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European Technical Assessment

ETA-10/0067 of 09.07.2015

GENERAL PART

Technical Assessment Body issuing the European Technical Assessment

Österreichisches Institut für Bautechnik
 Austrian Institute of Construction Engineering

Trade name of the construction product

Wolf Binderwinkel (Wolf angle bracket)

Product family to which the construction product belongs

Angle bracket for timber-to-timber and timber-to-concrete connections

Manufacturer

Wolf Systembau Gesellschaft m.b.H.
Fischerbühel 1
4644 Scharnstein
Austria

Manufacturing plant

Wolf Systembau Gesellschaft m.b.H.
Fischerbühel 1
4644 Scharnstein
Austria

This European Technical Assessment contains

14 Pages including 6 Annexes which form an integral part of this assessment.

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

ETAG 015 Guideline for European Technical Approval for “Three-dimensional nailing plates”, Edition November 2012, used as European Assessment Document.

This European Technical Assessment replaces

European technical approval ETA-10/0067 with validity from 09.07.2010 to 08.07.2015

Remarks

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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SPECIFIC PARTS

1 Technical description of the product

1.1 General

This European Technical Assessment¹ (ETA) applies to the angle bracket “Wolf Binderwinkel (Wolf angle bracket)”. Wolf Binderwinkel is a one-piece angle bracket to be used in load-bearing timber-to-timber or timber-to-concrete connections. They are installed to members made of timber or wood-based products with special nails and to members made of concrete with suitable anchors.

1.2 Angle bracket

Wolf Binderwinkel is made of galvanised steel S280GD + Z275 according to EN 10346². There are two types of angle brackets, one with a slotted hole and one with a circular hole. The two types together with their most important dimensions are shown in Annex 2.

1.3 Nail

The nail to install the angle bracket is specified in Annex 1. The nail is in galvanised steel as well. No essential characteristic is assessed for the nail.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (thereafter EAD)

2.1 Intended use

The angle brackets are intended to be used in load bearing connections of timber structures as side grain to side grain connections, e.g. between beams and purlins, or as side grain to concrete connections.

The connection may be with a single angle bracket or with angle brackets on each side of the fastened timber member. The typical installation of the angle brackets is shown in Annex 3.

The angle brackets shall be subjected to static and quasi static actions only.

The angle brackets are intended to be used in service classes 1 and 2 according to EN 1995-1-1.

2.2 General assumptions

Wolf Binderwinkel is manufactured in accordance with the provisions of the European Technical Assessment using the manufacturing process as identified in the inspection of the manufacturing plant by Österreichisches Institut für Bautechnik and laid down in the technical file³.

It is the responsibility of the ETA holder to ensure that all necessary information on design and installation is submitted to those responsible for design and execution of the works constructed with Wolf Binderwinkel.

¹ The ETA-10/0067 was firstly issued in 2010 as European technical approval with validity from 09.07.2010 and converted in 2015 to the European Technical Assessment ETA-10/0067 of 09.07.2015.

² Reference documents are listed in Annex 6.

³ The technical file of the European Technical Assessment is deposited at Österreichisches Institut für Bautechnik and, in so far as is relevant to the tasks of the notified factory production control certification body involved in the assessment and verification of constancy of performance procedure, is handed over to the notified factory production control certification body.

Design

The European Technical Assessment only applies to the manufacture and use of the angle brackets. Verification of stability of the works including application of loads on the column bases is not subject of the European Technical Assessment.

The following conditions shall be observed:

- Design of connections with angle brackets is carried under the responsibility of an engineer experienced in timber structures.
- Design of the works shall account for the protection of the connections to maintain service class 1 or 2 according to EN 1995-1-1.
- The angle brackets are installed correctly.
- For the lifting force F_1 according to Annex 4 it shall be checked in accordance with EN 1995-1-1 that splitting will not occur.

Design of connections with angle brackets may be according to EN 1995-1-1 taking into account the Annexes of the European Technical Assessment. Standards and regulations in force at the place of use shall be considered.

Packaging, transport and storage

Wolf Binderwinkel shall be protected during transport and storage against any damage and detrimental moisture effects.

Installation

The manufacturer shall prepare installation instructions in which the product-specific characteristics and the most important measures to be taken into consideration for installation are described. The installation instructions shall be available at every construction site and shall be deposited at Österreichisches Institut für Bautechnik.

Installation shall be carried out by appropriately qualified personnel under the supervision of the person responsible for technical matters on site.

The angle brackets shall be fully nailed with nails as specified in Annex 1.

The structural members which are connected with the angle brackets shall

- be restrained against rotation, except for the loads F_{4e} and F_{5e} ,
- be strength class C24 or better,
- be free from wane under the bracket,
- have plane surfaces against the angle brackets,
- virtually have no gap between the timber members and
- be with minimum spacing and edge distances in accordance with EN 1995-1-1.

If the connection consists of an angle bracket on both sides of the fastened timber member, the angle brackets shall be installed with an offset of 1 cm.

Use, maintenance and repair

The assessment of the product is based on the assumption that maintenance is not required during the assumed working life.

In case of a severe damage of a connection with the angle brackets, actions regarding the mechanical resistance and stability of the works shall be initiated. Repair is in general done by replacement.

2.3 Working life/Durability

The provisions made in the European Technical Assessment (ETA) are based on an assumed intended working life of the construction product of 50 years, when installed in the works, provided that the product is subject to appropriate installation, use and maintenance (see Clause 2.2). These provisions are based upon the current state of the art and the available knowledge and experience⁴.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA nor by the Technical Assessment Body, but are regarded only as a means for choosing the appropriate 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

Table 1: Essential characteristics of the product and assessment methods

No	Essential characteristic	Assessment method	Expression of product performance
Basic Requirement 1: Mechanical resistance and stability ¹⁾			
1	Characteristic load bearing capacity ²⁾	3.2	Annex 5
2	Stiffness	No performance assessed	
3	Ductility in cyclic testing	No performance assessed	
4	Resistance to corrosion and deterioration ²⁾	3.2	3.1.1.4
5	Dimensional stability ²⁾	3.2	3.1.1.5
Basic Requirement 2: Safety in case of fire			
6	Reaction to fire ²⁾	3.2	3.1.2.1
7	Resistance to fire	No performance assessed	
Basic Requirement 3: Hygiene, health and the environment			
8	Content emission and/or release of dangerous substances	3.2	3.1.3.1
Basic Requirement 4: Safety and accessibility in use			
9	Same as BR 1		
Basic Requirement 5: Protection against noise			
--	No characteristic assessed		

⁴ The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

Basic Requirement 6: Energy economy and heat retention	
--	No characteristic assessed
Basic Requirement 7: Sustainable use of natural resources	
--	No characteristic assessed
1)	These characteristics also relate to BR 4.
2)	Declaration of performance and CE mark shall not indicate “no performance determined” – NPD – for that characteristic.

3.1 Essential characteristics of the product

3.1.1 Mechanical resistance and stability

3.1.1.1 Characteristic load bearing capacity

The characteristic load bearing capacities of the angle brackets are determined by testing. The angle brackets are fully nailed with nails of nominal dimensions 4.0 × 35 mm as specified in Annex 1. Kinematic restraints are defined in Annex 4.

The values of the characteristic load bearing capacities for the loading directions F_1 to F_5 as defined in Annex 4 are given in Annex 5.

If the angle brackets are connected to structural members made of concrete, anchors with stiff washers are used. For such connections the same load bearing capacities shall be used as for timber-to-timber connections given in Annex 5, provided the anchors are designed to exceed the load bearing capacities of the angle bracket to timber connections.

3.1.1.2 Stiffness

No performance has been assessed in relation to stiffness of the connection.

3.1.1.3 Ductility in cyclic testing

No performance has been assessed in relation to ductility of the connections under cyclic testing. Therefore the contribution to the performance of structures subject to cyclic loading under seismic actions has not been assessed.

3.1.1.4 Resistance to corrosion and deterioration

The product is intended to be used in service classes 1 and 2 according to EN 1995-1-1. The product and each member of the connection should at least be suitable for service classes 1 and 2, but not for service class 1 only.

In accordance with ETAG 015 and EN 1995-1-1 the angle brackets are made of galvanised steel S280GD + Z275 according to EN 10346.

3.1.1.5 Dimensional stability

The effects of dimensional changes on the timber structures due to varying moisture content was considered by the determination of the strength of the joints. The conditions of Clause 2.2 shall be observed.

3.1.2 Safety in case of fire

3.1.2.1 Reaction to fire

The angle brackets are made of steel classified as Euroclass A1 in accordance with Commission Decision 96/603/EC as amended.

3.1.3 Hygiene, health and environment

3.1.3.1 Content emission and/or release of dangerous substances

On dangerous substances the product complies with Guideline for European Technical Approval ETAG 015 “Three-dimensional nailing plates”, Edition November 2012, used as European Assessment Document. A manufacturer’s declaration to this effect has been submitted.

In addition to the specific clauses relating to dangerous substances contained in the 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.

3.2 Assessment methods

3.2.1 General

The assessment of Wolf Binderwinkel for the intended use in relation to the requirements for mechanical resistance and stability, for safety in case of fire, for hygiene, health and the environment and for safety and accessibility in use in the sense of the Basic Requirements 1, 2, 3 and 4 of Regulation (EU) № 305/2011 has been made in accordance with *Guideline for European Technical Approval ETAG № 015 “Three-dimensional nailing plates” used as European Assessment Document*.

3.2.2 Identification

The European Technical Assessment for Wolf Binderwinkel is issued on the basis of agreed data, deposited with Österreichisches Institut für Bautechnik, which identifies the product that has been assessed. Changes to materials, to the composition or to characteristics of the product, or to the production process, which could result in this deposited data being incorrect, should be immediately notified to Österreichisches Institut für Bautechnik before the changes are introduced. Österreichisches Institut für Bautechnik will decide whether or not such changes affect the European Technical Assessment, and, if so, whether further assessment or alterations to the European Technical Assessment are considered necessary.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

4.1 System of assessment and verification of constancy of performance

The manufacturer shall draw up the declaration of performance and determine the product-type on the basis of the assessments and verifications of constancy of performance carried out under the following system as laid down in the Commission Delegated Regulation (EU) № 568/2014 of 18 February 2014, Annex V, 1.3, referred to as System 2+. This system provides for:

(a) The manufacturer shall carry out:

- (i) an assessment of the performance of the construction product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of that product;
- (ii) factory production control;
- (iii) testing of samples taken at the manufacturing plant by the manufacturer in accordance with a prescribed test plan⁵.

⁵ The prescribed test plan has been deposited with Österreichisches Institut für Bautechnik and is handed over only to the notified factory production control certification body involved in the procedure for the assessment and verification of constancy of performance. The prescribed test plan is also referred to as control plan.

- (b) The notified factory production control certification body shall decide on the issuing, restriction, suspension or withdrawal of the certificate of conformity of the factory production control on the basis of the outcome of the following assessments and verifications carried out by that body:
- (i) initial inspection of the manufacturing plant and of factory production control;
 - (ii) continuing surveillance, assessment and evaluation of factory production control.

4.2 AVCP for construction products for which a European Technical Assessment has been issued

Manufacturers undertaking tasks under System 2+ shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of that product. Manufacturers shall therefore not undertake the tasks referred to in point 4.1 (a)(i).

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

5.1 Tasks for the manufacturer

5.1.1 Factory production control

At the manufacturing plant the manufacturer has implemented and continuously maintains a factory production control system. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. The factory production control system ensures that the performance of 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 prescribed test plan. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of incoming materials shall include control of inspection documents (comparison with nominal values) presented by the manufacturer of the raw materials by verifying the dimensions and determining the material properties.

The frequencies of controls and tests conducted during manufacturing and on the assembled product are defined by taking account of the manufacturing process of the product and are laid down in the prescribed test plan.

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

- Designation of the product, basic materials and components
- Type of control or test
- Date of manufacture of the product and date of testing of the product or basic materials or components
- Results of controls and tests and, if appropriate, comparison with requirements
- Name and signature of person responsible for factory production control

The records shall be kept at least for ten years time after the construction product has been placed on the market and shall be presented to the notified factory production control certification body involved in continuous surveillance. On request they shall be presented to Österreichisches Institut für Bautechnik.

5.1.2 Declaration of performance

The manufacturer is responsible for preparing the declaration of performance. When all the criteria of the assessment and verification of constancy of performance are met, including the certificate of conformity of the factory production control issued by the notified factory production control certification body, the manufacturer shall draw up a declaration of performance. No performance determined, NPD, shall not be declared for characteristics as given in Table 1.

5.2 Tasks for the notified factory production control certification body

5.2.1 Initial inspection of the manufacturing plant and of factory production control

The notified factory production control certification body shall ascertain that, in accordance with the prescribed test plan, the factory, in particular personnel and equipment, and the factory production control, are suitable to ensure a continuously and orderly manufacturing of Wolf Binderwinkel (Wolf angle bracket) with the specifications given in the specific parts as well as in the Annexes of the European Technical Assessment.

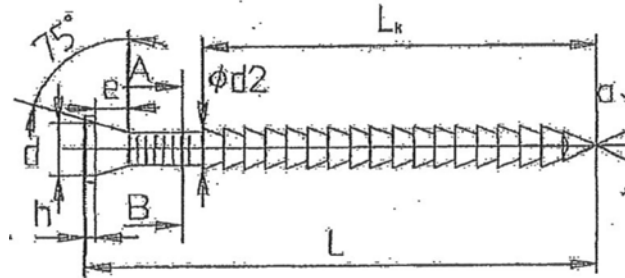
5.2.2 Continuing surveillance, assessment and evaluation of factory production control

The notified factory production control certification body shall visit the factory at least once a year for routine inspection. It shall be verified that the system of factory production control and the specified manufacturing process are maintained, taking account of the prescribed test plan. On demand the results of continuing surveillance shall be made available by the notified factory production control certification body to Österreichisches Institut für Bautechnik. When the provisions of the European Technical Assessment and the prescribed test plan are no longer fulfilled, the certificate of conformity of the factory production control shall be withdrawn.

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by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director



Special nail NFX-Norfix or an equivalent nail

Nominal diameter 4.0 mm

Nominal length 35.0 mm

Tensile strength $\geq 600 \text{ N/mm}^2$

Finish Zinc coating

Wolf Binderwinkel

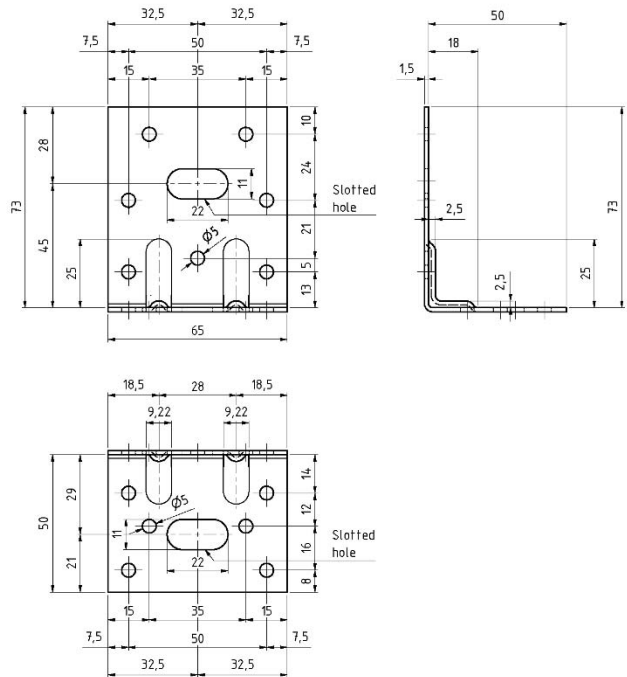
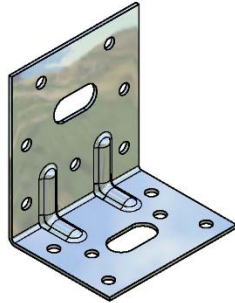
Annex 1

Fastener specification

of European Technical Assessment
ETA-10/0067 of 09.07.2015

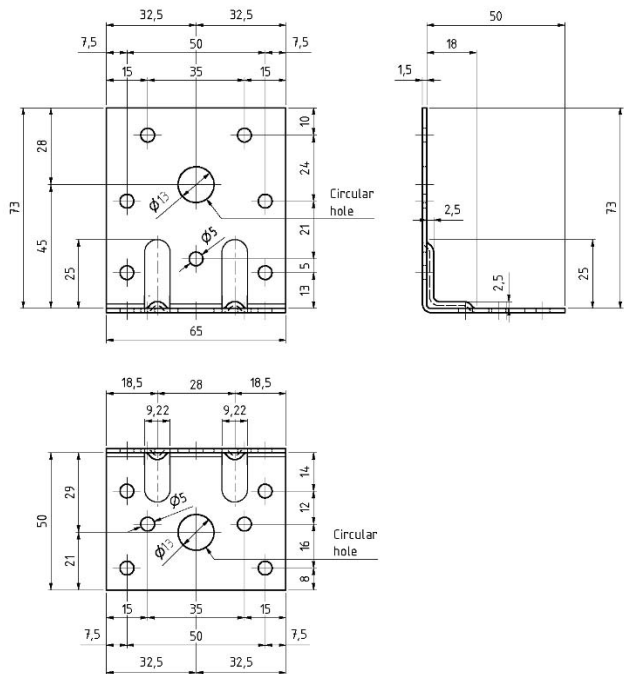
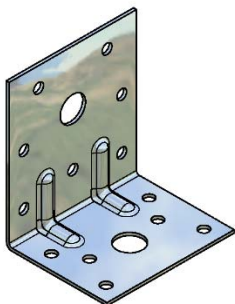
Wolf Binderwinkel – type with slotted hole 11 × 22 mm – Nominal dimensions

Bracket type: 50 × 73 × 65 mm
Thickness: s = 1,5 mm
Steel specification: S280GD
Zinc coating: Z275



Wolf Binderwinkel – type with circular hole Ø13 mm – Nominal dimensions

Bracket type: 50 × 73 × 65 mm
Thickness: s = 1,5 mm
Steel specification: S280GD
Zinc coating: Z275



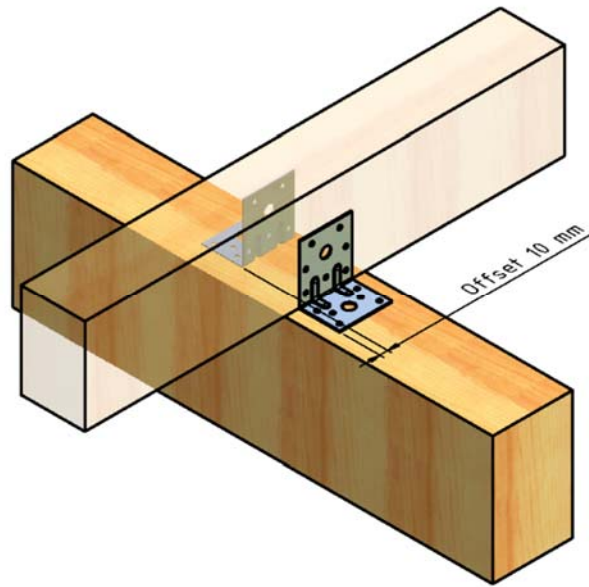
Dimensions in mm

Wolf Binderwinkel

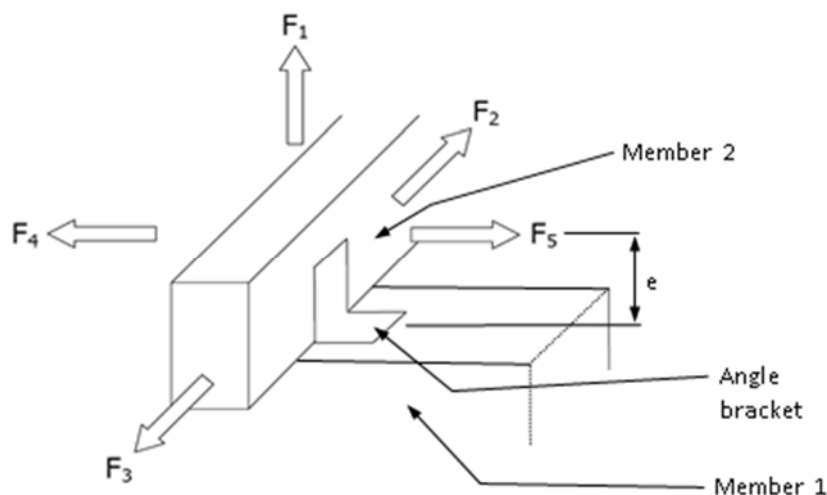
Annex 2

Product details definitions

of European Technical Assessment
ETA-10/0067 of 09.07.2015



Wolf Binderwinkel	Annex 3
Typical installation with two angle brackets	of European Technical Assessment ETA-10/0067 of 09.07.2015



Wooden structural components

Member 1 Purlin, solid wood, strength class C24 according to EN 338, $\geq 100 \times 160$ mm

Member 2 Beam, solid wood, strength class C24 according to EN 338, $\geq 36 \times 160$ mm

Instead of solid timber also equivalent glued laminated timber or wood based products may also be used. Member 1 may be of concrete.

Single angle bracket per connection

F_1 Wind suction, lifting force in the middle of the leg of the angle bracket. The members shall be prevented from rotation.

F_2 and F_3 Force acting in longitudinal direction of member 2. The members shall be prevented from rotation.

F_4 and F_5 Lateral force acting perpendicular to the axis of member 2. F_4 is the force away from the angle bracket and F_5 is the force towards the angle bracket. The members shall be prevented from rotation.

Two angle brackets per connection

F_1 Wind suction, lifting force in the middle of the two angle brackets. The members shall be prevented from rotation.

F_2 and F_3 Force acting in longitudinal direction of member 2. The members shall be prevented from rotation.

F_4 and F_5 Lateral force acting perpendicular to the axis of member 2. The members shall be prevented from rotation.

F_{4e} and F_{5e} Lateral force acting perpendicular to the axis of member 2 with eccentricity. Member 2 is not prevented from rotation.

Wolf Binderwinkel	Annex 4 of European Technical Assessment ETA-10/0067 of 09.07.2015
Definition of forces, their directions and eccentricities	

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Single angle bracket per connection

Direction of force	Characteristic load bearing capacity $F_{\max, \text{mod}, k}$
—	N
$F_{1,k}$	1 760
$F_{2,k}, F_{3,k}$	4 160
$F_{4,k}$	1 070
$F_{5,k}$	5 140

Two angle brackets per connection

Direction of force	Characteristic load bearing capacity $F_{\max, \text{mod}, k}$
—	N
$F_{1,k}$	2 710
$F_{2,k}, F_{3,k}$	11 370
$F_{4,k}, F_{5,k}$	5 700
$F_{4e,k}, F_{5e,k}$	2 190 ¹⁾
NOTE	
1) Excentricity $e \leq 80$ mm	

The characteristic load bearing capacities of the angle bracket connections are given for a characteristic density of 350 kg/m³. For timber or wood based material with a lower characteristic density than 350 kg/m³ the characteristic load bearing capacities shall be reduced by the factor k_{dens}

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

Where

- k_{dens} Factor to consider deviating densities
- ρ_k Characteristic density of timber in kg/m³

Wolf Binderwinkel	Annex 5
Characteristic load-bearing capacities	of European Technical Assessment ETA-10/0067 of 09.07.2015

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Guideline for European Technical Approval ETAG 015 “Three-dimensional nailing plates”,
Edition November 2012, used as European Assessment Document

EN 338 (10.2009) Structural timber – Strength classes

EN 1995-1-1 (11.2004) +AC (06.2006) +A1 (06.2008), Eurocode 5 – Design of timber
structures – Part 1-1: General – Common rules and rules for buildings

EN 10346 (03.2009), Continuously hot-dip coated steel flat products – Technical delivery
conditions

Commission Decision 96/603/EC of 4 October 1996 establishing the list of products belonging
to Classes A ‘No contribution to fire’ provided for in Decision 94/611/EC implementing Article
20 of Council Directive 89/106/EEC on construction products, Official Journal L 267 from
19.10.1996, page 23, amended by Commission Decision 2000/605/EC of 26 September 2000,
Official Journal L 258 from 12.10.2000 and Commission Decision 2003/424/EC of 6 June
2003, Official Journal L 144 from 12.6.2003

Wolf Binderwinkel	Annex 6
Reference documents	of European Technical Assessment ETA-10/0067 of 09.07.2015