



European Technical Approval ETA-08/0259

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

Betonflachstahllanker 40x40x200, 40x40x300, 40x40x400

Zulassungsinhaber
Holder of approval

BB Stanz- und Umformtechnik GmbH
Nordhäuser Straße 42
06536 Berga
DEUTSCHLAND

Zulassungsgegenstand
und Verwendungszweck
*Generic type and use
of construction product*

Blechformteile (Betonflachstahllanker als Holz-Beton-Verbindungsmitel)

*Three-dimensional nailing plates (Timber-concrete steel anchor for
timber to concrete connections)*

Geltungsdauer:
Validity: vom
from
bis
to

24 June 2013
24 June 2018

Herstellwerk
Manufacturing plant

BB Stanz- und Umformtechnik GmbH
Nordhäuser Straße 42
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Diese Zulassung umfasst
This Approval contains

14 Seiten einschließlich 2 Anhänge
14 pages including 2 annexes

Diese Zulassung ersetzt
This Approval replaces

ETA-08/0259 mit Geltungsdauer vom 02.12.2008 bis 01.12.2013
ETA-08/0259 with validity from 02.12.2008 to 01.12.2013

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 products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - *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 1998⁴, as amended by Article 2 of the law of 8 November 2011⁵;*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶;
 - Guideline for European technical approval of "Three-dimensional nailing plates", ETAG 015.
- 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.
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- 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.

¹ Official Journal of the European Communities L 40, 11 February 1989, p. 12
² Official Journal of the European Communities L 220, 30 August 1993, p. 1
³ Official Journal of the European Union L 284, 31 October 2003, p. 25
⁴ *Bundesgesetzblatt Teil I 1998*, p. 812
⁵ *Bundesgesetzblatt Teil I 2011*, p. 2178
⁶ 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/ products and intended use

1.1 Definition of the construction product

Betonflachstahllanker are one-piece non-welded timber to concrete connectors which are fastened to timber members with nails and to the concrete elements by casting in concrete or by bolts. They are made through cold forming of zinc-coated steel S250GD + Z275 in accordance with the standard 10346⁷.

Design, dimensions, hole positions and steel grade are presented in Annex A. Timber-concrete steel anchors are produced from steel sheets with dimensions according to the standard EN 10143⁸.

1.2 Intended use

Timber-concrete steel anchors are used for structural timber to concrete connections in constructions, which are subject to the requirement “Mechanical resistance and stability” within the meaning of Essential Requirement 1 of Council Directive 89/106/EEC.

The structural behaviour of the components and the support and restraint conditions shall comply with the specifications in Annex B and section 4.2 of this European technical approval. The timber-concrete steel anchors may only be used in service classes 1 and 2 of the standard EN 1995-1-1 (Eurocode 5), for structures that are primarily subject to static or quasi static loading.

The timber members can be of solid wood, glued laminated timber or wood-based materials. The European technical approval applies to the fastening of timber or wood-based materials with a characteristic density between 290 kg/m³ and 420 kg/m³. The following softwood materials are suitable for connections with the timber-concrete steel anchors produced by the company BB Stanz- und Umformtechnik GmbH:

- Structural solid timber according to EN 338⁹ / EN 14081-1¹⁰,
- Glulam according to EN 1194¹¹ / EN 14080¹²,
- Solid wood panels according to EN 13353¹³ / EN 13986¹⁴,
- Laminated veneer lumber (LVL) according to EN 14374¹⁵ (connection only perpendicular to the plane of the veneer),
- Plywood according to EN 636¹⁶ / EN 13986:2005,
- Oriented strand board (OSB) according to EN 300¹⁷ / EN 13986.

7	EN 10346:2009	Continuously hot-dip coated steel flat products -Technical delivery conditions
8	EN 10143:2006	Continuously hot-dip coated steel sheet and strip – Tolerances on dimensions and shape
9	EN 338:2009	Timber structures - Strength classes
10	EN 14081-1:2005+A1:2011	Timber structures - Strength graded structural timber with rectangular cross section - Part 1: General requirements
11	EN 1194:1999	Timber structures - Glued laminated timber - Strength classes and determination of characteristic values
12	EN 14080:2005	Timber structures - Glued laminated timber - Requirements
13	EN 13353:2008+A1:2011	Solid wood panels (SWP) - Requirements
14	EN 13986:2004	Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking
15	EN 14374:2004	Timber structures - Structural laminated veneer lumber - Requirements
16	EN 636:2012	Plywood - Specifications
17	EN 300:2006	Oriented Strand Boards (OSB) – Definitions, classification and specifications

The members must have a thickness that is greater than the penetration depth of the nail into the member.

Annex B includes characteristic values of load-carrying capacities for connections with timber-concrete steel anchors for a characteristic density of 350 kg/m³. For timber or wood-based materials with a characteristic density less than 350 kg/m³ the characteristic values of the load-carrying capacity shall be reduced by a factor of k_{dens} :

$$k_{\text{dens}} = (\rho_k / 350)^{0.5}$$

Where ρ_k is the characteristic density of the timber or wood based material in kg/m³.

The design of the connections shall be carried out according to national provisions that apply at the installation site of the certified object in line with the partial safety factor format, e.g. in accordance with Eurocode 5.

The provisions of this European technical approval are based on an assumed working life of 50 years for the timber-concrete steel anchors, provided the timber-concrete steel anchors are subject to appropriate use and maintenance.

The information provided on the working life cannot be interpreted as a guarantee given by the producer, but should be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the construction.

2 Characteristics of product and methods of verification

2.1 Characteristics

ETAG para.	Characteristic	Assessment of characteristic
6.1	Mechanical resistance and stability^{*)}	
6.1.1	Load-carrying capacity	See Annex B
6.1.2	Stiffness	No performance determined
6.1.3	Ductility in cyclic testing	No performance determined
6.2	Safety in case of fire	
	Reaction to fire	The timber-concrete steel anchors are made of European Class A1 steel in accordance with Decision 96/603/EC of the European Commission and its amendment through Decision 2000/605/EC of the European Commission.
	Resistance to fire	Resistance to fire is determined for complete structural elements with any associated finishes, but not for an individual connector. Therefore no performance is determined for this Essential Requirement.
6.3	Hygiene, health and the environment	
6.3.1	Release of dangerous substances	No dangerous substances ^{**)}
6.4	Safety in use	Not relevant
6.5	Protection against noise	Not relevant
6.6	Energy economy and heat retention	Not relevant
6.7	Aspects of serviceability ^{***)}	
6.7.1	Durability	The timber-concrete steel anchors have sufficient durability and serviceability as far as they are used with timber types as defined in service classes 1 and 2 of Eurocode 5.
6.7.2	Serviceability	
6.7.3	Identification	See Annex A

^{*)} See section 2.2 of this ETA

^{**)} In accordance with <http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm>. 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 EC Construction Products Directive, these requirements shall also be complied with, when and where they apply.

^{***)} See section 2.3 of this ETA.

2.2 Mechanical resistance and stability

The characteristic load-carrying capacities of a connection with timber-concrete steel anchors are based on the characteristic values of the nail connections, the timber component and the steel sheet. To calculate the design values, the characteristic load-carrying capacities given in Annex B have to be divided by partial safety factors for the material properties and multiplied by the coefficient k_{mod} for the nail connection and the timber component with regard to the load duration and the service class defined in Eurocode 5.

According to the standard EN 1990 (Eurocode – Basis of design) paragraph 6.3.5 the design value of load-carrying capacity can be determined by reducing the characteristic values of the load-carrying capacity with different partial safety factors.

Thus, the characteristic values of the load-carrying capacity are determined also for timber failure $F_{\text{Rk,H}}$ (reaching the embedment strength of nails subjected to shear), $F_{90,\text{Rk}}$ (reaching the transverse tensile strength perpendicular to the grain of the timber component) as well as for steel sheet failure $F_{\text{Rk,m}}$ and $F_{\text{Rk,t}}$, respectively. The design value of the load-carrying capacity F_{Rd} is the smallest value of:

$$F_{\text{Rd}} = \min \left\{ \frac{k_{\text{mod}} \cdot F_{\text{Rk,N}}}{\gamma_{\text{M,H}}}, \frac{F_{\text{Rk,m}}}{\gamma_{\text{M0}}}, \frac{F_{\text{Rk,t}}}{\gamma_{\text{M2}}}, \frac{k_{\text{mod}} \cdot F_{90,\text{Rk}}}{\gamma_{\text{M,H}}} \right\}$$

Therefore, for timber failure and the nails connection the load duration class and the service class are included. The different partial safety factors γ_{M} for steel or timber, respectively, are also taken into account.

Information on the fasteners is provided in Annex A Table A.3. The holes shall be nailed from the end of the timber-concrete steel anchor. Product drawings are shown in Annex A, Figures A.1-A.6. See annex B for the characteristic load-carrying capacity in the direction F_1 parallel to the longitudinal axis of the anchor.

The characteristic capacities of the steel anchors are determined by calculation assisted by testing as described in the Guideline ETAG 015. They are used for the design according to national provisions that apply at the installation site in line with the partial safety factor format, e.g. in accordance with Eurocode 5.

No performance has been determined in relation to ductility of a joint under cyclic testing. Thus the contribution of the connections to the structural behaviour under earthquake loads is not assessed. No performance has been determined in relation to the connection's stiffness properties - to be used for the analysis of the serviceability limit state.

2.3 Aspects of serviceability

2.3.1 Corrosion protection in service classes 1 and 2

In line with ETAG 015, the timber-concrete steel anchors are made of zinc-coated steel grade S250GD + Z275 in accordance with EN 10346.

2.3.2 In relation to the required corrosion protection for the nails to be used with the timber-concrete steel anchors national provisions that apply at the installation site of the certified object shall be considered e.g. Eurocode 5. In accordance with Eurocode 5 – Table 4.1 – the nails to be used may be of uncoated steel for service class 1 and require corrosion protection Fe/Zn 12c or Z275 for service class 2.

2.3.3 If preservative treatment of timber is used, national regulations apply.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the Decision 97/638/EC of the European Commission¹⁸, system 2+ of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 2+: Declaration of conformity of the product by the manufacturer on the basis of:

(a) Tasks for the manufacturer:

- (1) initial type-testing of the product;
- (2) factory production control;
- (3) testing of samples taken at the factory in accordance with a prescribed test plan.

(b) Tasks for the approved body:

- (4) certification of factory production control on the basis of:
 - initial inspection of factory and of factory production control;
 - continuous surveillance, assessment and approval of factory production control.

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

3.2 Responsibilities

3.2.1 Tasks for 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 attained. The factory production control shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use the raw materials listed in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the "Control plan relating to the European technical approval ETA-08/0259 issued on 24 June 2013" which is part of the technical documentation of this European technical approval. The control plan is specified in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik¹⁹.

The incoming raw materials shall be checked and tested by the manufacturer before acceptance. The check of materials, such as the steel sheet, shall include control of the test certificates presented by suppliers (comparison with nominal values), including verification of dimensions and determination of material properties, e.g. chemical composition, mechanical properties and thickness of the zinc coating.

The manufactured construction products shall be checked visually and for dimensional accuracy. The control plan includes details of the scope, type and frequency of testing and controls to be carried out within factory production control.

¹⁸ Official Journal of the European Union L 268/36, 1.10.97

¹⁹ The control plan is a confidential part of 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 results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan. The records shall include at least the following information:

- designation of the product, basic material and components,
- type of control or test,
- date of manufacture of the product and date of testing the product or its basic material and components,
- results of control and testing and, if applicable, comparison with requirements,
- signature of the person responsible for factory production control.

The records shall be submitted to the body approved for the continuous surveillance and, on demand, to Deutsches Institut für Bautechnik.

3.2.1.2 Other tasks for the 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 timber-concrete steel 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.

For initial type-testing of the product, the results of the tests performed as part of the assessment for the European technical approval may be used, unless there are changes to the production line or plant. In such cases the necessary initial type testing has to be agreed between Deutsches Institut für Bautechnik and the notified body.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the European technical approval ETA-08/0259 issued on 24 June 2013.

3.2.2 Tasks for the approved body

The approved body shall perform the following tasks in accordance with the provisions laid down in the control plan:

- initial inspection of factory and factory production control,
- continuous surveillance, assessment and approval of factory production control.

3.2.2.1 Initial inspection of the factory and of factory production control

The approved body shall ascertain that, in accordance with the prescribed control plan, the factory, particularly the staff and equipment, and the factory production control, are suitable to ensure continuous and orderly manufacturing of the timber-concrete steel anchors in compliance with the specifications of this European technical approval.

3.2.2.2 Continuous surveillance

The approved body shall visit the factory at least twice a year for routine inspections. It shall be verified that the factory production control system and the specified manufacturing processes are maintained in accordance with the control plan.

3.2.2.3 Other tasks for the approved body

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

The certification body shall make the results of the continuous surveillance available to Deutsches Institut für Bautechnik upon demand.

The certification body appointed by the manufacturer shall issue an EC certificate of conformity confirming compliance of the factory production control with the provisions 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 the each packaging of the timber-concrete steel anchors. The letters "CE" shall be followed by the identification number of the approved certification body and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- 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,
- the number of the European technical approval,
- the number of the guideline for European technical approval (ETAG 015),
- the name and the size of the product.

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

4.1 Manufacturing

The Betonflachstahllanker shall be manufactured in accordance with the provisions of the European technical approval using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and described in the technical documentation.

This European technical approval is issued for the product on the basis of agreed data/information, which is deposited with Deutsches Institut für Bautechnik and 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, shall 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 approval and consequently the validity of the CE marking on the basis of the approval, and if so whether further assessment or alterations to the approval shall be necessary.

4.2 Installation

The connection of timber and concrete members with timber-concrete steel anchors is considered to be suitable for the intended use, provided:

- *Nail arrangement*

The holes have to be nailed beginning at the end of the timber-concrete steel anchor. The number constitutes at least 4 and follows from the static calculation. Nails to be used shall have a diameter which fits the holes of the timber-concrete steel anchor.

- *Wane*

Wane is not allowed, the timber-concrete steel anchor must seat solidly on timber.

- *Support and restraint conditions*

It is assumed that members connected by timber-concrete steel anchors have to be secured against rotation.

- Others

Installation is carried out by personnel under the direction of a supervisor, all of whom are appropriately qualified for this work. Installation is in accordance with the manufacturer's technical documentation.

The members must have a thickness that is greater than the penetration depth of the nail into the member.

5 Recommendations

5.1 Packaging, transport and storage

Betonflachstahllanker are packed in boxes that bear the name of the manufacturer, product type, dimensions, quantity, date of manufacture and details of the delivery batch.

In relation of transportation and storage, the BB-Betonflachstahllanker should be treated as conventional metallic building products.

5.2 Use, maintenance, repair

Assessment of the fitness for use is based on the assumption that repair is not required during the assumed working life. Should repair prove necessary, this is normally done by replacement of the timber-concrete steel anchor.

Uwe Bender
Head of the Department

beglaubigt:
Baumann

Annex A

Product details

Table A.1 Material specification

Timber-concrete steel anchor	Thickness (mm)	Steel specifications	Coating specification
40 x 200 x 2.0	2.0	S250GD	Z275
40 x 300 x 2.0	2.0	S250GD	Z275
40 x 400 x 2.0	2.0	S250GD	Z275
40 x 200 x 4.0	4.0	S250GD	Z275
40 x 300 x 4.0	4.0	S250GD	Z275
40 x 400 x 4.0	4.0	S250GD	Z275

Table A.2 Range of sizes

Timber-concrete steel anchor	Length (mm)		Width (mm)	
	min	max	min	max
40 x 40 x 200 x 2.0	200	207	39	41
40 x 40 x 300 x 2.0	300	307	39	41
40 x 40 x 400 x 2.0	400	407	39	41
40 x 40 x 200 x 4.0	200	207	39	41
40 x 40 x 300 x 4.0	300	307	39	41
40 x 40 x 400 x 4.0	400	407	39	41

Table A.3 Fastener specification

Nail type	Nail size (mm)		Finish
	Diameter	Length	
According to EN 14592	4.0	40	Corrosion protection acc. to national provisions
Threaded nail with a truncated cone under the head		Thread $l \geq 30$	

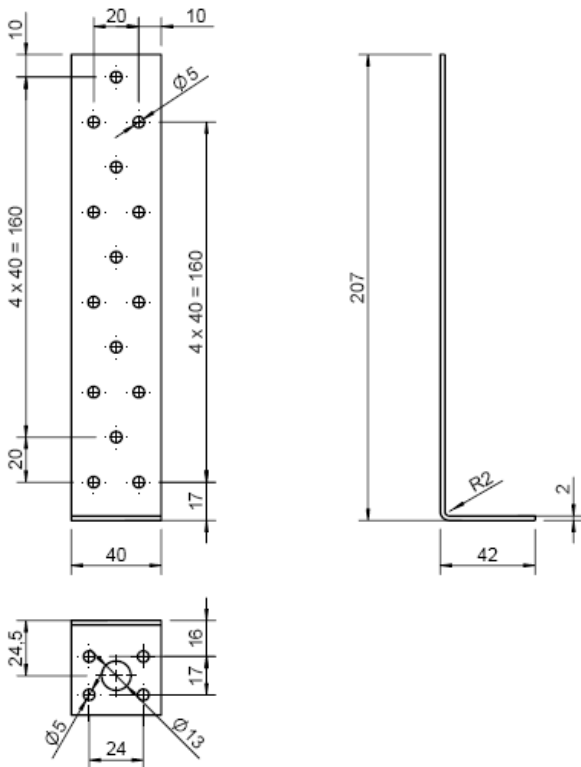


Figure A.1 Dimensions of
Timber-concrete steel anchor 40 x 200 x 2.00

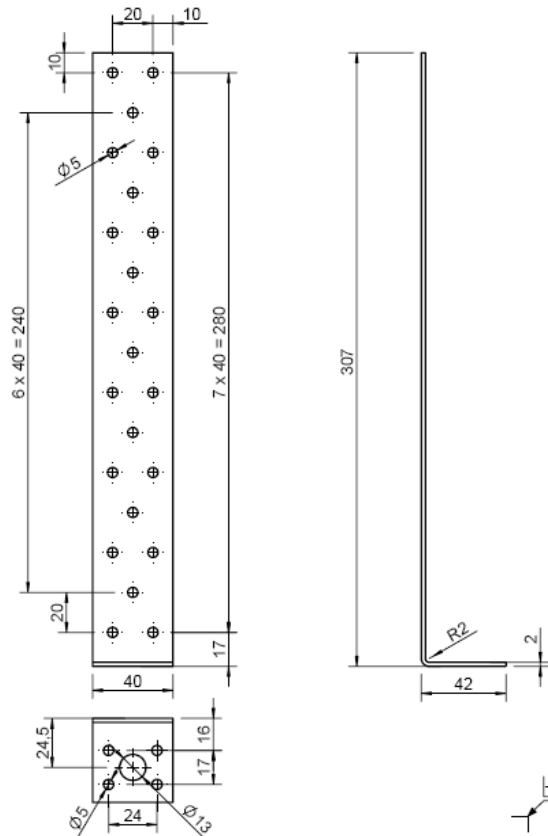


Figure A.2 Dimensions of
Timber-concrete steel anchor 40 x 300 x 2.00

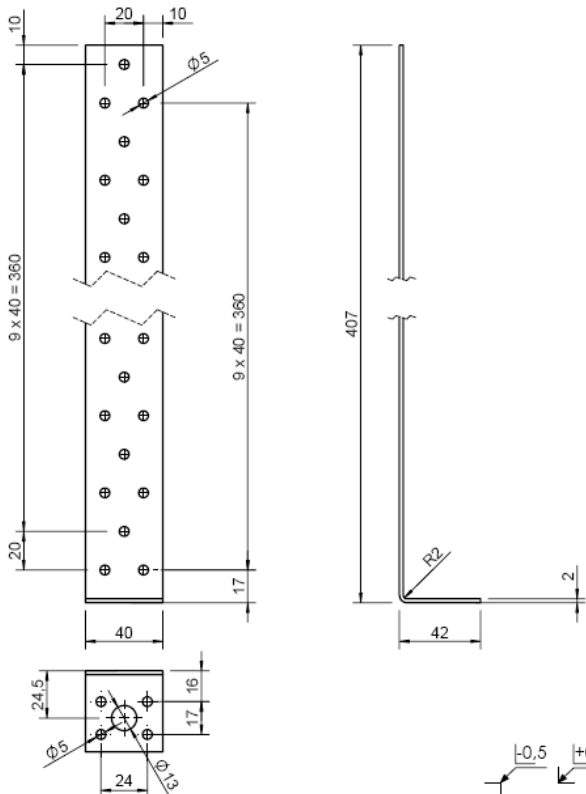


Figure A.3 Dimensions of
Timber-concrete steel anchor 40 x 400 x 2.00

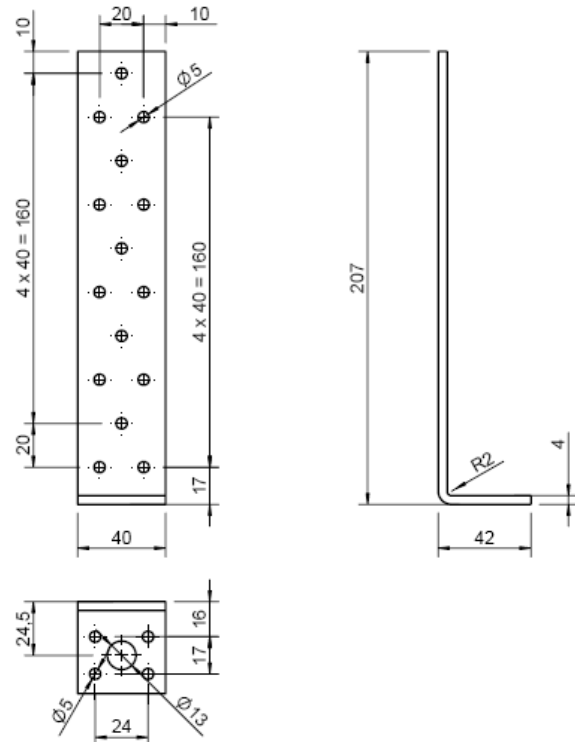


Figure A.4 Dimensions of
Timber-concrete steel anchor 40 x 200 x 4.00

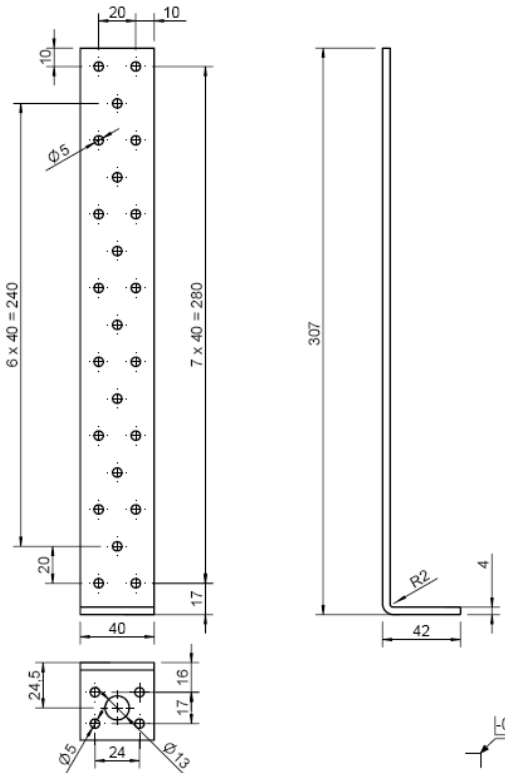


Figure A.5 Dimensions of
Timber-concrete steel anchor 40 x 300 x 4.00

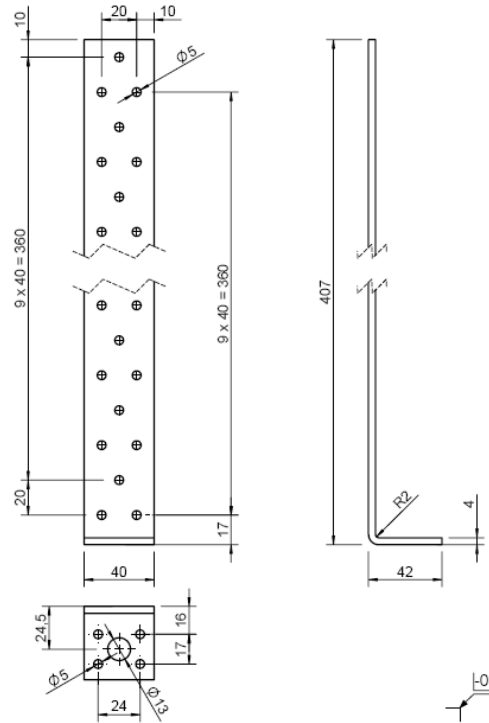


Figure A.6 Dimensions of
Timber-concrete steel anchor 40 x 400 x 4.00

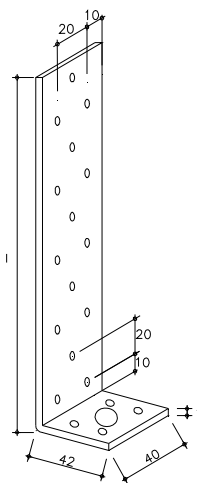


Figure A.7 Typical timber-concrete steel anchor

Annex B

Characteristic load-carrying capacities

Table of load-carrying capacities for connections with one timber-concrete steel anchor per connection

Table B.1: Characteristic load-carrying capacities, loading case F_1 (loading parallel to the longitudinal axis of the anchor) – per timber-concrete steel anchor

Thickness	Nail failure ($F_{Rk,N}$)	Steel failure ¹⁾		Failure of tensile stress perpendicular to the grain
		Bending ($F_{Rk,m}$)	Tension ($F_{Rk,t}$)	
2.0 mm	1.62 kN per nail	3.33 kN	17.8 kN	Design according to equation (B.1)
4.0 mm	1.56 kN per nail	9.07 kN	35.6 kN	Design according to equation (B.1)

¹⁾ Steel failure subjected to bending is governing for timber-concrete steel anchors which are fixed to the concrete with metal connectors and washers 43 mm x 4 mm according to EN ISO 7094. Steel failure subjected to tension is governing for cast in concrete timber-concrete steel anchors.

Splitting

For a lifting force F_1 tensile stress perpendicular to the grain has to be proved, when necessary, for the timber element. The capacity of a connection with timber-concrete steel anchors is calculated according to the general tensile stress perpendicular to the grain design for connections with mechanical fasteners in EN 1995 at:

$$F_{90,Rk} = 14 \cdot b \cdot \sqrt{\frac{h_e}{\left(1 - \frac{h_e}{h}\right)}} \quad (B.1)$$

Where:

- $F_{90,Rk}$ the characteristic tensile stress perpendicular to the grain capacity in N
- b the member thickness, in mm
- h_e is the loaded edge distance to the centre of the most distant fastener in mm
- h the timber member height in mm

The design value of the force component perpendicular to the axis of the member $F_{90,Ed}$ has to be lower than the design capacity $F_{90,Rd}$.

Connection to concrete

The fastening of the timber-concrete steel anchor to the concrete member has to be proved. It is not subject of this European technical approval.