Deutsches Institut für Bautechnik

Member of EOTA
www.eota.eu

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

European Technical Assessment

ETA-20/0132 of 30 January 2024

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	MULTI-MONTI-plus
Product family to which the construction product belongs	Screw anchor for use in masonry
Manufacturer	HECO-Schrauben GmbH & Co. KG Dr.-Kurt-Steim-Straße 28 78713 Schramberg DEUTSCHLAND
Manufacturing plant	HECO-Schraubern GmbH & Co. KG Werk Schramberg
This European Technical Assessment contains	32 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	EAD 330460-00-0604, Edition 08/2022

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

Specific Part

1 Technical description of the product

The Screw anchor MULTI-MONTI-plus is an anchor in size 6, 7.5, 10 and 12 mm made of galvanised. The anchor is screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterised by mechanical interlock in the special thread.

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 anchors 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 to steel failure of a single screw anchor under tension loading	$N_{Rk,s}$ see Annex C1
Characteristic resistance to steel failure of a single screw anchor under shear loading	$V_{Rk,s}$ [kN], $M^0_{Rk,s}$ see Annex C1
Characteristic resistance to pull-out failure or brick breakout failure of a single screw anchor under tension loading	$N_{Rk,p}$, $N_{Rk,b}$, $N_{Rk,p,c}$, $N_{Rk,b,c}$ see Annex B5, B6, C3, C6, C9, C12, C15, C18 $\alpha_{j,N}$ see Annex C2, C5, C8, C11, C14
Characteristic resistance to local brick failure and brick edge failure of a single screw anchor under shear loading	$V_{Rk,b,II}$, $V_{Rk,b,\perp}$, $V_{Rk,c,II}$, $V_{Rk,c,\perp}$ see Annex B5, B6, C3, C6, C9, C12, C15 $\alpha_{j,VII}$, $\alpha_{j,V\perp}$ see Annex C2, C5, C8, C11, C14, C17
Characteristic resistance to brick breakout failure of a screw anchor group under tension loading	N^g_{Rk} see Annex B5 and B6 $\alpha_{g,N}$ see Annex B5, B6, C2, C5, C8, C11, C14, C17

Essential characteristic	Performance
Characteristic resistance to local brick failure and brick edge failure of a screw anchor group under shear loading	$V^{g}_{Rk,b,II}$, $V^{g}_{Rk,b,\perp}$, $V^{g}_{Rk,c,II}$, $V^{g}_{Rk,c,\perp}$ see Annex B5 and B6 $\alpha_{g,VII}$, $\alpha_{g,V\perp}$ see Annex C2, C5, C8, C11, C14, C17
Edge distances, joint distances, spacing, member thickness	c_{cr}, s_{crII}, $s_{cr\perp}$ see Annex B5, C2, C5, C8, C11, C14, C17 c_{min}, c_{jII}, $c_{j\perp}$, s_{minII}, $s_{min\perp}$ see Annex B5, B6, C2, C5, C8, C11, C14, C17 h_{min} see Annex C2, C5, C8, C11, C14, C17
Resistance to combined tension and shear loading (hollow and perforated bricks)	Limit value X for interaction no performance assessed (NPA)
Displacements	δ_{N0}, $\delta_{N\infty}$, δ_{V0}, $\delta_{V\infty}$ see Annex C3, C6, C9, C12, C15, C18

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A 1
Resistance to fire	$N_{Rk,s,fi}$, $N_{Rk,p,fi}$, $N_{Rk,b,fi}$, $V_{Rk,s,fi}$, $M^{0}_{Rk,s,fi}$, $c_{min,fi}$, $c_{j,fi}$ see Annex C4, C7, C10, C13 $N^{g}_{Rk,fi}$, $s_{min,fi}$, $c_{min,fi}$, $c_{j,fi}$ see Annex C4, C7, C10, C13

3.3 Aspects of durability

Essential characteristic	Performance
Durability	see Annex B1

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

In accordance with the European Assessment Document EAD 330460-00-0604 the applicable European legal act is: 97/177/EC.

The system to be applied is: 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.

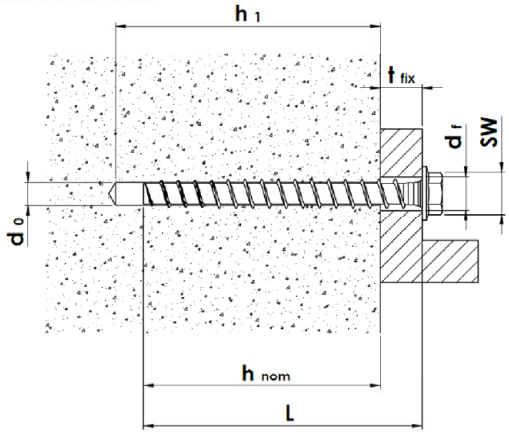
Issued in Berlin on 30 January 2024 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

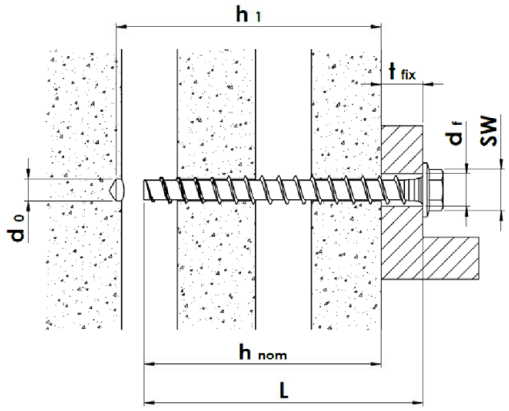
beglaubigt:
Aksünger

Deutsches Institut für Bautechnik DIBt

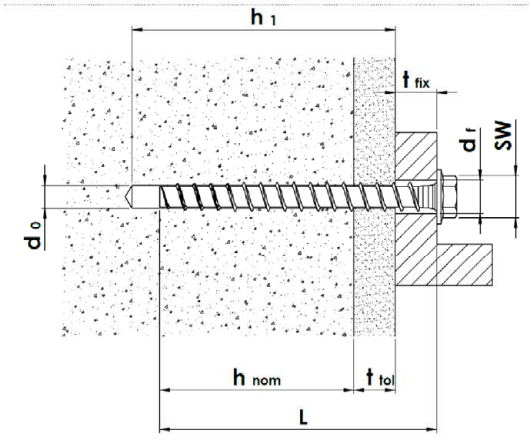
Installed condition



MMS-plus SS in solid brick masonry



MMS-plus SS in hollow brick masonry



MMS-plus SS with render bridge (solid brick masonry or hollow brick masonry)

d_0 = nominal drill hole diameter
h_{nom} = nominal embedment depth
h_1 = borehole depth
t_{fix} = thickness of fixture
d_f = diameter of clearance hole in the fixture
SW = size of drive

MULTI-MONTI-plus	**Annex A 1**
Product description Product in the installed state	

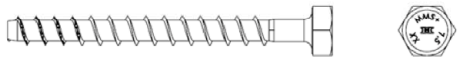
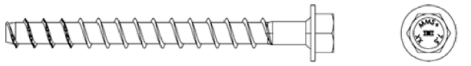
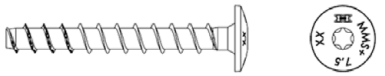
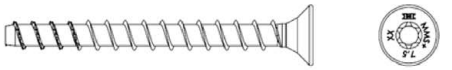
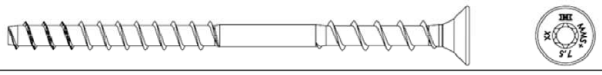
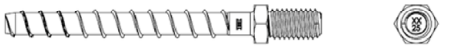
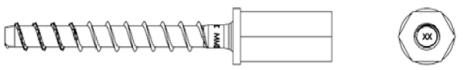
Deutsches Institut für Bautechnik DIBt

Table 1: Material and screw types

Type	Marking / Material
All types	Screw anchor / steel [1]

Size MMS-plus			6	7.5	10	12
nominal value of the characteristic yield strength	f_{yk}	[N/mm²]	640	640	640	640
nominal value of the characteristic tensile strength	f_{uk}	[N/mm²]	800	800	800	800
Elongation at rupture	A_5	[%]	≤ 8			

1) galvanized steel according EN 10263-4:2001 (multi-layered coating systems are possible)

	1) Hexagon head with and without washer (alternative design with cone under the head) **(S)**
	2) Hexagon head and combined washer **(SS)**
	3) Hexagon Head with combined washer and cone **(SSK)**
	4) PanHead **(P)**
	5) Flange head-anchor **(MS)**
	6) Countersunk **(F)**
	7) Countersunk, under head thread and single- or multi-start thread **(FT)**
	8) Cylinder Head, under head thread and single- or multi-start thread **(possible forms ZT, ST, SST & PT)**
	9) Hexagon head anchor with metric stud **(ST)**
	10) Anchor with metric stud for mounting of nuts (pre-assembled with sleeve) **(I)**
	11) Anchor with metric stud **(V)**
	12) Countersunk head with under head thread, different diameters compared to the concrete thread (other expression possible) **(TC)**

MULTI-MONTI-plus

Product description
Dimensions and screw types

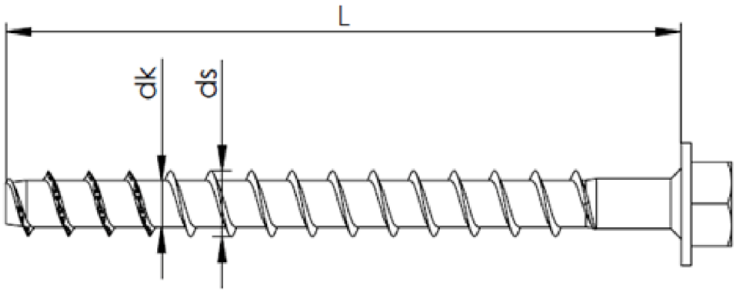
Annex A 2

Deutsches Institut für Bautechnik DIBt

Table 2: Dimensions and head markings

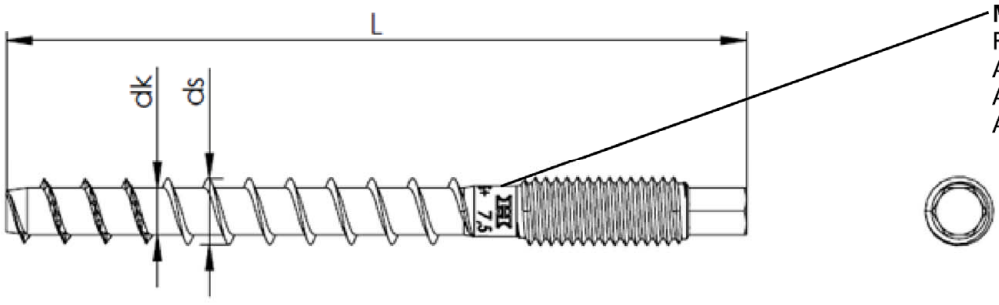
Size MMS-plus			**6**	**7.5**	**10**	**12**
Thread diameter	d_s	[mm]	6,65	7,75	10,5	12,6
Bolt diameter	d_k	[mm]	4,3	5,45	7,3	9,05
Length	L ≥	[mm]	35	35	50	75
	L ≤	[mm]	500	500	500	600

Head marking



Head marking
Factory signs: H
Anchor type: MMS+
Anchor size: e.g. 7,5
Anchor length: e.g. 80

Bolt marking



Marking
Factory signs: H
Anchor type: MMS+
Anchor size: e.g. 7,5
Anchor length: e.g. 100

MULTI-MONTI-plus

Product description
Dimensions and marking

Annex A3

Deutsches Institut für Bautechnik DIBt

Intended Use

Anchorages subject to:

Size MMS-plus			**6**		**7,5**		**10**		**12**	
Embedment depth	h_{nom}	[mm]	35	45	35	55	50[1)]	65	75	90[1)]
Head shapes			all		all		all		all	
Static and quasi static loads (all directions)			ok		ok		ok		ok	
Non-structural systems			ok		ok		ok		ok	
Fire exposure [2)]			NPA[3)]	ok	NPA[3)]	ok	NPA[3)]	ok	NPA[3)]	ok

1) Applies only to sand-lime brick XL (Annex 11, 12, 13)
2) not allowed for Screwhead I, V, TC
3) no performance assessed

Base Materials:

- Masonry units according to EN 771-1 to 3:2011+A1:2015.
- Solid masonry units see Annex C2-C7, C11-C18
- Hollow masonry units see Annex C8-C10
- In all cases horizontal joints must be filled completely with mortar according to EN 998-2:2016 with strength class at minimum M5.
- In case of fire, all joints must be filled completely with mortar according to EN 998-2:2016 with strength class at minimum M5
- Only dry masonry

Use conditions (Environmental conditions)

- Temperature range of masonry during the working life within the range -40 °C to +80 °C.
- Structures subject to dry internal conditions: All screws.

Design:

- The anchorages are to be designed in accordance with EOTA Technical Report TR 054: 2022-07, design method A under the responsibility of an engineer experienced in anchorages and masonry work.
- Screw sizes D6 and D 7,5 and nominal embedment depth smaller than 50 mm may only be used for anchoring of statically indeterminate systems.
- Verifiable calculation notes and drawings shall be prepared considering the relevant masonry in the area of anchorage, the loads to be transmitted and their transmission to the supports of the structure. The position of the ancho is indicated on the design drawings.
- The screw must be placed in the wall side of the masonry.
- The characteristic resistance of the assessed solid bricks is also valid for larger brick sizes and higher mean compressive strength and higher dry density of the masonry unit.
- For joints widths w_j > 2 mm, installation in the joint and close to the joint is not possible. Horizontal and vertical joints must be filled with mortar. The characteristic resistances are given in Annexes C3, C6, C9, C12, C15 and C18. The distances to joints c_j must comply with the Annexes C2, C5, C8, C11, C14 and C17.
- For KS XL with joints widths $w_j \leq 2$ mm; installation in the joint and close to the joint is possible if the joint factors α_j according to Annex C11 and C14 are considered. Horizontal joints must be filled with mortar, vertical joints can, but do not have to be filled with mortar.

MULTI-MONTI-plus	**Annex B1**
Intended Use Specification	

Deutsches Institut für Bautechnik DIBt

Installation:

- Hole drilling by hammer drilling or rotary drilling, with standard hammer drill bits or hollow drill bits (in accordance with Annex C). The masonry must be not damaged during hammer drilling. If cracks occur during drilling, the rotary mode must be used. In this case the hole must be aborted.
- In case of aborted hole: The hole shall be filled with high strength mortar.
- Bridging of non-bearing layer with the thickness t_{tol} (e.g.: plaster) is possible but has to be considered for choosing the length of the screw. The thickness t_{tol} of the non-bearing layer must be added to the screw-length L. Therefore, applies $L \geq h_{nom} + t_{tol} + t_{fix}$ (see Annex B2).
- Cleaning of the hole is not necessary if the driller is vented 3 times when reaching the correct drillhole depth (According B3), or when using a hollow drill with functional suction.
- Screw installation carried out by appropriately qualified personnel under the supervision of the person responsible for technical matters on side.

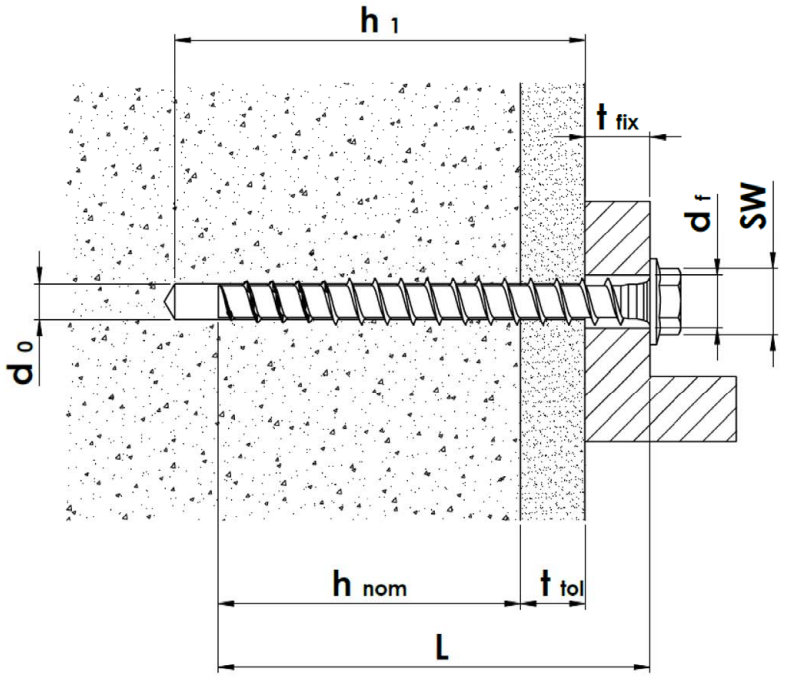
MULTI-MONTI-plus	**Annex B2**
Intended Use Specification	

Deutsches Institut für Bautechnik DIBt

Table 3: Installation parameters MULTI-MONTI-plus in masonry

Size MMS-plus			**6**		**7,5**		**10**		**12**	
Embedment depth in anchor base			h_{nom}		h_{nom}		h_{nom}		h_{nom}	
[mm]			35	45	35	55	50[1)]	65	75	90[1)]
Norminal drill hole diameter	d_0	[mm]	5		6		8		10	
Cutting diameter of drill bits	$d_{cut} \leq$	[mm]	5,40		6,40		8,45		10,45	
Drillhole depth with cleaning	$h_1 \geq$	[mm]	40	50	40	65	60	75	85	100
Drillhole depth without cleaning	$h_1 \geq$	[mm]	$\geq L - h_{nom} - t_{tol}$[2)] + 10 mm							
Clearance hole diameter	$d_f \leq$	[mm]	≤ 7		≤ 9		≤ 12		≤ 14	
Wrench size	SW	[mm]	10		10		13		15	
Thickness of fixture	$t_{fix} \leq$	[mm]	$\leq L - h_{nom} - t_{tol}$[2)]							
Maximum installation torque moment	max T_{inst}	[Nm]	See stone parameters							

1) Applies only to sand-lime brick XL (Annex C11, C12, C13, C14, C15, C16)
2) Only for installation with render bridge



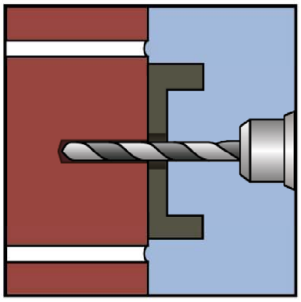
MULTI-MONTI-plus

Intended Use
Installation parameter in masonry

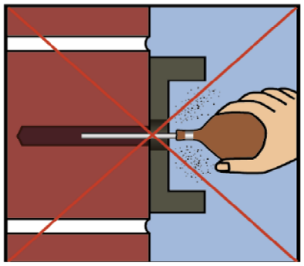
Annex B3

Deutsches Institut für Bautechnik DIBt

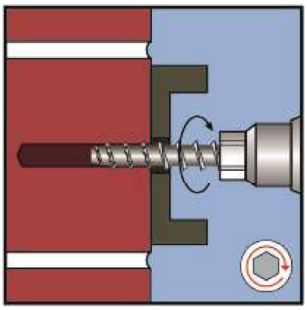
Installation instruction



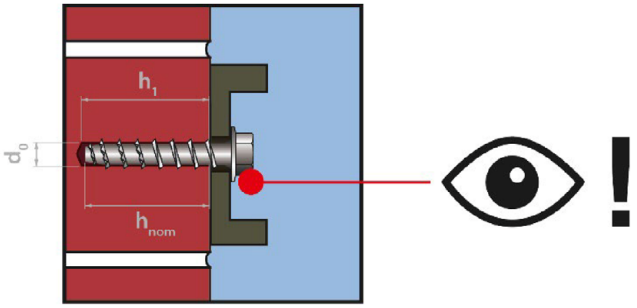
Step 1: Drill hole creation:
Solid bricks:
Drill the borehole by using a hammer drill or a hollow drill. When using a standard hammer drill, after reaching the required drill hole depth, insert the drill bit at least 3 times to the bottom of the drill hole while the machine is running and pull it out of the hole again. ("ventilate" the drill hole).
Drill hole diameter d_0 and drill hole depth h_1 according to Table 3 Annex B3.
Drilling method (hammer drilling / rotary drilling) according to specifications in Annex C



Borehole cleaning may be omitted if the borehole is drilled correspondingly deeper, or a hollow drill-bit is used - see Table 3 Annex B3.



Step 2: Installation:
Assembly of anchors by hand – refer to mounting parameters.
During installation the max. installation torque may not be exceeded – refer to mounting parameters.
Overtightening of the anchor should be avoided.
The anchor should not be able to be turned further easily after insertion is performed.
Anchors which have been overtightened may not be used for fixation of attachments.

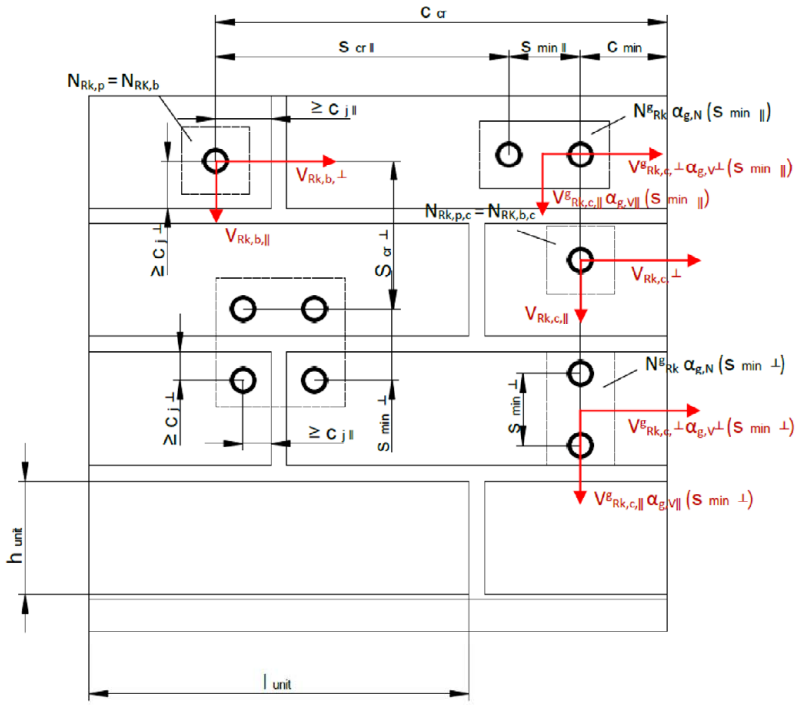


Step 3: Check for correct installation:
The head of the anchor has full contact with the attachment and is not damaged, or the required embedment depth h_{nom} in the substructure is reached (embedment depth control by measuring the anchor protrusion)
When applying anchors with connecting thread for fastening of attachments, the anchor must not rotate further whilst processing the connection (e.g. tightening of nuts).

MULTI-MONTI-plus	**Annex B4**
Intended Use Installation parameter in masonry	

Deutsches Institut für Bautechnik DIBt

Installation Positions for joint width > 2 mm
For joints width > 2 mm, the distances c_j must be observed.



c_{min}	= minimum edge distance to free edge of the wall
$c_{J\,II}$	= distance to vertical joints without influence on resistance of the screw anchor
$c_{J\,\perp}$	= distance to horizontal joints without influence on resistance of the screw anchor
$s_{min\,II}$	= minimum spacing parallel to the horizontal joint
$s_{min\,\perp}$	= minimum spacing perpendicular to the horizontal joint
c_{cr}	= edge distance for ensuring the transmission of the charact. resistance of a single screw anchor
$s_{cr\,II}$	= characteristic spacing parallel to the horizontal joint
$s_{cr\,\perp}$	= characteristic spacing perpendicular to the horizontal joint
l_{unit}	= length of the masonry unit
h_{unit}	= height of the masonry unit
$\alpha_{g,N}$	= group factor under tension load ($\alpha_{g,N} = \alpha_{g,N}$ ($s_{min\,II}$) = $\alpha_{g,N}$ ($s_{min\,\perp}$))
$\alpha_{g,V\,II}$	= group factor under shear load parallel to the edge ($\alpha_{g,V\,II} = \alpha_{g,V\,II}$ ($s_{min\,II}$) = $\alpha_{g,V\,II}$ ($s_{min\,\perp}$))
$\alpha_{g,V\,\perp}$	= group factor under shear load perpendicular to the edge ($\alpha_{g,V\,\perp} = \alpha_{g,V\,\perp}$ ($s_{min\,II}$) = $\alpha_{g,V\,\perp}$ ($s_{min\,\perp}$))

$N_{Rk} = N_{Rk,b} = N_{Rk,b,c} = N_{Rk,p,c}$

$V_{Rk,b,II} = V_{Rk,b,\perp}$

$V_{Rk,c} = V_{Rk,c,\perp} = V_{Rk,c,II}$

For $s \geq s_{cr}$: $\alpha_{g,N} = \alpha_{g,V\,II} = \alpha_{g,V\,\perp} = 2$

For $s_{min} \leq s < s_{cr}$: $\alpha_{g,N}$; $\alpha_{g,V\,II}$; $\alpha_{g,V\,\perp}$ according to installation parameter of brick in Annex C

$N^g_{Rk} = \alpha_{g,N} \bullet N_{Rk}$ (Group of 2 anchors)

$V^g_{Rk,\,II} = \alpha_{g,V\,II} \bullet V_{Rk}\,II$; $V^g_{Rk,\perp} = \alpha_{g,V\,\perp} \bullet V_{Rk\perp}$ (Group of 2 anchors)

$N^g_{Rk} = \alpha_{g,N}{}^2 \bullet N_{Rk}$ (Group of 4 anchors)

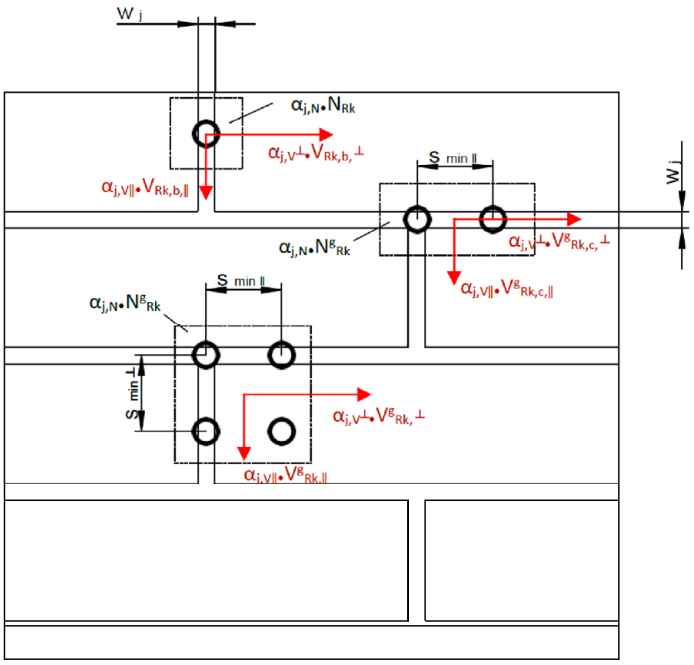
$V^g_{Rk,\,II} = \alpha_{g,V\,II}{}^2 \bullet V_{Rk}\,II$; $V^g_{Rk,\perp} = \alpha_{g,V\,\perp}{}^2 \bullet V_{Rk\perp}$ (Group of 4 anchors)

MULTI-MONTI-plus

Intended use
Installation position in masonry

Annex B5

Installation Positions for joint width ≤ 2 mm
The joint factors on α_j in accordance with Annex C and the group factors of Annex B6 must be taken into account.



w_j	= maximum permissible joint width for application below $c_{j\,\parallel}$, $c_{j\,\perp}$, the joint in which the screw is screwed in applies. In the case of cross joints, the less favorable applies
$c_{j\,\parallel}$	= distance to vertical joints without influence on resistance of the screw anchor
$c_{j\,\perp}$	= distance to horizontal joints without influence on resistance of the screw anchor
$\alpha_{j,N}$	= reduction factor under tension load for screw anchors influenced by joints
$\alpha_{j,V\,\parallel}$	= reduction factor under shear load parallel to the vertical joint for screw anchors influenced by joints
$\alpha_{j,V\,\perp}$	= reduction factor under shear load perpendicular to the vertical joint for screw anchors influenced by joints

$N_{Rk} = N_{Rk,b} = N_{Rk,b,c} = N_{Rk,p,c}$
$V_{Rk,b,\parallel} = V_{Rk,b,\perp}$
$V_{Rk,c} = V_{Rk,c,\perp} = V_{Rk,c,\parallel}$

For setting position with joint spacing $c < c_{j,\parallel}$, $c_{j\,\perp}$ and $w_j \leq 2$ and $w_j > 2$-10mm:

$N^{j}_{Rk} = \alpha_{j,N} \bullet N_{Rk}$ (single anchor)
$V^{j}_{Rk,\parallel} = \alpha_{j,V\,\parallel} \bullet V_{Rk\,\parallel}$; $V^{j}_{Rk,\perp} = \alpha_{j,V\,\perp} \bullet V_{Rk\perp}$ (single anchor)
$N^{jg}_{Rk} = \alpha_{j,N} \bullet N^{g}_{Rk}$ (Group of 2 anchors)
$V^{jg}_{Rk,\parallel} = \alpha_{j,V\,\parallel} \bullet V^{g}_{Rk\,\parallel}$; $Vj^{g}_{Rk,\perp} = \alpha_{j,V\,\perp} \bullet V^{g}_{Rk\perp}$ (Group of 2 anchors)

MULTI-MONTI-plus

Intended use
Installation position in masonry

Annex B6

Deutsches Institut für Bautechnik DIBt

Table C1: Characteristic resistance to steel failure of MMS-plus

Size MMS-plus			**6**		**7,5**		**10**		**12**	
			h_{nom}		h_{nom}		h_{nom}		h_{nom}	
Embedment depth in anchor base		[mm]	35	45	35	55	50[1)]	65	75	90[1)]
Characteristic resistance to steel failure under tension- and shear loading										
Characteristic resistance	$N_{Rk,s}$	[kN]	10,8		17,6		32,1		49,9	
Partial factor	$\gamma_{Ms,N}$	-	1,50							
Characteristic resistance	$V_{Rk,s}$	[kN]	4,1		6,1		13,7		24,1	
Partial factor	$\gamma_{Ms,V}$	-	1,25							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	6,7		14,1		34,5		66,8	

1) Applies only to sand-lime brick XL (Annex C11, C12, C13, C14, C15, C16)

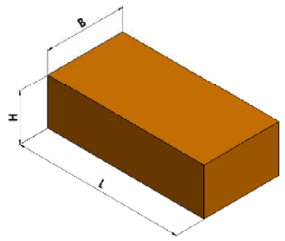
MULTI-MONTI-plus

Performance
Characteristic resistance parameters of the screw anchor
Spacing and edge distance of the screw anchor

Annex C1

Deutsches Institut für Bautechnik DIBt

Solid brick Mz, ≥ NF, EN 771-1:2015-11



Standard: Solid brick Mz, ≥ NF, EN 771-1: 2015-11

Nominal dimensions [mm]	length L h_{min}	width B	heigth H
	240	115	71
Mean gross density ρ [kg/dm³]	≥ 1,8		
Mean compressive strength / Min. compressive strength single brick[1)] [N/mm²]	35/28		

1) The compressive strength of a single brick must not be less than 80% of the mean compressive strength

Table C2.1: Installation parameters

Size			6		7,5		10	12
General Installation parameters								
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
Maximum installation torque	max T_{inst}	[Nm]	3		3		6	10
Setting tool	hand assembly							
Edge distance and spacing								
Min. edge distance to free edge	c_{min}	[mm]	80					
Min. spacing	$s_{min\,II} = s_{min\perp}$	[mm]	80					
Characteristic spacing	c_{cr}	[mm]	80	80	80	82,5	97,5	112
	$s_{cr\,II}$	[mm]	240					
	$s_{cr\perp}$	[mm]	80					
Drilling mode								
Hammer drilling or rotary drilling with standard hammer drill bit or hollow drill bit								

Table C2.2: Group factors

Size			6	7,5	10	12
Group factor	$\alpha_{g,N}$	-	1,0			
	$\alpha_{g,VII} = \alpha_{g,V\perp}$	-	1,36			

Table C2.3: Reduction factors depending on the distance to joints and the joint width

Size			6	7,5	10	12	6	7,5	10	12
Max. joint width	w_j	[mm]	> 2-10				≤ 2			
Distance to joints	$c_{j\perp}$	[mm]	≥ 35				≥ 35			
	$c_{j\,II}$	[mm]	≥ c_{cr}				≥ c_{cr}			
Joint factor	$\alpha_{j,N}$	[-]	1 (full resistance)				1 (full resistance)			
	$\alpha_{j,VII} = \alpha_{j,V\perp}$	[-]	1 (full resistance)				1 (full resistance)			
Distance to joints	$c_{j\perp}$	[mm]	< 35				< 35			
	$c_{j\,II}$	[mm]	< c_{cr}				< c_{cr}			
Joint factor	$\alpha_{j,N}$	[-]	0 (screw must not be used)				0 (screw must not be used)			
	$\alpha_{j,VII} = \alpha_{j,V\perp}$	[-]	0 (screw must not be used)				0 (screw must not be used)			

MULTI-MONTI-plus

Performance
Solid brick Mz ≥ NF, dimensions, installation parameters, distances, group and joint factors

Annex C2

Deutsches Institut für Bautechnik DIBt

Solid brick Mz, ≥ NF, EN 771-1:2015-11

Table C3.1: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

Size			6		7,5		10	12
Characteristic tension resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]					
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
≥ 35/28			1,7	2,4	1,50	2,1	4,6	4,1

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C3.2: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

Size			6		7,5		10	12
Characteristic shear resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$V_{Rk,b} = V_{Rk,b,\perp} = V_{Rk,b,\parallel}$ [kN]					
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
≥ 35/28			3,5	3,0	3,8	3,7	7,1	10,2
			$V_{Rk,c} = V_{Rk,c,\perp} = V_{Rk,c,\parallel}$ [kN]					
			3,0	3,0	2,0	2,5	3,5	1,5

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C3.3: Displacements under tension and shear loads

Size			6		7,5		10	12
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
Tension load	F_N	[kN]	0,49	0,69	0,43	0,60	1,31	1,17
Displacement under tension load	δ_{N0}	[mm]	0,03	0,03	0,07	0,03	0,09	0,05
	$\delta_{N\infty}$		0,06	0,06	0,14	0,06	0,18	0,10
Shear load	$F_{V\parallel} = F_{V\perp}$	[kN]	1,0	0,86	1,09	1,06	2,03	2,91
Displacement under shear load	δ_{V0}	[mm]	1,16	1,12	1,12	1,09	1,12	1,57
	$\delta_{V\infty}$		1,74	1,68	1,68	1,64	1,68	2,36

MULTI-MONTI-plus

Performance
Solid brick Mz ≥ NF, characteristic resistance under tension and shear loading, displacements

Annex C3

Deutsches Institut für Bautechnik DIBt

Solid brick Mz, ≥ NF, EN 771-1:2015-11

Table C4.1: Characteristic resistance of a single screw anchor under fire exposure

Size			6	7,5	10	12
Nominal embedment depth	h_{nom}	[mm]	45	55	65	75
Characteristic resistance to steel failure under tension loading and shear loading under fire exposure						
$N_{Rk,s,fi} = V_{Rk,s,fi}$	[kN]	R30	0,47	0,81	1,74	5,53
		R60	0,39	0,66	1,37	4,12
		R90	0,30	0,52	0,99	2,71
		R120	0,26	0,45	0,81	2,00
Characteristic bending moment under fire exposure						
$M^0_{Rk,s,fi}$	[Nm]	R30	0,29	0,67	1,91	7,51
		R60	0,24	0,55	1,50	5,59
		R90	0,18	0,42	1,09	3,67
		R120	0,16	0,37	0,89	2,72
Characteristic resistance to pull-out failure and local brick failure under fire exposure						
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]	[N/mm²]	-	35/28			
$N_{Rk,p,fi} = N_{Rk,b,fi}$	[kN]	R30	0,15	0,2	0,25	0,25
		R60	0,15	0,2	0,25	0,25
		R90	0,15	0,2	0,25	0,25
		R120	0,1	0,15	0,2	0,2
Min. edge distance	[mm]	$c_{min,fi}$	2 x h_{nom}			
Characteristic edge distance and spacing		$c_{cr,fi}$	2 x h_{nom}			
		$s_{cr,fi}$	2 x $c_{cr,fi}$			
Distance to joints		$c_{j,\perp,fi}$	≥ 35			
		$c_{j\,II,fi}$	≥ 120			

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

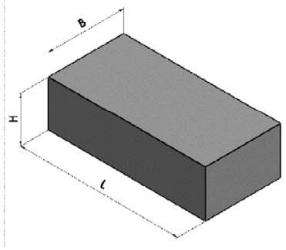
MULTI-MONTI-plus

Performance
Solid brick Mz ≥ NF, characteristic resistance under fire exposure

Annex C4

Deutsches Institut für Bautechnik DIBt

Solid brick KS, ≥ NF, EN 771-2:2015-11



Standard: Solid brick KS, ≥ NF, EN 771-2: 2015-11			
Nominal dimensions [mm]	length L h_{min}	width B	heigth H
	240	115	71
Mean gross density ρ [kg/dm³]	≥ 2,0		
Mean compressive strength/ Min. compressive strength single brick[1] [N/mm²]	25/20		

1) The compressive strength of a single brick must not be less than 80% of the mean compressive strength

Table C5.1: Installation parameters

Size			6		7,5		10	12
General Installation parameters								
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
Maximum installation torque	max T_{inst}	[Nm]	2,0	2,0	2,0	2,0	10	10
Setting tool	hand assembly							
Edge distance and spacing								
Min. edge distance to free edge	c_{min}	[mm]	80					
Min. spacing	$s_{min\,II} = s_{min\perp}$		80					
Characteristic spacing	c_{cr}		80	80	80	82,5	97,5	112,5
	$s_{cr\,II}$		240					
	$s_{cr\perp}$		80					
Drilling mode								
Hammer drilling or rotary drilling with standard hammer drill bit or hollow drill bit								

Table C5.2: Group factors

Size			6	7,5	10	12
Group factor	$\alpha_{g,N}$		1,0			
	$\alpha_{g,VII} = \alpha_{g,V\perp}$		1,06			

Table C5.3: Reduction factors depending on the distance to joints and the joint width

Size			6	7,5	10	12	6	7,5	10	12
Max. joint width	w_j	[mm]	> 2-10				≤ 2			
Distance to joints	$c_{j\perp}$	[mm]	≥ 35				≥ 35			
	$c_{j\,II}$		≥ c_{cr}				≥ c_{cr}			
Joint factor	$\alpha_{j,N}$	[-]	1 (full resistance)				1 (full resistance)			
	$\alpha_{j,VII} = \alpha_{j,V\perp}$									
Distance to joints	$c_{j\perp}$	[mm]	< 35				< 35			
	$c_{j\,II}$		< c_{cr}				< c_{cr}			
Joint factor	$\alpha_{j,N}$	[-]	0 (screw must not be used)				0 (screw must not be used)			
	$\alpha_{j,VII} = \alpha_{j,V\perp}$									

MULTI-MONTI-plus

Performance
Solid brick KS ≥ NF, dimensions, installation parameters, distances, group and joint factors

Annex C5

Deutsches Institut für Bautechnik DIBt

Solid brick KS, ≥ NF, EN 771-2:2015-11

Table C6.1: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

Size			6		7,5		10	12
Characteristic tension resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]					
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
≥ 25/20			2,4	2,6	1,6	3,4	3,7	3,2

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C6.2: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

Size			6		7,5		10	12
Characteristic shear resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$V_{Rk,b} = V_{Rk,b,\perp} = V_{Rk,b,\parallel}$ [kN]					
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
≥ 25/20			3,0	4,9	4,7	4,7	10,6	11,7
			$V_{Rk,c} = V_{Rk,c,\perp} = V_{Rk,c,\parallel}$ [kN]					
			1,5	1,5	1,5	2,0	1,2	1,2

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C6.3: Displacements under tension and shear loads

Size			6		7,5		10	12
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
Tension load	F_N	[kN]	0,69	0,74	0,46	1,23	1,29	1,29
Displacement under tension load	δ_{N0}	[mm]]	0,05	0,04	0,04	0,21	0,11	0,06
	$\delta_{N\infty}$		0,10	0,08	0,08	0,42	0,22	0,12
Shear load	$F_{V\parallel} = F_{V\perp}$	[kN]	0,86	1,40	1,34	1,34	3,03	3,34
Displacement under shear load	δ_{V0}	[mm]	1,20	1,10	1,29	0,82	0,93	1,41
	$\delta_{V\infty}$		1,80	1,65	1,94	1,23	1,39	2,12

MULTI-MONTI-plus

Performance
Solid brick KS ≥ NF, characteristic resistance under tension and shear loading, displacements

Annex C6

Deutsches Institut für Bautechnik DIBt

Solid brick KS, ≥ NF, EN 771-2:2015-11

Table C7.1: Characteristic resistance of a single screw anchor under fire exposure

Size			6	7,5	10	12
Nominal embedment depth	h_{nom}	[mm]	45	55	65	75
Characteristic resistance to steel failure under tension loading and shear loading under fire exposure						
$N_{Rk,s,fi} = V_{Rk,s,fi}$	[kN]	R30	0,47	0,81	1,74	5,53
		R60	0,39	0,66	1,37	4,12
		R90	0,30	0,52	0,99	2,71
		R120	0,26	0,45	0,81	2,00
Characteristic bending moment under fire exposure						
$M^0_{Rk,s,fi}$	[Nm]	R30	0,29	0,67	1,91	7,51
		R60	0,24	0,55	1,50	5,59
		R90	0,18	0,42	1,09	3,67
		R120	0,16	0,37	0,89	2,72
Characteristic resistance to pull-out failure and local brick failure under fire exposure						
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]	[N/mm²]	-	25/20			
$N_{Rk,p,fi} = N_{Rk,b,fi}$	[kN]	R30	0,15	0,2	0,15	0,15
		R60	0,15	0,2	0,15	0,15
		R90	0,15	0,2	0,15	0,15
		R120	0,1	0,15	0,1	0,1
Min. edge distance	[mm]	$c_{min,fi}$	$2 \times h_{nom}$			
Characteristic edge distance and spacing		$c_{cr,fi}$	$2 \times h_{nom}$			
		$s_{r,fi}$	$2 \times c_{cr,fi}$			
Distance to joints		$c_{j,\perp,fi}$	≥ 35			
		$c_{j\,II,fi}$	≥ 120			

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

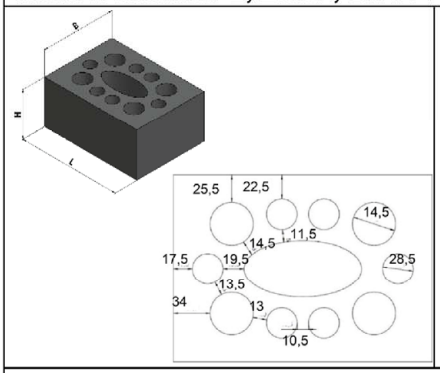
MULTI-MONTI-plus

Performance
Solid brick KS ≥ NF, characteristic resistance under fire exposure

Annex C7

Deutsches Institut für Bautechnik DIBt

Hollow brick KS L, ≥ 3DF, EN 771-2:2015-11



Standard: Hollow brick KS L, ≥ 3DF, EN 771-2: 2015-11			
Nominal dimensions [mm]	length L h_{min}	width B	heigth H
	240	175	113
Mean gross density ρ [kg/dm³]	1,4		
Mean compressive strength/ Min. compressive strength single brick[1] [N/mm²]	15/12		

1) The compressive strength of a single brick must not be less than 80% of the mean compressive strength

Table C8.1: Installation parameters

Size			6		7,5		10	12
General Installation parameters								
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
Maximum installation torque	max T_{inst}	[Nm]	1,0	1,0	2,0	2,0	5,0	5,0
Setting tool	hand assembly							
Edge distance and spacing								
Min. edge distance to free edge	c_{min}	[mm]	58					
Min. spacing	$s_{min\,II} = s_{min\perp}$		80					
Characteristic spacing	c_{cr}		58	67,5	58	82,5	97,5	112
	$s_{cr\,II}$		240					
	$s_{cr\perp}$		113					
Drilling mode								
Hammer drilling or rotary drilling with standard hammer drill bit or hollow drill bit								

Table C8.2: Group factors

Size			6	7,5	10	12
Group factor	$\alpha_{g,N}$		0,84			
	$\alpha_{g,VII} = \alpha_{g,V\perp}$		1,69			

Table C8.3: Reduction factors depending on the distance to joints and the joint width

Size			6	7,5	10	12	6	7,5	10	12
Max. joint width	w_j	[mm]	> 2-10				≤ 2			
Distance to joints	$c_{j\perp}$	[mm]	≥ 57				≥ 57			
	$c_{j\,II}$		≥ c_{cr}				≥ c_{cr}			
Joint factor	$\alpha_{j,N}$	[-]	1 (full resistance)				1 (full resistance)			
	$\alpha_{j,VII} = \alpha_{j,V\perp}$									
Distance to joints	$c_{j\perp}$	[mm]	< 57				< 57			
	$c_{j\,II}$		< c_{cr}				< c_{cr}			
Joint factor	$\alpha_{j,N}$	[-]	0 (screw must not be used)				0 (screw must not be used)			
	$\alpha_{j,VII} = \alpha_{j,V\perp}$									

MULTI-MONTI-plus

Performance
Hollow brick KS L ≥ 3DF, dimensions, installation parameters, distances, group and joint factors

Annex C8

Deutsches Institut für Bautechnik DIBt

Hollow brick KS L, ≥ 3DF, EN 771-2:2015-11

Table C9.1: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

Size			6		7,5		10	12
Characteristic tension resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]					
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
≥ 15/12			1,3		1,5		2,2	2,2

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C9.2: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

Size			6		7,5		10	12
Characteristic shear resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$V_{Rk,b} = V_{Rk,b,\perp} = V_{Rk,b,\parallel}$ [kN]					
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
≥ 15/12			2,7	2,7	3,7	3,7	8,0	8,0
			$V_{Rk,c} = V_{Rk,c,\perp} = V_{Rk,c,\parallel}$ [kN]					
			2,5	2,5	2,0	2,0	2,0	2,0

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C9.3: Displacements under tension and shear loads

Size			6		7,5		10	12
Nominal embedment depth	h_{nom}	[mm]	35	45	35	55	65	75
Tension load	F_N	[kN]	0,37	0,37	0,49	0,49	0,66	0,66
Displacement under tension load	δ_{N0}	[mm]]	0,04	0,02	0,07	0,07	0,08	0,07
	$\delta_{N\infty}$		0,08	0,07	0,14	0,14	0,16	0,14
Shear load	$F_{V\parallel} = F_{V\perp}$	[kN]	0,77	0,77	1,06	1,06	2,29	2,29
Displacement under shear load	δ_{V0}	[mm]	1,17	1,11	1,07	0,81	0,74	0,73
	$\delta_{V\infty}$		1,76	1,67	1,61	1,22	1,11	1,10

MULTI-MONTI-plus

Performance
Hollow brick KS L ≥ 3DF, characteristic resistance under tension and shear loading, displacements

Annex C9

Deutsches Institut für Bautechnik DIBt

Hollow brick KS L, ≥ 3DF, EN 771-2:2015-11

Table C10.1: Characteristic resistance of a single screw anchor under fire exposure

Size			6	7,5	10	12
Nominal embedment depth	h_{nom}	[mm]	45	55	65	75
Characteristic resistance to steel failure under tension loading and shear loading under fire exposure						
$N_{Rk,s,fi} = V_{Rk,s,fi}$	[kN]	R30	0,47	0,81	1,74	5,53
		R60	0,39	0,66	1,37	4,12
		R90	0,30	0,52	0,99	2,71
		R120	0,26	0,45	0,81	2,00
Characteristic bending moment under fire exposure						
$M^0_{Rk,s,fi}$	[Nm]	R30	0,29	0,67	1,91	7,51
		R60	0,24	0,55	1,50	5,59
		R90	0,18	0,42	1,09	3,67
		R120	0,16	0,37	0,89	2,72
Characteristic resistance to pull-out failure and local brick failure under fire exposure						
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]	[N/mm²]		≥ 15/12			
$N_{Rk,p,fi} = N_{Rk,b,fi}$	[kN]	R30	0,15	0,15	0,25	0,25
		R60	0,15	0,15	0,25	0,25
		R90	0,15	0,15	0,25	0,25
		R120	0,1	0,1	0,2	0,2
Min. edge distance	[mm]	$c_{min,fi}$	2 x h_{nom}			
Characteristic edge distance and spacing		$c_{cr,fi}$	2 x h_{nom}			
		$s_{r,fi}$	2 x $c_{cr,fi}$			
Distance to joints		$c_{j,\perp,fi}$	≥ 57			
		$c_{j\,II,fi}$	≥ 120			

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

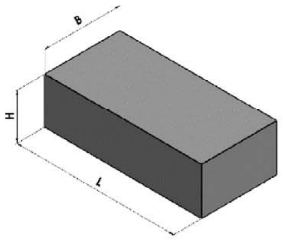
MULTI-MONTI-plus

Performance
Hollow brick KS L ≥ 3DF, characteristic resistance under fire exposure

Annex C10

Deutsches Institut für Bautechnik DIBt

Solid brick KS XL, EN 771-2:2015-11



Standard: Solid brick KS XL, EN 771-2: 2015-11			
Nominal dimensions [mm]	length L h_{min}	width B	heigth H
	248	175	498
Mean gross density ρ [kg/dm³]	2,0		
Mean compressive strength/ Min. compressive strength single brick[1] [N/mm²]	25/20		

1) The compressive strength of a single brick must not be less than 80% of the mean compressive strength

Table C11.1: Installation parameters for diameter 6,10 and 12 mm

Size			6		10		12	
General Installation parameters								
Nominal embedment depth	h_{nom}	[mm]	35	45	50	65	75	90
Maximum installation torque	max T_{inst}	[Nm]	4,0		10		10	
Setting tool	hand assembly							
Edge distance and spacing								
Characteristic spacing	c_{cr}	[mm]	1,5 x h_{nom}					
	$s_{cr\,II} = s_{cr\,\perp}$		3 x h_{nom}					
Min. edge distance to free edge	c_{min}		30		40		50	
Min. spacing	$s_{min\,II} = s_{min\,\perp}$		3 x h_{nom}		3 x h_{nom}		3 x h_{nom}	
Drilling mode								
Hammer drilling or rotary drilling with standard hammer drill bit or hollow drill bit								

Table C11.3: Reduction factors depending on the distance to joints and the joint width

Size			6	10	12	6	10	12
Max. joint width	w_j	[mm]	> 2-10			≤ 2		
Distance to joints	$c_{j\,\perp}$	[mm]	≥ c_{cr}			≥ c_{cr}		
	$c_{j\,II}$		≥ c_{cr}			≥ c_{cr}		
Joint factor	$\alpha_{j,N}$	[-]	1 (full resistance)			1 (full resistance)		
	$\alpha_{j,VII} = \alpha_{j,V\perp}$							
Distance to joints	$c_{j\,\perp}$	[mm]	< c_{cr}			< c_{cr}		
	$c_{j\,II}$		< c_{cr}			< c_{cr}		
Joint factor	$\alpha_{j,N}$	[-]	0 (not permitted)			0,5		
	$\alpha_{j,VII} = \alpha_{j,V\perp}$					0,75		

MULTI-MONTI-plus

Performance
Solid brick KS XL, dimensions, installation parameters, distances, group and joint factors

Annex C11

Deutsches Institut für Bautechnik DIBt

Solid brick KS XL, EN 771-2:2015-11

Table C12.1: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

Size			6		10		12	
Characteristic tension resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]					
Nominal embedment depth	h_{nom}	[mm]	35	45	50	65	75	90
≥ 25/20			3,0	4,6	6,9	9,5	11,9	11,9

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C12.2: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

Size			6		10		12	
Characteristic shear resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$V_{Rk,b} = V_{Rk,b,\perp} = V_{Rk,b,\parallel}$ [kN]					
Nominal embedment depth	h_{nom}	[mm]	35	45	50	65	75	90
≥ 25/20			4,6	5,2	12	10,3	12	12
			$V_{Rk,c} = V_{Rk,c,\perp} = V_{Rk,c,\parallel}$ [kN]					
Min. edge distance to free edge	c_{min}	[mm]	30		40		50	
			2,0	2,0	3,0	3,5	5,5	5,5

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C12.3: Displacements under tension and shear loads

Size			6		10		12	
Nominal embedment depth	h_{nom}	[mm]	35	45	50	65	75	90
Tension load	F_N	[kN]	0,86	1,31	1,97	3,09	3,74	3,74
Displacement under tension load	δ_{N0}	[mm]	0,21	0,23	0,16	0,34	0,33	0,29
	$\delta_{N\infty}$		0,42	0,46	0,32	0,68	0,66	0,58
Shear load	$F_{V\parallel} = F_{V\perp}$	[kN]	1,31	1,49	3,43	2,94	6,0	6,0
Displacement under shear load	δ_{V0}	[mm]	1,08	1,19	0,91	0,88	1,85	1,48
	$\delta_{V\infty}$		1,62	1,79	1,37	1,32	2,78	2,22

MULTI-MONTI-plus

Performance
Solid brick KS XL, characteristic resistance under tension and shear loading, displacements

Annex C12

Deutsches Institut für Bautechnik DIBt

Solid brick KS XL, EN 771-2:2015-11

Table C13.1: Characteristic resistance of a single screw anchor under fire exposure

Size			6	10	12
Nominal embedment depth	h_{nom}	[mm]			
Characteristic resistance to steel failure under tension loading and shear loading under fire exposure					
$N_{Rk,s,fi} = V_{Rk,s,fi}$	[kN]	R30	0,47	1,74	5,53
		R60	0,39	1,37	4,12
		R90	0,30	0,99	2,71
		R120	0,26	0,81	2,00
Characteristic bending moment under fire exposure					
$M^0_{Rk,s,fi}$	[Nm]	R30	0,29	1,91	7,51
		R60	0,24	1,50	5,59
		R90	0,18	1,09	3,67
		R120	0,16	0,89	2,72
Characteristic resistance to pull-out failure and local brick failure under fire exposure					
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]	[N/mm²]	-	25/20		
$N_{Rk,b,fi} = N_{Rk,p,fi}$	[kN]	R30	0,15		
		R60	0,15		
		R90	0,15		
		R120	0,1		
Min. edge distance	[mm]	$c_{min,fi}$	2 x h_{nom}		
Characteristic edge distance and spacing		$c_{cr,fi}$	2 x h_{nom}		
		$s_{r,fi}$	2 x $c_{cr,fi}$		
Distance to joints		$c_{j,\perp,fi}$	≥ 35		
		$c_{j\,||,fi}$	≥ 120		

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

MULTI-MONTI-plus

Performance
Solid brick KS XL, characteristic resistance under fire exposure

Annex C13

Deutsches Institut für Bautechnik DIBt

Table C14.1:	Installation parameters for diameter 7,5 mm									
Size			7,5							
General Installation parameters										
Nominal embedment depth	$h_{nom} = h_{ef}$	[mm]	35			55				
Maximum installation torque	max T_{inst}	[Nm]	4,0							
Setting tool	hand assembly									
Edge distance and spacing										
Characteristic spacing	c_{cr}	[mm]	1,5 x h_{nom}							
	$s_{cr\,II} = s_{cr\,\perp}$		3 x h_{nom}							
Min. edge distance to free edge	c_{min}		30	40	50	30	40	50		
Drilling mode										
Hammer drilling or rotary drilling with standard hammer drill bit or hollow drill bit										

Table C11.2:	Group factors								
Size			7,5						
Nominal embedment depth	h_{nom}	[mm]	35			55			
Min. spacing	$s_{min\,II} = s_{min\perp}$		35			35			
Min. edge distance to free edge	c_{min}	[mm]	30	40	50	30	40	50	
Group factor	$\alpha_{g,N}$		NPA [1]	1,08	1,16	NPA [1]	1,06	1,0	
	$\alpha_{g,VII} = \alpha_{g,V\perp}$		NPA [1]	0,54	0,58	NPA [1]	0,55	0,63	

Table C11.3:	Reduction factors depending on the distance to joints and the joint width			
Size			7,5	7,5
Max. joint width	w_j	[mm]	> 2-10	≤ 2
Distance to joints	$c_{j\perp}$	[mm]	≥ c_{cr}	≥ c_{cr}
	$c_{j\,II}$		< c_{cr}	< c_{cr}
Joint factor	$\alpha_{j,N}$	[-]	1 (full resistance)	1 (full resistance)
	$\alpha_{j,VII} = \alpha_{j,V\perp}$			
Distance to joints	$c_{j\perp}$	[mm]	< c_{cr}	< c_{cr}
	$c_{j\,II}$		< c_{cr}	< c_{cr}
Joint factor	$\alpha_{j,N}$	[-]	0 (not permitted)	0,5
	$\alpha_{j,VII} = \alpha_{j,V\perp}$			0,75

[1] No performance assessed

MULTI-MONTI-plus

Performance
Solid brick KS XL, dimensions, installation parameters, distances, group and joint factors

Annex C14

Deutsches Institut für Bautechnik DIBt

Solid brick KS XL, EN 771-2:2015-11

Table C15.1: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading for diameter 7,5 mm

Size x embedment depth		[mm]	7,5 x 35			7,5 x 55		
Characteristic tension resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]					
Min. edge distance to free edge	c_{min}	[mm]	30	40	50	30	40	50
≥ 25/20			3,8			5,6	7,5	

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C15.2: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading for diameter 7,5 mm

Size x embedment depth		[mm]	7,5 x 35			7,5 x 55		
Characteristic shear resistance depending on the mean compressive strength of the brick								
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$V_{Rk,b} = V_{Rk,b,\perp} = V_{Rk,b,\parallel}$ [kN]					
Min. edge distance to free edge	c_{cr}	[mm]	52,5			82,5		
≥ 25/20			4,90			6,10		
			$V_{Rk,c} = V_{Rk,c,\perp} = V_{Rk,c,\parallel}$ [kN]					
Min. edge distance to free edge	c_{min}	[mm]	30	40	50	30	40	50
≥ 25/20			1,50	4,50	4,50	2,00	5,50	NPA [2]

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

[2] No performance assessed

Table C15.3: Displacements under tension and shear loads for diameter 7,5 mm

Size				7,5	
Nominal embedment depth		h_{nom}	[mm]	35	55
Tension load		F_N	[kN]	1,09	2,14
Displacement under tension load		δ_{N0}	[mm]	0,27	0,28
		$\delta_{N\infty}$		0,54	0,56
Shear load		$F_{V\parallel} = F_{V\perp}$	[kN]	1,40	1,74
Displacement under shear load		δ_{V0}	[mm]	0,82	0,87
		$\delta_{V\infty}$		1,23	1,31

MULTI-MONTI-plus

Performance
Solid brick KS XL, characteristic resistance under tension and shear loading, displacements

Annex C15

Deutsches Institut für Bautechnik DIBt

Solid brick KS XL, EN 771-2:2015-11			
Table C16.1:	Characteristic resistance of a single screw anchor under fire exposure for diameter 7,5 mm		
Size			7,5
Nominal embedment depth	h_{nom}	[mm]	55
Characteristic resistance to steel failure under tension loading and shear loading under fire exposure			
$N_{Rk,s,fi} = V_{Rk,s,fi}$	[kN]	R30	0,81
		R60	0,66
		R90	0,52
		R120	0,45
Characteristic bending moment under fire exposure			
$M^0_{Rk,s,fi}$	[Nm]	R30	0,67
		R60	0,55
		R90	0,42
		R120	0,37
Characteristic resistance to pull-out failure and local brick failure under fire exposure			
Mean compressive strength / Min. compressive strength of single brick[1)] [N/mm²]	[N/mm²]	-	25/20
$N_{Rk,b,fi} = N_{Rk,p,fi}$	[kN]	R30	0,2
		R60	0,2
		R90	0,2
		R120	0,15
Min. edge distance	[mm]	$c_{min,fi}$	2 x h_{nom}
Characteristic edge distance and spacing		$c_{cr,fi}$	2 x h_{nom}
		$s_{r,fi}$	2 x $c_{cr,fi}$
Distance to joints		$c_{j,\perp,fi}$	≥ 35
		$c_{j\,II,fi}$	≥ 120

[1)] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

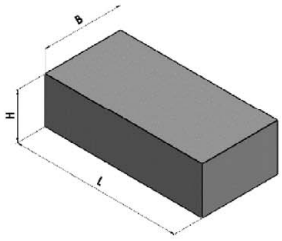
MULTI-MONTI-plus

Performance
Solid brick KS XL, characteristic resistance under fire exposure

Annex C16

Deutsches Institut für Bautechnik DIBt

Solid brick VBL, ≥ 2DF, EN 771-3:2015-11



Standard: Solid brick VBL, ≥ 2DF, EN 771-3: 2015-11			
Producer			
Nominal dimensions [mm]	length L h_{min}	width B	heigth H
	240	115	113
Mean gross density ρ [kg/dm³]	≥ 0,8		
Mean compressive strength/ Min. compressive strength single brick[1] [N/mm²]	2,5/2		

1) The compressive strength of a single brick must not be less than 80% of the mean compressive strength

Table C17.1: Installation parameters

Size			10	12
General Installation parameters				
Nominal embedment depth	h_{nom}	[mm]	65	75
Maximum installation torque	max T_{inst}	[Nm]	2,0	2,0
Setting tool	hand assembly			
Edge distance and spacing				
Min. edge distance to free edge	c_{min}	[mm]	80	
Min. spacing	$s_{min\,II} = s_{min\perp}$		No performance assessed	
Characteristic spacing	c_{cr}		1,5 x h_{nom}	
	$s_{cr\,II} = s_{cr\perp}$		3,0 x h_{nom}	
Drilling mode				
Hammer drilling or rotary drilling with standard hammer drill bit or hollow drill bit				

Table C17.2: Group factors

Size			10	12
Group factor	$\alpha_{g,N}$		No performance assessed	
	$\alpha_{g,VII} = \alpha_{g,V\perp}$		No performance assessed	

Table C17.3: Reduction factors depending on the distance to joints and the joint width

Size			10	12	10	12
Max. joint width	w_j	[mm]	> 2-10		≤ 2	
Distance to joints	$c_{j\perp}$	[mm]	≥ 57		≥ 57	
	$c_{j\,II}$		≥ c_{cr}		≥ c_{cr}	
Joint factor	$\alpha_{j,N}$	[-]	1 (full resistance)		1 (full resistance)	
	$\alpha_{j,VII} = \alpha_{j,V\perp}$					
Distance to joints	$c_{j\perp}$	[mm]	< 57		< 57	
	$c_{j\,II}$		< c_{cr}		< c_{cr}	
Joint factor	$\alpha_{j,N}$	[-]	0 (screw must not be used)		0 (screw must not be used)	
	$\alpha_{j,VII} = \alpha_{j,V\perp}$					

MULTI-MONTI-plus

Performance
Solid brick VBL ≥ 2DF, dimensions, installation parameters, distances, group and joint factors

Annex C17

Solid brick VBL, ≥ 2DF, EN 771-3:2015-11

Table C18.1: Characteristic resistance to pull-out failure or brick breakout failure of a single anchor under tension loading

Size			10	12
Nominal embedment depth	h_{nom}	[mm]	65	75
Characteristic tension resistance depending on the mean compressive strength of the brick				
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,p,c} = N_{Rk,b,c}$ [kN]	
≥ 2,5/2			0,5	0,5

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C18.2: Characteristic resistance to local brick failure or brick edge failure of a single anchor under shear loading

Size			10	12
Characteristic shear resistance depending on the mean compressive strength of the brick				
Mean compressive strength / Min. compressive strength of single brick[1] [N/mm²]			$V_{Rk,b} = V_{Rk,b,\perp} = V_{Rk,b,\parallel}$ [kN]	
Nominal embedment depth	h_{nom}	[mm]	65	75
≥ 2,5/2			1,5	1,8
			$V_{Rk,c} = V_{Rk,c,\perp} = V_{Rk,c,\parallel}$ [kN]	
			0,9	1,5

[1] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.

Table C18.3: Displacements under tension and shear loads

Size			10	12
Nominal embedment depth	h_{nom}	[mm]	65	75
Tension load	F_N	[kN]	0,17	0,17
Displacement under tension load	δ_{N0}	[mm]	0,02	0,02
	$\delta_{N\infty}$		0,04	0,04
Shear load	$F_{V\parallel} = F_{V\perp}$	[kN]	0,43	0,51
Displacement under shear load	δ_{V0}	[mm]	1,13	1,30
	$\delta_{V\infty}$		1,69	1,95

MULTI-MONTI-plus

Performance
Solid brick VBL ≥ 2DF, characteristic resistance under tension and shear loading, displacements

Annex C18