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-22/0123 of 28 November 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	Würth concrete screw W-BS 2/A4 and W-BS 2/HCR
Product family to which the construction product belongs	Mechanical fasteners for use in concrete
Manufacturer	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau DEUTSCHLAND
Manufacturing plant	Werk 9
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 330232-01-0601, Edition 05/2021
This version replaces	ETA-22/0123 issued on 5 May 2022

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Specific Part

1 Technical description of the product

The Würth concrete screw W-BS 2/A4 and W-BS 2/HCR is an anchor in size 6, 8 and 10 mm made of stainless steel. The anchor is screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterised by mechanical interlock in the special thread.

Product and product description are 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 B4, C1 and C2
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C1 and C2
Displacements (static and quasi-static loading)	See Annex C5
Characteristic resistance and displacements for seismic performance categorie C1	See Annex C3

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 European Assessment Document EAD No. 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 at Deutsches Institut für Bautechnik.

Issued in Berlin on 28 November 2022 by Deutsches Institut für Bautechnik

Beatrix Wittstock
Head of Section

beglaubigt:
Tempel

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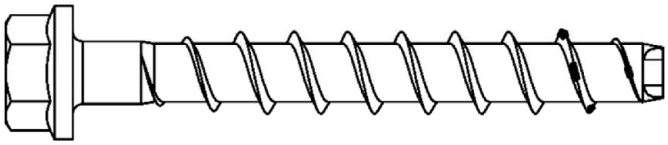
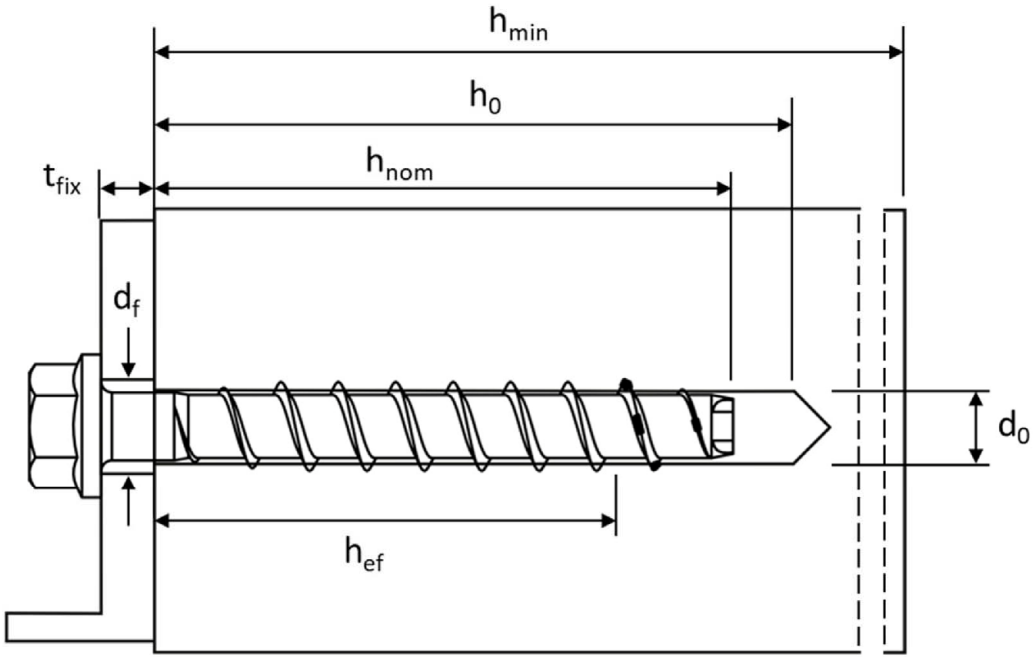
Product in installed condition

Würth concrete screw W-BS 2/A4 und W-BS 2/HCR

- Stainless steel A4
- High corrosion resistant steel HCR



e.g., W-BS 2 concrete screw with hexagon head and fixture



d_0 = nominal diameter of drill hole
t_{fix} = thickness of fixture
d_f = diameter of clearance hole

h_{min} = minimum thickness of member
h_{nom} = nominal embedment depth
h_0 = depth of drill hole
h_{ef} = effective embedment depth

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR	Annex A1
Product description Product in installed condition	

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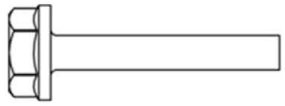
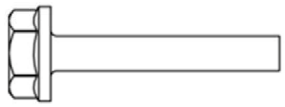
Screw types

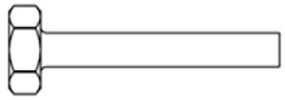

Configuration with threaded stud and hexagon drive
e.g., W-BS 2 8x105 Type ST M10 SW7



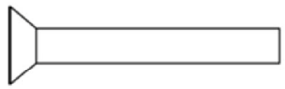

Configuration with washer and hexagon head
e.g., W-BS 2 6x60 Type S SW13



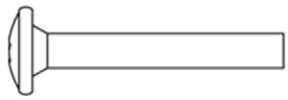

Configuration with washer, hexagon head and
TX drive e.g., W-BS 2 6x60 Type S SW13 TX 40



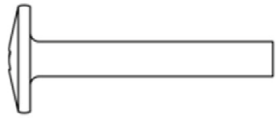

Configuration with hexagon head
e.g., W-BS 2 8x80 Type S SW13



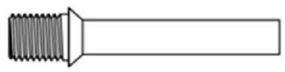

Configuration with countersunk head and TX drive
e.g., W-BS 2 6x60 Type CS TX40



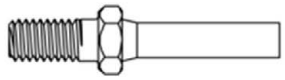

Configuration with pan head and TX drive
e.g., W-BS 2 6x60 Type P TX40



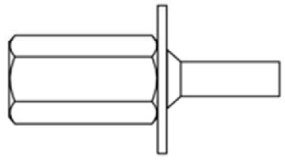

Configuration with large pan head and TX drive
e.g., W-BS 2 8x80 Type LP TX40




Configuration with countersunk head and
connection thread e.g., W-BS 2 6x55 Type ST-6 M8




Configuration with hexagon drive and connection
thread
e.g., W-BS 2 6x55 Type ST-6 SW10




Configuration with internal thread and
hexagon drive e.g., W-BS 2 6x55 Type I M8/M10

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR	
Product description Screw types	**Annex A2**

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Table 1: Material

Part	Name	Product name	Material
all types	Stainless Steel A4 CRC III	W-BS 2/A4	1.4401; 1.4404; 1.4571; 1.4578
	High corrosion resistant steel CRC V	W-BS 2/HCR	1.4529

Part	Product name	Nominal characteristic steel		Rupture elongation A_5 [%]
		Yield strength f_{yk} [N/mm²]	Ultimate strength f_{uk} [N/mm²]	
all types	W-BS 2/A4	560	700	≤ 8
	W-BS 2/HCR			

Table 2: Dimensions

Anchor size			6			8			10		
Nominal embedment depth		h_{nom}	1[1)]	2	3	1	2	3	1	2	3
		[mm]	35	45	55	45	55	65	55	75	85
Screw length	≤ L	[mm]	500								
Core diameter	d_K	[mm]	5,1			7,2			9,2		
Thread outer diameter	d_s	[mm]	7,6			10,5			12,5		

[1)] only for statically indeterminate non-structural systems (multiple use) according to EN 1992-4:2018, only in dry internal conditions

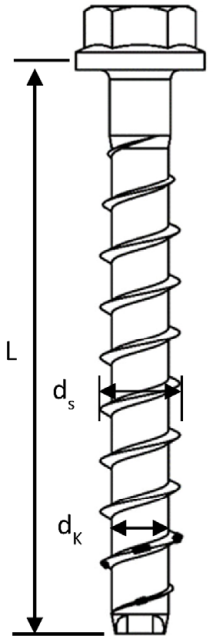
Marking:

W-BS 2/A4

Screw type:	TSM or W-BS
Screw size:	10
Screw length:	100
Material:	A4

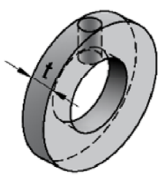
W-BS 2/HCR

Screw type:	TSM or W-BS
Screw size:	10
Screw length:	100
Material:	HCR

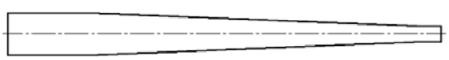


Filling washer WIT-SHB for screw size 8 and 10

Filling washer WIT-SHB t = 5mm



Mixer reduction nozzle



Würth concrete screw W-BS 2/A4 and W-BS 2/HCR

Product description
Material, dimensions and markings

Annex A3

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Specification of Intended use

Table 3: Anchorages subject to

Concrete screw size		6			8			10		
Nominal embedment depth	h_{nom}	h_{nom1} [1]	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
	[mm]	35	45	55	45	55	65	55	75	85
Static and quasi-static loads		All sizes and all embedment depths								
Fire exposure										
C1 category - seismic		-[2]	ok	ok	ok	-[2]	ok	ok	-[2]	ok

[1] only for statically indeterminate non-structural systems (multiple use) according to EN 1992-4:2018, only in dry internal conditions

[2] no performance assessed

Base materials:

- Compacted reinforced and unreinforced concrete without fibers according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Cracked and uncracked concrete.

Use conditions (Environmental conditions):

- Concrete screws in structures subject to dry, internal conditions: all screw types.
- For all other conditions corresponding to corrosion resistance classes CRC according to EN 1993-1-4:2006 + A1:2015
  - Stainless steel according to Annex A3, screw with marking A4: CRC III
  - High corrosion resistant steel according to Annex A3, screw with marking HCR: CRC V

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR	
Intended use Specification	**Annex B1**

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Specification of Intended use - continuation

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.).
- Anchorages are designed according to EN 1992-4:2018 and EOTA Technical Report TR 055, Edition February 2018.

  The design for shear load according to EN 1992-4:2018, Section 6.2.2 applies for all specified diameters d_f of clearance hole in the fixture in Annex B3, Table 4.

Installation:

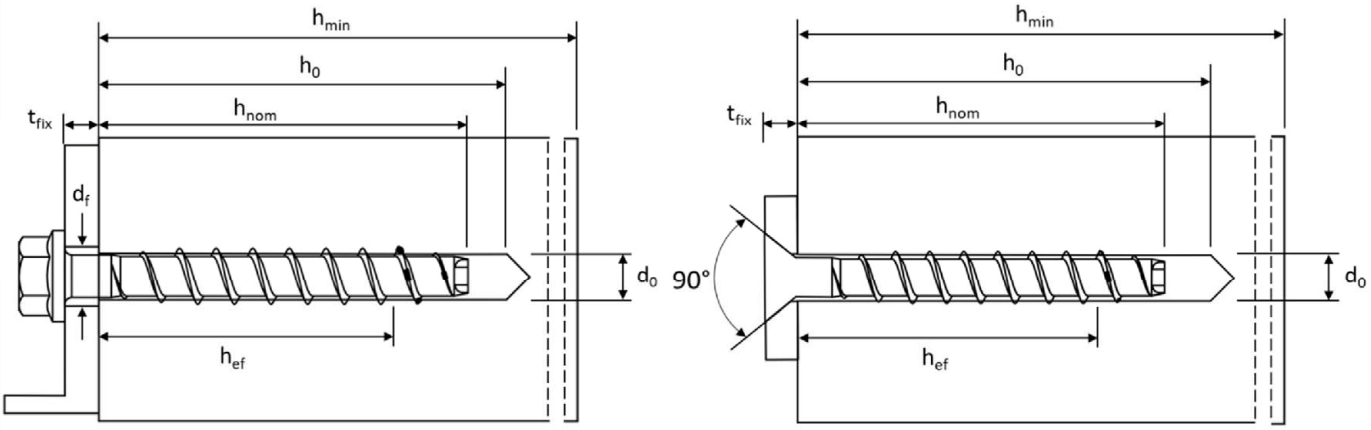
- Hammer drilling or vacuum drilling. Vacuum drilling only for size 8-10.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on site.
- In case of aborted drill hole: new drilling must be drilled at a minimum distance of twice the depth of aborted hole or closer, if the aborted hole is filled with high strength mortar and only if the hole is not in the direction of the oblique tensile or shear load.
- After installation further turning of the anchor must not be possible. The head of the anchor is supported in the fixture and is not damaged.
- The borehole may be filled with injection mortar WIT-BS.
- Adjustability according to Annex B6 for sizes 6-10 except for applications with filled borehole and not for seismic applications.
- Cleaning of borehole is not necessary, if using a vacuum-drill bit.

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR	Annex B2
Intended use Specification continuation	

Table 4: Installation parameters

Concrete screw size			6			8			10		
Nominal embedment depth		h_{nom}	h_{nom1} [1)]	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
		[mm]	35	45	55	45	55	65	55	75	85
Nominal drill hole diameter	d_0	[mm]	6			8			10		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40			8,45			10,45		
Depth of drill hole	$h_0 \geq$	[mm]	40	50	60	55	65	75	65	85	95
Clearance hole diameter	$d_f \leq$	[mm]	8			12			14		
Installation torque (version with threaded stud)	T_{inst}	[Nm]	10			20			40		
Torque impact screw driver	$T_{imp,max}$	[Nm]	Max. torque according to manufacturer's instructions								
			160			300			450		

[1)] only for statically indeterminate non-structural systems (multiple use) according to EN 1992-4:2018, only in dry internal conditions



Würth concrete screw W-BS 2/A4 and W-BS 2/HCR

Intended use
Installation parameters

Annex B3

Table 5: Minimum thickness of member, minimum edge distance and minimum spacing

Concrete screw size			6			8			10		
Nominal embedment depth		h_{nom}	h_{nom1} [1)]	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
		[mm]	35	45	55	45	55	65	55	75	85
Minimum thickness of member	h_{min}	[mm]	80	80	100	80	100	120	100	130	130
Minimum edge distance	c_{min}	[mm]	35	35	35	35	35	35	40	40	40
Minimum spacing	s_{min}	[mm]	35	35	35	35	35	35	40	40	40

[1)] only for statically indeterminate non-structural systems (multiple use) according to EN 1992-4:2018, only in dry internal conditions

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR

Intended use
Minimum thickness of member, minimum edge distance and minimum spacing

Annex B4

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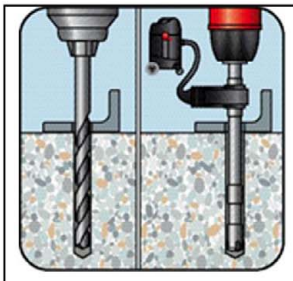
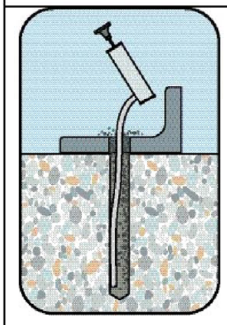
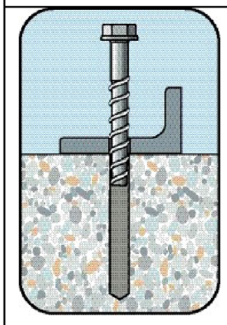
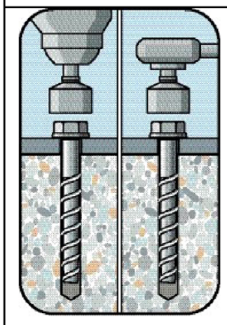
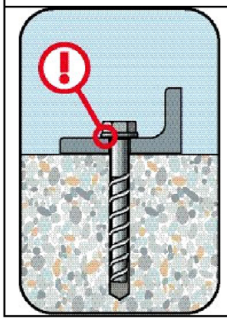
Installation instructions

	Create hammer drilled or vacuum drilled borehole.
	Blow out dust. Alternatively, vacuum clean down to the bottom of the drill hole. If using a vacuum drill bit an additional cleaning of the drill hole is not necessary.
	Set the screw.
	Install the screw by hand or using a impact screw driver. Consider $T_{imp,max}$ und T_{inst} . Note: For screw size 6 with h_{nom} = 35mm only setting with a impact screw driver is allowed.
	Installation was successful when the head of the anchor is fully supported and in contact to the fixture without damaging it.

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR	
Intended use Installation instructions	**Annex B5**

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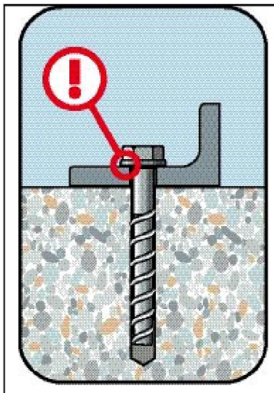
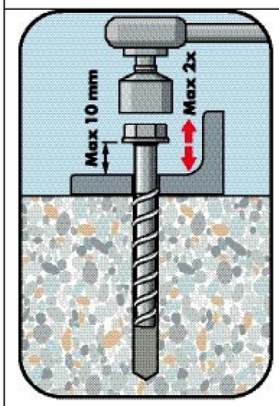
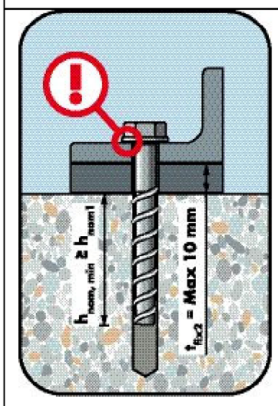
Installation instructions for adjustability

	Installation according to **annex B5** until the head of the anchor is fully supported.
	The Anchor may be adjusted **max. two times** while the anchor may turn back **at most 10 mm.**
	Install the screw again after the adjustment. The total allowed thickness of shims added during the adjustment process is 10mm. The final embedment depth after adjustment process must be equal or larger than h_{nom}.

Note: Adjustment for seismic loading is not allowed

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR	**Annex B6**
Intended use Installation instructions - Adjustment	

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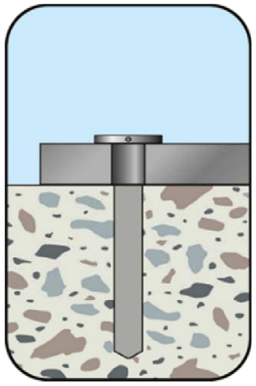
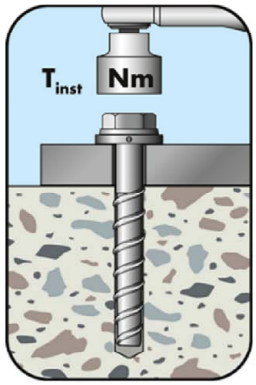
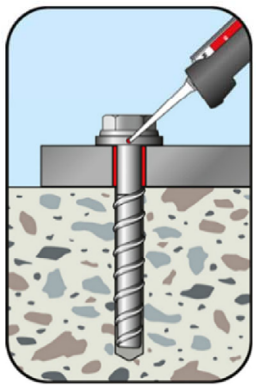
Installation instructions – filling annular gap

	After preparing bore hole **(Annex B5)**, position fixture first, then filling washer
	Install with impact screwdriver or torque wrench. Consider $T_{imp,max}$ and T_{inst}
	Connect the mixer reduction nozzle to the tip of the mixer. Fill the annular gap with injection mortar. The annular gap is filled with mortar, when mortar oozes out of the washer. You can use Würth injection mortars with a compressive strength ≥ 40 N/mm² like CONCRETE MULTI WIT-UH 300, ALLROUNDER WIT-VM 250, WIT-PE 1000, or WIT-BS Observe the processing/installation instructions for the injection mortar.

Note: The thickness of fixture t_{fix} is reduced about 5 mm when using WÜRTH Filling Washer WIT-SHB.A

Note: For seismic loading the installation with filled and without filled annular gap is approved. Differences in performance can be found in Annex C3.

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR	**Annex B7**
Intended use Installation instructions - Adjustment	

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Table 6: Characteristic values for static and quasi-static loading

Concrete screw size				6			8			10		
Nominal embedment depth		h_{nom}	h_{nom1} [1)]	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
		[mm]	35	45	55	45	55	65	55	75	85
Steel failure for tension and shear loading											
Characteristic tension load		$N_{Rk,s}$	[kN]	14,0			27,0			45,0	
Characteristic shear load		$V^0_{Rk,s}$	[kN]	7,0			13,5	17,0	22,5	34,0	
Ductility factor		k_7	[-]	0,8							
Characteristic bending load		$M^0_{Rk,s}$	[Nm]	10,9			26,0			56,0	
Pull-out failure in uncracked concrete											
Characteristic tension load C20/25		$N_{Rk,p}$	[kN]	3,5 [1)]	4,0	8,5	9,0	12,0	17,0	11,0	19,0	25,0
Increasing factor for $N_{Rk,p}$ = $N_{Rk,p\ (C20/25)} \cdot \Psi_c$	C25/30	Ψ_c	[-]	1,08	1,12	1,09	1,12	1,12	1,07	1,12	1,12	1,12
	C30/37			1,15	1,22	1,17	1,22	1,22	1,13	1,22	1,22	1,22
	C40/50			1,27	1,41	1,30	1,41	1,41	1,23	1,41	1,41	1,41
	C50/60			1,38	1,58	1,42	1,58	1,58	1,32	1,58	1,58	1,58
Pull-out failure in cracked concrete												
Characteristic tension load C20/25		$N_{Rk,p}$	[kN]	2,5 [1)]	1,5	3,0	3,0	5,5	8,0	6,0	13,0	17,0
Increasing factor for $N_{Rk,p}$ = $N_{Rk,p\ (C20/25)} \cdot \Psi_c$	C25/30	Ψ_c	[-]	1,10	1,08	1,12	1,12	1,12	1,12	1,12	1,09	1,09
	C30/37			1,18	1,15	1,22	1,22	1,22	1,22	1,22	1,17	1,17
	C40/50			1,32	1,27	1,41	1,41	1,41	1,41	1,41	1,31	1,31
	C50/60			1,45	1,38	1,58	1,58	1,58	1,58	1,58	1,43	1,43

[1)] only for statically indeterminate non-structural systems (multiple use) according to EN 1992-4:2018, only in dry internal conditions

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR

Performances
Characteristic values for static and quasi-static loading

Annex C1

Deutsches Institut für Bautechnik DIBt

Table 7: Characteristic values for static and quasi-static loading continuation

Concrete screw size				6			8			10		
Nominal embedment depth			h_{nom}	h_{nom1} [1)]	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			[mm]	35	45	55	45	55	65	55	75	85
Concrete failure: Splitting failure, concrete cone failure and pry-out failure												
Effective embedment depth		h_{ef}	[mm]	25	34	42	32	41	49	40	57	65
k-factor	cracked	k_{cr}	[-]	7,7								
	uncracked	k_{ucr}	[-]	11,0								
Concrete cone failure	spacing	$s_{cr,N}$	[mm]	3 x h_{ef}								
	edge distance	$c_{cr,N}$	[mm]	1,5 x h_{ef}								
Splitting failure case 1	resistance	$N^0_{Rk,sp}$	[kN]	3,5 [1)]	4,0	8,5	9,0	12,0	17,0	11,0	19,0	25,0
	spacing	$s_{cr,Sp}$	[mm]	120	160	240	200	240	290	230	280	320
	edge distance	$c_{cr,Sp}$	[mm]	60	80	120	100	120	145	115	140	160
Splitting failure case 2	resistance	$N^0_{Rk,sp}$	[kN]	- [2)]	2,5	5,5	5,5	8,0	11,0	7,0	15,0	20,0
	spacing	$s_{cr,Sp}$	[mm]	- [2)]	116	168	128	164	196	160	224	260
	edge distance	$c_{cr,Sp}$	[mm]	- [2)]	58	84	64	82	98	80	114	130
Factor for pry-out failure		k_8	[-]	1,0	1,6		2,1	2,8		2,5		
Installation factor		γ_{inst}	[-]	1,0								
Concrete edge failure												
Effective length in concrete		$l_f = h_{nom}$	[mm]	35	45	55	45	55	65	55	75	85
Nominal outer diameter of screw		d_{nom}	[mm]	6			8			10		

[1)] only for statically indeterminate non-structural systems (multiple use) according to EN 1992-4:2018, only in dry internal conditions

[2)] no performance assessed

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR

Performances
Characteristic values for static and quasi-static loading continuation

Annex C2

Table 8: Seismic category C1 – Characteristic load values (only type H, type CS, type ST, type ST-6[1)], type P and type I[1)])

Concrete screw size			6		8		10	
Nominal embedment depth		h_{nom}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom3}	h_{nom1}	h_{nom3}
		[mm]	45	55	45	65	55	85
Steel failure for tension and shear load (version **type H, type CS, type ST, type ST-6[1)], type P and type I[1)]**)								
Characteristic tension load	$N_{Rk,s,eq}$	[kN]	14,0		27,0		45,0	
Partial factor	$\gamma_{Ms,eq}$	[-]	1,5					
Characteristic shear load **Type H, Type ST, Type P**	$V_{Rk,s,eq}$	[kN]	3,5	4,0	8,0	10,0	14,0	16,0
Characteristic shear load **Type CS**	$V_{Rk,s,eq}$	[kN]	2,5	[2)]	4,5	7,0	14,0	10,0
Partial factor	$\gamma_{Ms,eq}$	[-]	1,25					
Without filling of the annular gap [3)]	α_{gap}	[-]	0,5					
With filling of the annular gap [4)]	α_{gap}	[-]	1,0					
Pull-out failure (version **type H, type CS, type ST, type ST-6[1)], type P and type I[1)]**)								
Characteristic tension load in cracked concrete C20/25	$N_{Rk,p,eq}$	[kN]	1,5	3,0	3,0	8,5	6,0	17,0
Concrete cone failure (version **type H, type CS, type ST, type ST-6[1)], type P and type I[1)]**)								
Effective embedment depth	h_{ef}	[mm]	34	42	32	49	40	65
Edge distance	$c_{cr,N}$	[mm]	1,5 x h_{ef}					
Spacing	$s_{cr,N}$	[mm]	3 x h_{ef}					
Installation safety factor	γ_{inst}	[-]	1,0					
Concrete pry-out failure (version **type H, type CS, type ST and type P**)								
Factor for pry-out failure	k_8	[-]	1,6		2,1	2,8	2,5	
Concrete edge failure (version **type H, type CS, type ST and type P**)								
Effective length in concrete	$l_f = h_{nom}$	[mm]	45	55	45	65	55	85
Nominal outer diameter of screw	d_{nom}	[mm]	6		8		10	

[1)] only tension load
[2)] no performance assessed
[3)] without filling of the annular gap according to annex B5
[4)] with filling of the annular gap according to annex B7

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR

Performances
Seismic category C1 – Characteristic load values

Annex C3

Deutsches Institut für Bautechnik DIBt

Table 9: Fire exposure – characteristic values of resistance

Concrete screw size				6			8			10		
Nominal embedment depth			h_{nom}	1[1)]	2	3	1	2	3	1	2	3
			[mm]	35	45	55	45	55	65	55	75	85
Steel failure for tension and shear load												
characteristic Resistance	R30	$N_{Rk,s,fi30}$	[kN]	0,9			2,4			4,4		
	R60	$N_{Rk,s,fi60}$	[kN]	0,8			1,7			3,3		
	R90	$N_{Rk,s,fi90}$	[kN]	0,6			1,1			2,3		
	R120	$N_{Rk,s,fi120}$	[kN]	0,4			0,7			1,7		
	R30	$V_{Rk,s,fi30}$	[kN]	0,9			2,4			4,4		
	R60	$V_{Rk,s,fi60}$	[kN]	0,8			1,7			3,3		
	R90	$V_{Rk,s,fi90}$	[kN]	0,6			1,1			2,3		
	R120	$V_{Rk,s,fi120}$	[kN]	0,4			0,7			1,7		
	R30	$M^0_{Rk,s,fi30}$	[Nm]	0,7			2,4			5,9		
	R60	$M^0_{Rk,s,fi60}$	[Nm]	0,6			1,8			4,5		
	R90	$M^0_{Rk,s,fi90}$	[Nm]	0,5			1,2			3,0		
	R120	$M^0_{Rk,s,fi120}$	[Nm]	0,3			0,9			2,3		
Pull-out failure												
characteristic Resistance	R30-90	$N_{Rk,p,fi}$	[kN]	0,6	0,4	0,8	0,8	1,4	2,0	1,5	3,3	4,3
	R120	$N_{Rk,p,fi}$	[kN]	0,5	0,3	0,6	0,6	1,1	1,6	1,2	2,6	3,4
Concrete cone failure												
characteristic Resistance	R30-90	$N^0_{Rk,c,fi}$	[kN]	0,5	1,2	2,0	1,0	1,9	2,9	1,7	4,2	5,9
	R120	$N^0_{Rk,c,fi}$	[kN]	0,4	0,9	1,6	0,8	1,5	2,3	1,4	3,4	4,7
Edge distance												
R30 - R120		$c_{cr,fi}$	[mm]	$2 \times h_{ef}$								
In case of fire attack from more than one side, the minimum edge distance shall be ≥300mm.												
Spacing												
R30 bis R120		$s_{cr,fi}$	[mm]	$4 \times h_{ef}$								
Pry-out failure												
R30 bis R120		k_8	[-]	1,0		1,6	2,1		2,8	2,5		
The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given value.												

[1)] only for statically indeterminate non-structural systems (multiple use) according to EN 1992-4:2018, only in dry internal conditions

Würth concrete screw W-BS 2/A4 and W-BS 2/HCR

Performances
Fire exposure – characteristic values of resistance

Annex C4

Table 10: Displacements under static and quasi-static tension load

Concrete screw size				6		8			10		
Nominal embedment depth			h_{nom}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			[mm]	45	55	45	55	65	55	75	85
Cracked concrete	tension load	N	[kN]	0,72	1,45	1,63	2,74	4,06	3,04	6,22	8,46
	displacement	δ_{N0}	[mm]	0,19	0,27	0,27	0,53	0,45	0,26	0,58	0,61
		$\delta_{N\infty}$	[mm]	0,55	0,84	0,49	0,66	0,61	0,69	0,92	1,1
Uncracked concrete	tension load	N	[kN]	2,11	4,07	4,24	5,97	8,03	5,42	9,17	12,28
	displacement	δ_{N0}	[mm]	0,42	0,43	0,33	0,49	0,58	0,84	0,62	0,79
		$\delta_{N\infty}$	[mm]	0,42	0,43	0,58			0,79		

Table 11: Displacements under static and quasi-static shear load

Concrete screw size				6		8			10		
Nominal embedment depth			h_{nom}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			[mm]	45	55	45	55	65	55	75	85
Cracked and uncracked concrete	shear load	V	[kN]	3,3		8,6			16,2		
	displacement	δ_{V0}	[mm]	1,55		2,7			2,7		
		$\delta_{V\infty}$	[mm]	3,1		4,1			4,3		