



European Technical Approval ETA-13/0909

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

MKT Injektionssystem VMU plus für Mauerwerk
MKT Injection System VMU plus for masonry

Zulassungsinhaber
Holder of approval

MKT
Metall-Kunststoff-Technik GmbH & Co. KG
Auf dem Immel 2
67685 Weilerbach
DEUTSCHLAND

Zulassungsgegenstand
und Verwendungszweck
*Generic type and use
of construction product*

Injektionssystem zur Verankerung im Mauerwerk
Injection system for use in masonry

Geltungsdauer:
Validity:

vom
from
bis
to

27 June 2013
27 June 2018

Herstellwerk
Manufacturing plant

Werk 2, D

Diese Zulassung umfasst
This Approval contains

20 Seiten einschließlich 12 Anhänge
20 pages including 12 annexes

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, as amended by Article 2 of the law of 8 November 2011⁵;*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶;
 - Guideline for European technical approval of "Metal Injection Anchors for Use in Masonry", ETAG 029.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
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- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities L 40, 11 February 1989, p. 12
² Official Journal of the European Communities L 220, 30 August 1993, p. 1
³ Official Journal of the European Union L 284, 31 October 2003, p. 25
⁴ *Bundesgesetzblatt Teil I 1998*, p. 812
⁵ *Bundesgesetzblatt Teil I 2011*, p. 2178
⁶ Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of the construction product

The MKT Injection System VMU plus is a bonded anchor (injection type) consist of a mortar cartridge with MKT injection mortar 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.

An illustration of the product and intended use is given in Annex 1.

1.2 Intended use

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106 EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences.

The anchor is to be used only for anchorages subject to static or quasi-static loading in solid masonry (use category b) or hollow or perforated masonry (use category c) according to Annex 7. The mortar strength class of the masonry has to be M 2,5 according to EN 998-2:2010 at minimum.

The anchor may be used in the following service temperature ranges:

Temperature range I:	-40 °C to +40 °C	(max long term temperature +24 °C and max short term temperature +40 °C)
Temperature range II:	-40 °C to +80 °C	(max long term temperature +50 °C and max short term temperature +80 °C)

The anchor may be installed and used in dry or wet structures. Category d/d applies for installation and use in dry structures and Category w/w applies for installation and use in wet structures.

Regarding the steel elements of the anchor following use conditions applies:

Steel elements made of zinc coated steel:

The steel elements made of electroplated or hot-dipped galvanised steel may only be used in structures subject to dry internal conditions.

Steel elements made of stainless steel A4:

The steel element made of stainless steel may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist. Such 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).

Steel elements made of high corrosion resistant steel HCR:

The steel element made of high corrosion resistant steel may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure, in permanently damp internal conditions or in other particular aggressive conditions. Such 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 chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

The provisions made in this European technical approval are based on an assumed working life of the anchor of 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.

2 Characteristics of the product and methods of verification

2.1 Characteristics of product

The anchor corresponds to the drawings and provisions given in the annexes. The characteristic material values, dimensions and tolerances of the anchor not indicated in annexes shall correspond to the respective values laid down in the technical documentation⁷ of this European technical approval.

The characteristic anchor values for the design of anchorages are given in Annex 10 to Annex 12.

The anchor satisfies the requirements for class A1 of the characteristic reaction to fire.

Regarding resistance to fire no performance is determined.

2.2 Methods of verification

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the "Guideline for European technical approval of Metal Injection Anchors for Use in Masonry", ETAG 029, based on the Use Categories b and c in respect of the base material and Category d/d and w/w in respect of installation and use.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

⁷ The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the Decision 97/177/EC of the European Commission⁸ System 1 of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

- (a) Tasks for the manufacturer:
 - (1) factory production control;
 - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;
- (b) Tasks for the approved body:
 - (3) initial type-testing of the product;
 - (4) initial inspection of factory and of factory production control;
 - (5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial/raw/constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan⁹ which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Deutsches Institut für Bautechnik. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2 For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

⁸ Official Journal of the European Communities L 073 of 14.03.1997

⁹ The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,

in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on each packaging of the anchor. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European technical approval,
- ETAG 029,
- use category (b or c, and d/d or w/w) and
- size.

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced.

Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

4.2 Design of anchorages

The fitness of the anchor for the intended use is given under the following conditions:

The anchorages are designed in accordance with the ETAG 029, Annex C¹⁰, Design method A under the responsibility of an engineer experienced in anchorages and masonry work.

Verifiable calculation notes and drawings are prepared taking account the relevant masonry in the region of the anchorage (nature and strength of the base materials), 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 characteristic resistances are only valid for kind of bricks according to Annex 8. The characteristic resistance for use in solid masonry are also valid for larger brick sizes and larger compressive strength of the masonry unit.

It is to ensure that the use category applies and that the characteristic values of the base material, in which the anchor is to be placed, is identical with the values, which the characteristic resistances apply for.

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 B¹¹ under consideration of the β -factor according to Annex 11, Table 10.

4.3 Installation

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site,
- use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor,
- anchor installation in accordance with the manufacturer's specifications and drawings using the tools indicated in the technical documentation of this European technical approval,
- checks before placing the anchor to ensure that the use category applies,
- commercial standard threaded rods, washers and hexagon nuts may also be used if the following requirements are fulfilled:
 - material, dimensions and mechanical properties of the metal parts according to the specifications given in Annex 4,
 - confirmation of material and mechanical properties of the metal parts by inspection certificate 3.1 according to EN 10204:2004, the documents should be stored,
 - marking of the threaded rod with the envisage embedment depth. This may be done by the manufacturer of the rod or the person on jobsite.
- holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit,
- in case of aborted drill hole the drill hole shall be filled with mortar,
- hole cleaning and anchor installation in accordance with manufacturer's installation instructions (Annex 6 and 7),
- keeping the installation parameters (Annex 5),
- marking and keeping the effective anchorage depth,

¹⁰ The Guideline ETAG 029, "Metal Injection Anchors for Use in Masonry, Annex C: Design Methods for Anchorages" is published in English on EOTA website www.eota.eu.

¹¹ The Guideline ETAG 029, "Metal Injection Anchors for Use in Masonry, Annex B: Recommendations for tests to be carried out on construction works" is published in English on EOTA website www.eota.eu.

- keeping edge distance and spacing according to Annex 12 without minus tolerances,
- observing the curing time according to Annex 5, Table 5 until the anchor may be loaded,
- fastening screws or threaded rods (including nut and washer) must comply with the material and property class according to Annex 4, Table 1.

5 Indications to the manufacturer

5.1 Manufacturer's responsibilities

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1 and 2 as well as sections 4.2, 4.3 and 5.2 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European technical approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- installation parameters according to Annex 5,
- material and property class of metal parts according to Annex 4, Table 1,
- information on the installation procedure, including cleaning of the hole with the cleaning equipments, preferably by means of an illustration,
- exact volume of injection mortar depend on the relevant installation,
- storage temperature of anchor components, minimum and maximum temperature of the base material, processing time (open time) of the mortar and curing time until the anchor may be loaded according to Annex 5,
- identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

5.2 Recommendations regarding packaging, transport and storage

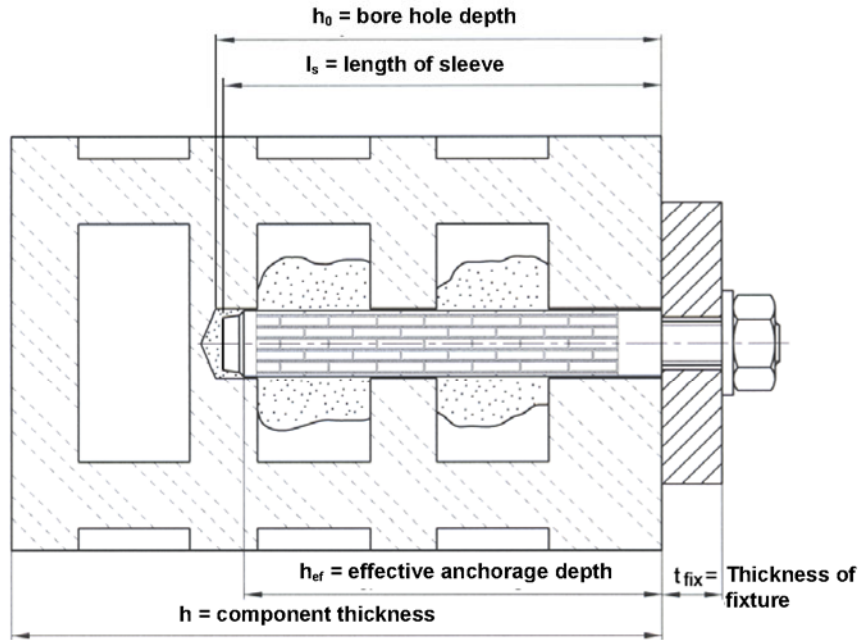
The injection cartridges shall be protected against sun radiation and shall be stored according to the manufacture's installation instructions in dry condition at temperatures of at least +5 °C to not more than +25 °C. Mortar cartridges with expired shelf life must no longer be used.

Andreas Kummerow
p. p. Head of Department

beglaubigt:
Wittstock

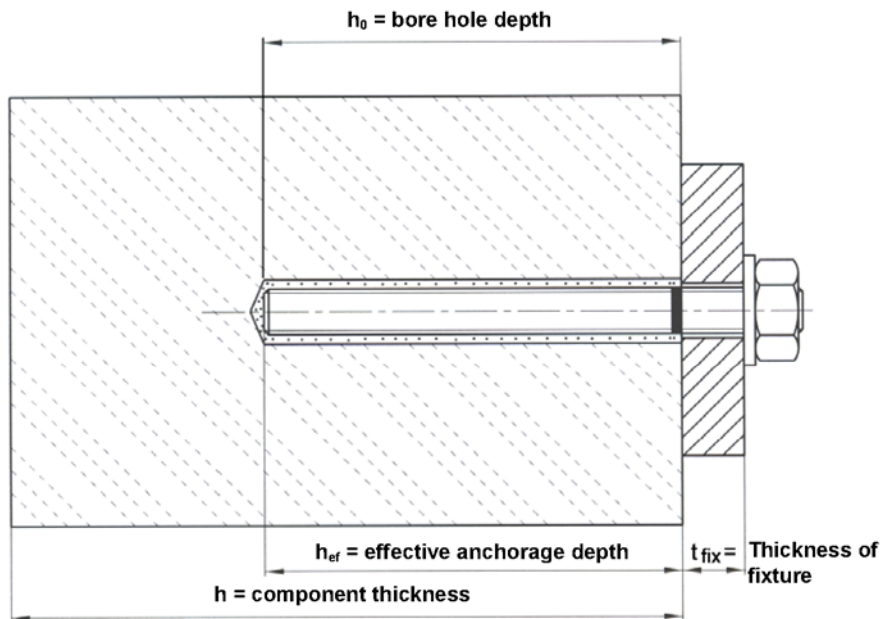
Installed anchor in hollow base material

Threaded Stud with perforated sleeve



Installed anchor in solid base material

Threaded Stud with or without perforated sleeve



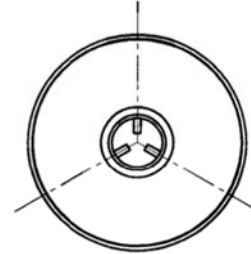
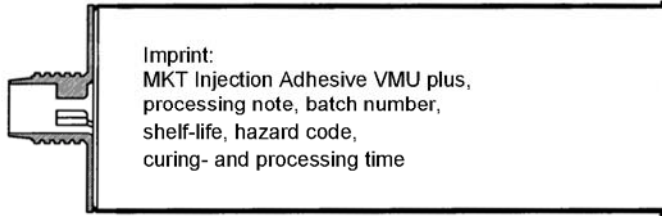
MKT Injection System VMU plus for masonry

Product and intended use

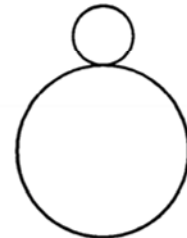
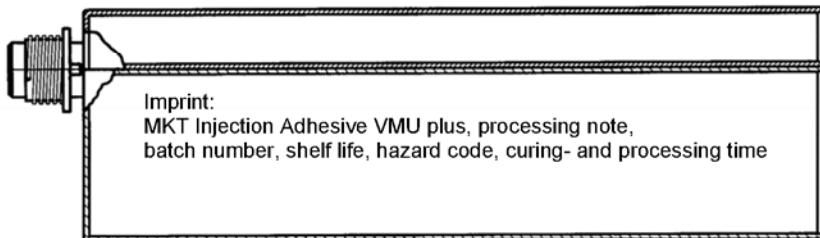
Annex 1

Cartridge: MKT Injection Adhesive VMU plus

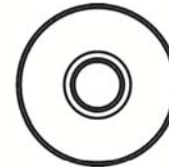
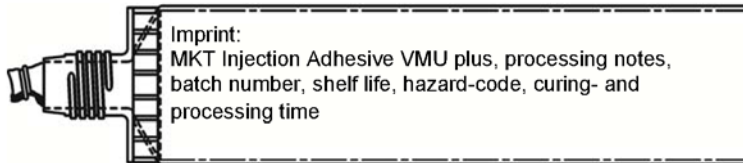
Type: coaxial (150 ml, 280 ml, 300 ml, 330 ml, 380 ml, 410 ml and 420 ml)



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



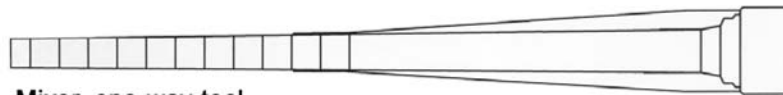
Type: „foil-tube“ (165 ml and 300 ml)



Sealing cap



Static mixer



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

Use category:

Base material: b and c (Solid or hollow masonry)
Installation and use: d/d or w/w (Installation and use in dry, wet masonry)

Temperature range:

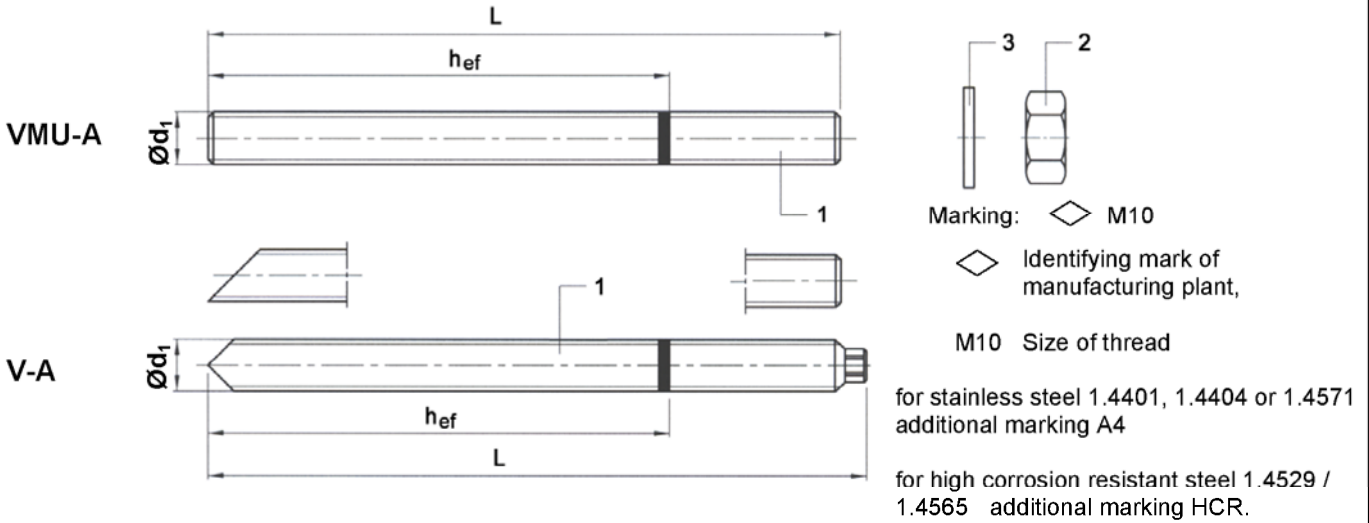
-40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C)
-40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C)

MKT Injection System VMU plus for masonry

Product (Injection system) and use category

Annex 2

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



Marking of length		F	G	H	I	J	K	L	M	N
Length of anchor	\geq	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	\geq	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

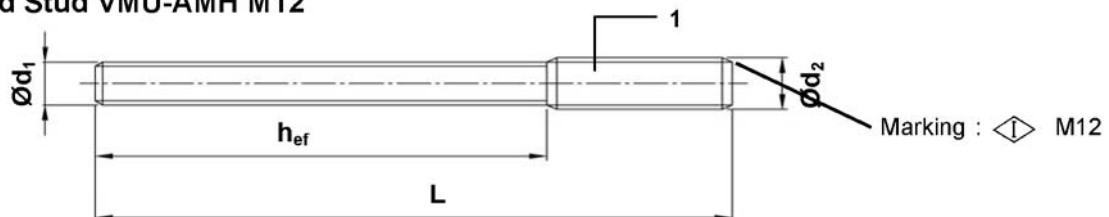
Dimensions in mm

Commercial threaded studs

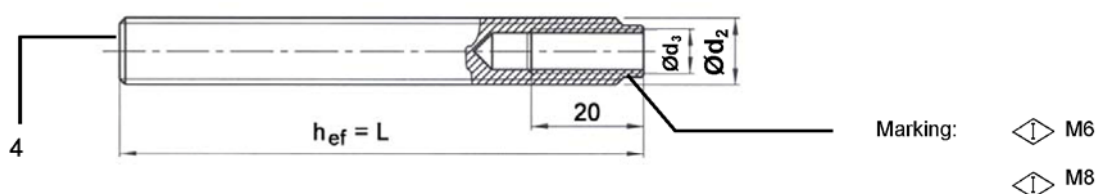
Requirements:

- Materials, dimensions and mechanical properties see Table 1 and Table 2
- 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



MKT Injection System VMU plus for masonry

Anchor studs

Annex 3

Perforated sleeve VMU-SH 14x100 and 16x100

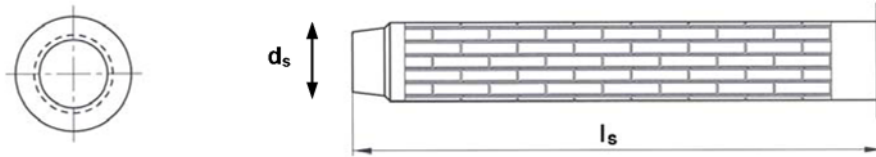


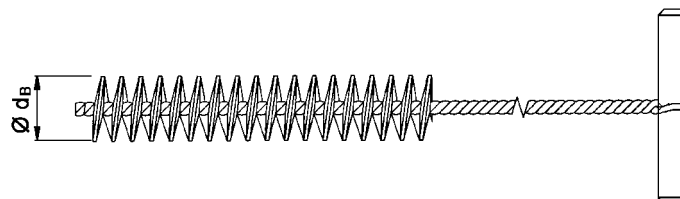
Table 1: Materials

	Designation	Steel, electroplated acc. to EN ISO 4042 $\geq 5\mu\text{m}$	Steel, hot-dip galvanised, acc. to EN ISO 1461 $\geq 40\mu\text{m}$	Stainless steel A4	High corrosion resistant steel HCR
1	Anchor stud	Steel, Property class 5.8, EN ISO 898-1	Steel, Property class 5.8, EN ISO 898-1	1.4401, 1.4404, 1.4571, EN 10088, Property class 70 EN ISO 3506	1.4529, 1.4565, EN 10088, Property class 70 EN ISO 3506
2	Hexagon nut, DIN 934	Property class 8, EN ISO 898-2	Property class 8, EN ISO 898-2	1.4401, 1.4571, EN 10088, Property class 70 EN ISO 3506	1.4529, 1.4565, EN 10088, Property class 70 EN ISO 3506
3	Washer, EN ISO 7089 or EN ISO 7093	Steel	Steel	1.4401, 1.4404, 1.4571, EN 10088	1.4529, 1.4565, EN 10088
4	Internal thread sleeve	Steel, Property class 5.8 EN ISO 898-1	-	1.4401, 1.4404, 1.4571, EN 10088, Property class 70 EN ISO 3506	1.4529, 1.4565, EN 10088, Property class 70 EN ISO 3506
	Fastening screw or threaded stud, nut and washer				

Table 2: Sizes threaded stud and sleeve

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	-	-	-	-	✓

Brush



MKT Injection System VMU plus for masonry

Perforated sleeve,
Materials, Sizes threaded stud and sleeve,
Brush

Annex 4

Table 3: 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 4: 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 5: 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

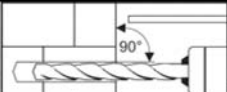
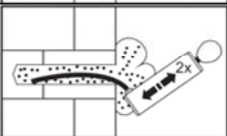
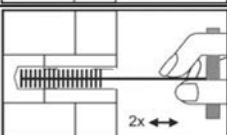
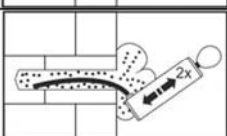
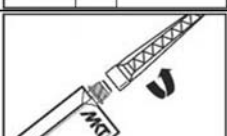
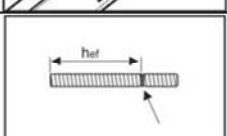
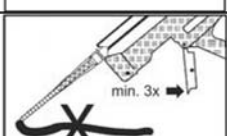
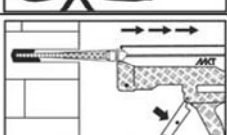
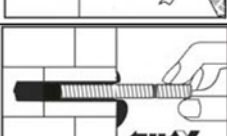
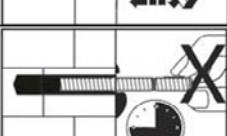
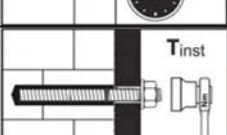
¹⁾ In wet base material the curing time **must** be doubled.

MKT Injection System VMU plus for masonry

Installation parameters,
Processing and curing time

Annex 5

Installation instructions for solid masonry without sleeve

1.		<p>Drill a hole, by rotary drill mode, into the base material, with nominal drill hole diameter and bore hole depth acc. to Table 3 or Table 4.</p>
<p>Drill hole must be cleaned directly prior to installation of the anchor.</p>		
2a.		<p>Blow out drill hole from the bottom with Blow-out Pump at least two times.</p>
2b.		<p>Clean drill hole with brush at least two times.</p>
2c.		<p>Afterwards blow out drill hole again from the bottom with the Blow-out Pump at least two times.</p>
3.		<p>Screw the supplied Mixer Nozzle tied onto the cartridge. For every working interruption longer than the recommended processing time (Table 5) as well as for new cartridges, a new Mixer Nozzle shall be used.</p>
4.		<p>Prior to injection of the mortar mark the embedment depth on the anchor stud.</p>
5.		<p>Insert cartridge in dispenser. Before injecting discard mortar (at least 3 full strokes) until it shows a consistent grey color. Never use this mortar.</p>
6.		<p>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 5.</p>
7.		<p>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.</p>
8.		<p>Follow minimum curing time shown in Table 5. During curing time threaded stud must not be moved or loaded. After the curing time remove excess mortar</p>
9.		<p>The fixture can be mounted after curing time. Apply installation torque max. T_{inst} according to Table 3 by using a torque wrench.</p>

MKT Injection System VMU plus for masonry

Installation instructions for solid masonry without sleeve

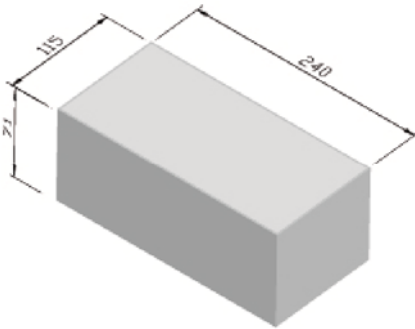
Annex 6

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 3 or Table 4. Drill 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 5) 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 5.
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 5. 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 4 by using torque wrench.
MKT Injection System VMU plus for masonry		Annex 7
Installation instructions for solid and hollow masonry with sleeve		

Types of brick and dimensions

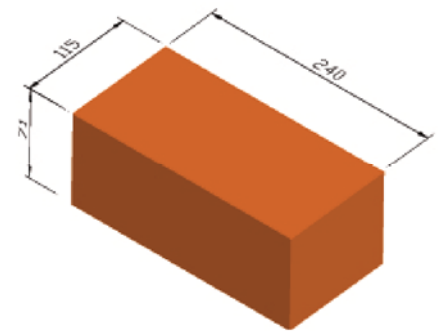
Brick No. 1

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



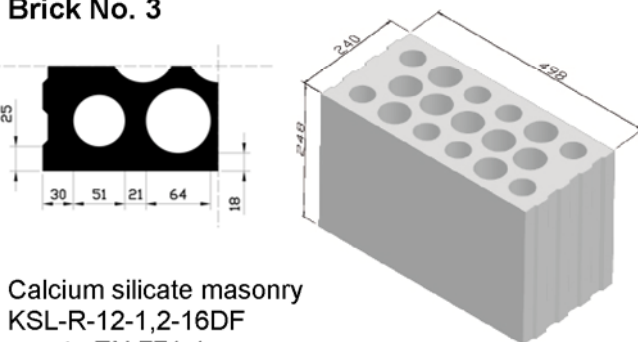
Brick No. 2

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



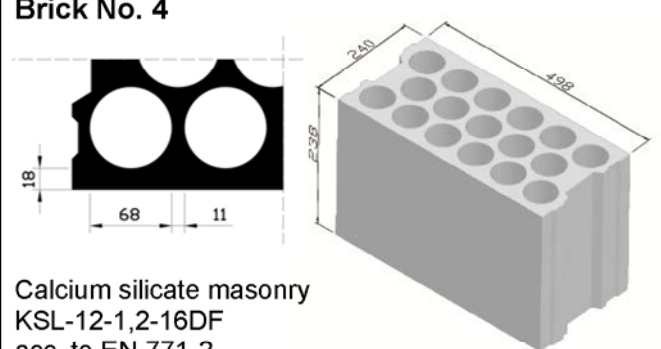
Brick No. 3

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



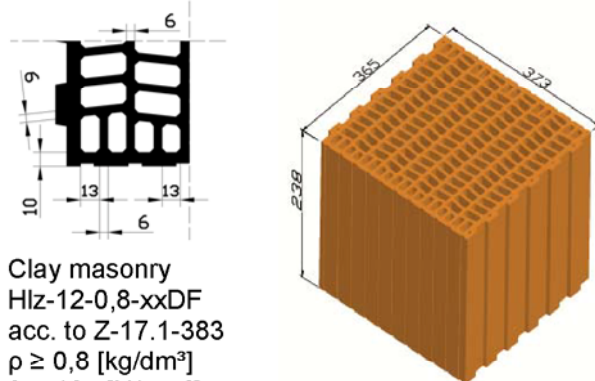
Brick No. 4

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



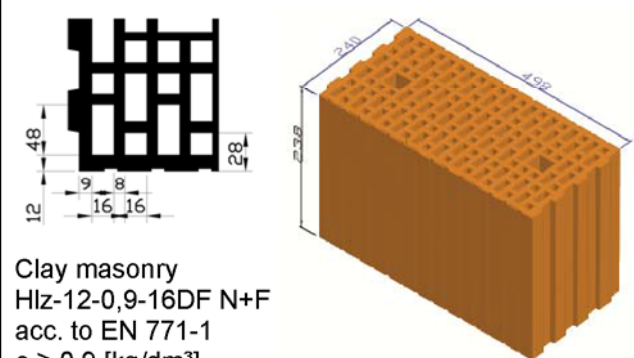
Brick No. 5

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
 $\rho \geq 0,9$ [kg/dm³]
 $f_b \geq 12$ [N/mm²]


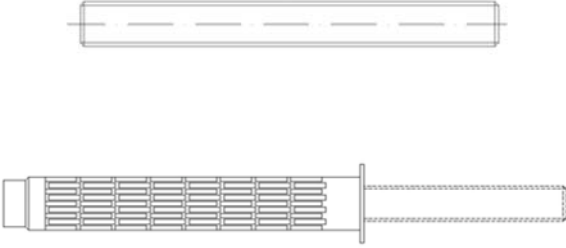

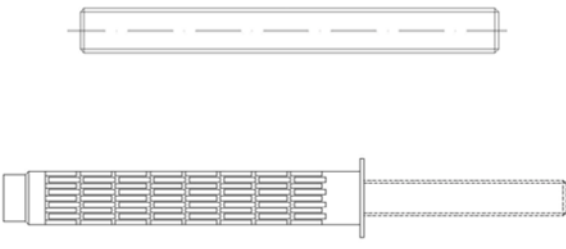

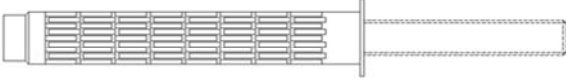
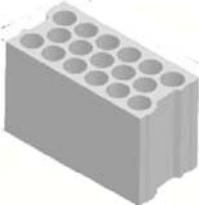
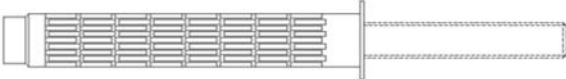


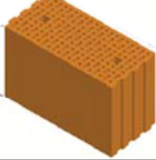
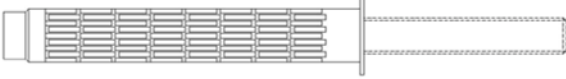


MKT Injection System VMU plus for masonry

Types of brick and dimensions

Annex 8

Table 6: Allocation of anchor studs¹⁾, sleeves¹⁾ and bricks

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

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 10.

MKT Injection System VMU plus for masonry

Allocation of anchor studs, sleeves and bricks

Annex 9

Table 7: Characteristic values for tension and shear loads

Brick No.	Density ρ [kg/dm ³] Compressive strength f_b [N/mm ²]	Sleeve	Anchor-size	Effective Embedment depth h_{ef} [mm]	Characteristic resistance							
					Use category							
					dry / dry ⁵⁾				wet / wet ^{5,6)}			
					24°C/40°C ⁷⁾		50°C/80°C ⁷⁾		24°C/40°C ⁷⁾		50°C/80°C ⁷⁾	
					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	$\rho \geq 1,8$ $f_b \geq 8$	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	$\rho \geq 1,8$ $f_b \geq 12$	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	$\rho \geq 1,2$ $f_b \geq 12$	SH 14x100	M8	80	3,5	2,5	3,5	2,5	3,0	2,0	3,0	2,0
4	$\rho \geq 1,2$ $f_b \geq 12$	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	$\rho \geq 0,8$ $f_b \geq 12$	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	$\rho \geq 0,9$ $f_b \geq 12$	SH 14x100	M8	80	3,0	2,0	3,0	2,0	2,5	2,0	2,5	2,0
Partial safety factor γ_M					2,5 ⁴⁾							

- 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) hollow masonry: $V_{Rk,c} = V_{Rk,i}$; solid masonry: $V_{Rk,c}$ according to ETAG 029, Annex C
- 4) In absence of national regulations
- 5) Installation / use
- 6) Includes also wet / dry
- 7) Long term temperature / short term temperature

MKT Injection System VMU plus for masonry

Characteristic values for tension and shear loads

Annex 10

Table 8: 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
Partial safety factor	$\gamma_{Ms,v}^{1)}$	[-]	1,25					
Characteristic bending moment, Stainless steel A4, property class 70	$M_{Rk,s}$	[Nm]	11	26	26	52	52	91
Partial safety factor	$\gamma_{Ms,v}^{1)}$	[-]	1,56					
Characteristic bending moment, High corrosion resistant steel HCR, property class 70	$M_{Rk,s}$	[Nm]	11	26	26	52	52	91
Partial safety factor	$\gamma_{Ms,v}^{1)}$	[-]	1,56					

¹⁾ If no other national regulations exist

Table 9: 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 10: 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	

MKT Injection System VMU plus for masonry

**Characteristic bending moment,
Displacements under tension and shear loads,
 β -factors for job side tests acc. to ETAG 029, Annex B**

Annex 11

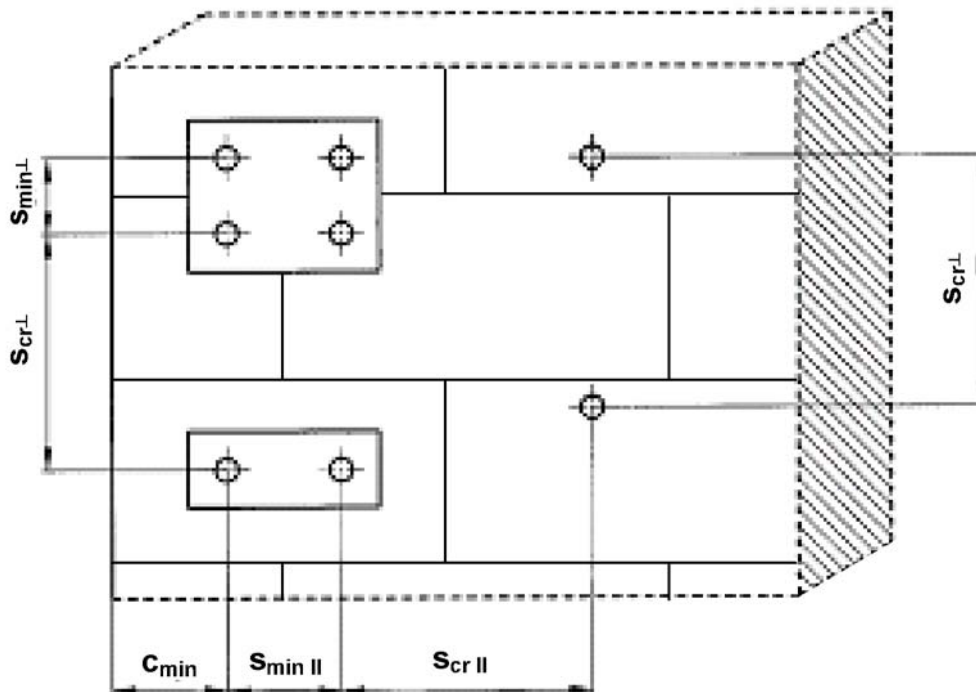
Table 11: Edge distances and spacings

Brick No.	Anchor size					
	M8			IG M6, IG M8, M10, AMH M12, M12		
	$c_{min} = c_{cr}$ [mm]	$s_{min, } = s_{cr, }^{1)}$ [mm]	$s_{min,\perp} = s_{cr,\perp}^{2)}$ [mm]	$c_{min} = c_{cr}$ [mm]	$s_{min, } = s_{cr, }^{1)}$ [mm]	$s_{min,\perp} = s_{cr,\perp}^{2)}$ [mm]
1	120 (150) ³⁾	240	71	135 (150) ³⁾	240	71
2	120 (150) ³⁾	240	71	135 (150) ³⁾	240	71
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⁾ $s_{||}$: Spacing parallel to the bearing joint

²⁾ s_{\perp} : Spacing perpendicular to the bearing joint

³⁾ with perforated sleeve



MKT Injection System VMU plus for masonry

Edge distances and spacings

Annex 12