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-23/0078 of 9 August 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	Bonded screw fasteners for use in concrete
Manufacturer	HECO-Schrauben GmbH & Co. KG Dr.-Kurt-Steim-Straße 28 78713 Schramberg DEUTSCHLAND
Manufacturing plant	HECO-Werk 1, HECO-Werk 2
This European Technical Assessment contains	16 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 332795-00-0601, Edition 03/2023

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This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No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 bonded screw fastener MULTI-MONTI-plus is a combination of a screw anchor in size 10 and 12 mm made of galvanised steel and the injection mortar HEP-1000. The anchor is screwed into a predrilled cylindrical drill hole filled with mortar HEP-1000. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterized by mechanical interlock in the special thread.

Product and product description is given in Annex A.

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

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

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

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex C1 and B3
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C1
Displacements (static and quasi-static loading)	See Annex C5
Characteristic resistance for seismic performance category C1	See Annex C2
Characteristic resistance and displacements for seismic performance category C2	See Annex C3 and C5

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C4

3.3 Aspects of durability linked with the Basic Works Requirements

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 332795-00-0601 the applicable European legal act is: [96/582/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.

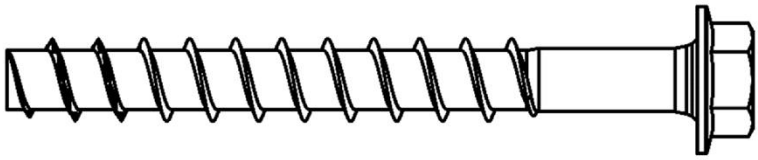
Issued in Berlin on 9 August 2024 by Deutsches Institut für Bautechnik

Beatrix Wittstock
Head of Section

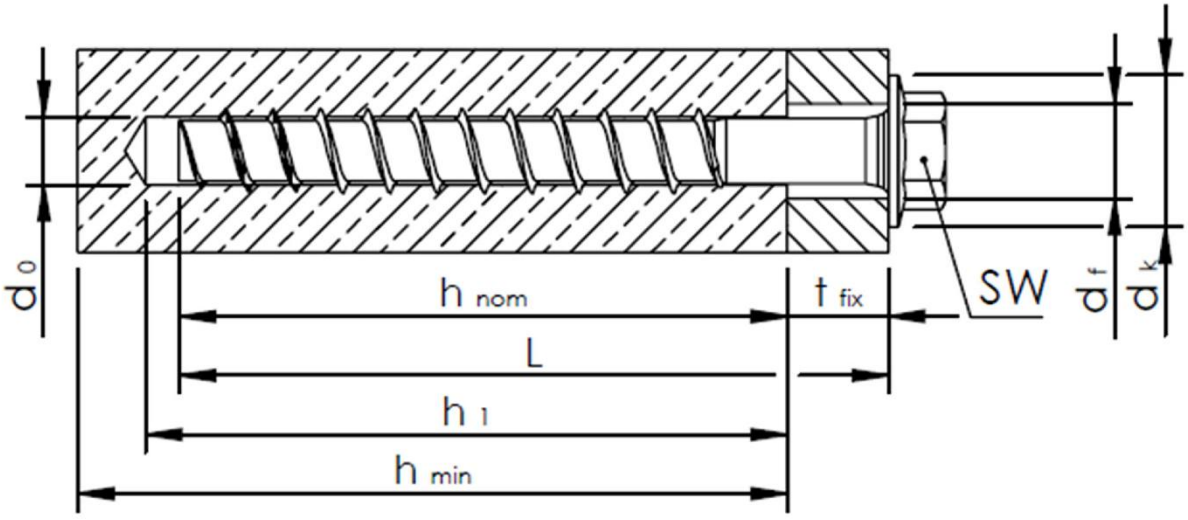
beglaubigt:
Tempel

Deutsches Institut für Bautechnik DIBt

Product and installed condition



MMS-plus SS



MMS-plus SS, type hexagonal head with washer

d_0	=	nominal drill hole diameter
h_{nom}	=	nominal embedment depth
h_1	=	Drill Hole Depth
h_{min}	=	minimum thickness of concrete member
t_{fix}	=	thickness of fixture
d_f	=	diameter of clearance hole
L	=	nominal screw length

MULTI-MONTI-plus	**Annex A 1**
Product description Product and installed condition	

Deutsches Institut für Bautechnik DIBt

Table A2.1: Screw types

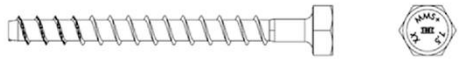
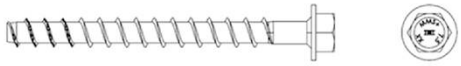
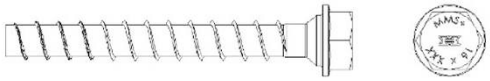
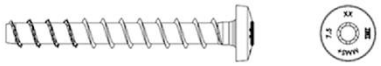
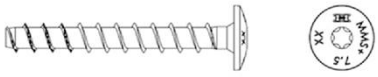
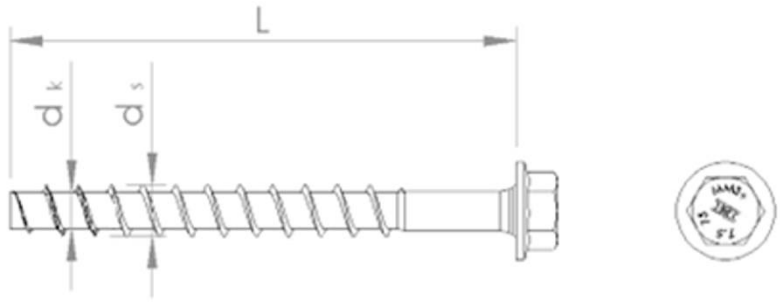
Head types	Designation
	1) Hexagonal head with and without insert washer (alternative version with cone under the head) **(S)**
	2) Hexagonal head and pressed washer **(SS)**
	3) Hexagonal head with pressed wsher and cone under the disc **(SSK)**
	4) Pan head with small round head **(P)**
	5) Mounting rail screw with large round head **(MS)**

Table A2.2: Dimensions, material and marking

Carbon steel [1]			Ø 10	Ø 12
External diameter	ds	[mm]	10,5	12,6
Core Diameter	dk	[mm]	7,3	9,05
Length	L ≥	[mm]	50	75
	L ≤	[mm]	500	600
Ultimate strain	A5	[%]	≤ 8	

1) galvanized steel according to EN 10263-4:2017 (multi-layer coating systems are possible)



Stamping	Feature
H MMS+ e.g. 7.5 e.g. 75	Factory sign Screw type screw size screw length

Materials	Stamping
Carbon steel	MMS+

MULTI-MONTI-plus

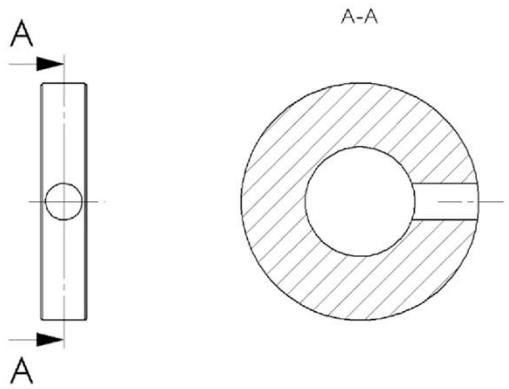
Product description
Screw designs, dimensions, material and marking

Annex A 2

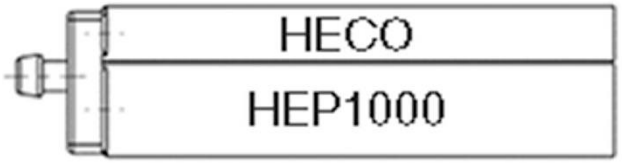
Deutsches Institut für Bautechnik DIBt

Table A3: Seismic kit

Filling washer



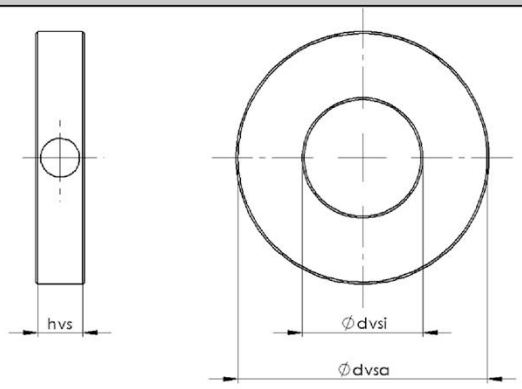
Injection mortar



Designation: HEP-1000

Filling washer dimension

Filling washer size			M10	M12
Diameter	d_{vsa}	[mm]	26	28
Diameter	d_{vsi}	[mm]	12	14
Thickness	h_{vs}	[mm]	5	5



MULTI-MONTI-plus

Product description
Seismic kit, dimensions

Annex A 3

Deutsches Institut für Bautechnik DIBt

Table B1: Specification of the intended use

Table B1: Anchorage subject to:

Size MMS-plus			**10**	**12**
Nominal embedment depth	h_{nom}	[mm]	65	90
Head Shapes			1-5	
Static and quasi-static loads in cracked and uncracked concrete			ok	
Fire exposure				

Size MMS-plus			**10**	**12**
Nominal embedment depth	h_{nom}	[mm]	10	90
Head Shapes			1-5	
Seismic action		C1	ok	
		C2	ok	

Base material:

- Reinforced or unreinforced normal concrete without fibres according to EN 206-1:2013 + A1:2016
- Strength class C20/25 to C50/60 according to EN 206-1:2013 + A1:2016
- Cracked or uncracked concrete.

Temperature in base material:

- **at installation:**
  +0°C to + 40°C
- **in-service**
  -40°C to +72°C
  (max. long-term temperature +50°C and max. short-term temperature +72°C)

Application conditions (environmental conditions):

- Components in dry indoor conditions: all types of screws

Design:

- The design of the anchors is carried out under the responsibility of an engineer experienced in the field of anchoring and concrete construction.
- Taking into account the loads to be anchored, verifiable calculations and design drawings must be made. The position of the dowel is indicated on the design drawings (e.g. position of the dowel in relation to the reinforcement or supports, etc.).
- The design of the anchorage under static and quasi-static stress and under fire stress is carried out in accordance with EN 1992-4:2018 and EOTA Technical Report TR 055, Edition February 2018.
- The design under transverse stress according to EN 1992-4:2018, clause 6.2.2 applies to all diameters d f of the through-hole in the attachment specified in Annex B2, Table B1 and Annex B3, Table B2.

Installation:

- Borehole production only by hammer drilling.
- Installation by appropriately trained personnel under the supervision of the site manager.
- It is not possible to continue turning the dowel slightly.
- The dowel head rests against the attachment and is not damaged, or the required screw-in depth has been reached.

MULTI-MONTI-plus	**Annex B 1**
Intended Use Specification	

Deutsches Institut für Bautechnik DIBt

Table B2: Working and curing time

Temperature in base material T			Maximum working time t_{work}	Minimum curing time[1] t_{cure}
+0°C	to	+4°C	90 min	144 h
+5°C	to	+9°C	80 min	48 h
+10°C	to	+14°C	60 min	28 h
+15°C	to	+19°C	40 min	18 h
+20°C	to	+24°C	30 min	12 h
+25°C	to	+34°C	12 min	9 h
+35°C	to	+39°C	8 min	6 h
+40°C			8 min	4 h
Cartrige temperature			+5°C to +40°C	

[1] The minimum curing time is only valid for dry base material.
In wet base material the curing time must be doubled.

MULTI-MONTI-plus

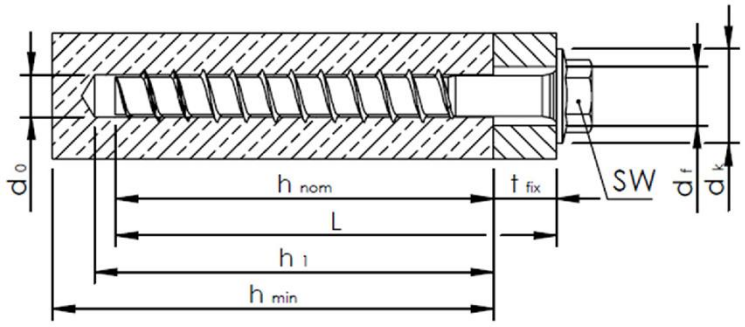
Intended Use
Working time and curing time

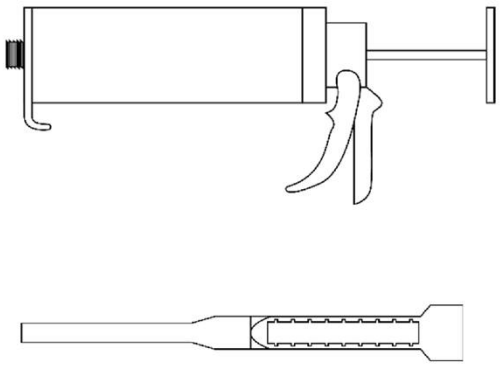
Annex B 2

Deutsches Institut für Bautechnik DIBt

Table B3: Installation parameter MMS-plus

Size MMS-plus				**10**	**12**
Nominal embedment depth		h_{nom}	[mm]	65	90
Nominal drill diameter		d_0	[mm]	8	10
Drill Cutting Ø		$d_{cut} \leq$	[mm]	8,45	10,45
Borehole depth with cleaning		$h_1 \geq$	[mm]	75	100
Through-hole attachment		$d_f \leq$	[mm]	12,5	14,5
Minimum component thickness		h_{min}	[mm]	115	150
cracked and uncracked concrete	minimum spacing	s_{min}	[mm]	35	35
	minimum edge disance	c_{min}	[mm]	60	60
Recommended installation tool			[Nm]	Impact screw driver, max. power output T_{max} according to manufacturer's specifications	
				400	650





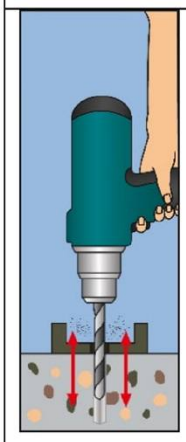
MULTI-MONTI-plus

Intended Use
Installation parameter

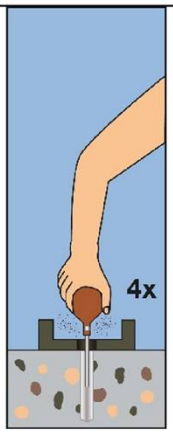
Annex B 3

Deutsches Institut für Bautechnik DIBt

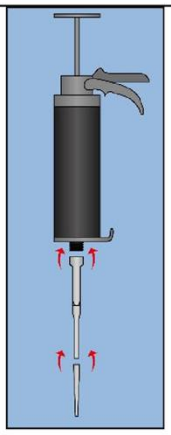
Table B4: Installation instruction MMS-plus



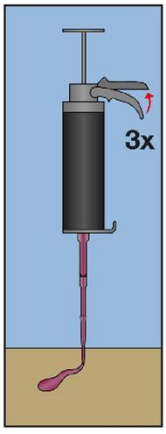
Create drill hole



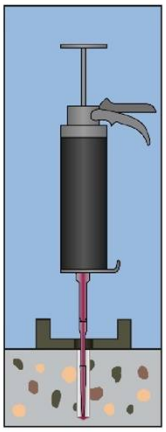
Clean drill hole



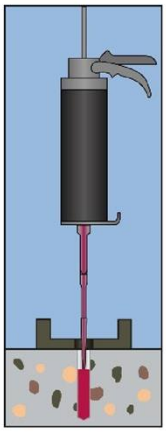
Mounting the mixing nozzle onto the cartridge



Discard 3 strokes of motar until an evenly mixed mortar purr is obtained

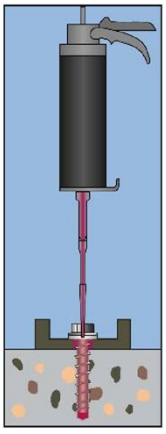


Fill the drill hole with mortar from the bottom of the drill hole

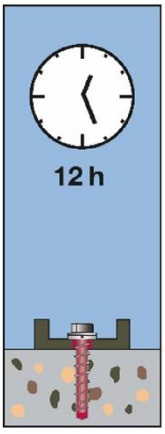


Fill the drill hole with mortar using at least 2-3 full strokes

Screw the screw with the filling washer into the drill hole. When the required setting depth is reached, mortar must emerge at the top of the drill hole. Otherwise, the attachment point may not be used.



Fill the backfill disc with mortar



Leave the mortar with the screw in place for at least 12 hours. Observe the curing time depending on the concrete temperature – see mortar cartridge

MULTI-MONTI-plus	**Annex B 4**
Intendend Use Installation instruction	

Deutsches Institut für Bautechnik DIBt

Table C1: Performance for static and quasi-static stress MMS-plus

Size MMS-plus				**10**	**12**
Nominal embedment depth		h_{nom}	[mm]	65	90
Steel failure for tensile and shear loads					
Characteristic resistance		$N_{Rk,s}$	[kN]	32,1	49,9
Partial safety factor		$\gamma_{Ms,N}$	[-]	1,50	
Characteristic resistance		$V^0_{Rk,s}$	[kN]	13,7	24,1
Partial safety factor		$\gamma_{Ms,V}$	[-]	1,25	
Ductility factor		k_7	[-]	0,8	
Characteristic resistance		$M^0_{Rk,s}$	[Nm]	34,5	66,8
Pullout					
Characteristic resistance in uncracked concrete C20/25		$N_{Rk,p}$	[kN]	$\geq N^0_{Rk,c}$	
Characteristic resistance in cracked concrete C20/25		$N_{Rk,p}$	[kN]	9	16
Increasing factor for $N_{Rk,p} = N_{Rk,p(C20/25)} * \psi_c$	C30/37	ψc	[-]	1,22	
	C40/50			1,41	
	C50/60			1,58	
Concrete cone failure and splitting failure					
Effective anchoring depth		h_{ef}	[mm]	50	70
Factor for	cracked	$k_{cr,N}$	[-]	7,7	
	uncracked	$k_{urc,N}$	[-]	11,0	
Concrete cone	edge distance	$c_{cr,N}$	[mm]	1.5 h_{ef}	
	spacing	$s_{cr,N}$	[mm]	3 h_{ef}	
Splitting	edge distance	$c_{cr,sp}$	[mm]	1.5 h_{ef}	
	spacing	$s_{cr,sp}$	[mm]	3 h_{ef}	
Installation factor		γ_{inst}	[-]	1,0	
Concrete pryout failure					
k-factor		k_8	[-]	1,0	2,0
Concrete edge breakage					
Effective length of the anchor		$l_f = h_{ef}$	[mm]	50	70
Effective diameter of the anchor		d_{nom}	[mm]	8	10

MULTI-MONTI-plus

Performances
Characteristic values for static and quasi-static loading

Annex C 1

Deutsches Institut für Bautechnik DIBt

Table C2: Performance for seismic category C1 MMS-plus

Size MMS-plus			**10**	**12**
Nominal embedment depth	h_{nom}	[mm]	65	90
Steel failure for tensile and shear loads				
Characteristic resistance	$N_{Rk,s,C1}$	[kN]	24,1	37,4
	$\gamma_{Ms,N}$	[-]	1,5	
	$V_{Rk,s,C1}$	[kN]	9,6	16,9
	$\gamma_{Ms,V}$	[-]	1,25	
Factor for annular gap	α_{gap}	[-]	0,5	
Pullout				
Characteristic resistance	$N_{Rk,p,C1}$	[kN]	6,8	12
Concrete cone failure				
Effective anchoring depth	h_{ef}	[mm]	50	70
Concrete cone – edge distance	$c_{cr,N}$	[mm]	1.5 h_{ef}	
Concrete cone – spacing	$s_{cr,N}$	[mm]	3 h_{ef}	
Installation factor	γ_{inst}	[-]	1,0	
Concrete pryout failure				
k-factor	k_8	[-]	1,0	2,0
Concrete edge failure				
Effective length of the anchor	$l_f = h_{ef}$	[mm]	50	70
Effective diameter of the anchor	d_{nom}	[mm]	8	10

MULTI-MONTI-plus

Performances
Characteristic values for seismic action C1

Annex C 2

Deutsches Institut für Bautechnik DIBt

Table C3: Performance for seismic category C2 MMS-plus

Size MMS-plus				**10**	**12**
Nominal embedment depth		h_{nom}	[mm]	65	90
Steel failure for tensile and shear loads					
Characteristic resistance		$N_{Rk,s,C2}$	[kN]	24,1	37,4
		$\gamma_{Ms,N}$		1,5	
		$V_{Rk,s,C2}$	[kN]	8,57	15,25
		$\gamma_{Ms,V}$		1,25	
Factor for annular gap		α_{gap}	[-]	0,5	
Pullout					
Characteristic resistance		$N_{Rk,p,C2}$	[kN]	1,37	4,48
Concrete cone failure					
Effective anchoring depth		h_{ef}	[mm]	50	70
Concrete cone	edge distance	$c_{cr,N}$	[mm]	1.5 h_{ef}	
	spacing	$s_{cr,N}$	[mm]	3 h_{ef}	
Installation factor		γ_{inst}	[-]	1,0	
Concrete pryout failure					
k-factor		k_8	[-]	2,0	
Concrete edge failure					
Effective length of the anchor		$l_f = h_{ef}$	[mm]	50	70
Effective diameter of the anchor		d_{nom}	[mm]	8	10

MULTI-MONTI-plus

Performances
Characteristic values for seismic action C2

Annex C 3

Deutsches Institut für Bautechnik DIBt

Table C4: Performance under fire exposure MMS-plus

Size MMS-plus				**10**	**12**
Nominal embedment depth		h_{nom}	[mm]	65	90
Characteristic resistance under tension and shear load / $F_{Rk,fi} = N_{Rk,s,fi} = N_{Rk,p,fi} = V_{Rk,s,fi}$					
Characteristic resistance	R30	$F_{Rk,fi}$	[kN]	2,3	3,9
	R60	$F_{Rk,fi}$	[kN]	1,4	2,1
	R90	$F_{Rk,fi}$	[kN]	1,0	1,5
	R120	$F_{Rk,fi}$	[kN]	0,8	1,2
	R30	$M^0_{Rk,s,fi}$	[Nm]	2,7	5,3
	R60	$M^0_{Rk,s,fi}$	[Nm]	1,5	2,8
	R90	$M^0_{Rk,s,fi}$	[Nm]	1,1	2,0
	R120	$M^0_{Rk,s,fi}$	[Nm]	0,9	1,6
Edge distance					
	R30 to R120	$c_{cr,fi}$	[mm]	2 h_{ef}	
Spacing					
	R30 to R120	$s_{cr,fi}$	[mm]	2 $c_{cr,fi}$	

MULTI-MONTI-plus

Performances
Characteristic values under fire exposure

Annex C 4

Deutsches Institut für Bautechnik DIBt

Table C5.1: Displacements under tensile load MMS-plus

Size MMS-plus			**10**	**12**
Nominal embedment depth	h_{nom}	[mm]	65	90
Tensile load	N	[kN]	7,9	12,8
Displacement	δ_{N0}	[mm]	0,1	0,2
	$\delta_{N\infty}$	[mm]	0,7	0,6
Tensile load	N	[kN]	4,3	6,4
Displacement	δ_{N0}	[mm]	0,1	0,1
	$\delta_{N\infty}$	[mm]	0,1	0,2

Table C5.2: Displacements under shear load MMS-plus

Size MMS-plus			**10**	**12**
Nominal embedment depth	h_{nom}	m[m]	65	90
Shear load	V	[kN]	8,0	12,0
Displacement	δ_{V0}	[mm]	0,1	0,2
	$\delta_{V\infty}$	[mm]	0,2	0,3

Table C5.3: Displacements under tensile and shear load for seismic performance category C2 MMS-plus

Size MMS-plus			**10**	**12**
Nominal embedment depth	h_{nom}	[mm]	65	90
Tensile load				
Displacement	$\delta_{N,C2(DLS)}$	[mm]	0,08	0,14
	$\delta_{N,C2(ULS)}$	[mm]	0,75	1,29
Shear Load				
Displacement	$\delta_{V,C2(DLS)}$	[mm]	0,50	0,68
	$\delta_{V,C2(ULS)}$	[mm]	1,85	2,27

MULTI-MONTI-plus

Performances
Displacements for static, quasi-static and seismic tensile and shear loads

Annex C 5