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and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-07/0084
of 19 February 2016

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

ATRION Concrete Screw ABS-W/-WII/-R and -HCR

Product family
to which the construction product belongs

Concrete screw made of galvanised steel and stainless
steel of sizes 8, 10, 12 and 14 for use in concrete

Manufacturer

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Straße 12 -17
74653 Künzelsau
DEUTSCHLAND

Manufacturing plant

Werk C, Deutschland

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

Guideline for European technical approval of "Metal
anchors for use in concrete", ETAG 001 Part 3: "Undercut
anchors", April 2013,
used as European Assessment Document (EAD)
according to Article 66 Paragraph 3 of Regulation (EU)
No 305/2011.

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Specific Part

1 Technical description of the product

The ATRION Concrete Screw ABS is an anchor in size of 8, 10, 12 and 14 made of zinc-plated steel respectively steel with zinc flake coating (ABS-W, ABS-WII) or made of stainless steel (ABS-R, ABS-HCR). 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 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 for tension and shear loads as well as bending moments in concrete	See Annex C 1 and C 2
Edge distances and spacing	See Annex C 1 and C 2
Displacements under tension and shear loads	See Annex C 3

3.2 Safety in case of fire (BWR 2)

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

3.3 Safety in use (BWR 4)

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

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, April 2013 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

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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.

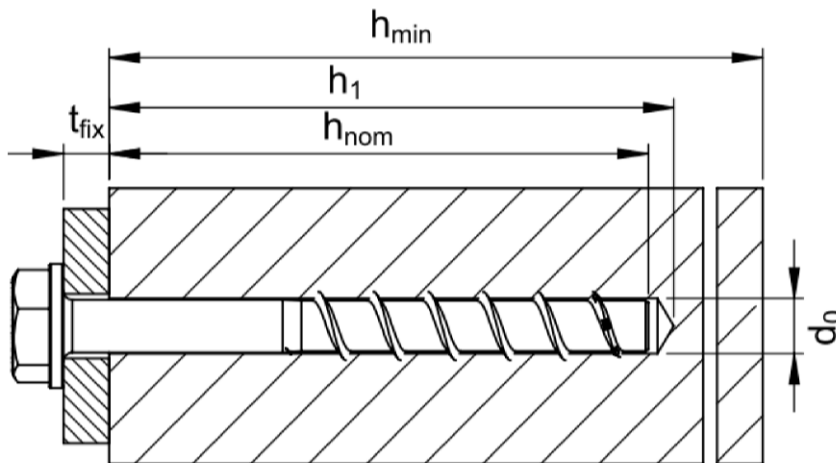
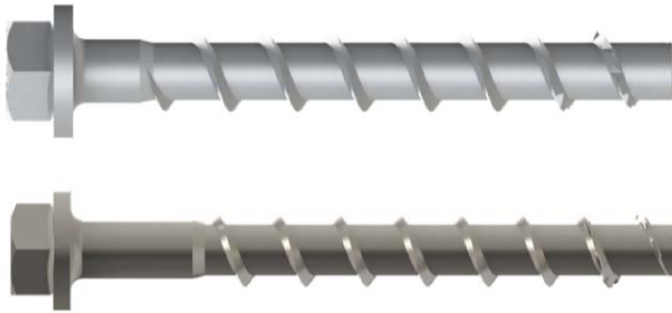
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Uwe Bender
Head of Department

beglaubigt:
Tempel

product and installed condition

ATRION concrete screw ABS



- | | | |
|-----------|---|-----------------------------|
| d_0 | = | nominal drill bit diameter |
| h_{nom} | = | nominal anchorage depth |
| h_1 | = | depth of the drill hole |
| h_{min} | = | minimum thickness of member |
| t_{fix} | = | thickness of fixture |

ATRION concrete screw ABS-W, WII, R, HCR








Product description

Installed condition

Annex A 1

Table A1: materials and variants

part	name	Material				
1, 2, 3, 4, 5, 6,	Screw anchor	ABS- W, WII	Steel EN 10263-4 galvanized acc. to EN ISO 4042 or zinc flake coating acc. to EN ISO 10683 ($\geq 5\mu\text{m}$)			
		ABS- R	1.4401, 1.4404, 1.4571, 1.4578			
		ABS- HCR	1.4529			
					W/WII	R/HCR
		nominal characteristic steel yield strength	f_{yk}	[N/mm ²]	600	700
		nominal characteristic steel ultimate strength	f_{uk}	[N/mm ²]	700	800

- | | | | |
|---|---|----|---|
|  |  | 1) | Anchor version with connection thread |
|  |  | 2) | Anchor version with washer, hexagon head and TORX |
|  |  | 3) | Anchor version with washer, hexagon head and |
|  |  | 4) | Anchor version with hexagon head |
|  |  | 5) | Anchor version with countersunk head |
|  |  | 6) | Anchor version with pan head |

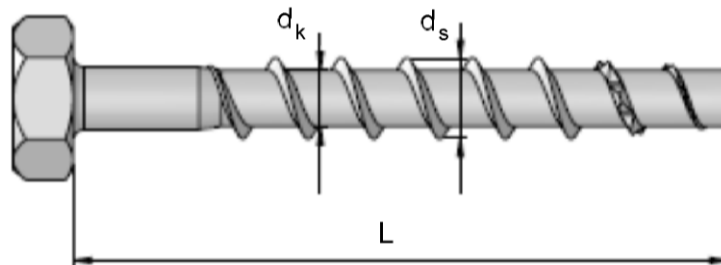
ATRION concrete screw ABS-W, WII, R, HCR

Product description
Material and screw types

Annex A 2

Table A2: dimensions and markings

Anchor size ABS			8	10	12	T14
Nominal embedment depth			$h_{nom} = 65 \text{ mm}$	$h_{nom} = 85 \text{ mm}$	$h_{nom} = 100 \text{ mm}$	$h_{nom} = 125 \text{ mm}$
Length of the anchor	$L \leq$	[mm]	300			
Diameter of shaft	d_k	[mm]	6,8	8,8	10,8	12,8
Diameter of thread	d_s	[mm]	10,6	12,6	14,6	16,6



Marking:

Anchor type: TSM B, TSM BC, TSM BS, TSM BSH
Anchor type: ABS-W, ABS-WII, ABS-R, ABS-HCR
Anchor size: 10
Length of the anchor: 100



Alternative marking ABS-R 8-15-80

ATRION concrete screw ABS-W, WII, R, HCR

Product descriptions

Dimensions and markings

Annex A 3

Intended use

Anchorage subject to:

- static and quasi static loads,
- Used for anchorages with requirements related to resistance of fire.

Base materials:

- reinforced and unreinforced concrete according to EN 206-1:2000-12,
- strength classes C20/25 to C50/60 according to EN 206-1:2000-12,
- cracked and uncracked concrete.

Use conditions (Environmental conditions):

- The anchor may only be used in dry internal conditions: All screw types,
- Structural subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition no particular aggressive conditions exists: screw types made of stainless steel with marking BS or ABS-R,
- Structural subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition if particular aggressive conditions exists: screw types made of stainless steel with marking BSH or ABS-HCR.

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.),
- Anchorages under static or quasi-static actions are designed for design Method A designed in accordance with:
 - ETAG 001, Annex C, Edition August 2010 or
 - or 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:

- Hammer drilling only,
- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the site,
- After installation further turning of the anchor is not possible. The head of the anchor is supported on the fixture and is not damaged.
- Optional with injection mortar ATRION AVM-S

ATRION concrete screw ABS-W, WII, R, HCR

Intended use

Specifications

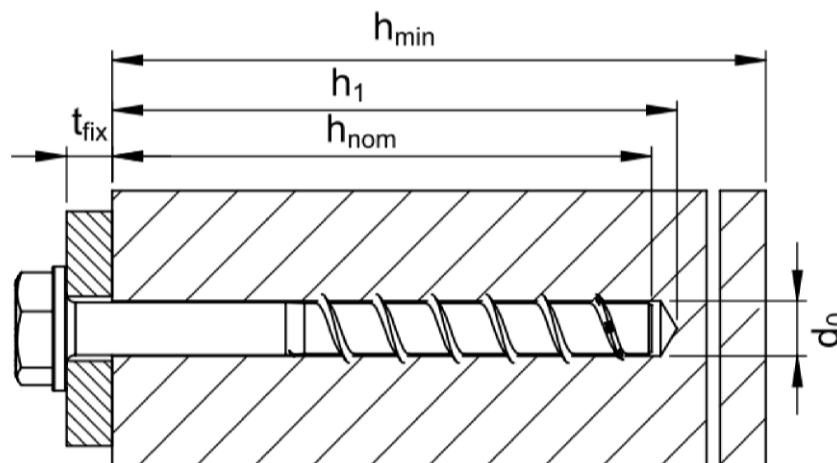
Annex B 1

Table B1: Installation parameters

Anchor size ABS		8	10	12	14
Nominal embedment depth		$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
nominal drill bit diameter	d_0 [mm]	8	10	12	14
cutting diameter of drill bit	$d_{cut} \leq$ [mm]	8,45	10,45	12,50	14,50
depth of drill hole	$h_1 \geq$ [mm]	75	95	110	135
nominal embedment depth	$h_{nom} \geq$ [mm]	65	85	100	125
diameter of clearing hole in the fixture	$d_f \leq$ [mm]	12	14	16	18

Table B2: Minimum thickness of member, minimum edge distance and minimum spacing

Anchor size ABS		8	10	12	14
Nominal embedment depth		$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
minimum thickness of member	h_{min} [mm]	120	130	150	200
minimum edge distance	c_{min} [mm]	50	70	80	100
minimum spacing	s_{min} [mm]	50	70	80	100



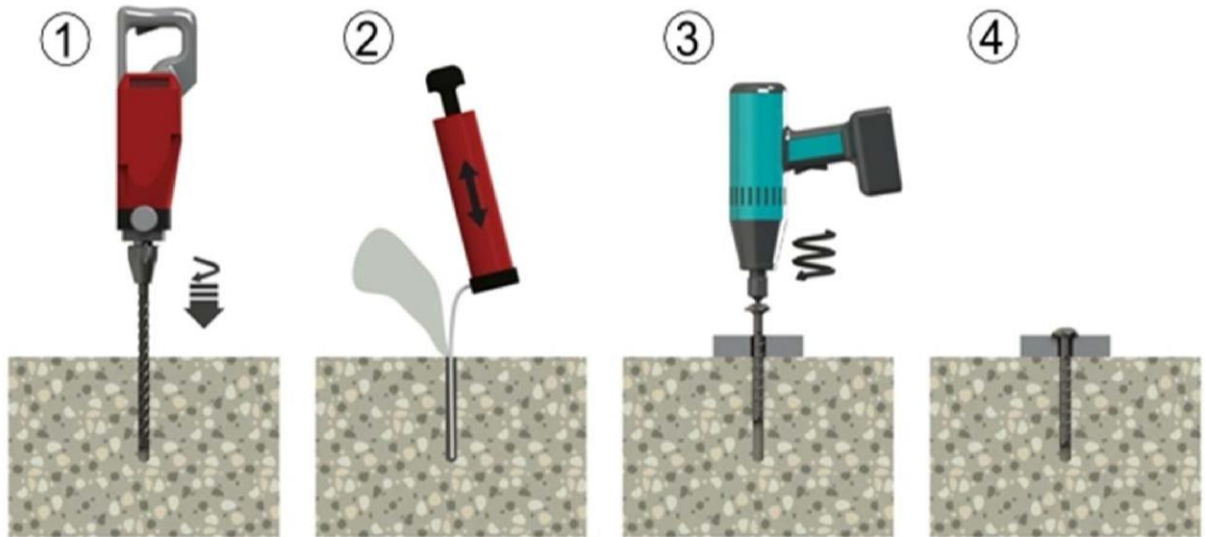
ATRION concrete screw ABS-W, WII, R, HCR

Intended use

Installation parameters

Annex B 2

Installation instructions



ATRION concrete screw ABS-W, WII, R, HCR

Intended use

Installation instructions

Annex B 3

**Table C1: Characteristic values for design method A according to ETAG 001, Annex C
or CEN/TS 1992-4 for ABS-W and WII**

Anchor size			8	10	12	14
Nominal embedment depth			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
steel failure for tension- and shear load						
characteristic load	$N_{RK,s}$	[kN]	25,0	42,0	64,0	90,0
	$V_{RK,s}$	[kN]	18,0	34,0	42,0	64,0
	$M^0_{RK,s}$	[Nm]	26,0	56,0	123,0	200,0
pull-out failure						
characteristic tension load in cracked concrete C20/25	$N_{RK,p}$	[kN]	9	16	Pull-out Failure is not decisive	Pull-out Failure is not decisive
characteristic tension load in uncracked concrete C20/25	$N_{RK,p}$	[kN]	12	Pull-out Failure is not decisive	Pull-out Failure is not decisive	Pull-out Failure is not decisive
increasing factor concrete for $N_{RK,p}$	Ψ_C	C30/37	1,22			
		C40/50	1,41			
		C50/60	1,55			
concrete cone and splitting failure						
effective anchorage depth	h_{ef}	[mm]	51	68	80	100
factor for	cracked	$k_{cr}^{2)}$	7,2			
	non cracked	$k_{ucr}^{2)}$	10,1			
concrete cone failure	spacing	$s_{cr,N}$	$3 \times h_{ef}$			
	edge distance	$c_{cr,N}$	$1,5 \times h_{ef}$			
splitting failure	spacing	$s_{cr,Sp}$	$3 \times h_{ef}$			
	edge distance	$c_{cr,Sp}$	$1,5 \times h_{ef}$			
installation safety factor	$\gamma_2^{1)} = \gamma_{inst}^{2)}$	[-]	1,0			
concrete pry out failure (pry-out)						
k-Factor	$k^{1)} = k_3^{2)}$	[-]	1,0	2,0		
concrete edge failure						
effective length of anchor	$l_f = h_{ef}$	[mm]	51	68	80	100
outside diameter of anchor	d_{nom}	[mm]	8	10	12	14

¹⁾ Parameter relevant only for design according to ETAG 001, Annex C

²⁾ Parameter relevant only for design according to CEN/TS 1992-4:2009

ATRION concrete screw ABS-W, WII, R, HCR

Performances

Characteristic values for ABS-W and WII for design method A

Annex C 1

**Table C2: Characteristic values for design method A according to ETAG 001, Annex C
or CEN/TS 1992-4 for ABS-R and HCR**

Anchor size			8	10	12	14
Nominal embedment depth			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
steel failure for tension- and shear load						
characteristic load	$N_{Rk,s}$	[kN]	29,0	48,0	73,0	103,0
	$V_{Rk,s}$	[kN]	21,0	40,0	49,0	64,0
	$M^0_{Rk,s}$	[Nm]	29,0	64,0	141,0	229,0
pull-out failure						
characteristic tension load in cracked concrete C20/25	$N_{Rk,p}$	[kN]	9	16	Pull-out Failure is not decisive	Pull-out Failure is not decisive
characteristic tension load in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	12	Pull-out Failure is not decisive	Pull-out Failure is not decisive	Pull-out Failure is not decisive
increasing factor concrete for $N_{Rk,p}$	Ψ_C	C30/37	1,22			
		C40/50	1,41			
		C50/60	1,55			
concrete cone and splitting failure						
effective anchorage depth	h_{ef}	[mm]	51	68	80	100
factor for	cracked	$k_{cr}^{2)}$	7,2			
	non cracked	$k_{ucr}^{2)}$	10,1			
concrete cone failure	spacing	$s_{cr,N}$	$3 \times h_{ef}$			
	edge distance	$c_{cr,N}$	$1,5 \times h_{ef}$			
splitting failure	spacing	$s_{cr,Sp}$	$3 \times h_{ef}$			
	edge distance	$c_{cr,Sp}$	$1,5 \times h_{ef}$			
installation safety factor	$\gamma_2^{1)} = \gamma_{inst}^{2)}$	[-]	1,0			
concrete pry out failure (pry-out)						
k-Factor	$k^{1)} = k_3^{2)}$	[-]	1,0	2,0		
concrete edge failure						
effective length of anchor	$l_f = h_{ef}$	[mm]	51	68	80	100
outside diameter of anchor	d_{nom}	[mm]	8	10	12	14

¹⁾ Parameter relevant only for design according to ETAG 001, Annex C

²⁾ Parameter relevant only for design according to CEN/TS 1992-4:2009

ATRION concrete screw ABS-W, WII, R, HCR

Performances

Characteristic values for ABS-R and HCR for design method A

Annex C 2

Table C3: Displacements under tension load for ABS-W, WII, R and HCR

Anchor size			8	10	12	14
			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
tension load	N	[kN]	4,3	7,6	11,1	15,9
displacement	δ_{N0}	[mm]	0,5			
	δ_{∞}	[mm]	1,0			

Table C4 : Displacements under shear load for ABS-W and WII

anchor size			8	10	12	14
			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
shear load	V	[kN]	8,6	16,2	20,0	30,5
displacement	δ_{V0}	[mm]	2,7	2,7	4,0	3,1
	δ_{∞}	[mm]	4,1	4,3	6,0	4,7

Table C5 : Displacements under shear load for ABS-R and HCR

Anchor size			8	10	12	14
			$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
shear load	V	[kN]	10,0	19,1	23,2	30,5
displacement	δ_{V0}	[mm]	2,9	3,5	4,1	4,6
	δ_{∞}	[mm]	4,4	5,3	6,2	7,0

ATRION concrete screw ABS-W, WII, R, HCR

Performances

Displacements under tension- and shear loads

Annex C 3

Table C6: Characteristic values of resistance to fire exposure for ABS-W and WII

Anchor size				8	10	12	14
Nominal embedment depth				$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm
fire resistance class							
R 30	characteristic resistance	$F_{Rk,fi30}$	[kN]	2,3	4,0	6,3	9,8
R 60	characteristic resistance	$F_{Rk,fi60}$	[kN]	1,7	3,3	5,8	8,1
R 90	characteristic resistance	$F_{Rk,fi90}$	[kN]	1,1	2,2	4,2	5,9
R 120	characteristic resistance	$F_{Rk,fi120}$	[kN]	0,8	1,7	3,4	4,8
R 30 bis R 120	spacing	$S_{cr,fi}$	[mm]	4 h_{ef}			
	edge distance	$C_{cr,fi}$		2 h_{ef}			

Table C7: Characteristic values of resistance to fire exposure for ABS-R and HCR

Anchor size				8	10	12	14		
Nominal embedment depth				$h_{nom} = 65$ mm	$h_{nom} = 85$ mm	$h_{nom} = 100$ mm	$h_{nom} = 125$ mm		
fire resistance class									
R 30	characteristic resistance	$F_{Rk,fi30}$	[kN]	2,3 ¹⁾	2,3 ²⁾	4,0	4,0	6,3	9,8
R 60	characteristic resistance	$F_{Rk,fi60}$	[kN]	1,7 ¹⁾	2,3 ²⁾	3,3	4,0	5,8	8,1
R 90	characteristic resistance	$F_{Rk,fi90}$	[kN]	1,1 ¹⁾	2,3 ²⁾	2,2	4,0	4,2	5,9
R 120	characteristic resistance	$F_{Rk,fi120}$	[kN]	0,8 ¹⁾	1,8 ²⁾	1,7	3,2	3,4	4,8
R 30 bis R 120	spacing	$S_{cr,fi}$	[mm]	4 h_{ef}					
	edge distance	$C_{cr,fi}$		2 h_{ef}					

¹⁾ For anchor version with hexagon head, pan head and counter sunk socket head

²⁾ For anchor version with connection thread

ATRION concrete screw ABS-W, WII, R, HCR

Performances

Characteristic values of resistance to fire exposure

Annex C 4