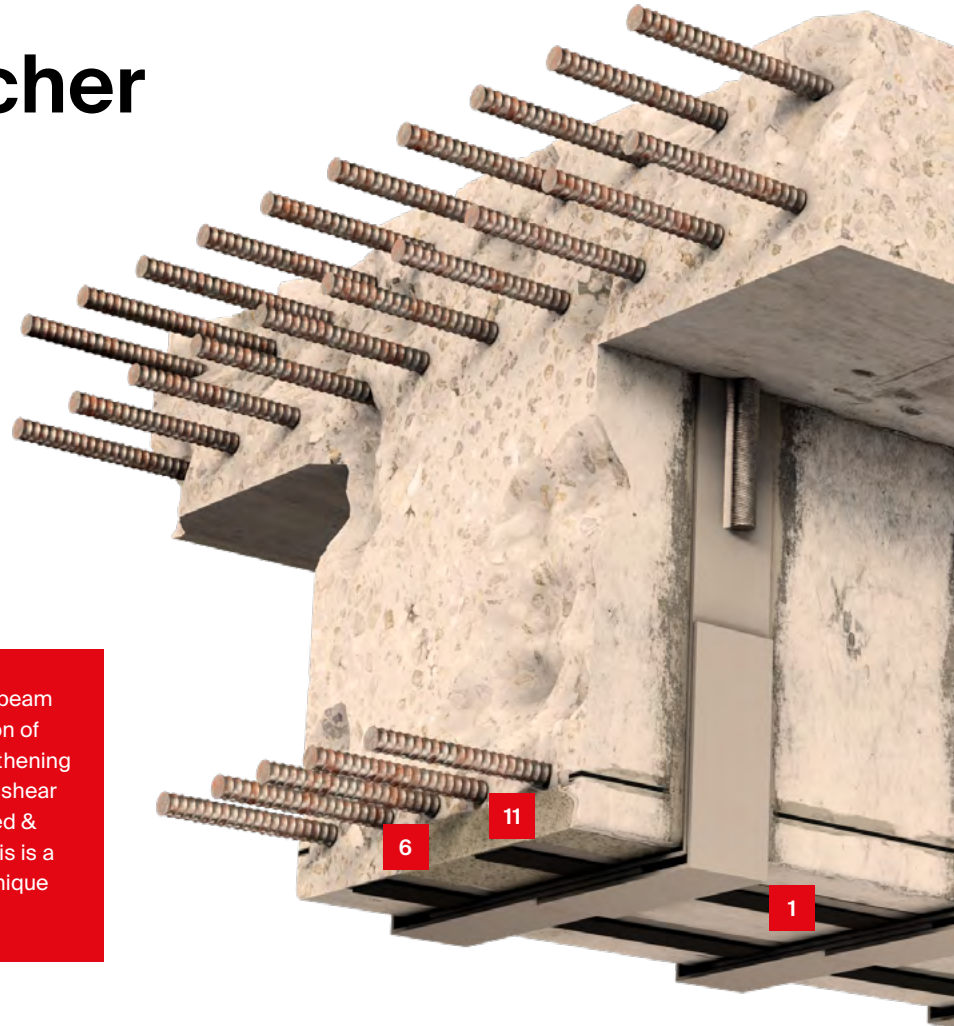
Axial strengthening and confinement of reinforced concrete columns with FRS-W CF fabrics



Bi-axial flexural strengthening of concrete slabs with FRS-L-S and FRS-L-H externally bonded laminates or with the combination of externally bonded and near surface mounted CFRP laminates

Rely on the fischer performance.

fischer knows no compromise when it comes to the performance of our products: The technical assessments for our fischer C-Fiber Force Strengthening System verify the short-term resistance as well as the durability of our products, such as water, fuel and alkaline resistance, resistance under sustained load, freeze-thaw, temperature, and fatigue. The constant quality of products is verified regularly by external audits as well as through extensive in-house quality control.



The left-hand side of the beam shows a typical application of combined flexural strengthening with CFRP laminates and shear strengthening with bonded & anchored steel plates. This is a typical construction technique especially in Germany.

1 CFRP Laminate FRS-L-S, FRS-L-H, FRS-L-S NSM



- Carbon Fiber Reinforced Laminates for structural strengthening applications.
- EB and NSM laminates with standard >170 GPa and high tensile modulus >200 GPa in tension.
- 12 EB and 3 NSM laminate geometries for economical design.

2 Carbon Fiber Fabric FRS-W U300 and FRS-W U600



- Unidirectional carbon fiber fabric for structural strengthening applications.
- 4 product variations: available with 300g/m² or 600g/m² area density and in two different roll widths
- For combined flexural, shear and torsion strengthening.

3 Spike anchor FRS-FC



- Carbon Fiber Spike Anchor.
- Increases the efficiency of load transfer between CF Fabrics and the base material.
- Typically used as end-anchorage for CF fabrics in various layouts and arrangements

4 Epoxy Mortar FRS-CS, FRS-CS 585 S



- Thixotropic, 2-component structural bonding agent for the installation of CFRP laminates and steel plates, available as can system and injection cartridge.
- Universal repair mortar and surface levelling with layer thickness ≤ 30 mm
- Complies with EN 1504-4, EN 1504-3, EN 1504-6

5 Saturating Resin FRS-CF

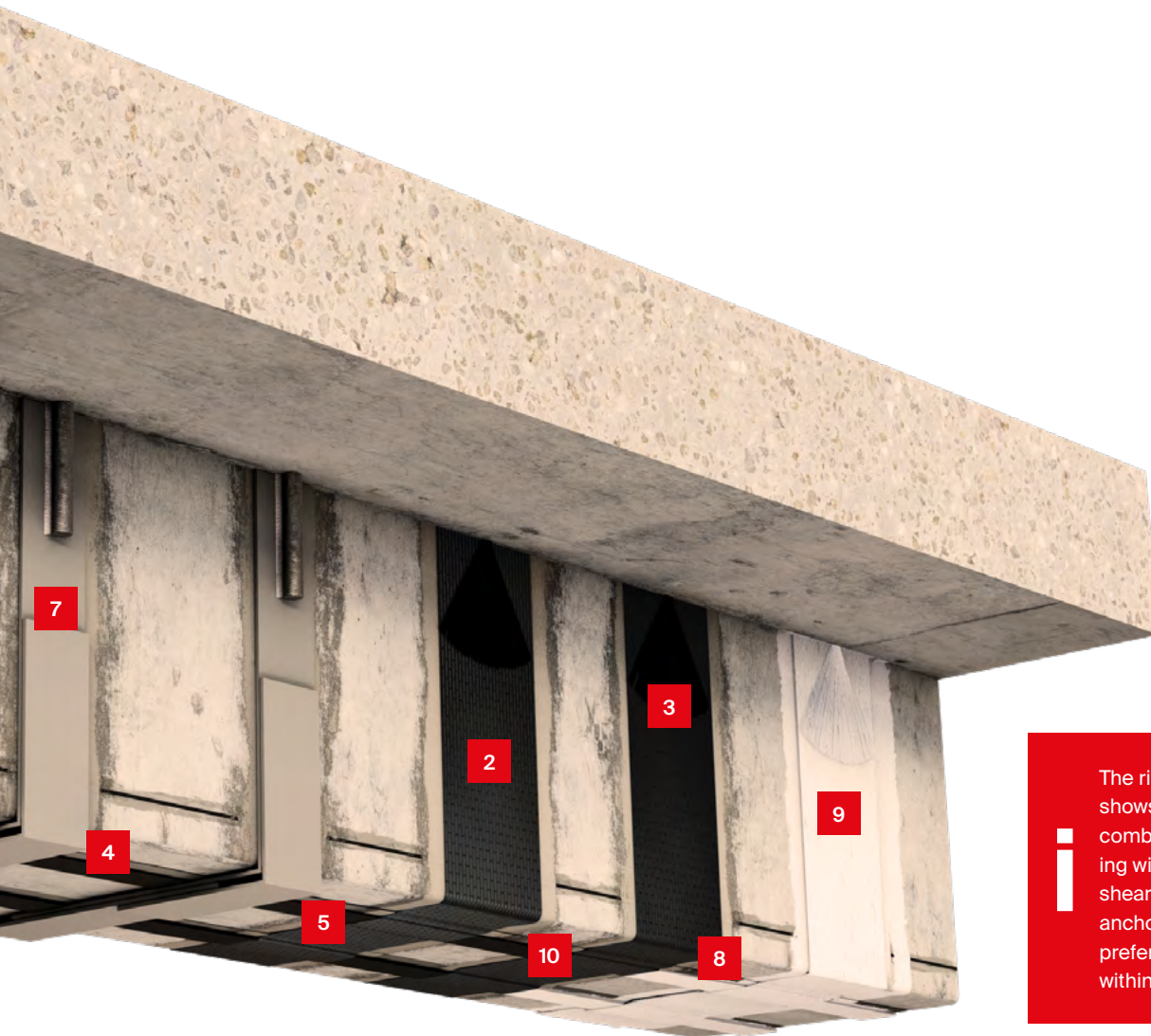


- Thixotropic epoxy-based saturating resin for the installation of FRS-W CF fabrics and FRS-FC Spike anchor, as well as for surface levelling
- Optimal saturating characteristics in dry and wet layup installations.
- Complies with EN1504-4
- High initial strength.

6 Bonding Agent FRS-BA



- Epoxy-based bonding agent for optimal adhesion between existing concrete and subsequent concrete repair mortar.
- Corrosion protection for embedded steel rebars.
- Complies with EN 1504-7.



The right-hand side of the beam shows a typical application of combined flexural strengthening with CFRP laminates and shear strengthening with end-anchored CF Fabrics. This is the preferred construction technique within the ACI440 context.

7 Corrosion Protection Primer FRS-CP red/grey



- 2-component, low viscosity epoxy-based corrosion protection coating for exposed steel surfaces.
- Universal corrosion primer according to DIN EN ISO 12944-2 and EN 1504-7
- Two differently pigmented colour variations available.

10 Cleaning Agent FRS-CA



- Universal non-dissolving cleaning agent for the CFRP laminate and contaminated tools.
- High cleaning performance.
- Fast cleaning with aerosol can due high spray power.

8 UV Protection Coating FRS-SF



- UV protection coating for CFRP laminates and CF fabrics.
- Good weather-ability and high durability against environmental exposure.

11 Epoxy Repair Mortar FRS-PC 11



- For reprofiling, surface levelling and increasing concrete cover with layer thickness up to 30 mm thickness.
- Thixotropic, 3 component universal epoxy-based concrete repair mortar.
- Suitable for overhead applications.
- Requirement class R4 according to EN 1504-3.
- Low chloride ion content, excellent shrinkage behaviour.

9 Fire Protection Coating FRS-FP



- Water-based coating against smoke development.
- Class A characteristics according to ASTM E84, in combination with CFRP laminates and CF Fabrics.

Assortment.

Externally bonded CFRP Laminates FRS-L-S and FRS-L-H



FRS-L-S and FRS-L-H

Item	Item No.	Width [mm]	Thickness [mm]	Area [mm ²]	Mean tensile strength (EN 2561) [N/mm ² =MPa]	Mean tensile modulus (EN 2561) [N/mm ² =MPa]	Mean ultimate tensile strain (EN 2561) [%]	Delivery Form	Sales unit [pcs]
FRS-L-S 50x1,2	562433	50	1,2	60	≥ 3.000	≥ 170.000	≥ 1,7	Coil 150 m	1
FRS-L-S 50x1,2	569837	50	1,2	60	≥ 3.000	≥ 170.000	≥ 1,7	1 m*	1
FRS-L-S 75x1,2	562434	75	1,2	90	≥ 3.000	≥ 170.000	≥ 1,7	Coil 150 m	1
FRS-L-S 75x1,2	569838	75	1,2	90	≥ 3.000	≥ 170.000	≥ 1,7	1 m*	1
FRS-L-S 100x1,2	562435	100	1,2	120	≥ 3.000	≥ 170.000	≥ 1,7	Coil 100 m	1
FRS-L-S 100x1,2	569839	100	1,2	120	≥ 3.000	≥ 170.000	≥ 1,7	1 m*	1
FRS-L-S 50x1,4	562439	50	1,4	70	≥ 3.000	≥ 170.000	≥ 1,7	Coil 150 m	1
FRS-L-S 50x1,4	569843	50	1,4	70	≥ 3.000	≥ 170.000	≥ 1,7	1 m*	1
FRS-L-S 75x1,4	562440	75	1,4	105	≥ 3.000	≥ 170.000	≥ 1,7	Coil 150 m	1
FRS-L-S 75x1,4	569844	75	1,4	105	≥ 3.000	≥ 170.000	≥ 1,7	1 m*	1
FRS-L-S 100x1,4	562441	100	1,4	140	≥ 3.000	≥ 170.000	≥ 1,7	Coil 100 m	1
FRS-L-S 100x1,4	569845	100	1,4	140	≥ 3.000	≥ 170.000	≥ 1,6	1 m*	1
FRS-L-H 50x1,2	562436	50	1,2	60	≥ 3.400	≥ 200.000	≥ 1,6	Coil 150 m	1
FRS-L-H 50x1,2	569840	50	1,2	60	≥ 3.400	≥ 200.000	≥ 1,6	1 m*	1
FRS-L-H 75x1,2	562437	75	1,2	90	≥ 3.400	≥ 200.000	≥ 1,6	Coil 150 m	1
FRS-L-H 75x1,2	569841	75	1,2	90	≥ 3.400	≥ 200.000	≥ 1,6	1 m*	1
FRS-L-H 100x1,2	562438	100	1,2	120	≥ 3.400	≥ 200.000	≥ 1,6	Coil 100 m	1
FRS-L-H 100x1,2	569842	100	1,2	120	≥ 3.400	≥ 200.000	≥ 1,6	1 m*	1
FRS-L-H 50x1,4	562442	50	1,4	70	≥ 3.400	≥ 200.000	≥ 1,6	Coil 150 m	1
FRS-L-H 50x1,4	569846	50	1,4	70	≥ 3.400	≥ 200.000	≥ 1,6	1 m*	1
FRS-L-H 75x1,4	562443	75	1,4	105	≥ 3.400	≥ 200.000	≥ 1,6	Coil 150 m	1
FRS-L-H 75x1,4	569847	75	1,4	105	≥ 3.400	≥ 200.000	≥ 1,6	1 m*	1
FRS-L-H 100x1,4	562444	100	1,4	140	≥ 3.400	≥ 200.000	≥ 1,6	Coil 100 m	1
FRS-L-H 100x1,4	569848	100	1,4	140	≥ 3.400	≥ 200.000	≥ 1,6	1 m*	1

Mechanical properties are determined according to EN 2561. Note that the different testing procedures defined in the different standards may result in slight deviations of the mechanical parameters. The values given in the valid technical approvals and assessments are always decisive for design.

* Custom length order is possible, if smaller quantity is requested than the full coil length. Please note the minimum order length of 10 meters.

Near Surface Mounted CFRP Laminates FRS-L-S NSM



FRS-L-S NSM

Item	Item No.	Width [mm]	Thickness [mm]	Area [mm ²]	Mean tensile strength (EN 2561) [N/mm ² =MPa]	Mean tensile modulus (EN 2561) [N/mm ² =MPa]	Mean ultimate tensile strain (EN 2561) [%]	Delivery Form	Sales unit [pcs]
FRS-L-S NSM 20x1,2	571700	20	1,2	24	≥ 3.000	≥ 170.000	≥ 1,7	Coil 150 m	1
FRS-L-S NSM 20x1,2	571712	20	1,2	24	≥ 3.000	≥ 170.000	≥ 1,7	1 m*	1
FRS-L-S NSM 15x1,4	571701	15	1,4	21	≥ 3.000	≥ 170.000	≥ 1,7	Coil 150 m	1
FRS-L-S NSM 15x1,4	571713	15	1,4	21	≥ 3.000	≥ 170.000	≥ 1,7	1 m*	1
FRS-L-S NSM 10x1,7	571702	10	1,7	17	≥ 3.000	≥ 170.000	≥ 1,7	Coil 150 m	1
FRS-L-S NSM 10x1,7	571714	10	1,7	17	≥ 3.000	≥ 170.000	≥ 1,7	1 m*	1

Mechanical properties are determined according to EN 2561. Note that the different testing procedures defined in the different standards may result in slight deviations of the mechanical parameters. The values given in the valid technical approvals and assessments are always decisive for design.

* Custom length order is possible, if smaller quantity is requested than the full coil length. Please note the minimum order length of 10 meters.

Epoxy Mortar FRS-CS and FRS-CS 585 S



Item	Item No.	Delivery Form	Content	Sales unit [pcs]
FRS-CS	569984	Can	10 kg (A+B comp.)	1
FRS-CS	569985	Can	5 kg (A+B comp.)	1
FRS-CS 585 S	571698	Injection cartridge	1x cartridge 585 ml, 1x FIS UMR, 1x FRS-GA	6
FIS UMR	520593	Bag	10x FIS UMR	1
FRS-GA	572382	Bag	10x FRS-GA	1
FIS DM SL	567768	Cardboard box	1x Manual dispenser	1

Carbon Fiber Fabric FRS-W U300 and FRS-W U600



Carbon Fiber Fabric FRS-W U300 and FRS-W U600

Item	Item No.	Area density [gr/m ²]	Roll width [mm]	Roll length [m]	Area [m ²]	Mean ultimate tensile strength (dry fiber) [N/mm ² =MPa]	Mean tensile modulus (dry fiber) [N/mm ² =MPa]	Mean ultimate tensile strain (dry fiber) [%]	Delivery Form	Sales unit [pcs]
FRS-W U300x500	562073	300	500	150	75	≥ 4.200	≥ 230.000	≥ 1,8	Roll	1
FRS-W U300x200	562072	300	200	150	30	≥ 4.200	≥ 230.000	≥ 1,8	Roll	1
FRS-W U600x500	562074	600	500	100	50	≥ 4.200	≥ 230.000	≥ 1,8	Roll	1
FRS-W U600x200	562075	600	200	150	30	≥ 4.200	≥ 230.000	≥ 1,8	Roll	1

Note that the mechanical properties of the prepared laminate made of the Saturating Resin FRS-CF and the Carbon Fiber Fabric FRS-W deviate from the dry fiber properties. The values given in the technical approvals and assessments are always decisive for design.

Spike Anchor FRS-FC



FRS-FC

Item	Item No.	Total Length [mm]	Length of loose CF-filaments [mm]	Length of the precured part [mm]	Diameter [mm]	Delivery form	Content	Sales unit [pcs]
FRS-FC 10 170/280	571718	450	280	170	10	Cardboard box	25 Spike Anchors	1
FRS-FC 12 170/280	574641	450	280	170	12	Cardboard box	25 Spike Anchors	1

Saturating Resin FRS-CF



Item	Item No.	Delivery Form	Content	Sales unit [pcs]
FRS-CF	569850	Can	10 kg (A+B comp.)	1
FRS-CF	569851	Can	5 kg (A+B comp.)	1

Assortment.

Epoxy Repair Mortar FRS-PC 11



FRS-PC 11 (11 kg)

Item	Item No.	Delivery Form	Content	Sales unit [pcs]
FRS-PC 11	561931	Can	11 kg (A+B+C)	1

Bonding Agent FRS-BA



FRS-BA (5 kg)

Item	Item No.	Delivery Form	Content	Sales unit [pcs]
FRS-BA	561929	Can	5 kg (A+B comp.)	1

Corrosion Protection Primer FRS-CP



FRS-CP red (5 kg)



FRS-CP grey (5 kg)

Item	Item No.	Delivery Form	Content	Sales unit [pcs]
FRS-CP red	562071	Can	5 kg (A+B comp.)	1
FRS-CP grey	561930	Can	5 kg (A+B comp.)	1

Fire Protection Coating FRS-FP



FRS-FP (25 kg)

Item	Item No.	Delivery Form	Content	Sales unit [pcs]
FRS-FP	569849	Can	25 kg	1

UV Protection Coating FRS-SF



FRS-SF (12,5 l)

Item	Item No.	Delivery Form	Content	Sales unit [pcs]
FRS-SF	569852	Can	12,5l	1

Universal cleaning agent FRS-CA



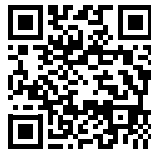
FRS-CA (0,5 l)

Item	Item No.	Delivery Form	Content	Sales unit [pcs]
FRS-CA	562137	Aerosol can	500 ml	1

Experience the design of tomorrow.



Learn more about our innovative REINFORCE-FIX design software



REINFORCE-FIX

This is the new fischer design software of the next generation. It makes the structural design of strengthening applications easier and more user-friendly than ever before. And all of that free of charge.

- Interactive 3D Model
- Interactive utilization bar for the different failure modes
- Documentation with transparent calculation steps, including dynamically changing stress-strain diagrams for ULS and SLS verifications.
- Use of any number of reinforcing bars of any cross-sections in the RC cross-section
- Iterative, precise determination of the neutral axis of the cross-sections
- Realistic estimate of materials and quantities
- Continuous development to include more and more guidelines & standards

DESIGN CASES ACCORDING TO:

ACI 440.2R

- Flexural strengthening with CFRP laminates and CF fabrics for concrete slabs, rectangular beams and T-beams
- Shear strengthening with CF fabrics for rectangular beams and T-beams
- Combined flexural and shear strengthening

DAfStb VL

- Flexural strengthening with CFRP laminates for concrete slabs, rectangular beams and T-beams
- Shear strengthening with steel plates for rectangular beams and T-beams
- Combined flexural and shear strengthening

Feel free to contact our site engineers for further technical support in case of standard applications as well as beyond. Browse among the wide range of live and online trainings offered by the fischer Academy.

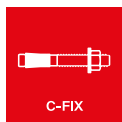
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FiXperience. Safe and reliable.

The fischer design Software FiXperience gives you safe and reliable support in dimensioning your projects whether you are a planner, structural engineer or craftsman. FiXperience is set up modularly

and usable for a variety of applications. The program includes an engineering software with special application modules:



C-FIX

The anchor design program for steel and bonded anchor in concrete, as well as injection systems for masonry. Now with the new FEM design tool for the realistic design of anchorages.



MORTAR-FIX

To determine the injection resin volume for bonded anchors in concrete and masonry.



WOOD-FIX

For the calculation of on-rafter insulation systems and joints in structural timber engineering.



RAIL-FIX

For the design of fixings for railings on reinforced concrete slabs and staircases.



INSTALL-FIX

For the design and dimensioning of MEP installation systems.



FACADE-FIX

For the design of façade fixings with timber sub-structure.



REBAR-FIX

For the design of post-installed rebars in reinforced concrete.



CHANNEL-FIX

For the design of cast-in channels and inserts.



REINFORCE-FIX

To design structural strengthening of reinforced concrete members

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