Technical Datasheet

FRS-CS Epoxy Mortar

Characteristics

- Epoxy-based structural bonding agent for the application of FRS-L-S, FRS-L-H, FRS-L-S NSM CFRP laminates for strengthening of concrete elements with externally bonded reinforcements
- High compressive (≥85 N/mm^2) and flexural strength (≥30 N/mm^2)
- High bonding performance and adhesion on various surfaces and substrates
- Component of European Technical Assessment ETA-24/0281
- Component of ESR-4774 (ICC-ES Evaluation Report)
- DoP´s according to EN1504-3, EN1504-4, EN1504-6
- Firm thixotropic consistency for enhanced processing properties
- General structural bonding agent and universal concrete repair mortar

General Information

Composition	Thixotropic 2-component epoxy adhesive	
Appearance	Concrete grey viscous paste	
Delivery Unit and packaging	Either 1 x steel can, with 5 kg or 10 kg filling weight Or 6 x injection cartridge with 585 ml volume with 6 FRS-GA injection adapters and 6 FIS UMR static mixer	
Mixing ratio	Component A : Component B = 4 : 1 by weight	
Art.-No.	569984	FRS-CS 10 kg can (A+B Comp.)
	569985	FRS-CS 5 kg can (A+B Comp.)
	571698	FRS- CS 585 S Cartridge system (585 ml)
Shelf life	36 months	
Storage conditions	Storage in dry conditions at temperatures between + 5 °C and + 40 °C. Before using the product, please ensure that the product is at application temperature. The product must be protected from direct sun exposure.	
Transport conditions	Only in original packaging or in adequate packaging protected against mechanical impact and aggressive environments.	

Approvals and Assessments

ETA 24/0281	According to EAD 160086-01-0301
ESR-4774 (ICC-ES Evaluation Report)	According to AC 125
EN 1504-3	EN 1504-3:2005
EN 1504-4	EN 1504-4:2004

EN 1504-6	EN 1504-6:2006

Technical data of the components

Property	Performance	Unit	Remark
Chemical base	Epoxy mortar with amine hardener		
Solid content	≥ 99	% by mass	
Consistency component A (mortar)	Viscous Paste		
Consistency component B (hardener)	Viscous Paste		
Density component A (mortar)	1,92 / 1,89	g/cm³	1st value can system 2nd value cartridge system EN ISO 2811
Density component B (hardener)	1,63 / 1,72	g/cm³	1st value can system 2nd value cartridge system EN ISO 2811
Viscosity Component A (mortar)	8000	Pa*s	Brookfield, spindle 6
Viscosity Component B (hardener)	8000	Pa*s	Brookfield, spindle 6
Colour Component A (mortar)	Beige		
Colour Component B (hardener)	Black		
Flashpoint	> 100	°C	

The values stated represent typical characteristics of the product and are not to be understood as binding products specifications.

Technical data of the mixture

Property	Performance	Unit	Remark
Workability time at 10 °C - 20 °C (10 kg)	≥ 180	min.	EN ISO 9514
Workability time at 20 °C - 30 °C (10 kg)	≥ 80	min.	EN ISO 9514
Workability time at 30 °C - 40 °C (10 kg)	≥ 20	min.	EN ISO 9514
Curing time at 10 °C - 20 °C	48	h	
Curing time at 20 °C - 30 °C	24	h	
Curing time at 30 °C - 40 °C	16	h	
Viscosity, mixture	8000	Pa*s	Brookfield, spindle 6
Density, mixture	1,86	g/cm³	EN ISO 2811-1
Consistency, mixture	Smooth thixotropic paste		
Colour of mixture and cured adhesive	Grey		

The values stated represent typical characteristics of the product and are not to be understood as binding products specifications.

Technical data of the cured adhesive

Property	Performance	Unit	Remark
Temperature range of use	- 40 to + 40	°C	Without long term load reduction
Temperature range short-term	80	°C	With load reduction during temperature exposure above 40°C
Water resistance	Resistant		
Weathering resistance	Resistant		
UV resistance	Conditionally resistant, in case of permanent UV radiation an adequate coating is recommended.		
Tensile strength	≥ 35	N/mm^2	ISO 527-1, after 7 d at RT
Young's modulus (tension)	≥ 7 000	N/mm^2	ISO 527-1, after 7 d at RT
Young's modulus (compression)	≥ 7 000	N/mm^2	EN 13412, after 7 days at RT
Compressive strength	≥ 80	N/mm^2	EN 196-1, after 1 d at RT
	≥ 85	N/mm^2	EN 196-1, after 3 d at RT
	≥ 85	N/mm^2	EN 196-1, after 7 d at RT
Flexural strength	≥ 25	N/mm^2	EN 196-1, after 1 d at RT
	≥ 25	N/mm^2	EN 196-1, after 3 d at RT
	≥ 30	N/mm^2	EN 196-1, after 7 d at RT
Lap shear strength steel at RT	≥ 13	N/mm^2	DIN EN 1465, after 1 d at RT
	≥ 13	N/mm^2	DIN EN 1465, after 2 d at RT
	≥ 14	N/mm^2	DIN EN 1465, after 7 d at RT
Glass transition temperature	≥ 40	°C	EN 12614, after 24 h at RT
	≥ 50	°C	EN 12614, after 72 h at RT
	≥ 50	°C	EN 12614, after 7 d at RT
Glass transition temperature	70	°C	ASTM E 1640, after 7 d at RT and 4 d at 40°C; max. loss modulus
Capillary water absorption	≤ 0,01	$Kg \cdot m^{-2} \cdot$	EN 13057
Shrinkage	≤ 0,10	%	EN 12617-1
Coefficient of thermal expansion	≤ 20	$10^{-6} K^{-1}$	EN 1770

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System components of ETA-24/0281	
CFRP laminates	fischer FRS-L-H / FRS-L-S / FRS-L-S NSM
Cleaning agent for the laminate	fischer FRS-CA
Epoxy mortar for the application of the CFRP laminate	fischer FRS-CS
Epoxy repair mortar	fischer FRS-PC 11
Bonding agent	fischer FRS-BA

System components of ESR-4774 (ICC-ES Evaluation Report)	
Externally bonded unidirectional CF fabrics	fischer FRS-W U300 / FRS-W U600
Saturating resin for CF Fabric application	fischer FRS-CF
Fire protection coating against flame spread and smoke development	fischer FRS-FP
CFRP Laminates	fischer FRS-L-H / FRS-L-S / FRS-L-S NSM
Epoxy mortar for the application of the CFRP Laminates	fischer FRS-CS

Measurement data

The technical data given in this datasheet are based on laboratory testing according to given EN or ASTM norms. Actual measured data may deviate depending on the measurement procedures, devices and norms used.

Processing instructions

Mixing ratio mortar to hardener

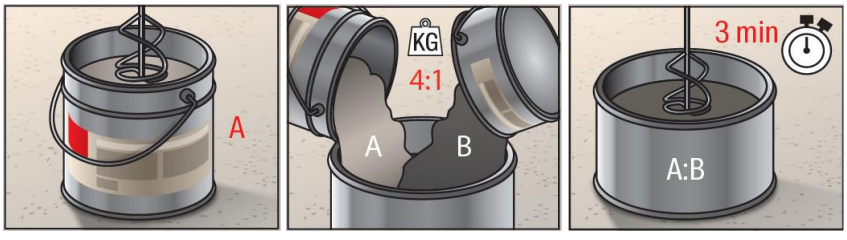
- Component A to component B: 4 parts by weight to 1 part by weight

Material, underground and air temperature before application:

- at least + 10 °C (and at least 3 K above dew point)
- maximum + 40 °C

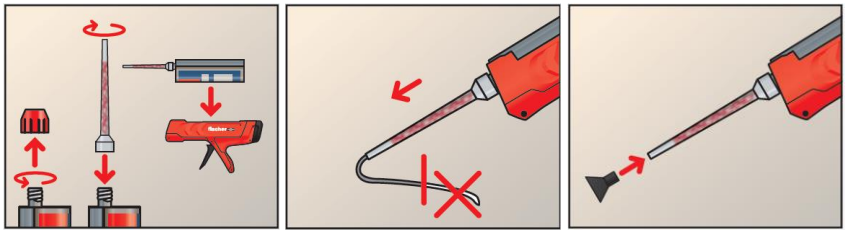
FRS-CS consists of two can components, supplied in prepacked quantities. Stir component A separately, then add component B completely. When taking subsets, please take care to ensure the exact mixing ratio by using a sufficiently accurate scale.

Stir with a hand-held stirrer (max. rotation speed U ≤ 300 rpm) until a homogeneous mass is formed. By moving the stirring rod circularly in the can, it must be ensured that the material near to can sides is also thoroughly mixed. Care should be taken to keep entrainment of air to a minimum while mixing. Mixing time needs to be at least 3 min or until a homogeneous mixture is achieved.



The can system is recommended for the application of the externally bonded FRS-L-S and/or FRS-L-H CFRP laminates, together with the FRS-AD Adhesion application device. The installation of the FRS-L-S / FRS-L-H Externally bonded CFRP laminate is described in the corresponding TD of the FRS-L-S and FRS-L-H CFRP laminate, as well as in a separate Installation Manual for Externally Bonded Laminates.

FRS-CS 585 S is a prefilled injection cartridge system. It is recommended to use the FRS-CS 585 S injection system for the installation of FRS-L-S NSM Near surface mounted laminates, together with the FIS DM SL mortar dispenser, FRS UMR mixing nozzle and the FRS-GA Injection adapter. The installation of the FRS-L-S NSM CFRP laminate is described in the corresponding TD of the FRS-L-S NSM CFRP laminate in a separate Installation Manual for Near Surface Mounted Laminate.



Cleaning of tools

The stirrer and all application tools must be cleaned before mixing FRS-CS. No substances may be used during cleaning that have separating or accelerating properties on the epoxy resins. Before using application tools, care must be taken that no cleaning agent encounters the FRS-CS components. After application FRS-CA Cleaning Agent or other potent organic solvents such as acetone, toluene, ethyl acetate, butyl acetate or others can be used. Take care to clean all equipment within pot life. Cured material can only be removed mechanically.

Chemical resistance

The hardened resin is largely resistant to diluted acids and alkalis as well as to many solvents, mineral oils, diesel, and gasoline. The long-term exposure of solvents can lead to a product volume increase and affects the performance. Short-term contact (24 h – 48 h) should not have a significant impact on the product performance. Concentrated acids and alkalis, in particular organic acids such as acetic acid can impair performance, especially upon prolonged or repeated exposure.

Please take notice of the safety information and advice given on the packaging labels and safety data sheets.