European Technical Assessment

valid for

Steel Anchor

Deutsches Institut für Bautechnik
DIBt

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-05/0161 of 7 April 2017

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	Deformation-controlled expansion anchor for multiple use for non-structural applications in concrete
Manufacturer	MÜPRO Services GmbH Hessenstraße 11 65719 Hofheim-Wallau DEUTSCHLAND
Manufacturing plant	MÜPRO Werk 1, Deutschland
This European Technical Assessment contains	20 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 6: "Anchors for multiple use for non-structural applications", January 2011, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No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 MÜPRO Steel anchor is an anchor made of zinc-plated steel, of stainless steel or high corrosion resistant steel which is placed into a drilled hole and anchored by deformation-controlled expansion.

The product description is given in Annex A.

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

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

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

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

3.1 Mechanical resistance and stability (BWR 1)

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

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	See Annex C 4 to C 5

3.3 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic values for static and quasi- static actions	See Annex C 1 to C 3

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

In accordance with guideline for European technical approval ETAG 001, January 2011 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 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 7 April 2017 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Baderschneider

Deutsches Institut für Bautechnik DIBt

MÜPRO Steel anchor

Anchorage depth h_{ef} = 25 mm (zinc plated)

M6x25 with plunged boss

M8x25 with plunged boss

M10x25 with plunged boss

M12x25 with plunged boss

Anchorage depth $h_{ef} \geq 30$ mm (zinc plated, A4 or HCR)

M6x30 with plunged boss

M6x30

M8x30 with plunged boss

M8x30

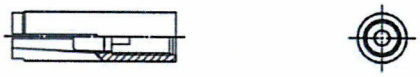
M8x40 with plunged boss

M8x40

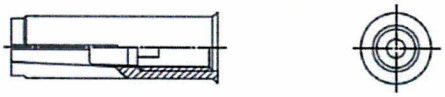
M10x30 with plunged boss (zinc plated only)

M10x40 with plunged boss

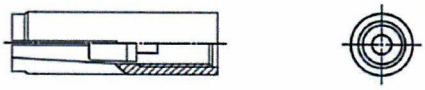
M10x40



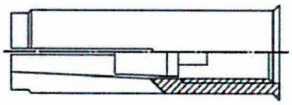
M12x50 with plunged boss



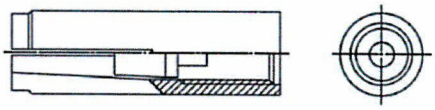
M12x50



M16x65 with plunged boss



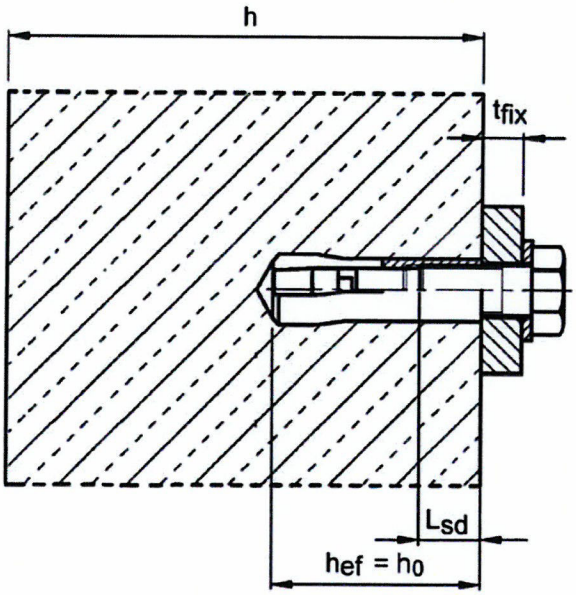
M16x65



MÜPRO Steel anchor	
Product description Anchor size	**Annex A1**

Deutsches Institut für Bautechnik DIBt

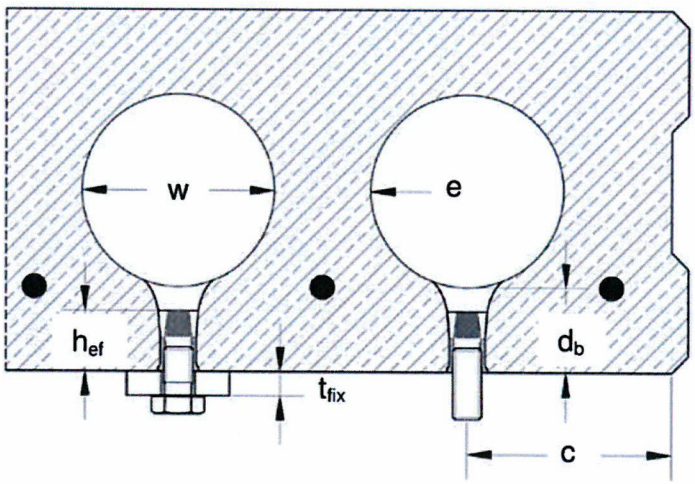
Installation situation in concrete



Installation situation in precast pre-stressed hollow core slabs for h_{ef} = 25 mm

w / e ≤ 4,2

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



MÜPRO Steel anchor

Product description
Installation situation

Annex A2

Deutsches Institut für Bautechnik DIBt

Table A1: Designation and Material MÜPRO Steel anchor

Part	Designation	Steel, zinc plated	Stainless steel A4	High corrosion resistant steel HCR
1	Anchor sleeve	Cold formed or machining steel, zinc plated, EN ISO 4042:1999	Stainless steel (e.g. 1.4401, 1.4404, 1.4571, 1.4362) EN 10088:2014, Property class 70, EN ISO 3506:2010	Stainless steel, 1.4529, 1.4565, EN 10088:2014, Property class 70, EN ISO 3506:2010
2	Cone	Cold formed or machining steel	Stainless steel (e.g. 1.4401, 1.4404, 1.4571, 1.4362) EN 10088:2014	

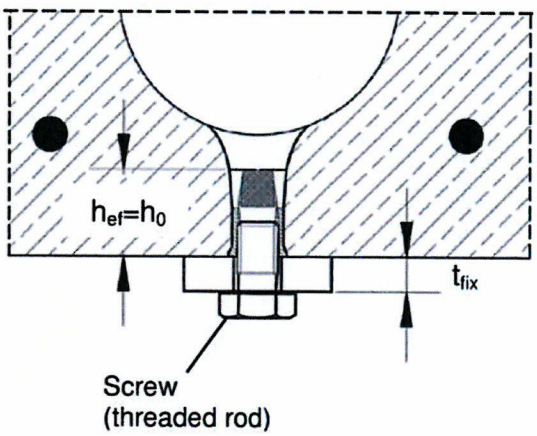
Requirements on the fastening screw or the threaded rod and nut according to the engineering documents:

- 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

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
- Material 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362 EN 10088:2014
- Property class 70 or 80 according to EN ISO 3506:2010

High corrosion resistant steel (HCR)
- Material 1.4529; 1.4565, according to EN 10088:2014
- Property class 70 or 80 according to EN ISO 3506:2010



MÜPRO Steel anchor

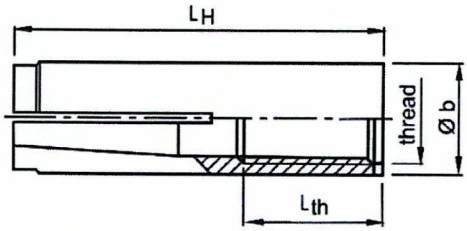
Product description
Material Steel anchor and requirements on the fastening screw or the threaded rod and nut

Annex A3

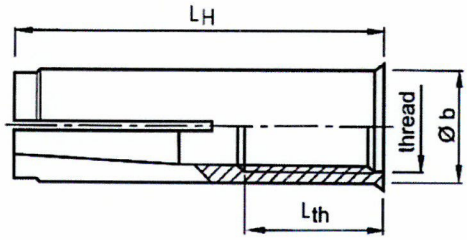
Deutsches Institut für Bautechnik DIBt

Anchor sleeve

Anchor version without shoulder (E)



Anchor version with shoulder (ES)

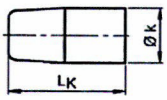


Marking: see Table A2

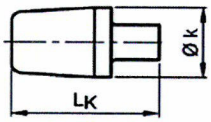
e.g.: ◇ E M8x40

◇	Identifying mark of manufacturing plant
E	Anchor identity (version without shoulder)
ES	Anchor identity (version with shoulder)
M8	Size of thread
40	Anchorage depth
A4	additional marking of stainless steel A4
HCR	additional marking of high corrosion resistant steel

Cone



Size M6x25 to M12x25, M6x30 and M10x30



Remaining sizes

Table A2: Dimensions and marking

	Anchor sleeve				Cone		Marking		
Anchor size	thread	Ø b	L_H	L_{th}	Ø k	L_K	version E	version ES	alternatively
M6x25	M6	8	25	12	4,6	9	-	◇ ES M6x25	-
M6x30	M6	8	30	13	5,0	13	◇ E M6x30	◇ ES M6x30	◇ E M6
M8x25	M8	10	25	12	6,3	9	-	◇ ES M8x25	-
M8x30	M8	10	30	13	6,5	12	◇ E M8x30	◇ ES M8x30	◇ E M8
M8x40	M8	10	40	20	6,5	12	◇ E M8x40	◇ ES M8x40	◇ E M8x40
M10x25	M10	12	25	12	8,2	9	-	◇ ES M10x25	-
M10x30	M10	12	30	12	8,2	12	-	◇ ES M10x30	◇ E M10x30
M10x40	M10	12	40	15	8,2	16	◇ E M10x40	◇ ES M10x40	◇ E M10
M12x25	M12	15	25	12	9,7	10,7	-	◇ ES M12x25	-
M12x50	M12	15	50	18	10,3	20	◇ E M12x50	◇ ES M12x50	◇ E M12
M16x65	M16	19,7	65	23	13,8	29	◇ E M16x65	◇ ES M16x65	◇ E M16

Dimensions in mm

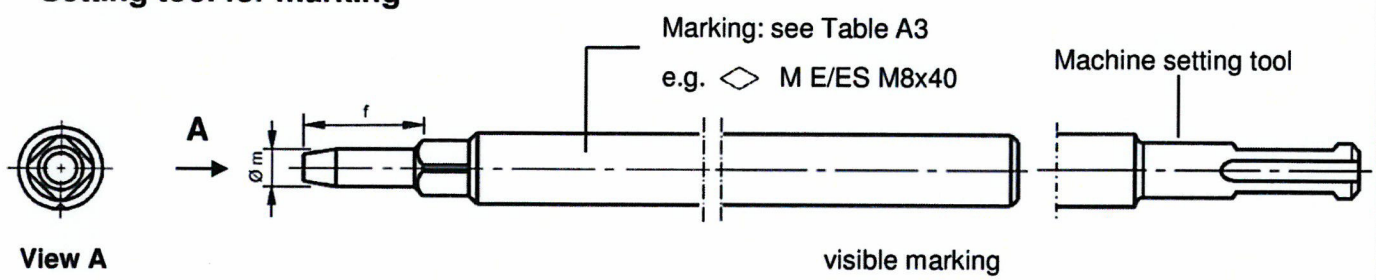
MÜPRO Steel anchor

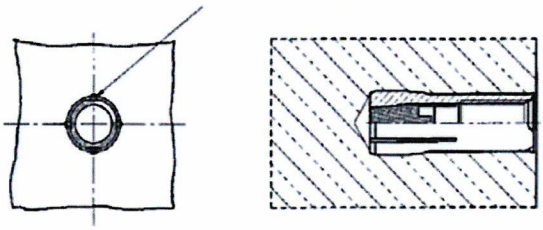
Product description
Dimensions and marking

Annex A4

Deutsches Institut für Bautechnik DIBt

Setting tool for marking





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

Setting tool

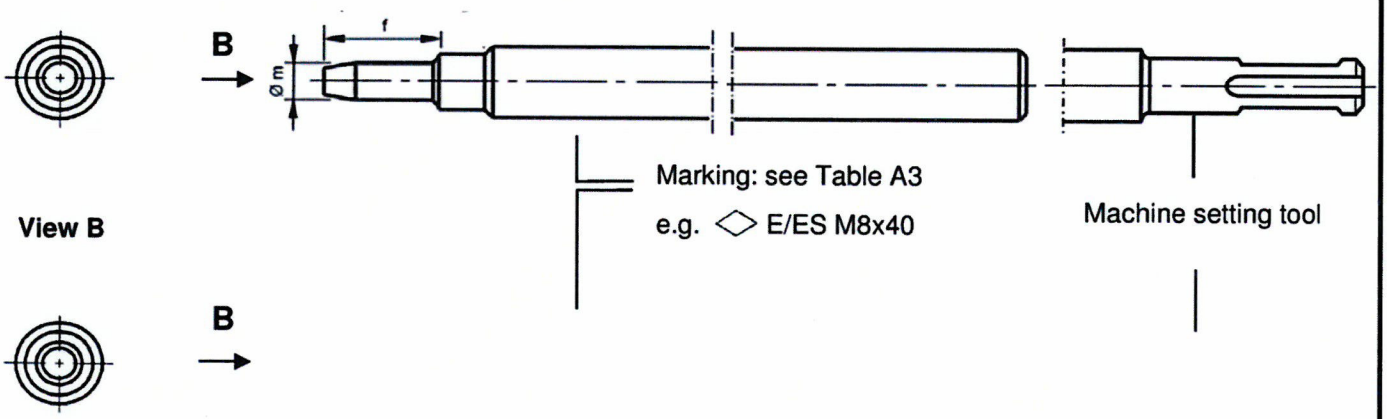


Table A3: Dimensions and marking of setting tools

Anchor size	Ø m	f	Setting tool for marking		Setting tool	
			Marking	alternatively	**Marking**	alternatively
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

Annex A5

Deutsches Institut für Bautechnik DIBt

Specifications of intended use

Steel anchor							
Anchorage depth $h_{ef} \geq 30$ 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**	✓						

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)	✓			

Base materials:

- reinforced or unreinforced normal weight concrete according to EN 206-1:2000

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	
Intended use Specifications	**Annex B1**

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 under static or quasi-static actions for multiple use for non-structural applications are designed in accordance with:
  - ETAG 001, Annex C, design method B, Edition August 2010 or
  - CEN/TS 1992-4:2009
- Anchorages under static or quasi-static actions for precast pre-stressed hollow core slabs:
  - ETAG 001, Annex C, design method C, Edition August 2010.
  - CEN/TS 1992-4:2009
- Anchorages under fire exposure are designed in accordance with:
  - EOTA Technical Report TR 020, Edition May 2004 or
  - CEN/TS 1992-4:2009, Annex D
  - It must be ensured that local spalling of the concrete cover does not occur

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site,
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools,
- Drill hole by hammer drilling only (use of vacuum drill bits is admissible),
- Positioning of the drill holes without damaging the reinforcement.

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	$h_0 =$	[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
Max. recommended 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
Available 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
Spacing	s_{cr}	[mm]	130	180	210	230	170	170	400
Edge distance	c_{cr}	[mm]	65	90	105	115	85	85	200
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	$h_0 =$	[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
Max. recommended 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
Available thread length	L_{th}	[mm]	12	12	12	12
Minimum screw-in depth	L_{sdmin}	[mm]	6	8	10	12
Installation in solid concrete slabs C12/15 to C50/60						
Spacing	s_{cr}	[mm]	75	75	75	75
Edge distance	c_{cr}	[mm]	38	38	38	38
Minimum thickness of member	$h_{min,1}$	[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	$h_{min,2}$	[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	$s_{cr} = s_{min}$	[mm]	200			
Edge distance	$c_{cr} = c_{min}$	[mm]	150			

MÜPRO Steel anchor

Intended use
Installation parameters

Annex B3

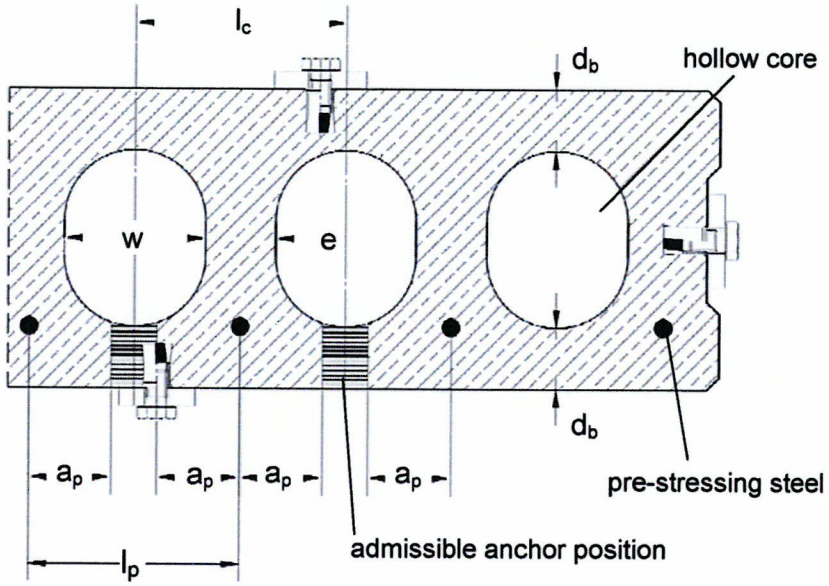
Deutsches Institut für Bautechnik DIBt

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

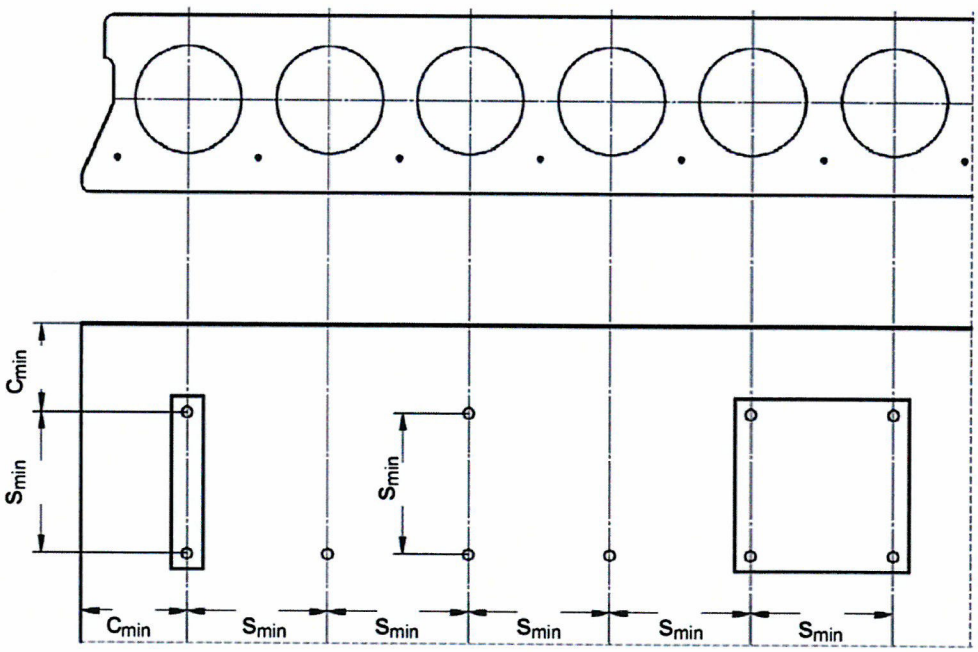
distance between anchor position and pre-stressing steel:
$a_p \geq 50$ mm



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

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

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



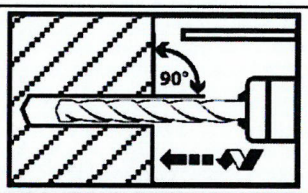
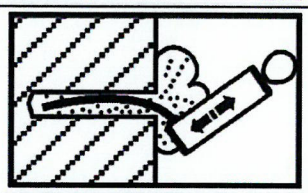
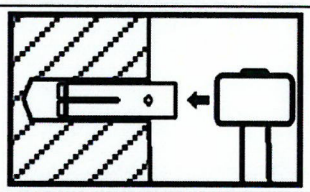
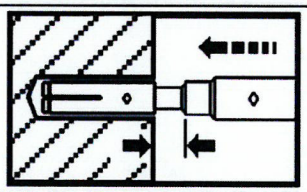
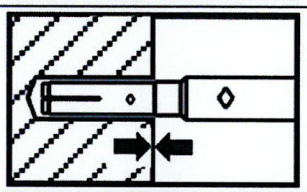
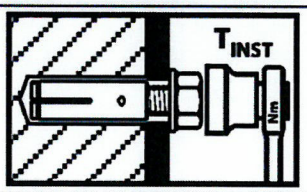
MÜPRO Steel anchor

Intended use
Installation in precast pre-stressed hollow core slabs

Annex B4

Deutsches Institut für Bautechnik DIBt

Installation instructions for solid concrete slabs

1		Drill hole perpendicular to concrete surface. When 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		Apply installation torque T_{inst} by using calibrated torque wrench.

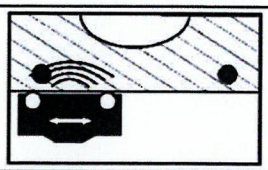
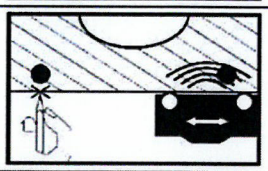
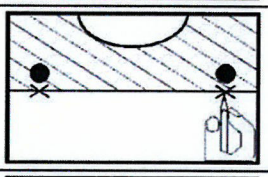
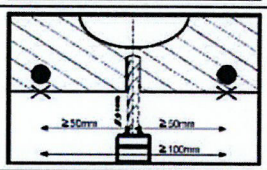
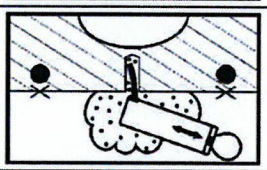
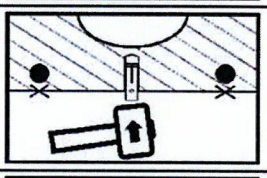
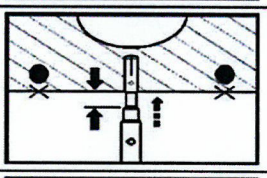
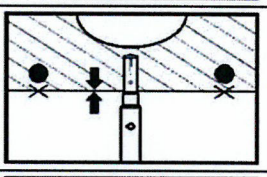
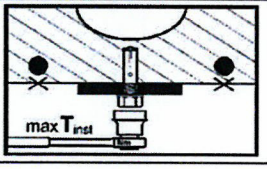
MÜPRO Steel anchor

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 reinforcement and search for the other position of the reinforcement
3		Mark the positions of reinforcement.
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		Apply installation torque T_{inst} by using calibrated torque wrench.

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**
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 safety factor	γ_M	[-]	1,8	2,16		2,1	2,16	1,8	1,8
Shear load with lever arm, Steel zinc plated									
Characteristic resistance **(Steel 4.6)**	$M^0_{Rk,s}$ 1)	[Nm]	6,1	15	15	30	30	52	133
Partial safety factor	γ_{Ms}	[-]	1,67						
Characteristic resistance **(Steel 4.8)**	$M^0_{Rk,s}$ 1)	[Nm]	6,1	15	15	30	30	52	133
Partial safety factor	γ_{Ms}	[-]	1,25						
Characteristic resistance **(Steel 5.6)**	$M^0_{Rk,s}$ 1)	[Nm]	7,6	19	19	37	37	65	166
Partial safety factor	γ_{Ms}	[-]	1,67						
Characteristic resistance **(Steel 5.8)**	$M^0_{Rk,s}$ 1)	[Nm]	7,6	19	19	37	37	65	166
Partial safety factor	γ_{Ms}	[-]	1,25						
Characteristic resistance **(Steel 8.8)**	$M^0_{Rk,s}$ 1)	[Nm]	12	30	30	59	60	105	266
Partial safety factor	γ_{Ms}	[-]	1,25						
Shear load with lever arm, Stainless steel A4 / HCR									
Characteristic resistance **(Property class 70)**	$M^0_{Rk,s}$ 1)	[Nm]	11	26	26	-	52	92	233
Partial safety factor	γ_{Ms}	[-]	1,56						
Characteristic resistance **(Property class 80)**	$M^0_{Rk,s}$ 1)	[Nm]	12	30	30	-	60	105	266
Partial safety factor	γ_{Ms}	[-]	1,33						

1) Characteristic bending moment $M^0_{Rk,s}$ for equation (5.5) in ETAG 001, Annex C or for equation (14) in CEN/TS 1992-4-4

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**
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 safety factor	γ_M	[-]	1,5			
Shear load with lever arm						
Characteristic resistance **(Steel 4.6)**	$M^0_{Rk,s}$ [1)]	[Nm]	6,1	15	30	52
Partial safety factor	γ_{Ms}	[-]	1,67			
Characteristic resistance **(Steel 4.8)**	$M^0_{Rk,s}$ [1)]	[Nm]	6,1	15	30	52
Partial safety factor	γ_{Ms}	[-]	1,25			
Characteristic resistance **(Steel 5.6)**	$M^0_{Rk,s}$ [1)]	[Nm]	7,6	19	37	65
Partial safety factor	γ_{Ms}	[-]	1,67			
Characteristic resistance **(Steel 5.8)**	$M^0_{Rk,s}$ [1)]	[Nm]	7,6	19	37	65
Partial safety factor	γ_{Ms}	[-]	1,25			
Characteristic resistance **(Steel 8.8)**	$M^0_{Rk,s}$ [1)]	[Nm]	12	30	60	105
Partial safety factor	γ_{Ms}	[-]	1,25			

[1)] Characteristic bending moment $M^0_{Rk,s}$ for equation (5.5) in ETAG 001, Annex C or for equation (14) in CEN/TS 1992-4-4

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**
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_{Rk}	[kN]	3,5	4,0	4,5	4,5
Partial safety factor	γ_M	[-]	1,5			
Shear load with lever arm						
Characteristic resistance **(Steel 4.6)**	$M^0_{Rk,s}$ [2]	[Nm]	6,1	15	30	52
Partial safety factor	γ_{Ms}	[-]	1,67			
Characteristic resistance **(Steel 4.8)**	$M^0_{Rk,s}$ [2]	[Nm]	6,1	15	30	52
Partial safety factor	γ_{Ms}	[-]	1,25			
Characteristic resistance **(Steel 5.6)**	$M^0_{Rk,s}$ [2]	[Nm]	7,6	19	37	65
Partial safety factor	γ_{Ms}	[-]	1,67			
Characteristic resistance **(Steel 5.8)**	$M^0_{Rk,s}$ [2]	[Nm]	7,6	19	37	65
Partial safety factor	γ_{Ms}	[-]	1,25			
Characteristic resistance **(Steel 8.8)**	$M^0_{Rk,s}$ [2]	[Nm]	12	30	60	105
Partial safety factor	γ_{Ms}	[-]	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] Characteristic bending moment $M^0_{Rk,s}$ for equation (5.5) in ETAG 001, Annex C or for equation (14) in CEN/TS 1992-4-4

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 concrete 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**									
Steel 4.6	R 30	Characteristic resistance	$F^0_{Rk,fi}$	[kN]	0,2	0,4	0,4	0,9	0,9	1,5	3,1
	R 60			[kN]	0,2	0,3	0,3	0,8	0,8	1,3	2,4
	R 90			[kN]	0,1	0,3	0,3	0,6	0,6	1,1	2,0
	R 120			[kN]	0,1	0,2	0,2	0,5	0,5	0,8	1,6
Steel 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]	0,3	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
Steel ≥ 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	-	1,5	1,5	4,0
	R 60			[kN]	0,8	0,9	1,5	-	1,5	1,5	4,0
	R 90			[kN]	0,4	0,9	0,9	-	1,5	1,5	3,7
	R 120			[kN]	0,3	0,5	0,5	-	1,0	1,2	2,4
		Partial safety 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	-	170	200	400
		Edge distance	$c_{cr,fi}$	[mm]	65	90	105	-	85	100	200
		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 $h_{ef} \geq 30$ mm

Annex C4

Deutsches Institut für Bautechnik DIBt

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

Anchor size				**M6x25**	**M8x25**	**M10x25**	**M12x25**
Fire resistance class		**Load in any direction**					
Steel ≥ 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]	0,30	0,6	0,6	0,6
	R 120		[kN]	0,25	0,5	0,5	0,5
		Partial safety factor $\gamma_{M,fi}$	[-]	1,0			
R 30 – R 120		Spacing $s_{cr,fi}$	[mm]	100	100	100	100
		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 h_{ef} = **25 mm**

Annex C5