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-10/0172 of 11 May 2022

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	Upat drop-in anchor USA
Product family to which the construction product belongs	Mechanical fasteners for use in concrete
Manufacturer	Upat Vertriebs GmbH Bebelstraße 11 79108 Freiburg im Breisgau DEUTSCHLAND
Manufacturing plant	Upat
This European Technical Assessment contains	14 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 330232-01-0601, Edition 05/2021
This version replaces	ETA-10/0172 issued on 25 April 2017

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Specific Part

1 Technical description of the product

The Upat drop-in anchor USA is an anchor 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.

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)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi static action) Method A	See Annex B2 and C1
Characteristic resistance to shear load (static and quasi static action)	See Annex C2
Displacements	See Annex C3
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

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 330232-01-0601 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

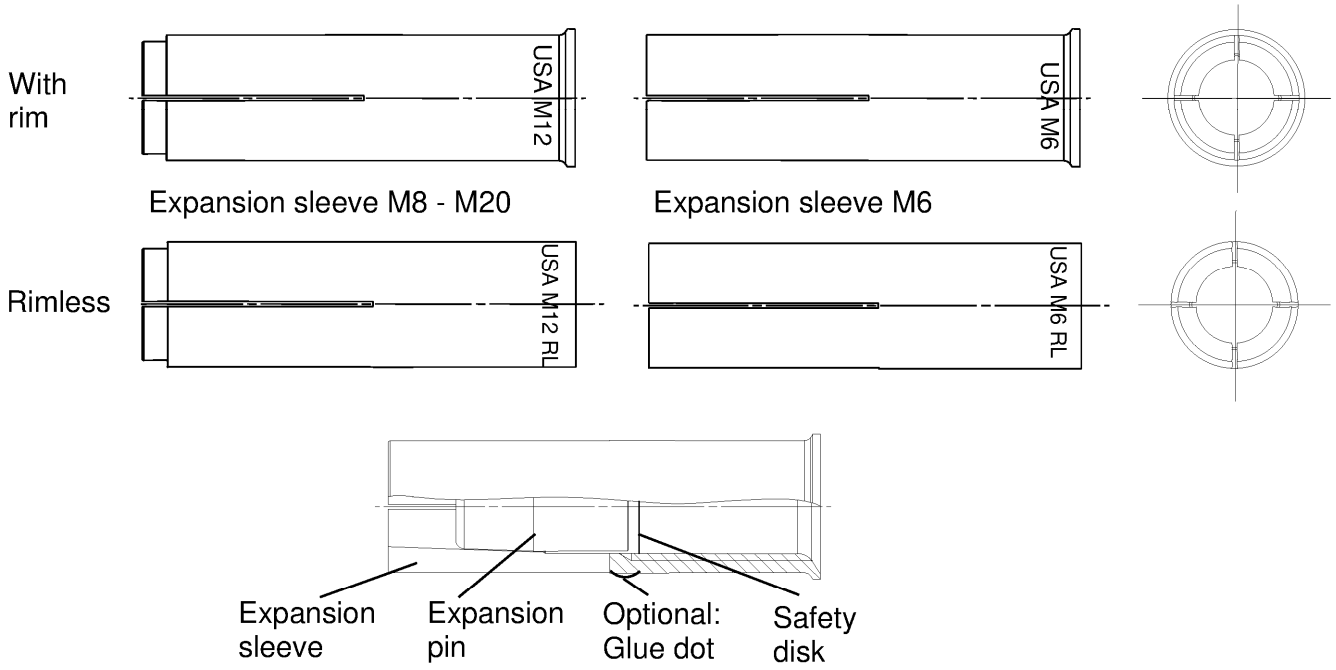
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 11 May 2022 by Deutsches Institut für Bautechnik

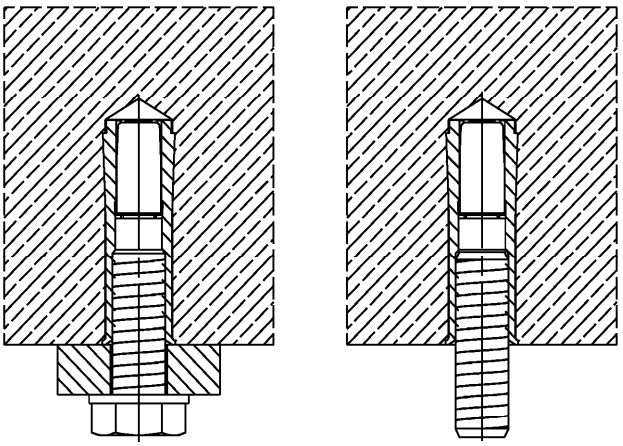
Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Baderschneider

Deutsches Institut für Bautechnik DIBt



Intended use in concrete



(Fig. not to scale)

Upat drop-in anchor USA	**Annex A 1**
Product description Anchor types Installed condition	

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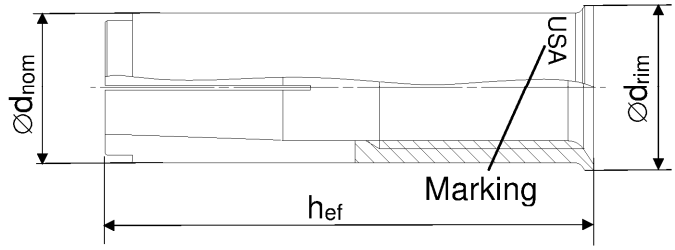
Expansion sleeve



Expansion pin

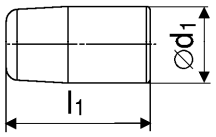
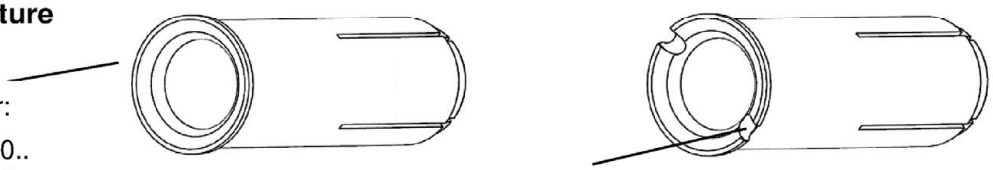


Table A2.1: Anchor size

Anchor size USA [mm]	M6x30	M8x30	M8x40	M10x30	M10x40	M12x50	M12x50 D	M16x65	M20x80
h_{ef}	30	30	40	30	40	50		65	80
∅ d_{nom}	8	10		12		15	16	20	25
∅ d_{rim} (not applicable for USA RL)	9,5	11,5		13,5		16,5	17,5	21,5	27,0
∅ d_1	5	6,5		8		10		13,5	17,5
l_1	14	13,5		13	18	18		25	26

Distinctive feature



No groove for:

- USA M6x30..
- USA M8x30..
- USA M10x40..
- USA M12x50..
- USA M16x65..
- USA M20x80..

2 grooves for:

- USA M8x40..
- USA M10x30..

Table A2.2: Marking on anchor body

galvanised steel (gvz)		stainless steel (R)	
with rim	*rimless*	*with rim*	*rimless*
USA M6x30	USA M6x30 RL	USA M6x30 R	USA M6x30 RL R
USA M8x30	USA M8x30 RL	USA M8x30 R	USA M8x30 RL R
USA M8x40	USA M8x40 RL	USA M8x40 R	USA M8x40 RL R
USA M10x30	USA M10x30 RL	USA M10x30 R	USA M10x30 RL R
USA M10x40	USA M10x40 RL	USA M10x40 R	USA M10x40 RL R
USA M12x50	USA M12x50 RL	USA M12x50 R	USA M12x50 RL R
USA M12x50 D	USA M12x50 RL D	USA M12x50 D R	USA M12x50 RL D R
USA M16x65	USA M16x65 RL	USA M16x65 R	USA M16x65 RL R
USA M20x80	USA M20x80 RL	USA M20x80 R	USA M20x80 RL R

(Fig. not to scale)

Upat drop-in anchor USA

Annex A 2

Product description
Anchor types

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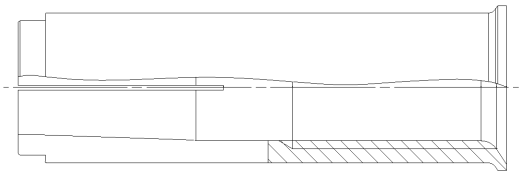
Expansion sleeve



Expansion pin

Table A3.1: Materials

	Material	
Designation	galvanised steel (≥ 5 µm)	stainless steel (R)
Expansion sleeve	EN 10277:2018 or EN 10084:2008 or EN 10111:2008 or EN 10263:2018 or EN 10087:1999 or ASTM A29/A29M	EN 10088:2014
Expansion pin		
Fastening screw or threaded rod	steel, property class 4.6, 5.6, 5.8 or 8.8 according to EN ISO 898-1:2013	property class 50, 70 or 80 according to EN ISO 3506:2020

(Fig. not to scale)

Upat drop-in anchor USA

Product description
Material

Annex A 3

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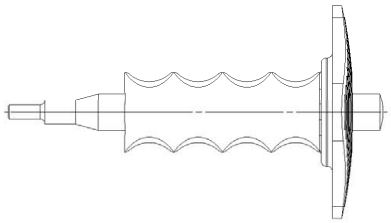
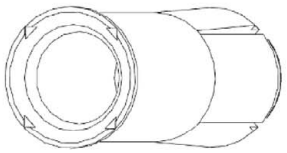
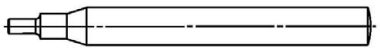
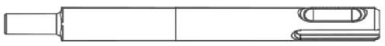
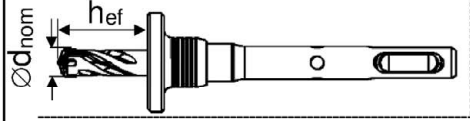
Setting & drilling tools

Setting tools	Marking	Description	Marking on USA with rim and rimless
	EHS Plus M..x h_{ef}	Manual setting tool with hand guard	
	EHS M..x h_{ef}	Manual setting tool basic format	
	EMS M..x h_{ef}	Machine setting tool with SDS Plus	No marking

Drilling tools

	EBB $\varnothing d_{nom}$ x h_{ef}	Stop drill
Or other usual driller		

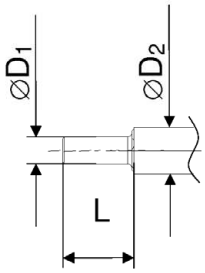


Table A4.1: Corresponding drill bits and parameters of setting tools

Manual setting tool	Machine setting tool	Stop drill	For anchor size USA	∅ D1 [mm]	∅ D2 [mm]	L [mm]
EHS (Plus) M6x25/30	EMS M6x25/30	EBB 8x30	USA M6x30	4,8	9,0	17,0
EHS (Plus) M8x25/30	EMS M8x25/30	EBB 10x30	USA M8x30	6,4	11,0	18,0
EHS (Plus) M8x40	EMS M8x40	EBB 10x40	USA M8x40			28,0
EHS (Plus) M10x25/30	EMS M10x25/30	EBB 12x30	USA M10x30	7,9	13,0	18,0
EHS (Plus) M10x40	EMS M10x40	EBB 12x40	USA M10x40			24,0
EHS (Plus) M12x50	EMS M12x50	EBB 15x50	USA M12x50	10,2	16,5	30,0
EHS (Plus) M12x50	EMS M12x50	EBB 16x50	USA M12x50 D			
EHS (Plus) M16x65	EMS M16x65	EBB 20x65	USA M16x65	13,5	22	36,0
EHS (Plus) M20x80	EMS M20x80	EBB 25x80	USA M20x80	16,4	27	50,0

(Fig. not to scale)

Upat drop-in anchor USA

Intended Use
Setting & Drilling tools

Annex A 4

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Specifications of intended use

Anchorages subject to:

Upat drop-in anchor USA (all versions)			M6	M8	M10	M12	M16	M20
Hammer drilling with standard drill bit 			All types					
Hammer drilling with hollow drill bit with automatic cleaning 								
Material	Steel	Zinc plated				✓		
	Stainless	R				✓		
Static and quasi-static loads						✓		
Uncracked concrete						✓		

Base materials:

- Reinforced or unreinforced normal concrete without fibres of strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions: **USA, USA R**
- For all other conditions according to EN 1993-1-4:2006 + A1:2015 corresponding to corrosion resistance class CRC III **USA R**
  Anchor types M6x30 R, M8x30 R and M10x30 R only for dry internal exposure

Design:

- Anchorages are to be designed under the responsibility of an engineer experienced in anchorages and concrete work
- Verifiable calculation notes and drawings are to be 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.)
- Design of fastenings according to EN 1992-4:2018 and Technical Report TR 055, Edition February 2018
- Anchor sizes M6x30, M8x30 and M10x30 for statically indeterminate structural components only, when in case of failure, the load can be distributed to other fasteners.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Create drill hole with hammer drill or with hollow drill and vacuum cleaner
- The anchor may only be used once
- In case of aborted hole: New hole must be drilled at a minimum distance of twice the depth of the aborted hole or closer, if the hole is filled with a high strength mortar (e.g. UPM 66, UPM 55 or UPM 44) and only if the hole is not in the direction of the oblique tensile or shear load
- Anchor expansion by impact using the setting tools given in Annex A 4. The anchor is property set if the stop of the setting tool reaches the expansion sleeve. The manual setting tool with installation control leaves a visible mark on the sleeve, as illustrated in Annex A 4 and B 3

Upat drop-in anchor USA	**Annex B 1**
Intended Use Specifications	

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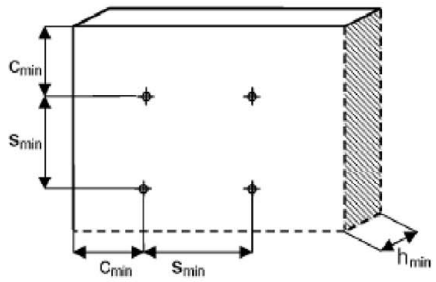
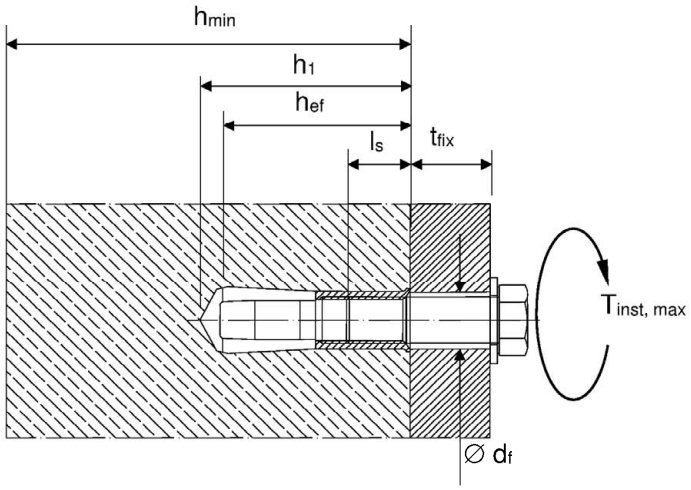
Table B2.1: Installation parameters for concrete C20/25 to C50/60

Anchor size (all versions)			**M6x30**	**M8x30**	**M8x40**	**M10x30**	**M10x40**	**M12x50**	**M12x50 D**	**M16x65**	**M20x80**
Nominal drill hole diameter	d_0	[mm]	8	10		12		15	16	20	25
Cutting diameter of drill bit	d_{cut}		8,45	10,45		12,50		15,50	16,50	20,55	25,55
Effective anchorage depth	h_{ef}		30	30	40	30	40	50		65	80
Maximum installation torque	$T_{inst,max}$	[Nm]	4	8		15		35		60	120
Minimum drill hole depth	h_1	[mm]	32	33	43	33	43	54		70	85
Minimum screw-in depth	$l_{s,min}$		6	8		10		12		16	20
Maximum screw-in depth	$l_{s,max}$		14	14		15	17	22		28	34
Clearance of hole diameter	$\varnothing d_f \leq$		7	9		12		14		18	22
h_{min} = 80 mm											
Minimum spacing	s_{min}	[mm]	70	110	200	200		-[1]			
Minimum edge distance	c_{min}		150	150		150					
h_{min} = 100 mm											
Minimum spacing	s_{min}	[mm]	65	70		90	150	200		-[1]	
Minimum edge distance	c_{min}		115	115		160	180				
h_{min} = 120 mm											
Minimum spacing	s_{min}	[mm]	65	70		85	95	145		-[1]	
Minimum edge distance	c_{min}		115	115		140	150	200			
h_{min} = 160 mm											
Minimum spacing	s_{min}	[mm]	65	70		85	95	145		180	-[1]
Minimum edge distance	c_{min}		115	115		140	150	200		240	
h_{min} = 200 mm											
Minimum spacing	s_{min}	[mm]	65	70		85	95	145		180	190
Minimum edge distance	c_{min}		115	115		140	150	200		240	280

[1] No performance assessed





Fastening screw or threaded rod:

- Minimum property class and materials according to table A3.1
- The length of the fastening screw or threaded rod shall be determined depending on thickness of fixture t_{fix}, admissible tolerances and maximum screw-in depth $l_{s,max}$ as well as minimum screw-in depth $l_{s,min}$

(Fig. not to scale)

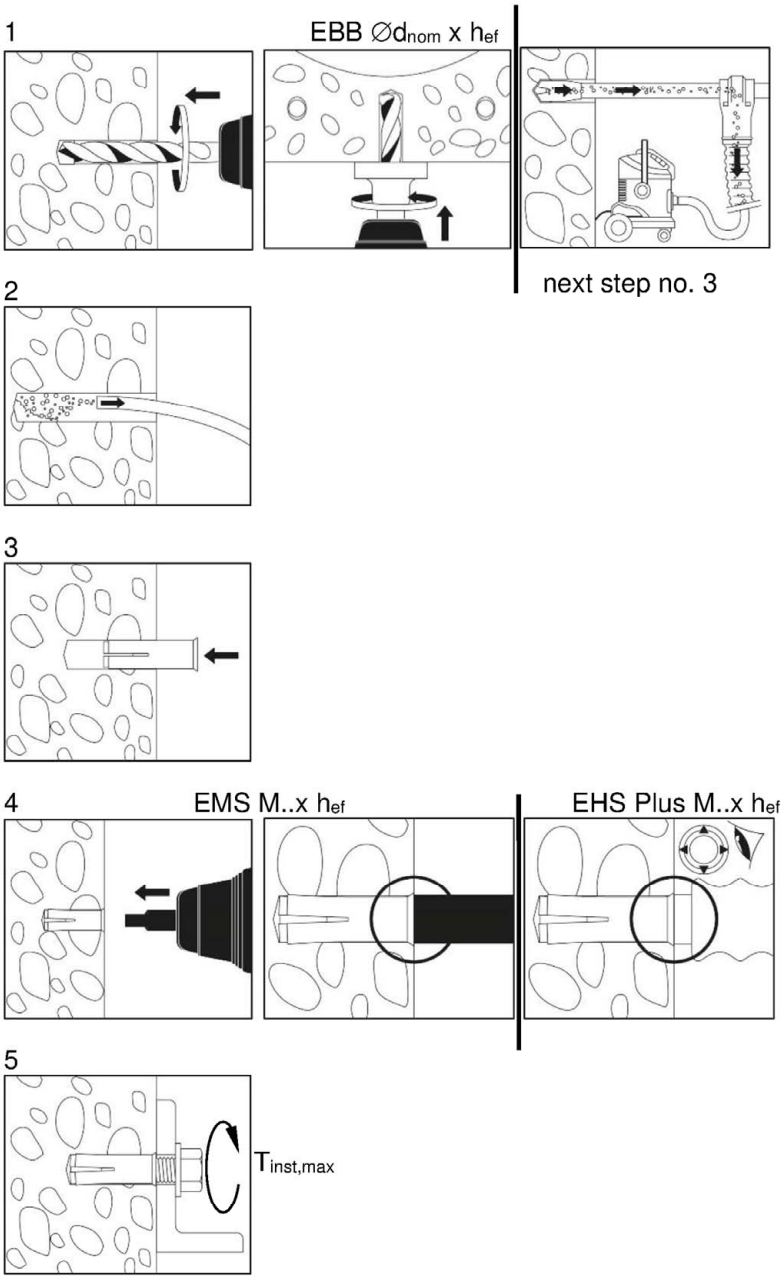
Upat drop-in anchor USA

Intended Use
Installation parameters

Annex B 2

Deutsches Institut für Bautechnik DIBt

Installation instructions



No.	Description
1	Create drill hole with hammer drill or stop drill or with hollow drill and vacuum cleaner
2	Clean from drill-dust
3	Set anchor till anchor is flush with surface of concrete
4	Expand the sleeve by driving the pin with the corresponding setting tool into the sleeve and control the correct setting
5	Fixation of fixture. Maximum installation torque $T_{inst,max}$ must not be exceeded

(Fig. not to scale)

Upat drop-in anchor USA

Intended Use
Installation instructions

Annex B 3

Deutsches Institut für Bautechnik DIBt

Table C1.1: Characteristic values for tension loads under static and quasi-static action

USA		property class of the fastening screw or threaded rod	M6x30[1]	M8x30[1]	M8x40	M10x30[1]	M10x40	M12x50	M12x50 D	M16x65	M20x80
Steel failure											
Installation factor	γ_{inst} [-]		1,0								
Characteristic resistance	$N_{Rk,s}$ [kN]	A4-50	10,1	18,3		29,0		42,1		78,3	122,4
Partial factor	γ_{Ms}[4] [-]		2,86								
Characteristic resistance	$N_{Rk,s}$ [kN]	A4-70	14,1	19,6		24,9		45,1	59,0	73,8	117,2
Partial factor	γ_{Ms}[4] [-]		1,87	1,5					1,87	1,5	
Characteristic resistance	$N_{Rk,s}$ [kN]	A4-80	16,1	19,6		24,9		45,1	59,0	73,8	117,2
Partial factor	γ_{Ms}[4] [-]		1,6	1,5							
Characteristic resistance	$N_{Rk,s}$ [kN]	steel 4.6	8,0	14,6		23,2		33,7		62,7	97,9
Partial factor	γ_{Ms}[4] [-]		2,0								
Characteristic resistance	$N_{Rk,s}$ [kN]	steel 5.6	10,1	18,3		29,0		42,1		78,3	122,4
Partial factor	γ_{Ms}[4] [-]		2,0								
Characteristic resistance	$N_{Rk,s}$ [kN]	steel 5.8	10,1	17,2		21,8		39,6	42,1	64,7	102,8
Partial factor	γ_{Ms}[4] [-]		1,5								
Characteristic resistance	$N_{Rk,s}$ [kN]	steel 8.8	13,5	17,2		21,8		39,6	53,3	64,7	102,8
Partial factor	γ_{Ms}[4] [-]		1,5								
Pullout failure											
Characteristic resistance C20/25	$N_{Rk,p}$	[kN]	8,1		12,5	8,1	12,5	17,4		25,8	35,2
Increasing Factors for $N_{Rk,p}$ $N_{Rk,p} = \psi_c \cdot N_{Rk,p}$ (C20/25)	ψ_c	C25/30	1,12								
		C30/37	1,22								
		C35/45	1,32								
		C40/50	1,41								
		C45/55	1,50								
		C50/60	1,58								
Installation factor	γ_{inst}	[-]	1,0								
Concrete cone and splitting failure											
Effective anchorage depth	h_{ef}	[mm]	30		40	30	40	50		65	80
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0[2]								
Factor for cracked concrete	$k_{cr,N}$	[-]	No performance assessed								
Spacing	$s_{cr,N}$	[mm]	90		120	90	120	150		195	240
Edge distance	$c_{cr,N}$	[mm]	45		60	45	60	75		97	120
Spacing (splitting failure)	$s_{cr,sp}$	[mm]	210		280	210	320	350		455	560
Edge distance (splitting failure)	$c_{cr,sp}$	[mm]	105		140	105	160	175		227	280
Characteristic resistance to splitting	$N^0_{Rk,sp}$	[kN]	min $\{N^0_{Rk,c}; N_{Rk,p}\}$[3]								

[1] Use restricted to anchoring of structural components which are statically indeterminate
[2] Based on concrete strength as cylinder strength
[3] $N^0_{Rk,c}$ according to EN 1992-4:2018
[4] In absence of other national regulations

Upat drop-in anchor USA

Performances
Characteristic resistance to tension loads under static and quasi-static action

Annex C 1

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Table C2.1: Characteristic values for shear loads under static and quasi-static action

USA	property class of the fastening screw or threaded rod	**M6x30**[1]	**M8x30**[1]	**M8x40**	**M10x30**[1]	**M10x40**	**M12x50**	**M12x50 D**	**M16x65**	**M20x80**
Factor for ductility	k_7 [-]	1,0								
Installation factor	γ_{inst} [-]	1,0								
Steel failure without lever arm										
Characteristic resistance	$V^0_{Rk,s}$ [kN] A4-50	5,0	9,2		14,5		21,1		39,2	61,2
Partial factor	γ_{Ms}[2] [-]	2,38								
Characteristic resistance	$V^0_{Rk,s}$ [kN] A4-70	7,0	9,8		12,4		22,6	29,5	37	59
Partial factor	γ_{Ms}[2] [-]	1,56	1,25					1,56	1,25	
Characteristic resistance	$V^0_{Rk,s}$ [kN] A4-80	8,0	9,8		12,4		22,6	30,4	36,9	58,6
Partial factor	γ_{Ms}[2] [-]	1,33	1,25							
Characteristic resistance	$V^0_{Rk,s}$ [kN] steel 4.6	4,0	7,3		11,6		16,9		31	49
Partial factor	γ_{Ms}[2] [-]	1,67								
Characteristic resistance	$V^0_{Rk,s}$ [kN] steel 5.6	5,0	9,2		14,5		21,1		39	61
Partial factor	γ_{Ms}[2] [-]	1,67								
Characteristic resistance	$V^0_{Rk,s}$ [kN] steel 5.8	5,0	8,6		10,9		19,8	21,1	32	51
Partial factor	γ_{Ms}[2] [-]	1,25								
Characteristic resistance	$V^0_{Rk,s}$ [kN] steel 8.8	6,8	8,6		10,9		19,8	27	32	51
Partial factor	γ_{Ms}[2] [-]	1,25								
Steel failure with lever arm										
Characteristic resistance	$M^0_{Rk,s}$ [Nm] A4-50	8	19		37		66		166	324
Partial factor	γ_{Ms}[2] [-]	2,38								
Characteristic resistance	$M^0_{Rk,s}$ [Nm] A4-70	11	26		52		92		232	454
Partial factor	γ_{Ms}[2] [-]	1,56								
Characteristic resistance	$M^0_{Rk,s}$ [Nm] A4-80	12	30		60		105		266	519
Partial factor	γ_{Ms}[2] [-]	1,33								
Characteristic resistance	$M^0_{Rk,s}$ [Nm] steel 4.6	6,1	15		30		52		133	259
Partial factor	γ_{Ms}[2] [-]	1,67								
Characteristic resistance	$M^0_{Rk,s}$ [Nm] steel 5.6	7,6	19		37		66		166	324
Partial factor	γ_{Ms}[2] [-]	1,67								
Characteristic resistance	$M^0_{Rk,s}$ [Nm] steel 5.8	7,6	19		37		66		166	324
Partial factor	γ_{Ms}[2] [-]	1,25								
Characteristic resistance	$M^0_{Rk,s}$ [Nm] steel 8.8	12	30		60		105		266	517
Partial factor	γ_{Ms}[2] [-]	1,25								
Concrete pryout failure										
Factor for pryout failure	k_8 [-]	1,74		1,9	1,74	1,9	2,0			
Concrete edge failure										
Effective length of anchor	l_f [mm]	30		40	30	40	50		65	80
Effective diameter of anchor	d_{nom} [mm]	8	10		12		15	16	20	25

[1] Use restricted to anchoring of structural components which are statically indeterminate
[2] In absence of other national regulations

Upat drop-in anchor USA

Performances
Characteristic resistance to shear loads under static and quasi-static action

Annex C 2

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Table C3.1: Displacements under tension and shear loads for USA in galvanised steel

USA			M6x30	M8x30	M8x40	M10x30	M10x40	M12x50	M12x50 D	M16x65	M20x80
Tension load in C20/25 to C50/60	N	[kN]	4,0		6,1	4,0	6,1	8,5		12,6	17,2
Displacement	δ_{No}	[mm]	0,1								
	$\delta_{N\infty}$	[mm]	0,2								
Shear load in C20/25 to C50/60	V	[kN]	3,9	4,9	6,2			11,3	15,2	18,5	29,4
Displacement	δ_{Vo}	[mm]	0,95	1,00		1,05		1,10		1,40	1,80
	$\delta_{V\infty}$	[mm]	1,40	1,50		1,60		1,70		2,10	2,70

Table C3.2: Displacements under tension and shear loads for USA in stainless steel

USA R			M6x30	M8x30	M8x40	M10x30	M10x40	M12x50	M12x50 D	M16x65	M20x80
Tension load in C20/25 to C50/60	N	[kN]	4,0		6,1	4,0	6,1	8,5		12,6	17,2
Displacement	δ_{No}	[mm]	0,1								
	$\delta_{N\infty}$	[mm]	0,2								
Shear load in C20/25 to C50/60	V	[kN]	3,2	5,6	7,1			12,9	13,5	21,1	33,5
Displacement	δ_{Vo}	[mm]	0,95	1,00		1,05		1,10		1,40	1,80
	$\delta_{V\infty}$	[mm]	1,40	1,50		1,60		1,70		2,10	2,70

Upat drop-in anchor USA

Performances
Displacements

Annex C 3