Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-14/0353 of 19 September 2014

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Injection system FAKKT VMU plus for masonry
Product family to which the construction product belongs	Injection system for use in masonry
Manufacturer	Keller & Kalmbach GmbH Siemensstraße 19 85716 Unterschleißheim DEUTSCHLAND
Manufacturing plant	Werk 1 D Werk 2 D
This European Technical Assessment contains	17 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	Guideline for European technical approval of "Metal Injection Anchors for Use in Masonry", ETAG 029, April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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Specific Part

1 Technical description of the product

The Injection system FAKKT VMU plus for masonry is a bonded anchor (injection type) consisting of a mortar cartridge with injection mortar FAKKT VMU plus, a perforated sleeve and an anchor rod with hexagon nut and washer in the range of M8 to M12 or an internal threaded anchor in the range of M6 and M8. The steel elements are made of zinc coated steel, stainless steel or high corrosion resistant steel.

The anchor rod is placed into a drilled hole filled with injection mortar and is anchored via the bond between steel element, injection mortar and masonry and mechanical interlock.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for tension and shear loads	See Annex C 1
Characteristic resistance for bending moments	See Annex C 2
Displacements under shear and tension loads	See Annex C 2
Reduction Factor for job site tests (β-Factor)	See Annex C 2
Edge distances and spacings	See Annex C 3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	No performance determined (NPD)

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

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3.4 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

3.5 Protection against noise (BWR 5)

Not applicable.

3.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.7 Sustainable use of natural resources (BWR 7)

The sustainable use of natural resources was not investigated.

3.8 General aspects

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

According to Decision of the Commission of 17 February 1997 (97/177/EC) (OJ L 073 of 14.03.97 p. 24-25), the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Metal injection anchors for use in masonry	For fixing and/or supporting to masonry, structural elements (which contributes to the stability of the works) or heavy units	—	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 19 September 2014 by Deutsches Institut für Bautechnik

Andreas Kummerow
p.p. Head of Department

beglaubigt:
Baderschneider

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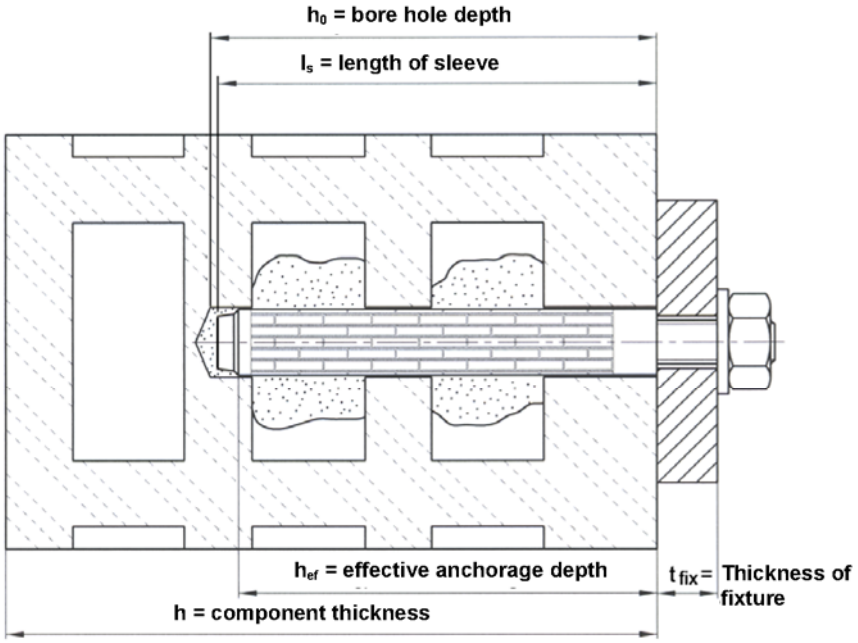
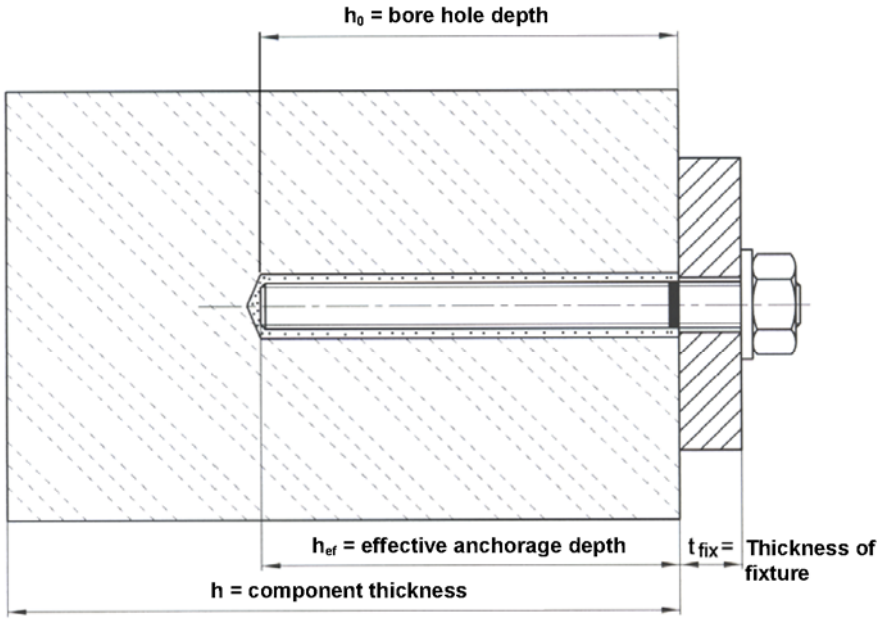
Installation in hollow brick

Threaded Stud with perforated sleeve



Installation in solid brick

Threaded Stud with or without perforated sleeve



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Injection System FAKKT VMU plus for masonry	Annex A1
Product description Installed condition	

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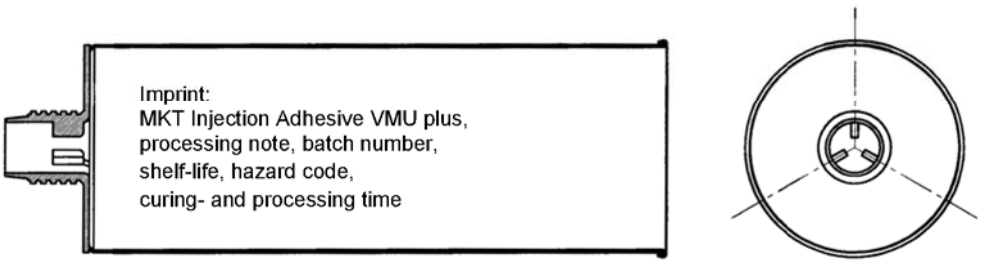
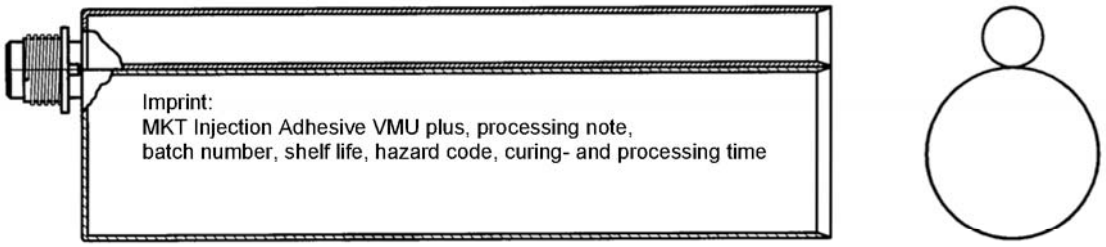
Cartridge: FAKKT VMU plus

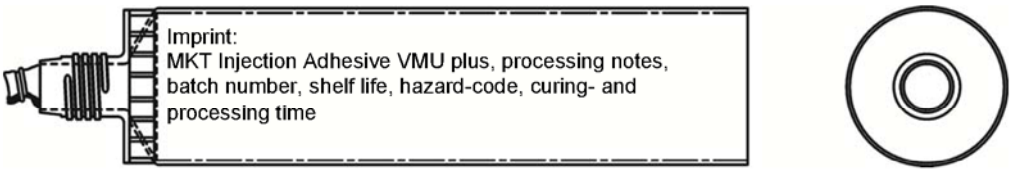
Type: coaxial (150 ml, 280 ml, 300 ml, 330 ml, 380 ml, 410 ml and 420 ml)



Type: „side-by-side“ (235 ml, 345 ml and 825 ml)

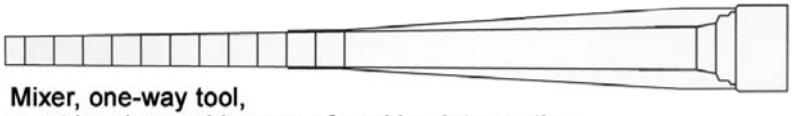


Type: „foil-tube” (165 ml and 300 ml)



Sealing cap

Static mixer



Mixer, one-way tool,
must be changed in case of working interruption

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Injection System FAKKT VMU plus for masonry	Annex A2
Product description Injection system	

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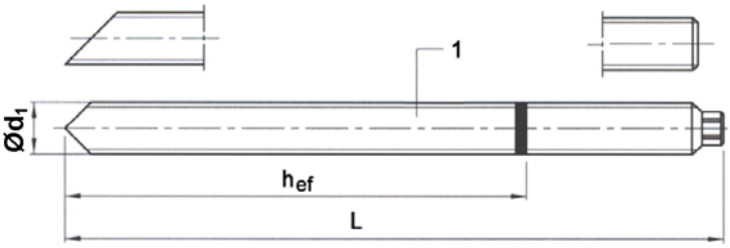
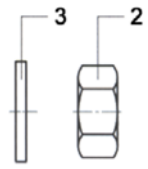
Threaded Stud VMU-A, V-A or commercial threaded stud

VMU-A

V-A





Marking: ◇ M10

◇ Identifying mark of manufacturing plant,

M10 Size of thread

for stainless steel 1.4401, 1.4404 or 1.4571 additional marking A4

for high corrosion resistant steel 1.4529 / 1.4565 additional marking HCR.

Marking of length		F	G	H	I	J	K	L	M	N
Length of anchor	≥	101,6	114,3	127,0	139,7	152,4	165,1	177,8	203,2	203,2
	<	114,3	127,0	139,7	152,4	165,1	177,8	190,5	215,9	215,9

Marking of length		O	P	Q	R	S	T	U	V	W	X	Y	Z
Length of anchor	≥	215,9	228,6	241,3	254,0	279,4	304,8	330,2	355,6	381,0	406,4	431,8	457,2
	<	228,6	241,3	254,0	279,4	304,8	330,2	355,6	381,0	406,4	431,8	457,2	483,0

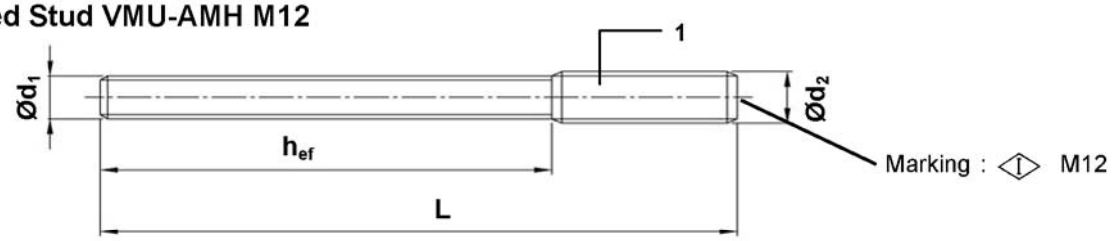
Dimensions in mm

Commercial threaded studs

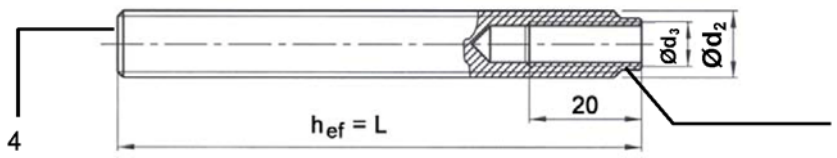
Requirements:

- Materials, dimensions and mechanical properties see Table A1 and Table A2
- Inspection certificate 3.1 acc. to EN 10204:2004
- Place marking of embedment depth
- Stud ends perpendicular

Threaded Stud VMU-AMH M12



Internal Thread Sleeve VMU-IG M6 and VMU-IG M8



Marking: ◇ M6

◇ M8

Injection System FAKKT VMU plus for masonry

Product description
Threaded studs

Annex A3

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Perforated sleeve VMU-SH 14x100 and 16x100

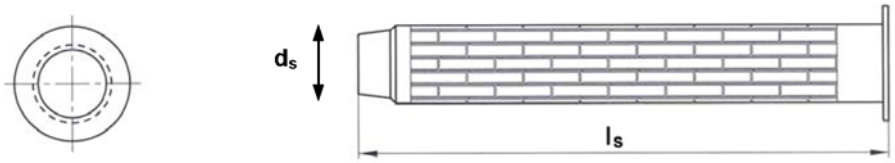

Table A1: Sizes of threaded studs and sleeves

Type	Size	Anchor Stud						Solid and hollow base material with perforated sleeve			Solid base material without perforated sleeve
		d_1 [mm]	d_2 [mm]	d_3 [mm]	h_{ef} [mm]	L_{min} [mm]	L_{max} [mm]	Size	d_s [mm]	l_s [mm]	
VMU-A, V-A	M8	M8	-	-	80	89,5	500	VMU-SH 14x100	13	100	✓
VMU-A, V-A	M10	M10	-	-	90	101,5	500	VMU-SH 16x100	15	100	✓
VMU-AMH	M12	M10	M12	-	93	107,5	500	VMU-SH 16x100	15	100	-
VMU-A, V-A	M12	M12	-	-	≥ 93	107,5	500	-	-	-	✓
VMU-IG	M6	-	M10	M6	93	93	-	-	-	-	✓
VMU-IG	M8	-	M12	M8	93	93	-	-	-	-	✓

Table A2: Materials

	Designation	Steel, electroplated acc. to EN ISO 4042:1999 ≥ 5µm	Steel, hot-dip galvanised, acc. to EN ISO 1461:2009 ≥ 40µm	Stainless steel A4	High corrosion resistant steel HCR
1	Anchor stud	Steel, Property class 5.8, 8.8 EN ISO 898-1:2013 $f_{uk} = f_{ub}$ $f_{yk} = f_{yb}$	Steel, Property class 5.8, 8.8 EN ISO 898-1:2013 $f_{uk} = f_{ub}$ $f_{yk} = f_{yb}$	1.4401, 1.4404, 1.4571, EN 10088-1:2008, Property class 70, EN ISO 3506-1:2009 $f_{uk} = R_{m,min}$ $f_{yk} = R_{p0,2,min}$	1.4529, 1.4565, EN 10088-1:2008, Property class 70, EN ISO 3506-1:2009 $f_{uk} = R_{m,min}$ $f_{yk} = R_{p0,2,min}$
2	Hexagon nut	Property class 8, EN ISO 898-2:2012	Property class 8, EN ISO 898-2:2012	1.4401, 1.4571, EN 10088-1:2008, Property class 70 EN ISO 3506-2:2009	1.4529, 1.4565, EN 10088-1:2008, Property class 70 EN ISO 3506-2:2009
3	Washer, EN ISO 7089:2000; EN ISO 7093:2000	Steel	Steel	1.4401, 1.4404, 1.4571, EN 10088-1:2008	1.4529, 1.4565, EN 10088-1:2008
4	Internal thread sleeve Fastening screw or threaded stud, nut and washer	Steel, Property class 5.8 EN ISO 898-1:2013	-	1.4401, 1.4404, 1.4571, EN 10088-1:2008, Property class 70 EN ISO 3506-1:2009 (Anchor stud) EN ISO 3506-2:2009 (Hexagon nut)	1.4529, 1.4565, EN 10088-1:2008, Property class 70 EN ISO 3506-1:2009 (Anchor stud) EN ISO 3506-2:2009 (Hexagon nut)

Injection System FAKKT VMU plus for masonry

Product description
Perforated sleeve, sizes of threaded studs, materials

Annex A4

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Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads

Base materials:

- Solid brick masonry (Use category b), according to Annex B 2.

  Note: The characteristic resistance are also valid for larger brick sizes and larger compressive strength of the masonry unit.
- Hollow brick masonry (use category c), according to Annex B 2.
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2010.
- For other bricks in solid masonry and in hollow or perforated masonry, the characteristic resistance of the anchor may be determined by job site tests according to ETAG 029, Annex B under consideration of the β-factor according to Annex C 2, Table C4.

Temperature Range:

- Ta: - 40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C)
- Tb: - 40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C)

Use conditions (Environmental conditions):

- Dry and wet structure (regarding injection mortar).
- Structures subject to dry internal conditions (zinc coated steel, stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure (including industrial and marine environment) or exposure to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel or high corrosion resistant steel).
- Structures subject to permanently damp internal condition or in other particular aggressive conditions (high corrosion resistant steel).

  Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Use categories in respect of installation and use:

- Category d/d.
- Category w/w.

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 anchorages are designed in accordance with the ETAG 029, Annex C, Design method A under the responsibility of an engineer experienced in anchorages and masonry work.

Installation:

- Dry or wet structures.
- Hole drilling by rotary drill mode.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

Injection System FAKKT VMU plus for masonry	Annex B1
Intended Use Specifications	

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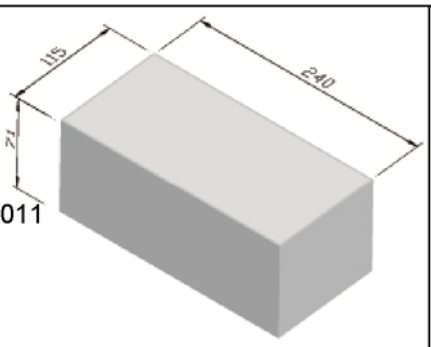
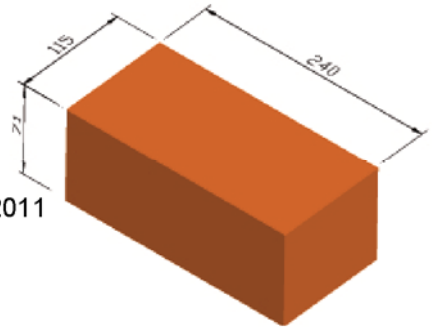
Types of brick and dimensions

Brick No. 1



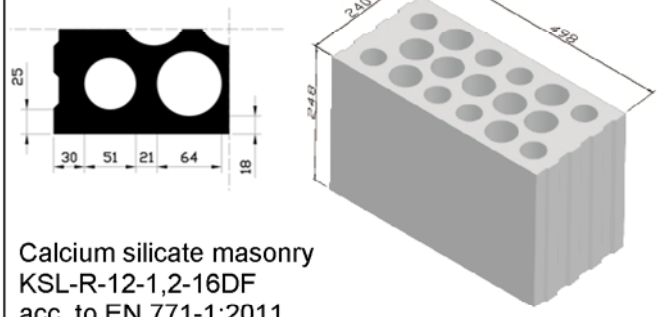
Calcium silicate masonry
KSV – NF
acc. to EN 771-1:2011
$\rho \geq 1{,}8$ [kg/dm³]
$f_b \geq 8$ [N/mm²]

Brick No. 2



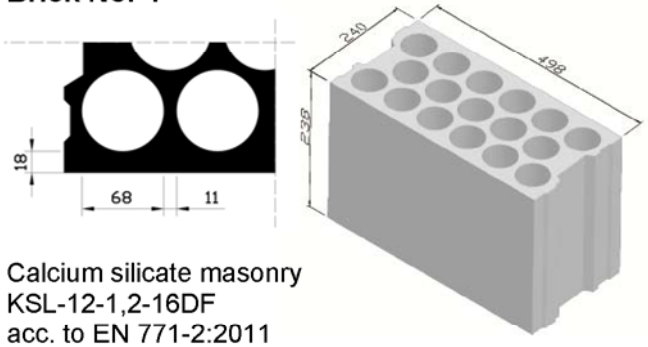
Clay masonry
Mz – NF
acc.to EN 771-1:2011
$\rho \geq 1{,}8$ [kg/dm³]
$f_b \geq 12$ [N/mm²]

Brick No. 3



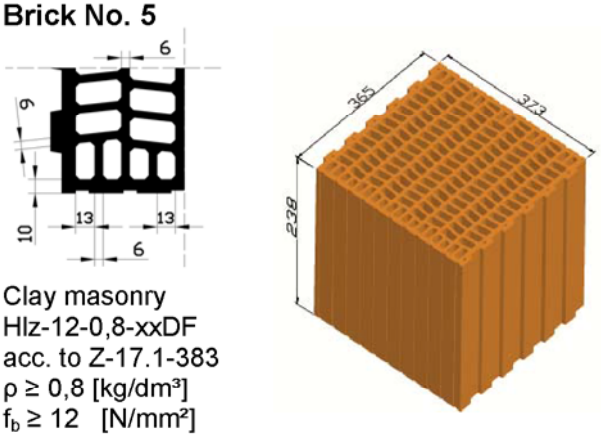
Calcium silicate masonry
KSL-R-12-1,2-16DF
acc. to EN 771-1:2011
$\rho \geq 1{,}2$ [kg/dm³]
$f_b \geq 12$ [N/mm²]

Brick No. 4



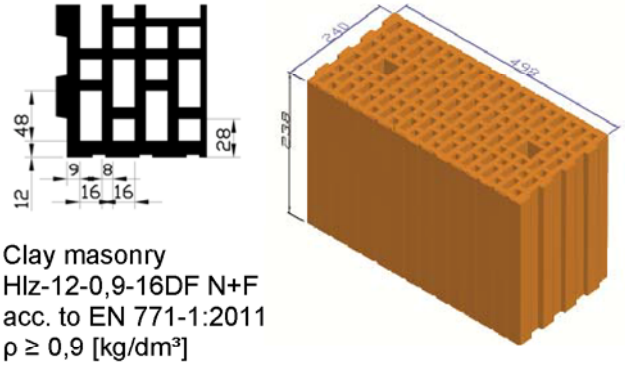
Calcium silicate masonry
KSL-12-1,2-16DF
acc. to EN 771-2:2011
$\rho \geq 1{,}2$ [kg/dm³]
$f_b \geq 12$ [N/mm²]

Brick No. 5



Clay masonry
Hlz-12-0,8-xxDF
acc. to Z-17.1-383
$\rho \geq 0{,}8$ [kg/dm³]
$f_b \geq 12$ [N/mm²]

Brick No. 6



Clay masonry
Hlz-12-0,9-16DF N+F
acc. to EN 771-1:2011
$\rho \geq 0{,}9$ [kg/dm³]
$f_b \geq 12$ [N/mm²]

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Injection System FAKKT VMU plus for masonry

Intended Use
Types of brick and dimensions

Annex B2

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Cleaning Brush

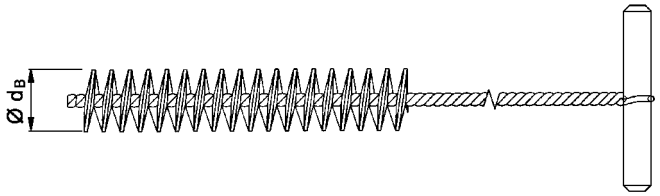

Table B1: Installation parameter in solid masonry (without sleeve)

Type of anchor stud			VMU-A, V-A			VMU-IG	
Size			M8	M10	M12	M6	M8
Nominal drill bit diameter	d_0	[mm]	10	12	14	12	14
Embedment depth	h_{ef}	[mm]	80	90	≥ 93	93	93
Depth of drill hole	$h_0 \geq$	[mm]	85	95	98	98	98
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14	7	9
Diameter of brush	$d_B \geq$	[mm]	20				
Installation torque	max. T_{inst}	[Nm]	2				

Table B2: Installation parameter in solid and hollow masonry (with sleeve)

Type of anchor stud			VMU-A, V-A		VMU-AMH
Size			M8	M10	M12
Perforated sleeve			SH 14x100	SH 16x100	SH 16x100
Nominal drill bit diameter	d_0	[mm]	14	16	16
Setting depth sleeve	h_{nom}	[mm]	100	100	100
Embedment depth	h_{ef}	[mm]	80	90	93
Depth of drill hole	h_0	[mm]	105	105	105
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14
Diameter of brush	$d_B \geq$	[mm]	20		
Installation torque	max. T_{inst}	[Nm]	2		

Table B3: Processing and curing time

Temperature in base material	Processing time	Minimum curing time in dry base material [1)]
+ 5 °C to + 9 °C	25 min	2 h
+ 10 °C to + 19 °C	15 min	80 min
+ 20 °C to + 29 °C	6 min	45 min
+ 30°C to + 34 °C	4 min	25 min
+ 35°C to + 40 °C	2 min	20 min

[1)] In wet base material the curing time **must** be doubled.

Injection System FAKKT VMU plus for masonry

Intended Use
Cleaning brush, installation parameters, processing and curing times

Annex B3

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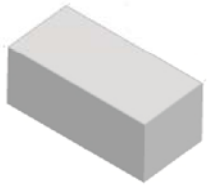
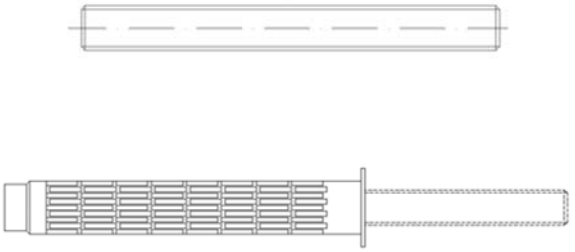
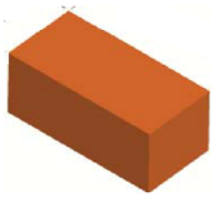
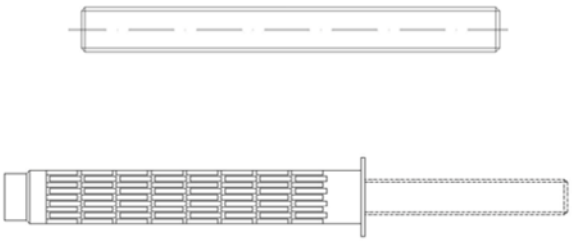
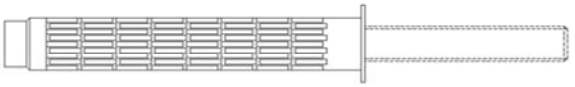
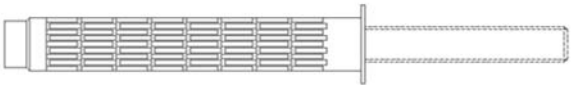
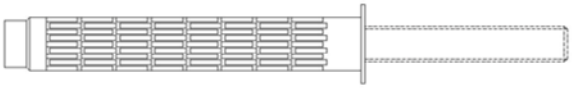
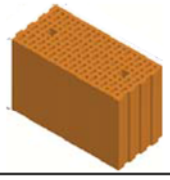
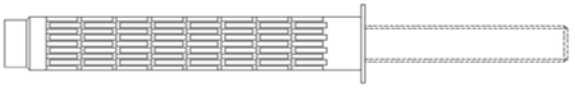
Table B4: Allocation of anchor studs[1)], sleeves[1)] and bricks

Brick	Valid anchor studs and sleeves	
No. 1 		VMU-A / V-A M8, M10, M12 VMU-IG M6, M8 SH 14x100: (VMU-A / V-A M8) SH 16x100: (VMU-A / V-A M10; VMU-AMH M12)
No. 2 		VMU-A / V-A M8, M10, M12 VMU-IG M6, M8 SH 14x100: (VMU-A / V-A M8) SH 16x100: (VMU-A / V-A M10; VMU-AMH M12)
No. 3 		SH 14x100: (VMU-A / V-A M8)
No. 4 		SH 14x100: (VMU-A / V-A M8) SH 16x100: (VMU-A / V-A M10; VMU-AMH M12)
No. 5 		SH 14x100: (VMU-A / V-A M8) SH 16x100: (VMU-A / V-A M10; VMU-AMH M12)
No. 6 		SH 14x100: (VMU-A / V-A M8)

1) Other combinations can be used after job side test acc. to ETAG 029, Annex B. The β-factors for job side tests are given in Table C4.

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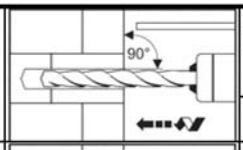
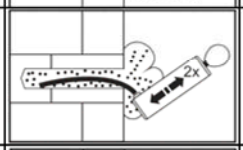
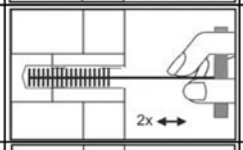
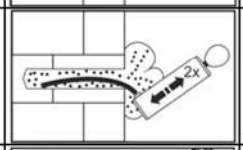
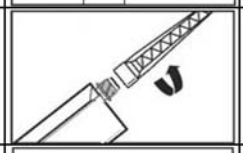
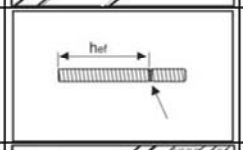
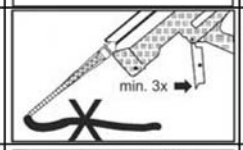
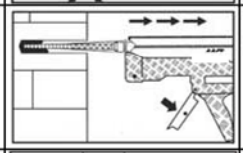
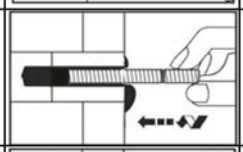
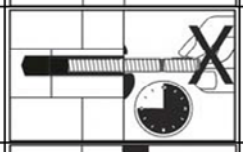
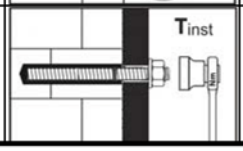
Injection System FAKKT VMU plus for masonry

Intended Use
Allocation of anchor rods, sleeves and bricks

Annex B4

Deutsches Institut für Bautechnik DIBt

Installation instructions for solid masonry without sleeve

1.		Drill a hole, by rotary drill mode, into the base material, with nominal drill hole diameter and bore hole depth acc. to Table B1 or Table B2. **Dill hole must be cleaned directly prior to installation of the anchor.**
2a.		Blow out drill hole from the bottom with Blow-out Pump at least two times.
2b.		Clean drill hole with brush at least two times.
2c.		Afterwards blow out drill hole again from the bottom with the Blow-out Pump at least two times.
3.		Screw the supplied Mixer Nozzle tied onto the cartridge. For every working interruption longer than the recommended processing time (Table B3) as well as for new cartridges, a new Mixer Nozzle shall be used.
4.		Prior to injection of the mortar mark the embedment depth on the anchor stud.
5.		Insert cartridge in dispenser. Before injecting discard mortar (at least 3 full strokes) until it shows a consistent grey color. Never use this mortar.
6.		Starting from the bottom or back of the cleaned anchor hole fill the hole up to min. two-thirds with adhesive. Slowly withdrawn the mixing nozzle as the hole fills to avoid creating air pockets. Observe the processing time given in Table B3.
7.		Insert the threaded stud by hand, rotating slightly up to the full embedment depth as marked on the anchor stud. The anchor stud is properly set when excess mortar seeps from the hole. If the hole is not completely filled, pull out anchor stud, let mortar cure, drill out hole and start again from No. 2. The anchor stud should be free of dirt, grease and oil.
8.		Follow minimum curing time shown in Table B3. During curing time threaded stud must not be moved or loaded. After the curing time remove excess mortar
9.		The fixture can be mounted after curing time. Apply installation torque max. T_{inst} according to Table B1 by using a torque wrench.

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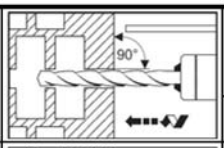
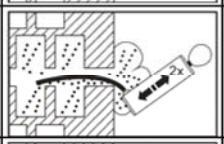
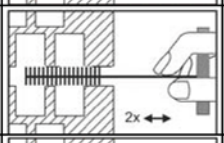
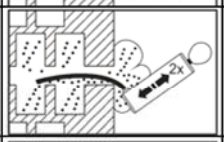
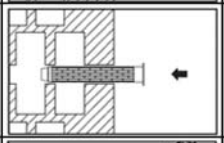
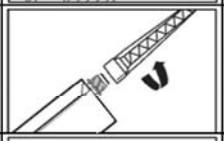
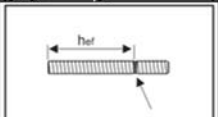
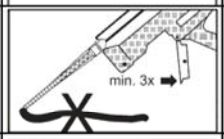
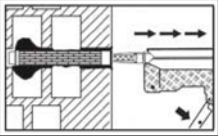
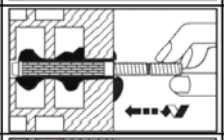
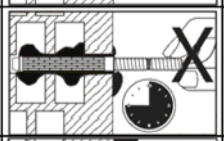
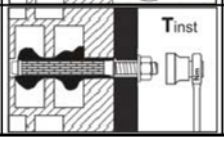
Injection System FAKKT VMU plus for masonry

Intended Use
Installation instructions (solid brick)

Annex B5

Deutsches Institut für Bautechnik DIBt

Installation instructions for solid and hollow masonry with sleeve

1.		Drill a hole, by rotary drill mode, into the base material, with nominal drill hole diameter and bore hole depth acc. to Table B1 or Table B2. **Dill hole must be cleaned directly prior to installation of the anchor.**
2a.		Blow out drill hole from the bottom with Blow-out Pump at least two times.
2b.		Clean drill hole with brush at least two times.
2c.		Afterwards blow out drill hole again from the bottom with the Blow-out Pump at least two times.
3.		Insert the perforated sleeve into the bore hole. Make sure that the sleeve fits well into the hole. Never cut the sleeve! Only use sleeves that have the right length.
4.		Screw the supplied Mixer Nozzle tied onto the cartridge. For every working interruption longer than the recommended processing time (Table B3) as well as for new cartridges, a new Mixer Nozzle shall be used.
5.		Prior to injection of the mortar mark the embedment depth on the anchor stud.
6.		Insert cartridge in Dispenser. Before injecting discard mortar (at least 3 full strokes) until it shows a consistent grey color. Never use this mortar.
7.		Starting from the bottom or back fill the sleeve completely with adhesive. For quantity of mortar attend cartridge label. Observe the processing time given in Table B3.
8.		Push the threaded stud 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 or oil.
9.		Follow minimum curing time shown in Table B3. During curing time threaded stud must not be moved or loaded.
10.		The fixture can be mounted after curing time. Apply installation torque max. T_{inst} according to Table B2 by using torque wrench.

Injection System FAKKT VMU plus for masonry

Intended Use
Installation instructions (hollow brick)

Annex B6

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Table C1: Characteristic values for tension and shear loads

Brick No.	Desity ρ [kg/dm³] Compressive strength f_b [N/mm²]	Sleeve	Anchor-size	Effective Embedment depth h_{ef} [mm]	Characteristic resistance							
					Use category							
					dry / dry				wet / wet			
					24°C/40°C		50°C/80°C		24°C/40°C		50°C/80°C	
					N_{Rk} [1]	V_{Rk} [2,3]	N_{Rk} [1]	V_{Rk} [2,3]	N_{Rk} [1]	V_{Rk} [2,3]	N_{Rk} [1]	V_{Rk} [2,3]
					[kN]		[kN]		[kN]		[kN]	
1	ρ ≥ 1,8 f_b ≥ 8	without	M8	80	4,0	4,0	3,0	3,0	3,0	3,0	2,5	2,5
		without	IG M6; IG M8; M10; M12	93; 93; 90; ≥ 93	5,0	5,0	4,5	4,5	4,0	4,0	3,5	3,5
		SH 14x100	M8	80	5,0	5,0	4,5	4,5	4,5	4,5	3,5	3,5
		SH 16x100	M10; AMH M12	90	7,0	7,0	6,0	6,0	5,0	5,0	4,5	4,5
2	ρ ≥ 1,8 f_b ≥ 12	without	M8	80	4,0	4,0	3,0	3,0	3,5	3,5	3,0	3,0
		without	IG M6; IG M8; M10; M12	93; 93; 90; ≥ 93	5,0	5,0	4,5	4,5	5,0	5,0	4,0	4,0
		SH 14x100	M8	80	3,5	3,5	3,0	3,0	3,5	3,5	2,5	2,5
		SH 16x100	M10; AMH M12	90	4,5	4,5	3,5	3,5	4,5	4,5	3,5	3,5
3	ρ ≥ 1,2 f_b ≥ 12	SH 14x100	M8	80	3,5	2,5	3,5	2,5	3,0	2,0	3,0	2,0
4	ρ ≥ 1,2 f_b ≥ 12	SH 14x100	M8	80	2,5	2,0	2,5	2,0	2,0	1,5	2,0	1,5
		SH 16x100	M10; AMH M12	90	3,0	2,5	3,0	2,5	2,0	2,0	2,0	2,0
5	ρ ≥ 0,8 f_b ≥ 12	SH 14x100	M8	80	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
		SH 16x100	M10; AMH M12	90	2,0	2,5	2,0	2,5	2,0	2,5	2,0	2,5
6	ρ ≥ 0,9 f_b ≥ 12	SH 14x100	M8	80	3,0	2,0	3,0	2,0	2,5	2,0	2,5	2,0

1) For design according to ETAG 029, Annex C: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,s}$
2) For design according to ETAG 029, Annex C: $V_{Rk} = V_{Rk,b} = V_{Rk,s}$
3) $V_{Rk,c}$ according to ETAG 029, Annex C

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Injection System FAKKT VMU plus for masonry

Performances
Characteristic values of resistance for tension and shear loads

Annex C1

Deutsches Institut für Bautechnik DIBt

Table C2: Characteristic bending moments

			IG M6	IG M8	M8	M10	AMH M12	M12
Characteristic bending moment, Steel, property class 5.8	$M_{Rk,s}$	[Nm]	7	19	19	37	37	65
Characteristic bending moment, Steel, property class 8.8	$M_{Rk,s}$	[Nm]	12	30	30	60	60	105
Characteristic bending moment, Stainless steel A4, property class 70	$M_{Rk,s}$	[Nm]	11	26	26	52	52	91
Characteristic bending moment, High corrosion resistant steel HCR, property class 70	$M_{Rk,s}$	[Nm]	11	26	26	52	52	91

Table C3: Displacements under tension and shear loads

Brick-No.	N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
1	$\frac{N_{Rk}}{1,4 \times \gamma_M}$	0,1	0,2	$\frac{V_{Rk}}{1,4 \times \gamma_M}$	$\frac{V_{Rk}\ [kN]}{2,0\ [kN/mm]}$	$1,5\ \delta_{V0}$
2						
3					0,7	1,1
4						
5						
6						

Table C4: β-factors for job side tests acc. to ETAG 029, Annex B

Brick-No.	Installation & use	β-factor	
		24°C / 40°C	50°C / 80°C
1-2	d/d	0,66	0,53
3-6		0,92	
1	w/w (incl. w/d)	0,53	0,42
2		0,61	0,49
3		0,74	
4		0,74	
5		0,86	
6		0,86	

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Injection System FAKKT VMU plus for masonry

Performances
Characteristic values of resistance for bending moments, Displacements, β-factors for job site tests

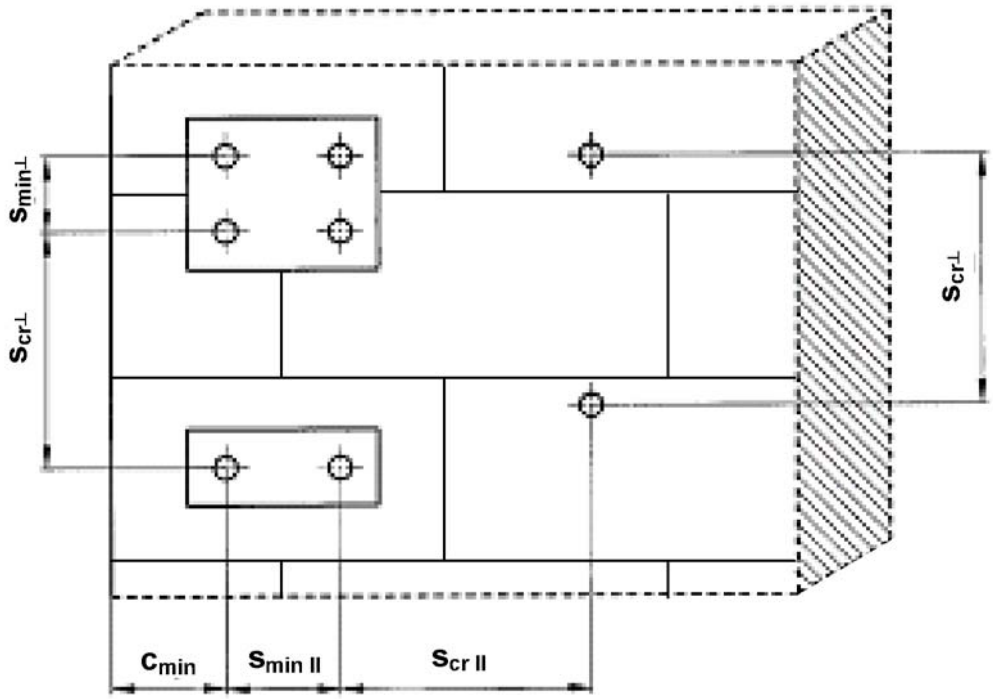
Annex C2

Deutsches Institut für Bautechnik DIBt

Table C5: Edge distances and spacings

Brick No.	Anchor size					
	M8			IG M6, IG M8, M10, AMH M12, M12		
	$c_{min} = c_{cr}$ [mm]	$s_{min,II} = s_{cr,II}$ [1] [mm]	$s_{min,\perp} = s_{cr,\perp}$ [2] [mm]	$c_{min} = c_{cr}$ [mm]	$s_{min,II} = s_{cr,II}$ [1] [mm]	$s_{min,\perp} = s_{cr,\perp}$ [2] [mm]
1	120 (150) [3]	240 (300) [3]	240 (300) [3]	135 (150) [3]	270 (300) [3]	270 (300) [3]
2	120 (150) [3]	240 (300) [3]	240 (300) [3]	135 (150) [3]	270 (300) [3]	270 (300) [3]
3	100	498	248	100	498	248
4	100	498	238	100	498	238
5	100	373	238	100	373	238
6	100	498	238	100	498	238

[1] s_{II} : Spacing parallel to the bearing joint
[2] $s_{\perp}$: Spacing perpendicular to the bearing joint
[3] with perforated sleeve



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Injection System FAKKT VMU plus for masonry

Performances
Edge distances and spacings

Annex C3