



## European Technical Approval ETA-12/0060

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung <i>Trade name</i>	Simpson Strong-Tie® - Betonschraube THD <i>Simpson Strong-Tie® - Screw Anchor THD</i>
Zulassungsinhaber <i>Holder of approval</i>	SIMPSON STRONG -TIE® GmbH Hubert-Vergölst-Straße 6-14 61231 Bad Nauheim DEUTSCHLAND
Zulassungsgegenstand und Verwendungszweck <i>Generic type and use of construction product</i>	Betonschraube aus verzinktem Stahl in den Größen 8, 10, 12, 16 und 20 zur Verankerung in Beton <i>Concrete screw made of zinc coated steel of sizes 8, 10, 12, 16 and 20 for use in concrete</i>
Geltungsdauer: <i>Validity:</i>	vom <i>from</i> bis <i>to</i>
Herstellwerk <i>Manufacturing plant</i>	Simpson Strong-Tie Manufacturing Facilities

Diese Zulassung umfasst  
*This Approval contains*

16 Seiten einschließlich 9 Anhänge  
*16 pages including 9 annexes*

Diese Zulassung ersetzt  
*This Approval replaces*

ETA-12/0060 mit Geltungsdauer vom 26.03.2012 bis 26.03.2017  
*ETA-12/0060 with validity from 26.03.2012 to 26.03.2017*

## I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
  - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998<sup>4</sup>, as amended by Article 2 of the law of 8 November 2011<sup>5</sup>;*
  - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC<sup>6</sup>;
  - Guideline for European technical approval of "Metal anchors for use in concrete - Part 3: Undercut anchors", ETAG 001-03.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.
- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

<sup>1</sup> Official Journal of the European Communities L 40, 11 February 1989, p. 12  
<sup>2</sup> Official Journal of the European Communities L 220, 30 August 1993, p. 1  
<sup>3</sup> Official Journal of the European Union L 284, 31 October 2003, p. 25  
<sup>4</sup> *Bundesgesetzblatt Teil I 1998*, p. 812  
<sup>5</sup> *Bundesgesetzblatt Teil I 2011*, p. 2178  
<sup>6</sup> Official Journal of the European Communities L 17, 20 January 1994, p. 34

## II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of product and intended use

#### 1.1 Definition of the construction product

The Simpson Strong-Tie concrete screw 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.

An illustration of the product and intended use is given in Annex 1.

#### 1.2 Intended use

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106 EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences.

The anchor may be used for anchorages with requirements related to resistance to fire.

The anchor is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at most according to EN 206:2000-12.

The anchor may be anchored in cracked and non-cracked concrete.

The Simpson Strong-Tie concrete screw THD may only be used in structures subject to dry internal conditions.

The provisions made in this European technical approval are based on an assumed working life of the anchor of 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.

### 2 Characteristics of the product and methods of verification

#### 2.1 Characteristics of product

The anchor corresponds to the drawings and information given in Annex 2. The characteristic material values, dimensions and tolerances of the anchor not indicated in Annex 2 shall correspond to the respective values laid down in the technical documentation<sup>7</sup> of this European technical approval.

Regarding the requirements concerning safety in case of fire it is assumed that the anchor meets the requirements of class A1 in relation to reaction to fire in accordance with the stipulations of the Commission decision 96/603/EC, amended by 2000/605/EC.

<sup>7</sup> The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

The characteristic values for the design of the anchorages are given in Annexes 5 and 6.

The characteristic values for the design of the anchorages regarding resistance to fire are given in Annexes 7 and 8. They are valid for use in a system that is required to provide a specific fire resistance class.

Each anchor shall be marked with the identifying mark of the producer, the commercial name, the anchor size and the anchor length according to Annex 2.

The anchor shall only be packaged and supplied as a complete unit.

## 2.2 Methods of verification

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the "Guideline for European technical approval of Metal Anchors for Use in Concrete", Part 1 "Anchors in general" and Part 3 "Undercut anchors", on the basis of Option 1.

The assessment of the anchor for the intended use in relation to the requirements for resistance to fire has been made in accordance with the Technical Report TR 020 "Evaluation of anchorages in concrete concerning resistance to fire".

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

## 3 Evaluation and attestation of conformity and CE marking

### 3.1 System of attestation of conformity

According to the decision 96/582/EG of the European Commission<sup>8</sup> the system 2(i) (referred to as system 1) of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

- (a) Tasks for the manufacturer:
  - (1) factory production control;
  - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed control plan;
- (b) Tasks for the approved body:
  - (3) initial type-testing of the product;
  - (4) initial inspection of factory and of factory production control;
  - (5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

<sup>8</sup> Official Journal of the European Communities L 254 of 08.10.1996.

### 3.2 Responsibilities

#### 3.2.1 Tasks of the manufacturer

##### 3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial / raw / constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Deutsches Institut für Bautechnik.<sup>9</sup>

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

##### 3.2.1.2 Other tasks of manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

#### 3.2.2 Tasks of approved bodies

The approved body shall perform the

- initial inspection of factory and of factory production control,
  - continuous surveillance, assessment and approval of factory production control,
- in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the factory production control of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

### 3.3 CE marking

The CE marking shall be affixed on each packaging of the anchors. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacturer),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate for the factory production control,

<sup>9</sup> The control plan is a confidential part of the documentation of the European technical approval, but not published together with the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

- the number of the European technical approval,
- the number of the guideline for European technical approval,
- use category (ETAG 001-1, Option 1),
- size.

#### **4 Assumptions under which the fitness of the product for the intended use was favourably assessed**

##### **4.1 Manufacturing**

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the European technical approval and consequently the validity of the CE marking on the basis of the European technical approval and if so whether further assessment or alterations to the European technical approval shall be necessary.

##### **4.2 Design of anchorages**

The fitness of the anchor for the intended use is given under the following conditions:

The anchorages are designed in accordance with the "Guideline for European technical approval of Metal Anchors for Use in Concrete", Annex C, Method A 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, in cracked or non-cracked concrete, etc.).

The design of anchorages under fire exposure has to consider the conditions given in the Technical Report TR 020 "Evaluation of anchorages in concrete concerning resistance to fire". The relevant characteristic values are given in Annex 7, Table 9 and Annex 8, Table 10. The design method covers anchors with a fire attack from one side only. If the fire attack is from more than one side, the design method may be taken only, if the edge distance of the anchor is  $c \geq 300$  mm.

##### **4.3 Installation of anchors**

The fitness for use of the anchor can only be assumed if the following conditions of installation are met:

- Anchor installation carried out by appropriately qualified personnel under the supervision of the person responsible for technical matters on site,
- Use of the anchor only as supplied by the manufacturer,
- Anchor installation in accordance with the manufacturer's specifications and drawings,
- Checks before placing the anchor, to ensure that the characteristic values of the base material in which the anchor is to be placed, is identical with the values, which the characteristic loads apply,
- Check of the concrete being well compacted, e.g. without significant voids,
- Edge distances and spacings not less than the specified values without minus tolerances,
- Placing drill holes without damaging the reinforcement,

- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application,
- Cleaning of the hole of drilling dust according to Annex 9,
- Anchor installation such that the embedment depth of the anchor in the concrete is not smaller than the value  $h_{nom}$  given in Annex 3, Table 3,
- The fixture is fully pressed on the concrete surface without intermediate layers,
- Further turning of the anchor is not possible,
- The head of the anchor is fully supported on the fixture and is not damaged,
- The anchor may only be used once.

## 5 Responsibility of the manufacturer

The manufacturer is responsible to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to as well as sections 4.2 and 4.3 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European technical approval. In addition, all installation data shall be shown clearly on the packaging and/or on an enclosed instruction sheet, preferably using illustrations.

The minimum data required are:

- Drill bit diameter,
- Size of the anchor,
- Maximum thickness of the fixture,
- Minimum embedment depth,
- Minimum hole depth,
- Information on the installation procedure, including cleaning of the hole, preferably by means of an illustration,
- Reference to any special installation equipment needed,
- Identification of the manufacturing batch.

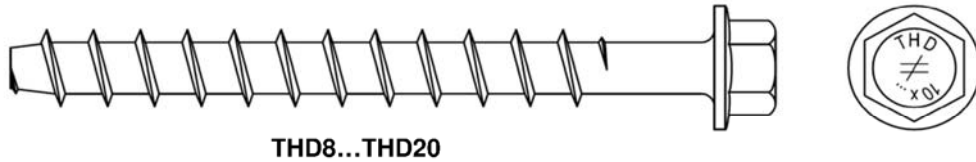
All data shall be presented in a clear and explicit form.

Andreas Kummerow  
p. p. Head of Department

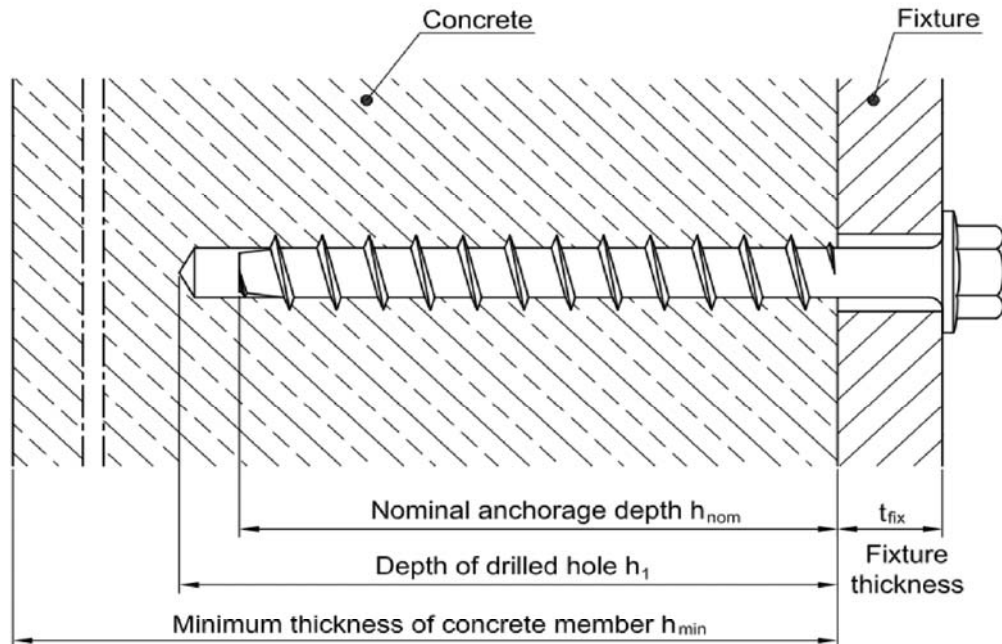
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Tempel



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



**Screw anchor THD after installation**



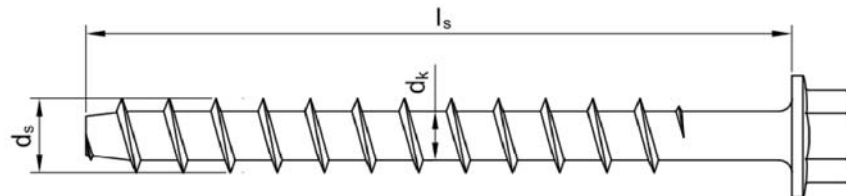
**Simpson Strong-Tie®  
Screw anchor THD**

**Annex 1**

Product and intended use



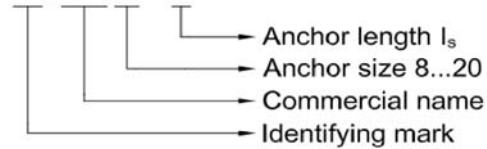
**Simpson Strong-Tie®  
Screw anchor THD**



Head marking



≠ THD10 x ...



**Table 1: Materials**

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

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

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

**Table 2: Dimensions**

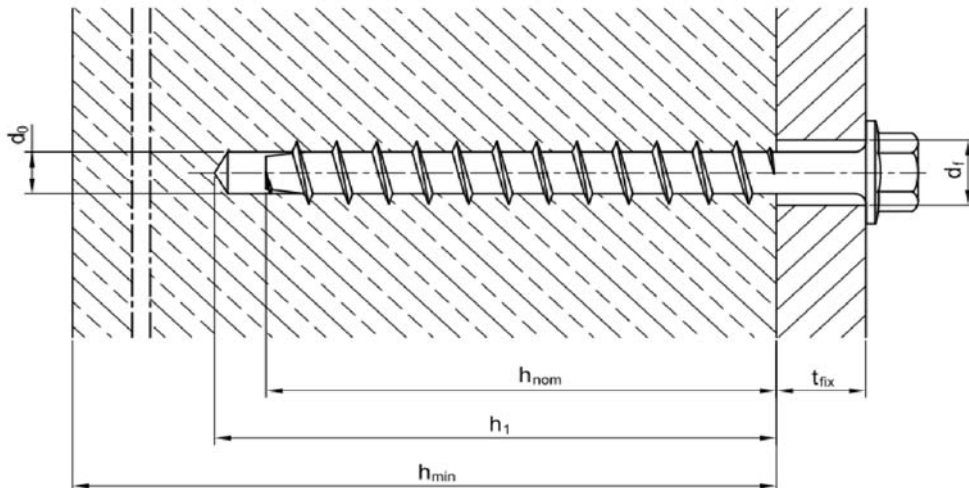
Anchor size	Length $l_s$ [mm]	Outer diameter $d_s$ [mm]	Core diameter $d_k$ [mm]
THD8	70...200	10,3	7,6
THD10	80...200	12,5	9,6
THD12	100...400	14,4	11,3
THD16	120...400	19,6	15,3
THD20	140...400	23,5	19,3

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

**Materials and dimensions**

**Annex 2**

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



**Table 3: Installation data**

Simpson Strong-Tie® Screw anchor THD		Anchor 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	12,50	16,50	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 only with impact screw driver.

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

**Annex 3**

**Installation data**

**Table 4: Design method A**  
**Minimum thickness of concrete member, minimum spacing and edge distance**

Simpson Strong-Tie® Screw anchor THD			Anchor size				
			8	10	12	16	20
Cracked concrete	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
Non-cracked concrete	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®**  
**Screw anchor THD**

**Annex 4**

**Design method A: Minimum thickness of concrete, minimum spacing and edge distances**

**Table 5: Design method A**  
**Characteristic resistance for tension loads**

Simpson Strong-Tie® Screw anchor THD			Anchor 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	$\gamma_{Ms}$ <sup>1)</sup>	[-]	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				
Partial safety factor	$\gamma_{Mp}$ <sup>1)</sup>	[-]	1,8 <sup>2)</sup>				
<b>Concrete cone failure and splitting failure</b>							
Effective anchorage depth	$h_{ef}$	[mm]	47	55	70	86	102
Characteristic spacing	$s_{cr,N}$	[mm]	3 $h_{ef}$				
	$s_{cr,sp}$	[mm]					
Characteristic edge distance	$c_{cr,sp}$	[mm]	1,5 $h_{ef}$				
	$c_{cr,sp}$	[mm]					
Partial safety factor	$\gamma_{Mc} = \gamma_{Msp}$ <sup>1)</sup>	[-]	1,8 <sup>2)</sup>				

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

<sup>2)</sup> The installation factor  $\gamma_2 = 1,2$  is included.

**Table 6: Displacements under tension loads**

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

Annex 5

Design method A:  
Characteristic resistance for tension loads / displacements

**Table 7: Design method A**  
**Characteristic resistance for shear loads**

Simpson Strong-Tie® Screw anchor THD			Anchor 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	70,0	110,4
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,5				
<b>Steel failure with lever arm</b>							
Characteristic resistance	$M_{RK,s}^0$	[Nm]	40,0	79,0	128,0	322,3	637,5
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,5				
<b>Concrete pry-out failure</b>							
Factor in Eq. (5.6) of ETAG 001 Annex C, section 5.2.3.3	k	[-]	2				
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5 <sup>2)</sup>				
<b>Concrete edge failure</b>							
Effective length of anchor in shear loading	$l_f$	[mm]	47	55	70	86	102
Effective diameter of anchor	$d_{nom}$	[mm]	7,7	9,6	11,3	15,3	19,3
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5 <sup>2)</sup>				

<sup>1)</sup> In absense of other national regulations.

<sup>2)</sup> The installation factor  $\gamma_2 = 1,0$  is included.

**Remark for design in shear**

In general, the conditions given in ETAG 001, Annex C, section 4.2.2.1 a) and 4.2.2.2. b) are not fulfilled because the diameter of the clearance hole in the fixture acc. to Annex 3, Table 3 is greater than the values given in Annex C, Table 4.1 for corresponding diameter of the anchor.

**Table 8: Displacements under shear loads**

Simpson Strong-Tie® Screw anchor THD			Anchor 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

Design method A:  
Characteristic resistance for shear loads / displacements

Annex 6

**Table 9: Design method A**  
**Characteristic tension resistance in cracked and non-cracked concrete**  
**C20/25 to C50/60 under fire exposure**

Simpson Strong-Tie® Screw anchor THD				Anchor 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	$N^0_{Rk,c,fi}$	[kN]	2,7	4,0	7,4	12,2	18,7
	R120	$N^0_{Rk,c,fi}$	[kN]	2,2	3,2	5,9	9,7	14,9
Edge distance	R30...R120	$c_{cr,N}$	[mm]	$2h_{ef}$				
	R30...R120	$c_{min}$	[mm]	Fire exposure from one side: $c_{min} = 2h_{ef}$ Fire exposure from more than one side: $c_{min} \geq 300\text{mm}$				
Anchor spacing	R30...R120	$s_{cr,N}$	[mm]	$4h_{ef}$				
		$s_{min}$	[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**

**Design method A:**  
**Characteristic values of tension load under fire exposure**

**Annex 7**

**Table 10: Design method A**  
**Characteristic shear resistance in cracked and non-cracked concrete**  
**C20/25 to C50/60 under fire exposure**

Simpson Strong-Tie® Screw anchor THD				Anchor 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	$M^0_{Rk,s,fi}$	[Nm]	0,5	1,6	3,4	8,5	16,8
	R60	$M^0_{Rk,s,fi}$	[Nm]	0,5	1,4	2,5	6,4	12,6
	R90	$M^0_{Rk,s,fi}$	[Nm]	0,4	1,0	2,2	5,5	10,9
	R120	$M^0_{Rk,s,fi}$	[Nm]	0,3	0,8	1,7	4,3	8,4
<b>Concrete pry-out failure</b>								
Factor in eq. (5.6) of ETAG 001 Annex C, 5.2.3.3	R30...R120	k	[-]	2				
<b>Concrete edge failure</b>								
The initial value $V^0_{Rk,c,fi}$ of the characteristic resistance in concrete C20/25 to C50/60 under fire exposure may be determined by:								
$V^0_{Rk,c,fi} = 0.25 \times V^0_{Rk,c} (\leq R90)$				$V^0_{Rk,c,fi} = 0.25 \times V^0_{Rk,c} (R120)$				
With $V^0_{Rk,c}$ equal to the characteristic resistance in 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**

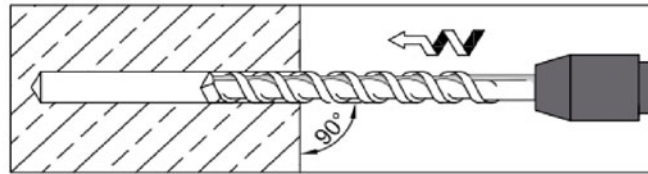
**Annex 8**

**Design method A:  
Characteristic values of shear load under fire exposure**



## Simpson Strong-Tie® Screw anchor THD

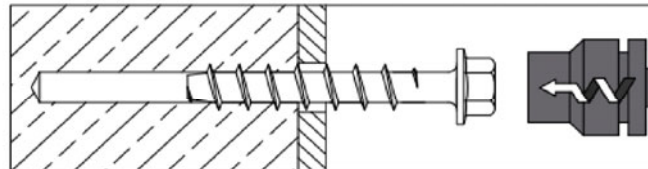
### Installation instructions



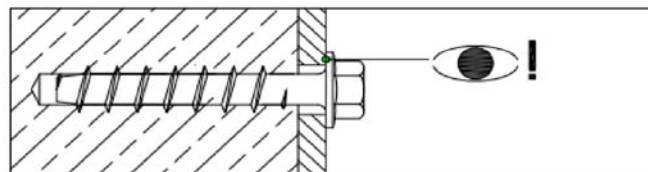
1. Drill hole



2. Clean hole



3. Setting anchor with an impact screw driver



4. Check connection

Simpson Strong-Tie®  
Screw anchor THD

Installation instructions

Annex 9