ETA-Danmark A/S
Kollegievej 6
DK-2920 Charlottenlund
Tel. +45 45 76 20 20
Fax +45 45 76 33 20
Internet www.etadanmark.dk

Authorised and notified according to Article 10 of the 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

MEMBER OF EOTA

European Technical Approval ETA-07/0212

This ETA replaces the previous ETA with the same number and validity from 2012-09-07 to 2015-09-07

Trade name:	SIMA Angle Brackets type V1, V1-1, V1Ø7, V2, V2PL, V2 Stainless, V2Ø7, V3, V4, V4PL, V4 Stainless, V6, V7, V7PL, V10, V12, V13, V14, V15, V21, LV1, P4, P1-8, P1-10, P1-12, P2-10, P2-12, 1-150, K4.
Holder of approval:	Sima Industri ApS Industrivej Nord 40 DK-7490 Aulum Tel. +45 97 47 26 11 Fax +45 97 47 37 11 Internet www.simaindustri.dk
Generic type and use of construction product:	Three-dimensional nailing plate (timber-to-timber/timber-to-concrete angle bracket)
Valid from: to:	2013-06-26 2015-09-07
Manufacturing plant:	Sima Industri ApS Industrivej Nord 40 DK-7490 Aulum
This European Technical Approval contains:	46 pages including 3 annexes which form an integral part of the document

I LEGAL BASIS AND GENERAL CONDITIONS

1 This European Technical Approval is issued by ETA-Danmark A/S 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[1)], as amended by Council Directive 93/68/EEC of 22 July 1993[2)].

- Bekendtgørelse 559 af 27-06-1994 (afløser bekendtgørelse 480 af 25-06-1991) om ikrafttræden af EF direktiv af 21. december 1988 om indbyrdes tilnærmelse af medlemsstaternes love og administrative bestemmelser om byggevarer.

- Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC[3)].

- EOTA Guideline ETAG 015 *Three-dimensional nailing plates,* September 2002 edition.

2 ETA-Danmark A/S 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 ETA-Danmark A/S pursuant to Article 5(1) of Council Directive89/106/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 ETA-Danmark A/S. 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 This European Technical Approval is issued by ETA-Danmark A/S in Danish.
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 N° L40, 11 Feb 1989, p 12.
2) Official Journal of the European Communities N° L220, 30 Aug 1993, p 1.
3) Official Journal of the European Communities N° L 17, 20 Jan 1994, p 34.

II SPECIAL CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

Definition of the product
SIMA Angle Brackets type V1, V1-1, V1Ø7, V2, V2PL, V2 Stainless, V2Ø7, V3, V4, V4PL, V4 Stainless, V6, V7, V7PL, V10, V12, V13, V14, V15, V21, LV1, P4, P1-8, P1-10, P1-12, P2-10, P2-12, 1-150 and K4 are one piece, non-welded angle brackets. They are intended for timber-to-timber, timber-to-concrete or timber-to-steel connections fastened by a range of nails or bolts.

Most of the angle brackets are made from pre-galvanized steel Grade S250GD + min. Z275 according to EN 10346. The angle brackets V2 Stainless and V4 Stainless are made from stainless steel 1.4401 or 1.4404 according to EN 10088 with a minimum characteristic yield stress of 235 MPa or a minimum ultimate tensile strength of 330 MPa. Dimensions, hole positions and typical installations are shown in Annex B.

Additionally, the angle brackets type V2PL can be made from 1,5 mm pre-galvanized steel in grades from Grade S350GD to Grade S500GD + min. Z275 according to EN 10346 and bracket type V4PL can be made from 2,0 mm pre-galvanized steel in grades from Grade S350GD to Grade S500GD + min. Z275 according to EN 10346.

Intended use
The angle brackets are intended for use in making connections in load bearing structures, as a connection between two timber beams or a timber beam and a timber column or between a timber member and a concrete or steel member, where 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.

The connection may be with a single angle bracket or with an angle bracket on each side of the fastened timber member.

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

The wood members can be of solid timber, glued laminated timber and similar glued members, or wood-based structural members with a characteristic density from 290 kg/m^3 to 420 kg/m^3.

This requirement to the material of the wood members can be fulfilled by using the following materials:

- Solid timber classified to C14-C40 according to EN 338 / EN 14081
- Glued members of timber classified to C14-C40 according to EN 338 / EN 14081 when structural adhesives are used.
- Glued laminated timber classified to GL24c or better according to EN 1194 / EN 14080.
- Solid Wood Panels, SWP according to EN 13353.
- Laminated Veneer Lumber LVL according to EN 14374
- Laminated Strand Lumber, e.g. Parallam and Timber Strand
- Plywood according to EN 636
- Oriented Strand Board, OSB according to EN 300

Annex C states the load-carrying capacities of the Angle Bracket connections for a characteristic density of 350 kg/m^3.
For timber or wood based material with a lower characteristic density than 350 kg/m^3 the load-carrying capacities shall be reduced by the k_{dens} factor:

$$k_{dens} = \left(\frac{\rho_k}{350} \right)^2$$

Where ρ_k is the characteristic density of the timber in kg/m^3.

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 nails into the members.

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

The angle brackets can 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.

The angle brackets may also be used for connections between a timber member and a member of concrete, steel or masonry.

Assumed working life
The assumed intended working life of the Angle Brackets for the intended use is 50 years, provided that they are subject to appropriate use and maintenance.

The information on the working life should not be regarded as a guarantee provided by the manufacturer or ETA-Danmark A/S. An “assumed intended working life” means that it is expected that, when this working life has elapsed, the real working life may be, in normal use conditions, considerably longer without major degradation affecting the essential requirements.

2 Characteristics of product and assessment

ETAG para.	Characteristic	Assessment of characteristic
	2.1 Mechanical resistance and stability*)	
6.1.1	Characteristic load-carrying capacity	See Annex C
6.1.2	Stiffness	No performance determined
6.1.3	Ductility in cyclic testing	No performance determined
	2.2 Safety in case of fire	
6.2.1	Reaction to fire	The angle brackets are made from steel classified as **Euroclass A1** in accordance with EN 13501-1 and EC decision 96/603/EC, amended by EC Decision 2000/605/EC
	2.3 Hygiene, health and the environment	
6.3.1	Influence on air quality	No dangerous materials **)
	2.4 Safety in use	Not relevant
	2.5 Protection against noise	Not relevant
	2.6 Energy economy and heat retention	Not relevant
	2.7 Related aspects of serviceability	
6.7.1	Durability	The angle brackets 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 dry internal conditions defined by service class 1, 2 and 3
6.7.2	Serviceability	
6.7.3	Identification	See Annex B

*) See page 5 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 EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

Safety principles and partial factors

The characteristic load-carrying capacities have been calculated without considering different ratios between the partial factors for timber connections and steel cross sections. Therefore, in the end use calculation based on this ETA, this shall be considered.

The values in annex C have been determined by multiplying the calculated resistance of the connection by k_{mod} to consider load duration and service classes in accordance with EC 5.

2.1 Mechanical resistance and stability

See annex C for characteristic load-carrying capacity in the different directions F_1 to $F_{5.}$

The characteristic capacities of the angle brackets 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.

Connector nails in accordance to ETA-09/0273
The load bearing capacities of the brackets has been determined based on the use of Paslode Connector nails 4,0 x 40 mm and 4,0 × 60 mm in accordance with the ETA-09/0273 for the nails. The fastener can be replaced by fastener mentioned in the ETA-09/0273 with the same or higher performance. The capacity of the connection may not be higher than the load mentioned in this ETA.
The capacity of the nails used in calculation are:

$F_{ax,Rk}$ =0,998kN
$F_{V,Rk}$ =1,885kN

The angle bracket is mounted using one specific nail patterns for each of the load directions.

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.

2.7 Related aspects of serviceability

2.7.1 Corrosion protection in service class 1 and 2.
In accordance with ETAG 015 shall the angle bracket have a zinc coating weight of Z275. The steel employed is S250GD with Z275, S350GD with Z275 or S500GD with Z275, both according to EN 10346.

2.7.2 Corrosion protection in service class 3.
In accordance with Eurocode 5 the angle brackets are made from stainless steel 1.4401 and/or 1.4404 according to EN 10088 and the nails or bolts shall be produced from stainless steel. Products which are hot dipped galvanized according to EN ISO 1461 with a zinc coating thickness of approximately 55 µm are intended for use in service class 1,2 and 3 according to EN 1995 (Eurocode 5).

3 Attestation of Conformity and CE marking

3.1 Attestation of Conformity system

The system of attestation of conformity is 2+ described in Council Directive 89/106/EEC (Construction Products Directive) Annex III.

a) Tasks for the manufacturer:

(1) Factory production control,
(2) 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

3.2 Responsibilities

3.2.1 Tasks of the manufacturer

3.2.1.1 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 Approval.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the control plan[1]. 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 and zinc coating thickness.

The manufactured components are checked visually and for dimensions.

The control plan, which is part of the technical documentation of this European Technical Approval, includes details of the extent, nature and frequency of testing and controls to be performed within the factory production control and has been agreed between the approval holder and ETA-Danmark A/S.

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 A/S on request

3.2.1.1 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 Approval 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 A/S and the notified body

3.2.2. Tasks of notified bodies

3.2.2.1 Initial inspection of the factory and the factory production control

The approved body should ascertain that, in accordance with the control plan, the factory, in particular the staff and equipment, and the factory production control, are suitable to ensure a continuous and orderly manufacturing of the angle brackets with the specifications given in part 2.

3.2.2.2 Continuous surveillance

The approved body shall visit the factory at least once a year for a routine inspection. It shall be verified that the system of factory production control and the specified manufacturing processes are maintained, taking account of the control plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body to ETA-Danmark A/S. Where the provisions of the European Technical

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

Approval and the control plan are no longer fulfilled, the certificate of conformity shall be withdrawn by the approved body.

3.3 CE marking

The CE marking shall be affixed on each packaging of angle brackets. The initials "CE" shall be followed by the identification number of the certification body and shall be accompanied by the following information:

- Name or identifying mark of the manufacturer
- The last two digits of the year in which the marking was affixed (Production year)
- Number of the European Technical Approval
- Name and size of product
- Number of the ETA Guideline
- Number of the EC Certificate of conformity

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

4.1 Manufacturing

The angle brackets are manufactured in accordance with the provisions of the European Technical Approval using the automated manufacturing process as identified during the inspection of the plant by ETA-Danmark A/S and the notified body and laid down in the technical documentation.

4.2 Installation

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

Wane under the flaps of the angle bracket is allowed provided it does not occur under the nails. Wane can reduce the load-bearing capacity of the connection.

A gap between the connector and the timber member is not allowed. However, where the angle bracket is used for a connection between a beam and a column a gap of 5 mm is allowed.

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

4.3 Maintenance and repair

Maintenance is not required during the assumed intended working life.

Should repair prove necessary, it is normal to replace the angle bracket.

Thomas Bruun
Manager, ETA-Danmark

Annex A
Changes from last ETA

Additions and modifications for this ETA	
Pages	**Update**
9	Annex A added
26-46	Formula for F4/F5 directions optimised through the ETA
11,13 and 29,32	V1Ø7 and V2Ø7 added
16,16 and 38,39	V7PL and V10 added
11	Angle V1 added with smaller height
11-23	Colored hole patterns

Additions and modifications for the ETA valid from 2012-09-07 to 2015-09-07	
Pages	**Update**
12,14 and 29-37	V2PL and V4PL edited
23,23 and 44,44	1-150 and K4 added
19,20 and 42-43	V21 and P4 added

Additions and modifications for the ETA valid from 2010-04-09 to 2015-04-09	
Pages	**Update**
12,14 and 29-37	V2PL and V4PL added

Annex B
Product details and definitions

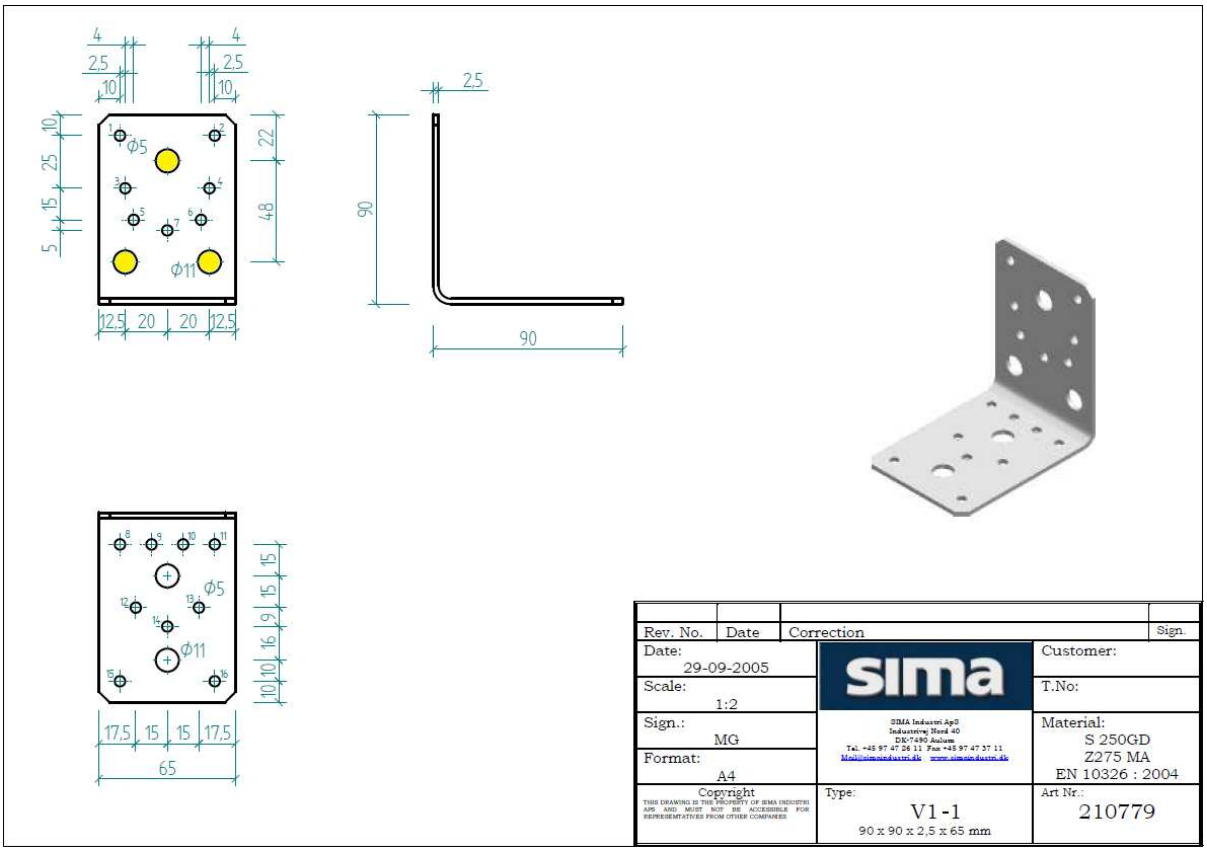
Table A1 Fastener specification

Nail, screw and bolt type	Nail and screw size (mm)		Finish	ETA
	Diameter	Length		
Paslode Connector nail	4,0	40	Electroplated zinc	09/0273
Paslode Connector nail	4,0	60	Electroplated zinc	09/0273
Bolt M8	8		For relevant angle brackets see the assumed characteristic capacities of the bolt connection and compare with the specification of the manufacturer	
Bolt M10	10			
Bolt M12	12			
Hexagon head wood screw	6	40		

Connector specification:

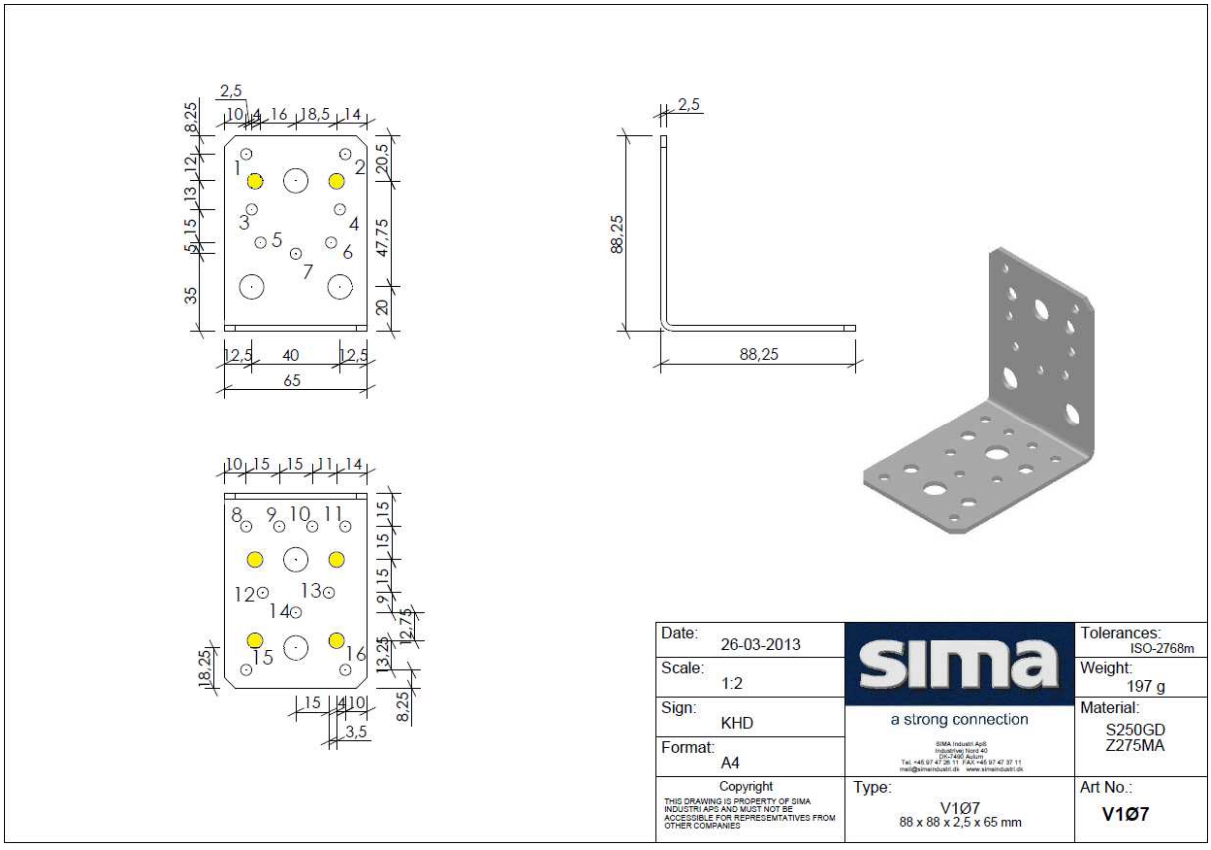
Holes marked blue are used in case of optimal nailing
Holes marked yellow are used in case of bolting
Angle bracket V1-1, V2, V2PL, V3 and V4 and V4PL are marked with numbers referenced from Annex C

V1-1

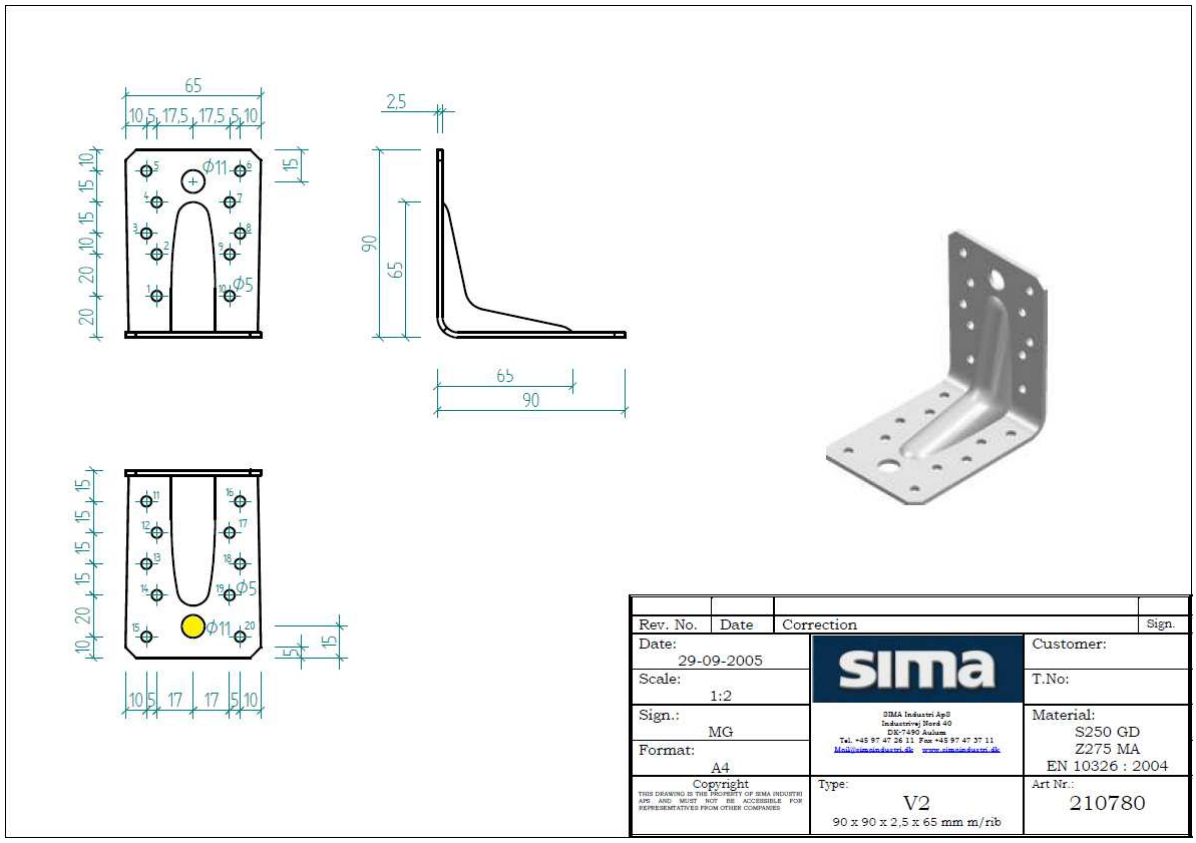


Additionally, the angle brackets type V1-1 can be made in a height of 88,25 mm for each flange named V1. The original will be renamed to V1-1 in a transitional period.

V1Ø7

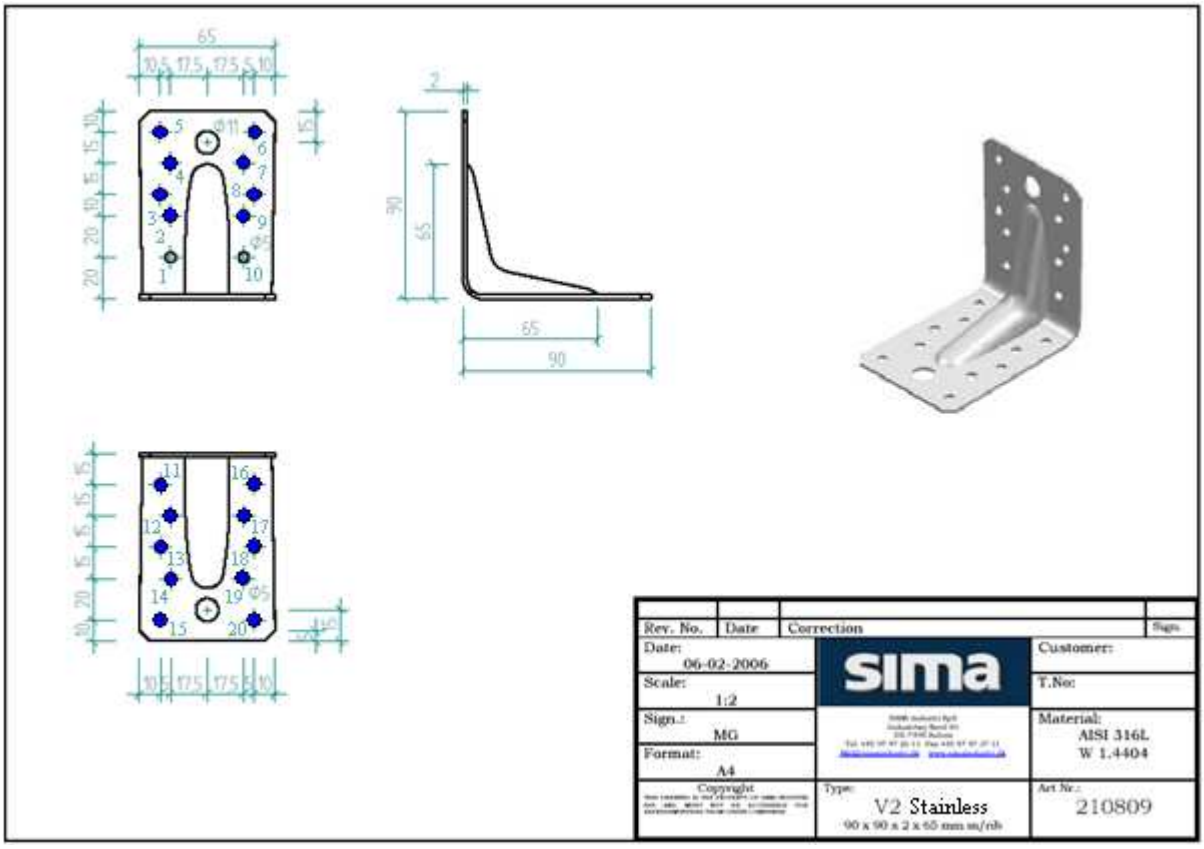


V2

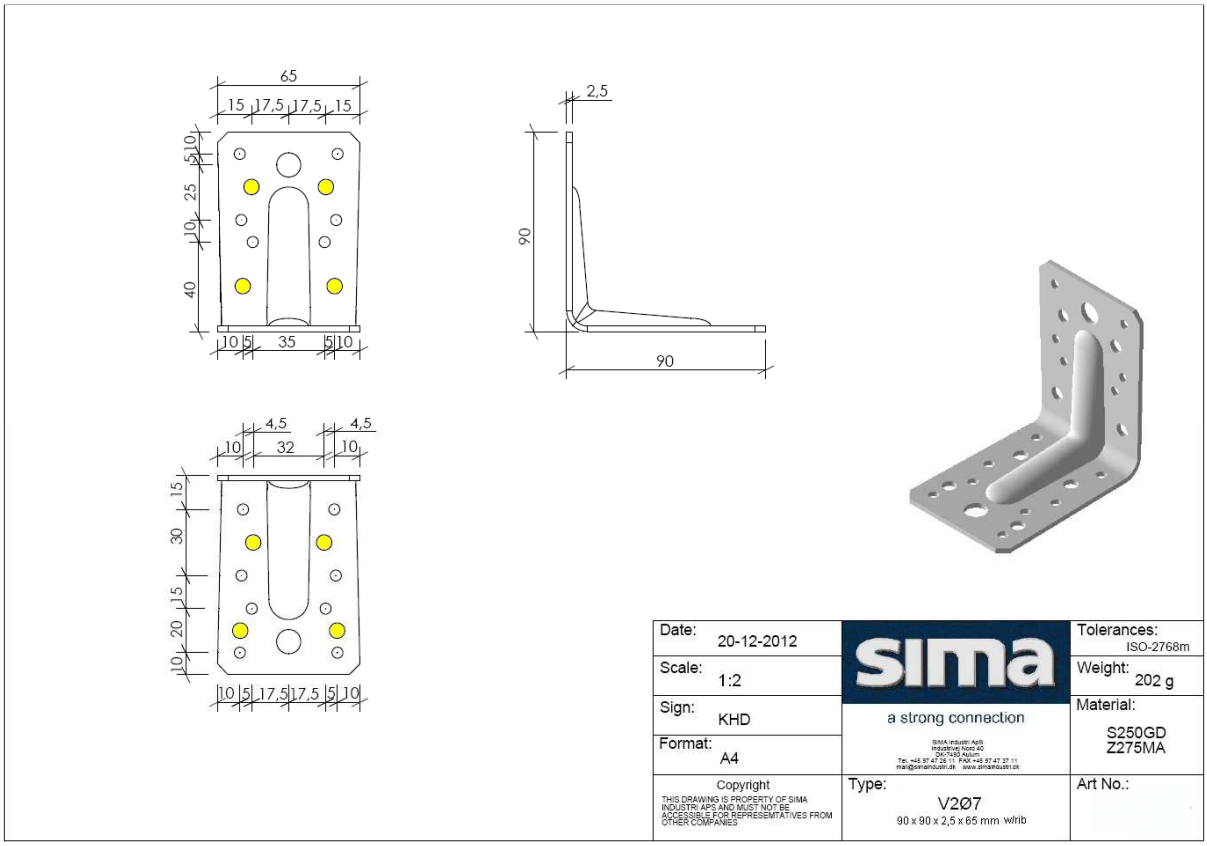


Additionally, the angle brackets type V2 can be made from 1,5 mm pre-galvanized steel in grades from Grade S350GD to Grade S500GD + min. Z275 according to EN 10346 named V2PL

V2 Stainless



V2Ø7



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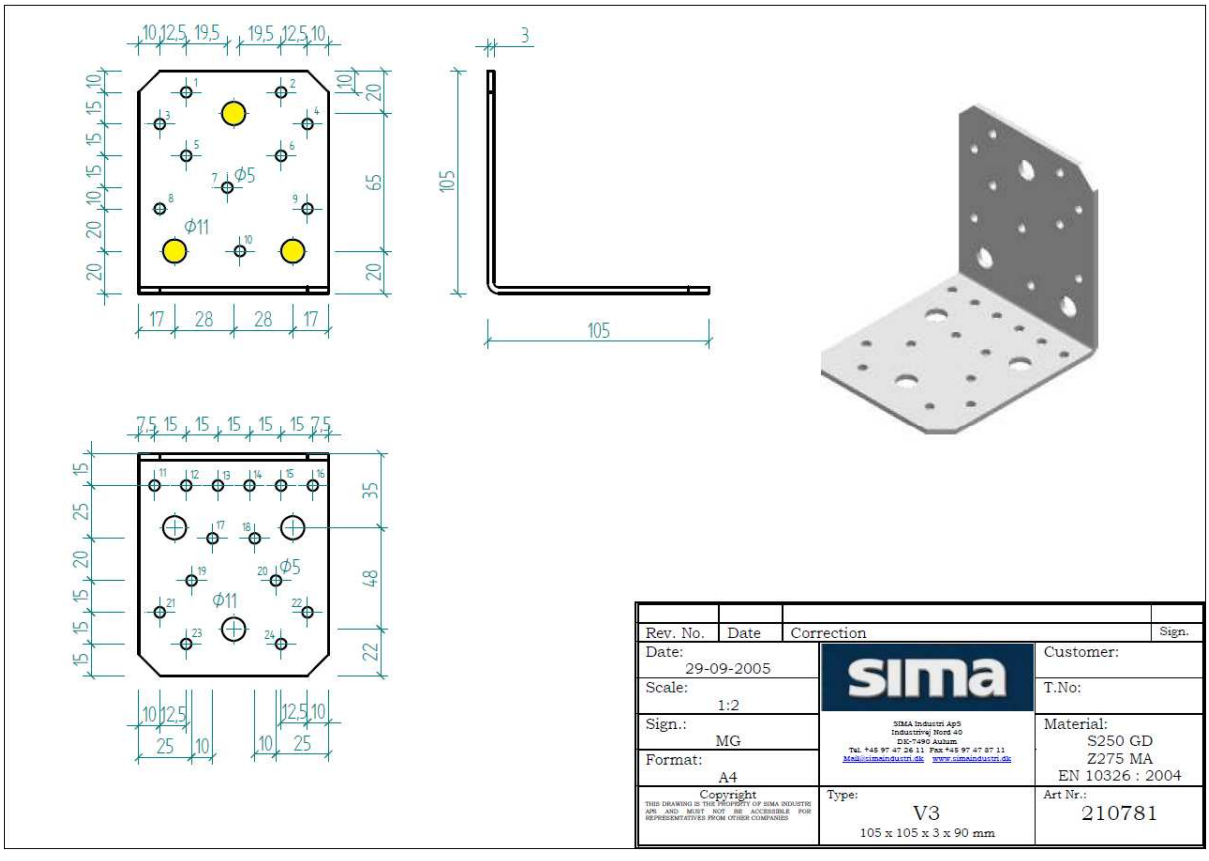
Scale: 1:2		Weight: 202 g
Sign: KHD		Material: S250GD Z275MA
Format: A4		
Copyright THIS DRAWING IS PROPERTY OF SIMA INDUSTRI APS AND MUST NOT BE ACCESSIBLE FOR REPRESENTATIVES FROM OTHER COMPANIES	Type: V2Ø7 90 x 90 x 2,5 x 65 mm w/rib	Art No.:

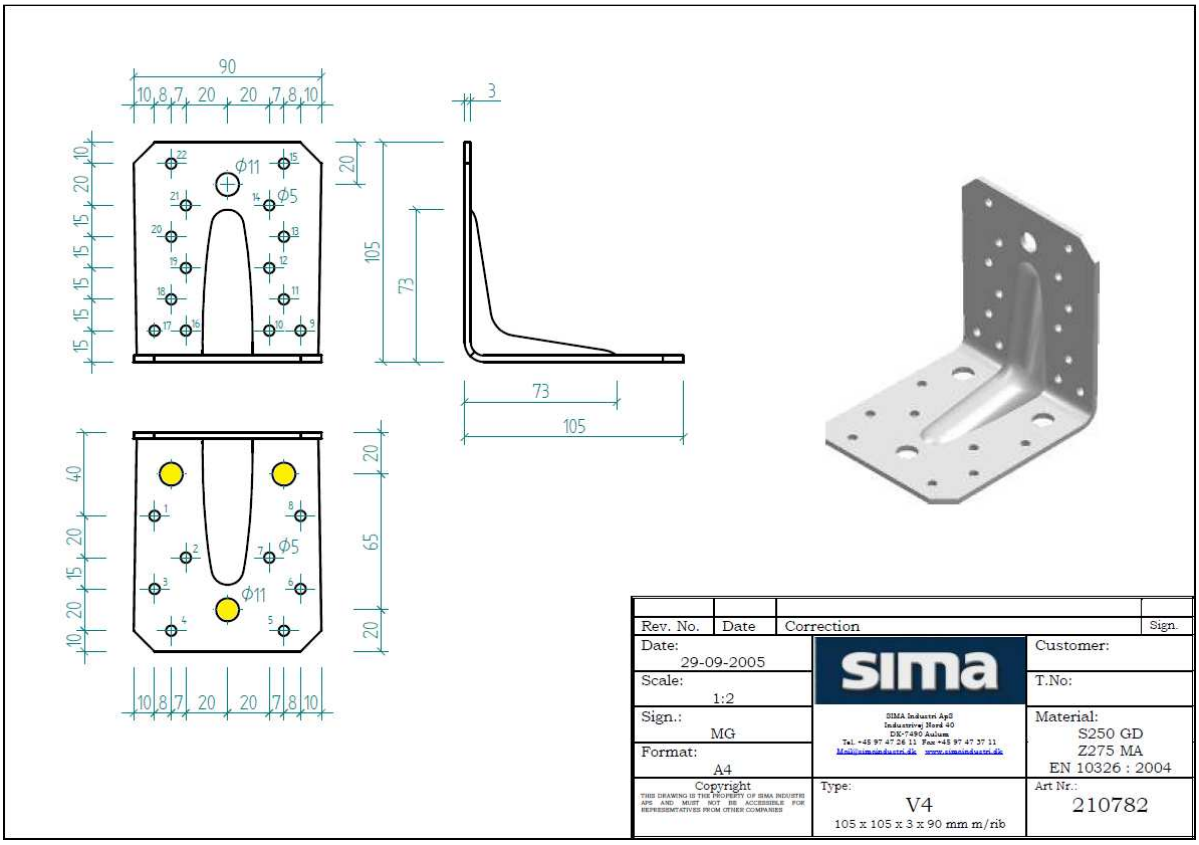
V3



Rev. No.	Date	Correction	Sign.

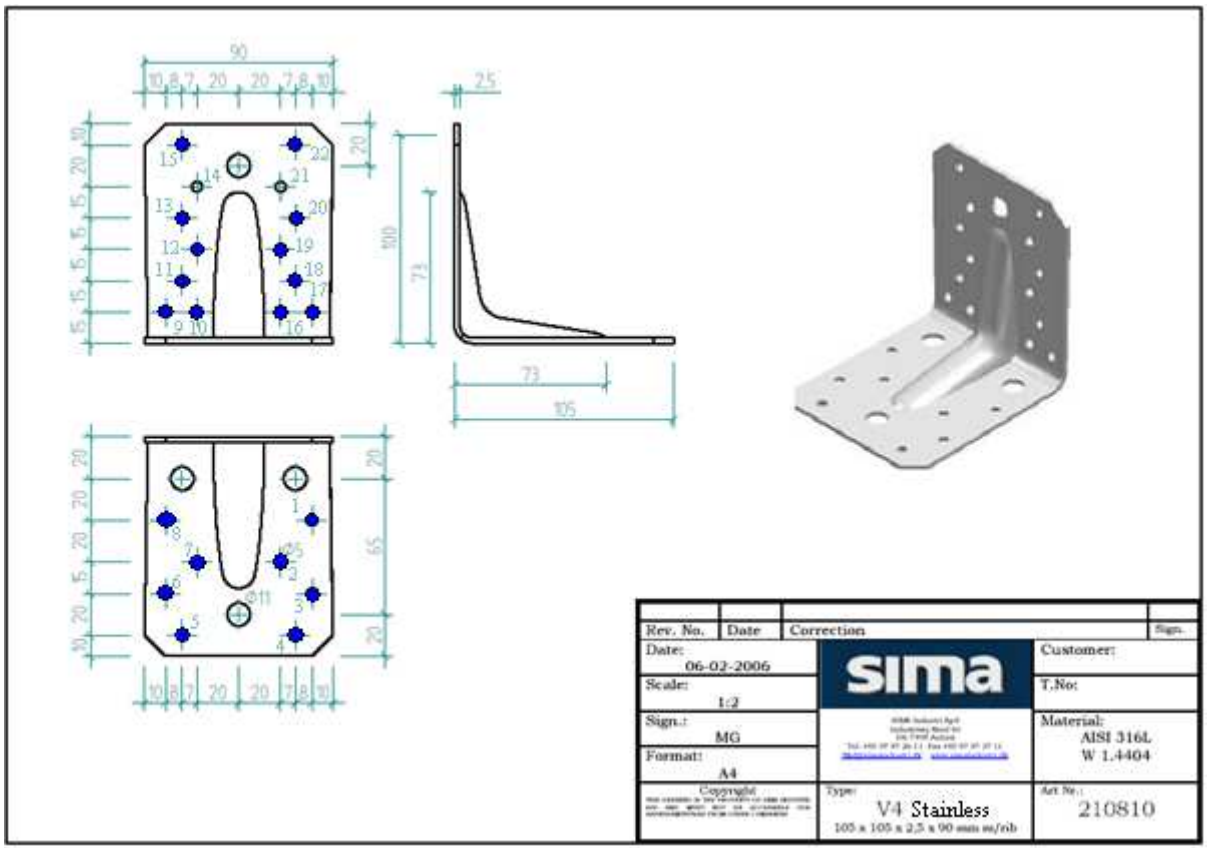
Date: 29-09-2005	SIMA	Customer:
Scale: 1:2		T.No:
Sign.: MG	SIMA Industri ApS Industrivej Nord 40 DK-7490 Aulum Tel. +45 97 47 26 11 Fax +45 97 47 87 11 Mail@simaindustri.dk www.simaindustri.dk	Material: S250 GD Z275 MA EN 10326 : 2004
Format: A4		
Copyright THIS DRAWING IS THE PROPERTY OF SIMA INDUSTRI APS AND MUST NOT BE ACCESSIBLE FOR REPRESENTATIVES FROM OTHER COMPANIES	Type: V3 105 x 105 x 3 x 90 mm	Art Nr.: 210781

V4

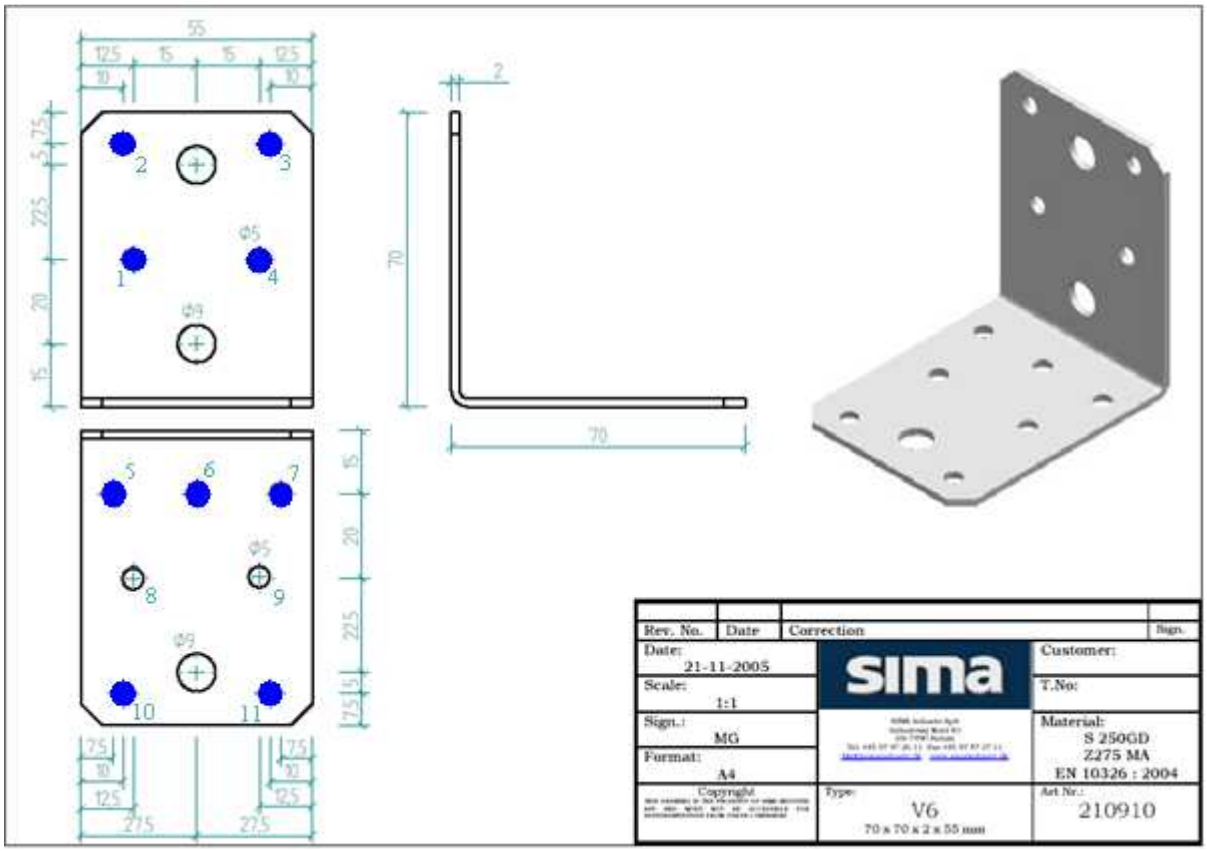


Additionally, the bracket type V4 can be made from 2,0 mm pre-galvanized steel grades from Grade S350GD to Grade S500GD + min. Z275 according to EN 10346 named V4PL

V4 Stainless



V6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V6
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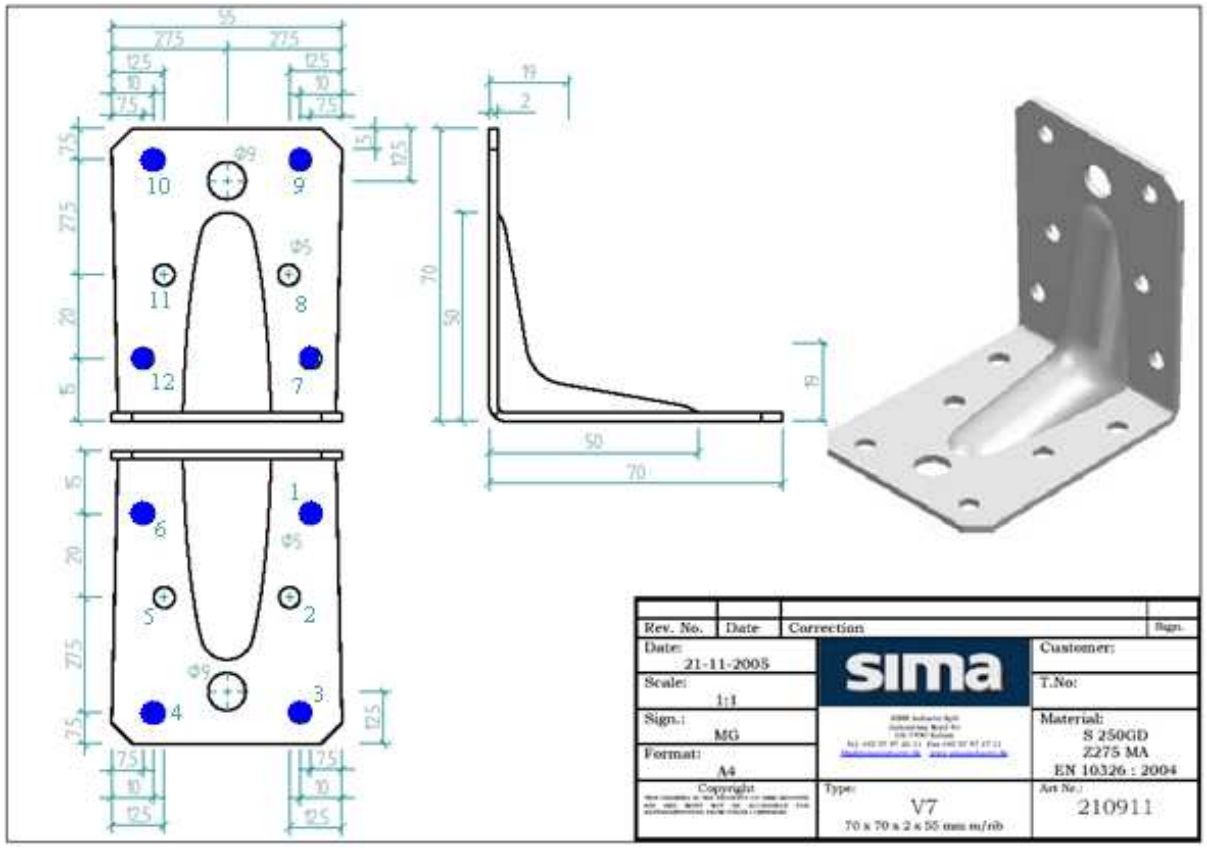
Art Nr.:
210910

V7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Art Nr.:
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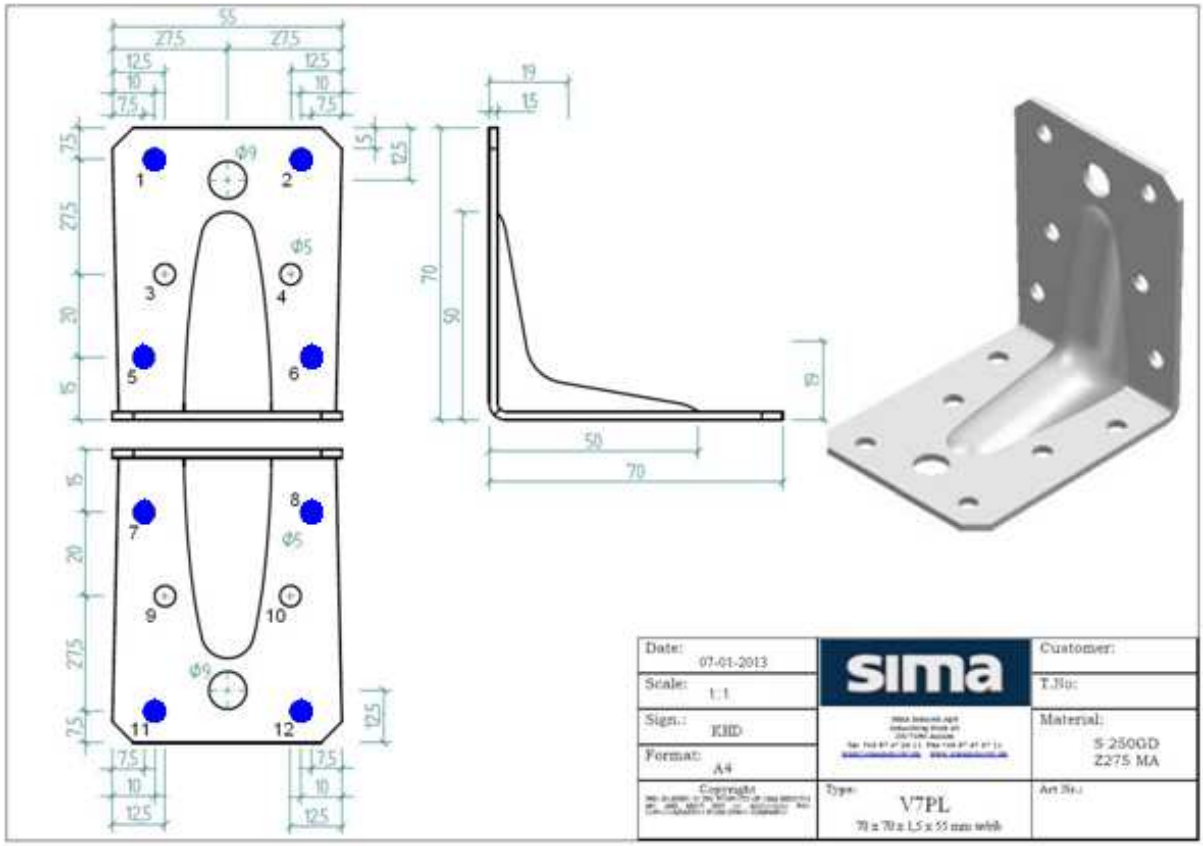
V7PL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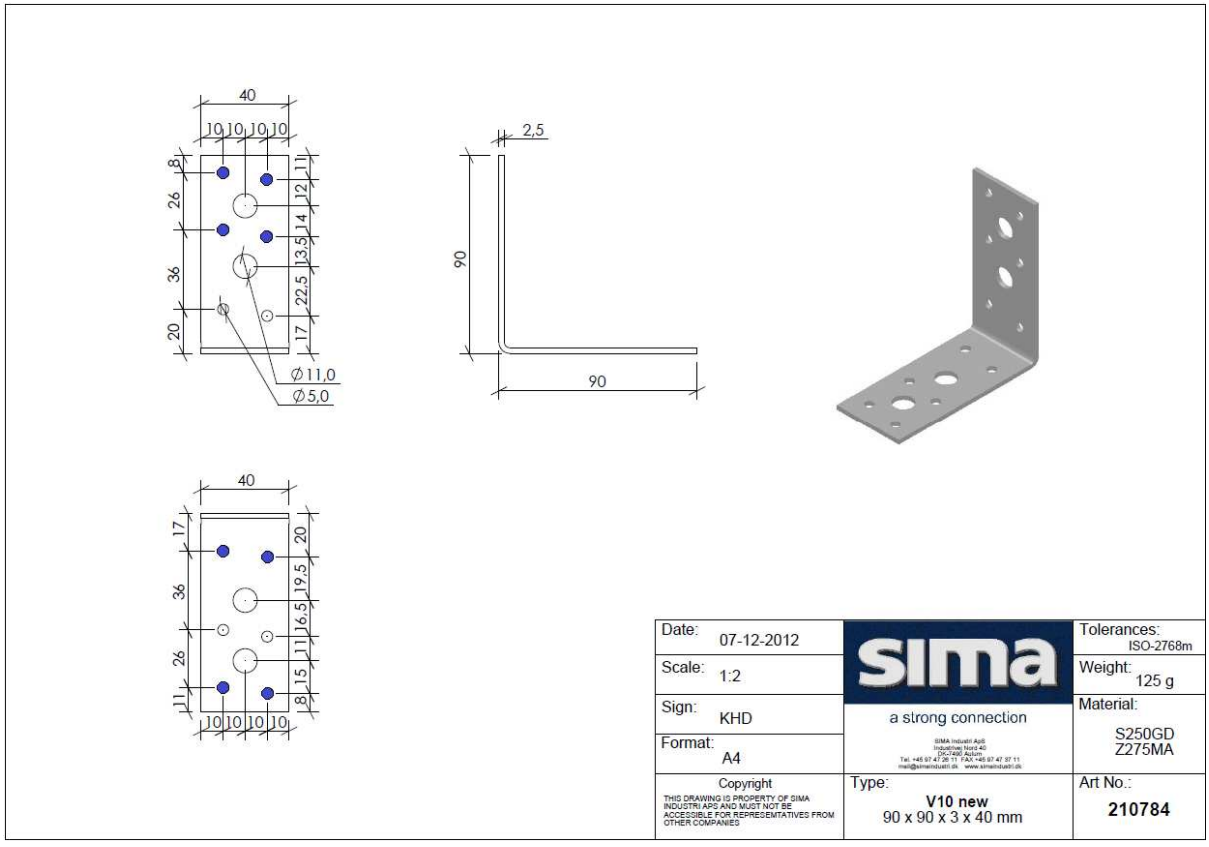
Art No.:

V10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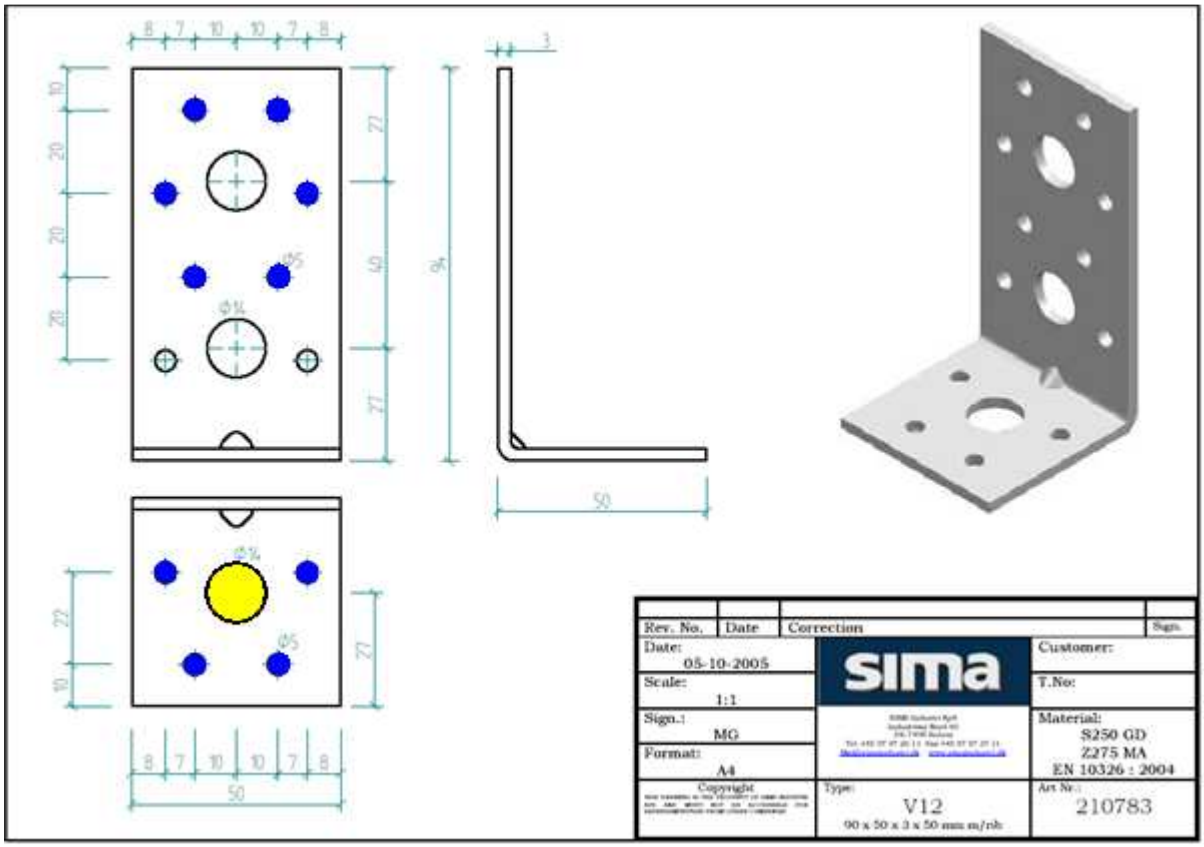
Copyright
THIS DRAWING IS PROPERTY OF SIMA INDUSTRI APS AND MUST NOT BE ACCESSIBLE FOR REPRESENTATIVES FROM OTHER COMPANIES
sima
a strong connection
Tolerances: ISO-2768m
Weight: 125 g
Material: S250GD Z275MA
Type: V10 new 90 x 90 x 3 x 40 mm
Art No.: 210784

V12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Type:
V12
90 x 50 x 3 x 50 mm m/rib
Art Nr.:
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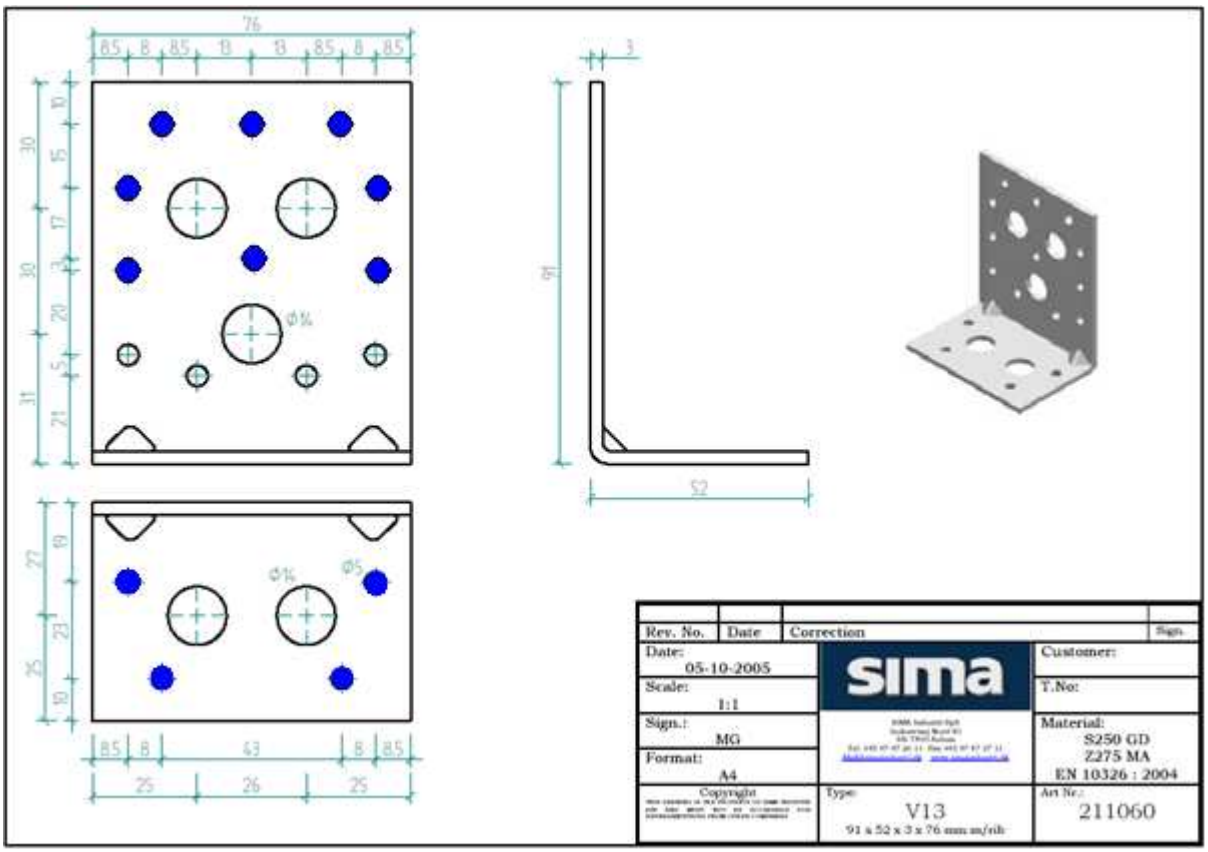
V13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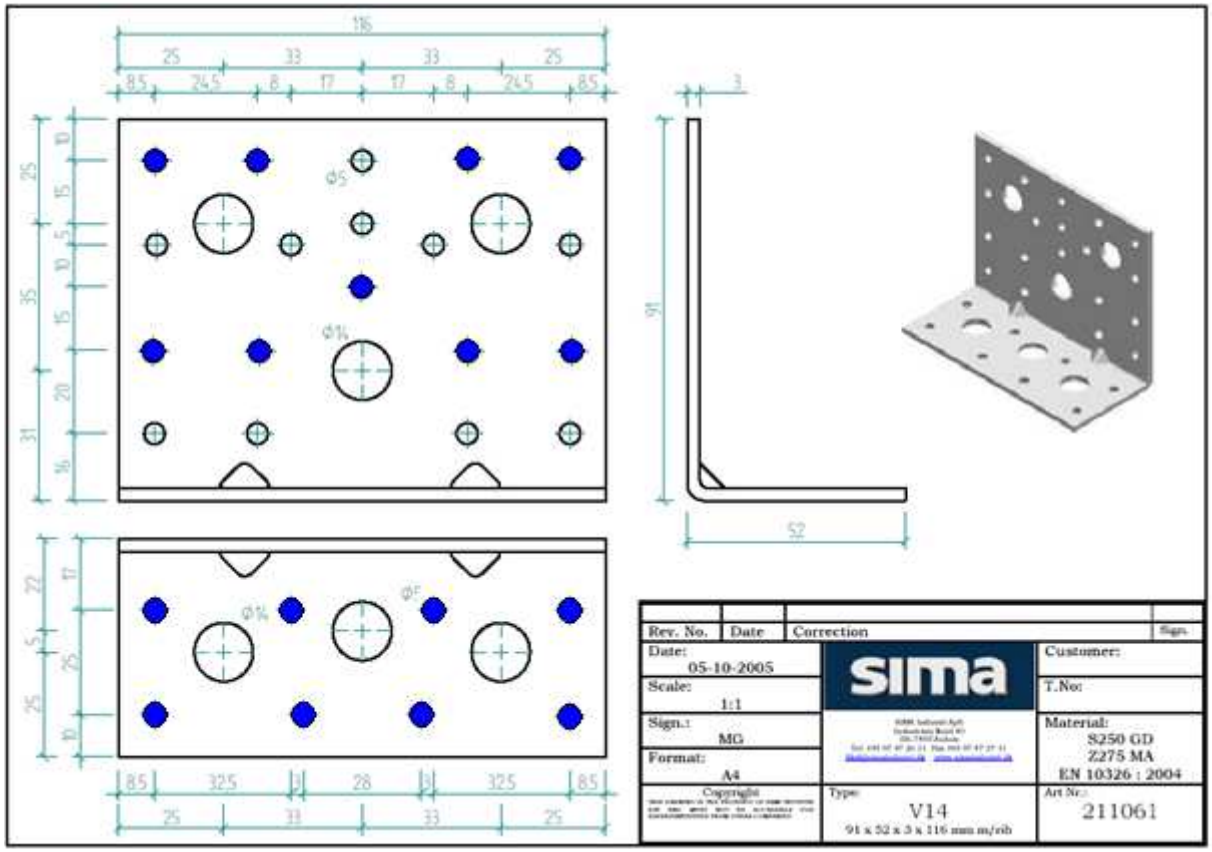
EN 10326 : 2004
Type:
V13
91 x 52 x 3 x 76 mm m/rib
Art Nr.:
211060

V14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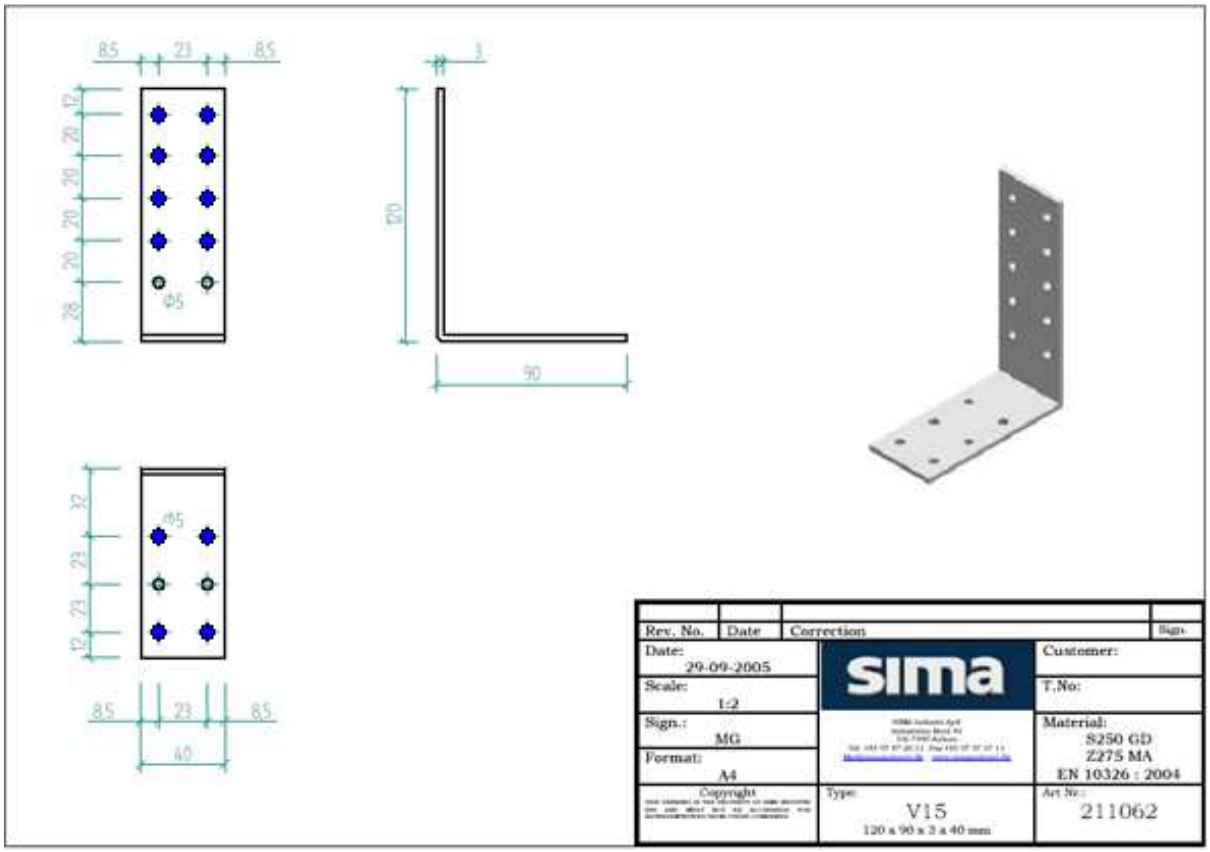
V14
91 x 52 x 3 x 116 mm m/rib
Art No.:
211061

V15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Customer:
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Z275 MA
EN 10326 : 2004
Type:
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Art No.:
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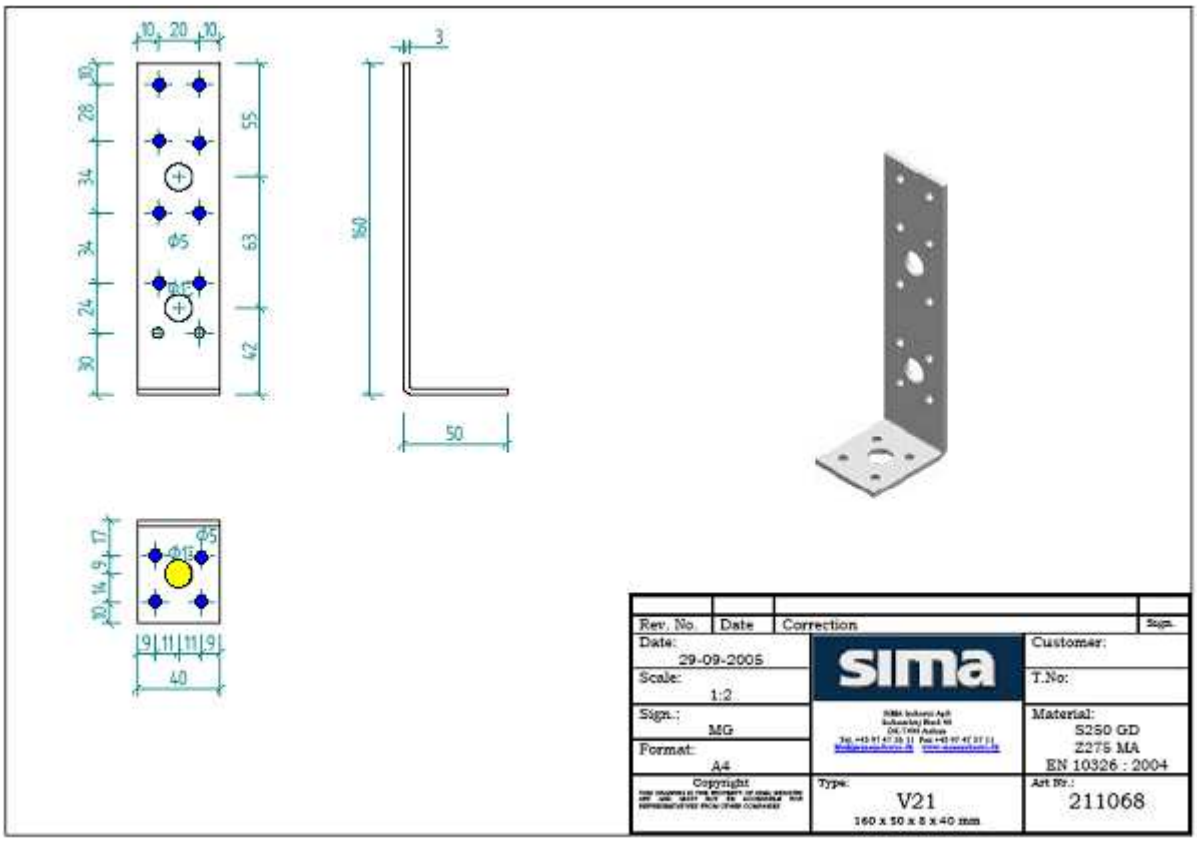
V21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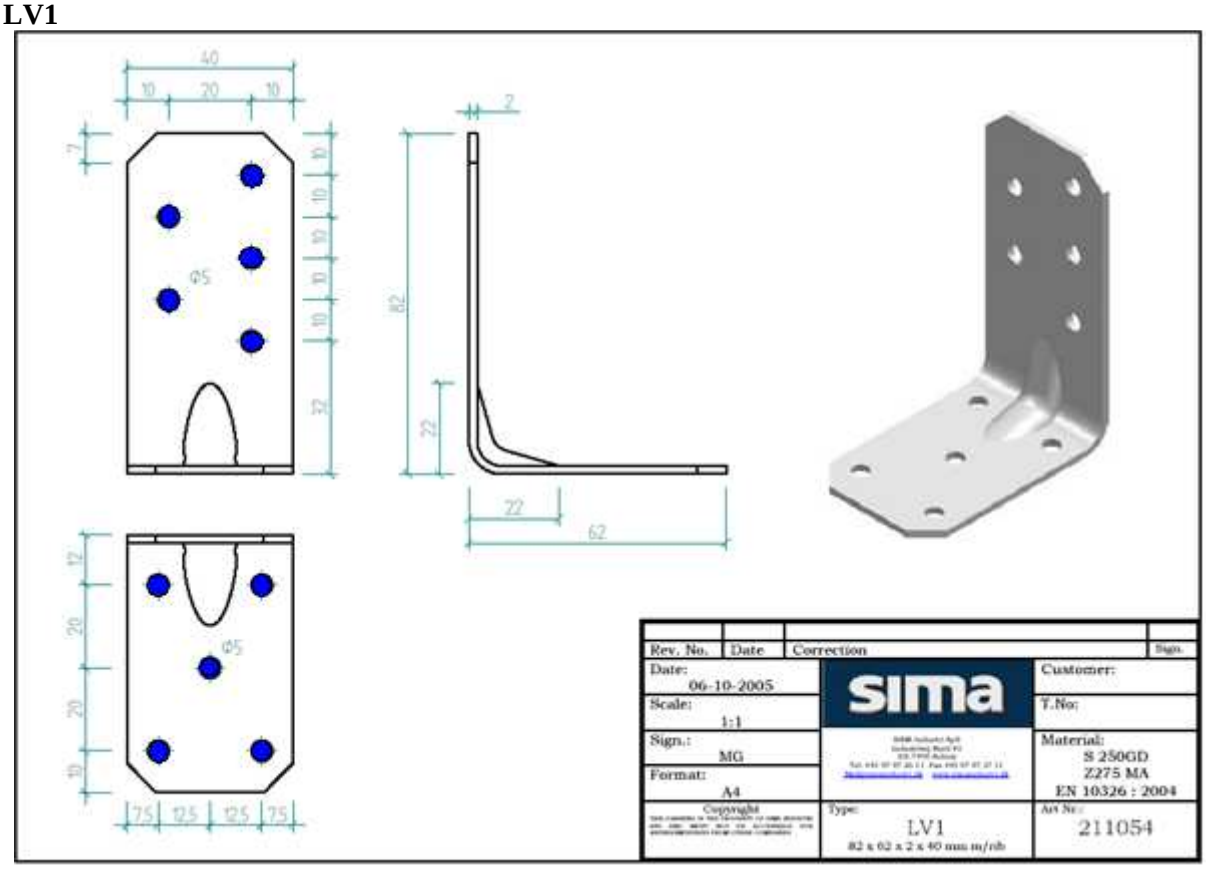
LV1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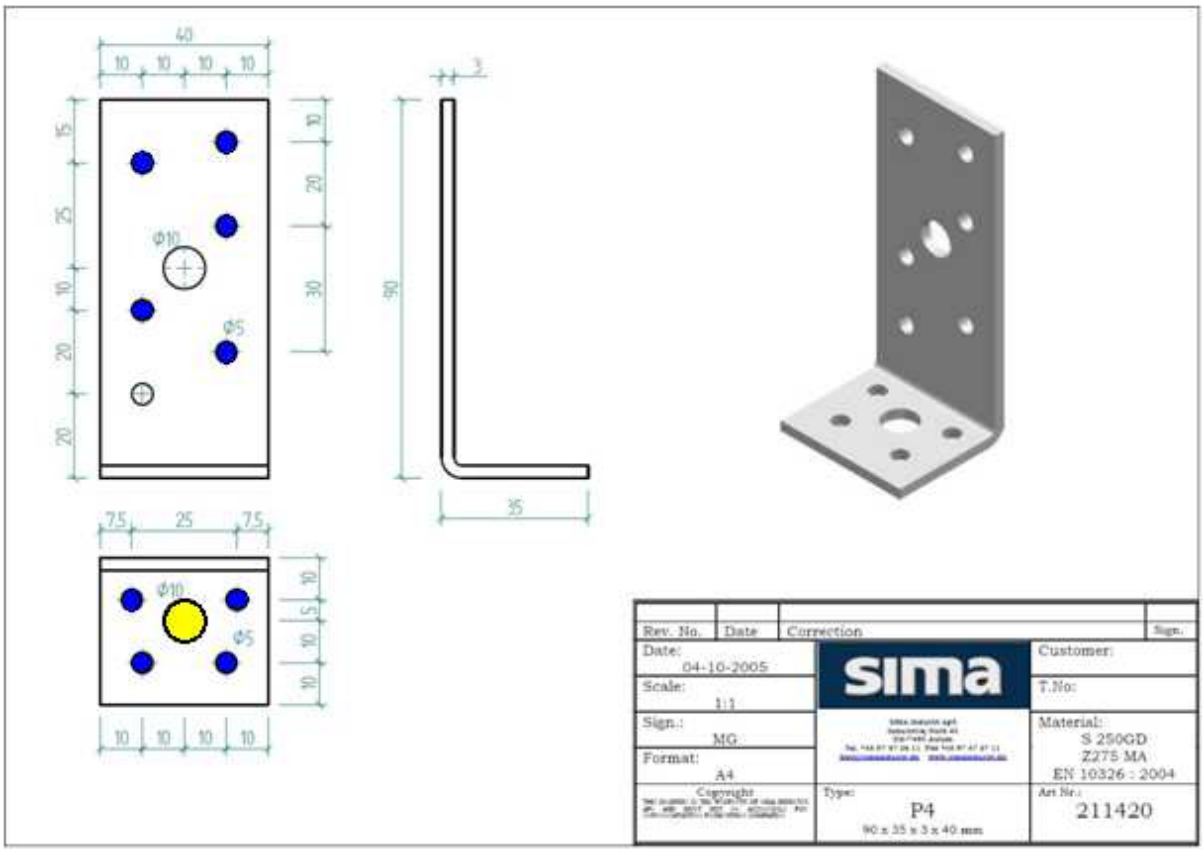
P4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Z275 MA
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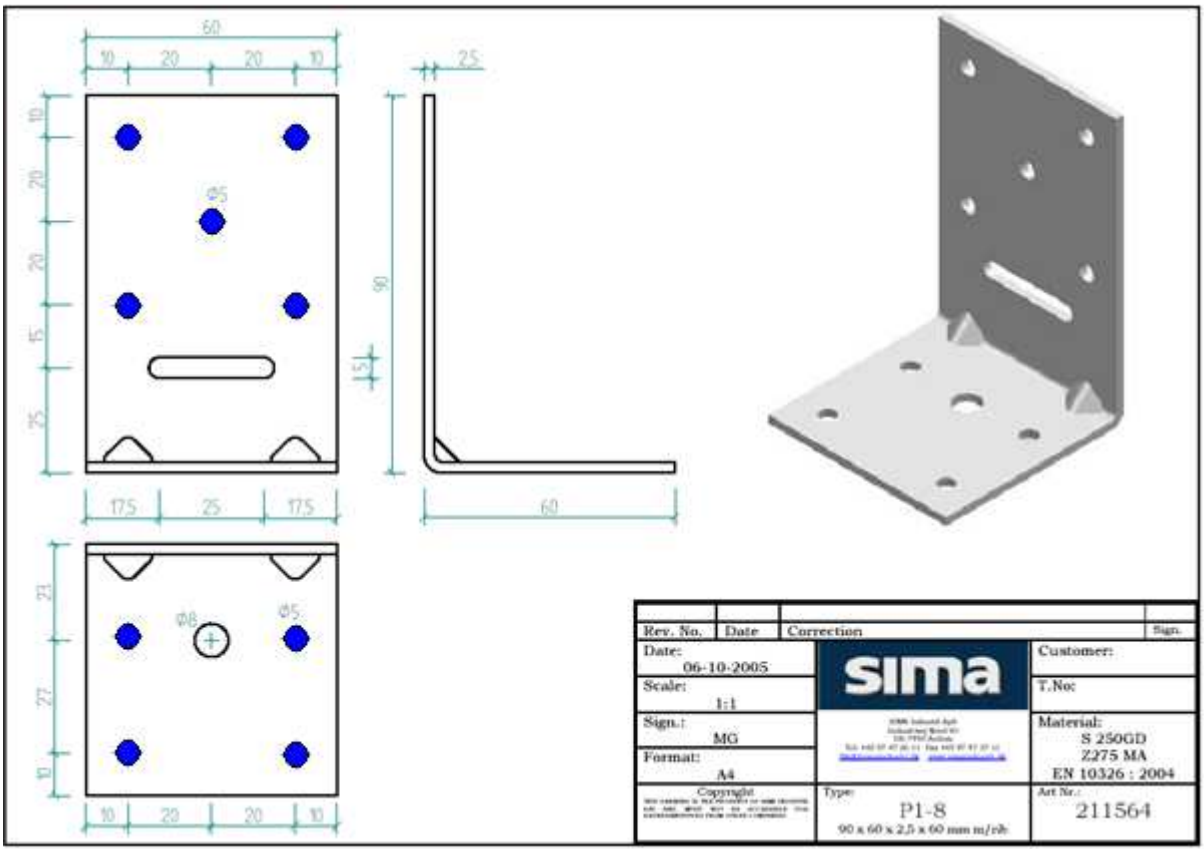
P1-8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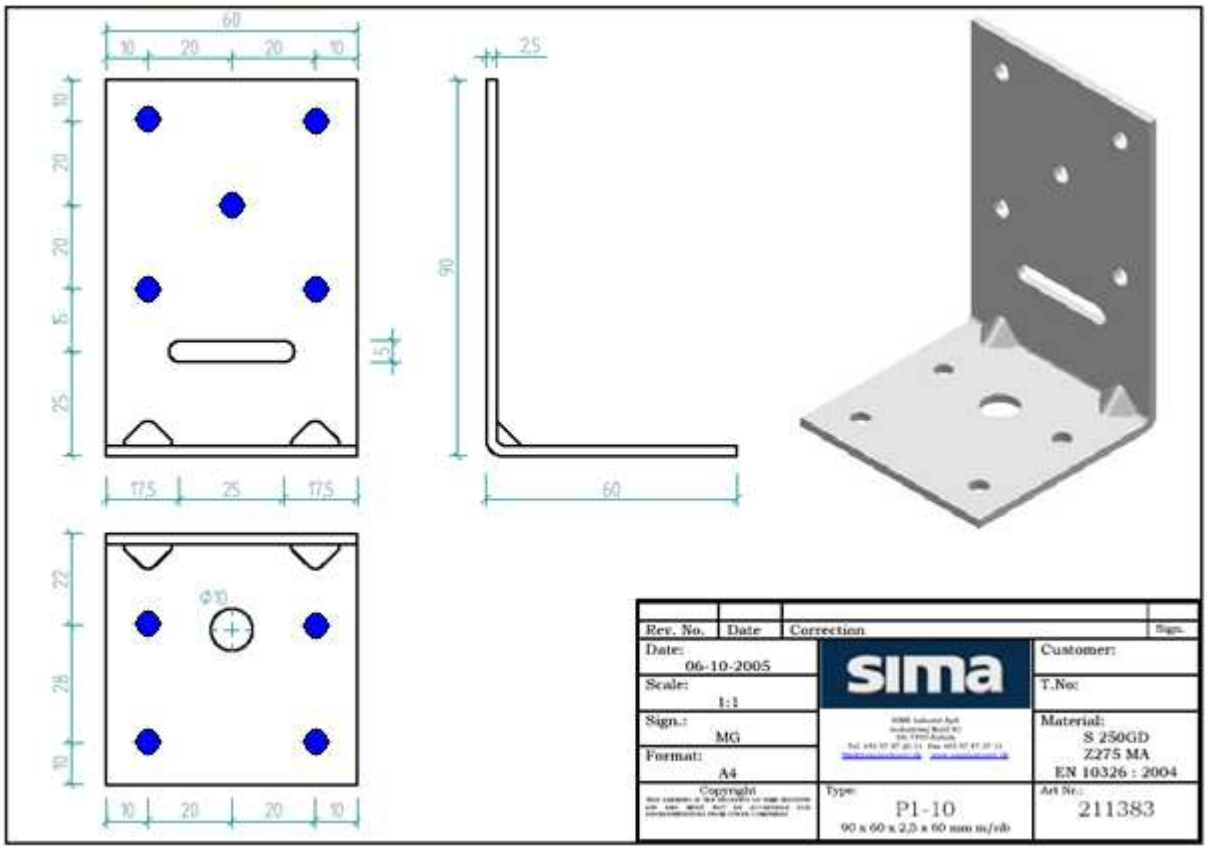
P1-10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Art Nr.: 211383

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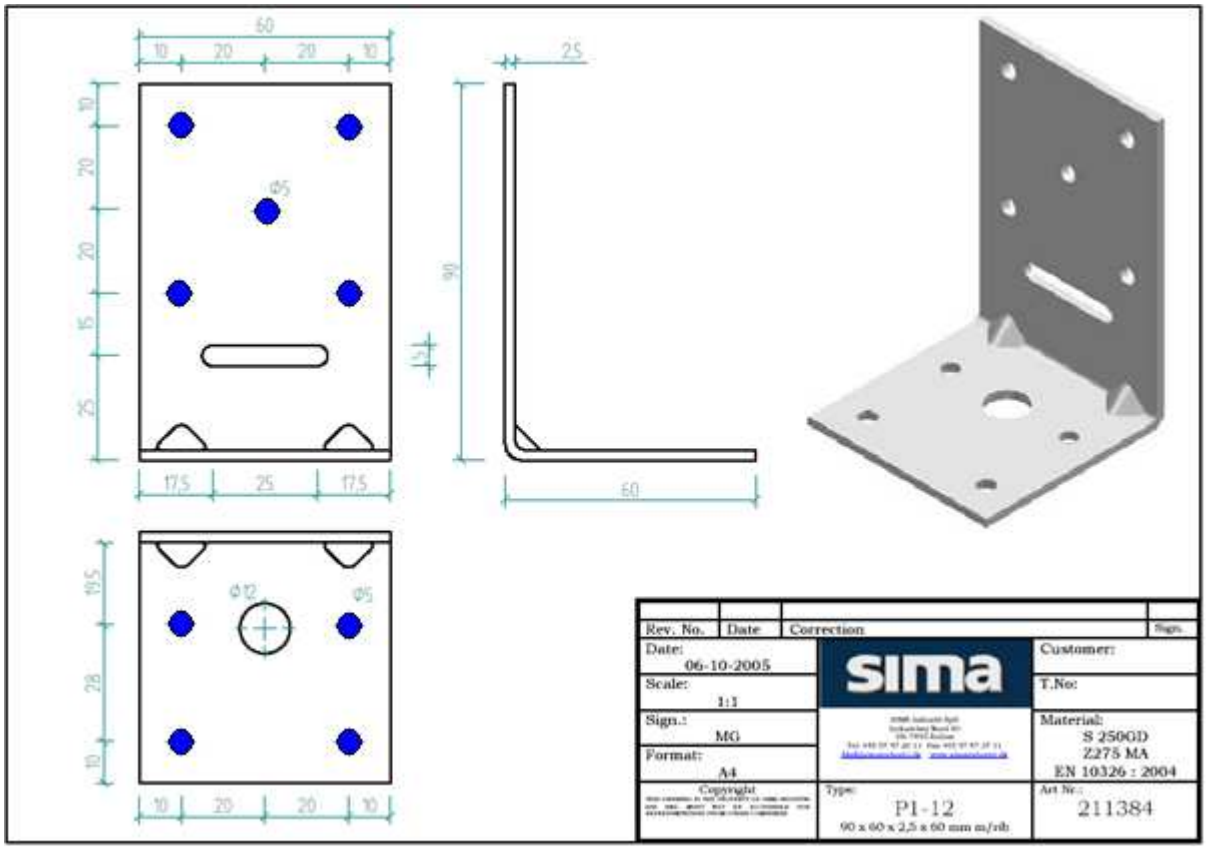
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Type: P1-12
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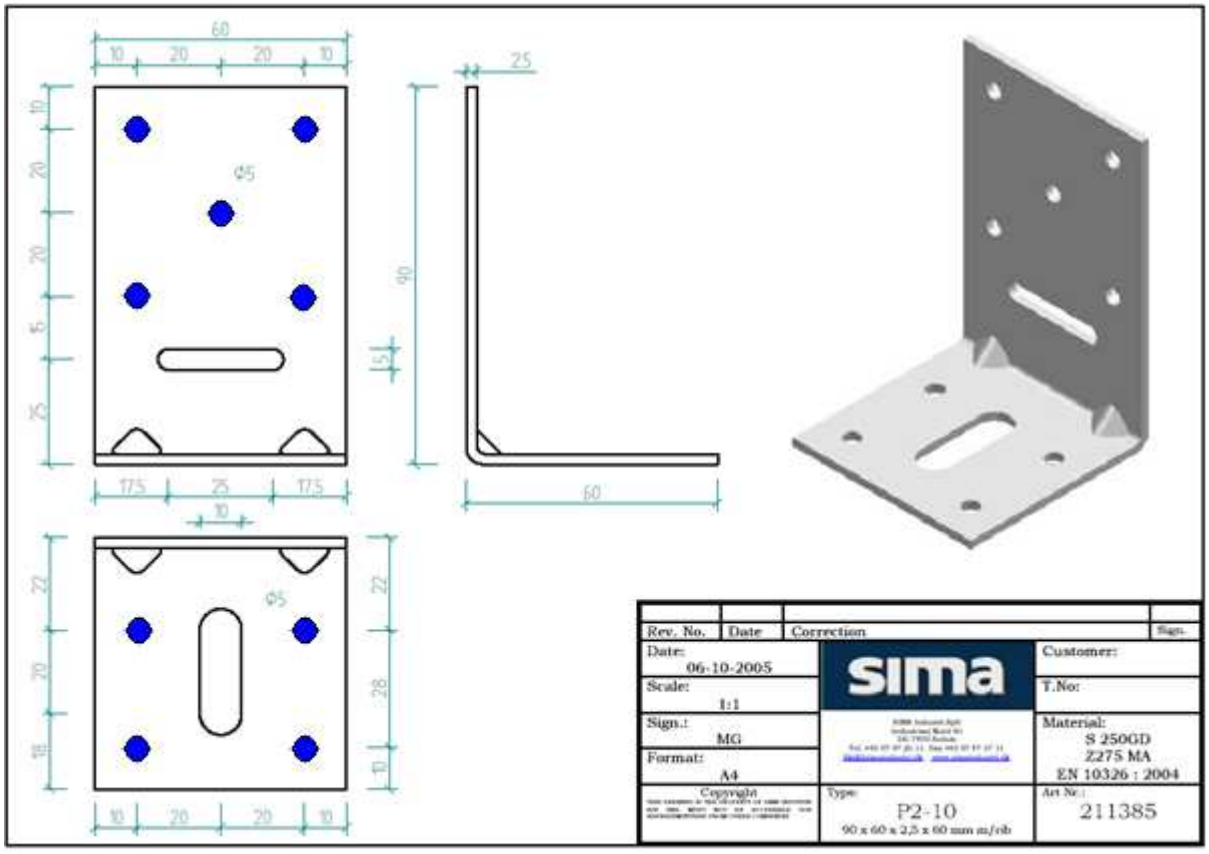
Art Nr.: 211384

P2-10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Copyright
sima
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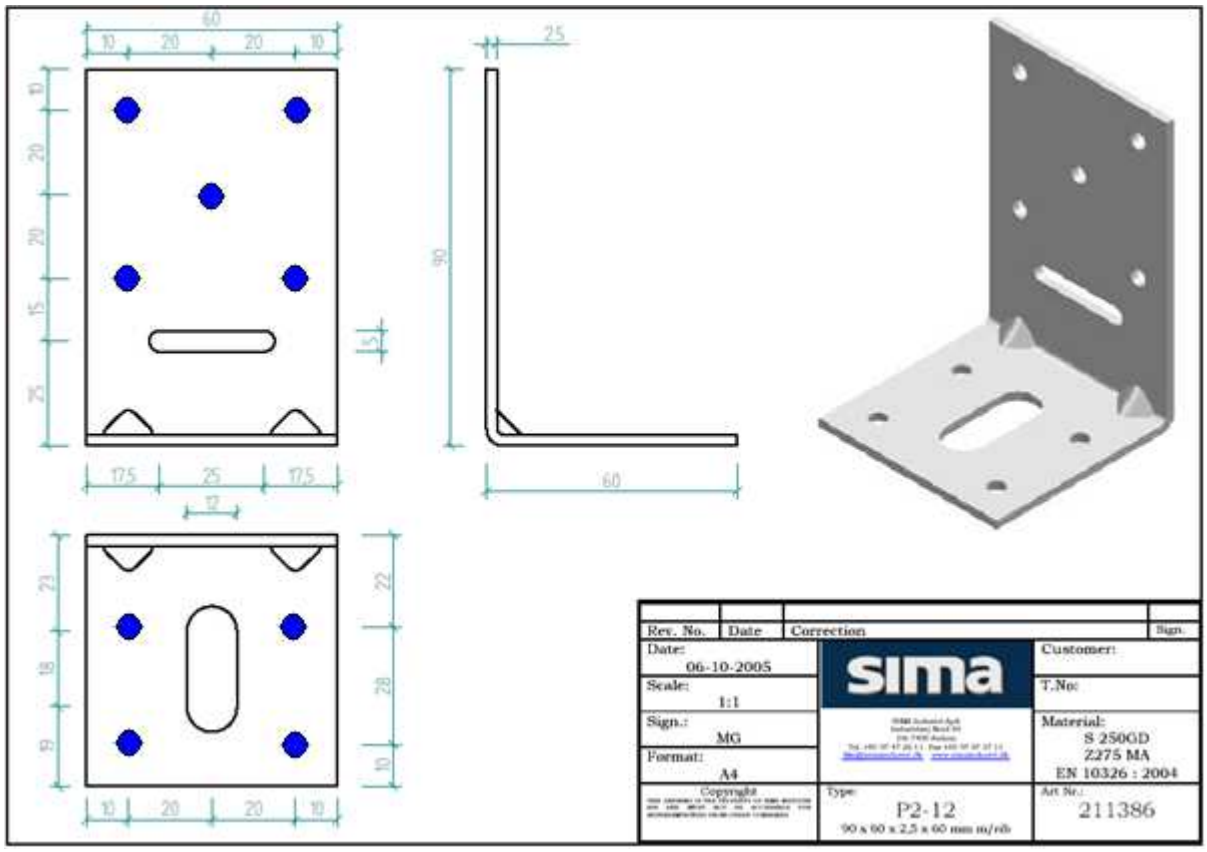
Type: P2-10
90 x 60 x 2,5 x 60 mm m/rib
Art Nr.: 211385

P2-12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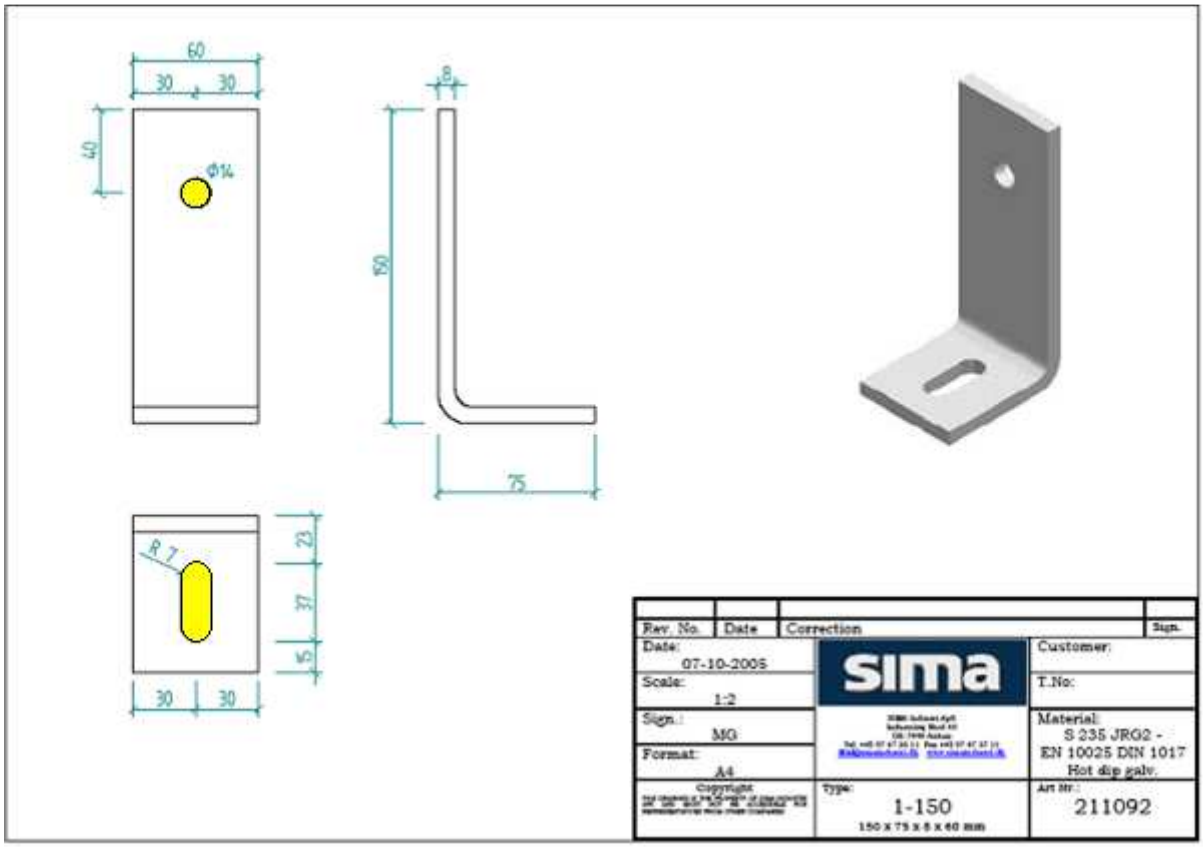
Art Nr.: 211386

1-150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Type:
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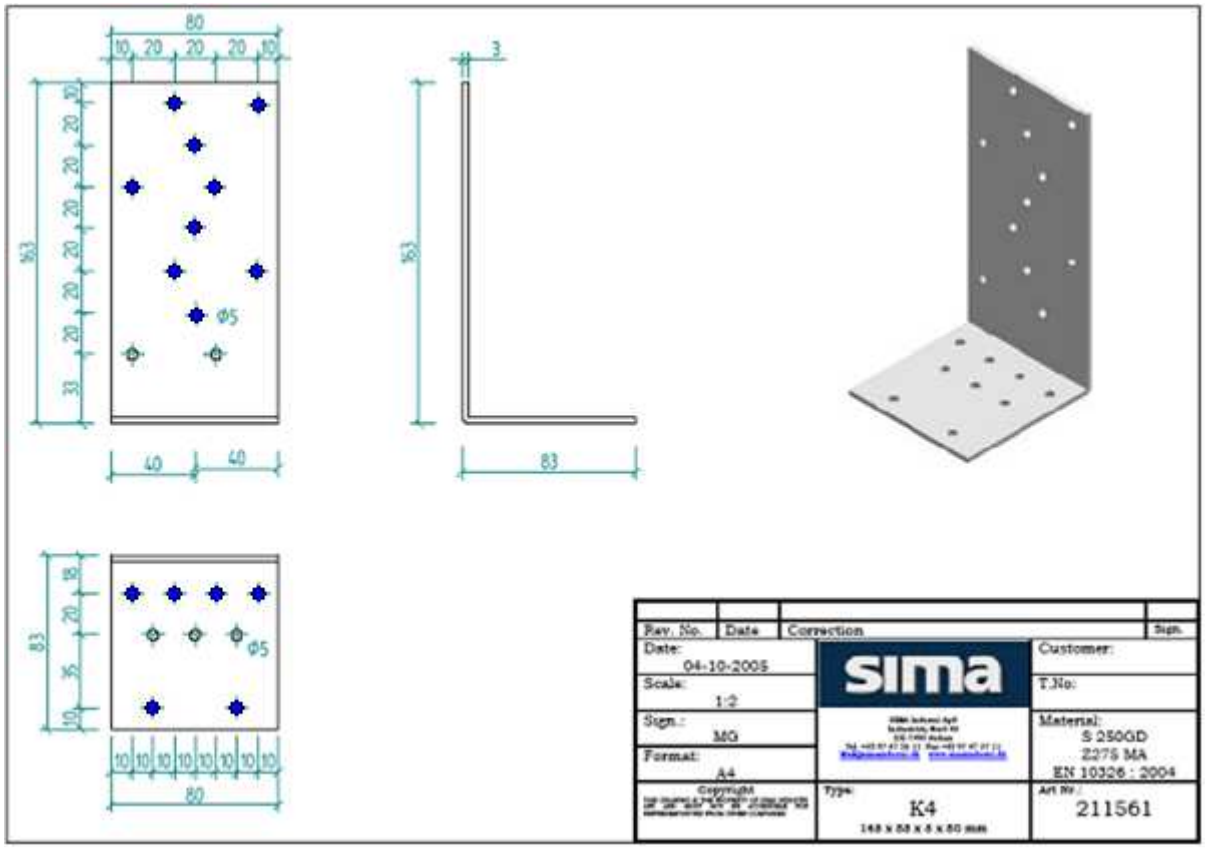
Art Nr.:
211092

K4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Z275 MA
EN 10326 : 2004
Type:
K4
Art Nr.:
211561

Annex C
Characteristic load-carrying capacity

Design Basis - general

Combined forces

For practical purposes the strength verification is always carried out for design forces and design capacities. If the forces are combined the following inequalities shall be fulfilled:

$$\left(\frac{F_{1,d}}{R_{1,d}}\right)^2 + \left(\frac{F_{2,d}}{R_{2,d}}\right)^2 + \left(\frac{F_{3,d}}{R_{3,d}}\right)^2 \leq 1$$

The forces $F_{2,d}$ and $F_{3,d}$ are forces with opposite direction. Only the one with a value shall be inserted while the other shall be set to zero.

$$\frac{F_{1,d}}{R_{1,d}} + \frac{F_{4,d}}{R_{4,d}} + \frac{F_{5,d}}{R_{5,d}} \leq 1$$

The forces $F_{4,d}$ and $F_{5,d}$ are forces with opposite direction. Only the one with a value shall be inserted while the other shall be set to zero.

In case of a combination where forces work in 3 directions the following formula are to be used:

$$\sqrt{\left[\frac{F_{1,d}}{R_{1,d}} + \frac{F_{4,d/5,d}}{R_{4,d/5,d}}\right]^2 + \left[\frac{F_{2,d/3,d}}{R_{2,d/3,d}}\right]^2} \leq 1$$

Timber splitting

For the lifting force F_1 it must be checked that splitting will not occur in accordance with Eurocode 5 or a similar national Timber Code.

Density

The load-carrying capacities of the angle bracket connections are stated for a characteristic density of 350 kg/m^3.
For timber or wood based material with a lower characteristic density than 350 kg/m^3 the load-carrying capacities shall be reduced by the k_{dens} factor:

$$k_{dens} = \left(\frac{\rho_k}{350}\right)^2$$

Where ρ_k is the characteristic density of the timber in kg/m^3.

Angle Bracket V1, V1-1, V1Ø7, V2, V2PL, V2 stainless, V2Ø7, V3, V4, V4PL, V4 stainless, V6, V7, V7PL, V10, V12, V13, V14, V15, V21, P4, K4, LV1, 1-150

Design Basis

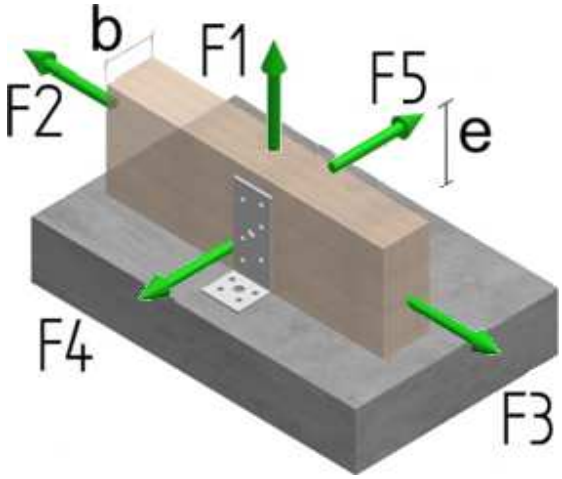

Figure 1. Forces, 1 bracket: wood to concrete

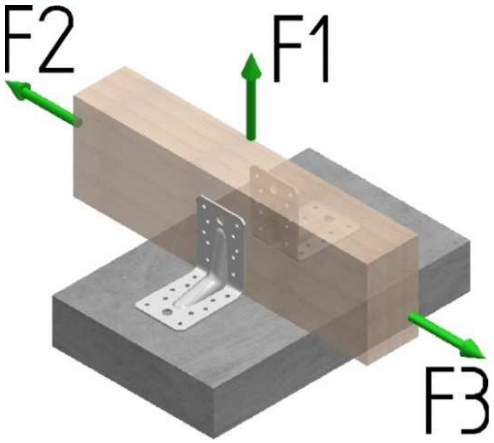

Figure 2. Forces, 2 brackets: wood to concrete

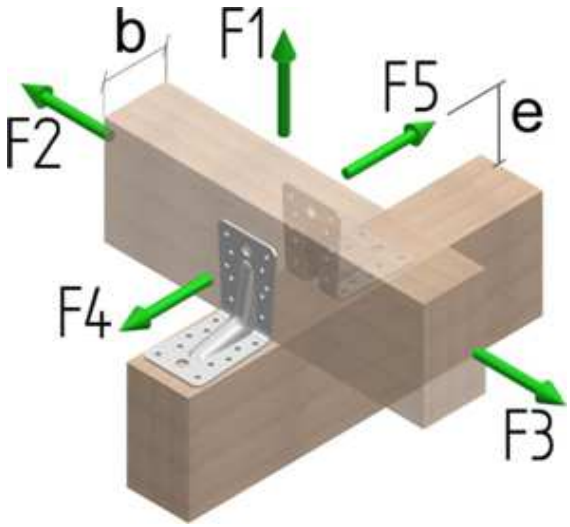

Figure 3. Forces, 2 brackets: beam to beam

Two angle brackets per connection
The angle brackets must be placed on each side of the beam opposite of each other

Acting forces
F_1 Lifting force acting along the central axis of the joint.
F_2 and F_3 Lateral force acting in the joint between the purlin and beam in the purlin direction.
F_4 and F_5 Lateral force acting in the beam direction along the central axis of the joint but elevated e above the beam.

One angle bracket per connection
Acting forces
F_4 Lateral force acting in the beam direction perpendicular to the vertical flap elevated e above the beam directed towards the angle brackets vertical flap
F_5 Lateral force acting in the beam direction perpendicular to the vertical flap elevated e above the beam directed away from the angle brackets vertical flap

Wane
For F_1, F_2 and F_3 wane is allowed on the side towards the angle bracket with an extent from the bottom to the lower row of nails. For all other forces wane is not allowed under the angle bracket.

Note:
The characteristic values stated below for connections with 2,5 mm thick brackets type V2 made from pre-galvanized steel Grade S250GD + min. Z275 according to EN 10346 can be applied to connections made with 1,5 mm thick brackets type V2 made from pre-galvanized steel in grades from Grade S350GD to Grade S500GD + min. Z275 according to EN 10346 named V2PL.

Similarly, the characteristic values stated below for connections with 3,0 mm thick brackets type V4 made from pre-galvanized steel Grade S250GD + min. Z275 according to EN 10346 can be applied to connections made with 2,0 mm thick brackets type V4 made from pre-galvanized steel in grades from Grade S350GD to Grade S500GD + min. Z275 according to EN 10346 named V4PL.

The values have been assessed in accordance with EC 5 Table 3.1- "Values of Kmod" where needed.

1 angle bracket V1 and V1-1, wood – concrete

Paslode Connector nails 4,0 × 40 mm / Expansion bolt	No. of fasteners pr connection	Load Duration	F4, [kN]	F5, [kN]
12,13,14,15,16 /	9 nails	P	25,4/e, max ↓ 20,63	1,85*(2,5+b)/e, max ↓ 1,07
		L	25,4/e, max ↓ 20,63	2,16*(2,5+b)/e, max ↓ 1,25
		M	25,4/e, max ↓ 20,63	2,47*(2,5+b)/e, max ↓ 1,42
Holes marked yellow	3 bolts	S	25,4/e, max ↓ 20,63	2,78*(2,5+b)/e, max ↓ 1,60
		I	25,4/e, max ↓ 20,63	3,40*(2,5+b)/e, max ↓ 1,96
Characteristic values, b and e in mm				

2 angle brackets V1 and V1-1, wood – concrete

Paslode Connector nails 4,0 × 40 mm / Expansion bolt	No. of fasteners pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]
Holes marked blue	9 nails	P	2,45	19,24
		L	2,86	22,44
		M	3,26	25,65
Holes marked yellow	6 bolts	S	3,67	28,85
		I	4,49	35,27
Characteristic values				

2 angle brackets V1 and V1-1, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4 / 8,11,15,16	16	P	2,03	4,40	0,47*(29,6+b)/e, max ↓ 5,36
		L	2,37	5,13	0,55*(29,6+b)/e, max ↓ 6,25
		M	2,71	5,86	0,62*(29,6+b)/e, max ↓ 7,14
		S	3,05	6,60	0,70*(29,6+b)/e, max ↓ 8,04
		I	3,73	8,06	0,86*(29,6+b)/e, max ↓ 9,82
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4 / 8,9,10,11,15,16	20	P	4,07	4,40	0,47*(29,6+b)/e, max ↓ 8,04
		L	4,75	5,13	0,55*(29,6+b)/e, max ↓ 9,38
		M	5,42	5,86	0,62*(29,6+b)/e, max ↓ 10,72
		S	6,10	6,60	0,70*(29,6+b)/e, max ↓ 12,06
		I	7,46	8,06	0,86*(29,6+b)/e, max ↓ 14,74
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4,5,6 / 8,9,10,11,12,13,14,15,16	30	P	4,07	6,31	0,47*(29,6+b))e, max ↓ 12,05
		L	4,75	7,36	0,55*(29,6+b)/e, max ↓ 14,06
		M	5,42	8,41	0,62*(29,6+b)/e, max ↓ 16,07
		S	6,10	9,46	0,70*(29,6+b)/e, max ↓ 18,08
		I	7,46	11,56	0,86*(29,6+b)/e, max ↓ 22,10
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4 / 8,11,15,16	16	P	3,78	4,40	0,87*(15,9+b)/e, max ↓ 5,36
		L	4,41	5,13	1,02*(15,9+b)/e, max ↓ 6,25
		M	5,04	5,86	1,16*(15,9+b)/e, max ↓ 7,14
		S	5,67	6,60	1,31*(15,9+b)/e, max ↓ 8,04
		I	6,93	8,06	1,60*(15,9+b)/e, max ↓ 9,82
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4 / 8,9,10,11,15,16	20	P	5,01	4,40	0,87*(15,9+b)/e, max ↓ 8,04
		L	5,85	5,13	1,02*(15,9+b)/e, max ↓ 9,38
		M	6,68	5,86	1,16*(15,9+b)/e, max ↓ 10,72
		S	7,52	6,60	1,31*(15,9+b)/e, max ↓ 12,06
		I	9,19	8,06	1,60*(15,9+b)/e, max ↓ 14,74
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4 / 8,9,10,11,12,13,14,15,16	30	P	6,78	6,31	0,87*(15,9+b)/e, max ↓ 12,05
		L	7,91	7,36	1,02*(15,9+b)/e, max ↓ 14,06
		M	9,04	8,41	1,16*(15,9+b)/e, max ↓ 16,06
		S	10,17	9,46	1,31*(15,9+b)/e, max ↓ 18,08
		I	12,43	11,56	1,60*(15,9+b)/e, max ↓ 22,10
Characteristic values, b and e in mm					

2 angle brackets V1 with Ø7 holes

M6 Hexagon wood screw	No. of bolts pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked yellow	2 bolts	P	1,87	0,49	0,93*(2,5+b)/e, max ↓ 1,87
		L	2,18	0,57	1,09*(2,5+b)/e, max ↓ 2,18
		M	2,49	0,66	1,24*(2,5+b)/e), max ↓ 2,49
	4 bolts	S	2,8	0,74	1,40*(2,5+b)/e, max ↓ 2,8
		I	3,42	0,90	1,71*(2,5+b)/e, max ↓ 3,42
Characteristic values, b and e in mm					

1 angle bracket V2 and V2PL, wood – concrete

Paslode Connector nails 4,0 × 40 mm/ Expansion bolt	No. of fasteners pr connection	Load Duration	F4, [kN]	F5, [kN]
2,3,4,5,6,7,8,9 /	10 nails	P	25,4/e, max ↓ 20,63	1,53*(2,5+b)/e, max ↓ 1,22
		L	25,4/e, max ↓ 20,63	1,74*(2,5+b)/e, max ↓ 1,42
		M	25,4/e, max ↓ 20,63	2,04*(2,5+b)/e, max ↓ 1,62
Hole marked yellow	1 bolt	S	25,4/e, max ↓ 20,63	2,30*(2,5+b)/e, max ↓ 1,83
		I	25,4/e, max ↓ 20,63	2,81*(2,5+b)/e, max ↓ 2,23
Characteristic values, b and e in mm				

1 angle bracket V2 and V2PL, beam to beam connection

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4, [kN]	F5, [kN]
2,3,4,5,6,7,8,9 / 11,12,13,14,15,16, 17,18,19,20	20	P	1,75	2,87	25,4/e, max ↓ 6,41	6,41*(37,5+b)/e, max ↓ 1,75
		L	2,04	3,35	25,4/e, max ↓ 7,48	7,48*(37,5+b)/e, max ↓ 2,04
		M	2,34	3,82	25,4/e, max ↓ 8,55	8,55*(37,5+b)/e, max ↓ 2,34
		S	2,63	4,30	25,4/e, max ↓ 9,62	9,62*(37,5+b)/e, max ↓ 2,63
		I	3,21	5,26	25,4/e, max ↓ 11,76	11,76*(37,5+b)/e, max ↓ 3,21
Characteristic values, b and e in mm						

2 angle brackets V2 and V2PL, wood – concrete

Paslode Connector nails 4,0 × 40 mm/ Expansion bolt	No. of fasteners pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]
2,3,4,5,6,7,8,9 /	20 nails	P	0,76	5,17
		L	0,89	6,03
		M	1,02	6,90
		S	1,14	7,76
Holes marked yellow	2 bolts	I	1,40	9,48
Characteristic values				

2 angle brackets V2 and V2PL, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
2,3,4,5,6,7,8,9 /	36	P	5,58	8,70	2,10*(41,1+b)/e, max ↓ 9,42
		L	6,51	10,15	2,45*(41,1+b)/e, max ↓ 10,99
		M	7,44	11,6	2,80*(41,1+b)/e, max ↓ 12,56
11,12,13,14,15,16, 17,18,19,20		S	8,37	13,05	3,15*(41,1+b)/e, max ↓ 14,13
		I	10,23	15,95	3,85*(41,1+b)/e, max ↓ 17,27
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
2,5,6,9 /	16	P	4,07	4,33	0,94*(65+b)/e, max ↓ 5,36
		L	4,75	5,05	1,09*(65+b)/e, max ↓ 6,25
		M	5,42	5,78	1,25*(65+b)/e, max ↓ 7,14
11,15,16,20		S	6,10	6,50	1,40*(65+b)/e, max ↓ 8,04
		I	7,46	7,94	1,72*(65+b)/e, max ↓ 9,82
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
2,3,4,5,6,7,8,9 / 11,12,13,15,16, 17,18,20	32	P	7,33	7,98	1,69*(47,5+b)/e, max ↓ 10,72
		L	8,55	9,31	1,97*(47,5+b)/e, max ↓ 12,50
		M	9,78	10,64	2,25*(47,5+b)/e, max ↓ 14,29
		S	11,00	11,97	2,53*(47,5+b)/e, max ↓ 16,07
		I	13,44	14,63	3,09*(47,5+b)/e, max ↓ 19,65
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
2,3,4,5,6,7,8,9 / 11,12,13,14,15,16, 17,18,19,20	36	P	9,66	8,52	2,1*(41,1+b)/e, max ↓ 9,06
		L	11,27	9,94	2,45*(41,1+b)/e, max ↓ 10,5
		M	12,88	11,36	2,8*(41,1+b)/e, max ↓ 12,08
		S	14,49	12,78	3,15*(41,1+b)/e, max ↓ 13,59
		I	17,71	15,62	3,85*(41,1+b)/e, max ↓ 16,61
Characteristic values, b and e in mm					

2 angle brackets V2 Stainless, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	36	P	4,79	6,91	2,4*(22+b)/e or 7,73*(2+b)/e, max ↓ 7,73
		L	5,59	8,06	2,8*(22+b)/e or 9,02*(2+b)/e, max ↓ 9,02
		M	6,38	9,22	3,2*(22+b)/e or 10,31*(2+b)/e, max ↓ 10,31
		S	7,18	10,37	3,6*(22+b)/e or 11,60*(2+b)/e, max ↓ 11,60
		I	8,78	12,67	4,4*(22+b)/e or 14,18*(2+b)/e, max ↓ 14,18
Characteristic values, b and e in mm					

2 angle brackets V2 with Ø7 holes

M6 Hexagon wood screw	No. of bolts pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked yellow	2 bolts	P	1,87	1,51	0,87*(15,9+b)/e, max ↓ 5,36
		L	2,18	1,76	1,02*(15,9+b)/e, max ↓ 6,25
	4 bolts	M	2,49	2,02	1,16*(15,9+b)/e, max ↓ 7,14
		S	2,8	2,27	1,31*(15,9+b)/e, max ↓ 8,04
		I	3,42	2,77	1,60*(15,9+b)/e, max ↓ 9,82
Characteristic values, b and e in mm					

1 angle bracket V3, wood – concrete

Paslode Connector nails 4,0 × 40 mm / Expansion bolt	No. of fasteners pr connection	Load Duration	F4, [kN]	F5, [kN]
17,18,19,20,21,22,23,24	14 nails	P	(50,6/e), max ↓ 54,75	3,63*(3+b)/e), max ↓ 1,04
		L	(50,6/e), max ↓ 54,75	4,24*(3+b)/e), max ↓ 1,22
		M	(50,6/e), max ↓ 54,75	4,84*(3+b)/e), max ↓ 1,39
Holes marked yellow	3 bolts	S	(50,6/e), max ↓ 54,75	5,45*(3+b)/e), max ↓ 1,57
		I	(50,6/e), max ↓ 54,75	6,65*(3+b)/e), max ↓ 1,91
Characteristic values, b and e in mm				

2 angle brackets V3, wood to concrete

Paslode Connector nails 4,0 × 40 mm / Expansion bolt	No. of fasteners pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
17,18,19,20,21,22,23,24	16 nails	P	9,61	5,49	30,36/e or 8,55*(3+b)/e, max ↓54,75
		L	9,61	6,41	35,42/e or 9,98*(3+b)/e, max ↓54,75
		M	9,61	7,32	40,48/e or 11,40*(3+b)/e, max ↓54,75
Holes marked yellow	6 bolts	S	9,61	8,24	45,54/e or 12,83*(3+b)/e, max ↓54,75
		I	9,61	10,07	55,66/e or 15,68*(3+b)/e, max ↓54,75
Characteristic values, b and e in mm					

2 angle brackets V3, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,8,9 / 11,16,23,24	16	P	2,08	4,97	0,6*((0,80*(57,8+b))/e), max ↓ 5,36
		L	2,42	5,80	0,7*((0,80*(57,8+b))/e), max ↓ 6,25
		M	2,77	6,62	0,8*((0,80*(57,8+b))/e), max ↓ 7,14
		S	3,11	7,45	0,9*((0,80*(57,8+b))/e), max ↓ 8,04
		I	3,81	9,11	1,1*((0,80*(57,8+b))/e), max ↓ 9,82
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,5,6,8,9 / 11,12,15,16,23,24	24	P	4,15	7,03	0,6*((1,59*(28,9+b))/e), max ↓ 8,04
		L	4,84	8,20	0,7*((1,59*(28,9+b))/e), max ↓ 9,38
		M	5,53	9,38	0,8*((1,59*(28,9+b))/e), max ↓ 10,72
		S	6,22	10,55	0,9*((1,59*(28,9+b))/e), max ↓ 12,06
		I	7,60	12,89	1,1*((1,59*(28,9+b))/e), max ↓ 14,74
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4,5,6 / 11,12,13,14,15,16,23,24	28	P	6,22	5,53	0,6*((2,39*(19,3+b))/e), max ↓ 10,72
		L	7,25	6,45	0,7*((2,39*(19,3+b))/e), max ↓ 12,50
		M	8,29	7,37	0,8*((2,39*(19,3+b))/e), max ↓ 14,29
		S	9,32	8,29	0,9*((2,39*(19,3+b))/e), max ↓ 16,07
		I	11,40	10,13	1,1*((2,39*(19,3+b))/e), max ↓ 19,65
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4,5,6,7,8,9 / 11,12,13,14,15, 16,21,22,23,24	38	P	6,22	10,38	0,6*((2,39*(19,3+b))/e), max ↓ 13,40
		L	7,25	12,11	0,7*((2,39*(19,3+b))/e), max ↓ 15,63
		M	8,29	13,84	0,8*((2,39*(19,3+b))/e), max ↓ 17,86
		S	9,32	15,57	0,9*((2,39*(19,3+b))/e), max ↓ 20,10
		I	11,40	19,03	1,1*((2,39*(19,3+b))/e), max ↓ 24,56
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,8,9 / 11,16,23,24	16	P	3,85	4,97	0,6*((1,48*(31,2+b))/e), max ↓ 5,36
		L	4,49	5,80	0,7*((1,48*(31,2+b))/e), max ↓ 6,25
		M	5,13	6,62	0,8*((1,48*(31,2+b))/e), max ↓ 7,14
		S	5,77	7,45	0,9*((1,48*(31,2+b))/e), max ↓ 8,04
		I	7,05	9,11	1,1*((1,48*(31,2+b))/e), max ↓ 9,82
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,5,6,8,9 / 11,12,15,16,23,24	24	P	7,70	7,03	0,6*((2,95*(15,6+b))/e), max ↓ 8,04
		L	8,98	8,20	0,7*((2,95*(15,6+b))/e), max ↓ 9,38
		M	10,26	9,38	0,8*((2,95*(15,6+b))/e), max ↓ 10,72
		S	11,55	10,55	0,9*((2,95*(15,6+b))/e), max ↓ 12,06
		I	14,11	12,89	1,1*((2,95*(15,6+b))/e), max ↓ 14,74
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4,5,6 / 11,12,13,14,15,16,23,24	28	P	10,02	5,53	0,6*((3,84*(12,0+b))/e), max ↓ 10,72
		L	11,69	6,45	0,7*((3,84*(12,0+b))/e), max ↓ 12,50
		M	13,36	7,37	0,8*((3,84*(12,0+b))/e), max ↓ 16,07
		S	15,03	8,29	0,9*((3,84*(12,0+b))/e), max ↓ 14,29
		I	18,37	10,13	1,1*((3,84*(12,0+b))/e), max ↓ 19,65
Characteristic values, b and e in mm					

1 angle bracket V4 and V4PL, wood – concrete

Paslode Connector nails 4,0 × 40 mm/ Expansion bolt	No. of fasteners pr connection	Load Duration	F4, [kN]	F5, [kN]
Vertical flap fully nailed	14 nails	P	50,6/e, max ↓54,75	3,89*(3+b)/e, max ↓1,52
		L	50,6/e, max ↓54,75	4,54*(3+b)/e, max ↓1,77
		M	50,6/e, max ↓54,75	5,19*(3+b)/e, max ↓2,02
Holes marked yellow	3 bolts	S	50,6/e, max ↓54,75	5,84*(3+b)/e, max ↓2,28
		I	50,6/e, max ↓54,75	7,14*(3+b)/e, max ↓2,78
Characteristic values, b and e in mm				

1 angle bracket V4 and V4PL, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4, [kN]	F5, [kN]
Fully nailed	22	P	1,75	2,83	47,8/e, max ↓ 8,55	8,55*(33+b)/e, max ↓ 0,88
		L	2,04	3,30	47,8/e, max ↓ 8,55	9,98*(33+b)/e, max ↓ 1,02
		M	2,34	3,77	47,8/e, max ↓ 8,55	11,40*(33+b)/e, max ↓ 1,17
		S	2,63	4,24	47,8/e, max ↓ 8,55	12,83*(33+b)/e, max ↓ 1,31
		I	3,21	5,18	47,8/e, max ↓ 8,55	15,68*(33+b)/e, max ↓ 1,61
Characteristic values, b and e in mm						

2 angle brackets V4 and V4PL, wood – concrete

Paslode Connector nails 4,0 × 40 mm/ Expansion bolt	No. of fasteners pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]
Vertical flap fully nailed	16 nails	P	5,29	29,93
		L	6,17	34,92
		M	7,06	39,90
Holes marked yellow	6 bolts	S	7,94	44,89
		I	9,70	54,87
Characteristic values				

2 angle brackets V4 and V4PL, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F2 /F3, [kN]
1,3,4,5,6,8/	24	P	7,48
		L	8,73
		M	9,98
9,10,15,16,17,22		S	11,22
		I	13,72
Characteristic values, b and e in mm			

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4,5,6,7,8 /	32	P	9,9	9,68	2,62*(56,3+b)/e), max ↓ 9,06
		L	11,55	11,30	3,09*(56,3+b)/e, max ↓ 10,57
		M	13,20	12,91	3,54*(56,3+b)/e, max ↓ 12,08
9,10,11,15,16,17,18,22		S	14,85	14,53	3,98*(56,3+b)/e, max ↓ 13,59
		I	18,15	17,75	4,86*(56,3+b)/e, max ↓ 16,61
Characteristic values					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,3,4,5,6,7,8 / 9,10,15,16,17,22	24	P	8,14	7,48	1,87*(73,5+b)/e, max ↓ 8,04
		L	9,50	8,73	2,18*(73,5+b)/e, max ↓ 9,38
		M	10,86	9,98	2,50*(73,5+b)/e, max ↓ 10,72
		S	12,21	11,22	2,81*(73,5+b)/e, max ↓ 12,06
		I	14,93	13,72	3,43*(73,5+b)/e, max ↓ 14,74
Characteristic values, b and e in mm					

Paslode Connector nails 4,0 × 60 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
1,2,3,4,5,6,7,8 / 9,10,11,15,16,17,18,22	32	P	13,32	9,84	2,62*(56,3+b)/e, max ↓ 10,26
		L	15,54	11,48	3,09*(56,3+b)/e, max ↓ 11,97
		M	17,76	13,12	3,54*(56,3+b)/e, max ↓ 13,68
		S	19,98	14,76	3,98*(56,3+b)/e, max ↓ 15,39
		I	24,42	18,04	4,86*(56,3+b)/e, max ↓ 18,81
Characteristic values, b and e in mm					

2 angle brackets V4 Stainless, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	44	P	4,79	6,80	2,4*(17,5+b)/e or 10,31*(2,5+b)/e, max ↓ 10,31
		L	5,59	7,94	2,8*(17,5+b)/e or 12,03*(2,5+b)/e, max ↓ 12,03
		M	6,38	9,07	3,2*(17,5+b)/e or 13,75*(2,5+b)/e, max ↓ 13,75
		S	7,18	10,21	3,6*(17,5+b)/e or 15,47*(2,5+b)/e, max ↓ 15,47
		I	8,78	12,47	4,4*(17,5+b)/e or 18,91*(2,5+b)/e, max ↓ 18,91
Characteristic values, b and e in mm					

2 angle brackets V6, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	14	P	3,42	3,07	1,96*(20,5+b)/e or 2,26*(2+b)/e), max ↓ 5,66
		L	3,42	3,58	2,29*(20,5+b)/e or 2,64*(2+b)/e), max ↓ 6,60
		M	3,42	4,09	2,61*(20,5+b)/e or 3,02*(2+b)/e), max ↓ 7,54
		S	3,42	4,60	2,94*(20,5+b)/e or 3,93*(2+b)/e), max ↓ 8,49
		I	3,42	5,62	3,60*(20,5+b)/e or 4,15*(2+b)/e), max ↓ 10,37
Characteristic values, b and e in mm					

2 angle brackets V7, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4d /F5, [kN]
Holes marked blue	16	P	2,39	3,07	1,2*(17+b)/e or 2,26*(2+b)/e), max ↓ 4,52
		L	2,79	3,58	1,4*(17+b)/e or 2,64*(2+b)/e), max ↓ 5,28
		M	3,19	4,09	1,6*(17+b)/e or 3,02*(2+b)/e), max ↓ 6,03
		S	3,59	4,6	1,8*(17+b)/e or 3,93*(2+b)/e), max ↓ 6,79
		I	4,39	5,62	2,2*(17+b)/e or 4,15*(2+b)/e), max ↓ 8,29
Characteristic values, b and e in mm					

2 angle brackets V7PL, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4d /F5, [kN]
Holes marked blue	16	P	2,39	3,07	1,2*(16,5+b)/e or 2,26*(1,5+b)/e), max ↓ 4,52
		L	2,79	3,58	1,4*(16,5+b)/e or 2,64*(1,5+b)/e), max ↓ 5,28
		M	3,19	4,09	1,6*(16,5+b)/e or 3,02*(1,5+b)/e), max ↓ 6,03
		S	3,59	4,6	1,8*(16,5+b)/e or 3,93*(1,5+b)/e), max ↓ 6,79
		I	4,39	5,62	2,2*(16,5+b)/e or 4,15*(1,5+b)/e), max ↓ 8,29
Characteristic values, b and e in mm					

1 angle bracket V10, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4, [kN]	F5, [kN]
Holes marked blue	8	P	1,2	1,03	1,2*(16,5+b)/e, max ↓ 1,2	4,52*(2,5+b)/e, max ↓ 1,2
		L	1,4	1,20	1,4*(16,5+b)/e, max ↓ 1,4	5,28*(2,5+b)/e, max ↓ 1,4
		M	1,6	1,37	1,6*(16,5+b)/e, max ↓ 1,6	6,03*(2,5+b)/e, max ↓ 1,6
		S	1,6	1,55	1,8*(16,5+b)/e, max ↓ 1,6	6,79*(2,5+b)/e, max ↓ 1,6
		I	1,6	1,89	2,2*(16,5+b)/e, max ↓ 1,6	8,29*(2,5+b)/e, max ↓ 1,6
Characteristic values, b and e in mm						

2 angle brackets V10, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	16	P	2,39	2,07	1,2*(21+b)/e or 4,52*(2,5+b)/e), max ↓ 4,52
		L	2,79	2,42	1,4*(21+b)/e or 5,28*(2,5+b)/e), max ↓ 5,28
		M	3,19	2,76	1,6*(21+b)/e or 6,03*(2,5+b)/e), max ↓ 6,03
		S	3,19	3,11	1,8*(21+b)/e or 6,79*(2,5+b)/e), max ↓ 6,79
		I	3,19	3,80	2,2*(21+b)/e or 8,29*(2,5+b)/e), max ↓ 8,29
Characteristic values, b and e in mm					

1 angle bracket V12, beam to concrete connection

Paslode Connector nails 4,0 × 40 mm	No. of fasteners pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4, [kN]	F5, [kN]
Holes marked blue	6 nails	P	1,86	1,96	16,86/e, max ↓ 16,26	6,41*b/e, max ↓1,58
		L	1,86	2,29	19,67/e, max ↓ 16,26	7,48*b/e, max ↓1,58
		M	1,86	2,62	22,48/e, max ↓ 16,26	8,55*b/e, max ↓1,58
Hole marked yellow	1 bolt	S	1,86	2,94	25,49/e, max ↓ 16,26	9,62*b/e, max ↓1,58
		I	1,86	3,60	30,91/e, max ↓ 16,26	11,76*b/e, max ↓1,58
Characteristic values, b and e in mm						

2 angle brackets V12, beam to concrete connection

Paslode Connector nails 4,0 × 40 mm / Expansion bolt	No. of fasteners pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue /	16 nails	P	3,72	3,92	10,42
		L	3,72	4,58	12,15
		M	3,72	5,23	13,89
		S	3,72	5,89	15,62
Holes marked yellow	2 bolts	I	3,72	7,19	19,09
Characteristic values					

1 angle bracket V12, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4, [kN]	F5, [kN]
Holes marked blue	10	P	0,88	1,68	16,86/e, max ↓ 2,14	6,41*b/e, max ↓1,58
		L	1,02	1,96	19,67/e, max ↓ 2,14	7,48*b/e, max ↓1,58
		M	1,17	2,24	22,48/e, max ↓ 2,14	8,55*b/e, max ↓1,58
		S	1,31	2,52	25,49/e, max ↓ 2,14	9,62*b/e, max ↓1,58
		I	1,61	3,08	30,91/e, max ↓ 2,14	11,76*b/e, max ↓1,58
Characteristic values, b and e in mm						

2 angle brackets V12, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	20	P	2,39	3,55	1,2*(21+b)/e or 6,79*(3+b)/e, max ↓ 2,26
		L	2,79	4,14	1,4*(21+b)/e or 7,92*(3+b)/e, max ↓ 2,64
		M	3,19	4,74	1,6*(21+b)/e or 9,05*(3+b)/e, max ↓ 3,02
		S	3,59	5,33	1,8*(21+b)/e or 10,18*(3+b)/e, max ↓ 3,39
		I	4,39	6,51	2,2*(21+b)/e or 12,44*(3+b)/e, max ↓ 4,15
Characteristic values, b and e in mm					

2 angle brackets V13, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	24	P	2,39	4,95	1,2*(22+b)/e or 9,05*(2+b)/e, max ↓ 2,26
		L	2,79	5,78	1,4*(22+b)/e or 10,56*(2+b)/e, max ↓ 2,64
		M	3,19	6,6	1,6*(22+b)/e or 12,06*(2+b)/e, max ↓ 3,02
		S	3,59	7,43	1,8*(22+b)/e or 13,57*(2+b)/e, max ↓ 3,39
		I	4,39	9,08	2,2*(22+b)/e or 16,59*(2+b)/e, max ↓ 4,15
Characteristic values, b and e in mm					

2 angle brackets V14, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	34	P	4,79	8,48	2,4*(20+b)/e or 10,18*(3+b)/e, max ↓ 4,52
		L	5,59	9,89	2,8*(20+b)/e or 11,87*(3+b)/e, max ↓ 5,28
		M	6,38	11,30	3,2*(20+b)/e or 13,57*(3+b)/e, max ↓ 6,03
		S	7,18	12,72	3,6*(20+b)/e or 15,26*(3+b)/e, max ↓ 6,79
		I	8,78	15,54	4,4*(20+b)/e or 18,66*(3+b)/e, max ↓ 8,29
Characteristic values, b and e in mm					

2 angle brackets V15, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	24	P	1,60	2,57	1,45*(42,9+b)/e or 9,05*(3+b)/e, max ↓ 4,52
		L	1,86	3,00	1,69*(42,9+b)/e or 10,56*(3+b)/e, max ↓ 5,28
		M	2,13	3,42	1,93*(42,9+b)/e or 12,06*(3+b)/e, max ↓ 6,03
		S	2,39	3,85	2,17*(42,9+b)/e or 13,57*(3+b)/e), max ↓ 6,79
		I	2,93	4,71	2,65*(42,9+b)/e or 16,59*(3+b)/e, max ↓ 8,29
Characteristic values, b and e in mm					

1 angle bracket V21, wood – concrete

Paslode Connector nails 4,0 × 40 mm/ Expansion bolt	No. of fasteners pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4, [kN]	F5, [kN]
Holes marked blue	8 nails	P	1,23	1,47	20,5/e, max ↓ 19,8	10,69*b/e, max ↓ 1,31
		L	1,23	1,72	20,5/e, max ↓ 19,8	12,47*b/e, max ↓ 1,31
		M	1,23	1,96	20,5/e, max ↓ 19,8	14,25*b/e, max ↓ 1,31
		S	1,23	2,21	20,5/e, max ↓ 19,8	16,03*b/e, max ↓ 1,31
Hole marked yellow	1 bolts	I	1,23	2,70	20,5/e, max ↓ 19,8	19,59*b/e, max ↓ 1,31
Characteristic values, b and e in mm						

2 angle brackets V21, wood – concrete

Paslode Connector nails 4,0 × 40 mm/ Expansion bolt	No. of fasteners pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	16 nails	P	2,47	2,94	14,64
		L	2,47	3,43	17,08
		M	2,47	3,92	19,52
		S	2,47	4,41	19,80
Holes marked yellow	2 bolts	I	2,47	5,39	19,80
Characteristic values					

1 angle bracket V21, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4, [kN]	F5, [kN]
Holes marked blue	12	P	0,88	1,47	22,5/e, max ↓ 2,14	10,69*b/e, max ↓ 1,31
		L	1,02	1,72	22,5/e, max ↓ 2,49	12,47*b/e, max ↓ 1,31
		M	1,17	1,96	22,5/e, max ↓ 2,85	14,25*b/e, max ↓ 1,31
		S	1,31	2,21	22,5/e, max ↓ 3,20	16,03*b/e, max ↓ 1,31
		I	1,61	2,70	22,5/e, max ↓ 3,92	19,59*b/e, max ↓ 1,31
Characteristic values, b and e in mm						

1 angle bracket P4, wood – concrete

Paslode Connector nails 4,0 × 40 mm/3 Expansion bolt	No. of fasteners pr connection	Load Duration	F1, [kN]	F2/F3, [kN]	F4, [kN]	F5, [kN]
Holes marked blue	5 nails	P	2,25	1,19	22,5/e, max ↓ 8,11	5,35*b/e, max ↓ 1,03
		L	2,25	1,39	22,5/e, max ↓ 9,46	6,24*b/e, max ↓ 1,20
		M	2,25	1,58	22,5/e, max ↓ 9,9	7,13*b/e, max ↓ 1,38
		S	2,25	1,78	22,5/e, max ↓ 9,9	8,02*b/e, max ↓ 1,55
Hole marked yellow	1 bolts	I	2,25	2,18	22,5/e, max ↓ 9,9	9,80*b/e, max ↓ 1,89
Characteristic values, b and e in mm						

2 angle brackets P4, wood – concrete

Paslode Connector nails 4,0 × 40 mm/ Expansion bolt	No. of fasteners pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	10 nails	P	4,5	2,38	9,9
		L	4,5	2,77	9,9
		M	4,5	3,17	9,9
		S	4,5	3,56	9,9
Holes marked yellow	2 bolts	I	4,5	4,36	9,9
Characteristic values					

1 angle bracket P4, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4, [kN]	F5, [kN]
Holes marked blue	9	P	0,88	1,19	22,5/e, max ↓ 2,14	5,35*b/e, max ↓ 1,21
		L	1,02	1,39	22,5/e, max ↓ 2,49	6,24*b/e, max ↓ 1,41
		M	1,17	1,58	22,5/e, max ↓ 2,85	7,13*b/e, max ↓ 1,61
		S	1,31	1,78	22,5/e, max ↓ 3,20	8,02*b/e, max ↓ 1,81
		I	1,61	2,18	22,5/e, max ↓ 3,92	9,80*b/e, max ↓ 2,21
Characteristic values, b and e in mm						

2 angle brackets K4, beam to beam connection

Paslode Connector nails 4,0 × 40 mm/ Expansion bolt	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	34 nails	P	5,16	6,41	6,79
		L	6,02	7,48	7,92
		M	6,88	8,55	9,05
		S	7,74	9,62	10,18
		I	9,46	11,76	12,44
Characteristic values					

1 angle bracket 1-150, wood – concrete

Expansion bolt	No. of bolts pr connection	Load Duration	F1, [kN]
Holes marked yellow	1 bolt	P	4,12
		L	4,80
		M	5,49
	1 bolt	S	6,17
		I	7,55
Characteristic values			

2 angle brackets LV1, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F1, [kN]	F2 /F3, [kN]	F4 /F5, [kN]
Holes marked blue	20 nails	P	1,89	1,30	1,44*(20,7+b)/e or 2,26*(2,0+b)/e, max ↓ 4,52
		L	2,2	1,51	1,68*(20,7+b)/e or 2,64*(2,0+b)/e, max ↓ 5,28
		M	2,52	1,73	1,92*(20,7+b)/e or 3,02*(2,0+b)/e, max ↓ 6,03
		S	2,83	1,94	2,16*(20,7+b)/e or 3,39*(2,0+b)/e, max ↓ 6,79
		I	3,46	2,38	2,64*(20,7+b)/e or 4,15*(2,0+b)/e, max ↓ 8,29
Characteristic values, b and e in mm					

Angle Bracket P1-8, P1-10, P1-12, P2-10, P2-12

Design Basis

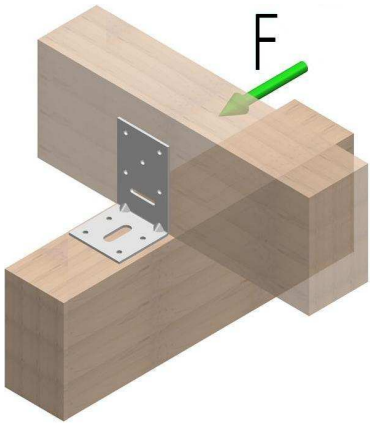

Figure 4. Force, 1 bracket wood to wood, beam to beam

One angle bracket per connection

F Lateral force acting in the beam direction perpendicular to the vertical flap directed towards the angle brackets vertical flap.

The values have been assessed in accordance with EC 5 Table 3.1- "Values of Kmod"

Wane

For F wane is allowed on the side towards the angle bracket with an extent from the bottom to the lower row of nails.
For all other forces wane is not allowed under the angle bracket.

1 angle bracket P1-8, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F, [kN]
Holes marked blue	9	P	2,26
		L	2,64
		M	3,02
		S	3,39
		I	4,15
Characteristic values			

1 angle bracket P1-10, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F, [kN]
Holes marked blue	9	P	4,52
		L	5,28
		M	6,03
		S	6,79
		I	8,29
Characteristic values			

1 angle bracket P1-12, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F, [kN]
Holes marked blue	9	P	4,52
		L	5,28
		M	6,03
		S	6,79
		I	8,29
Characteristic values			

1 angle bracket P2-10, beam to beam connection

Paslode Connectornails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F, [kN]
Holes marked blue	9	P	4,52
		L	5,28
		M	6,03
		S	6,79
		I	8,29
Characteristic values			

1 angle bracket P2-12, beam to beam connection

Paslode Connector nails 4,0 × 40 mm	No. of nails pr connection	Load Duration	F, [kN]
Holes marked blue	9	P	4,52
		L	5,28
		M	6,03
		S	6,79
		I	8,29
Characteristic values			