

European Technical Approval ETA-13/0242

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

Zebra Blindniet 4,8 x L
Zebra blind rivet 4,8 x L

Zulassungsinhaber
Holder of approval

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Straße 12-17
74653 Künzelsau
DEUTSCHLAND

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

Blindniete für die Verwendung im Stahlleichtbau
Blindrivets for use in light steel structures

Geltungsdauer:
Validity: vom
from
bis
to

11 June 2013
11 June 2018

Herstellwerk
Manufacturing plant

Werk 27
Werk 28
Plant 27
Plant 28

Diese Zulassung umfasst
This Approval contains

13 Seiten einschließlich 6 Anhänge
13 pages including 6 annexes

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, as amended by Article 2 of the law of 8 November 2011⁵;*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
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- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

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

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product/ products and intended use

1.1 Definition of the construction product

The products is the blind rivet Zebra Blind Rivet 4,8 x L made of aluminium (sleeve) and carbon steel or stainless steel (mandrel). Samples of blind rivets and a corresponding connection are shown in Annex 1. For details see the Annexes 2 to 6.

The Zebra Blind Rivets 4,8 x L and the corresponding connections are subject to tension and/or shear forces. Possible failure modes of connections made with the blind rivets are described in Annex 1.

1.2 Intended use

The Zebra Blind Rivets 4,8 x L are intended to be used for fastening steel or aluminium sheeting to steel or aluminium supporting structures according to Table 1. The sheeting can either be used as wall or roof cladding or as load bearing wall and roof element.

The Zebra Blind Rivets 4,8 x L can also be used for the fastening of other thin gauge metal members.

The intended use comprises Zebra Blind Rivets 4,8 x L and connections for indoor and outdoor applications. Zebra Blind Rivets 4,8 x L which are intended to be used in external environments with high or very high corrosion category are usually made of aluminium and stainless steel.

The intended use comprises connections with predominantly static loads (e.g. wind loads, dead loads).

The provisions made in this European technical approval are based on an assumed working life of the Zebra Blind Rivets 4,8 x L for the intended use of 25 years when installed in the works or 50 years if the Zebra Blind Rivets 4,8 x L are not accessible after installation and they are sufficiently protected against corrosion. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

Table 1 Material of the components to be connected

Annex	Sheeting component I	Supporting structure component II
Annex 2	Steel S280GD to S350GD	Steel S235 or S280GD to S350GD
Annex 3	Aluminium alloy with $R_m \geq 215 \text{ N/mm}^2$	Steel S235 or S280GD to S350GD
Annex 4	Aluminium alloy with $R_m \geq 165 \text{ N/mm}^2$	Steel S235 or S280GD to S350GD
Annex 5	Aluminium alloy with $R_m \geq 215 \text{ N/mm}^2$	Aluminium alloy with $R_m \geq 215 \text{ N/mm}^2$
Annex 6	Aluminium alloy with $R_m \geq 165 \text{ N/mm}^2$	Aluminium alloy with $R_m \geq 165 \text{ N/mm}^2$

2 Characteristics of product and methods of verification

2.1 Characteristics of product

The Zebra Blind Rivets 4,8 x L shall correspond to the drawings given in the Annexes.

The characteristic material values, dimensions and tolerances of the Zebra Blind Rivets 4,8 x L neither indicated in this section nor in the Annexes shall correspond to the respective values laid down in the technical documentation⁷ to this European technical approval.

The characteristic values of the shear and tension resistance of the connections made with the Zebra Blind Rivets 4,8 x L are given in the appropriate Annexes or in section 4.2.

The Zebra Blind Rivets 4,8 x L are considered to satisfy the requirements of performance class A1 of the characteristic reaction to fire.

2.2 Methods of verification

The assessment of the fitness of the Zebra Blind Rivets 4,8 x L for the intended use in relation to the Essential Requirements ER 1 (Mechanical resistance and stability), ER 2 (Safety in case of fire), ER 4 (Safety in use) and additional aspects of durability has been made in accordance with section 3.2 of the Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶.

The assessment of the resistance to fire performance is only relevant to the assembled system (blind rivets, sheeting, supporting structure) which is not part of the ETA.

The Zebra Blind Rivets 4,8 x L are considered to satisfy the requirements of performance class A 1 of the characteristic reaction to fire, in accordance with the provisions of the EC Decision 96/603/EC (as amended) without the need for testing on the basis of its listing in that decision.

Concerning Essential Requirements No. 1 (Mechanical resistance and stability) and No. 4 (Safety in use) the following applies:

The characteristic values of resistance given in the Annexes were determined by shear and tension tests.

The formulas to calculate the design resistance are given in clause 4.2.1.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the Decision 99/92/EC of the European Commission⁸ system 2+ of the attestation of conformity applies.

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

(a) Tasks for the manufacturer:

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

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

⁸ Official Journal of the European Communities L 80 of 18.03.1998

(b) Tasks for the approved body:

(4) certification of factory production control on the basis of:

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

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

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

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

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

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

3.2.1.2 Other tasks for the manufacturer

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

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

3.2.2 Tasks for the approved bodies

The approved body shall perform the

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

in accordance with the provisions laid down in the control plan.

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

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

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

⁹ The control plan is a confidential part of the European technical approval and only handed over to the approved bodies involved in the procedure of attestation of conformity. See section 3.2.2.

3.3 CE marking

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

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

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

4.1 Manufacturing

The Zebra Blind Rivets 4,8 x L are manufactured in accordance with the provisions of the European technical approval using the manufacturing process as laid down in the technical documentation.

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

4.2 Design

For the corrosion protection of the Zebra Blind Rivets 4,8 x L and therewith executed connections the rules given in EN 1090-2:2008 + A1:2011, EN 1993-1-3:2006 + AC:2009 and EN 1993-1-4:2006 are taken into account.

For the types of connection (a, b, c, d) listed in the Annexes it is not necessary to take into account the effect of constraints due to temperature. For other types of connection it shall be considered for design unless constraining forces due to temperature do not occur or are not significant (e. g. sufficient flexibility of the structure).

The loading is predominantly static. (Remark: Wind loads are regarded as predominantly static.) Dimensions, material properties and nominal material thicknesses t_1 and t_{II} as stated in the ETA or in the Annexes are observed.

The verification concept stated in EN 1990:2002 + A1:2005 + A1:2005/AC:2010 is used for the design of the connections made with the Zebra Blind Rivets 4,8 x L. The characteristic values (shear and tension resistance) stated in the Annexes are used for the design of the entire connections.

The following formulas are used to calculate the values of design resistance:

$$N_{Rd} = \frac{N_{Rk}}{\gamma_M}$$

$$V_{Rd} = \frac{V_{Rk}}{\gamma_M}$$

The recommended partial safety factor $\gamma_M = 1.33$ is used in order to determine the corresponding design resistances, provided no values are given in national regulations of the member state in which the Zebra Blind Rivets 4,8 x L are used or in the respective National Annex to Eurocode 3. In case of combined tension and shear forces the linear interaction formula according to EN 1993-1-3:2006 + AC:2009, section 8.3 (8) is taken into account.

$$\frac{N_{Sd}}{N_{Rd}} + \frac{V_{Sd}}{V_{Rd}} \leq 1.0$$

The possibly required reduction of the tension resistance (pull-through resistance) due to the position of the blind rivet is taken into account:

- in accordance with EN 1993-1-3:2006, section 8.3 (7) and Fig. 8.2 (component I is made of steel) or EN 1999-1-4:2007 + A1:2011, section 8.1 (6) and Table 8.3 (component I is made of aluminium),
- of 0,7 if the supporting structure is an asymmetric profile (e.g. Z-profile) with $t_{II} < 5$ mm

4.3 Installation

The installation is only carried out according to the manufacturer's instructions. The manufacturer hands over the assembly instructions to the assembler.

It is guaranteed by the execution that no bimetallic corrosion will occur.

The components I and II are directly connected to each other so that the Zebra Blind Rivets 4,8 x L do not get additional bending.

The Zebra Blind Rivets 4,8 x L are fixed rectangular to the surface of the components to guarantee a correct load bearing and if necessary rain-proof connection.

The manufacturer's instruction to the clamping length is taken into account.

The conformity of the installed Zebra Blind Rivets 4,8 x L with the provisions of the ETA is attested by the executing company.

5 Indications to the manufacturer

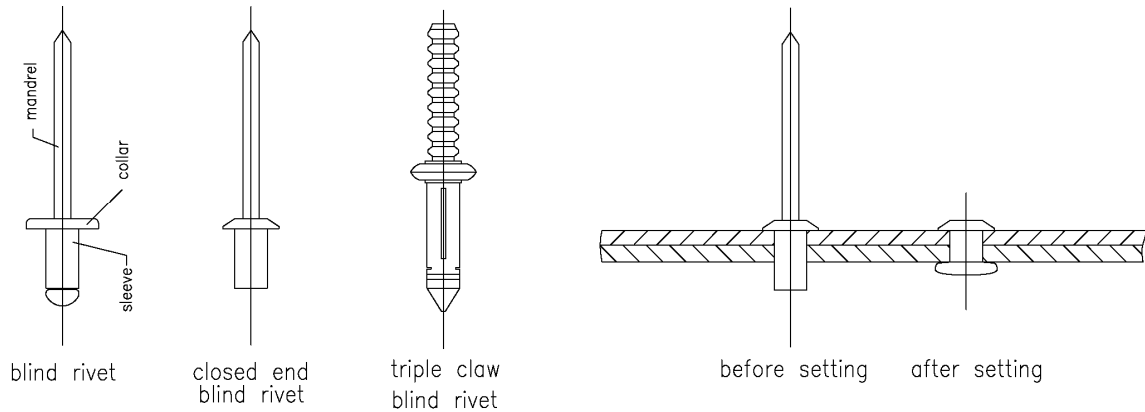
It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1, 2, 4.2 and 4.3 (including Annexes referred to) is given to those who are concerned. This information may be given by reproduction of the respective parts of the European technical approval.

In addition all installation data (hole diameter, clamping length, application limits) shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

Andreas Kummerow
p. p. Head of Department

beglaubigt:
Ulbrich

Samples for blind rivets and a corresponding connection



Types of connection

Types of connection			
Type a	Type b	Type c	Type d
Single connection	Side lap connection	End overlap connection	Side lap + end overlap connection

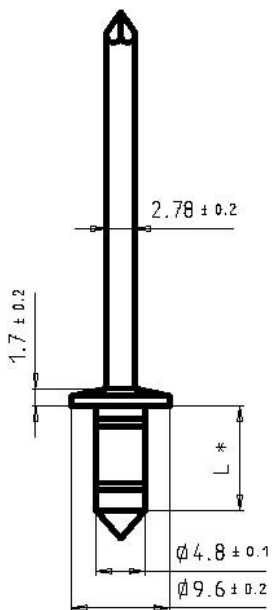
Possible failure modes of connections

Component	Tensile load	Shear load
Blind rivet	Tensile fracture	Shear fracture
Component I	Pull-through	Hole elongation
Component II	Pull-out of rivet	Hole elongation

Zebra blind rivet 4,8 x L

Samples for blind rivets and a corresponding connection
Types of connection
Possible failure modes of connections

Annex 1



*) L = depending from clamping range

Material

Sleeve: Aluminium AlMg2,5 – EN 573

Mandrel: Steel galvanised or stainless steel

Component I: S280GD to S350GD – EN 10346

Component II: S235 – EN 10025-1
S280GD to S350GD – EN 10346

Pre-drill diameter: Ø 4,9 – 5,1 mm

Thickness Component II t_{II} [mm]:

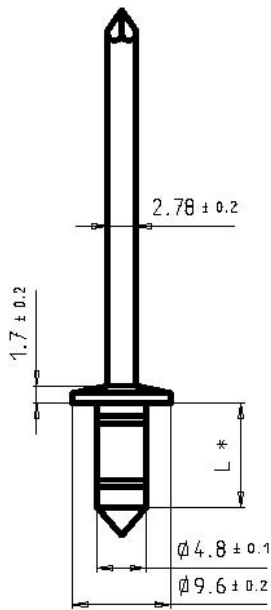
		0,40	0,50	0,55	0,63	0,75	0,88	1,00	1,13	1,25	1,50	2,00
Thickness Component I t_I [mm]:	Shear load $V_{R,k}$ [kN]	0,40	1,09 a)	1,09 a)	1,09 a)	1,09 a)	1,09 a)	1,09 a)	1,09 a)	1,09 a)	1,09 a)	1,09 a)
		0,50	1,09 a)	1,37 a)	1,37 a)	1,37 a)	1,37 a)	1,37 a)	1,37 a)	1,37 a)	1,37 a)	1,37 a)
		0,55	1,09 a)	1,37 a)	1,38 —	1,38 —	1,38 —	1,38 —	1,38 —	1,38 —	1,38 —	1,38 —
		0,63	1,09 a)	1,37 a)	1,38 —	1,40 —	1,40 —	1,40 —	1,40 —	1,40 —	1,40 —	1,40 —
		0,75	1,09 a)	1,37 a)	1,38 —	1,40 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —
		0,88	1,09 a)	1,37 a)	1,38 —	1,40 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —
		1,00	1,09 a)	1,37 a)	1,38 —	1,40 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —
		1,13	1,09 a)	1,37 a)	1,38 —	1,40 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —
		1,25	1,09 a)	1,37 a)	1,38 —	1,40 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —
		1,50	1,09 a)	1,37 a)	1,38 —	1,40 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —
		1,75	1,09 a)	1,37 a)	1,38 —	1,40 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —
	2,00	1,09 a)	1,37 a)	1,38 —	1,40 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —	1,60 —	
Thickness Component I t_I [mm]:	Tension load $N_{R,k}$ [kN]	0,40	0,50 a)	0,55 a)	0,68 —	0,83 a)	0,83 a)	0,83 a)	0,83 a)	0,83 a)	0,83 a)	0,83 a)
		0,50	0,50 a)	0,55 a)	0,68 —	0,90 —	1,02 a)	1,02 a)	1,02 a)	1,02 a)	1,02 a)	1,02 a)
		0,55	0,50 a)	0,55 a)	0,68 —	0,90 —	1,09 —	1,09 —	1,09 —	1,09 —	1,09 —	1,09 —
		0,63	0,50 a)	0,55 a)	0,68 —	0,90 —	1,10 —	1,20 —	1,20 —	1,20 —	1,20 —	1,20 —
		0,75	0,50 a)	0,55 a)	0,68 —	0,90 —	1,10 —	1,30 —	1,30 —	1,30 —	1,30 —	1,30 —
		0,88	0,50 a)	0,55 a)	0,68 —	0,90 —	1,10 —	1,40 —	1,40 —	1,40 —	1,40 —	1,40 —
		1,00	0,50 a)	0,55 a)	0,68 —	0,90 —	1,10 —	1,50 —	1,50 —	1,50 —	1,50 —	1,50 —
		1,13	0,50 a)	0,55 a)	0,68 —	0,90 —	1,10 —	1,50 —	1,60 —	1,60 —	1,60 —	1,60 —
		1,25	0,50 a)	0,55 a)	0,68 —	0,90 —	1,10 —	1,50 —	1,70 —	1,70 —	1,70 —	1,70 —
		1,50	0,50 a)	0,55 a)	0,68 —	0,90 —	1,10 —	1,50 —	1,80 —	1,80 —	1,90 —	1,90 —
		1,75	0,50 a)	0,55 a)	0,68 —	0,90 —	1,10 —	1,50 —	1,80 —	1,80 —	1,90 —	1,90 —
	2,00	0,50 a)	0,55 a)	0,68 —	0,90 —	1,10 —	1,50 —	1,80 —	1,80 —	1,90 —	1,90 —	

If component I and component II are made of S320GD or S350GD the values marked with a) may be increased by 8,0 %

Zebra blind rivet 4,8 x L

Component I made of steel
Component II made of steel

Annex 2



*) L = depending on clamping range

Material

Sleeve: Aluminium AlMg2,5 – EN 573
Steel grade 3.3523
Mandrel: Steel galvanised or stainless steel
Component I: Aluminium alloy
with $R_m \geq 215 \text{ N/mm}^2$ – EN 573
Component II: S235 – EN 10025-1
S280GD to S350GD – EN 10346

Pre-drill diameter: $\varnothing 4,9 - 5,1 \text{ mm}$

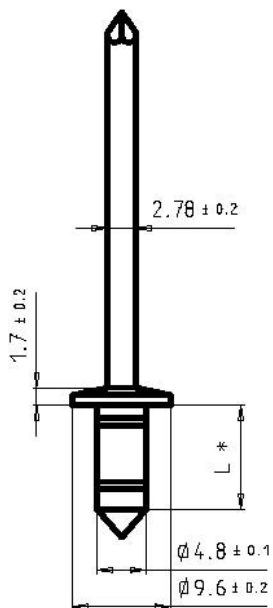
		Thickness Component II t_{II} [mm]									
		0,50	0,63	0,75	0,88	1,00	1,13	1,25	1,50	2,00	
Thickness Component I t_I [mm]	Shear load $V_{R,k}$ [kN]	0,50	0,86 -	0,86 -	0,86 -	0,86 -	0,86 -	0,86 -	0,86 -	0,86 -	0,86 -
		0,60	0,86 -	1,07 -	1,07 -	1,07 -	1,07 -	1,07 -	1,07 -	1,07 -	1,07 -
		0,70	0,86 -	1,13 -	1,27 -	1,27 -	1,27 -	1,27 -	1,27 -	1,27 -	1,27 -
		0,80	0,86 -	1,13 -	1,48 -	1,48 -	1,48 -	1,48 -	1,48 -	1,48 -	1,48 -
		0,90	0,86 -	1,13 -	1,48 -	1,58 -	1,60 -	1,60 -	1,60 -	1,60 -	1,60 -
		1,00	0,86 -	1,13 -	1,48 -	1,58 -	1,60 -	1,60 -	1,60 -	1,60 -	1,60 -
		1,20	0,86 -	1,13 -	1,48 -	1,58 -	1,60 -	1,60 -	1,60 -	1,60 -	1,60 -
		1,50	0,86 -	1,13 -	1,48 -	1,58 -	1,60 -	1,60 -	1,60 -	1,60 -	1,60 -
		2,00	0,86 -	1,13 -	1,48 -	1,58 -	1,60 -	1,60 -	1,60 -	1,60 -	1,60 -
		Thickness Component I t_I [mm]									
Tension load $N_{R,k}$ [kN]		0,55 a)	0,90	1,10	1,50	1,80	1,80	1,90	1,90	1,90	

If component II is made of S320GD or S350GD the values marked with a) may be increased by 8%

Zebra blind rivet 4,8 x L

Component I made of aluminium
Component II made of steel

Annex 3



*) L = depending on clamping range

Material

Sleeve: Aluminium AlMg2,5 – EN 573
Steel grade 3.3523

Mandrel: Steel galvanised or stainless steel

Component I: Aluminium alloy
with $R_m \geq 165 \text{ N/mm}^2$ – EN 573

Component II: S235 – EN 10025-1
S280GD to S350GD – EN 10346

Pre-drill diameter: Ø 4,9 – 5,1 mm

Thickness Component II t_{II} [mm]

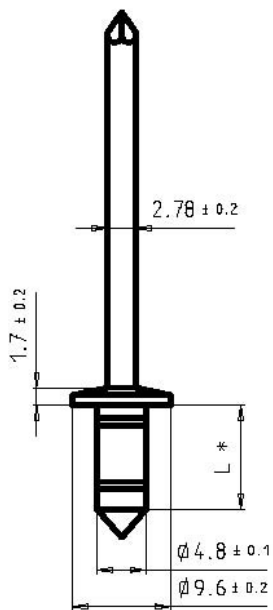
		0,50	0,63	0,75	0,88	1,00	1,13	1,25	1,50	2,00
Thickness Component I t_I [mm]	Shear load $V_{R,k}$ [kN]	0,50	0,66 -	0,66 -	0,66 -	0,66 -	0,66 -	0,66 -	0,66 -	0,66 -
		0,60	0,66 -	0,82 -	0,82 -	0,82 -	0,82 -	0,82 -	0,82 -	0,82 -
		0,70	0,66 -	0,87 -	0,97 -	0,97 -	0,97 -	0,97 -	0,97 -	0,97 -
		0,80	0,66 -	0,87 -	1,05 -	1,13 -	1,13 -	1,13 -	1,13 -	1,13 -
		0,90	0,66 -	0,87 -	1,05 -	1,26 -	1,29 -	1,29 -	1,29 -	1,29 -
		1,00	0,66 -	0,87 -	1,05 -	1,26 -	1,44 -	1,44 -	1,44 -	1,44 -
		1,20	0,66 -	0,87 -	1,05 -	1,26 -	1,44 -	1,54 -	1,60 -	1,60 -
		1,50	0,66 -	0,87 -	1,05 -	1,26 -	1,44 -	1,54 -	1,60 -	1,60 -
		2,00	0,66 -	0,87 -	1,05 -	1,26 -	1,44 -	1,54 -	1,60 -	1,60 -
Thickness Component I t_I [mm]	Tension load $N_{R,k}$ [kN]		0,55 a)	0,90	1,10	1,50	1,80	1,80	1,90	1,90

If component II is made of S320GD or S350GD the values marked with a) may be increased by 8%

Zebra blind rivet 4,8 x L

Component I made of aluminium
Component II made of steel

Annex 4



*) L = depending on clamping range

Material

Sleeve: Aluminium AlMg2,5 – EN 573
Steel grade 3.3523

Mandrel: Steel galvanised or stainless steel

Component I: Aluminium alloy
with $R_m \geq 215 \text{ N/mm}^2$ – EN 573

Component II: Aluminium alloy
with $R_m \geq 215 \text{ N/mm}^2$ – EN 573

Pre-drill diameter: $\varnothing 4,9 - 5,1 \text{ mm}$

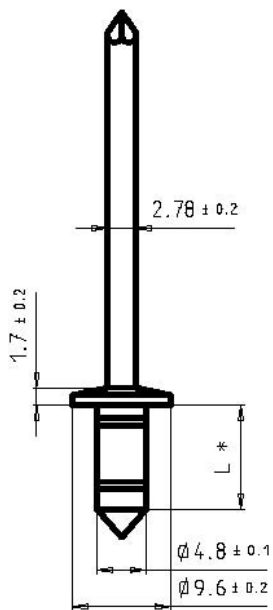
Thickness Component II t_{II} [mm]

		0,50	0,60	0,70	0,80	0,90	1,00	1,20	1,50	2,00
Thickness Component I t_I [mm]	Shear load $V_{R,k}$ [kN]	0,50	0,86 -	0,86 -	0,86 -	0,86 -	0,86 -	0,86 -	0,86 -	0,86 -
		0,60	0,86 -	1,07 -	1,07 -	1,07 -	1,07 -	1,07 -	1,07 -	1,07 -
		0,70	0,86 -	1,07 -	1,27 -	1,27 -	1,27 -	1,27 -	1,27 -	1,27 -
		0,80	0,86 -	1,07 -	1,27 -	1,48 -	1,48 -	1,48 -	1,48 -	1,48 -
		0,90	0,86 -	1,07 -	1,27 -	1,48 -	1,60 -	1,60 -	1,60 -	1,60 -
		1,00	0,86 -	1,07 -	1,27 -	1,48 -	1,60 -	1,60 -	1,60 -	1,60 -
		1,20	0,86 -	1,07 -	1,27 -	1,48 -	1,60 -	1,60 -	1,60 -	1,60 -
		1,50	0,86 -	1,07 -	1,27 -	1,48 -	1,60 -	1,60 -	1,60 -	1,60 -
		2,00	0,86 -	1,07 -	1,27 -	1,48 -	1,60 -	1,60 -	1,60 -	1,60 -
Thickness Component I t_I [mm]	Tension load $N_{R,k}$ [kN]		0,31	0,40	0,51	0,61	0,84	1,06	1,29	1,29

Zebra blind rivet 4,8 x L

Component I made of aluminium
Component II made of aluminium

Annex 5



*) L = depending on clamping range

Material

Sleeve: Aluminium AlMg2,5 – EN 573
Steel grade 3.3523

Mandrel: Steel galvanised or stainless steel

Component I: Aluminium alloy
with $R_m \geq 165 \text{ N/mm}^2$ – EN 576

Component II: Aluminium alloy
with $R_m \geq 165 \text{ N/mm}^2$ – EN 576

Pre-drill diameter: $\varnothing 4,9 - 5,1 \text{ mm}$

Thickness Component II t_{II} [mm]

		0,50	0,60	0,70	0,80	0,90	1,00	1,20	1,50	2,00
Thickness Component I t_I [mm]	Shear load $V_{R,k}$ [kN]	0,50	0,60	0,70	0,80	0,90	1,00	1,20	1,50	2,00
		0,66 -	0,66 -	0,66 -	0,66 -	0,66 -	0,66 -	0,66 -	0,66 -	0,66 -
		0,66 -	0,82 -	0,82 -	0,82 -	0,82 -	0,82 -	0,82 -	0,82 -	0,82 -
		0,66 -	0,82 -	0,97 -	0,97 -	0,97 -	0,97 -	0,97 -	0,97 -	0,97 -
		0,66 -	0,82 -	0,97 -	1,13 -	1,13 -	1,13 -	1,13 -	1,13 -	1,13 -
		0,66 -	0,82 -	0,97 -	1,13 -	1,29 -	1,29 -	1,29 -	1,29 -	1,29 -
		0,66 -	0,82 -	0,97 -	1,13 -	1,29 -	1,44 -	1,44 -	1,44 -	1,44 -
		0,66 -	0,82 -	0,97 -	1,13 -	1,29 -	1,44 -	1,60 -	1,60 -	1,60 -
		0,66 -	0,82 -	0,97 -	1,13 -	1,29 -	1,44 -	1,60 -	1,60 -	1,60 -
	0,66 -	0,82 -	0,97 -	1,13 -	1,29 -	1,44 -	1,60 -	1,60 -	1,60 -	
Thickness Component I t_I [mm]	Tension load $N_{R,k}$ [kN]	0,24	0,32	0,39	0,47	0,64	0,81	0,99	0,99	0,99

Zebra blind rivet 4,8 x L

Component I made of aluminium
Component II made of aluminium

Annex 6