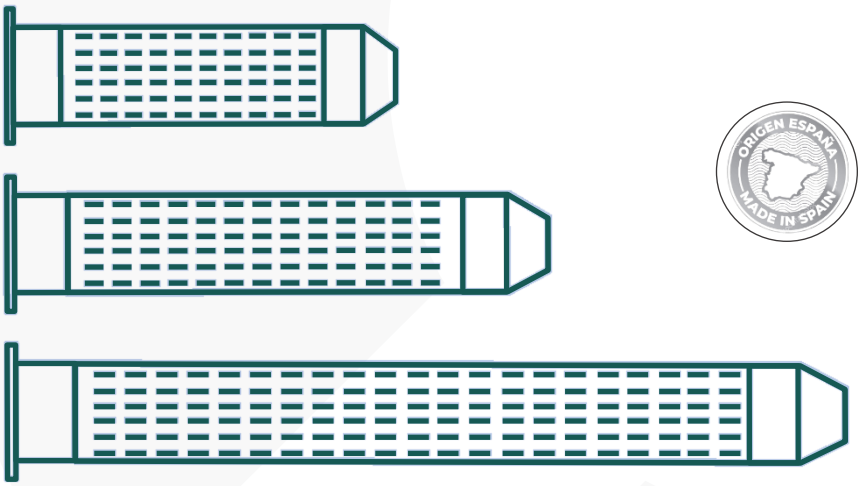
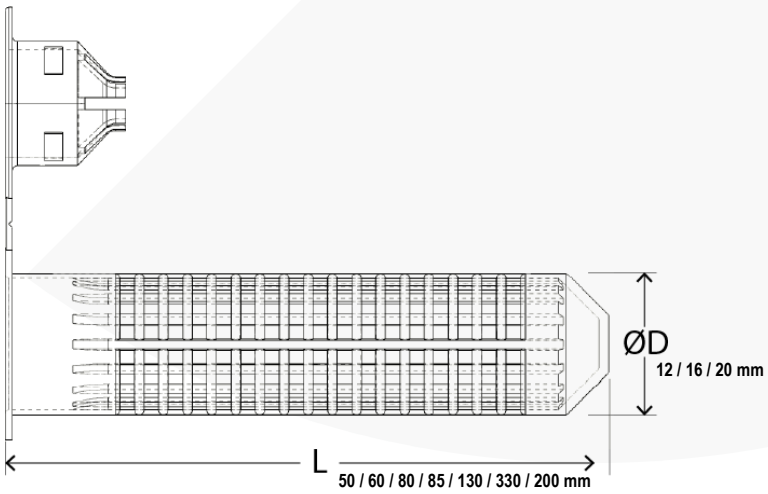
Injection anchor sleeve

1. Product description

The injection anchor sleeve is a system component used to attach threaded rods or internal threaded anchors in perforated brickwork in a professional and mortar-saving manner.

It may be used with injection mortars. The improved grid structure minimizes the need for injection mortar. After installing the threaded rod and internal threaded anchor, the mortar is forced through the grid structure and forms a form fit with the perforated brick. This directs the load into the construction material. Setting occurs in a pre-positioned installation. Non-bearing layers can be bridged using the injection anchor sleeve. The different injection mortar approvals must be followed.





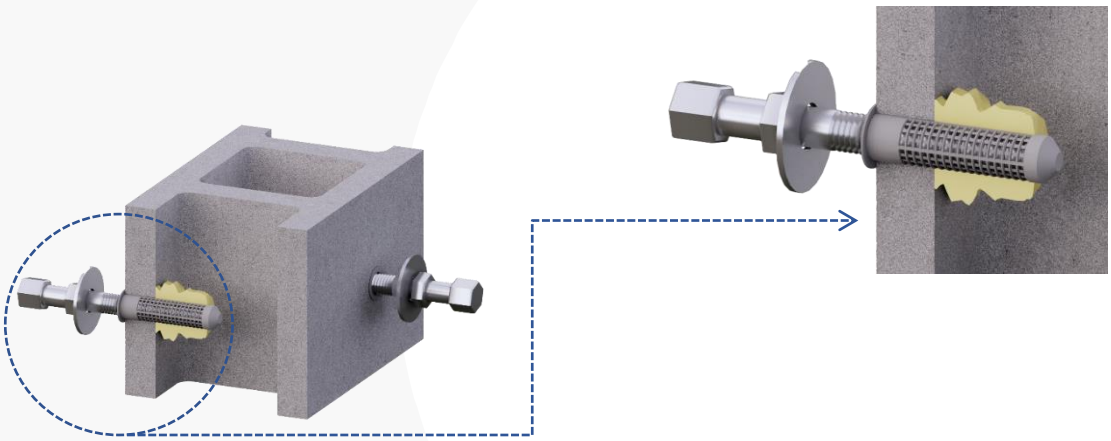
2. Your advantages

The grid structure of the anchor sleeve is designed for injection mortars and guarantees that the mortar is used efficiently.

The centering blades correctly position the anchor in the anchor sleeve and allow it to be used with threaded rods of varying sizes.

The anchor sleeve is secured in the borehole by barbed hooks, allowing for trouble-free overhead installation.

Because of the form of the anchor sleeves, non-bearing layers may be bridged for quick and convenient installation.



3. Applications and Building materials

- Anchoring using injection mortars in perforated brick masonry.

Approved for:

- Vertically perforated brick is authorized.
- Concrete hollow blocks composed of lightweight cement
- Concrete blocks with hollow interiors
- Sand and lime brick with holes
- Unbreakable sand-lime brick
- Strong brick

Also suitable for:

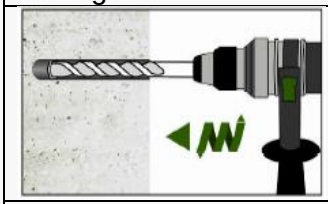
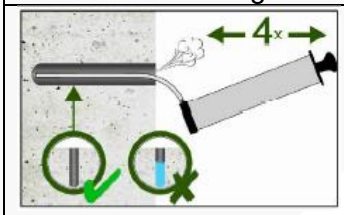
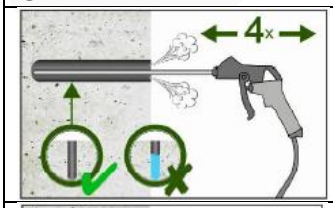
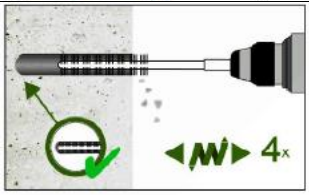
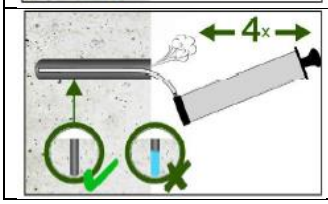
- Hollow pumice slabs are another option.
- Hollow brick and various perforated brick slabs
- Solid construction supplies include solid pumice.

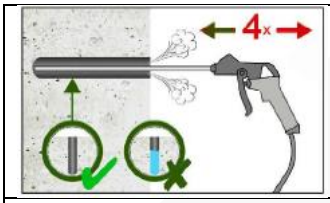
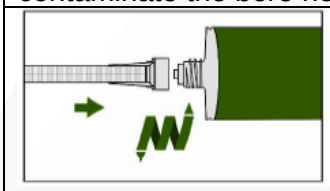
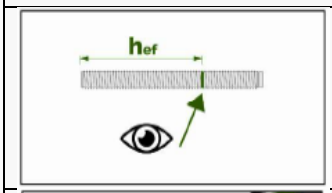
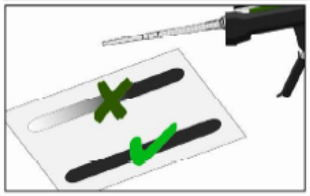
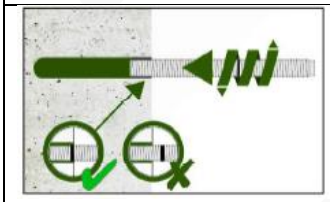
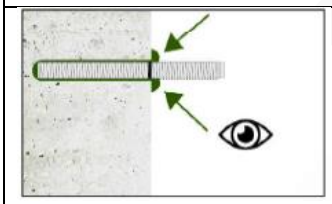
4. Assembly instructions

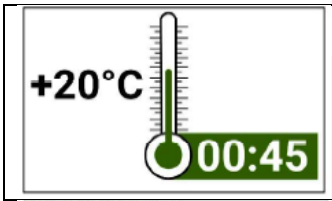
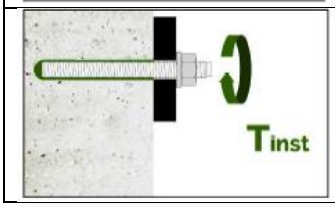
- The system is compatible with all authorized injection mortars.
- When used in conjunction with injection anchor sleeves, threaded rods, or internal threaded anchors, the system is appropriate for pre-positioned installation.
- After being inserted into the borehole, the anchor sleeve is filled with injection mortar from the bottom up.
- As the anchor rotates, the mortar is forced into the grid pattern of the anchor sleeve, precisely matching it to the base material. The interlock supports the load.

4.1 Anchorage in concrete

Installation instructions – concrete

Drilling of the bore hole	
	1. Drill with hammer drill a hole into the base material to the size and embedment depth required by the selected anchor. In the case of aborted drill hole: the drill hole shall be filled with mortar.
Attention! Standing water must be removed before cleaning.	
 Or 	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 lager then 20 mm or deeper 240 mm, compressed air (min. 6bar) must be used.
	2b. Check brush diameter and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush >$d_{b,min}$ a minimum of four times. If the bore hole ground is not reached with the brush, a brsh 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.

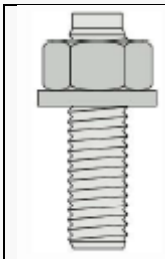
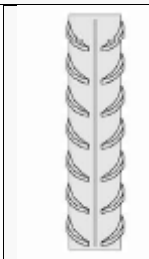
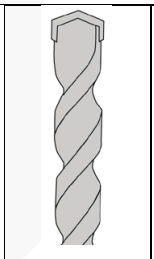
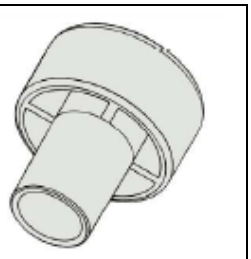
	The hand-pump can be used for anchor sizes up to bore hole diameter 20 mm. For bore holes larger than 20 mm or deeper 240 mm, compressed air (min. 6 bar) must be used.
After cleaning, the bore hole has to be protected against re-contamination in an appropriate way, until dispensing the mortar in the bore hole. If necessary, the cleaning has to be repeated 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. After 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 anchor hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey or blue color. For foil tube cartridges it must be discarded a minimum of six full strokes.
	6. Starting from the bottom resp. back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw of the static mixing nozzle as the hole is filled avoids creating air pockets. If the bore hole ground is not reached with the static-mixing nozzle, an appropriate extension must be used. Observe the gel-/ working times given.
	7. Piston plugs and mixer nozzle extensions shall be used for the following applications: • Horizontal assembly (horizontal direction) and ground erection (vertical downwards direction): Drill bit-0 d_o ≥ 18 mm and embedment depth hef > 250mm • Overhead assembly (vertical upwards direction): Drill bit-0 d_o ≥ 18 mm.
	8. 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.
	9. 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 shall be fixed (e. g. wedges).

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

Installation accessories – concrete

CAC – Rec. compressed air tool (min 6 bar)
Drill bit diameter (d_0): all diameters

MAC – Hand pump (volume 750 ml)
Drill bit diameter (d_0): 10 mm to 20 mm
Drill hole depth (h_0): < 240 mm

								
Threaded rod	Rebar	D_0 Drill bit – Ø HD	d_b Brush - Ø		$d_{b,min}$ min. Brush - Ø	Piston plug	Installation direction and use of piston plug	
[mm]	[mm]	[mm]	[-]	[mm]	[mm]	[mm]	➡	⬇ ⬆
M 8		10	RBT 10	12	10,5	No piston plug required		
M 10	8	12	RBT 12	14	12,5			
M 12	10	14	RBT 14	16	14,5			
	12	16	RBT 16	18	16,5			
M16	14	18	RBT18	20	18,5	VS 18	H_{ef} >250 mm	all
	16	20	RBT20	22	20,5	VS20		

Setting parameter– concrete

Anchor size			M8	M10	M12	M16
Outer diameter of anchor	$d = d_{nom}$	[mm]	8	10	12	16
Nominal drill hole diameter	D_0	[mm]	10	12	14	18
Effective embedment depth	$h_{ef,min}$	[mm]	60	60	70	80
	$h_{ef,max}$	[mm]	160	200	240	320
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14	18
Maximum torque moment	$T_{inst} \leq$	[mm]	10	20	40	80
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
Minimum edge distance	C_{min}	[mm]	40	50	60	80

Rebar size			Ø8	Ø 10	Ø 12	Ø14	Ø 16
Outer diameter of anchor	$d = d_{nom}$	[mm]	8	10	12	14	16
Nominal drill hole diameter	D_0	[mm]	12	14	16	18	20
Effective embedment depth	$h_{ef,min}$	[mm]	60	60	70	75	80
	$h_{ef,max}$	[mm]	160	200	240	280	320
Minimum thickness of member	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm		h_{ef} + $2d_0$		
Minimum spacing	S_{min}	[mm]	50	55	65	70	80
Minimum edge distance	C_{min}	[mm]	50	55	65	70	80

Recommended loads– concrete

Threaded rod

The recommended loads are only valid for single anchors for a roughly design, if the following conditions are valid:

- $c \geq 1{,}5 \times h_{ef}$ $s \geq 3{,}0 \times h_{ef}$ $h \geq 2 \times h_{ef}$
- $\psi_{sus} = 1{,}0$; percentage of dead load ≤ ψ^0_{sus} see table below.
- Cleaning: Compressed Air Cleaning – CAC
- The recommended loads have been calculated using the partial safety factors for resistances stated in ETA(s) and with a partial safety factor for actions of γ =1.4.
  The partial safety factor for seismic action is γ = 1,0.

If the conditions are not fulfilled, the loads must be calculated acc. to EN 1992-4. For further details observe ETA-19/0402.

• Property class 5.8 • Concrete – C20/25 • Hammer drilling (HD) • Dry, wet concrete					M8	M10	M12	M16
Recommended tension load	40° C / 24° C [1] ψ_{sus}^0 = 0,60	uncracked	$N_{rec,stat}$	[kN]	6,8	9,0	13,2	19,9
		cracked	$N_{rec,stat}$	[kN]	3,6	5,0	7,4	11,2
			$N_{rec,eq,C1}$	[kN]	2,6	3,5	5,3	7,7
			$N_{rec,eq,C2}$	[kN]	NPA		1,7	3,3
	80° C / 50° C [1] ψ_{sus}^0 = 0,60	uncracked	$N_{rec,stat}$	[kN]	5,2	6,7	9,9	15,0
		cracked	$N_{rec,stat}$	[kN]	2,8	3,9	5,8	8,7
			$N_{rec,eq,C1}$	[kN]	2,1	2,8	4,1	6,1
			$N_{rec,eq,C2}$	[kN]	NPA		1,4	2,6
Recommended shear load without lever arm [2] [3]		uncracked	$V_{rec,stat}$	[kN]	6,3	9,7	14,3	20,8
		cracked	$V_{rec,stat}$	[kN]	6,3	8,4	11,7	14,8
			$V_{rec,eq,C1}$	[kN]	4,2	5,8	8,5	12,5
			$V_{rec,eq,C2}$	[kN]	NPA		2,8	5,3
Embedment depth			h_{ef}	[mm]	80	90	110	125
Edge distance			c ≥	[mm]	120	135	165	190
Axial distance			S ≥	[mm]	240	270	330	375

1) Short term temperature/ Long term temperature.
2) Shear loads are valid for all specified temperature ranges.
3) In case of seismic action, the annular gap between the anchor rod and the through hole of the attachment must be filled with mortar, otherwise α_{gap} 0,5 acc. To ETA-19/0402 must be taken into account.
$N_{rec,stat}$ $V_{rec,stat}$ = Recommended load under static and quasi-static action
$N_{rec,eq}$ $V_{rec,eq}$ = Recommended load under seismic action

Rebar

The recommended loads are only valid for single anchors for a roughly design, if the following conditions are valid:

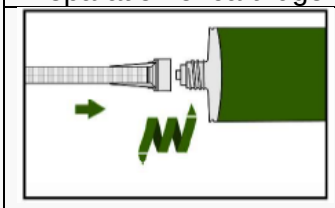
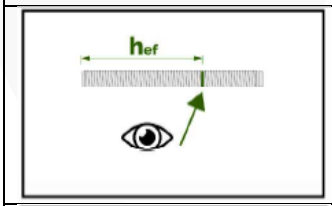
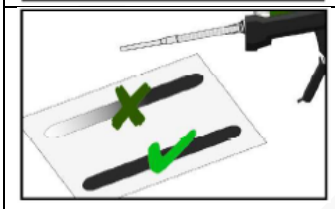
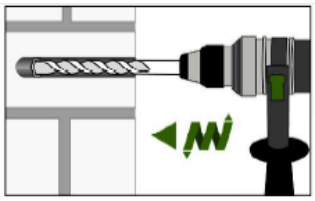
- $c \geq 1{,}5 \times h_{ef}$ $s \geq 3{,}0 \times h_{ef}$ $h \geq 2 \times h_{ef}$
- ψ_{sus} = 1,0; percentage of dead load ≤ ψ^0_{sus} see table below.
- Cleaning: Compressed Air Cleaning – CAC
- The recommended loads have been calculated using the partial safety factors for resistances stated in ETA(s) and with a partial safety factor for actions of γ =1.4.

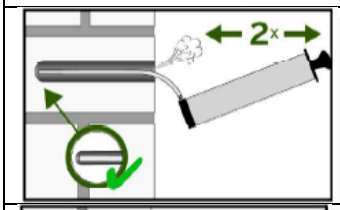
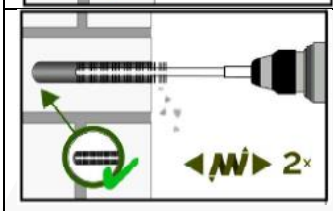
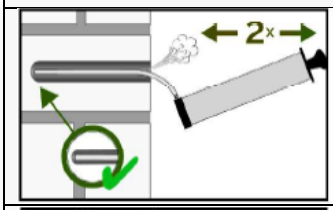
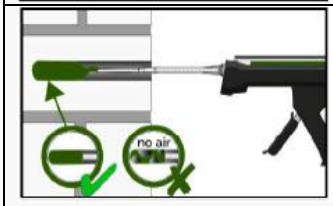
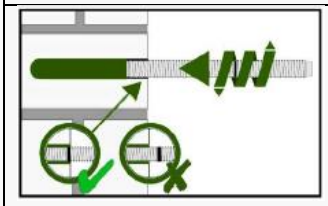
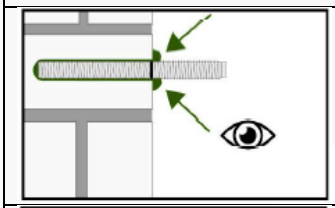
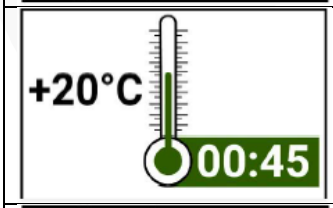
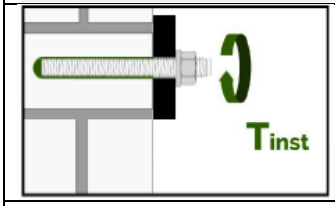
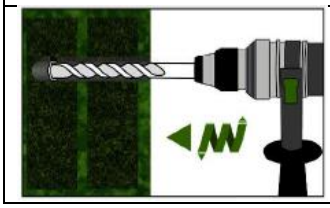
If the conditions are not fulfilled, the loads must be calculated acc. to EN 1992-4.
For further details observe ETA-19/0477.

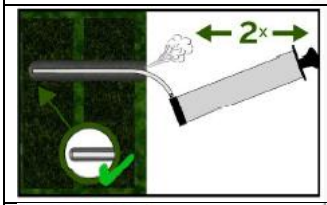
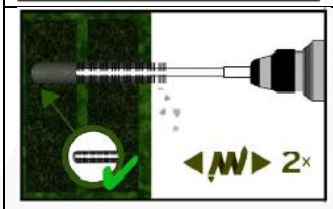
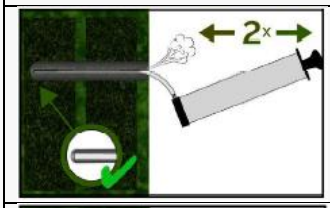
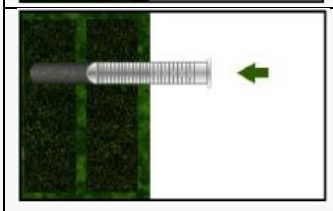
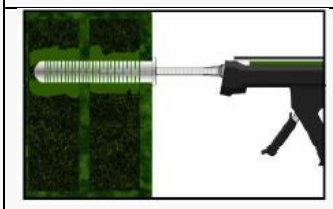
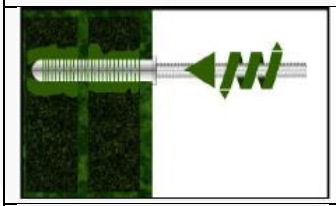
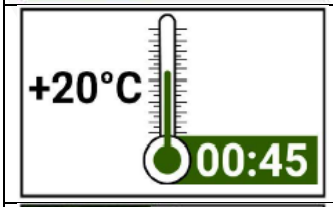
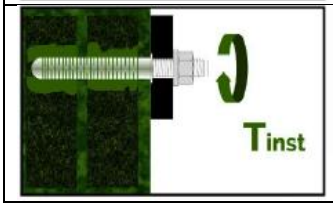
• Property class BSt 500 • Concrete – C20/25 • Hammer drilling (HD) • Dry, wet concrete					Ø8	Ø10	Ø12	Ø14	Ø16
Recommended tension load	40° C / 24° C [1] ψ_{sus}^0 = 0,60	uncracked	$N_{rec,stat}$	[kN]	5,6	7,9	11,5	14,0	16,2
	80° C / 50° C [1] ψ_{sus}^0 = 0,60		$N_{rec,stat}$	[kN]	4,4	6,2	9,1	11,0	13,7

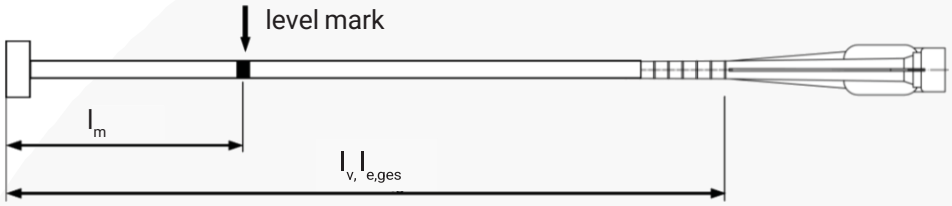
4.2 Anchorage in masonry

Installation instructions – masonry

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 a 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 inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods.
	**3.** Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey color. For foil tube cartridges it must be discarded a minimum of six full strokes.
Installation in solid masonry (without sleeve)	
	**4.** 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 drilling method, into the base material, with nominal drill hole diameter and bore hole depth according 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.

	**5a.** Starting from the bottom or back of the bore hole, blow the hole clean with handpump a minimum to two times.
	**5b.** Attach an appropriate sized wire brush > $d_{b,min}$ to a drill or a cordless screwdriver and brush the hole clean with a minimum of two times in a twisting motion. If the bore hole ground is not reached with the brush, a brush extension must be used.
	**5c.** Finally blow the hole clean again with handpump (see page 12) a minimum of two times.
	**6.** Starting from the bottom resp. back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw of the static mixing nozzle as the hole is filled avoids creating air pockets. 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.
	**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.
	**10.** After full curing, the fixture can be installed with up to the max. installation torque by using a calibrated torque wrench.
Installation in solid and hollow masonry (with sleeve)	
	**4.** 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, into the base material, with nominal drill hole diameter and bore hole depth according 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.
	**5a.** Starting from the bottom or back of the bore hole, blow the hole clean with handpump a minimum of two times.
	**5b.** Attach an appropriate sized wire brush > $d_{b,rnin}$ to a drill or a cordless screwdriver and brush the hole clean with a minimum of two times in a twisting motion. If the bore hole ground is not reached with the brush, a brush extension must be used.
	**5c.** Finally blow the hole clean again with handpump a minimum of two times.
	**6.** Insert the perforated sleeve flush with the surface of the masonry or plaster. Only use sleeves that have the right length. Never cut the sleeve. For installation through insulation the sleeve SH 16x130/330 shall be cutted at the top end according to the insulation thickness.
	**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
	**8.** 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.
	**9.** Allow the adhesive to cure to the specified curing time prior to app-lying any load or torque. Do not move or load the anchor until it is fully cured.
	10. After full curing, the fixture can be installed with up to the max. installation torque by using a calibrated torque wrench.



Injection tool must be marked by mortar level mark l_m and anchorage depth l_v resp. $l_{e,ges}$ with tape or marker. Quick estimation: $l_m = 1/3 * l_v$

Continue injection until mortar level mark l_m becomes visible.

Optimum mortar volume: $l_m = l_v$ rep. $l_{e,ges} * (1{,}2 * Ø^2/d_0^2 * 0{,}2)$ [mm]