

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-12/0060**  
**of 8 December 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® - Screw Anchor THD

Product family  
to which the construction product belongs

Concrete screw for use in concrete

Manufacturer

SIMPSON STRONG -TIE® GmbH  
Hubert-Vergölst-Straße 6-14  
61231 Bad Nauheim  
DEUTSCHLAND

Manufacturing plant

Simpson Strong-Tie Manufacturing Facilities

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.

**European Technical Assessment**

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**Specific Part**

**1 Technical description of the product**

The Simpson Strong-Tie® - Screw Anchor THD is an anchor made of galvanised or mechanically zinc coated steel of sizes 8, 10, 12, 16 and 20. 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 values and Displacements under tension and shear loads	See Annex C 1 and C 2

**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 3 and 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

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document**

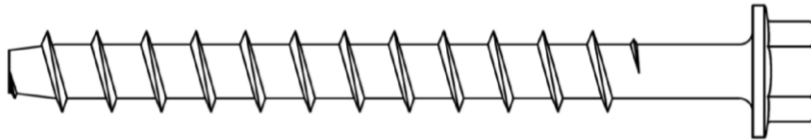
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 8 December 2016 by Deutsches Institut für Bautechnik

Andreas Kummerow  
p.p. Head of Department

*beglaubigt:*  
Baderschneider

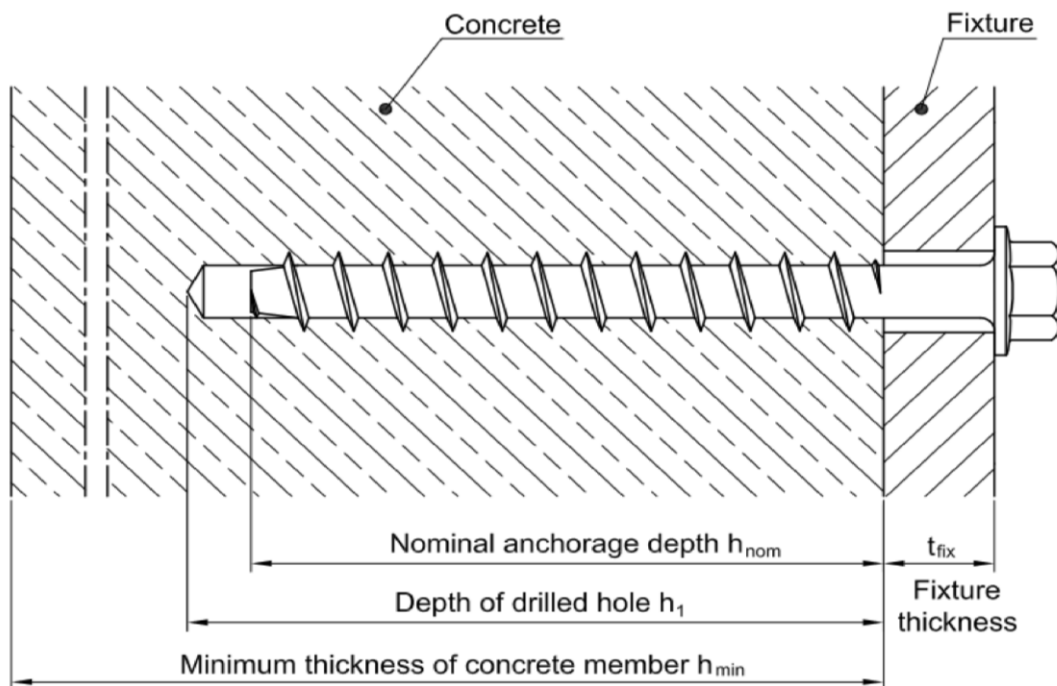
**Simpson Strong-Tie®  
Screw anchor THD**



THD8...THD20



**Screw anchor THD after installation**

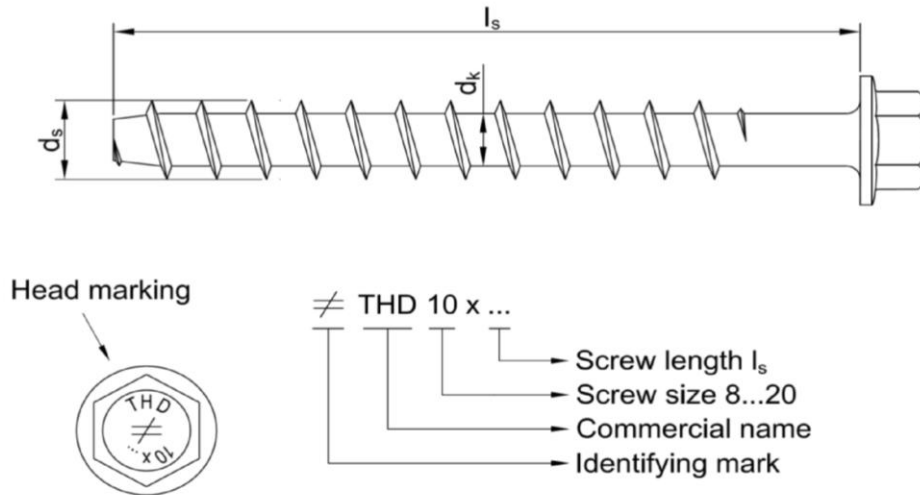


Simpson Strong-Tie®

Product description  
Installation condition

**Annex A1**

**Simpson Strong-Tie®  
Screw anchor THD**



**Table A1: Materials**

Part	Designation	Material <sup>1) 2)</sup>
Screw anchor	THD	Carbon steel, cold formed

1) zinc electroplated  $\geq 5 \mu\text{m}$  according EN ISO 4042; passivated

2) mechanical galvanized  $\geq 12 \mu\text{m}$  according EN ISO 12683; Type 1

**Table A2: Dimensions**

Screw size	Screw length $l_s$ [mm]	Outer diameter $d_s$ [mm]	Core diameter $d_k$ [mm]
THD8	70...200	10,3	7,6
THD10	80...200	12,5	9,6
THD12	100...400	14,4	11,3
THD16	120...400	19,6	15,3
THD20	140...400	23,5	19,3

Simpson Strong-Tie®  
Screw anchor THD

Product description  
Materials and dimensions

**Annex A2**

### Specifications of intended use

#### Anchorage subject to:

- Static and quasi-static loads: All sizes and embedment depths.
- Fire exposure: All sizes and embedment depths.

#### Base materials:

- Cracked and non-cracked concrete.
- Reinforced or unreinforced normal weight concrete of strength classes C20/25 to C50/60 according to EN 206-1: 2000

#### Use conditions (Environmental conditions):

- Structures subject to dry indoor conditions.

#### 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 under static or quasi-static actions are to be designed in accordance with:
  - ETAG 001, Annex C, design method A, Edition August 2010 or
  - CEN/TS 1992-4:2009, design method A
- Anchorages under fire exposures are to be designed in accordance with:
  - EOTA Technical Report TR 020, Edition Mai 2004 or
  - CEN/TS 1992-4:2009, Annex D
- It must be ensured that local spalling of the concrete cover does not occur.

#### Installation:

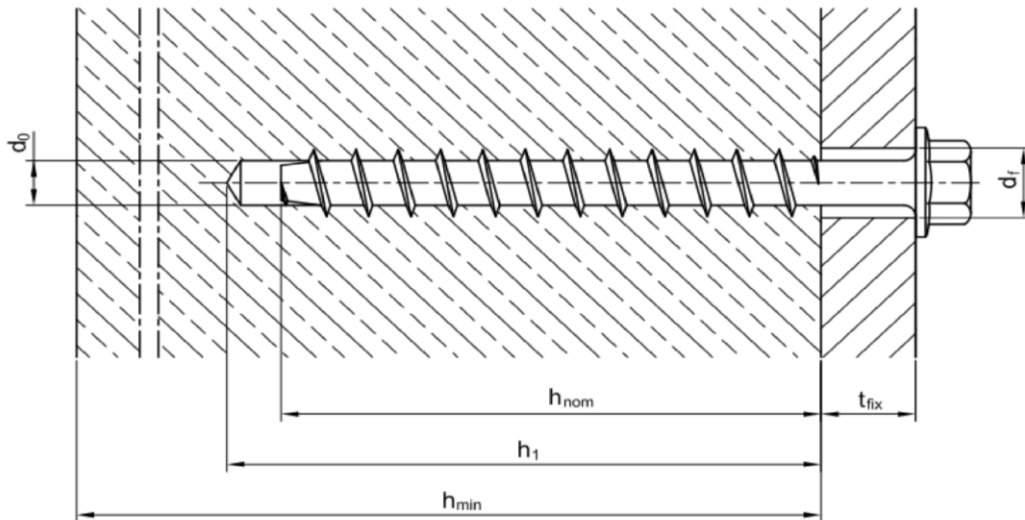
- Screw installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the screw only as supplied by the manufacturer.
- Screw installation in accordance with manufacturer's specifications and drawings.
- Edge distances and spacings not less than the specified values without minus tolerances.
- Hole drilling by hammer-drilling.
- Cleaning of the drill hole
- In case of aborted hole, drilling of new hole at a minimum distance of twice the depth of the aborted hole, or smaller distance provided the aborted drill hole is filled with high strength non-shrinkage mortar. No shear or oblique tension loads are allowed in the direction of a not filled aborted hole.
- The fixture is fully pressed on the concrete surface without intermediate layers.
- After installation further turning of the screw is not possible.
- The head of the screw is fully supported on the fixture and is not damaged.
- The screw may be used only once.

Simpson Strong-Tie®  
Screw anchor THD

Intendend Use  
Specifications

Annex B1

**Simpson Strong-Tie®  
Screw anchor THD**



**Table B1: Installation data**

Simpson Strong-Tie® Screw anchor THD		Screw size				
		8	10	12	16	20
Nominal diameter of drill bit	$d_0$ [mm]	8	10	12	16	20
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	8,45	10,45	12,5	16,5	20,55
Depth of drill hole	$h_1 \geq$ [mm]	75	85	105	130	160
Nominal anchorage depth	$h_{nom} \geq$ [mm]	65	75	95	115	135
Minimum thickness of concrete member	$h_{min} \geq$ [mm]	105	125	150	180	220
Clearance hole diameter in the fixture	$d_f \leq$ [mm]	12	14	16	22	26
Width across flats	SW [mm]	13	15	18	24	30
Installation with torque wrench	$T_{inst}$ [Nm]	- <sup>1)</sup>	75	- <sup>1)</sup>	280	350
Installation with impact screw driver	$T_{SD} \leq$ [Nm]	Recommend impact screw driver with max. power output specified according manufacturer's instructions				
		200	515			

<sup>1)</sup> Installation with impact screw driver only.

**Simpson Strong-Tie®  
Screw anchor THD**

**Intended use  
Installation parameter**

**Annex B2**



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

Simpson Strong-Tie® Screw anchor THD			Screw size				
			8	10	12	16	20
<b>Cracked concrete</b>	Minimum member thickness	$h_{min}$ [mm]	105	125	150	180	220
	Minimum edge distance	$c_{min}$ [mm]	50	60	80	100	120
	Minimum spacing	$s_{min}$ [mm]	50	60	80	100	120
<b>Non-cracked concrete</b>	Minimum member thickness	$h_{min}$ [mm]	105	125	150	180	220
	Minimum edge distance	$c_{min}$ [mm]	50	60	80	100	120
	Minimum spacing	$s_{min}$ [mm]	50	60	80	100	120

Simpson Strong-Tie®

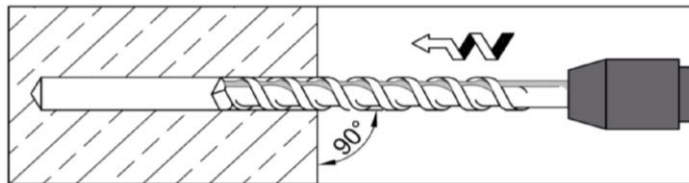
Intended use

Minimum thickness of concrete, minimum spacing and edge distances

**Annex B3**

## Simpson Strong-Tie® Screw anchor THD

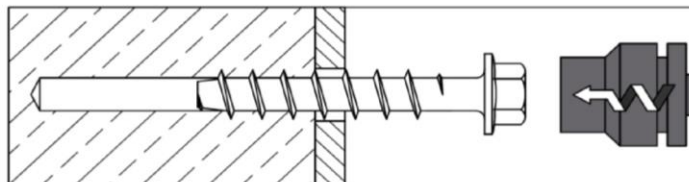
### Installation instructions



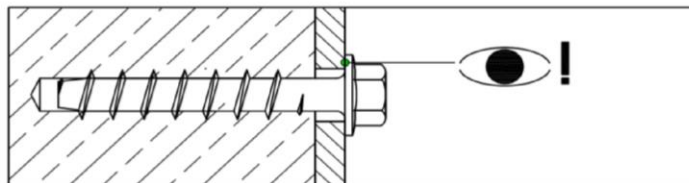
1. Drill hole



2. Clean hole



3. Setting screw anchor with an impact screw driver



4. Check connection

Simpson Strong-Tie®  
Screw anchor THD

Intended use  
Installation instructions

Annex B4

**Table C1: Characteristic resistance under tension loads for static and quasi-static loads**

Simpson Strong-Tie® Screw anchor THD			Screw size				
			8	10	12	16	20
<b>Steel failure</b>							
Characteristic resistance	$N_{Rk,s}$	[kN]	35,1	54,9	75,7	140,1	220,7
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,4				
<b>Pull-out failure</b>							
Characteristic resistance in cracked concrete C20/25	$N_{Rk,p}$	[kN]	6,0	7,5	12,0	25,0	35,0
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	7,5	10,5	25,0	30,0	50,0
Increasing factors for $N_{Rk,p}$	$\Psi_C$	C30/37	1,22				
		C40/50	1,41				
		C50/60	1,55				
Installation safety factor	$\gamma_2^{3)} = \gamma_{inst}^{2)}$	[-]	1,2				
<b>Concrete cone failure and splitting failure</b>							
Effective anchorage depth	$h_{ef}$	[mm]	47	55	70	86	102
Factor for cracked concrete	$k_{cr}^{2)}$	[-]	7,2				
Factor for non-cracked concrete	$k_{ucr}^{2)}$	[-]	10,1				
Characteristic spacing	$s_{cr,N}$	[mm]	3 $h_{ef}$				
	$s_{cr,sp}$	[mm]					
Characteristic edge distance	$c_{cr,N}$	[mm]	1,5 $h_{ef}$				
	$c_{cr,sp}$	[mm]					
Installation safety factor	$\gamma_2^{3)} = \gamma_{inst}^{2)}$	[-]	1,2				

1) In absence of other national regulations

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

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

**Table C2: Displacements under tension loads**

Simpson Strong-Tie® Screw anchor THD				Screw size				
				8	10	12	16	20
Cracked concrete C20/25 to C50/60	Tension load	N	[kN]	2,4	3,0	4,8	9,9	13,9
	Displacement	$\delta_{N0}$	[mm]	0,1	0,1	0,2	0,2	0,3
		$\delta_{N\infty}$	[mm]	0,3	0,4	0,6	0,4	0,6
Non-cracked concrete C20/25 to C50/60	Tension load	N	[kN]	3,0	4,2	9,9	11,9	19,8
	Displacement	$\delta_{N0}$	[mm]	0,1	0,1	0,1	0,2	0,3
		$\delta_{N\infty}$	[mm]	0,3	0,4	0,6	0,4	0,6

Simpson Strong-Tie®

Performance

Characteristic resistance for tension loads / displacements

**Annex C1**

**Table C3: Characteristic resistance under shear loads for static and quasi-static action**

Simpson Strong-Tie® Screw anchor THD			Screw size				
			8	10	12	16	20
<b>Steel failure without lever arm</b>							
Characteristic resistance	$V_{Rk,s}$	[kN]	17,5	27,4	37,8	70	110,4
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,5				
k-factor	$k_2^{2)}$	[-]	0,8				
<b>Steel failure with lever arm</b>							
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	40	79	128	322,3	637,5
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,5				
<b>Concrete pry-out failure</b>							
k-factor	$k^{3)} = k_3^{2)}$	[-]	2				
Installation safety factor	$\gamma_2^{3)} = \gamma_{inst}^{2)}$	[-]	1,0				
<b>Concrete edge failure</b>							
Effective length of anchor in shear loading	$l_f = h_{ef}$	[mm]	47	55	70	86	102
Effective diameter of anchor	$d_{nom}$	[mm]	7,7	9,6	11,3	15,3	19,3

<sup>1)</sup> In absence of other national regulations

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

<sup>3)</sup> Parameter relevant only for design according to ETAG 001, Annex C

**Table C4: Displacements under shear loads**

Simpson Strong-Tie® Screw anchor THD			Screw size					
			8	10	12	16	20	
Cracked and non-cracked concrete C20/25 to C50/60	Shear load	V	[kN]	8,3	13,0	18,0	33,3	52,6
	Displacement	$\delta_{v0}$	[mm]	2,0	2,2	2,5	2,7	3,0
		$\delta_{v\infty}$	[mm]	3,0	3,3	3,8	4,1	4,5

Simpson Strong-Tie®  
Screw anchor THD

Performance

Characteristic resistance for shear loads / displacements

**Annex C2**

**Table C5: Characteristic tension resistance in cracked and non-cracked concrete C20/25 to C50/60 under fire exposure**

Simpson Strong-Tie® Screw anchor THD				Screw size				
				8	10	12	16	20
<b>Steel failure</b>								
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	0,5	1,1	2,0	3,7	5,8
	R60	$N_{Rk,s,fi}$	[kN]	0,4	0,9	1,5	2,8	4,4
	R90	$N_{Rk,s,fi}$	[kN]	0,3	0,7	1,3	2,4	3,8
	R120	$N_{Rk,s,fi}$	[kN]	0,2	0,6	1,0	1,8	2,9
<b>Pullout failure</b>								
Characteristic resistance	R30...R90	$N_{Rk,p,fi}$	[kN]	1,5	1,9	3,0	6,3	8,8
	R120	$N_{Rk,p,fi}$	[kN]	1,2	1,5	2,4	5,0	7,0
<b>Concrete failure</b>								
Characteristic resistance	R30...R90	$N_{Rk,p,fi}^0$	[kN]	2,7	4,0	7,4	12,2	18,7
	R120	$N_{Rk,p,fi}^0$	[kN]	2,2	3,2	5,9	9,7	14,9
Edge distance	R30...R120	$c_{cr,N,fi}$	[mm]	2 $h_{ef}$				
	R30...R120	$c_{min,fi}$	[mm]	Fire exposure from more than one side: $c_{min,fi} \geq 300\text{mm}$				
Anchor spacing	R30...R120	$s_{cr,N,fi}$	[mm]	2 $c_{cr,N,fi}$				
		$s_{min,fi}$	[mm]	50	60	80	100	120

In absence of other national regulations a partial safety factor for resistance under fire exposure of  $\gamma_{M,fi} = 1,0$  is recommended.

Simpson Strong-Tie®  
Screw anchor THD

Performance

Characteristic values of tension load under fire exposure

Annex C3

**Table C6: Characteristic shear resistance in cracked and non-cracked concrete C20/25 to C50/60 under fire exposure**

Simpson Strong-Tie® Screw anchor THD				Screw size				
				8	10	12	16	20
<b>Steel failure without lever arm</b>								
Characteristic resistance	R30	$V_{Rk,s,fi}$	[kN]	0,5	1,1	2,0	3,7	5,8
	R60	$V_{Rk,s,fi}$	[kN]	0,4	0,9	1,5	2,8	4,4
	R90	$V_{Rk,s,fi}$	[kN]	0,3	0,7	1,3	2,4	3,8
	R120	$V_{Rk,s,fi}$	[kN]	0,2	0,6	1,0	1,8	2,9
<b>Steel failure with lever arm</b>								
Characteristic resistance	R30	$M_{Rk,s,fi}^0$	[Nm]	0,5	1,6	3,4	8,5	16,8
	R60	$M_{Rk,s,fi}^0$	[Nm]	0,5	1,4	2,5	6,4	12,6
	R90	$M_{Rk,s,fi}^0$	[Nm]	0,4	1,0	2,2	5,5	10,9
	R120	$M_{Rk,s,fi}^0$	[Nm]	0,3	0,8	1,7	4,3	8,4
<b>Concrete pry-out failure</b>								
R30...R120		k	[-]	2				
<b>Concrete edge failure</b>								
The initial value $V_{Rk,c,fi}^0$ of the characteristic resistance in concrete C20/25 to C50/60 under fire exposure may be determined by:								
$V_{Rk,c,fi}^0 = 0.25 \times V_{Rk,c}^0 (\leq R90)$				$V_{Rk,c,fi}^0 = 0.25 \times V_{Rk,c}^0 (R120)$				
With $V_{Rk,c}^0$ equal to the characteristic resistance in non-cracked concrete C20/25 under normal temperatures.								

In absence of other national regulations a partial safety factor for resistance under fire exposure of  $\gamma_{M,fi} = 1,0$  is recommended.

Simpson Strong-Tie® Screw anchor THD	<b>Annex C4</b>
Performance Characteristic values of shear load under fire exposure	