Deutsches Institut für Bautechnik

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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-11/0080 of 9 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	Simpson Strong-Tie® - Throughbolt WA
Product family to which the construction product belongs	Torque controlled expansion anchor made of zinc coated steel for use in non-cracked concrete
Manufacturer	SIMPSON STRONG -TIE® GmbH Hubert-Vergölst-Straße 6-14 61231 Bad Nauheim GERMANY
Manufacturing plant	Simpson Strong-Tie Manufacturing Facilities
This European Technical Assessment contains	10 pages including 3 annexes
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 2: "Torque controlled expansion anchors", used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.
This version replaces	ETA-11/0080 issued on 5 June 2013

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Specific Part

1 Technical description of the product

The "Simpson Strong-Tie® Throughbolt WA" of sizes M6, M8, M10, M12 and M16 is an anchor made of galvanised steel which is placed into a drilled hole and anchored by torque-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)

Essential characteristic	Performance
Characteristic resistance tension and shear loads, displacements	See Annex C1 - C2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for class A1
Resistance to fire	No performance assessed

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

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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

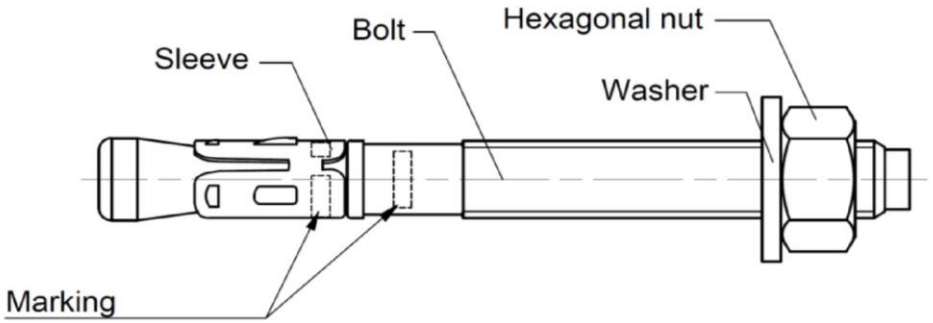
Issued in Berlin on 9 February 2016 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Lange

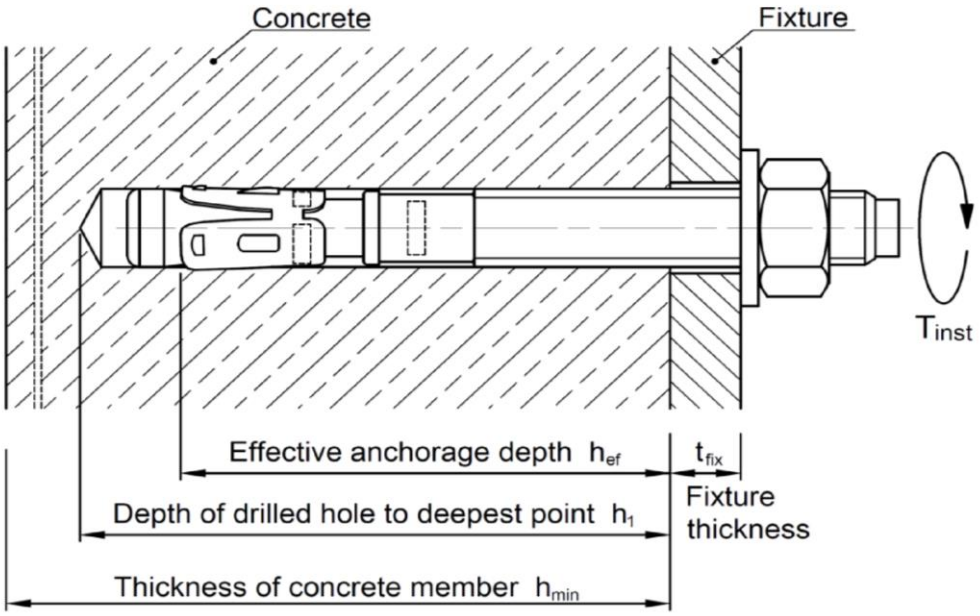
Deutsches Institut für Bautechnik DIBt

Simpson Strong-Tie®
Throughbolt WA



Sleeve:	Identifying mark:	≠
	Commercial name:	WA
	Size:	M .... (M12)
Bolt:	Diameter - Eff. anchorage depth:	12 - 65

Throughbolt WA after installation



Simpson Strong-Tie® - Throughbolt WA	**Annex A1**
Product description Installed condition	

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Simpson Strong-Tie®
Throughbolt WA

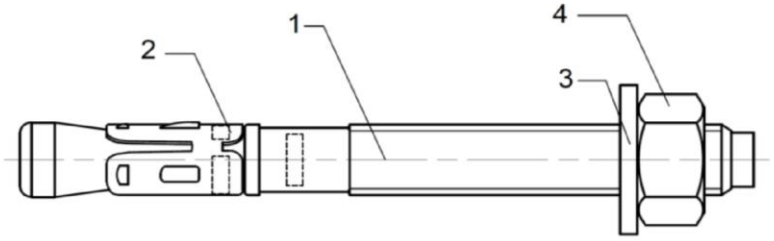

Table A1: Materials

Part	Designation	Material [1)]
1	Bolt	Carbon steel, cold formed
2	Sleeve	Carbon steel strip, cold formed
3	Washer	Steel; DIN 125 (EN ISO 7089), DIN 440 (EN ISO 7094) DIN 9021 (EN ISO 7093)
4	Hexagonal nut	Steel DIN 934 (EN ISO 4032), property class 8 acc. EN 20898-2

[1)] zinc electroplated ≥ 5 µm according EN ISO 4042; passivated

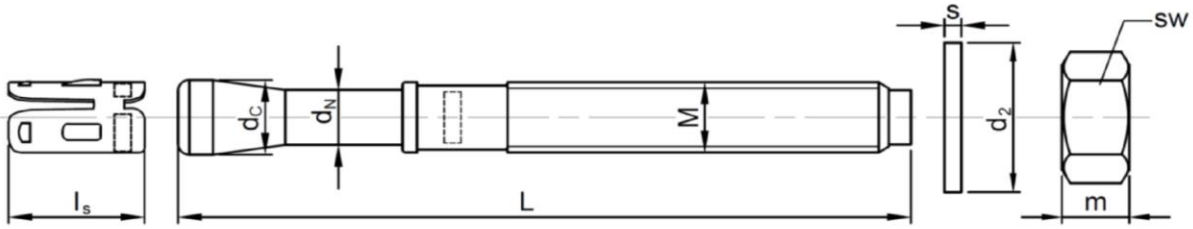

Table A2: Dimensions

Anchor type / size	Bolt				Sleeve	Washer		Hex-nut	
	L [mm]	M	d_C [mm]	d_N [mm]	l_s [mm]	s [mm]	d_2 [mm]	m [mm]	SW [mm]
WA 6/..	t_{fix} +55	M6	6,00	4,3	12,5	≥1,6	≥12	5,0	10
WA 8/..	t_{fix} +63	M8	8,00	5,9	15,0	≥1,6	≥16	6,5	13
WA 10/..	t_{fix} +73	M10	10,00	7,6	16,8	≥2,0	≥20	8,0	17 (16)
WA 12/..	t_{fix} +99	M12	11,95	8,8	20,0	≥2,5	≥24	10,0	19 (18)
WA 16/..	t_{fix} +121	M16	15,95	12,0	22,6	≥3,0	≥30	13,0	24

Simpson Strong-Tie® - Throughbolt WA

Product description
Materials and dimensions

Annex A2

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Specification of intended use

Anchorages subject to:

- Static and quasi-static action
- Non-cracked concrete

Base materials:

- Reinforced and unreinforced normal weight concrete according to EN 206: 2013
- Strength classes C20/25 to C50/60 according to EN 206: 2013

Use conditions (Enviromental conditions):

- Structures subject to dry internal conditions.

Design:

- Anchorages are to be designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings prepared are taking account of the loads to be anchored. The position of the anchor is indicated on the designed drawings. (e.g. position of the anchor relative to reinforcement or to supports).
- Anchorages under static or quasi-static actions are to be designed in accordance with:
  - ETAG 001, Annex C, Design method A, Edition August 2010
  - CEN/TS 1992-4: 2009, Part 4-1 & Part 4-4, Design method A

Installation of anchors:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of site.
- Use the anchor only as supplied by the manufacturer without exchanging the components of the anchor.
- Anchor installation in accordance with the manufacturer`s specifications, drawings and using the appropriate tools.
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Edge distances and spacing not less than the specified values without minus tolerances.
- Drilling technique by hammer drilling only.
- Positioning of the drill holes without damaging the reinforcement.
- In case of aborted drill hole: New drilling at a minimum distance away of twice the depth of the aborted drill hole and if under shear or oblique tension load it is not in the direction of the applied loads, or in a smaller distance if the aborted drill hole is filled with high strength non-shrinkage mortar.
- Cleaning of the hole of drilling dust and anchor installation in accordance with Annex B2.
- Keeping the effective anchorage depth.
- Application of the torque moment T_{inst} given in Annex B2 using a calibrated torque wrench.

Simpson Strong-Tie® - Throughbolt WA	**Annex B1**
Intended use Specifications	

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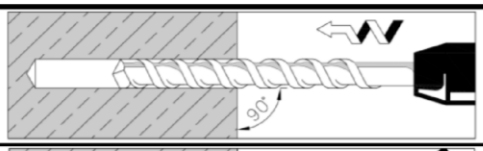
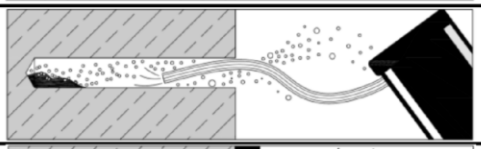
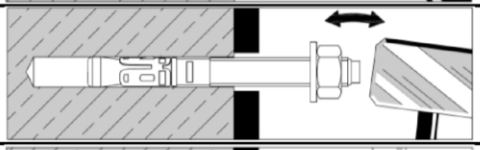
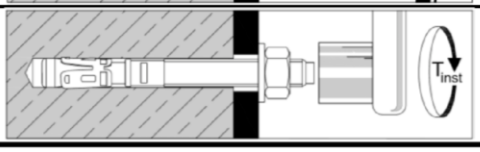
Table B1: Installation data

Simpson Strong-Tie® Throughbolt WA			Anchor size				
			M6	M8	M10	M12	M16
Max. total length	L	[mm]	100	163	233	259	281
Drill hole diameter	d_o	[mm]	6	8	10	12	16
Cutting diameter at the upper tolerance limit	$d_{cut,max} \leq$	[mm]	6,45	8,45	10,45	12,5	16,5
Effective anchorage depth	h_{ef}	[mm]	40	45	50	65	80
Depth of drilled hole to deepest point	$h_1 \geq$	[mm]	55	65	70	90	110
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	7	9	12	14	18
Maximum thickness of fixture	$t_{fix,max}$	[mm]	45	100	160	160	160
Installation torque	T_{inst}	[Nm]	8	15	30	50	100
Width across flats	SW	[mm]	10	13	17(16)	19(18)	24
Minimum thickness of concrete member	h_{min}	[mm]	100	100	100	130	160
Minimum allowable spacing	s_{min}	[mm]	30	40	50	70	90
Minimum allowable edge distance	c_{min}	[mm]	40	40	50	70	90

Installation instruction

	Drill hole perpendicular to concrete surface.
	Blow out dust. Alternatively vacuum cleaning down to the bottom of the hole.
	Insert the anchor through the fixture.
	Apply installation torque T_{inst} using an calibrated torque-wrench.

Simpson Strong-Tie® - Throughbolt WA	**Annex B2**
Intended use Installation data, minimum spacing and edge distance	

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Table C1: Characteristic values of resistance to tension loads.
Design method A, acc. **ETAG 001, Annex C** or **CEN/TS 1992-4-4**

Simpson Strong-Tie® Throughbolt WA			**Anchor size**				
			M6	**M8**	**M10**	**M12**	**M16**
Steel failure							
Characteristic resistance	$N_{Rk,s}$	[kN]	10,9	20,5	32,3	45,6	79,2
Partial safety factor	γ_{Ms}	[-]	1,4 [1)]				
Pull-out failure							
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	9	12	16	[2)]	[2)]
Increasing factor for $N_{Rk,p}$	Ψ_C	C30/37	1,08	1,22		-	-
		C40/50	1,16	1,41			
		C50/60	1,23	1,55			
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0				
Concrete cone failure and splitting failure							
Effective anchorage depth	h_{ef}	[mm]	40	45	50	65	80
k-factor for non-cracked concrete	k_{ucr}	[-]	10,1				
Spacing	$s_{cr,N}$	[mm]	$3 \times h_{ef}$				
Edge distance	$c_{cr,N}$	[mm]	$1,5 \times h_{ef}$				
Spacing (splitting)	$s_{cr,sp}$	[mm]	$2 \times c_{cr,sp}$				
Edge distance (splitting)	$c_{cr,sp}$	[mm]	80	115	125	180	200

1) In absence of other national regulations.
2) Pull-out failure mode is not decisive.

Table C2: Displacements under tension loads

Simpson Strong-Tie® Throughbolt WA			**Anchor size**				
			M6	**M8**	**M10**	**M12**	**M16**
Tension load in non-cracked concrete C20/25	N	[kN]	4,3	5,7	7,6	12,6	17,2
Displacement	δ_{N0}	[mm]	0,2	0,4	0,2	0,2	0,2
	$\delta_{N\infty}$	[mm]	1,1	1,1	1,1	1,1	1,1

Simpson Strong-Tie® Throughbolt WA	**Annex C1**
Performances Characteristic values of resistance to tension loads / Displacements Design method A: acc. **ETAG 001, Annex C** or **CEN/TS 1992-4-4**	

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Table C3: Characteristic values of resistance to shear loads.
Design method A, acc. **ETAG 001, Annex C** or **CEN/TS 1992-4-4**

Simpson Strong-Tie® Throughbolt WA			**Anchor size**				
			M6	**M8**	**M10**	**M12**	**M16**
Steel failure without lever arm							
Characteristic resistance	$V_{Rk,s}$	[kN]	6	9,5	17	25	47
Partial safety factor	γ_{Ms}	[-]	1,25 [1)]				
Factor for ductility	k_2	[-]	1,0				
Steel failure with lever arm							
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	12	29	57	99	233
Partial safety factor	γ_{Ms}	[-]	1,25 [1)]				
Factor for ductility	k_2	[-]	1,0				
Concrete pry-out failure							
k-factor	k / k_3	[-]	1			2	
Concrete edge failure							
Effective length of anchor under shear loading	l_f	[mm]	40	45	50	65	80
Outside diameter of anchor	d_{nom}	[mm]	6	8	10	12	16

[1)] In absence of other national regulations.

Table C4: Displacements under shear loads

Simpson Strong-Tie® Throughbolt WA			**Anchor size**				
			M6	**M8**	**M10**	**M12**	**M16**
Shear load	V	[kN]	3,4	5,4	9,7	14,3	26,9
Displacement	δ_{V0}	[mm]	1,1	1,5	5,1	2,1	3,0
	$\delta_{V\infty}$	[mm]	1,7	2,2	7,7	3,2	4,6

Simpson Strong-Tie® Throughbolt WA	**Annex C2**
Performances Chararacteristic values of resistance to shear loads / Displacements Design method A: acc. **ETAG 001, Annex C** or **CEN/TS 1992-4-4**	