CF850 & CF920 Strength of chemical anchoring

Technical handbook

long-lasting

strong

secure

Contents

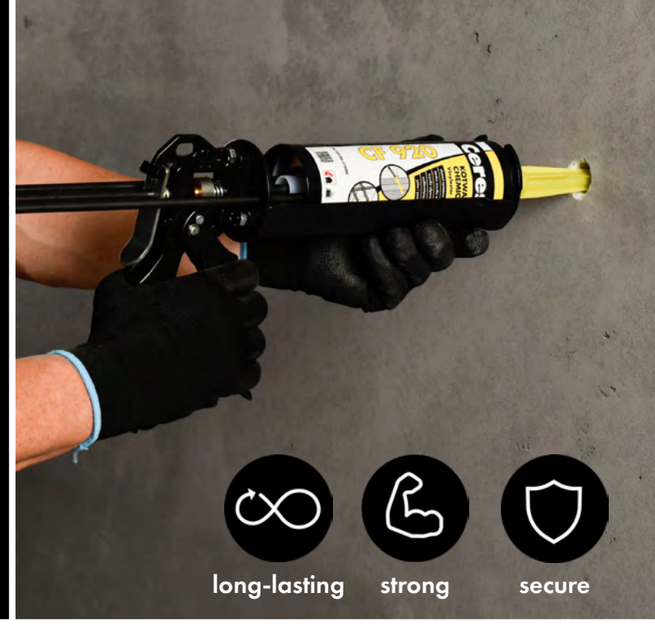
All information, instructions and advice found within this technical handbook are based on the knowledge and experience of Henkel and its technical information and data sheets on the date of the creation of this handbook.

We maintain the right to alter technical information specifications etc. without notification.

All of the technical data and values are based on tests performed in controlled environments. The user takes full responsibility for the application of the included data for the on-site usage of the product. Henkel can provide general guidance and advice related to chemical anchoring, however, the final responsibility for selecting the right product for a particular application resides with the user.

All products must be used and applied strictly in accordance with all current technical information and application instructions published by Henkel as well as technical standards and other principles.

Chemical Anchoring Applications



Ceresit chemical anchors are two-component, quick-setting adhesives based on reactive resins.

They are designed to anchor steel studs, bolts and anchorages into different base materials like **concrete** (cracked, non-cracked one, light concrete, porous concrete), **solid masonry and hollow brick or even natural stone**.

The key importance of Ceresit chemical anchors is that they **form very strong bonds**, stronger then the base materials itself. As a system is based on chemical adhesion, **no load stress is imparted to the base material** as in case of expansion type anchor.

Therefore they are ideal solution for **high load applications**, for **close to edge fixing**, reduced center and group anchoring and use in concrete of unknown quality or low compressive strength.

Ceresit chemical anchor products stand out on the market with excellent application abilities. Depending on exact product, **fast-setting** allows you to speed up work, while **application in unfavorable conditions** like low to high temperatures (even -10°C or +40°C) and **demanding areas** (flooded holes) make it a truly universal and reliable fixing solution.

KEY BENEFITS OF CERESIT CHEMICAL ANCHORING RANGE:

- **High strength:** since resin anchors are supposed to take the high load and safely distribute it to the base, Ceresit chemical anchors have minimum compressive strength of 88 MPa
- **Tough, shrink-free bonding:** once filling the gap between the anchor rod and the substrate, Ceresit chemical anchors produce a strong, tight & waterproof bonding, preventing water and aggressive substances from penetration and destruction of the rod and substrate
- **Vibration and corrosion resistance:** Ceresit chemical anchors provide a long life solution; they are chemically resistant in highly aggressive environments and thus protect anchor rod from corrosion too, they can also stand out vibrations due to wind or machine operations
- Can be placed in **wet and damp** conditions, even for **underwater anchors**
- For anchoring in **variety of base materials/ substrates** (incl those of low load-bearing capacity and cohesiveness)
- **Free of expansion forces**
- **Perfect for problematic fixings** like close axial or edge/ corner distance
- **Universal in application areas and climatic conditions** (indoors/ outdoors & downward, horizontal and upwards installation)
- **Easy** to install

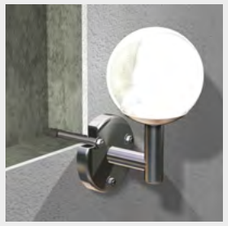
Chemical anchor is a **long-lasting, strong and secure way** to fix loads of various weights and problematic anchoring situations.

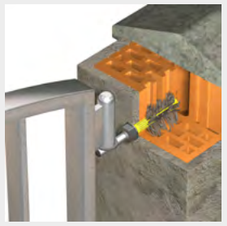
Applications Overview

LIGHT DUTY APPLICATIONS

Light duty applications include many fixings for residential use (i.e. bathroom fixings, window shutters, satellite dishes, air conditioners and outside lights among many others). Additional applicatins can include inside fixings such as televisions, overhead lighting fixtures and hanging cabinets. We recommend especially Ceresit CF850 as best solution for these types of light and medium load applications.

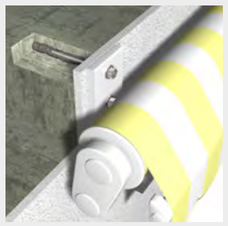






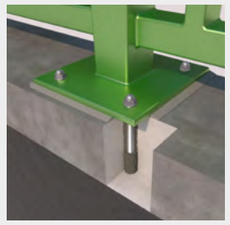
VIBRATION / EXTERNAL FORCE HEAVIER DUTY APPLICATIONS

Chemical anchor is ideal in settings where external effects influence must be considered. Vibrations due to wind or machine operation can be overcome through the use of chemical anchor, which will securely retain the fixing element. We recommend Ceresit CF920 for these types of applications or optionally Ceresit CF850 depending on fixing exact requirements.



HEAVY DUTY FIXING

Heavy duty fixings can include varied weight loads where life and dead loads must be considered. This includes applications such as I beams, balconies and railings. We recommend Ceresit CF920 for these types of applications.

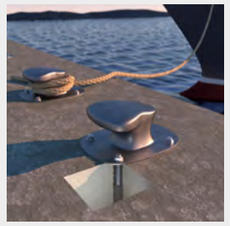



PROBLEMATIC FIXING

In certain situations, chemical anchor is the only solution for fixing a load. Problematic applications include wet and underwater anchors where corrosion and aggressive environmental effects must be considered. Environments containing aggressive chemicals or which are regularly exposed to salt water are also ideal application areas for chemical anchor. It creates a total form closure that protects the anchor rod from corrosion. Cracked concrete is another problematic application. Ceresit CF920 is an ideal solution for anchor fixings in cracked concrete. Another problematic situation involves fixing a load with close axial or edge distance. Chemical anchor will hold heavy loads that must be fixed close to the edge without creating any internal pressure. For these types of applications the relevant choice is Ceresit CF920.

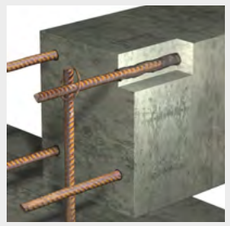






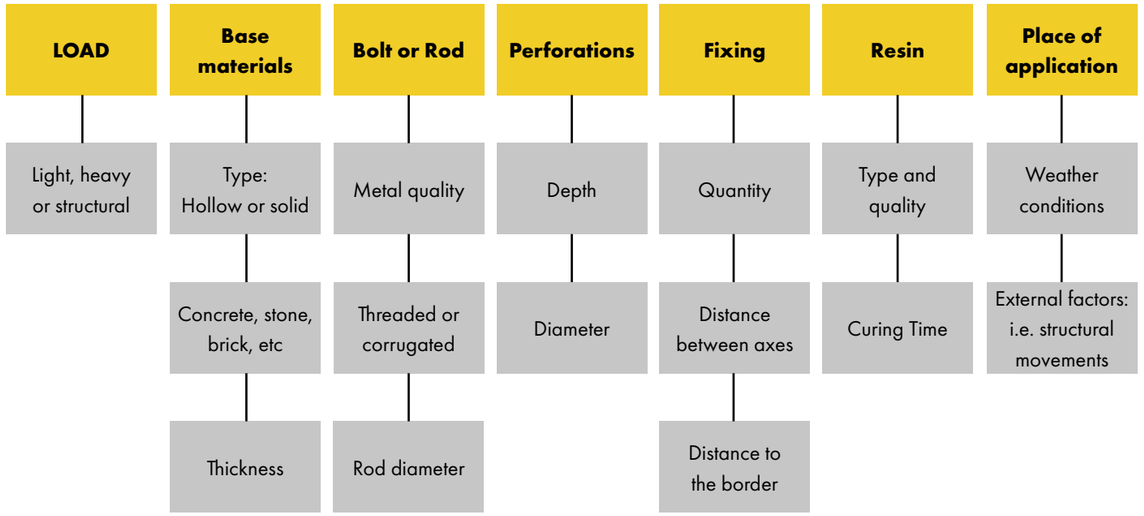
POST–INSTALLED REBAR

Post – installed rebar is an application that can only be completed using chemical anchor. For this application only Ceresit CF920 is suitable.



More information about Ceresit CF850 and CF920 you can find on pages 22-35 and 36-57.

Before choosing chemical anchor it is important to analyze the following factors:

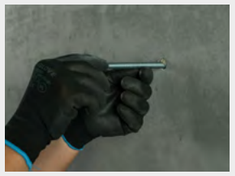


Theory Section

About Building Materials

BASE MATERIALS

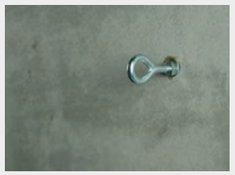
There are many kinds of base materials. It is important to know their individual properties in order to determine the permitted load and to select suitable anchors. Only in this way is it possible to ensure that anchors are safe and of a high quality. Concrete, light building materials and masonry (including full stone and hollow brick) are the most commonly used building materials.

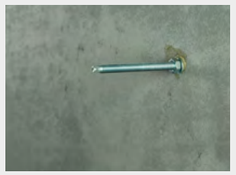


CONCRETE

Concrete consisting of a mixture of cement, aggregates, water and possibly other additives, is a synthetic stone. It is produced after the cement paste hardens and cures. Although it has a relatively high compressive strength, it has only a low tensile strength. Because of this, steel reinforcing bars are cast in concrete to take up tensile forces. This is then referred to as reinforced concrete.

The composition and the processing of the material determine the concrete's properties. A crucial attribute for concrete is compressive strength. Normal concrete without accelerating additives obtains its full minimum compressive strength after 28 days and is ideal for anchoring. After this time has elapsed, the testing procedure defined in EN206-1 is performed to determine the strength class of the concrete. This is generally between



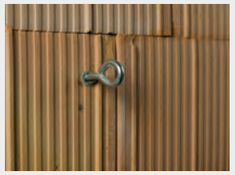


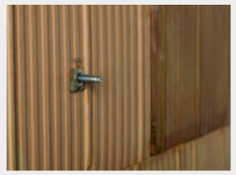
C12/12 (<B15) and C50/60 (<B55). For special purposes, higher quality concrete is available, but C20/25 is the most commonly used concrete class.

C20/25 stands for the following:
C = Concrete
20 = Compressive strength f_{ck} of the concrete test cylinders (diameter 150 mm, height 300 mm) in N/mm²
25 = Compressive strength $f_{ck,cube}$ of the concrete test cubes (edge length 150 mm) in N/mm²

MASONRY

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.





TYPES OF MASONRY

Clay brick	Calcium silicate	Hollow blocks	Lightweight concrete	Masonry units (normal-weight concrete)	Aerated concrete masonry units
Clay Water	Sand-lime Water	Cement Lightweight aggregate Water		Cement Aggregates Water	Cement Lime Sand Water
Solid brick (Mz) Vertical coring brick (Hlz)	Solid stone (KSV) Perforated brick (KSL)	Distinction according to number of chambers	Solid stone (v) Solid block (Vb)	Solid stones (vn) Hollow blocks (Hbn)	Masonry units w/ specific properties (PP) Blocks (PB)

FIGURE: SHOWS TYPES OF MASONRY AND PRIMARY MATERIALS INCLUDED IN EACH TYPE:

Clay Brick

Hollow Clay Brick

Hollow Concrete

Hollow Sand-Lime Stone

Solid Sand-Lime Stone

CRITERIA AND DIFFERENTIATION OF MASONRY

Due to the relatively low strength of masonry, the loads taken up locally cannot be particularly high. Holes drilled for anchors may run into mortar joints or cavities. Care must be taken to ensure that a layer of insulation or plaster is not used as the base material; the specified anchorage depth (depth of embedment) must be in the actual base material.

- Before anchoring in masonry, you should obtain accurate information regarding which brick (designation, dimensions, allowance, boring, and material and compressive strength) and mortar (mortar technology) are present.
- To ensure that anchors in unfamiliar or old masonry are safe, on-site load tests can be performed after consultation with the planner or structural engineer.
- The extra load on the masonry must be considered for anchors near edges (e.g. roof truss). Consult the anchor approval specifications for more information.
- Holes may also be present in solid brick (e.g. clay brick or lime-sand brick). There are often large grip holes in the middle of the brick.
- When drilling into perforated or hollow bricks do not use the hammer function.
- Non-load bearing surfaces such as plaster may not be considered as a load-bearing base material.
- Avoid anchoring in masonry joints as the joints are not homogeneous. The approval documents from the approval body regulate anchoring in joints (butt or horizontal joint).

OTHER BASE MATERIALS

Aerated concrete is manufactured using fine-grained sand as the aggregate, lime and/or cement as the binding agent, and water and aluminum as the gas-forming agent.

Lightweight concrete is concrete with a low density (less than 1800 kg/m3) and a porosity that reduces the strength of the concrete and, consequentially, the loading capacity of an anchor.

Drywall (plasterboard/gypsum) panels are mostly building components without a supporting function to which less important, secondary fastenings are made. This includes wall and ceiling panels.

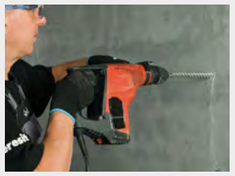
A large variety of other materials (e.g. natural stone) may be encountered in practice. The previously mentioned materials may also be combined to produce special building components. Due to the manufacturing method and configuration, these components produce base materials with peculiarities that must be given careful attention (e.g. hollow ceiling floor components). Although fastenings can be made to these types of materials, this brochure will not explore those specific detailed situations.

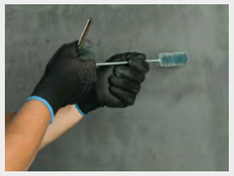
Theory Section

Types of Drilling Methods

DRILLING HOLES

There are many ways of drilling holes. Rotary drilling does not use the hammer function and is especially suited for perforated bricks or base materials with low rigidity. Hammer drilling makes use of the hammer function of professional hammer drills and is suited for hard base materials such as concrete. Diamond core drilling is a vibration-free method of drilling that requires special equipment with diamond drill bits. It is mostly used with wet drilling, but dry drilling is also possible.





MORE INFORMATION

- The approvals of almost all 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 misdrills (such as if iron is struck or if the hole was in the wrong location) is regulated in the approvals. The distance from a misdrill must usually be two times the drilling depth of the misdrill. A misdrill 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.
- Unless the stipulations of the respective approval state otherwise, 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.

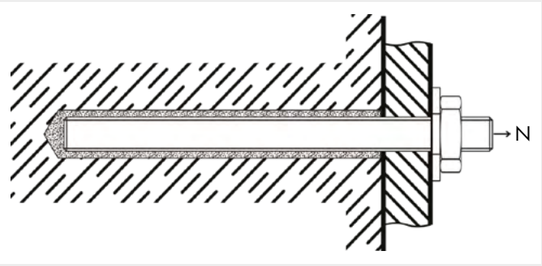
Theory Section

How Anchors Hold in Base Materials

FORM CLOSURE

A form closure is produced between the anchor rod and the hammer-drilled rough hole wall by a cured resin adhesive.

N = tensile load.



INSTALLATION TYPES

There are several types of installations. With through-hole mounting, the attachment part (bore pattern) is used to create the drill hole and pushes the anchor into the base material itself. The diameter of the hole must in part be greater than or equal to the drill-hole diameter. Pre-insertion mounting creates the drill hole and inserts the anchor into the base material before the attachment part is installed.

When using spaced mounting, the attachment part to be fastened is installed with a space to ensure the tensile and compressive strength. Both through-hole and pre-insertion mounting can be used with this technique.

- Distance = lever arm a
- Bending moment = shear force * lever arm
- Mb = V · a [Nm]

MORE INFORMATION

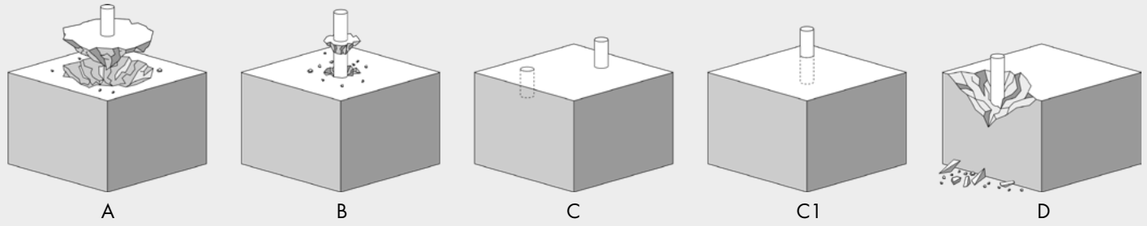
- The approvals for the respective anchor sizes accurately define the holes of the attachment part. These specifications must be taken into account.
- An additional bending moment occurs that is usually the decisive bending moment for spaced mounting with lateral load V.
- The attachment part must be laid out level and dry on the base material and can be reinforced with a compression-proof leveling layer of a maximum of 3 mm. If this is not the case, the anchoring must be measured as a spaced mounting with lever arm.
- The attachment part must fit the entire length of the through hole (the thickness of the attachment part) on the anchor/ threaded bolts. If this is not the case, the anchoring must be measured as a spaced mounting with lever arm.
- Note the maximum mounting height, also described as the usable length, in the manufacturer's specifications: tfix = attachment part thickness + non-load bearing surfaces up to load-bearing base material.
- A specified torque, which ensures the required pretensioning 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.

Theory Section

Failure Modes

EFFECTS OF STATIC LOADING

Anchor fastenings subjected to a continually increased load can cause the failure patterns depicted here:



COMBINED LOAD

Essentially, the same modes of failure take place under a combined load. As the angle between the direction of the applied load and the anchor axis increases, break-out (A) becomes less common.

SHEAR LOAD

A shell-like area of spall on one side of the anchor hole is generally caused by shear loads. The anchor parts then suffer bending tension or shear failure. However, the edge breaks away if the distance from an edge is small and the shear load is towards the free edge of a building component.

EFFICIENT UTILIZATION OF REINFORCEMENT

The tensile stress condition of rotational symmetry around the anchor axis establishes equilibrium when anchor fastenings are made in non-cracked concrete.

LOAD-BEARING MECHANISMS

Because virtually no annular tensile forces can be absorbed beyond the edge of a crack, the existence of a crack seriously distrupts the load-bearing mechanisms. The disruption caused by the crack reduces the load-bearing capacity of the anchor system.

MODES OF FAILURE

The cause of failure is determined by the weakest point in an anchor fastening. The following modes of failure occur mostly when a pure tensile load is placed on single anchors that are a sufficient distance from an edge or the next anchor:

- break-out (A)
- anchor pull-away (B)
- failure of anchor parts (C/C1)

These failure causes govern the maximum loading capacity of anchors.

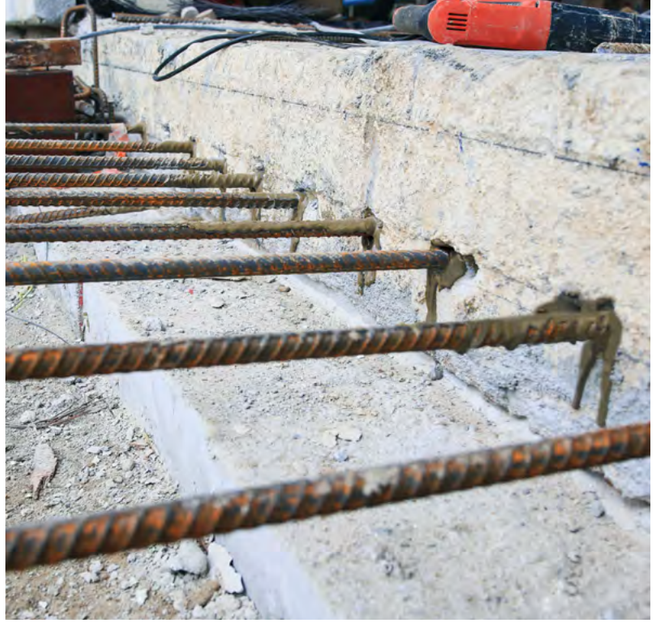
If the anchor is only a small distance from the edge, this may cause edge breaking (D). In this case, the ultimate loads are smaller than those of the previously mentioned modes of failure. In the cases of break-out, edge breaking and anchor pull-away, the tensile strength of the fastening base material is exceeded.

INFLUENCE OF CRACKS

Under working conditions, it is not possible for a reinforced concrete structure to be built that does not have cracks. However, as long as they do not exceed a certain width it is not necessary to regard the cracks as structural defects. Keeping this in mind, the designer of a structure assumes that cracks will exist in the tension zone of reinforced concrete components when carrying out the design work. In a composite construction, suitably sized ribbed steel bars absorb tensile forces from bending, whereas the concrete (compression zone) absorbs the compressive forces from bending. Only if the concrete in the tension zone is permitted to be stressed (elongated) to such an extent that it cracks under the working load can the reinforcement be utilized efficiently. The static/design system and the location at which the load is applied to the structure determine the position of the tension zone. Cracks normally run in a single direction (line or parallel cracks). Cracks can run in two directions, but only in rare instances, such as with reinforced concrete slabs stressed in two planes.

Theory Section

Reinforcement Bars



GENERAL

Reinforcement bars must be set in mortar. The bars act as a transmitter of the external forces such as tensile strength into the concrete. The transfer of the tensile strength is different based on two different applications using reinforcement bars. The allowable cases of application are demonstrated in certification.

Reinforcement bars increase the tensile strength of the concrete. Cast in reinforcement bars are positioned prior to pouring concrete into the reinforced iron cast created by the rebars. Post-installed rebars are installed into an existing concrete structure. Post-installed rebars transfer the tensile strength between the neighboring reinforcement bars. It is not possible to add a shear load on a rebar and there are three types of failures modes that can occur with this type of application. These failure modes include: (1) failure of mortar or concrete, (2) failure of anchor or mortar and (3) a combination of different failures. The concrete volume needs to be large enough to accommodate the transfer of tensile strength. The overlap connection of the reinforcement bars are governed by the Rules for Concrete Building Europe Code 2 (EC2).

The temperature limitations of the curing mortar should be observed. The measurement of the reinforcement connections and the transmis- sion of loads must be calculated by an engineer according to the EC2. The necessary interconnection lengths for anchoring and the overlap connection are determined by the EC2. There is a minimum embedment depth according to the diameter of the reinforced bar, which must be considered according to the rules. The connection joints of the concrete must be roughened before laying concrete for a new structure. This will allow for the transfer of forces between the new and exiting structures. The connection strength for the injection mortar from artificial resin can be weakened when the temperature goes up. Therefore, reinforcement connections are tested for fire behavior. The reinforcement bar systems always require certification.

Theory Section

Types of Steel Quality

GENERAL

Most anchors are available in two material types, electrogalvanized steel (sherardized or coated with Delta-Tone) and rust-resistant steel (mostly A4 or A5). Other types of anchors do exist, however, they are not normally covered in the approval (e.g. hot-dip galvanized or copper-plated).

For outdoor use or where there is moisture, anchors must be made from rust-resistant stainless steel. Electrogalvanized anchors are only permitted in dry interior rooms. For particularly aggressive ambient conditions (e.g. chlorine gases in the ceiling areas of swimming pools, tunnels, contact with sea water, etc.), anchors made of highly corrosion-resistant steel are available (also known as HCR steel).

If two or more components of different metallic materials are joined together so that they are electrically conductive, an electrochemical potential forms (i.e. low current flows). This causes contact corrosion and the lower grade material corrodes at the point of contact.

Fixing elements / Attached parts	Brass	Rust-resistant steel	Structural steel	Aluminum alloy	Hot-dip galvanized	Electro-galvanized
Brass	●	●	●	●	●	●
Copper	●	●	●	●	●	●
Tin	●	●	●	●	●	●
CrNi(Mo) steel	●	●	●	●	●	●
Chrome steel	●	●	●	●	●	●
Cast steel	●	●	●	●	●	●
Structural steel	●	●	●	●	●	●
Cadmium coating	●	●	●	●	●	●
Aluminum alloy	●	●	●	●	●	●
Hot-dip galvanized parts	●	●	●	●	●	●
Zinc	●	●	●	●	●	●

● Minor or no corrosion of fixing element ● Medium corrosion of fixing element ● Severe corrosion of fixing element

Theory Section

Anchor types

GENERAL

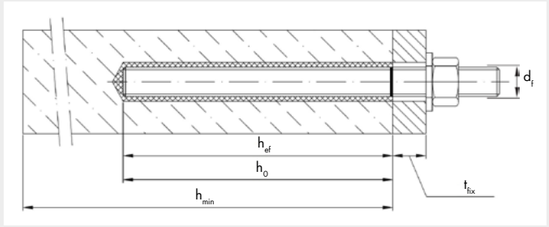
For anchor fixings to be safe, measurements using engineering principles are mandatory. Testable calculations and design drawings must be provided. Various measurement concepts can be used for measuring fixings.

METAL ELEMENTS

Steel element which is bonded with injection mortar consists of commercial threaded rod, a hexagon nut and a washer.
The steel elements are made of galvanized steel or stainless steel.

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

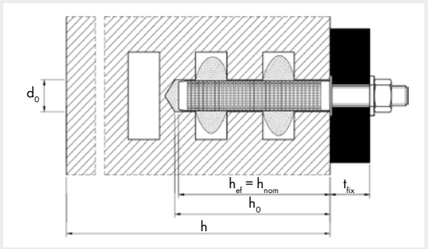
The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between metal part, injection mortar and concrete.

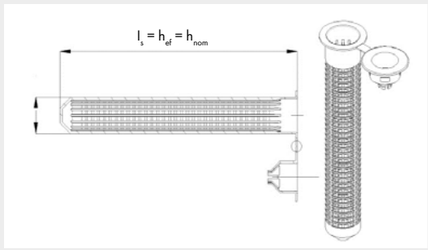


SLEEVES

Material, diamensions and mechanical properties are specified in relevant tables in ETA documents. For installation in hollow materials there are also special sleeves which are compatible with threaded rod sizes.

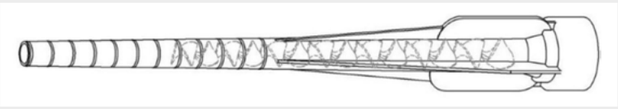
d_0 = nominal drill hole diameter
t_{fix} = thickness of fixture
h_0 = depth of drill hole at shoulder
h_{ef} = effective anchorage depth
h_{nom} = overall embedment depth





CHEMICAL ANCHORING INJECTION MORTAR

Chemical anchoring consists of fixing high-load carriers into construction materials, by injecting a 2-component injection mortar into a drilled hole and screwing in the mechanical element. Chemical anchor can be used in a range of applications and project sizes. Mixing of 2 component materials is done while extruding material via static mixer.



Product Overview

Chemical Systems and Product Performance Measurements

CHEMICAL ANCHOR SYSTEMS

Chemical anchoring consists of fixing high-load carriers into construction materials, by injecting a 2-component injection mortar into a drilled hole and screwing in the mechanical element. Chemical anchor can be used in a range of applications and project sizes.
Ceresit chemical anchors are based on polyester technology (CF850) or vinylester technology (CF920), suitable for use in different base materials and fast curing.

RELATIVE PERFORMANCE MEASUREMENTS - OVERVIEW

Product name:	Ceresit CF850	Ceresit CF920
Non- cracked concrete	YES	YES
Solid stone	YES	YES
Hollow brick	YES	YES
Wet and water- filled holes	YES	YES
Underwater anchors	NO	YES
Cracked concrete	NO	YES
For post- installed rebar connection	NO	YES
Weight of load possible	++	+++
Chemical resistance	+	+++
Shrinkage behavior	< 0,3%	< 0,3%
Styrene content	NO	NO
Curing time	fast	fast
ETA Certification	YES	YES

POLYESTER TECHNOLOGY

The 2-component injection mortars based on polyester technology meet the expectations for all general applications. Ceresit CF850 mortar based on polyester resin is developed for the structural chemical bonding to fixate mechanical elements into solid and hollow materials.
For static and quasi static loads. Suitable for wet and water- filled drill holes.

CERESIT CF850 SPECIAL PROPERTIES

- Excellent solution for general applications in standard conditions
- Fast curing
- Free of expansion forces
- High bending and compressive strength
- Easy application
- Styrene free

RANGE OF USE

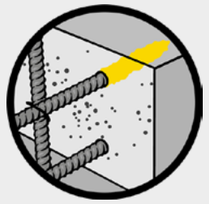
Ceresit CF850 can be applied in solid and hollow materials, non- cracked concrete and places where expandable dowels cannot be used.

VINYLESTER TECHNOLOGY

The 2-component injection mortars based on vinylester resins unify the good thermal and mechanical properties of the epoxy resins with the easy and fast processability of the unsaturated polyester resins. Reaction resin mortars based on vinylester technology distinguish themselves by their very high chemical resistance. They are suitable for wet and water- filled drill holes and underwater anchors.

CERESIT CF920 SPECIAL PROPERTIES

- Suitable for wet and underwater anchors
- Certified as fire resistant for rebar connections
- Very good thermal and mechanical properties
- High chemical resistance
- Styrene free
- Universal solution for wider applications and heavier loads, also where vibration may occure
- For heavy duty fixings



RANGE OF USE

Ceresit CF920 can be used in solid and hollow materials, cracked and non-cracked concrete and places where expandable dowels cannot be used. For wet and underwater holes. Also for rebar connections.

Product Overview

Injection mortars

Product name:	Ceresit CF850	Ceresit CF920
Base:	**2 comp resin mortar**	**2 comp resin mortar**
Technology:	**Polyester**	**Vinylester**
Styrene content:	**NO**	**NO**
Density:	**1,79 kg/dm³**	**1,77 kg/dm³**
Strenght:		
compressive EN 196 part 1	**88 N/mm²**	**100 N/mm²**
flexural EN 196 part 1	**31 N/mm²**	**15 N/mm²**
E modulus EN 12504-4	**14 kN/mm²**	**14 kN/mm²**
UV resistance	**YES**	**YES**
pH value	**> 12**	**> 12**
Curing speed	**FAST**	**FAST**
Substrates:		
non cracked concrete	**YES**	**YES**
cracked concrete	**NO**	**YES**
solid brick	**YES**	**YES**
hollow brick	**YES**	**YES**
natural stone	**YES**	**YES**
Rebar connections	**NO**	**YES**
Metal elements:		
static loads	**YES**	**YES**
quasi static	**YES**	**YES**
sleeve compatible	**YES**	**YES**
Installation:		
dry	**YES**	**YES**
wet and water filled holes	**YES**	**YES**
underwater anchors	**NO**	**YES**
downward	**YES**	**YES**
horizontal	**YES**	**YES**
upwards (overhead)	**YES**	**YES**

Product name:	Ceresit CF850	Ceresit CF920
Drilling method:		
hammer drill	**YES**	**YES**
hollow drill	**YES**	**YES**
compressed air drill	**YES**	**YES**
Aplication tools:		
hand gun	**YES**	**YES**
electric gun	**YES**	**YES**
pneumatic gun	**YES**	**YES**
Temperature range:		
installation temp	from **-5°C** up to **+39°C**	from **-10°C** up to **+40°C**
long term in service	from **-40°C** up to **+50°C**	from **-40°C** up to **+50°C**
short term in service	from **-40°C** up to **+80°C**	from **-40°C** up to **+80°C**
Chemical resistance	**limited**	**high**
Certification:		
ETAs:		
bonded injection type anchors		
for use in concrete	**ETA – 12/0109***	**ETA – 08/0381***
injection anchors for use in masonry	**ETA – 13/0677***	in process
system for rebar connections	**NO**	**ETA – 13/0428**
working life:	min **50** years	min **50** years
Extra certifications		
French VOC	**YES***	**YES***
LEED	**YES***	**YES***
fire exposure	**NO**	**YES***
drinking water	**NO**	**YES***
KOT – reinforcing	**NO**	**YES***
Shelf Life	**12 months**	**18 months**

* update processing

Reactivity timing					
Product	**Ceresit CF850**		**Ceresit CF920**		
Temp. range of base material	**Max. working time**	**Min. curing time**	**Max. working time in dry base material**	**Min. curing time in dry base material**	**Max. curing time in wet base material**
from -10°C up to -6°C	**–**	**–**	**90 min**	**24 h**	**48 h**
from -5°C up to -1°C	**90 min**	**6 h**	**90 min**	**14 h**	**28 h**
from 0°C up to +4°C	**45 min**	**3 h**	**45 min**	**7 h**	**14 h**
from +5°C up to +9°C	**25 min**	**2 h**	**25 min**	**2 h**	**4 h**
from +10°C up to +14°C	**20 min**	**100 min**	**15 min**	**80 min**	**160 min**
from +15°C up to +19°C	**15 min**	**80 min**	**15 min**	**80 min**	**160 min**
from +20°C up to +29°C	**6 min**	**45 min**	**6 min**	**45 min**	**90 min**
from +30°C up to +34°C	**4 min**	**25 min**	**4 min**	**25 min**	**50 min**
from +35°C up to +39°C	**2 min**	**20 min**	**2 min**	**20 min**	**40 min**
at 40°C	**–**	**–**	**1,5 min**	**15 min**	**30 min**
cartridge temperature	**from +5°C up to +40°C**		**from -10°C up to -6°C cartridge must be conditioned at from +15°C up to +25°C**		

Product details CF850

CERESIT CF850
2K REACTION RESIN MORTAR, POLYESTER-BASED STYRENE-FREE

- 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

CF850 is a two-component, fast-setting adhesive 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.

APPLICATION IN CONCRETE / SOLID STONE

AREAS OF APPLICATION

- Heavy load-carrying attachments in solid stone, non -cracked concrete, porous concrete and light concrete
- Suitable for attachment points close to the edge, since chemical anchoring is free of expansion forces
- Also suitable as repair mortar or adhesive mortar for concrete components
- Attachment of anchor rods, threaded collars, reinforcement bars, profiles etc.

BENEFITS

- Can be used in various solid stones
- Cartridge can be used until the expiration date by replacing either the static mixer or resealing cartridge with the sealing cap
- Water-impermeable joint, i.e. no water can penetrate into the hole at the side of the adhesive compound
- Galvanized steel, stainless steel, highly corrosion-resistant steel

PRODUCT PROPERTIES

- Compressive strength: 88 N/mm² acc. to EN 196 Part 1
- Flexural strength: 31 N/mm² acc. to EN 196 Part 1
- E modulus: 14 kN/mm² acc. to EN 12504-4
- Raw density mean value of 1,79 kg/dm³
- Application temperature: from -5°C up to +39°C
- Thermal resistance (cured mortar): from -40°C up to +80°C
- Watertight
- UV resistant

INSTALLATION IN CONCRETE, SPECIFIED IN ETA 12/0109, THREADED ROD/M8-M24:

- Reinforced or unreinforced normal weight concrete
- Strength classes C20/25 to C50/60
- Non-cracked concrete

ANCHORAGES SUBJECT TO:

- Static and quasi-static loads

USE CONDITIONS:

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

Anchor materials specification refers to table in relevant ETA 12/0109.

DESIGN:

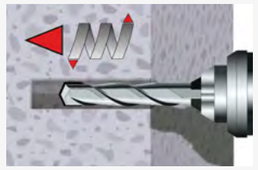
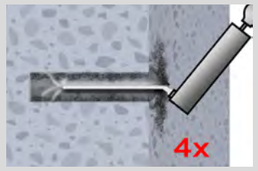
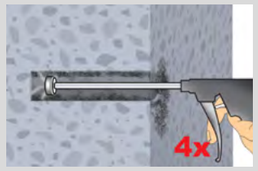
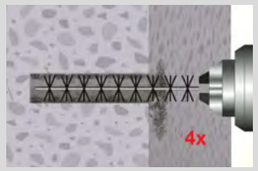
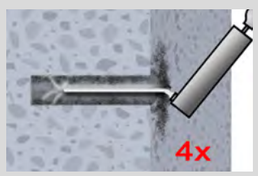
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored
- The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.)
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work
- Anchorages under static or quasi-static actions are designed in accordance with ETA 12/0109

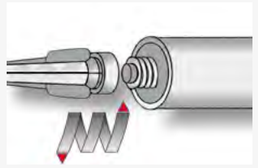
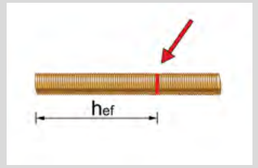
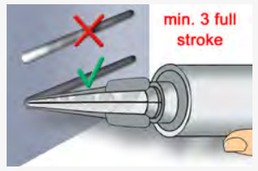
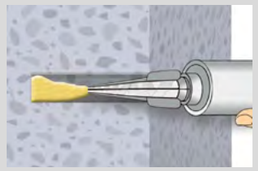
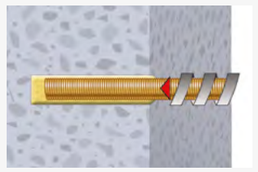
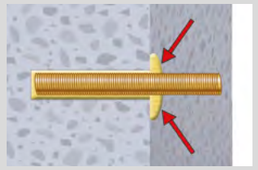
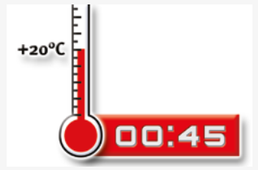
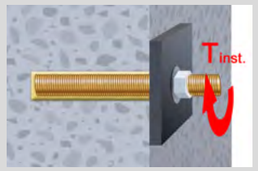
INSTALLATION:

- Dry, wet or flooded bore holes (not sea water)
- 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

Application in concrete

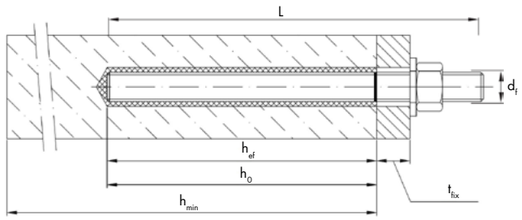
PRIOR RESIN MORTAR APPLICATION DRILLING MUST BE DONE ACCORDINGLY TO SUBSTRATE AND FIXING TYPE. FOR HEAVY LOAD-CARRYING ATTACHMENTS IN NON-CRACKED CONCRETE, LIGHT-CONCRETE, POROUS-CONCRETE AND SOLID STONE, FOLLOWING STEPS ARE RECOMMENDED:

Step by step	
	1. Drill with hammer drill a hole into the base material 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.
 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 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.
	2b. Check brush diameter (acc. tab) and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush > $d_{b,\,min}$ (acc table) a minimum of four times. If the bore hole ground is not reached with the brush, a brush extension shall be used.
 Or	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 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. For overhead and horizontal installation in bore holes bigger than 20 mm resp. deeper than 240 mm a piston plug shall be used. Observe the gel-/ working times given.
	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 minimum timing table).
	10. After full curing, the add-on part can be installed with the max. torque by using a calibrated torque wrench.

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



STEEL BRUSH

HAND PUMP (VOLUME 750 ML)

Drill bit diameter (d_o): 10 mm to 20 mm and anchorage depth up to 240 mm

Installation parameters for threaded rod							
Anchor size		**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M 24**
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

EXCELLENT FOR APPLICATION IN HOLLOW BRICK

AREAS OF APPLICATION

- Used for medium-load applications
- Suitable for attachment of façades, projecting roofs, wooden constructions, metal constructions, metal profiles, consoles, railings, grills, sanitary fittings, pipe connections, cable runs etc.
- No expansion effect, allowing attachment points to be placed close to edges etc.

BENEFITS

- Secure anchoring in hollow brick; high load bearing capacity
- Cartridge can be used until the expiration date by replacing either the static mixer or resealing cartridge with the sealing cap

PROPERTIES

- Anchoring by composite form-fitting between injection mortar, sleeve collar, anchor rod and anchoring surface
- Galvanized steel, stainless steel, highly corrosion-resistant steel

INSTALLATION IN MASONRY, SPECIFIED IN ETA 13/0677, THREADED ROD/M8-M16:

- 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
- Joints of the masonry must be visible and filled with mortar

AND:

- 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. Steel element in case of chemical anchoring in masonry can be used with a plastic sleeve, accordingly to case

ANCHORAGES SUBJECT TO:

- Static and quasi-static loads

USE CONDITIONS (ENVIRONMENTAL CONDITIONS): ANCHORS M8-M16

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

NOTE:

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

Anchor materials specification refers to table in relevant ETA 13/0677.

USE CONDITIONS IN RESPECT OF INSTALLATION AND USE:

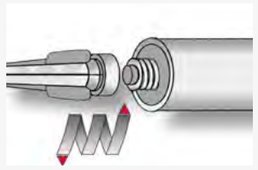
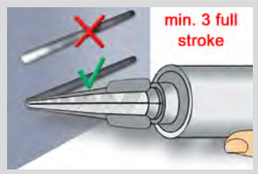
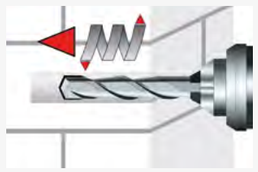
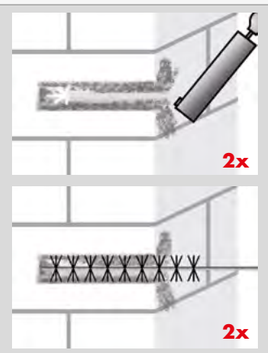
- Installation and use in dry masonry
- Installation and use in wet masonry (incl. w/d installation in wet masonry and use in dry masonry)

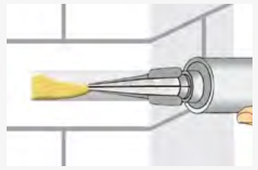
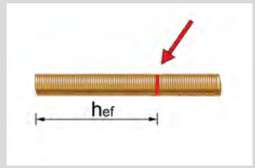
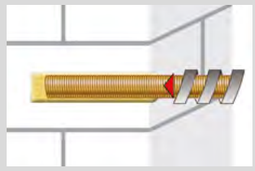
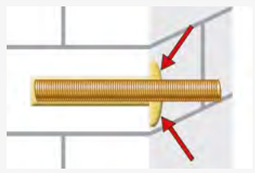
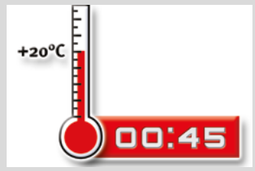
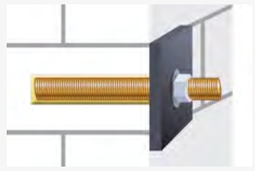
DESIGN:

- 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 ETA 13/0677 and under the responsibility of an engineer experienced in anchorages and masonry work

Application in solid and hollow masonry

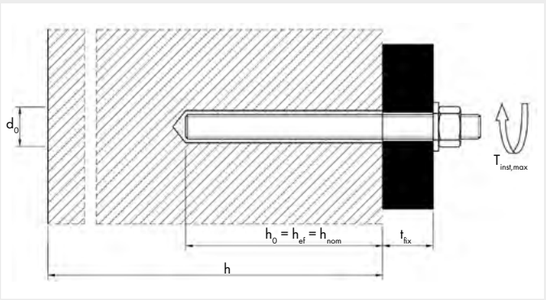
PRIOR RESIN MORTAR APPLICATION DRILLING MUST BE DONE ACCORDINGLY TO SUBSTRATE AND FIXING TYPE. FOR MEDIUM LOAD APPLICATIONS IN SOLID MASONRY AND AUTOCLAVED AERATED CONCRETE WITHOUT SLEEVE, FOLLOWING STEPS ARE RECOMMENDED:

Step by step	
	**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, 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 (>$d_{b,min,}$ according table) 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.
 	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).
	9. After full curing, the fixture can be installed with up to the max. torque by using a calibrated torque wrench.

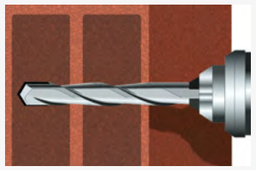
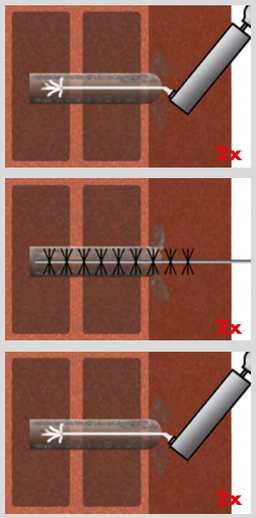
INSTALLATION IN SOLID BRICK; THREADED ROD WITHOUT SLEEVE

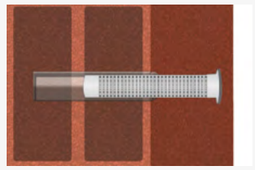
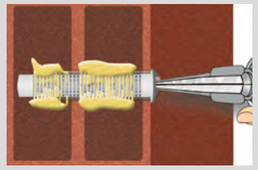
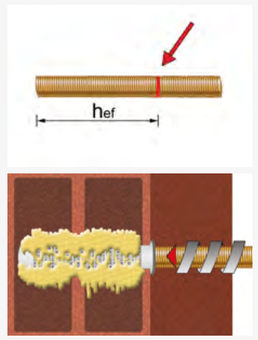
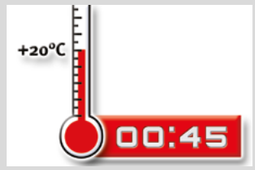
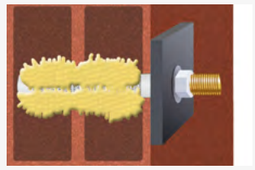
d_0 = nominal drill hole diameter
t_{fix} = thickness of fixture
$T_{inst,max}$ = max installation torque moment
h = thickness of member
h_0 = depth of drill hole at shoulder
h_{ef} = effective anchorage depth
h_{nom} = overall embedment depth



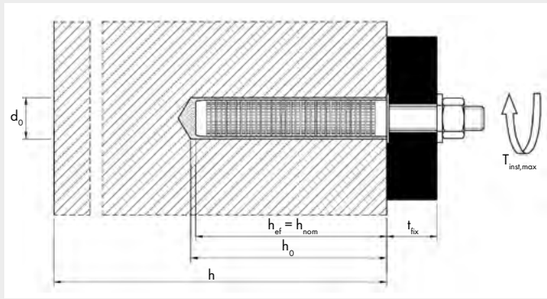
Installation parameters in Autoclaved Aerated Concrete AAC and solid masonry (without sleeve)						
Threaded rod			**M 8**	**M 10**	**M 12**	**M 16**
Nominal drill hole diameter	d_0	[mm]	**10**	**12**	**14**	**18**
Drill hole depth	h_0	[mm]	**80**	**90**	**100**	**100**
Effective anchorage depth	$h_{ef} = h_{nom}$	[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]	refer to specific brick parameters			

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:

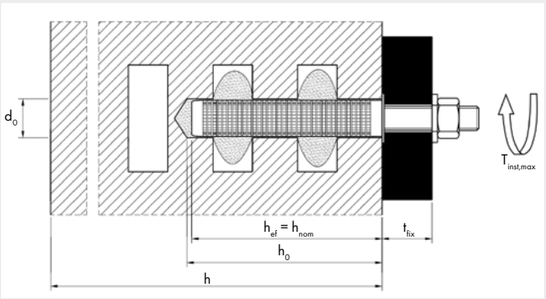
Step by step (after cartridge preparation)	
	**Installation in solid and hollow masonry (with sleeve)** 3. Holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit. Drill a hole, with drill method according to material type, into the base material, 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 (> $d_{b,min,}$ acc table) 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.
	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).
	9. After full curing, the fixture can be installed with up to the max. torque (value given for specific material type), by using a calibrated torque wrench.

INSTALLATION IN SOLID BRICK; THREADED ROD WITH SLEEVE



INSTALLATION IN HOLLOW BRICK; THREADED ROD WITH SLEEVE



Installation parameters in solid and hollow masonry (with sleeve)									
Threaded rod			**M8**	**M8 / M10**			**M12 / M16**		
Sleeve		**[mm]**	**12x80**	**16x85**	**16x130**	**16x130 / 330**	**20x85**	**20x130**	**20x200**
Nominal drill hole diameter	d_0	**[mm]**	**12**	**16**	**16**	**16**	**20**	**20**	**20**
Drill hole depth	h_0	**[mm]**	**85**	**90**	**135 +t_{fix}[1)]**	**135**	**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]**	**refer to specific brick parameters**						

1) t_{fix} < 200 mm

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 misdrills (such as if iron is struck or if the hole was in the wrong location) is regulated in the approvals.

  The distance from a misdrill must usually be two times the drilling depth of the misdrill. A misdrill 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.
- The installation of the injection anchor shall be practicable without steel failure, turn-through in the hole or failure of the anchorage.
- 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 tables 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.

Consumption: for solid concrete and masonry: 300 ml cartridge			
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**

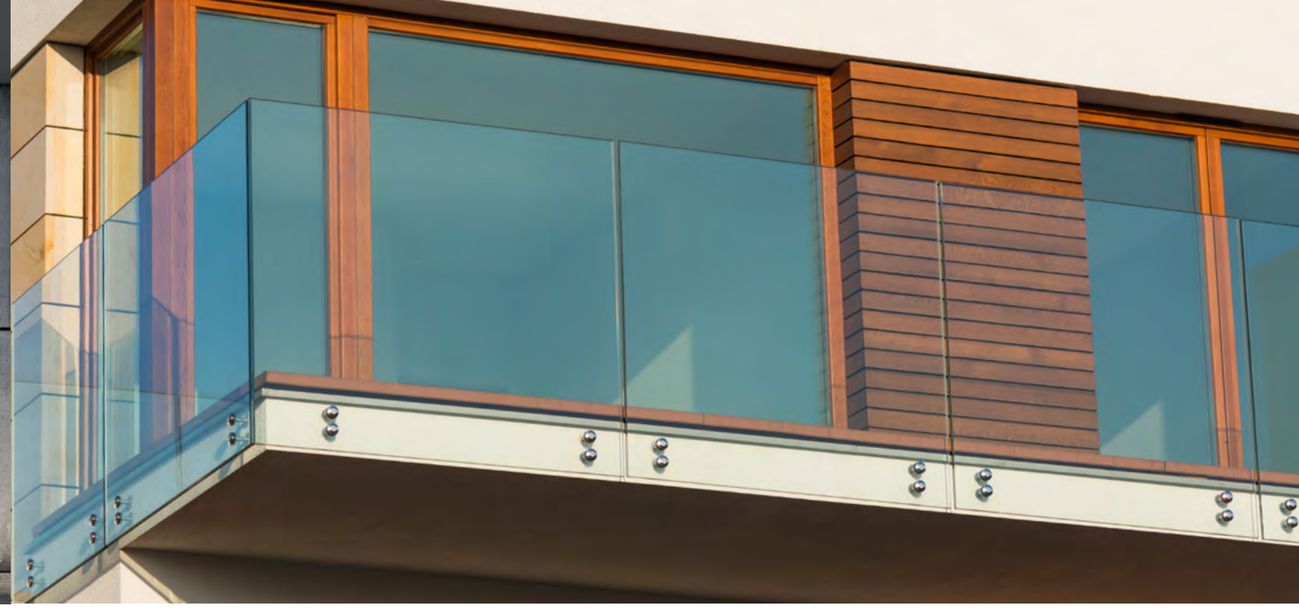
Consumption: for hollow masonry: 300 ml cartridge with sleeve usage				
Nominal anchor (Ømm)	**Nominal drill hole (Ømm)**	**Depth of drill hole (mm)**	**Sleeve size (Ø x L)**	**Efficiency from one package***
M8	**16**	**135**	**16 x130**	**< 14**
M10	**16**	**135**	**16 x130**	**< 14**
M12	**20**	**135**	**20 x130**	**< 14**

* estimated values

REFER TO SPECIFIC INFORMATION REGARDING INTENDED APPLICATIONS.

- Installation in non- cracked concrete acc. ETA 12/0109 Henkel Injection System
- Installation in masonry acc. ETA 13/0677 Henkel Injection System

Light and medium load applications



Product details CF920

CERESIT CF920
2K REACTION RESIN MORTAR, VINYLESTER-BASED, STYRENE-FREE

- fast setting
- high bending- and compressive strength
- free of expansion forces
- high chemical resistant
- for internal and external use
- downward, horizontal and upwards installation
- high temperature resistant
- styrene-free
- easy application even in flooded holes

CF920 is a two-component, fast-setting adhesive 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 also for underwater application. Extrusion of material is easy and possible with using an ordinary cartridge gun or special one depending on cartridge type.

For static and quasi-static loads, as well as where vibration may occur. 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. For heavy duty fixings** that include varied weight loads where life and dead loads must be considered. This includes applications such as I-beams, balconies and railings. Also for professional **post-installed connection.**

Suitable for building substrates such as: **non-cracked and 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.

CONCRETE / SOLID STONE

AREAS OF APPLICATION

- Heavy load-carrying attachments in solid stone, cracked and non-cracked concrete, porous concrete and light concrete
- For heavy anchoring - doweling and post-installed rebar connection
- Suitable for attachment points close to the edge, since anchoring is free of expansion forces
- Also suitable as repair mortar or adhesive mortar for concrete components
- For underwater anchors and waterfilled bore holes
- Attachment of anchor rods, threaded collars, reinforcement bars, profiles etc.

BENEFITS

- Can be used in various solid stones
- Cartridge can be used until the expiration date by replacing either the static mixer or resealing cartridge with the sealing cap
- Water-impermeable joint, i.e. no water can penetrate into the hole at the side of the adhesive compound
- Galvanized steel, stainless steel, highly corrosion-resistant steel
- Safe for use as a component in a drinking water system

PRODUCT PROPERTIES

- Compressive strength: 100 N/mm² acc. to EN 196 Part 1
- Flexural strength: 15 N/mm² acc. to EN 196 Part 1
- E modulus: 14 kN/mm² acc. to EN 12504-4
- Raw density mean value of 1,77 kg/dm³
- Application temperature: from -5°C up to +40°C
- Thermal resistance (cured mortar): from -40°C up to +120°C
- Watertight
- UV resistant
- High chemical resistance
- Fire rated

INSTALLATION IN CONCRETE, SPECIFIED IN ETA 08/0381, THREADED ROD M8-M30:

- Reinforced or unreinforced normal weight concrete
- Strength classes C20/25 to C50/60
- Non-cracked concrete: M8 to M30, rebar Ø8 to Ø32
- Cracked concrete: M12 to M30, rebar Ø12 to Ø32

ANCHORAGES SUBJECT TO:

- Static and quasi static loads: M8 to M30, Rebar Ø8 to Ø32
- Seismic action for Performance Category C1: M12 to M30, rebar Ø12 to Ø32

USE CONDITIONS (ENVIRONMENTAL):

- Structures subject to dry internal conditions, subject to external atmospheric exposure (including industrial and marine environment) and permanently dump internal condition even if other particular aggressive conditions exist

DESIGN:

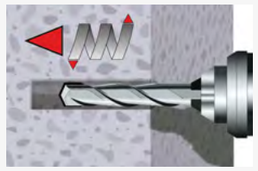
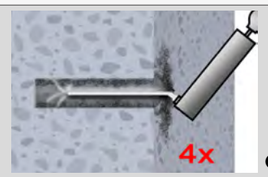
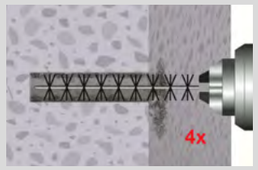
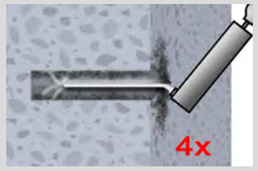
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.)
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work
- Anchorages under static or quasi-static actions are designed in accordance with ETA 08/0381

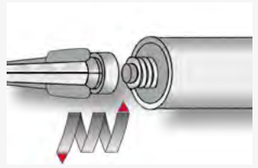
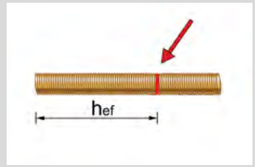
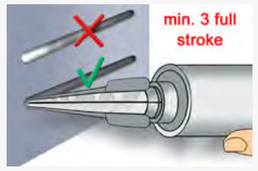
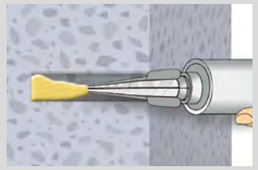
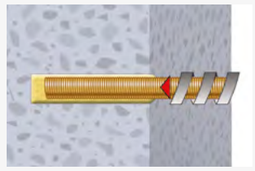
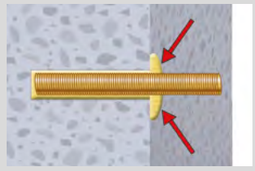
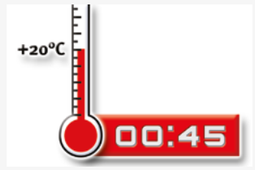
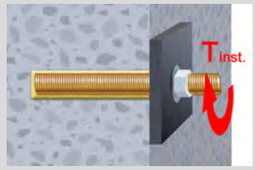
INSTALLATION:

- Dry or wet concrete: M8 to M30 rebar Ø8 to Ø32
- Flooded holes (not see water) : M8 to M16, rebar Ø8 to Ø16
- 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 responsible for technical matters on the site

Application in concrete

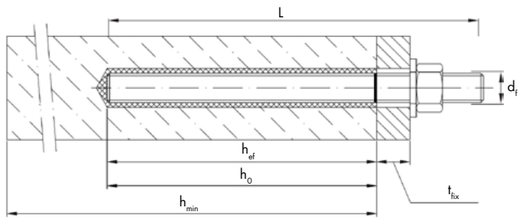
PRIOR RESIN MORTAR APPLICATION DRILLING MUST BE DONE ACCORDINGLY TO SUBSTRATE AND FIXING TYPE. FOR HEAVY LOAD-CARRYING ATTACHMENTS IN NON-CRACKED CONCRETE, CRACKED CONCRETE, LIGHT-CONCRETE, POROUS-CONCRETE AND SOLID STONE, FOLLOWING STEPS ARE RECOMMENDED:

Step by step	
	1. Drill with hammer drill a hole into the base material 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.
 Or    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 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. 2b. Check brush diameter (acc. tab) and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush > $d_{b,\,min}$ (acc table) a minimum of four times. If the bore hole ground is not reached with the brush, a brush extension shall be used. 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 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. For overhead and horizontal installation in bore holes bigger than 20 mm resp. deeper than 240 mm a piston plug shall be used. Observe the gel-/ working times given.
	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 minimum timing table).
	10. After full curing, the add-on part can be installed with the max. torque by using a calibrated torque wrench.

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



STEEL BRUSH

HAND PUMP (VOLUME 750 ML)

Drill bit diameter (d_o): 10 mm to 20 mm and anchorage depth up to 240 mm

Installation parameters for threaded rod									
Anchor size		**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M 24**	**M 27**	**M 30**
Nominal drill hole diameter	d_0 [mm] =	10	12	14	18	24	28	32	35
Effective anchorage depth	$h_{ef,min}$ [mm] =	60	60	70	80	90	96	108	120
	$h_{ef,max}$ [mm] =	160	200	240	320	400	480	540	600
Diameter of clearance hole in the fixture	d_f [mm] ≤	9	12	14	18	22	26	30	33
Torque moment	T_{inst} [Nm] ≤	10	20	40	80	120	160	180	200
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	135	150
Minimum edge distance	c_{min} [mm]	40	50	60	80	100	120	135	150
Steel brush diameter	d_b [mm]	12	14	16	20	26	30	34	37

Installation parameters for rebar									
Rebar size		**Ø 8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
Nominal drill hole diameter	d_0 [mm] =	12	14	16	18	20	24	32	35	40
Effective anchorage depth	$h_{ef,min}$ [mm] =	60	60	70	75	80	90	100	112	128
	$h_{ef,max}$ [mm] =	160	200	240	280	320	400	480	540	640
Diameter of steel brush	d_b [mm] ≥	14	16	18	20	22	26	34	37	41,5
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	70	80	100	125	140	160
Minimum edge distance	c_{min} [mm]	40	50	60	70	80	100	125	140	160

FOR INSTALLATION IN CONCRETE SPECIFIED IN ETA 13/0428: FOR POST INSTALL REBAR CONNECTION WITH MORTAR, REINFORCING BARS MADE OF STEEL WITH A DIAMETER F FROM 8 TO 32 MM OR THE TENSION ANCHOR ZA FROM SIZES M12 TO M24:

- Reinforced or unreinforced normal weight concrete
- Strength classes C12/15 to C50/C60
- Maximum chloride concrete of 0,40% (CL 0,40) related to the cement content
- Non carbonated concrete

ANCHORAGES SUBJECT TO:

- Static and quasi-static loads
- Fire exposure

USE CONDITIONS (ENVIRONMENTAL):

- structurers subject to dry internal conditions or to subject external atmospheric exposure (included industrial and marine environment) and to permanently dump internal condition even if particular aggressive conditions exist

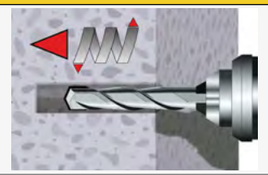
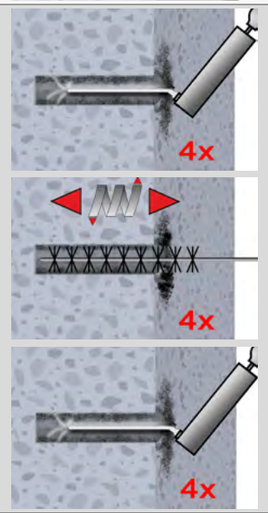
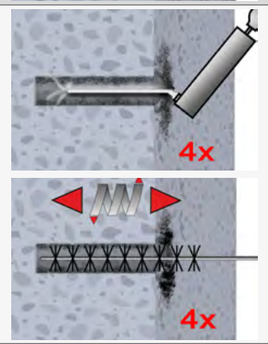
DESIGN:

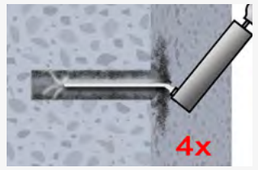
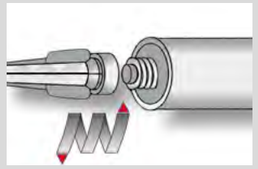
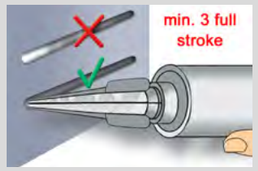
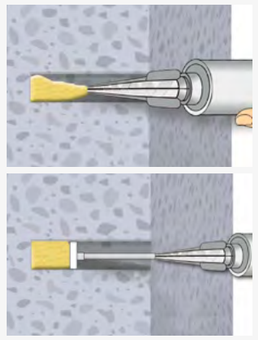
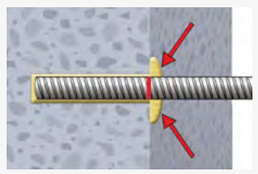
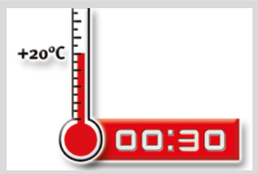
- Anchorages are design under the responsibility of an engineer experienced in anchorages and concrete work, according to relevant norms
- Verifiable calculation notes and drawings are prepared taking into account of the forces to be transmitted
- The actual position of the reinforcement in the existing structure shall be determined on the basis of the construction documentation and taken into account when designing

INSTALLATION:

- Dry or wet concrete
- It must not be installed in a flooded holes
- Hole drilling by hammer drill(HD), hollow drill (HDB) or compressed air drill mode (CD)
- The installation of pos-installed rebar resp. tension anchors shall be done only be suitable trained installer and under supervision on site: the conditions under which an installer may be considered as suitable trained and the conditions for supervision on site are up to the Member States in which the installation is done
- Check the position of the existing rebars (if the position of existing rebars is not known, it shall be determined using rebar detector suitable for this purpose as well as on the basis of the construction documentation and then marked on the building component for the overlap joint)

Post installed rebar connection (in concrete)

Step by step	
	1. Drill a hole into the base material to the size and embedment depth requried by the selected reinforcing bar with carbide hammer drill (HD) or a compressed air drill (CD). In case of aborted drill hole: the hole shall be filled with mortar.
	**Cleaning for bore hole diameter $d_0 \leq 20$mm and bore hole depth $h_0 \leq 10d_s$** 2a. Starting from the bottom or back of the bore hole, blow the hole clean and hand pump a minimum of four times. 2b. Check brush diameter (acc. table). Brush the hole with an appropriate sized wire brush > $d_{o.min}$ (acc. table) a minimum of four times in a twisting motion. If the bore hole ground is not reached with the brush, a brush extension shall be used. 2c. Finally blow the hole clean again with a hand pump a minimum of four times.
	**Cleaning for all bore hole diameter and bore hole depth** 2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) a minimum of four times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension shall be used. 2b. Check the brush diameter (Table B5). Brush the hole with an appropriate sized wire brush > $d_{b,min}$ (acc. table) a minimum of four times. If the borehole ground is not reached with the brush, a brush extension shall be used.

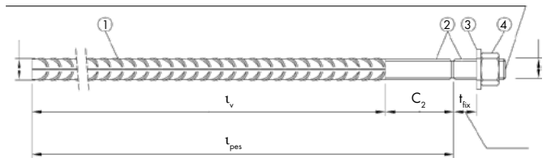
	2c. Finally blow the hole clean again with compressed air (min. 6 bar) a minimum of four times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension shall be used.
	3. Attach the supplied static-mixing nozzle to the cartridge and load the cartridge into 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 (Time table) as well as for new cartridges, a new static-mixer shall be used.
	4. Prior to inserting the reinforcing bar into the filled bore hole, the position of the embedment depth shall be marked (e.g. with tape) on the reinforcing bar and insert bar in empty hole to verify hole and depth. The reinforcing bar should be free of dirt, grease, oil or other foreign material.
	5. Prior to dispensing into the anchor hole, squeeze out separately the mortar until it shows a consistent grey colour, but a minimum of three full strokes (a minimum of six full strokes in case of foil tube cartridge), and discard non-uniformly mixed adhesive components.
	6a. 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. For embedment larger than 190 mm an extension nozzle shall be used. 6b. For overhead and horizontal installation and bore holes deeper than 240 mm a piston plug and the appropriate mixer extension must be used. Observe the gel-/ working times given in Time table.
	7. Push the reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The bar should be free of dirt, grease, oil or other foreign material.
	8.Be sure that the bar is inserted in the bore hole until the embedment mark is at the concrete surface 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 installation fix embedded part (e.g. wedges).
	9. Observe gelling time t_{gel}. Attend that the gelling time can vary according to the base material temperature (see Table B3). It is not allowed to move the bar after geling time t_{gel} has elapsed. Allow the adhesive to cure to the specified time prior to applying any load. Do not move or load the bar until it is fully cured (attend Table B3). After full curing time t_{cure} has elapsed, the add-on part can be installed.

INSTALLATION CASES FOR POST INSTALLED REBAR CONNECTIONS ARE GIVEN IN ETA-13/0428.

REINFORCING BAR (REBAR): Ø8, Ø10, Ø12, Ø14, Ø16, Ø20, Ø22, Ø24, Ø25, Ø28, Ø32

- Minimum value of related rip area $f_{R,min}$ according to EN 1992-1-1:2004+AC:2010
- Rib height of the bar shall be in the range $0{,}05\phi \le h \le 0{,}07\phi\varphi$ (ϕ: Nominal diameter of the bar; h: Rip height of the bar)

TENSION ANCHORS DIMENSION AND INSTALLATION PARAMETERS



Dimensions and installation parameter							
Size				**ZA-M12**	**ZA-M16**	**ZA-M20**	**ZA-M24**
Diameter of threaded rod			**[mm]**	**12**	**16**	**20**	**24**
Diameter of reinforcement bar			**[mm]**	**12**	**16**	**20**	**25**
Drill hole diameter			**[mm]**	**16**	**20**	**25**	**32**
Diameter of clearance hole in fixture			**[mm]**	**14**	**18**	**22**	**26**
With across nut flats		**SW**	**[mm]**	**19**	**24**	**30**	**36**
Stress area		**A_s**	**[mm²]**	**84**	**157**	**245**	**353**
Effective embedment depth		**l_v**	**[mm]**	**according to static calculation**			
Length of bonded thread	**plated**	**C_2**	**[mm]**	**≥ 20**	**≥ 20**	**≥ 20**	**≥ 20**
	A4/HCR			**≥ 100**	**≥ 100**	**≥ 100**	**≥ 100**
Minimum thickness of fixture		**t_{fix}**	**[mm]**	**5**	**5**	**5**	**5**
Maximum thickness of fixture		**t_{fix}**	**[mm]**	**3000**	**3000**	**3000**	**3000**
Maximum installation torque		**T_{max}**	**[mm]**	**50**	**100**	**150**	**150**

INSTALLATION OF BONDED FASTENERS FOR REINFORCEMENT OF PREFABRICATED CONCRETE AND REINFORCED CONCRETE SANDWICH TYPE WALLS IN "LARGE PANEL" BUILDINGS

- Specified in National Technical Assessment: ITB nr AT-15-8510/2016 +Aneks1 CERESIT CF920 bonded fasteners for the reinforcement of prefabricated concrete and reinforced concrete sandwich type walls.
- CERESIT CF920 bonded fasteners are intended for the reinforcement of prefabricated concrete and reinforced concrete sandwich walls in large-panel buildings where the load-bearing layer is at least:
  – 80 mm - it is made of non-cracked normal concrete, class not lower than C12/15 according to PN-EN 206 + A1: 2016,
  – 140 mm - it is made of non-cracked lightweight concrete, class not lower than LC12/13 according to the PN-EN 206 + A1: 2016 standard

USE CONDITIONS:

- ambient temperature: from -10°C up to +40°C
- cartridge temperature: +5°C up to +35°C – protect from overheating and freezing
- fasteners made of threaded rods M20-A4, nuts and washers are made of corrosion-resistant steel (stainless steel), grade 1.4401 according to PN-EN 10088-1: 2014, mechanical properties class A4-70 according to PN-EN ISO 3506-1: 2009
- due to the corrosive aggressiveness of the environment, fasteners made of corrosion-resistant (stainless) steel, grade 1.4401 according to the PN-EN standard 10088-1: 2014, should be used in accordance with the requirements specified in PN-H-86020: 1971 for steel OH17N14M2 grade
- the polypropylene or steel mesh sleeves have a diameter of 24 mm

DESIGN:

Ceresit CF920 bonded fasteners should be used in accordance with the technical design, developed taking into account standards and construction regulations, the provisions of this National Technical Assessment, and in accordance with the manufacturer's instructions regarding the conditions of fastening with the use of the above-mentioned bonded fasteners.

Prefabricated and reinforced concrete

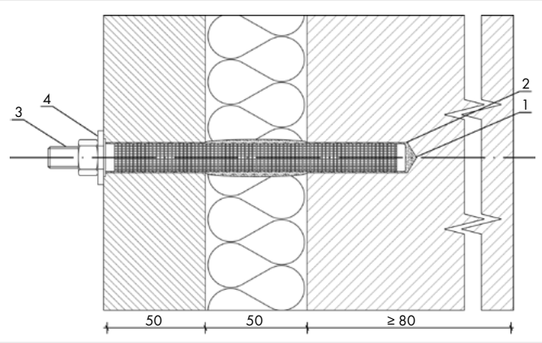
APPLICATION IN PREFABRICATED CONCRETE AND REINFORCED CONCRETE SANDWICH TYPE WALLS IN “LARGE PANEL” BUILDINGS

Step by step	
1.	Drill with hammer drill a horizontal holes with a Ø24 mm, passing through the façade layer, the insulating layer and through the load bearing layer (over a certain section of it thickness).
2.	Starting from the bottom of the bore hole blow the hole clean with a hand pump a minimum of four times.
3.	Use a 30 mm diameter steel brush. Brush the hole minimum of four times in a twisting motion. If the bore hole ground is not reached with the brush, a brush extension shall be used.
4.	Finally blow the hole clean again with a hand pump a minimum four times.
5.	Prepare the chemical anchor accordingly: • Remove the cap and attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. For every working interruption longer than the recommended working time, as well as for new cartridges, a new static-mixer shall be used. • Prior to dispensing into the anchor hole, squeeze out separately a minimum of three fullstrokes, and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour. • For holes deeper than 240 mm a piston plug and the appropriate mixer extension must be used.
6.	Insert relevant sleeve flush with the surface of panel or panel’s socket. Only use sleeves that have the right length.
7.	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.
8.	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.
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 Minimum timing table).
10.	After full curing, the fixture can be installed with up to the max. torque (value given for specific material type) by using a calibrated torque wrench.

REINFORCEMENT OF A CONCRETE SANDWICH WALL AND ELEMENTS OF A GLUED-IN REINFORCED ANCHOR WITH CERESIT CF920, ANCHORED IN A LOAD-BEARING LAYER OF NORMAL CONCRETE OF AT LEAST C12 / 15 CLASS

1 – Ceresit CF920
2 – Sleeve diameter 24 mm
3 – Stainless steel anchor M20-A4
4 – Nut and washer

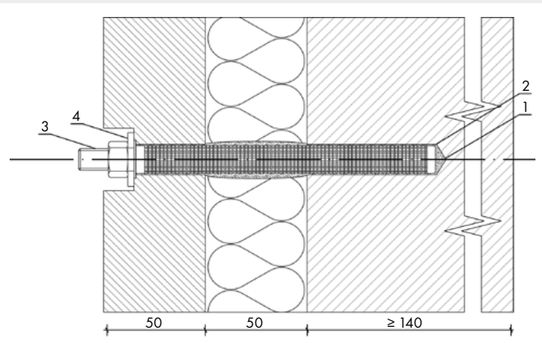
h_{min} = 65 mm



RREINFORCEMENT OF A CONCRETE SANDWICH WALL AND ELEMENTS OF A GLUED-IN ANCHOR WITH CERESIT CF920 ANCHORED IN THE LOAD-BEARING LAYER OF LIGHTWEIGHT CONCRETE OF AT LEAST LC12 / 13 CLASS

1 – Ceresit CF920
2 – Sleeve diameter 24 mm
3 – Stainless steel anchor M24-A4
4 – Washer and nut

h_{min} = 85 mm



Installation parameters of CERESIT CF 920 bonded anchors

Anchor designation	Hole diameter (mm) - d_{cut}	Minimum depth of anchoring (mm) - h_{min}	Minimum depth of bore hole (mm) - h_1	Maximal torque (Nm) - T_{inst}
Drill hole d Applies to sandwich walls with a load-bearing layer (ordinary concrete, class C12 / 15) with a thickness of at least 80 mm				
M20-A4	**24**	**65**	**70**	**120**
Applies to sandwich walls with a load-bearing layer (LC 12/ 13 lightweight concrete) with a minimum thickness of 140 mm				
M20-A4	**24**	**85**	**90**	**80**

APPLICATION IN SOLID AND HOLLOW MASONRY

AREAS OF APPLICATION

- Used for medium-load applications
- Suitable for attachment of façades, projecting roofs, wooden constructions, metal constructions, metal profiles, consoles, railings, grills, sanitary fittings, pipe connections, cable runs etc.
- No expansion effect, allowing attachment points to be placed close to edges etc.

BENEFITS

- Secure anchoring in hollow brick; high load bearing capacity
- Cartridge can be used until the expiration date by replacing either the static mixer or resealing cartridge with the sealing cap

PROPERTIES

- Anchoring by composite form-fitting between injection mortar, sleeve collar, anchor rod and anchoring surface
- Galvanized steel, stainless steel, highly corrosion-resistant

INSTALLATION IN MASONRY:

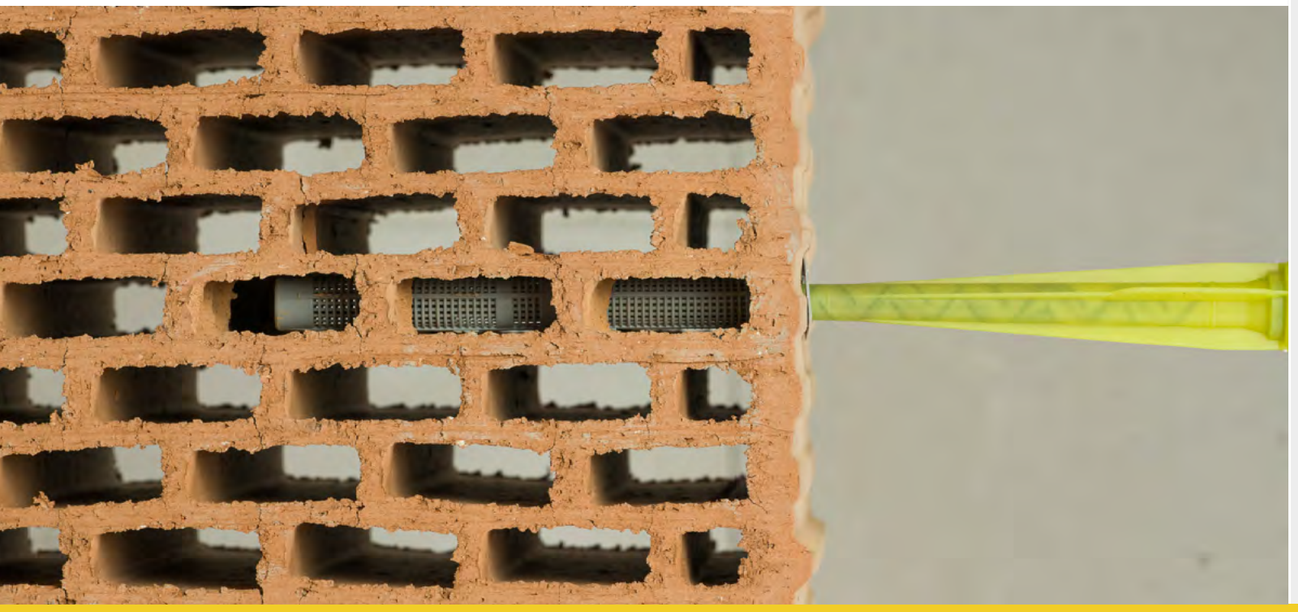
- Autoclaved Aerated Concrete
- Solid brick masonry
- Hollow brick masonry
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2010
- Joints of the masonry must be visible and filled with mortar

AND:

- Characteristic resistance of the anchor must be determined by job site tests according to EOTA Technical Report TR 053 under consideration of the β-factor to Annex C1, Table C1. Steel element in case of chemical anchoring in masonry can be used with a plastic sleeve, accordingly to case.

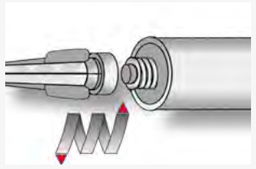
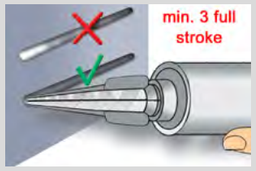
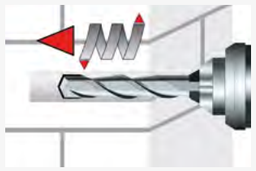
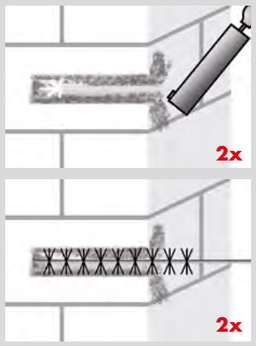
USE CONDITIONS IN RESPECT OF INSTALLATION AND USE:

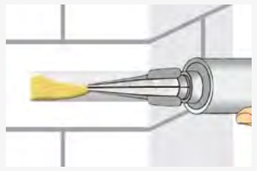
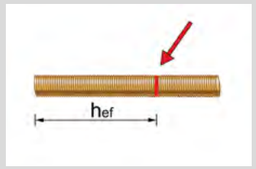
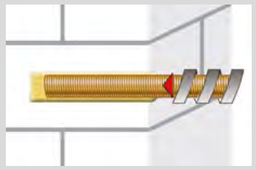
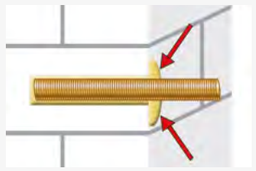
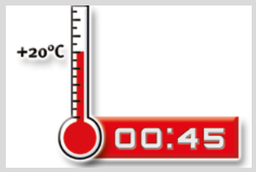
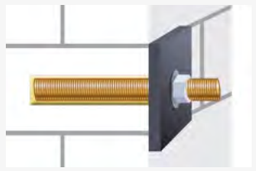
- Installation and use in dry and wet masonry
- Anchors M8-M16 made of material suitable for specific structure exposure



Application in solid and hollow masonry

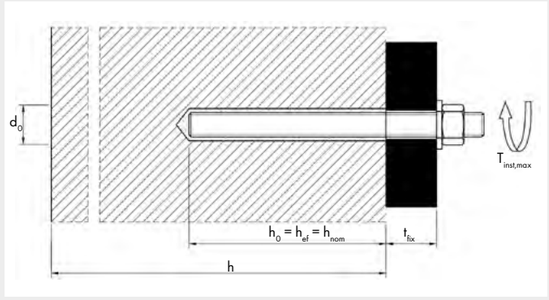
PRIOR RESIN MORTAR APPLICATION DRILLING MUST BE DONE ACCORDINGLY TO SUBSTRATE AND FIXING TYPE. FOR MEDIUM LOAD APPLICATIONS IN SOLID MASONRY: E.G. CALCIUM SOLID SILICA BRICKS, CONCRETE SOLID BRICKS, CLAY SOLID BRICKS, ETC., FOLLOWING STEPS ARE RECOMMENDED:

Step by step	
	**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, 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 (>$d_{b,min,}$ according table) 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.
 	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).
	9. After full curing, the fixture can be installed with up to the max. torque by using a calibrated torque wrench.

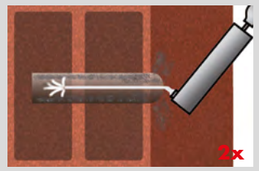
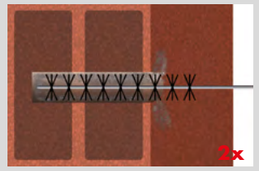
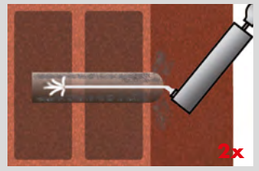
INSTALLATION IN SOLID BRICK; THREADED ROD WITHOUT SLEEVE

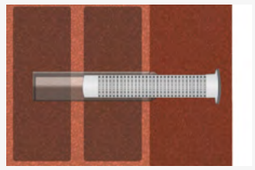
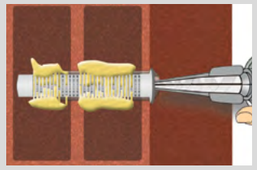
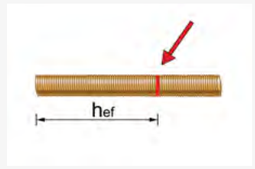
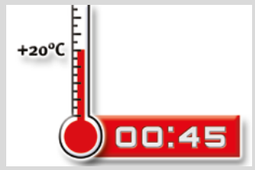
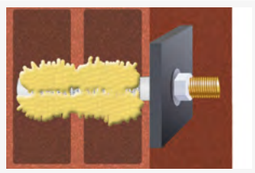
d_0 = nominal drill hole diameter
t_{fix} = thickness of fixture
$T_{inst,max}$ = max installation torque moment
h = thickness of member
h_0 = depth of drill hole at shoulder
h_{ef} = effective anchorage depth
h_{nom} = overall embedment depth



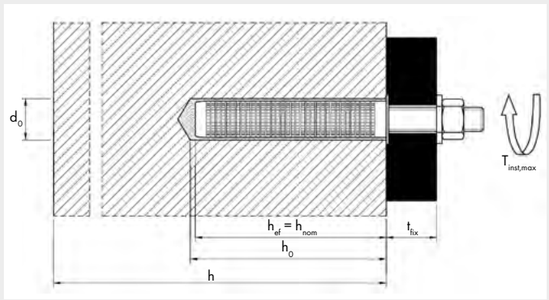
Installation parameters in Autoclaved Aerated Concrete AAC and solid masonry (without sleeve)						
Threaded rod			**M 8**	**M 10**	**M 12**	**M 16**
Nominal drill hole diameter	d_0	[mm]	10	12	14	18
Drill hole depth	h_0	[mm]	80	90	100	100
Effective anchorage depth	$h_{ef} = h_{nom}$	[mm]	80	90	100	100
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]	refer to specific brick parameters			

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:

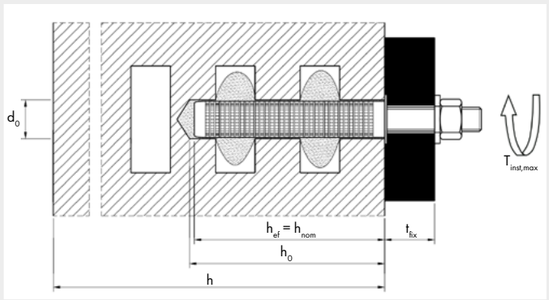
Step by step (after cartridge preparation)	
	Installation in solid and hollow masonry (with sleeve) 3. Holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit. Drill a hole, with drill method according to material type, into the base material, 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 (> $d_{b,min,}$ acc table) 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.
 	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).
	9. After full curing, the fixture can be installed with up to the max. torque (value given for specific material type), by using a calibrated torque wrench.

INSTALLATION IN SOLID BRICK; THREADED ROD WITH SLEEVE



INSTALLATION IN HOLLOW BRICK; THREADED ROD WITH SLEEVE



Installation parameters in solid and hollow masonry (with sleeve)									
Threaded rod			**M8**	**M8 / M10**			**M12 / M16**		
Sleeve		**[mm]**	**12x80**	**16x85**	**16x130**	**16x130 / 130**	**20x85**	**20x130**	**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**	**90**	**135**	**135**
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]**	**refer to specific brick parameters**						

PLEASE NOTE

- 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 misdrills (such as if iron is struck or if the hole was in the wrong location) is regulated in the approvals. The distance from a misdrill must usually be two times the drilling depth of the misdrill. A misdrill 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.
- The installation of the injection anchor shall be practicable without steel failure, turn-through in the hole or failure of the anchorage.
- 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 tables 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.

Consumption: for solid concrete and masonry: 300 ml cartridge: threaded rod			
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: 300 ml cartridge with sleeve usage				
Nominal anchor (Ømm)	**Nominal drill hole (Ømm)**	**Depth of drill hole (mm)**	**Sleeve size (ØxL)**	**Efficiency from one package***
M8	16	135	16x130	< 14
M10	16	135	16x130	< 14
M12	20	135	20x130	< 14

* estimated values

Consumption: for solid concrete and masonry: 420 ml cartridge: threaded rod			
Nominal anchor (Ømm)	**Nominal drill hole (Ømm)**	**Depth of drill hole (mm)**	**Efficiency from one package***
M10	12	90	< 46
M12	14	110	< 27
M16	18	125	< 14

Consumption: for solid concrete and masonry: 420 ml cartridge: reinforcing bar			
Nominal anchor (Ømm)	**Nominal drill hole (Ømm)**	**Depth of drill hole (mm)**	**Efficiency from one package***
Ø16	20	125	< 18
Ø20	24	175	< 10
Ø24	32	240	< 4

* estimated values

Chemical resistance			
Chemical Agent	**Concentration**	**Resistant**	**Not Resistant**
Accumulator acid		●	
Acetic acid	40		●
Acetic acid	10	●	
Acetone	10		●
Ammonia, aqueous solution	5	●	
Aniline	100		●
Beer		●	
Benzene (kp 100-140°F)	100	●	
Benzol	100		●
Boric Acid, aqueous solution		●	
Calcium carbonate, suspended in water	all	●	
Calcium chloride, suspended in water		●	
Calcium hydroxide, suspended in water		●	
Carbon tetrachloride	100	●	
Caustic soda solution	10	●	
Citric acid	all	●	
Chlorine water, swimming pool	all	●	
Diesel oil	100	●	
Ethyl alcohol, aqueous solution	50		●
Formic acid	100		●
Formaldehyde, aqueous solution	30	●	
Freon		●	
Fuel Oil		●	
Gasoline (premium grade)	100	●	
Glycol (Ethylene glycol)		●	
Hydraulic fluid	conc.	●	
Hydrochloric acid (Muriatic Acid)	conc.		●
Hydrogen peroxide	30		●
Isopropyi alcohol	100		●

Chemical resistance			
Chemical Agent	**Concentration**	**Resistant**	**Not Resistant**
Lactic acid	all	●	
Linseed oil	100	●	
Lubricating oil	100	●	
Magnesium chloride, aqueous solution	all	●	
Methanol	100		●
Motor oil (SAE 20 W-50)	100	●	
Nitric acid	10		●
Oleic acid	100	●	
Perchloroethylene	100	●	
Petroleum	100	●	
Phenol, aqueous solution	8		●
Phosphoric acid	85	●	
Potash lye (Potassium hydroxide)	10	●	
Potassium carbonate, aqueous solution	all	●	
Potassium chlorite, aqueous solution	all	●	
Potassium nitrate, aqueous solution	all	●	
Sea water, salty	all	●	
Sodium carbonate	all	●	
Sodium Chloride, aqueous solution	all	●	
Sodium phosphate, aqueous solution	all	●	
Sodium silicate	all	●	
Standard Benzine	100	●	
Sulfuric acid	10	●	
Sulfuric acid	70		●
Tartaric acid	all	●	
Tetrachloroethylene	100	●	
Toluene			●
Trichloroethylene	100		●
Turpentine	100	●	

Heavy duty applications

CR/M&A/G3/10.2022

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