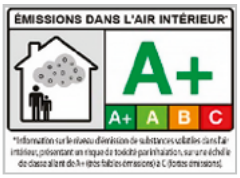
CF850

2K Reaction resin mortar, polyester-based styrene-free

CHARACTERISTICS

- Fast setting
- High bending- and compressive strength
- Free of expansion forces
- Chemical resistance
- For internal and external use
- Downward, horizontal and upwards installation
- High temperature resistant
- Styrene-free
- Easy application



SCOPE OF USE

CF850 is a two-component, fast-setting injection mortar for anchoring based on reactive resins, styrene free. It is characterized by high load carrying capacity. The material is suitable for internal and external use. Application is easy and possible with using an ordinary cartridge gun.
For static and quasi-static loads. Can be used **for fixation of: rods and threaded anchors, gates and fences, mounting machines and devices** (e.g. fans, air conditioners), **handrails, railings, balustrades and masts, attaching handles, brackets and gratings, facades and wall coverings, installations** (e.g. cabinets, boxes and wires), **sanitary devices** (e.g. sinks, urinal), **cable trays, piping, etc.** Suitable for building substrates such as: **non-cracked concrete, light-concrete, porous-concrete, solid masonry, hollow brick and natural stone** (need to be checked for discoloration effect in advance) since chemical anchoring is free of expansion forces. For anchors of different types like: threaded rods (zinc plated or hot dip, stainless steel and high corrosion resistance steel), reinforcing bars, internal threaded rods, profiled rod, etc.

SUBSTRATE PREPARATION / MATERIAL REQUIREMENTS

Substrates should comply with the requirements of comparable national standards. In particular they must be level, load-bearing, free from structural defects, clean, dry and free of dust and substances which impair adhesion.
In addition requirements must comply with relevant ETA 12/0109 or ETA 13/0677.

For installation in concrete, specified in ETA12/0109, threaded rod/M8-M24:

Anchorages subject to: static and quasi-static loads

Base materials:
- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000
- Strength classes C20/25 to C50/60 according to EN 206-1:2000
- Non-cracked concrete

Temperature range:
- From -40°C up to +50°C long term and up to +80°C short term

Use conditions:
- Structures subject to dry internal conditions, external atmospheric exposure and to permanently damp internal condition in combination with relevant anchor material type.

Design:
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.)
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Anchorages under static or quasi-static actions are designed in accordance with:
  – EOTA Technical Report TR 029 "Design of bonded anchors", Edition September 2010 or
  – CEN/TS 1992-4:2009

Installation:
- Dry, wet or flooded bore holes
- Hole drilling by hammer or compressed air drill mode
- Overhead installation allowed
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site

For installation in masonry, specified in ETA 13/0677, threaded rod/M8-M16:

Anchorages subject to: static and quasi-static loads

Base materials:
- Autoclaved Aerated Concrete (Use category d) to Annex B2, Table 1
- Solid brick masonry (Use category b), according to Annex B2 to B4, Table 1
- Hollow brick masonry (Use category c), according to Annex B2 to B4, Table 1
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2010
- For other bricks in solid masonry and in hollow or perforated masonry, the characteristic resistance of the anchor may be determined by job site tests according to ETAG 029, Annex B under consideration of the ß-factor to Annex C1, Table C1

Note: The characteristic resistances are also valid for larger brick sizes and larger compressive strength of the masonry unit.

Temperature range:
- From -40°C up to +50°C long term and up to +80°C short term

Use conditions (Environmental conditions):
- Structures subject to dry internal conditions, external atmospheric exposure and to permanently damp internal condition in combination with relevant anchor material type

Use categories in respect of installation and use:
- Category d/d: Installation and use in dry masonry
- Category w/w: Installation and use in wet masonry

Design:
- Verifiable calculation notes and drawings are prepared taking account the relevant masonry in the region of the anchorage, the loads to be transmitted and their transmission to the supports of the structure. The position of the anchor is indicated on the design drawings
- The anchorage are designed in accordance with the ETAG 029, Annex C, Design method A under the responsibility of an engineer experienced in anchorages and masonry work.

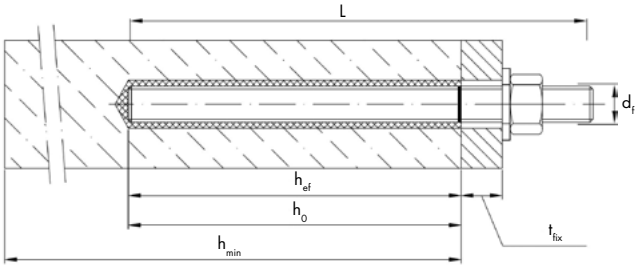
Installation:
- Dry or wet structures
- Anchor Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site

APPLICATION IN CONCRETE

Refer to: ETA 12/0109

Anchoring by composite form-fitting between injection mortar, anchor threaded rod and anchoring surface.
Prior resin injection mortar application, preparation steps must be done accordingly to substrate and fixing type given accordingly in:

- Annex A1: **Installation threaded rod**



d_f = diameter of clearance hole in the fixture
t_{fix} = thickness of fixture
h_{ef} = effective embedment depth
h_0 = depth of drill hole
h_{min} = minimum thickness of member

- Annex A4,Table A1: Anchor threaded rods types: galvanized steel, stainless steel, highly corrosion-resistant steel
- Annex B2,Table B1: Drill size and embedment depth, minimum spacing, minimum edge distance

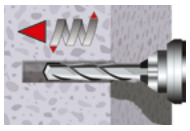
Tabel B1: Installation parameters for threaded rod

Anchor size		M8	M10	M12	M16	M20	M24
Nominal drill hole diameter	d_0 [mm] =	10	12	14	18	24	28
Effective anchorage depth	$h_{ef,min}$ [mm] =	60	60	70	80	90	96
	$h_{ef,max}$ [mm] =	160	200	240	320	400	480
Diameter of clearance hole in the fixture	d_f [mm] ≤	9	12	14	18	22	26
Maximum torque moment	T_{inst} [Nm] ≤	10	20	40	80	120	160
Thickness of fixture	$t_{fix,min}$ [mm] >	0					
	$t_{fix,max}$ [mm] <	1500					
Minimum thickness of member	h_{min} [mm]	h_{ef} + 30 mm ≥ 100 mm			h_{ef} + $2d_0$		
Minimum spacing	s_{min} [mm]	40	50	60	80	100	120
Minimum edge distance	c_{min} [mm]	40	50	60	80	100	120
Steel brush diameter	d_b [mm]	12	14	16	20	26	30

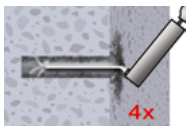
- Annex B2, Table B2: Brush diameter new and maximally used
- Annex B3, Table B3: Parameter cleaning and setting tools
- Annex B4, Table B3 and technical data in TDS - Working and curing times with cartridge temp range given

For heavy load-carrying attachments in non-cracked concrete, light-concrete, porous-concrete and solid stone following steps are recommended:

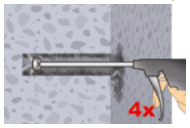
Installation instructions



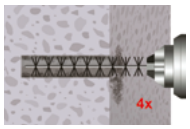
1. Drill with hammer drill a hole into the base material to the size and embedment depth required by the selected anchor (Table B1).
In case of aborted drill hole: the drill hole shall be filled with mortar.

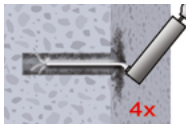


or



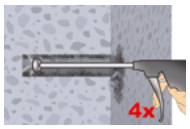
Attention! Standing water in the bore hole must be removed before cleaning.
2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) or a hand pump (Annex B2) a minimum of four times. If the bore hole ground is not reached an extension shall be used.
The hand-pump can be used for anchor sizes up to bore hole diameter 20 mm. For bore holes larger then 20 mm or deeper 240 mm, compressed air (min. 6 bar) **must** be used.





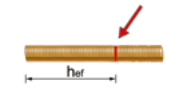
or

2b. Check brush diameter (Table B2) and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush > db, min (Table B2) a minimum of four times.
If the bore hole ground is not reached with the brush, a brush extension shall be used (Table B2).
2c. Finally blow the hole clean again with compressed air (min. 6 bar) or a hand pump a minimum of four times. If the bore hole ground is not reached an extension shall be used.
The hand-pump can be used for anchor sizes up to bore hole diameter 20 mm.For bore holes larger than 20 mm or deeper 240 mm, compressed air (min. 6 bar) **must** be used.

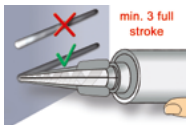


After cleaning, the bore hole has to be protected against re-contamination in an appropriate way, until dispensing the mortar in the bore hole.
If necessary, the cleaning repeated has to be directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.

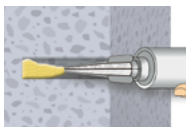
3. Attach a supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. Cut off the foil tube clip before use. For every working interruption longer than the recommended working time (Table B3) as well as for new cartridges, a new static-mixer shall be used.



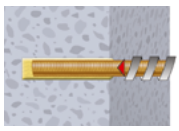
4. Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods.



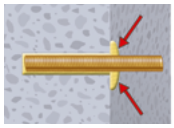
5. Prior to dispensing into the drill hole, squeeze out separately a minimum of three full strokes (a minimum of six full strokes in case of foil tube cartridges) and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.



6. Starting from the bottom resp. back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole is filled to avoid creating air pockets. For embedment larger than 190 mm anextension nozzle shall be used. Observe the gel-/ working times given in table B3.

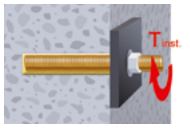


7. Push the threaded rod or reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor should be free of dirt, grease, oil or other foreign material.



8. Be sure that the anchor is fully seated at the bottom of the hole and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed. For overhead application the anchor rod should be fixed (e.g. wedges).

9. Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend table B3).



10. After full curing, the add-on part can be installed with the max. torque (Table B1) by using a calibrated torque wrench.

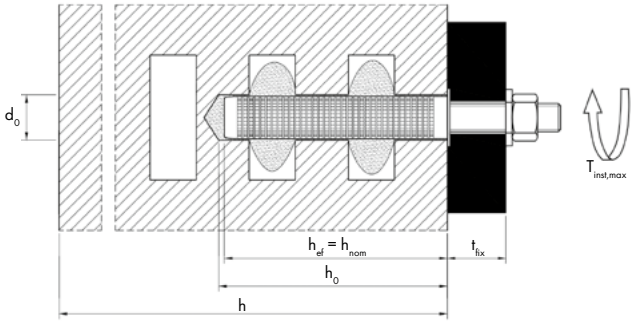
APPLICATION IN SOLID AND HOLLOW MASONRY

Refer to: ETA 13/0677

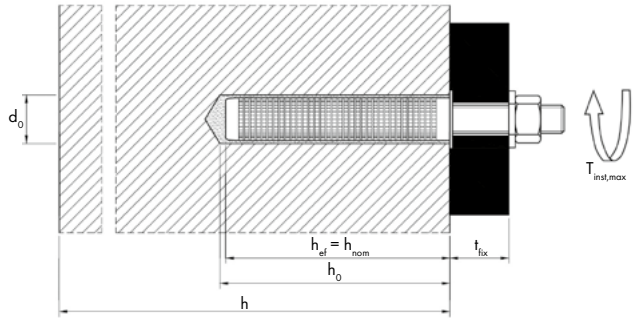
Anchoring by composite form-fitting between injection mortar, optionally sleeve collar, anchor rod and anchoring surface. Prior resin injection mortar application, preparation steps must be done accordingly to substrate and fixing type given accordingly in:

- Annex A1:

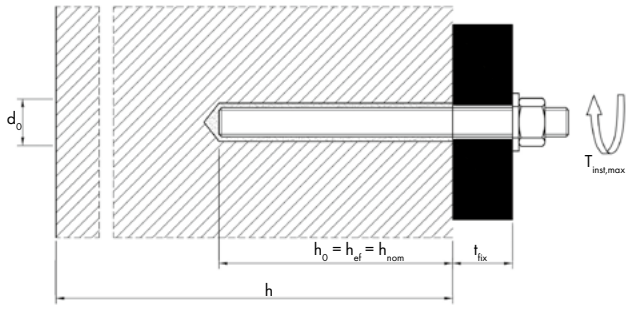
Installation in hollow brick; threaded rod with sleeve



Installation in solid brick; threaded rod with sleeve



Installation in solid brick; threaded rod without sleeve



d_0 = nominal drill hole diameter
t_{fix} = thickness of fixture
$T_{inst,max}$ = max installation torque moment
h = thickness of member
h_0 = depth of drill hole at shoulder
h_{ef} = effective anchorage depth
h_{nom} = overall embedment depth

- Annex A4, Table A1: Anchor threaded rods types: galvanized steel, stainless steel, highly corrosion-
- Annex A5, Table A2: Sleeve types
- Annex B5, Table B: Overview brick types with corresponding fastens elements
- Annex B5, Table B2: Drill hole, drill depth, brush diameter, in solid and AA concrete without sleeve

Table B2: Installation parameters in Autoclaved Aerated Concrete AAC and solid masonry (without sleeve)

Threaded rod			**M8**	**M10**	**M12**	**M16**
Nominal drill hole diameter	d_0	[mm]	10	12	14	18
Drill hole depth	h_0	[mm]	80	90	100	100
Effective anchorage depth	$h_{ef} = h_{nom}$	[mm]	80	90	100	100
Minimum wall thickness	h_{min}	[mm]	h_{ef} + 30			
Diameter of clearance hole in the fixture	$d_r \leq$	[mm]	9	12	14	18
Diameter of steel brush	$d_b \geq$	[mm]	12	14	16	20
Minimum diameter of steel brush	$d_{b,min}$	[mm]	10,5	12,5	14,5	18,5
Max torque moment	T_{inst}	[Nm]	See parameters of brick Annex C4 to Annex C39			

- Annex B5, Table B3: Drill hole, drill depth, brush diameter, in solid and hollow masonry with sleeve

Table B3: Installation parameters in solid and hollow masonry (with sleeve)

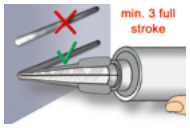
Threaded rod			**M8**	**M8/M10**			**M12/M16**		
Sleeve	d_0	[mm]	VM-SH 12x80	VM-SH 16x85	VM-SH 16x130	VM-SH 13x130 /330	VM-SH 20x85	VM-SH 20x130	VM-SH 20x200
Nominal drill hole diameter	d_0	[mm]	12	16	16	16	20	20	20
Drill hole depth	h_0	[mm]	85	90	135	135+t_{fix} [1)]	90	135	205
Effective anchorage depth	h_{ef}= h_{nom}	[mm]	80	85	130	130	85	130	200
Minimum wall thickness	h_{min}	[mm]	115	115	175	175	115	175	240
Diameter of clearance hole in the fixture	$d_r \leq$	[mm]	9	9 (M8) / 12 (M10)			14 (M12) / 18 (M16)		
Diameter of steel brush	$d_b \geq$	[mm]	14	18			22		
Minimum diameter of steel brush	$d_{b,min}$	[mm]	12,5	16,5			20,5		
Max torque moment	T_{inst}	[Nm]	See parameters of brick Annex C4 to Annex C39						

- Working and curing times with cartridge temp range given in general description of TDS and Annex B6, Table B4

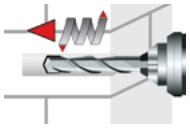
For medium load applications in solid masonry and autoclaved aerated concrete without sleeve following steps are recommended:

Installation instructions

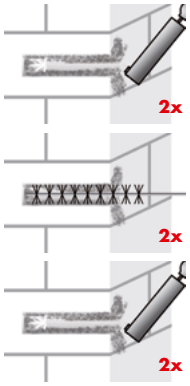
Preparation of cartridge
1. Remove the cap and attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. In case of foil tube cartridge, cut off the clip before use. For every working interruption longer than the recommended working time (Table B4), as well as for new cartridges, a new static-mixer shall be used.



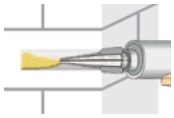
2. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes (a minimum of six full strokes in case of foil tube cartridges), and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.



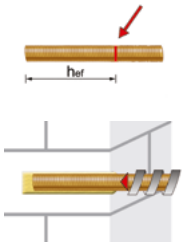
Installation in solid masonry (without sleeve)
3. Holes to be drilled perpendicular to the surface of the base material by using a hard-metaltipped hammer drill bit. Drill a hole, with drill method according to brick type into the base material, with nominal drill hole diameter and bore hole depth acc. to the sizeand embedment depth required by the selected anchor. In case of aborted drill hole the drill hole shall be filled with mortar.



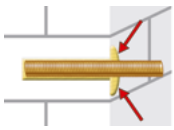
4. Blow out from the bottom of the drill hole two times. Attach the appropriate sized brush (>$d_{b,min,}$ Table B2 or B3) to a drilling machine or a battery screwdriver, brush the hole clean two times, and finally blow out the hole again two times.



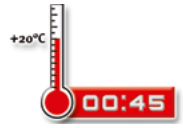
5. Starting from the bottom or back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets. Observe the gel-/ working times given in Minimum timing Table B4.



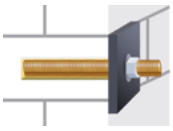
6. The position of the embedment depth shall be marked on the threaded rod. Push the threaded rod into the drill hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor shall be free of dirt, grease, oil or other foreign material.



7. Be sure that the annular gap is fully filled with mortar. If no excess mortar is visible at the top of the hole, the application has to be renewed.



8. Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Minimum timing Table B4).

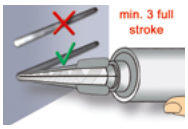


9. After full curing, the fixture can be installed with up to the max. torque (see parameters of brick Annex C4 to Annex C34) by calibrated torque wrench.

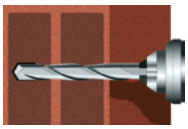
For medium load applications in solid and hollow masonry with sleeves: e.g. solid or hollow calcium silica bricks, solid or hollow concrete bricks, solid or hollow clay bricks, etc., following steps are recommended:

Installation instructions

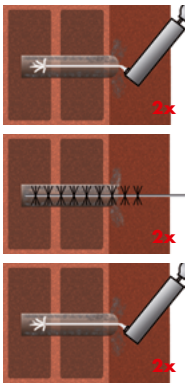
Preparation of cartridge
1. Remove the cap and attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. In case of foil tube cartridge, cut off the clip before use. For every working interruption longer than the recommended working time (Table B4), as well as for new cartridges, a new static-mixer shall be used.



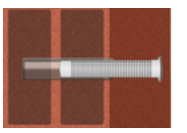
2. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes (a minimum of six full strokes in case of foil tube cartridges), and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.



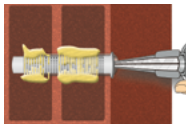
Installation in solid and hollow masonry (with sleeve)
3. Holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit. Drill a hole, with drill method according to material type, into the base material, with nominal drill hole diameter and drill hole depth acc. to the size and embedment depth required by the selected anchor. In case of aborted drill hole the drill hole shall be filled with mortar.



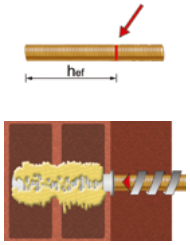
4. Blow out from the bottom of the drill hole two times. Attach the appropriate sized brush (> $d_{b,min,}$ Table B2 or B3) to a drilling machine or a battery screwdriver, brush the hole clean two times, and finally blow out the hole again two times.



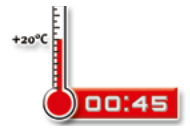
5. Insert the sleeve flush with the surface of the masonry. Only use sleeves that have the right length. Never cut the sleeve except the sleve 16x130/330. For installing the sleeve 16x130/330 measure the required length of sleeve, cut the sleeve from the top and set the cap on it before pushing it through the fixing element.



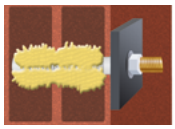
6. Starting from the bottom or back fill the sleeve with adhesive. For quantity of mortar attend cartridges label or installation instructions. Observe the gel-/ working times given in Minimum timing Table B4.



7. The position of the embedment depth shall be marked on the threaded rod. Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor shall be free of dirt, grease, oil or other foreign material.



8. Allow the adhesive to cure to the specified curing time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Minimum timing Table B4).



9. After full curing, the fixture can be installed with up to the max. torque (see parameters of brick Annex C4 to Annex C34) by using a calibrated torque wrench.

PLEASE NOTE

- Please note: anchor type, cleaning bore hole method, working time and max torque are to be observed in relevant tables included in actual ETA 12/109 and ETA 13/0677
- The approvals of approved anchors specify rotary or hammer drilling
- Drill bits with excessively worn cutting edges should not be used (see approval stipulations)
- The respective approval must be observed with regards to the cleaning of drill holes (brushed and blown out)
- Also included in the anchor approval is the drilling depth, which refers to a specific base material thickness. Without an approval, the following can be used as a rule of thumb for general applications: required base material thickness = drilling depth + 50 mm
- The location of new holes to be drilled after mis drills (such as if iron is struck or if the hole was in the wrong location) is regulated in the approvals. The distance from a mis drill must usually be two times the drilling depth of the mis drill. A mis drill hole must be sealed
- Due to the following, diamond bits are only allowed in exceptional cases:
  – The wall of the drill hole may be too smooth for the anchor
  – Standing moisture or dampness may drastically reduce the load bearing capacity of the anchor (especially with injection methods)
  – There is a risk of drilling through supporting reinforcing iron
- Standing water must be removed from the drill hole of shear anchors or injection systems
- Below freezing temperatures, the anchor should be set immediately after the hole is drilled to avoid the formation of ice crystals in the drill hole
- The approvals for the respective anchor sizes accurately define the holes of the attachment part. These specifications must be taken into account
- Note the maximum mounting height, also described as the usable length, in the manufacturer's specifications: tfi x = attachment part thickness + non-load bearing surfaces up to load-bearing base material
- A specified torque, which ensures the required pre-tensioning force and correct anchor mounting, is required for tightening many anchors approved by construction authorities. A calibrated torque wrench should be used for this
- For chemical anchors, observe the required hardening time before applying the tightening torque or actual load
- Anchors must be installed as standard units. Replacing or removing parts is not allowed

STORAGE

Up to 12 months from the production date; store in a cold and dark place, storage temperature: from +5°C up to +25°C.

PACKAGING

Foil tube cartridges 300 ml.

PRODUCT SAFETY

For professional users. Safety data sheet available on website https://mysds.henkel.com/index.html#/appSelection or www.henkel-adhesives.com.

May cause an allergic skin reaction. Causes serious eye irritation. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Avoid breathing mist/ vapors. Wear protective gloves/eye protection. IF ON SKIN: Wash with plenty of soap and water. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

DISPOSAL

Dispose of waste and residues in accordance with local authority requirements.
Disposal of uncleaned packages: Use packages for recycling only when totally empty.
Waste code: 08040

TECHNICAL DATA

General information regarding material properties

Base:	Polyester resin, styrene free
Density:	1,79 kg / dm^3
pH-value:	>12
Compressive strength:	88 N / mm^2 acc. EN 196 Part 1
Flexural strength:	31 N / mm^2 acc. EN 196 Part 1
E modulus:	14 kN / mm^2acc. EN 12504-4
Watertightness:	0 mm acc. DIN EN 12390-8
UV resistance:	Pass
Working time:	from 2 min up to 90 minutes depending on ambient conditions (refer table B3)
Application temperature:	from -5°C up to +39°C
Reaction to fire:	class A1
Curing time:	from 20 min up to 6 h depending on ambient conditions and substrate conditions

Ceresit CF850

Temp. in base material	Max. Working time	Min. Curing time
from -5°C up to -1°C	90 min.	6 h
from 0°C up to +4°C	45 min.	3 h
from +5°C up to +9°C	25 min.	2 h
from +10°C up to +14°C	20 min.	100 min.
from +15°C up to +19°C	15 min.	80 min.
from +20°C up to +29°C	6 min.	45 min.
from +30°C up to +34°C	4 min.	25 min.
from +35°C up to +39°C	2 min.	20 min.
cartridge temp.: from +5°C up to +40°C		

Thermal resistance (cured mortar):
from -40°C up to +80°C

Consumption: for solid concrete and masonry for given diameter:

Nominal anchor (Ømm)	Nominal drill hole (Ømm)	Depth of drill hole (mm)	Efficiency from one package
M8	10	80	< 56
M10	12	90	< 37
M12	14	110	< 22

Consumption: for hollow masonry with sleeve usage for given diameter:

Nominal anchor (Ømm)	Nominal drill hole (Ømm)	Depth of drill hole (mm)	Sleeve size (Ø x L)	Efficiency from one package
M8	16	135	16x130	< 14
M10	16	135	16x130	< 14
M12	20	135	20x130	< 14

Certificates: ETA 12/0109, ETA 13/0677, VOC French A+, LEED confirmation

CE
2873

Henkel AG & Co. KGaA, D-40191 Düsseldorf
22

DoP 01709 ETAG 029 ETA 13/0677: Injection anchors for use in masonry Anchore type/-sizes; threaded rod/M8 - M16		DoP 01710 ETAG 001-Part 1 and Part 5 ETA 12/0109: Bonded Injection type anchor for use in non-cracked concrete Anchore type/-sizes; threaded rod/M8 - M24	
Reduction factor for job site tests (β-factor)	DoP, Annex: C 1	Characteristic resistance for tension load	DoP, Annex: C 1
Characteristic resistance for tension and shear loads	DoP, Annex: C 5 to C 35	Characteristic resistance for shear load	DoP, Annex: C 2
Characteristic resistance for bending moments	DoP, Annex: C2	Displacement	DoP, Annex: C 3
Displacement under shear and tension loads	DoP, Annex: C 4 to C 34	Reaction to fire	Class A1
Edge distances and spacing	DoP, Annex: C 3 to C 34		
Reaction to fire	Class A 1		

www.henkel-dop.com

Refer to specific information regarding intended applications.

1.Installation in concrete acc. to ETA 12/0109

Table C1: Characteristic values under tension loads in non-cracked concrete

Anchor size threaded rod				**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M 24**
Steel failure									
Characteristic tension resistance		$N_{Rk,s}$	[kN]	$A_s \times f_{uk}$					
Combined pull-out and concrete failure									
Characteristic bond resistance in non-cracked concrete C20/25									
Temperature range I: 40°C/24°C	dry and wet concrete	$T_{Rk,ucr}$	[N/mm²]	8,5	8,0	8,0	8,0	8,0	8,0
	flooded bore hole	$T_{Rk,ucr}$	[N/mm²]	8,5	8,0	8,0	8,0	8,0	8,0
Temperature range II: 80°C/50°C	dry and wet concrete	$T_{Rk,ucr}$	[N/mm²]	6,5	6,0	6,0	6,0	6,0	6,0
	flooded bore hole	$T_{Rk,ucr}$	[N/mm²]	6,5	6,0	6,0	6,0	6,0	6,0
Increasing factors for concrete Ψ_c		C25/30		1,04					
		C30/37		1,08					
		C35/45		1,13					
		C40/50		1,15					
		C45/55		1,17					
		C50/60		1,19					
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3		k_8	[-]	10,1					
Concrete cone failure									
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1		k_{ucr}	[-]	10,1					
Edge distance		$c_{cr,N}$	[mm]	$1,5\ h_{ef}$					
Axial distance		$s_{cr,N}$	[mm]	$3,0\ h_{ef}$					
Splitting failure									
Edge distance		$c_{cr,sp}$	[mm]	$1,0 \cdot h_{ef} \le (2,5 - \frac{h}{h_{ef}}) \le 2,4 \cdot h_{ef}$					
Axial distance		$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$					
Installation safety factor (dry and wet concrete)		$\gamma_2=\gamma_{inst}$	[-]	1,2					
Installation safety factor (flooded bore hole)		$\gamma_2=\gamma_{inst}$	[-]	1,2					

Henkel Injection system CF850, CF850 E, CF850 T for concrete	**Annex C 1**
Performances Characteristic values under tension loads in non-cracked concrete	

Table C2: Characteristic values under shear loads in non-cracked concrete

Anchor size threaded rod			**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M 24**
Steel failure without lever arm								
Characteristic shear resistance	$V_{Rk,s}$	[kN]	$0,5 \times A_s \times f_{uk}$					
Ductility factor according to CEN/TS 1992-4-5 Section 6.3.2.1	k_2	[-]	0,8					
Steel failure with lever arm								
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	$1.2 \times W_{el} \times f_{uk}$					
Concrete pry-out failure								
Factor k_3 in equation (27) of CEN/TS 1992-4-5 Section 6.3.3 Factor k in equation (5.7) of Technical Report TR 029	$k_{(3)}$	[-]	2,0					
Installation safety factor	$\gamma_2=\gamma_{inst}$	[-]	1,1					
Concrete cone failure								
Effective length of anchor	l_f	[mm]	$l_f = \min(h_{ef}; 8\ d_{nom})$					
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16	20	24
Installation safety factor	$\gamma_2=\gamma_{inst}$	[-]	1,0					

Henkel Injection system CF850, CF850 E, CF850 T for concrete	**Annex C 2**
Performances Characteristic values under shear loads in non-cracked concrete	

Table C3: Displacement under tension load[1)]

Anchor size threaded rod			**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M 24**
Non-cracked concrete C20/25								
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,03	0,04	0,05	0,07	0,08	0,10
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,07	0,08	0,08	0,08	0,08	0,10
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,02	0,03	0,03	0,04	0,04	0,05
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,15	0,17	0,17	0,17	0,17	0,17

1) Calculation of the displacement

$\delta_{N0} = \delta_{N0}\text{-factor} \cdot T;$

$\delta_{N\infty} = \delta_{N\infty}\text{-factor} \cdot T;$

Table C4: Displacement under shear load[1)]

Anchor size threaded rod			**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M 24**
For non-cracked concrete C20/25								
All temperature ranges	δ_{V0}-factor	[mm/(kN)]	0,02	0,02	0,01	0,01	0,01	0,01
	$\delta_{V\infty}$-factor	[mm/(kN)]	0,03	0,02	0,02	0,01	0,01	0,01

1) Calculation of the displacement

$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V;$

$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V;$

Henkel Injection system CF850, CF850 E, CF850 T for concrete	**Annex C 3**
Performances Displacement	

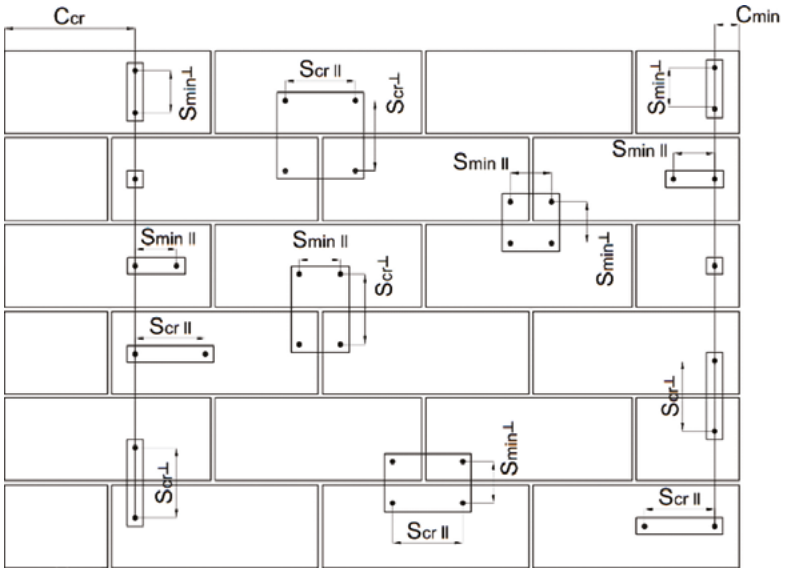
2. Installation in masonry acc. to ETA 13/0677

Table C1: ß-factors for job-site testing under tension loading

Brick-Nr.	Installation & Use category	Anchor size	ß-factor	
			T_a: 24°C / 40°C	T_b: 50°C / 80°C
1-3	d/d	M 8	0,82	0,70
		M 10		
		M 12	0,70	0,60
		M 16		
	w/w	M 8	0,82	0,70
		M 10	0,63	0,54
		M 12	0,48	0,41
		M 16		
4-18	d/d w/d w/w	For all anchor	0,72	0,50

Henkel Injection system CF850, CF850 E, CF850 T for masonry	**Annex C 1**
Performances ß-factors for job site testing under tension load	

Spacing and edge distances



c_{cr} = Characteristic edge distance
$s_{cr\,II}$ = Characteristic spacing parallel to the bed joint
$s_{cr}{}^{\perp}$ = Characteristic spacing perpendicular to the bed joint
c_{min} = Minimum edge distance
$s_{min\,II}$ = Minimum spacing parallel to the bed joint
$s_{min}{}^{\perp}$ = Minimum spacing perpendicular to the bed joint

Henkel Injection system CF850, CF850 E, CF850 T for masonry	**Annex C 3**
Performances Edge distance and anchor spacing	

Table C2: Characteristic tension, shear resistance and bending moment of threaded rod

Anchor size threaded rod			**M 8**	**M 10**	**M 12**	**M 16**
Characteristic tension resistance						
steel, property class 4.6	$N_{Rk,s}$	[kN]	15	23	34	63
	γ_{Ms} [1)]	[-]	2,0			
steel, property class 4.8	$N_{Rk,s}$	[kN]	15	23	34	63
	γ_{Ms} [1)]	[-]	1,5			
steel, property class 5.6	$N_{Rk,s}$	[kN]	18	29	42	79
	γ_{Ms} [1)]	[-]	2,0			
steel, property class 5.8	$N_{Rk,s}$	[kN]	18	29	42	79
	γ_{Ms} [1)]	[-]	1,5			
steel, property class 8.8	$N_{Rk,s}$	[kN]	29	46	67	126
	γ_{Ms} [1)]	[-]	1,5			
Stainless steel A4 / HCR, property class 70	$N_{Rk,s}$	[kN]	26	41	59	110
	γ_{Ms} [1)]	[-]	1,87			
Stainless steel A4 / HCR, property class 80	$N_{Rk,s}$	[kN]	29	46	67	126
	γ_{Ms} [1)]	[-]	1,6			
Characteristic shear resistance						
steel, property class 4.6	$V_{Rk,s}$	[kN]	7	12	17	31
	γ_{Ms} [1)]	[-]	1,67			
steel, property class 4.8	$V_{Rk,s}$	[kN]	7	12	17	31
	γ_{Ms} [1)]	[-]	1,25			
steel, property class 5.6	$V_{Rk,s}$	[kN]	9	15	21	39
	γ_{Ms} [1)]	[-]	1,67			
steel, property class 5.8	$V_{Rk,s}$	[kN]	9	15	21	39
	γ_{Ms} [1)]	[-]	1,25			
steel, property class 8.8	$V_{Rk,s}$	[kN]	15	23	34	63
	γ_{Ms} [1)]	[-]	1,25			
Stainless steel A4 / HCR, property class 70	$V_{Rk,s}$	[kN]	13	20	30	55
	γ_{Ms} [1)]	[-]	1,56			
Stainless steel A4 / HCR, property class 80	$V_{Rk,s}$	[kN]	15	23	34	63
	γ_{Ms} [1)]	[-]	1,33			
Characteristic bending moment						
steel, property class 4.6	$M_{Rk,s}$	[Nm]	15	30	52	133
	γ_{Ms} [1)]	[-]	1,67			
steel, property class 4.8	$M_{Rk,s}$	[Nm]	15	30	52	133
	γ_{Ms} [1)]	[-]	1,25			
steel, property class 5.6	$M_{Rk,s}$	[Nm]	19	37	65	166
	γ_{Ms} [1)]	[-]	1,67			
steel, property class 5.8	$M_{Rk,s}$	[Nm]	19	37	65	166
	γ_{Ms} [1)]	[-]	1,25			
steel, property class 8.8	$M_{Rk,s}$	[Nm]	30	60	105	266
	γ_{Ms} [1)]	[-]	1,25			
Stainless steel A4 / HCR, property class 70	$M_{Rk,s}$	[Nm]	26	52	92	232
	γ_{Ms} [1)]	[-]	1,56			
Stainless steel A4 / HCR, property class 80	$M_{Rk,s}$	[Nm]	30	60	105	266
	γ_{Ms} [1)]	[-]	1,33			

[1)] In absence of national regulations

Henkel Injection system CF850, CF850 E, CF850 T for masonry	**Annex C 2**
Performances Characteristic tension, shear resistance and bending moment of threaded rod	

There is a tremendous variety of masonry bricks on the market. The different types of bricks (e.g. clay, sand-lime, or concrete bricks) are composed of different materials and are available in various shapes, sizes, bulk densities, and strength classes. They can be either solid or with cavities. As such, this base material is heterogeneous. Performance data often exists only for the shear connector for certain brick styles. In ETA 13/0677 there are Annexes C 4 -C 35 with description and characteristic values for specific masonry products. In another cases job-side test are required if manufacturer, type and characteristic parameters are unknown.