

DECLARATION OF PERFORMANCE

according to the Construction Products Regulation (EU) No.305/2011

Nr.: LE_13_1060_EN

- | | | |
|-----|--|---|
| 1. | Product type identification code | Tie Rod
Dimensions: see ETA -13/1060 |
| 2. | Type, batch, series numbers or other identification code | ETA -13/1060
Batch number: see label |
| 3. | Intended use | Fastener for supporting wood concrete; wood steel; wood-wood connections in constructions in accordance with ETA -13/1060 |
| 4. | Manufacturer contact address | BB Stanz- und Umformtechnik GmbH
Nordhäuser Str. 44
06536 Berga
Germany |
| 5. | System or systems for durability assessment and testing | System 2+ |
| 6. | Reference document | ETA -13/1060 |
| 7. | Eota ref. / number | ETA-Danmark A/S, Charlottenlund |
| 8. | Conducted by the certification authority | - Initial inspection of the manufacturing plant and of factory production control
- Current monitoring, analysis and assessment of factory production control
- Result in conformity certificate 0769-CPD-6119/01 |
| 9. | Declared performance | See ETA -13/1060 |
| 10. | Product performance pursuant to item 1 and 2 corresponds to the declared performance pursuant to item 9. The manufacturer pursuant to item 4 is liable for this Performance Declaration. | |

Signed for the manufacturer and on behalf of the manufacturer by:



Günther Blesch
(Chief Operating Officer)
Berga, 13.01.2017

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Authorised and notified according to
Article 29 of the Regulation (EU)
No 305/2011 of the European
Parliament and of the Council of 9
March 2011

MEMBER OF EOTA

European Technical Assessment ETA-13/1060 of 2013/12/20

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

BB Stanz- und Umformtechnik GmbH hold downs type KR 460x90x65x3,0, KR 460x90x65x4,0, type R Lx60x60x3,0 and R Lx80x80x3,0

Product family to which the above construction product belongs:

EC PAC 13: Three-dimensional nailing plate (Angle brackets and hold-downs for timber-to-timber or timber-to-concrete or steel connections)

Manufacturer:

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Manufacturing plant:

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This European Technical Assessment contains:

16 pages including 2 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:

Guideline for European Technical Approval (ETAG) No. 015 Three Dimensional Nailing Plates, April 2013, used as European Assessment Document (EAD).

This version replaces:

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Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

BB hold-downs are one-piece welded or similarly joined face-fixed nailing plates to be used in timber to concrete or to steel or in timber to timber connections. They are connected to construction members made of timber or wood-based products with profiled (ringed shank) nails or screws according to EN 14592 or ETA and to concrete or steel members with bolts or metal anchors.

The hold downs with a steel plate thickness of 3 mm to 4 mm are made from zinc-coated or zinc-magnesium-coated steel grade S355 according to EN 10025-2:2004, or steel grade DX 51D according to EN 10327:2004 with $R_e \geq 200$ N/mm², $R_m \geq 270$ N/mm² and $A_{80} \geq 22\%$ or steel grade DD11 according to EN 10111:2008 with $R_e \geq 200$ N/mm², $R_m \leq 440$ N/mm² and $A_{80} \geq 23\%$ with tolerances according to EN 10143:1993 and are available in various sizes. Dimensions, hole positions and typical installations are shown in Annex A and B.

2 Specification of the intended use in accordance with the applicable EAD

The hold-downs are intended for use in making connections in load bearing timber structures, as a connection between a column and a concrete, steel or timber member, where requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation (EU) 305/2011 shall be fulfilled.

The static and kinematical behaviour of the timber members or the supports shall be as described in Annex B.

The wood members may be of solid timber, glued laminated timber and similar glued members, or wood-based structural members. These requirements to the material of the wood members can be fulfilled by using timber or wood based material with a characteristic density from 290 kg/m³ to 420 kg/m³. This is fulfilled for the following materials:

- Solid timber according to EN 14081,
- Glued solid timber according to EN 14080,
- Glulam according to EN 14080,

- LVL according to EN 14374,
- Parallam PSL,
- Intrallam LSL,
- Cross laminated timber according to EN 16351,
- Plywood according to EN 636

Annex B states the load-carrying capacities of the hold down connections for a characteristic density of 350 kg/m³. For timber or wood based material with a lower characteristic density than 350 kg/m³ the load-carrying capacities shall be reduced by the k_{dens} factor:

$$k_{dens} = \left(\frac{\rho_k}{350} \right)^{0.5}$$

Where ρ_k is the characteristic density of the timber in kg/m³.

The design of the connections shall be in accordance with Eurocode 5 or a similar national Timber Code. The wood members shall have a thickness which is larger than the penetration depth of the fasteners into the members.

The hold-downs are primarily for use in timber structures subject to the dry, internal conditions defined by service classes 1 and 2 of Eurocode 5 and for connections subject to static or quasi-static loading.

The hold downs may also be used in outdoor timber structures, service class 3, when a corrosion protection in accordance with Eurocode 5 is applied, or when stainless steel with similar or better characteristic yield and ultimate strength is employed. If a stainless steel with a lower characteristic yield or ultimate strength is employed, the load-carrying capacities $F_{t,Rk}$ in Table 1 (see annex B) are to be reduced proportionally.

The scope of the brackets regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions.

The hold downs may also be used for connections between a timber member and a member of concrete or steel.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the hold downs of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, 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

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability*) (BR1)	
Characteristic load-carrying capacity	See Annex B
Stiffness	No performance determined
Ductility in cyclic testing	No performance determined
3.2 Safety in case of fire (BR2)	
Reaction to fire	The hold downs are made from steel classified as Euroclass A1 in accordance with EN 1350-1 and EC decision 96/603/EC, amended by EC Decision 2000/605/EC
3.3 Hygiene, health and the environment (BR3)	
Influence on air quality	No dangerous materials
3.4 Safety in use (BR4)	
	Not relevant
3.5 Protection against noise (BR5)	
	Not relevant
3.6 Energy economy and heat retention (BR6)	
	Not relevant
3.7 Sustainable use of natural resources (BR7)	
	Not relevant
3.8 General aspects related to the performance of the product	
	The hold downs have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 and subject to the conditions defined by service class 1 and 2
Identification	See Annex A

*) See additional information in section 3.8 – 3.9.

In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, 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 Regulation, these requirements need also to be complied with, when and where they apply.

3.9 Methods of verification

Safety principles and partial factors

The characteristic load-carrying capacities are based on the characteristic values of the nail or screw connections and the steel plates. To obtain design values the capacities have to be divided by different partial factors for the material properties, the nail connection in addition multiplied with the coefficient k_{mod} .

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

Thus, the characteristic values of the load-carrying capacity are determined also for timber failure $F_{Rk,H}$ (obtaining the embedment strength of nails or screws subjected to shear or the withdrawal capacity of the most loaded nail or screw, respectively) as well as for steel plate failure $F_{Rk,S}$. The design value of the load-carrying capacity is the smaller value of both load-carrying capacities.

$$F_{Rd} = \min \left\{ \frac{k_{mod} \cdot F_{Rk,H}}{\gamma_{M,H}}; \frac{F_{Rk,S}}{\gamma_{M,S}} \right\}$$

Therefore, for timber failure the load duration class and the service class are included. The different partial factors γ_M for steel or timber, respectively, are also correctly taken into account.

3.10 Mechanical resistance and stability

See annex B for the characteristic load-carrying capacity in the direction F_1 .

The characteristic capacities of the hold-downs are determined by calculation assisted by testing as described in the EOTA Guideline 015 clause 5.1.2. They should be used for designs in accordance with Eurocode 5 or a similar national Timber Code.

No performance has been determined in relation to ductility of a joint under cyclic testing. The contribution to the performance of structures in seismic zones, therefore, has not been assessed.

No performance has been determined in relation to the joint's stiffness properties to be used for the analysis of the serviceability limit state.

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1 and 2.

zinc-coated or zinc-magnesium-coated steel grade S355 according to EN 10025-2:2004, or steel grade DX 51D according to EN 10327:2004 with $R_e \geq 200$ N/mm², $R_m \geq 270$ N/mm² and $A_{80} \geq 22\%$ or steel grade DD11 according to EN 10111:2008 with $R_e \geq 200$ N/mm², $R_m \leq 440$ N/mm² and $A_{80} \geq 23\%$ with tolerances according to EN 10143:1993.

3.11.2 Corrosion protection in service class 3.

In accordance with Eurocode 5 the hold downs are made from stainless steel 1.4016, 1.4301, 1.4401, 1.4541 or 1.4571 according to EN 10088-2:2005 and the nails shall be produced from stainless steel.

3.12 General aspects related to the fitness for use of the product

The hold downs are manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and laid down in the technical documentation

The nailing pattern used shall be either the maximum or the minimum pattern as defined in Annex A.

The following provisions concerning installation apply:

The structural members – the components 1 and 2 shown in the figure on page 12 - to which the brackets are fixed shall be:

- Restrained against rotation.
- Strength class C14 or better,
- Free from wane under the bracket.
- The gap between the timber members does not exceed 3 mm.
- There are no specific requirements relating to preparation of the timber members.

The execution of the connection shall be in accordance with the assessment holder's technical literature.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 97/638/EC of the European Commission¹, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 2+.

- a) Tasks for the manufacturer:
Factory production control,
 - (1) Initial type testing of the product,
- b) Tasks for the notified body:
 - (1) Initial inspection of the factory and the factory production control,
 - (2) Continuous surveillance

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

5.1 Tasks of the manufacturer

5.1.1 Factory production control

The manufacturer has a factory production control system in the plant and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Assessment.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the control plan¹. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of materials, such as sheet metal, shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimension and determining material properties, e.g. chemical composition, mechanical properties.

The manufactured components are checked visually and for dimensions.

The control plan, which is part of the technical documentation of this European Technical Assessment, includes details of the extent, nature and frequency of testing and controls to be performed within the factory

¹ The control plan has been deposited at ETA-Danmark and is only made available to the approved bodies involved in the AVCP procedure.

production control and has been agreed between the assessment holder and ETA-Danmark.

The results of factory production control are recorded and evaluated. The records include at least the following information:

- Designation of the product, basic material and components;
- Type of control or testing;
- Date of manufacture of the product and date of testing of the product or basic material and components;
- Result of control and testing and, if appropriate, comparison with requirements;
- Signature of person responsible for factory production control.

The records shall be presented to ETA Danmark on request.

5.1.2 Initial type testing of the product

For initial type-testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary initial type testing has to be agreed between ETA-Danmark and the notified body.

5.2. Tasks of notified bodies

5.2.1 Initial inspection of factory and of factory production control

The Notified body shall ascertain that, in accordance with the control plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the anchor according to the specifications mentioned in 2.1 as well as to the Annexes to the European Technical Assessment.

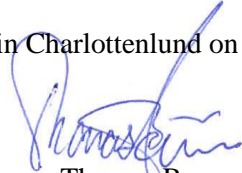
5.2.2 Continuous surveillance

The Notified body shall visit the factory at least once a year for regular inspection. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking account of the control plan.

Continuous surveillance and assessment of factory production control have to be performed according to the control plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to ETA-Danmark. In cases where the provisions of the European Technical Assessment and the control plan are no longer fulfilled the conformity certificate shall be withdrawn.

Issued in Charlottenlund on 2013-12-20



Thomas Bruun
Manager, ETA-Danmark

Annex A
Product details definitions

Table A.1 Materials specification

Hold down type	Thickness (mm)	Steel specification	Coating specification
KR Lx90x65x3,0	3,0	DX51D or DD11	Z 275 or Z 350
KR Lx90x65x4,0	4,0	DX51D or DD11	Z 275 or Z 350
R Lx60x60x3,0	3,0	S355	Fe Zn 12c or Fe Zn 25c
R Lx80x80x3,0	3,0	S355	Fe Zn 12c or Fe Zn 25c
Washer 30x3	3,0	S 235	Fe Zn 12c
Washer 37x3	3,0	S 235	Fe Zn 12c
Base plate 58,5x50x10	10,0	S 235	Fe Zn 12c
Base plate 79x70x20	20,0	S 235	Fe Zn 12c

Table A.2 Range of sizes

Hold down type	Height (mm) vertical		Depth (mm) horizontal		Width (mm)	
KR Lx90x65x3,0	L - 2	L + 2	89	91	64	66
KR Lx90x65x4,0	L - 2	L + 2	89	91	64	66
R Lx60x60x3,0	L - 2	L + 2	59	61	39	41
R Lx80x80x3,0	L - 2	L + 2	79	81	82	84
Washer 30x3	-	-	29	31	62	64
Washer 37x3	-	-	36	38	36	38
Base plate 58,5x50x10	-	-	58	59	49	51
Base plate 79x70x20	-	-	78	80	69	71

Table A.3 Fastener specification

FASTERNER	Length Min – max	Nail type
Nail 4.0 mm	40 – 100 mm	Ringed shank nails according to EN 14592
Screw 5.0 mm	35 – 70 mm	Self-tapping screws according to EN 14592 or ETA

In the load-carrying-capacities of the nailed or screwed connection in Annex B the capacities calculated from the formulas of Eurocode 5 are used assuming a thick steel plate when calculating the lateral fastener load-carrying-capacity. The load-carrying-capacities of the hold downs have been determined based on the use of connector nails \varnothing 4,0 mm or screws \varnothing 5,0 mm in accordance with the German national approval for the nails or the ETA for screws. The characteristic withdrawal capacity of the nails or screws has to be determined by calculation in accordance with EN 1995-1-1:2008, paragraph 8.3.2 (head pull-through is not relevant):

$$F_{ax,Rk} = f_{l,k} \times d \times t_{pen}$$

Where:

$f_{l,k}$ Characteristic value of the withdrawal parameter in N/mm²

d Nail or screw diameter in mm

t_{pen} Penetration depth of the profiled shank in mm;

(4,0 x 40 mm $t_{pen} \geq 31$ mm; 4,0 x 50 mm $t_{pen} \geq 40$ mm; 4,0 x 60 mm $t_{pen} \geq 50$ mm)

Based on tests by Versuchsanstalt für Stahl, Holz und Steine, University of Karlsruhe, the characteristic value of the withdrawal parameter in N/mm² for the threaded nails or screws used can be calculated as:

$$f_{l,k} = 50 \times 10^{-6} \times \rho_k^2 \text{ for nails}$$

$$f_{l,k} = 12 \times (\rho_k/350)^{0,8} \text{ for screws}$$

Where:

ρ_k Characteristic density of the timber in kg/m³

The shape of the nail or screw directly under the head shall be in the form of a truncated cone with a diameter under the head which fits or exceeds the hole diameter.

BOLT or METAL ANCHOR diameter	Correspondent Hole diameter	Bolt or metal anchor type
16.0 - 20.0 mm	Max. 2 mm. larger than the bolt or anchor diameter	Bolt according to EN 14592 Anchor according to ETA (see specification of the manufacturer)

Annex B Characteristic load-carrying capacities

Table 1: Force F_1 , 1 hold-down / connection timber-concrete / softwood¹⁾ $\rho_k = 350 \text{ kg/m}^3$

Hold down type	capacity per nail in the vertical flange ($F_{v,Rk}$) [kN] ²⁾			capacity per screw in the vertical flange ($F_{v,Rk}$) [kN] ²⁾			concrete	steel ³⁾	bolt
	4x40	4x50	4x60	5x35	5x40	5x50		tensile ($F_{t,Rk}$) [kN]	k_t
KR 460x90x65x3,0	1,57	1,87	1,93	1,80	1,92	2,52	see EN1992	36,2	2,05
KR 460x90x65x4,0	1,57	1,87	1,93	1,80	1,92	2,52		48,3	2,04
R Lx60x60x3,0*	1,57	1,87	1,93	1,80	1,92	2,52		35,0	3,79
R Lx60x60x3,0**	1,57	1,87	1,93	1,80	1,92	2,52		45,0	3,79
R Lx80x80x3,0***	1,57	1,87	1,93	1,80	1,92	2,52		60,0	2,63

* with washer 30x3; ** with base plate $t = 10 \text{ mm}$; *** with washer 37x3 or base plate $t = 20 \text{ mm}$

1) For other characteristic softwood densities, $F_{v,Rk}$ is multiplied by $k_{dens} = \left(\frac{\rho_k}{350}\right)^{0,5}$;

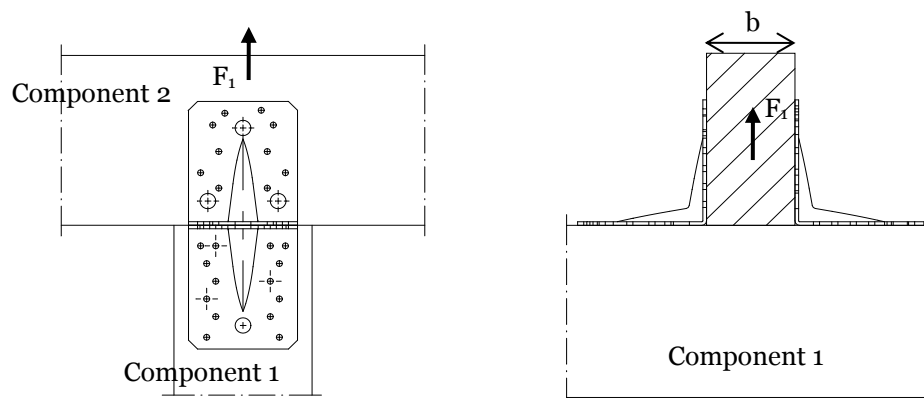
For hardwoods, $F_{v,Rk}$ is calculated according to EN 1995-1-1;

If a wood-based panel interlayer with a thickness of not more than 26 mm is placed between the connector plate and the timber member, the lateral load-carrying capacity of the nail or screw, respectively, has to take into account the effect of the interlayer.

2) 4,0 mm nails or 5,0 mm screws may be used

3) Base plates/washers according to the engineering drawings are used

Definitions of forces, their directions and eccentricity



Single hold down per connection

Acting forces

F_1 Lifting force acting in the central axis of the hold down. The component 2 shall be prevented from rotation.

Double hold downs per connection

The hold downs must be placed at each side opposite to each other, symmetrically to the component axis.

Acting forces

F_1 Lifting force acting along the central axis of the joint. The load-carrying capacity is twice the load-carrying capacity of a connection with one hold down.

Wane

Wane is not allowed, the timber has to be sharp-edged in the area of the hold downs.

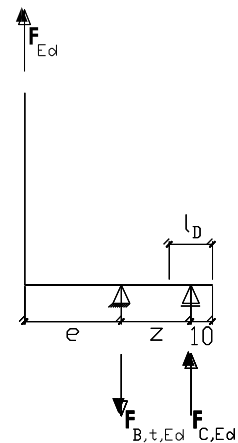
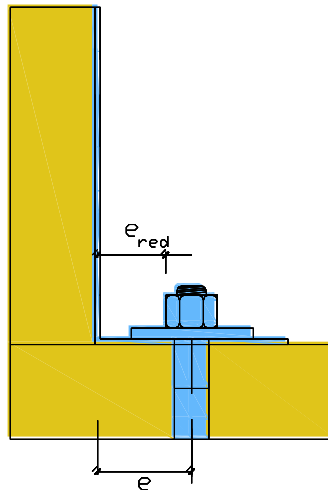
Connection to timber, concrete or steel with a bolt or metal anchor

The load $F_{B,Ed}$ for the design of a bolt or metal anchor is calculated as:

$$F_{B,t,Ed} = k_t \cdot F_{Ed} \text{ for tensile load}$$

Where:

- $F_{B,t,Ed}$ Bolt tensile load in N
- k_t Coefficient taking into account the moment arm or hole tolerance, respectively
- F_{Ed} Tensile load F_1 on vertical flap of the hold down



BB Hold downs

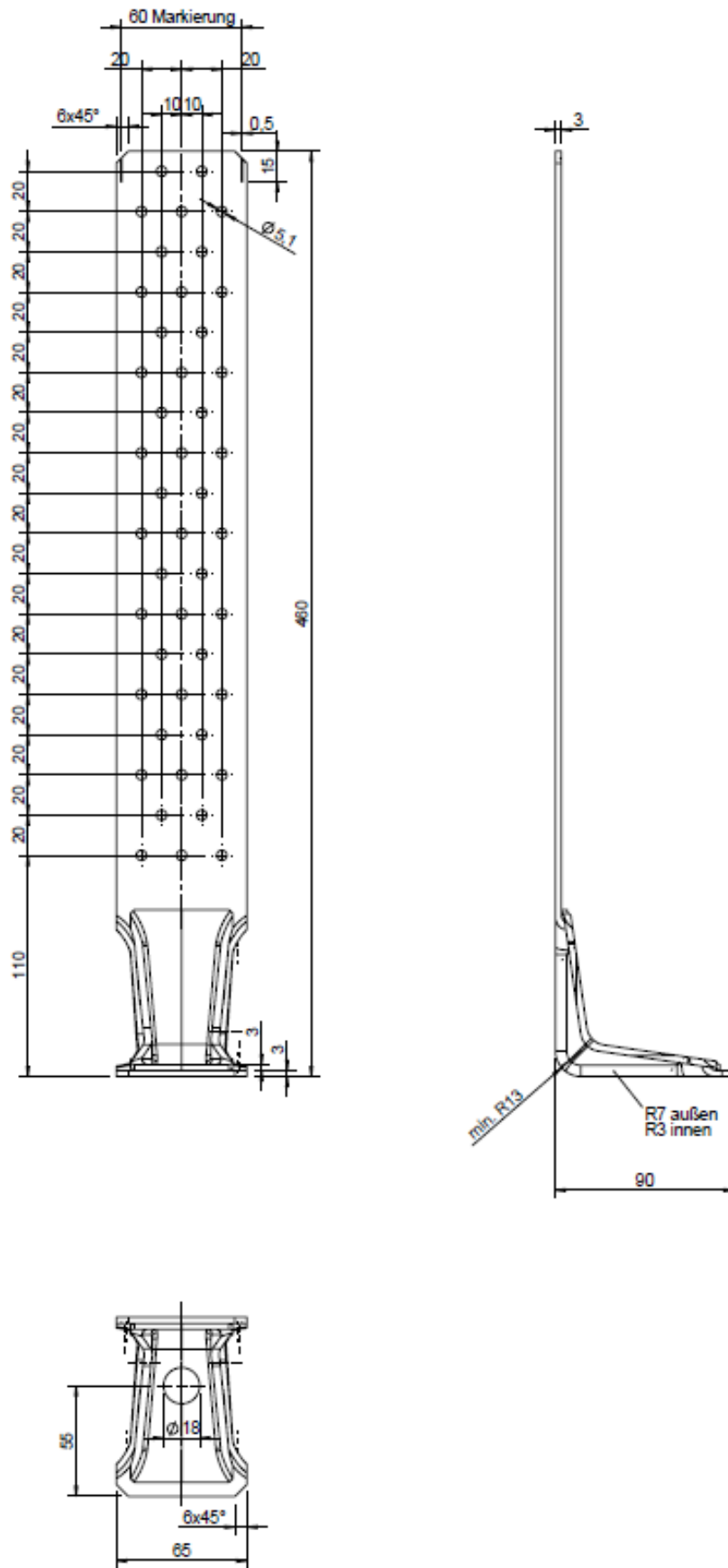


Figure B.1 Dimensions of type KR 460x90x65x3,0

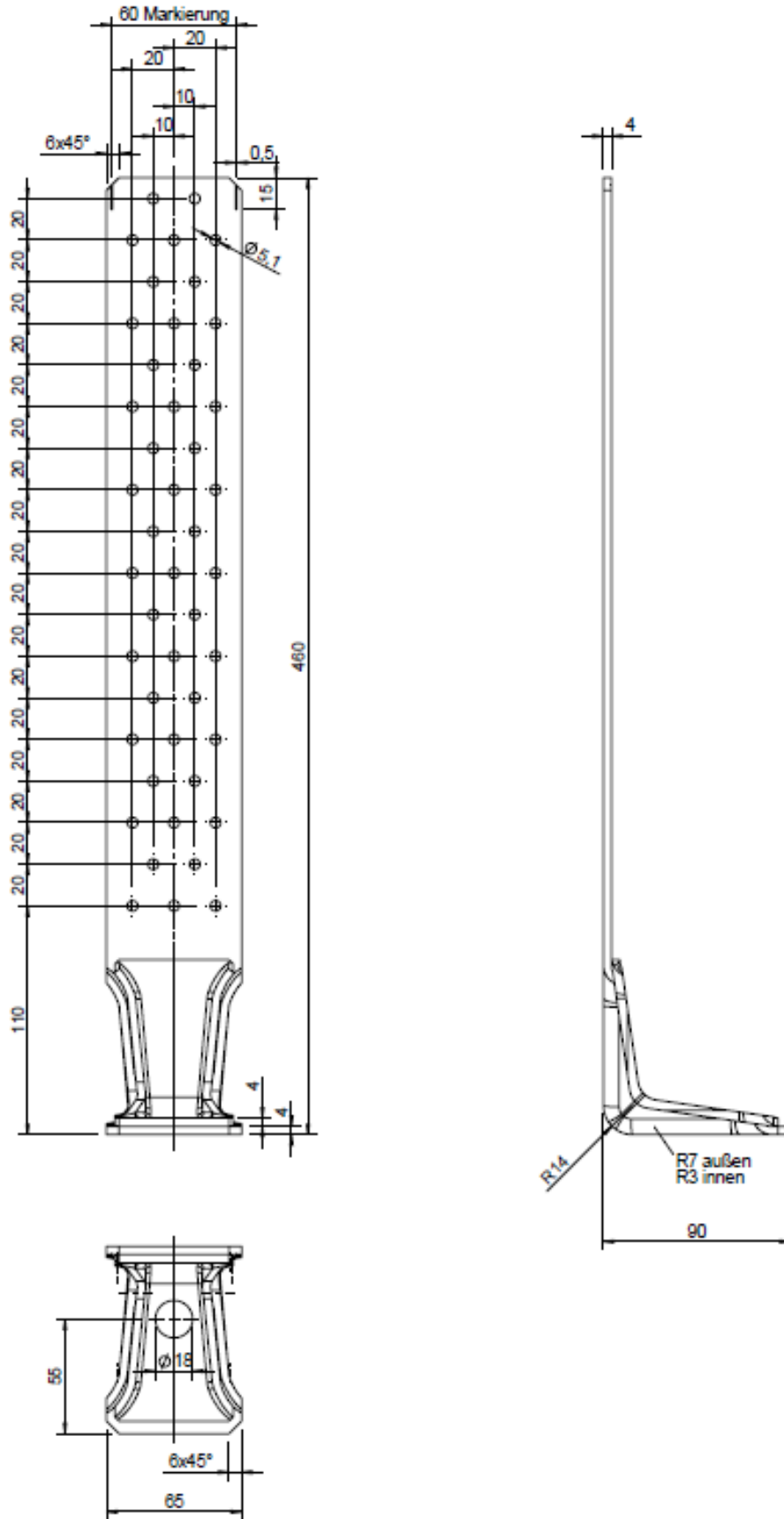


Figure B.2 Dimensions of type KR 460x90x65x4,0

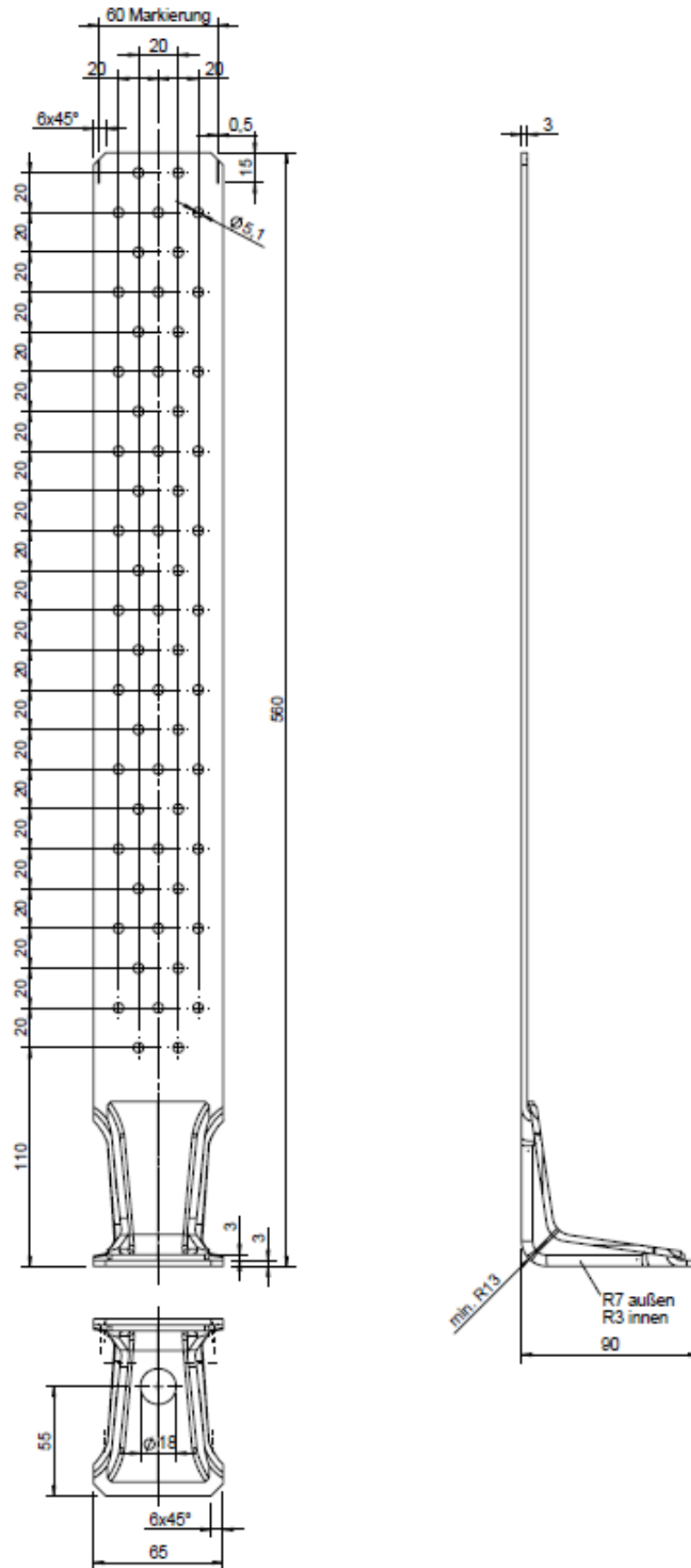


Figure B.3 Dimensions of type KR 560x90x65x3,0

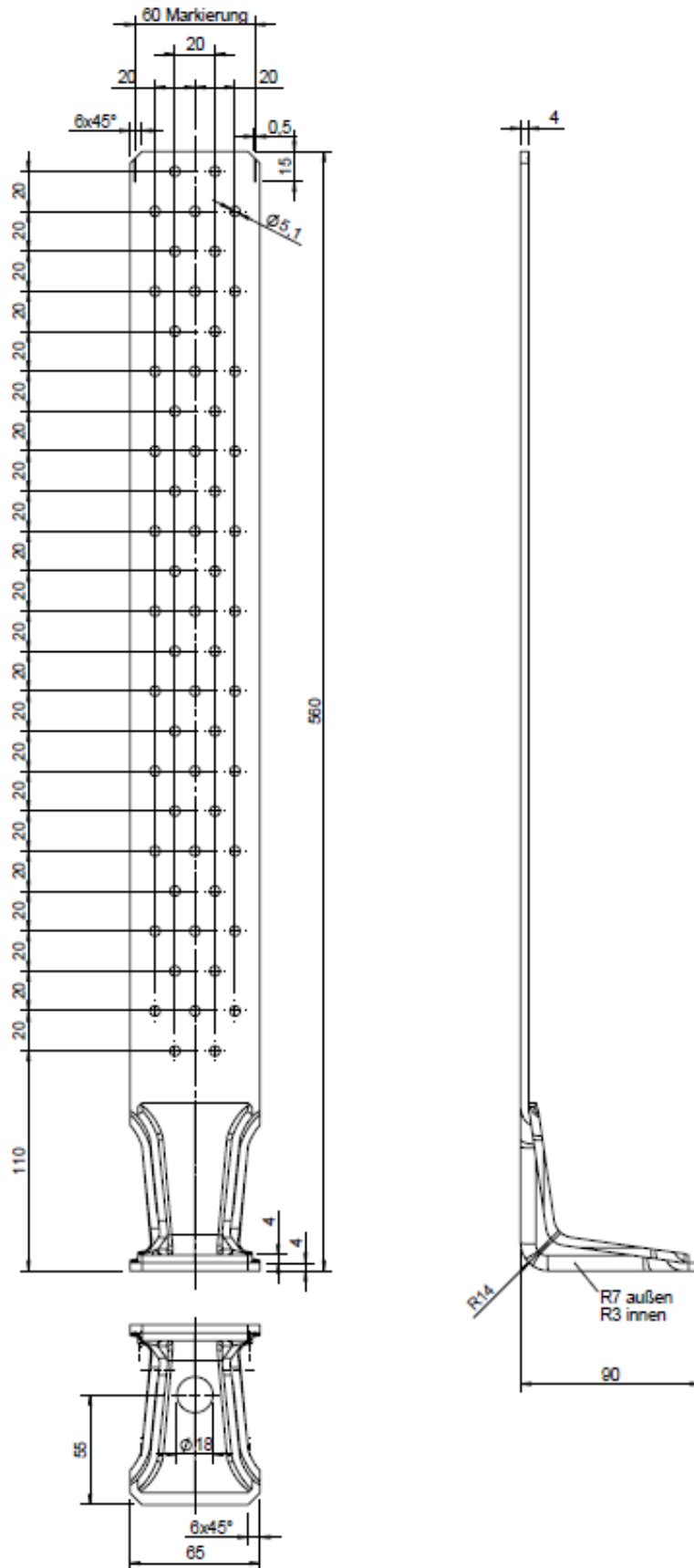


Figure B.4 Dimensions of type KR 560x90x65x4,0

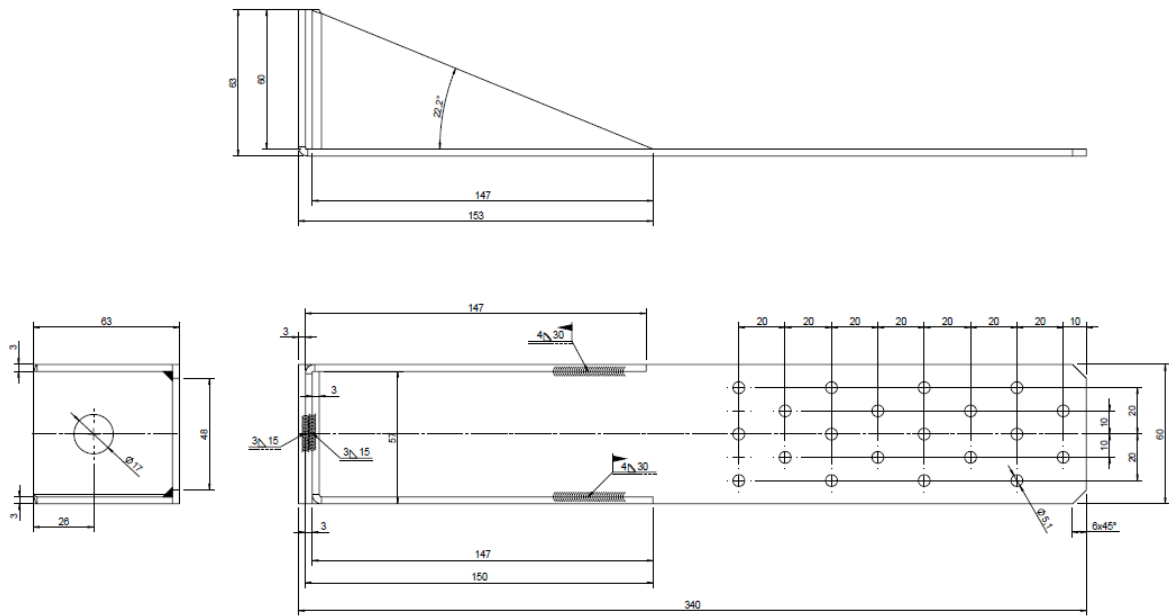


Figure B.5 Dimensions of type R 340x60x60x3,0

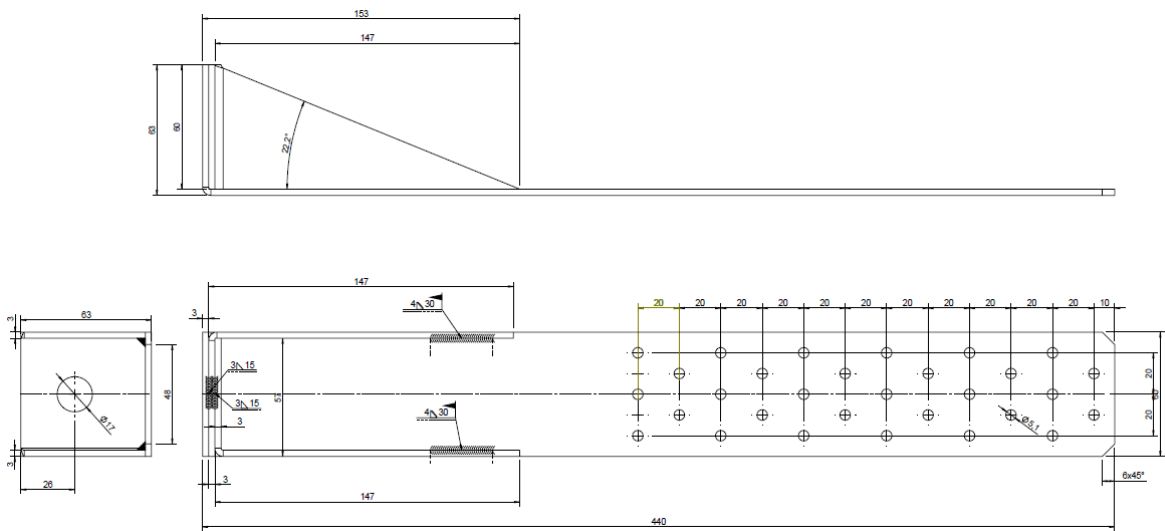


Figure B.6 Dimensions of type R 440x60x60x3,0

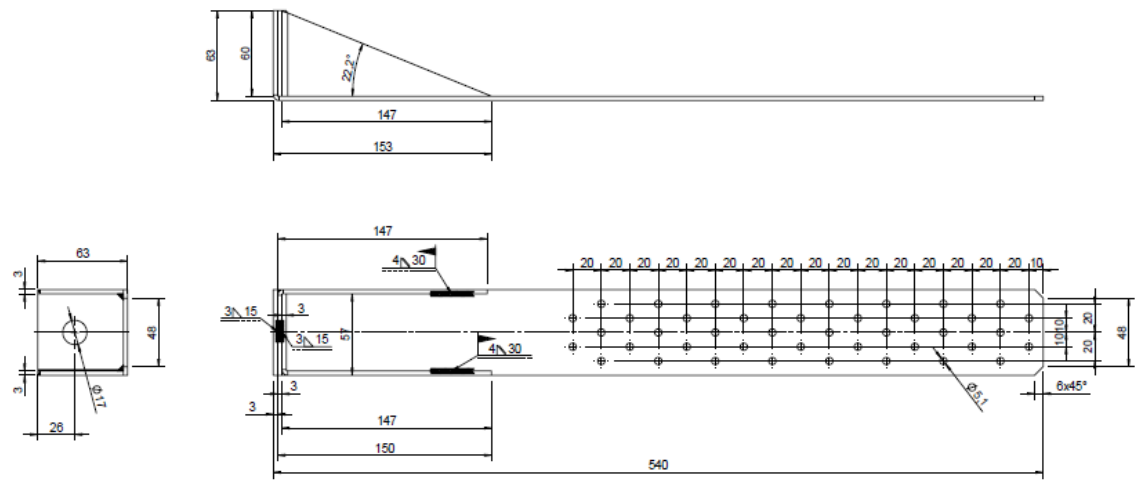


Figure B.7 Dimensions of type R 540x60x60x3,0

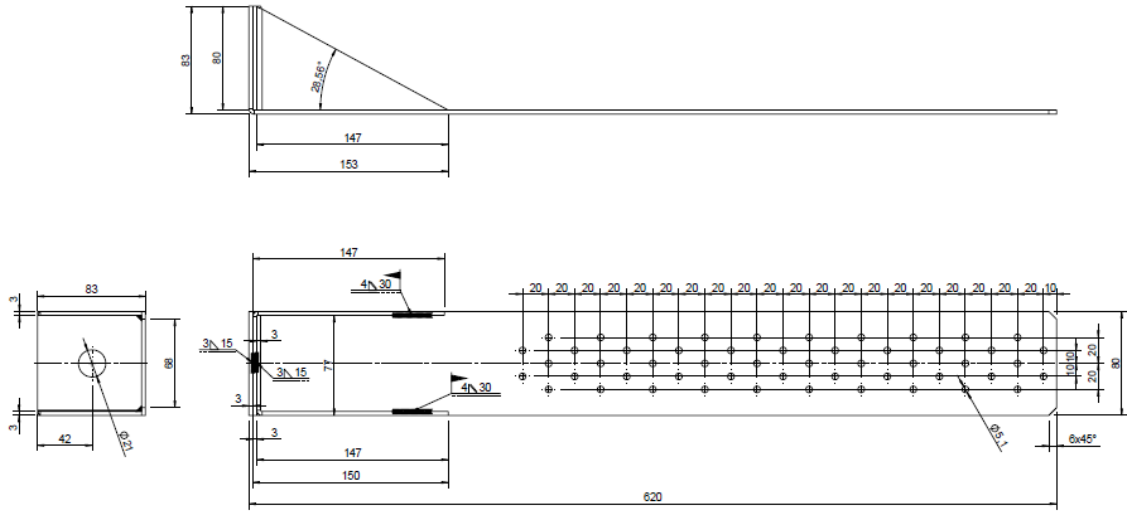


Figure B.8 Dimensions of type R 620x80x80x3,0

59x50x10

79x70x20

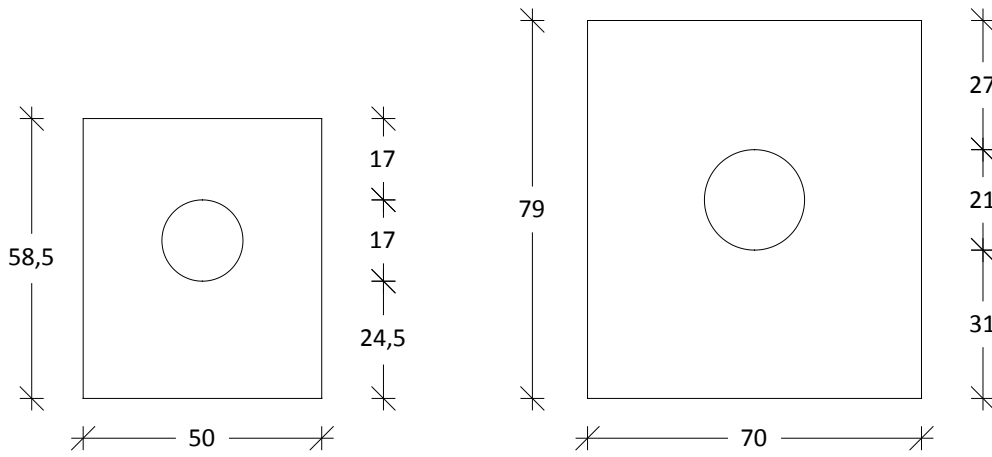


Figure B.9 Dimensions of base plates type R Lx60x60x3,0 (left) and R Lx80x80x3,0 (right)

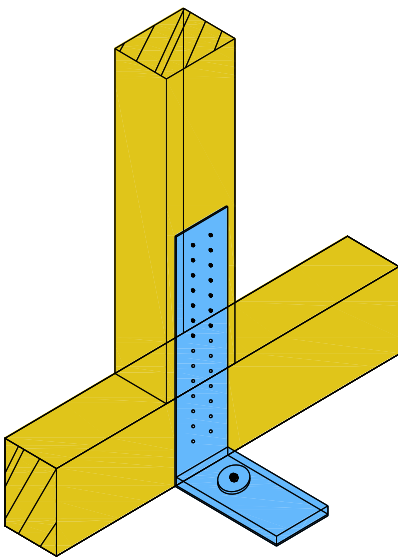


Figure B.10 Typical installation