Deutsches Institut für Bautechnik

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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-05/0161 of 3 December 2021

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	MÜPRO Steel anchor
Product family to which the construction product belongs	Fastener for use in concrete for redundant non-structural systems
Manufacturer	MÜPRO Services GmbH Borsigstraße 14 65205 Wiesbaden DEUTSCHLAND
Manufacturing plant	MÜPRO Werk 1, Deutschland
This European Technical Assessment contains	19 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 330747-00-0601, Edition 06/2018
This version replaces	ETA-05/0161 issued on 7 April 2017

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Specific Part

1 Technical description of the product

The MÜPRO Steel anchor is a fastener made of galvanized or stainless steel which is placed into a drilled hole and anchored by deformation-controlled expansion.

The fixture shall be anchored with a fastening screw or threaded rod according to Annex A2.

The product description is given in Annex A.

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

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

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

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

3.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C5

3.2 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance for all load directions and modes of failure for simplified design	See Annex B3, C1 to C4
Durability	See Annex B1

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

In accordance with European Assessment Document EAD No. 330747-00-0601, the applicable European legal act is: [97/161/EC].

The system to be applied is: 2+

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 with Deutsches Institut für Bautechnik.

Issued in Berlin on xx Month 2021 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

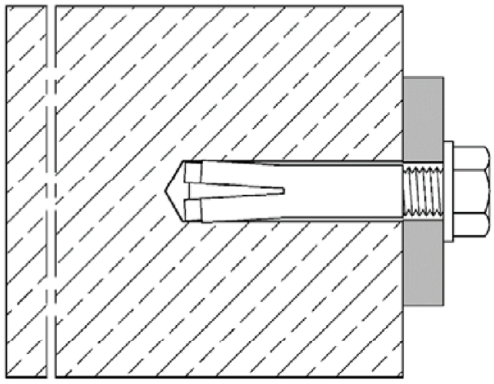
beglaubigt:
Baderschneider

Deutsches Institut für Bautechnik DIBt

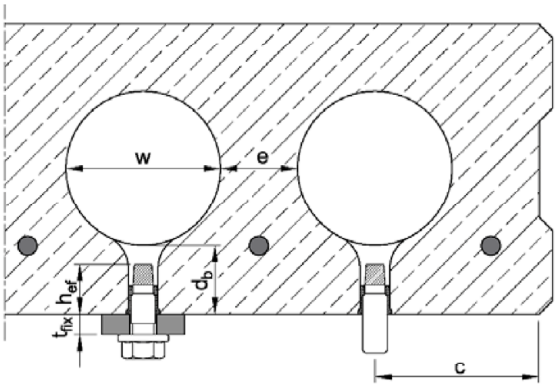
MÜPRO Steel anchor

Anchor sizes and variations			
Steel anchor (without plunged boss)		**Steel anchor** (with plunged boss)	
Anchorage depth h_{ef} ≥ 30 mm (zinc plated, A4 or HCR)			
E M6x30		ES M6x30	
E M8x30 E M8x40		ES M8x30 ES M8x40	
E M10x40 E M12x50 E M16x65		ES M10x30 (zinc plated)	
		ES M10x40 ES M12x50 ES M16x65	
Steel anchor (with plunged boss)			
Anchorage depth h_{ef} = 25 mm (zinc plated)			
ES M6x25 ES M8x25 ES M10x25 ES M12x25			

Installation situation Steel anchor (with and without plunged boss) in concrete



Installation situation Steel anchor (with plunged boss) in precast pre-stressed hollow core slabs for hef = 25 mm



w / e ≤ 4,2

w = core width
e = web thickness
d_b = flange thickness ≥35mm (or ≥ 30mm, see Annex C3)
h_{ef} = anchorage depth
t_{fix} = thickness of fixture
c = edge distance

MÜPRO Steel anchor

Product description
Anchor sizes and variations / Installation situations

Annex A1

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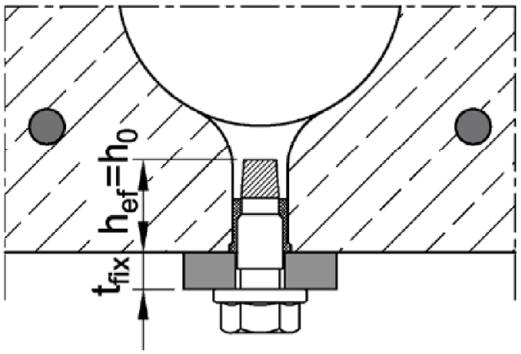
Table A1: Materials

Part	Designation	Steel, zinc plated	Stainless steel A4	High corrosion resistant steel HCR
1	Anchor sleeve	Cold formed or machining steel, galvanized, EN ISO 4042:2018	Stainless steel (e.g. 1.4401, 1.4404, 1.4571) EN 10088:2014, EN ISO 3506:2020	Stainless steel, 1.4529, 1.4565, EN 10088:2014, EN ISO 3506:2020
2	Cone	Cold formed or machining steel	Stainless steel (e.g. 1.4401, 1.4404, 1.4571) EN 10088:2014	

Requirements on the fastening screw or the threaded rod and nut according to the engineering documents:

- Minimum screw-in depth L_{sdmin} see Table B1 and B2
- The length of screw or the threaded rod shall be determined depending on the thickness of fixture t_{fix}, available thread length L_{th} (= maximum screw-in depth) and the minimum screw-in depth L_{sdmin}.
- A_5 > 8 % Ductility
- Materials
  - **Steel, zinc plated,** property class 4.6 / 4.8 / 5.6 / 5.8 or 8.8 according to EN ISO 898-1:2013 or EN ISO 898-2:2012
  - **Stainless steel A4** or **high corrosion resistant steel HCR,** property class 70 or 80 according to EN ISO 3506:2020



MÜPRO Steel anchor

Product description
Materials

Annex A2

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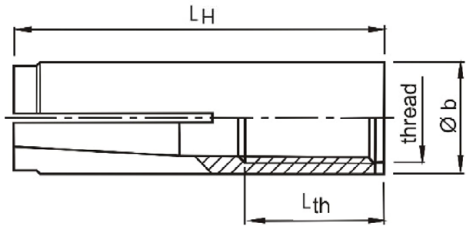
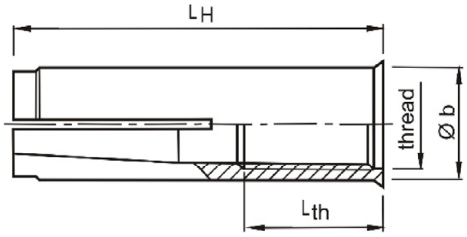
Anchor sleeve

Anchor version without plunged boss



Anchor version with plunged boss



Marking: see Table A2

e.g.: ◇ E M8x40

◇ identifying mark of manufacturing plant

E anchor identity (version without plunged boss)

ES anchor identity (version with plunged boss)

M8 size of thread

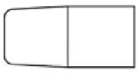
40 anchorage depth

additional marking

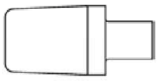
A4 stainless steel

HCR high corrosion resistant steel

Cone



M6x25 to M12x25, M6x30 and M10x30



remaining sizes

Table A2: Dimensions and marking

Anchor size	Anchor sleeve				Marking			Cone
	thread	Ø b	L_H	L_{th}	Version E (without plunged boss)	Version ES (with plunged boss)	alternative	
M6x25	M6	8	25	12	-	◇ ES M6x25	-	
M6x30	M6	8	30	13	◇ E M6x30	◇ ES M6x30	◇ E M6	
M8x25	M8	10	25	12	-	◇ ES M8x25	-	
M8x30	M8	10	30	13	◇ E M8x30	◇ ES M8x30	◇ E M8	
M8x40	M8	10	40	20	◇ E M8x40	◇ ES M8x40	◇ E M8x40	
M10x25	M10	12	25	12	-	◇ ES M10x25	-	
M10x30	M10	12	30	12	-	◇ ES M10x30	E M10x30	
M10x40	M10	12	40	15	◇ E M10x40	◇ ES M10x40	◇ E M10	
M12x25	M12	15	25	12	-	◇ ES M12x25	-	
M12x50	M12	15	50	18	◇ E M12x50	◇ ES M12x50	◇ E M12	
M16x65	M16	19,7	65	23	◇ E M16x65	◇ ES M16x65	◇ E M16	

Dimensions in mm

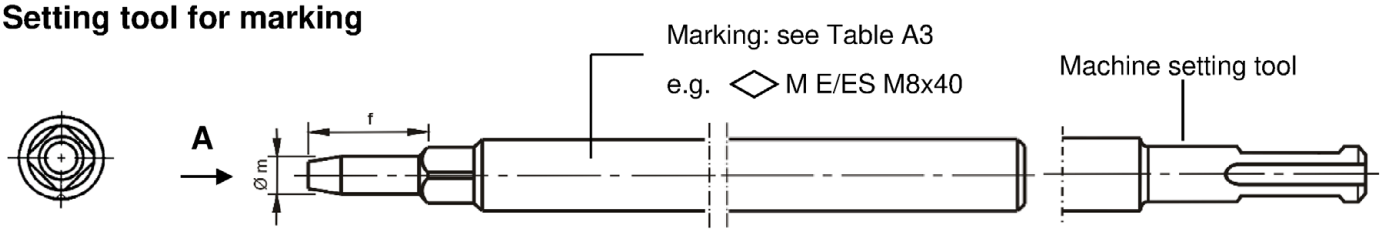
MÜPRO Steel anchor

Product description
Dimensions and Marking

Annex A3

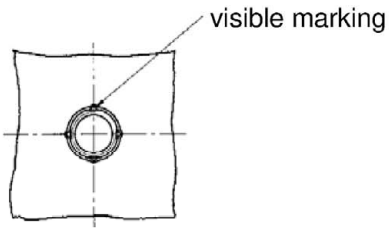
Deutsches Institut für Bautechnik DIBt

Setting tool for marking

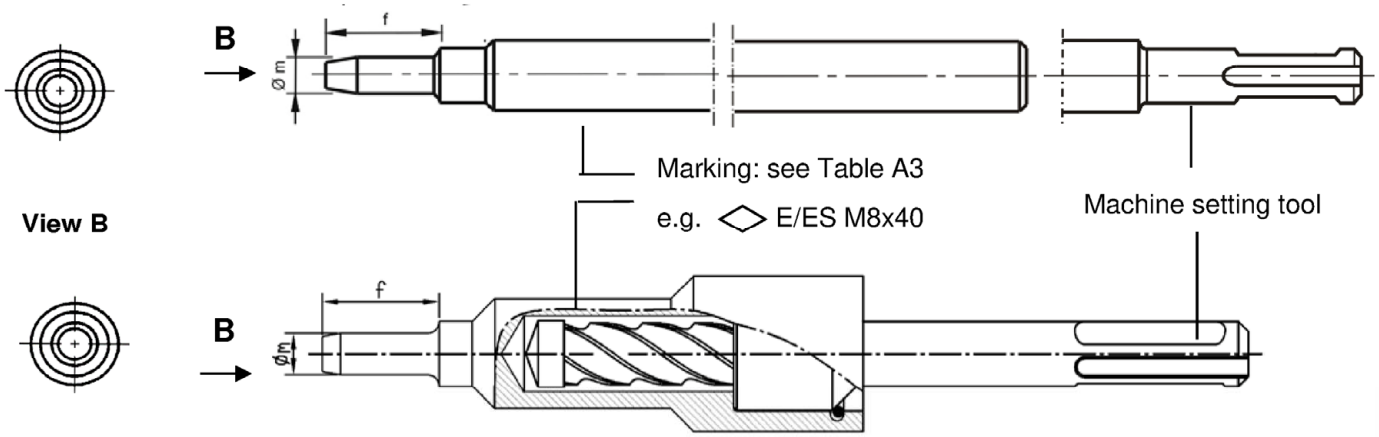


View A

Verification of correct installation with setting tool for marking
The setting tool leaves a visible marking after correct installation.



Setting tool



View B

Table A3: Dimensions and marking of setting tools

Anchor size	Ø m	f	Setting tool for marking		Setting tool	
			Marking	alternative	**Marking**	alternative
M6x25	4,9	17	◇ M ES M6x25	-	◇ ES M6x25	-
M6x30	4,9	17	◇ M E/ES M6x30	◇ M E M6	◇ E/ES M6x30	◇ E M6
M8x25	6,4	17	◇ M ES M8x25	-	◇ ES M8x25	-
M8x30	6,4	18	◇ M E/ES M8x30	◇ M E M8	◇ E/ES M8x30	◇ E M8
M8x40	6,4	28	◇ M E/ES M8x40	◇ M E M8x40	◇ E/ES M8x40	◇ E M8x40
M10x25	8,0	18	◇ M ES M10x25	-	◇ ES M10x25	-
M10x30	8,0	18	◇ M ES M10x30	◇ M E M10x30	◇ ES M10x30	◇ E M10x30
M10x40	8,0	24	◇ M E/ES M10x40	◇ M E M10	◇ E/ES M10x40	◇ E M10
M12x25	10,0	15,5	◇ M ES M12x25	-	◇ ES M12x25	-
M12x50	10,0	30	◇ M E/ES M12x50	◇ M E M12	◇ E/ES M12x50	◇ E M12
M16x65	13,5	36	◇ M E/ES M16x65	◇ M E M16	◇ E/ES M16x65	◇ E M16

Dimensions in mm

MÜPRO Steel anchor

Product description
Setting tools / Dimensions and marking of setting tools

Annex A4

Deutsches Institut für Bautechnik DIBt

Specifications of intended use

Steel Anchor	Anchorage depth h_{ef} ≥ 30 mm						
	M6x30	M8x30	M8x40	M10x30	M10x40	M12x50	M16x65
Steel, zinc plated	✓						
Stainless steel A4 and high corrosion resistant steel HCR	✓			-	✓		
Static and quasi-static loads	✓						
Fire exposure	✓						
Cracked and uncracked concrete	✓						
Solid concrete **C20/25 to C50/60**	✓						

Steel Anchor	Anchorage depth h_{ef} = 25 mm			
	M6x25	M8x25	M10x25	M12x25
Steel, zinc plated	✓			
Stainless steel A4 and high corrosion resistant steel HCR	-			
Static and quasi-static loads	✓			
Fire exposure (solid concrete, C20/25 to C50/60)	✓			
Cracked and uncracked concrete	✓			
Solid concrete **C12/15 to C50/60**	✓			
Precast pre-stressed hollow core slabs C30/37 to C50/60	✓			

Use only for redundant, non-structural systems!

Base materials:

- Compacted, reinforced or unreinforced normal weight concrete (without fibers) acc. to EN 206:2013 + A1:2016

Use conditions:

- Structures subject to dry internal conditions
  (zinc plated steel, stainless steel or high corrosion resistant steel)
- Structures subject to external atmospheric exposure (including industrial and marine environment) or exposure to permanently damp internal condition, if no particular aggressive conditions exist
  (stainless steel or high corrosion resistant steel)
- Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions
  (high corrosion resistant steel)

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

MÜPRO Steel anchor	**Annex B1**
Intended use Specifications	

Deutsches Institut für Bautechnik DIBt

Specifications of intended use

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.)
- The strength class and the length of the fastening screw or threaded rod shall be defined by the designing engineer
- Anchorages are designed acc. to EN 1992-4:2018 (if necessary in connection with TR 055, Edition February 2018)

Installation:

- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools
- Drill hole by hammer drilling or vacuum drilling

MÜPRO Steel anchor	
Intended use Specifications	**Annex B2**

Deutsches Institut für Bautechnik DIBt

Table B1: Installation parameters for $h_{ef} \geq 30$ mm

Anchor size			M6x30	M8x30	M8x40	M10x30	M10x40	M12x50	M16x65
Depth of drill hole (without plunged boss)	$h_0 =$	[mm]	30	30	40	30	40	50	65
Depth of drill hole (with plunged boss)	$h_0 \geq$	[mm]	30	30	40	30	40	50	65
Drill hole diameter	$d_0 =$	[mm]	8	10	10	12	12	15	20
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	8,45	10,45	10,45	12,5	12,5	15,5	20,55
Maximum installation torque	$T_{inst} \leq$	[Nm]	4	8	8	15	15	35	60
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	7	9	9	12	12	14	18
Thread length	L_{th}	[mm]	13	13	20	12	15	18	23
Minimum screw-in depth	L_{sdmin}	[mm]	7	9	9	10	11	13	18
Steel, zinc plated									
Minimum thickness of member	h_{min}	[mm]	100	100	100	120	120	130	160
Minimum spacing	s_{min}	[mm]	55	60	80	100	100	120	150
Minimum distance	c_{min}	[mm]	95	95	95	115	135	165	200
Stainless steel A4, HCR									
Minimum thickness of member	h_{min}	[mm]	100	100	100	-	130	140	160
Minimum spacing	s_{min}	[mm]	50	60	80	-	100	120	150
Minimum distance	c_{min}	[mm]	80	95	95	-	135	165	200

Table B2: Installation parameters for $h_{ef} = 25$ mm

Anchor size			M6x25	M8x25	M10x25	M12x25
Depth of drill hole	$h_0 \geq$	[mm]	25	25	25	25
Drill hole diameter	$d_0 =$	[mm]	8	10	12	15
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	8,45	10,45	12,5	15,5
Maximum installation torque	$T_{inst} \leq$	[Nm]	4	8	15	35
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	7	9	12	14
Thread length	L_{th}	[mm]	12	12	12	12
Minimum screw-in depth	L_{sdmin}	[mm]	6	8	10	12
Minimum thickness of member	$\mathbf{h_{min,1}}$	[mm]	**80**			
Minimum spacing	s_{min}	[mm]	30	70	70	100
Minimum edge distance	c_{min}	[mm]	60	100	100	130
Standard thickness of member	$\mathbf{h_{min,2}}$	[mm]	**100**			
Minimum spacing	s_{min}	[mm]	30	50	60	100
Minimum edge distance	c_{min}	[mm]	60	100	100	110
Installation in precast pre-stressed hollow core slabs C30/37 to C50/60						
Spacing	s_{min}	[mm]	200			
Edge distance	c_{min}	[mm]	150			

MÜPRO Steel anchor

Intended use
Installation parameters

Annex B3

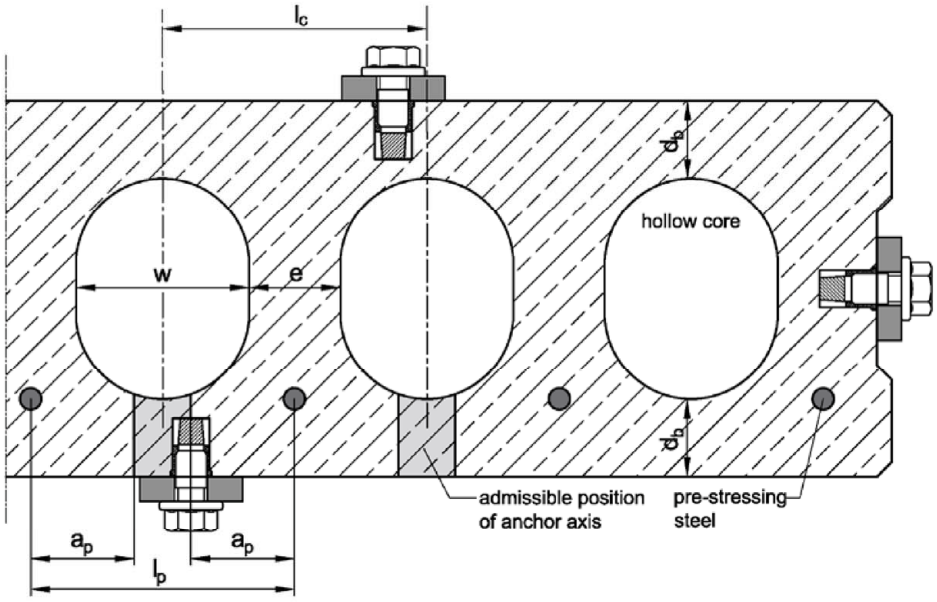
Deutsches Institut für Bautechnik DIBt

Admissible anchor positions in precast pre-stressed hollow core slabs (w / e ≤ 4,2)

Core distance:
$l_c \geq 100$ mm

Pre-stressing steel distance:
$l_p \geq 100$ mm

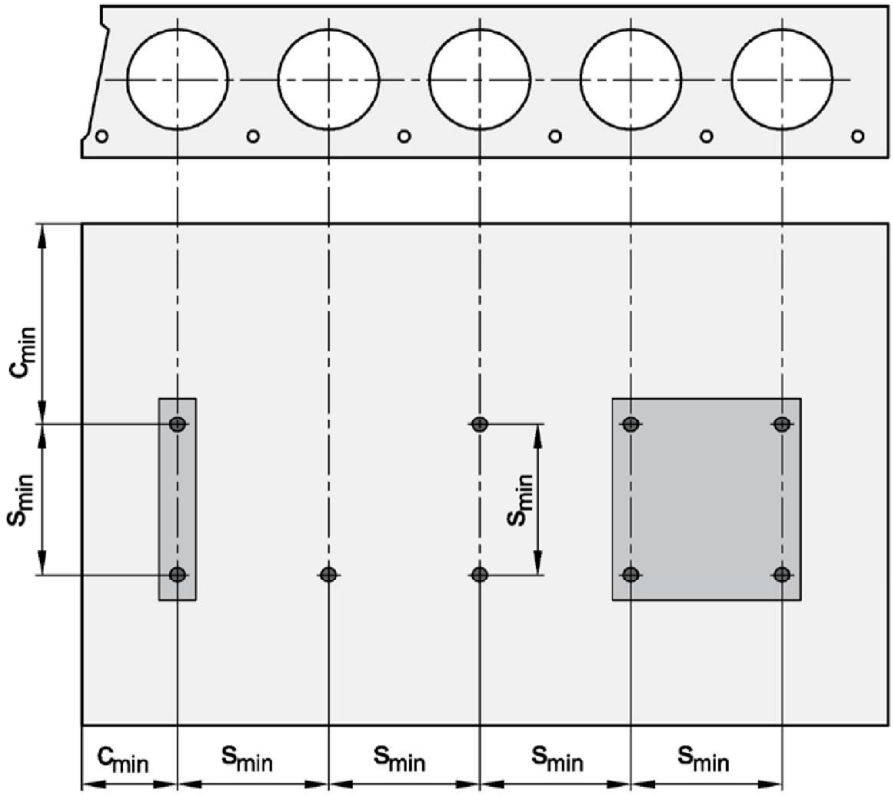
Distance between anchor position and pre-stressing steel:
$a_p \geq 50$ mm



Minimum spacing and edge distance of anchors and distance in precast pre-stressed hollow core slabs

Minimum edge distance
$c_{min} \geq 150$ mm

Minimum spacing
$s_{min} \geq 200$ mm



MÜPRO Steel anchor

Intended use
Installation in precast pre-stressed hollow core slabs

Annex B4

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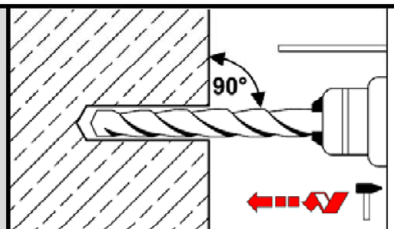
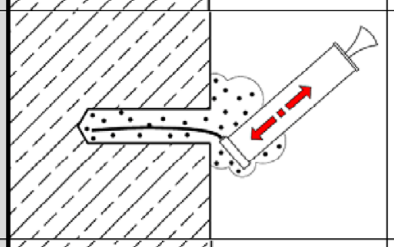
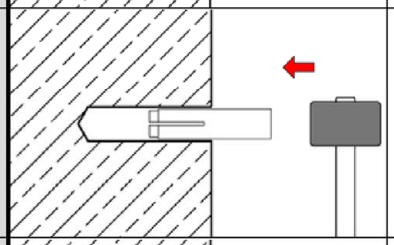
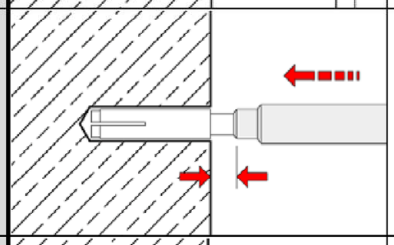
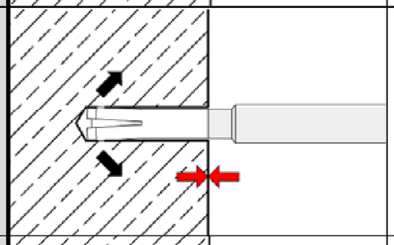
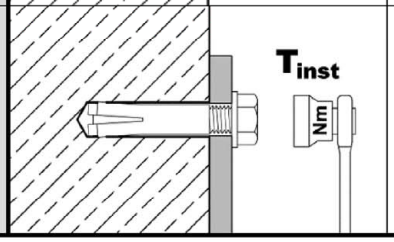
Installation instructions for solid concrete slabs

1		Drill hole perpendicular to concrete surface. Using vacuum drill bit proceed with step 3.
2		Blow out dust. Alternatively, vacuum clean down to the bottom of the hole.
3		Drive in anchor.
4		Drive in cone by using setting tool.
5		Shoulder of setting tool must fit on anchor rim.
6		Turn in screw or threaded rod with nut, observe minimum screw-in depth (see Annex B3). Apply installation torque T_{inst}.

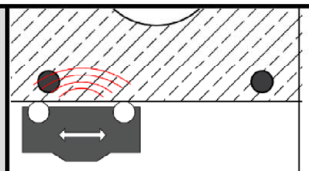
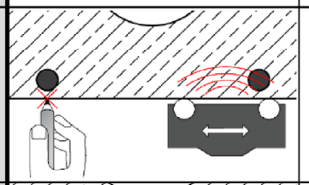
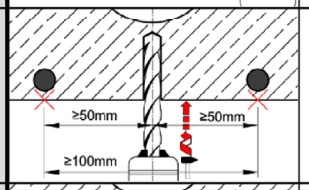
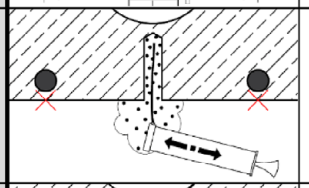
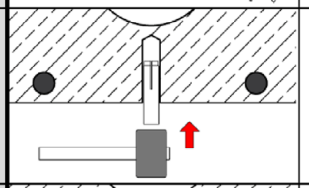
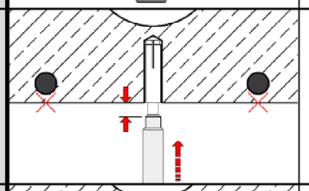
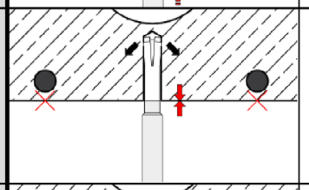
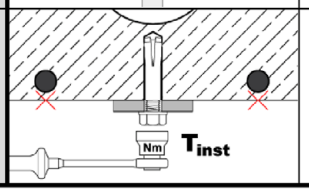
MÜPRO Steel anchor

Intended use
Installation instructions for solid concrete slabs

Annex B5

Deutsches Institut für Bautechnik DIBt

Installation instructions for precast pre-stressed hollow core slabs

1		Search for the position of the reinforcement.
2		Mark the position of the pre-stressing steel and search for the other position of the pre-stressing steel.
3		Mark the positions of next pre-stressing steel.
4		Drill hole while maintaining the required distances.
5		Blow out dust. Alternatively vacuum clean down to the bottom of the hole.
6		Drive in anchor.
7		Drive in cone by using setting tool.
8		Shoulder of setting tool must fit on anchor rim.
9		Turn in screw or threaded rod with nut, observe the minimum screw-in depth (see Annex B3). Apply installation torque T_{inst}.

MÜPRO Steel anchor

Intended use
Installation instructions for precast pre-stressed hollow core slabs

Annex B6

Deutsches Institut für Bautechnik DIBt

Table C1: Characteristic resistance for $h_{ef} \geq 30$ mm in solid concrete slabs

Anchor size			M6x30	M8x30	M8x40	M10x30	M10x40	M12x50	M16x65
Installation factor	γ_{inst}	[-]	1,0						
Load in any direction									
Characteristic resistance in concrete **C20/25 to C50/60**	F^0_{Rk}	[kN]	3	5	6	6	6	6	16
Partial factor	γ_M 1)	[-]	1,8	2,16		2,1	2,16	1,8	1,8
Spacing	s_{cr}	[mm]	130	180	210	230	170	170	400
Edge distance	c_{cr}	[mm]	65	90	105	115	85	85	200
Shear load with lever arm, steel zinc plated									
Characteristic resistance **(property class 4.6)**	$M^0_{Rk,s}$	[Nm]	6,1	15	15	30	30	52	133
Partial factor	γ_{Ms} 1)	[-]	1,67						
Characteristic resistance **(property class 4.8)**	$M^0_{Rk,s}$	[Nm]	6,1	15	15	30	30	52	133
Partial factor	γ_{Ms} 1)	[-]	1,25						
Characteristic resistance **(property class 5.6)**	$M^0_{Rk,s}$	[Nm]	7,6	19	19	37	37	65	166
Partial factor	γ_{Ms} 1)	[-]	1,67						
Characteristic resistance **(property class 5.8)**	$M^0_{Rk,s}$	[Nm]	7,6	19	19	37	37	65	166
Partial factor	γ_{Ms} 1)	[-]	1,25						
Characteristic resistance **(property class 8.8)**	$M^0_{Rk,s}$	[Nm]	12	30	30	59	60	105	266
Partial factor	γ_{Ms} 1)	[-]	1,25						
Shear load with lever arm, stainless steel A4 / HCR									
Characteristic resistance **(Property class 70)**	$M^0_{Rk,s}$	[Nm]	11	26	26	-2)	52	92	233
Partial factor	γ_{Ms} 1)	[-]	1,56						
Characteristic resistance **(Property class 80)**	$M^0_{Rk,s}$	[Nm]	12	30	30	-2)	60	105	266
Partial factor	γ_{Ms} 1)	[-]	1,33						

1) in absence of other national regulations
2) Anchor version is not part of the ETA

MÜPRO Steel anchor

Performance
Characteristic resistance for $h_{ef} \geq 30$ mm in **solid concrete**

Annex C1

Deutsches Institut für Bautechnik DIBt

Table C2: Characteristic resistance for h_{ef} = 25 mm in solid concrete slabs

Anchor size			M6x25	M8x25	M10x25	M12x25
Installation factor	γ_{inst}	[-]	1,0			
Load in any direction						
Characteristic resistance in concrete **C12/15 and C16/20**	F^0_{Rk}	[kN]	2,5	2,5	3,5	3,5
Characteristic resistance in concrete **C20/25 to C50/60**	F^0_{Rk}	[kN]	3,5	4,0	4,5	4,5
Partial factor	γ_M [1)]	[-]	1,5			
Spacing	s_{cr}	[mm]	75	75	75	75
Edge distance	c_{cr}	[mm]	38	38	38	38
Shear load with lever arm						
Characteristic resistance **(property class 4.6)**	$M^0_{Rk,s}$	[Nm]	6,1	15	30	52
Partial factor	γ_{Ms} [1)]	[-]	1,67			
Characteristic resistance **(property class 4.8)**	$M^0_{Rk,s}$	[Nm]	6,1	15	30	52
Partial factor	γ_{Ms} [1)]	[-]	1,25			
Characteristic resistance **(property class 5.6)**	$M^0_{Rk,s}$	[Nm]	7,6	19	37	65
Partial factor	γ_{Ms} [1)]	[-]	1,67			
Characteristic resistance **(property class 5.8)**	$M^0_{Rk,s}$	[Nm]	7,6	19	37	65
Partial factor	γ_{Ms} [1)]	[-]	1,25			
Characteristic resistance **(property class 8.8)**	$M^0_{Rk,s}$	[Nm]	12	30	60	105
Partial factor	γ_{Ms} [1)]	[-]	1,25			

[1)] in absence of other national regulations

MÜPRO Steel anchor

Performance
Characteristic resistance for h_{ef} = 25 mm in **solid concrete**

Annex C2

Deutsches Institut für Bautechnik DIBt

Table C3: Characteristic resistance for h_{ef} = 25 mm in precast pre-stressed hollow core slabs

Anchor size			M6x25	M8x25	M10x25	M12x25
Installation factor	γ_{inst}	[-]	1,0			
Load in any direction						
Flange thickness	d_b	[mm]	≥ 35 (30)[1]			
Characteristic resistance in precast pre-stressed hollow core slabs **C30/37 to C50/60**	F^0_{Rk}	[kN]	3,5	4,0	4,5	4,5
Partial factor	γ_M[2]	[-]	1,5			
Spacing	s_{cr}	[mm]	200			
Edge distance	c_{cr}	[mm]	150			
Shear load with lever arm						
Characteristic resistance **(property class 4.6)**	$M^0_{Rk,s}$	[Nm]	6,1	15	30	52
Partial factor	γ_{Ms}[2]	[-]	1,67			
Characteristic resistance **(property class 4.8)**	$M^0_{Rk,s}$	[Nm]	6,1	15	30	52
Partial factor	γ_{Ms}[2]	[-]	1,25			
Characteristic resistance **(property class 5.6)**	$M^0_{Rk,s}$	[Nm]	7,6	19	37	65
Partial factor	γ_{Ms}[2]	[-]	1,67			
Characteristic resistance **(property class 5.8)**	$M^0_{Rk,s}$	[Nm]	7,6	19	37	65
Partial factor	γ_{Ms}[2]	[-]	1,25			
Characteristic resistance **(property class 8.8)**	$M^0_{Rk,s}$	[Nm]	12	30	60	105
Partial factor	γ_{Ms}[2]	[-]	1,25			

[1] the anchor may be set in a flange thickness of 30 mm with identical characteristic loads, if the borehole cuts no hollow core
[2] in absence of other national regulations

MÜPRO Steel anchor

Performance
Characteristic resistance for h_{ef} = 25 mm in precast pre-stressed hollow core slabs

Annex C3

Deutsches Institut für Bautechnik DIBt

Table C4: Characteristic values under **fire exposure** in **solid concrete slabs** C20/25 to C50/60 for $h_{ef} \geq 30$ mm

Anchor size					**M6x30**	**M8x30**	**M8x40**	**M10x30**	**M10x40**	**M12x50**	**M16x65**
Fire resistance class		**Load in any direction**									
Property class 4.6	R 30	Characteristic resistance	$F^0_{Rk,fi}$	[kN]	0,4	0,6	0,6	0,9	0,9	1,5	3,1
	R 60			[kN]	0,35	0,6	0,6	0,8	0,8	1,3	2,4
	R 90			[kN]	0,3	0,6	0,6	0,6	0,6	1,1	2,0
	R 120			[kN]	0,25	0,5	0,5	0,5	0,5	0,8	1,6
Property class 4.8	R 30	Characteristic resistance	$F^0_{Rk,fi}$	[kN]	0,4	0,9	1,1	0,9	1,5	1,5	4,0
	R 60			[kN]	0,35	0,9	0,9	0,9	1,5	1,5	4,0
	R 90			[kN]	0,3	0,6	0,6	0,9	1,1	1,5	3,0
	R 120			[kN]	0,3	0,5	0,5	0,7	0,9	1,2	2,4
Property class ≥ 5.6	R 30	Characteristic resistance	$F^0_{Rk,fi}$	[kN]	0,8	0,9	1,5	0,9	1,5	1,5	4,0
	R 60			[kN]	0,8	0,9	1,5	0,9	1,5	1,5	4,0
	R 90			[kN]	0,4	0,9	0,9	0,9	1,5	1,5	3,7
	R 120			[kN]	0,3	0,5	0,5	0,7	1,0	1,2	2,4
A4 / HCR	R 30	Characteristic resistance	$F^0_{Rk,fi}$	[kN]	0,8	0,9	1,5	-[1]	1,5	1,5	4,0
	R 60			[kN]	0,8	0,9	1,5	-[1]	1,5	1,5	4,0
	R 90			[kN]	0,4	0,9	0,9	-[1]	1,5	1,5	3,7
	R 120			[kN]	0,3	0,5	0,5	-[1]	1,0	1,2	2,4
		Partial factor	$\gamma_{M,fi}$	[-]	1,0						
Steel zinc plated											
R 30 – R 120		Spacing	$s_{cr,fi}$	[mm]	130	180	210	170	170	200	400
		Edge distance	$c_{cr,fi}$	[mm]	65	90	105	85	85	100	200
		If the fire attack is from more than one side, the edge distance shall be ≥ 300 mm.									
Stainless steel A4, HCR											
R 30 – R 120		Spacing	$s_{cr,fi}$	[mm]	130	180	210	-[1]	170	200	400
		Edge distance	$c_{cr,fi}$	[mm]	65	90	105	-[1]	85	100	200
		If the fire attack is from more than one side, the edge distance shall be ≥ 300 mm.									

[1] Anchor version is not part of the ETA

MÜPRO Steel anchor

Performance
Characteristic values under **fire exposure** for $h_{ef} \geq 30$ mm

Annex C4

Deutsches Institut für Bautechnik DIBt

Table C5: Characteristic values under **fire exposure** in **solid concrete slabs** C20/25 to C50/60 for $\mathbf{h_{ef}}$ **= 25 mm**

Anchor size					**M6x25**	**M8x25**	**M10x25**	**M12x25**
Fire resistance class		**Load in any direction**						
Property class ≥ 4.6	R 30	Characteristic resistance	$F^0_{Rk,fi}$	[kN]	0,4	0,6	0,6	0,6
	R 60			[kN]	0,35	0,6	0,6	0,6
	R 90			[kN]	0,3	0,6	0,6	0,6
	R 120			[kN]	0,25	0,5	0,5	0,5
		Partial factor	$\gamma_{M,fi}$	[-]	1,0			
		Spacing	$s_{cr,fi}$	[mm]	100	100	100	100
R 30 – R 120		Edge distance	$c_{cr,fi}$	[mm]	50	50	50	50
		If the fire attack is from more than one side, the edge distance shall be ≥ 300 mm.						

MÜPRO Steel anchor

Performance
Characteristic values under **fire exposure** for $\mathbf{h_{ef}}$ **= 25 mm**

Annex C5