Deutsches Institut für Bautechnik
DIBt

Member of EOTA
www.eota.eu

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-18/0708 of 1 April 2019

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	BeA/KMR staples d=1,55mm, d=1,8mm and d=2,02mm - with gold coating
Product family to which the construction product belongs	Dowel-type fasteners with resin coating
Manufacturer	Joh. Friedrich Behrens AG Bogenstraße 43-45 22926 Ahrensburg DEUTSCHLAND
Manufacturing plant	Joh. Friedrich Behrens AG
This European Technical Assessment contains	12 pages including 3 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	EAD 130019-00-0603

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

Specific Part

1 Technical description of the product

BeA/KMR Staples d=1,55mm, d=1,8mm and d=2,02mm with gold coating are dowel type fasteners made of non-alloy steel rods according to EN ISO 16120[1] for timber constructions. The staples have a special resin coating over their entire length.

The diameters of the staple legs are d=1,55mm +0/- 0,02mm, d=1,8mm +0/- 0,02 mm or d=2,02mm +0,02/- 0,01 mm. Further dimensions are shown in Annex 1.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the BeA/KMR Staples d=1,55mm, d=1,8mm and d=2,02mm with gold coating are used in compliance with the specifications and conditions given in Annex 2.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of BeA/KMR Staples d=1,55mm, d=1,8mm and d=2,02mm with gold coating of at least 50 years. 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.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Dimensions	See Annex 1
Characteristic yield moment	See Annex 3
Withdrawal capacity for short-term and medium-term loads	See Annex 3
Withdrawal capacity for long term and permanent loads	See Annex 3
Characteristic head pull-through parameter	See Annex 3
Minimum tensile strength of the wire	See Annex 3
Minimum and maximum thickness of the connected material	See Annex 3
Durability against corrosion	See Annex 2
Durability of the resin coating	See Annex 2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Euroclass A1

3.3 Safety and accessibility in use (BWR 4)

The essential characteristics of BWR 4 have been covered by BWR 1.

[1] EN ISO 16120:2011 Non–alloy steel wire rod for conversation to wire (all parts)

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

In accordance with EAD No.130019-00-0603, the applicable European legal act is: [1997/176/EC(EU)].

The system to be applied is: 3

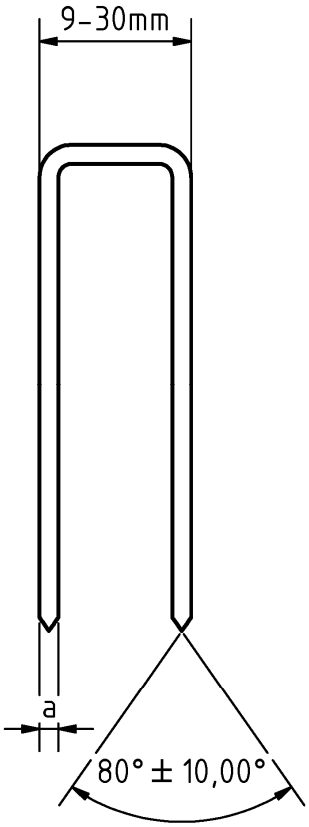
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

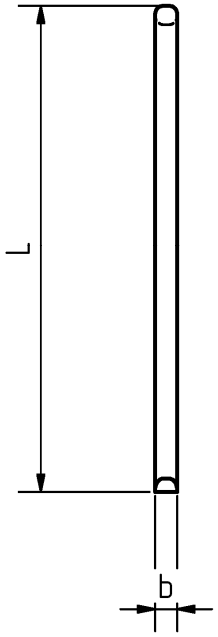
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 1 April 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Baumann



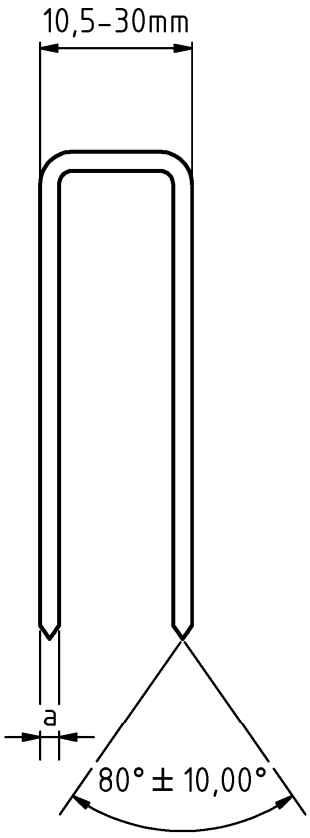


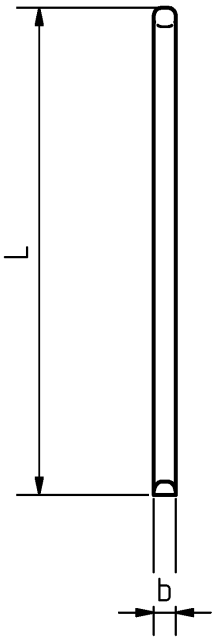
		Size	Tolerance
Raw-wire		1,55	+0/-0,02
flattened wire	a	1,44	±0,03
	b	1,57	±0,02

Length L		min	tolerance total
Nominal size	approx.	L	
mm	inch	mm	mm
30	1 3/16	29,7	±0,3
32	1 1/4	31,7	±0,3
35	1 3/8	34,6	±0,4
38	1 1/2	37,6	±0,4
40	1 5/8	39,6	±0,4
45	1 3/4	44,5	±0,5
50	2	49,5	±0,5
55	2 5/32	54,4	±0,6
56	2 5/32	55,4	±0,6
60	2 3/8	59,4	±0,6
65	2 5/8	64,3	±0,7
70	2 3/4	69,3	±0,7
75	3	74,3	±0,7
80	3 1/6	79,3	±0,7
85	3 1/3	84,3	±0,7
90	3 9/16	89,3	±0,7

Non-alloy steel rod in accordance with EN ISO 16120
Tensile-strength min. 900N/mm²
Resin coating Typ 3 (DIN EN 14592:2008+A1:2012) -- over their entire length
Galavanized with a zinc-thickness of 12µ

BeA/KMR staples d=1,55mm, d=1,8mm und d=2,02mm - with gold coating	Annex 1.1
Product description: BeA staple with golden coating: 155 VZHZ; 146 VZHZ KMR staple with golden coating: KG700 Galv; G Galv	



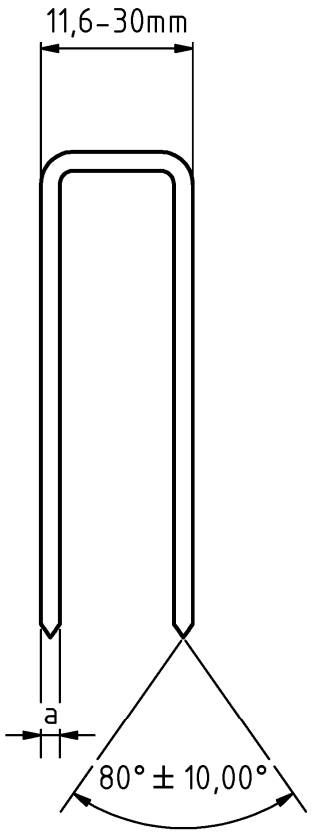


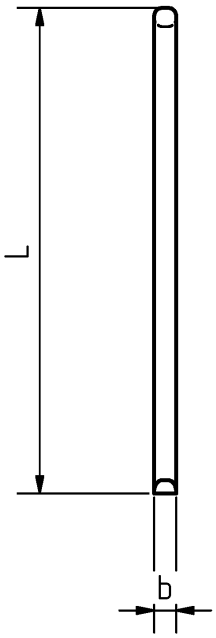
		Size	Tolerance
Raw-wire		1,8	+0/-0,02
flattened wire	a	1,63	±0,03
	b	1,84	±0,02

Length L		min	tolerance total
Nominal size	approx.	L	
mm	inch	mm	mm
30	1 3/16	29,7	±0,3
32	1 1/4	31,7	±0,3
35	1 3/8	34,6	±0,4
38	1 1/2	37,6	±0,4
40	1 5/8	39,6	±0,4
45	1 3/4	44,5	±0,5
50	2	49,5	±0,5
55	2 5/32	54,4	±0,6
56	2 5/32	55,4	±0,6
60	2 3/8	59,4	±0,6
65	2 5/8	64,3	±0,7
70	2 3/4	69,3	±0,7
75	3	74,3	±0,7
80	3 1/6	79,3	±0,7
85	3 1/3	84,3	±0,7
90	3 9/16	89,3	±0,7

Non-alloy steel rod in accordance with EN ISO 16120
Tensile-strength min. 900N/mm²
Resin coating Typ 3 (DIN EN 14592:2008+A1:2012) -- over their entire length
Galavanized with a zinc-thickness of 12µ

BeA/KMR staples d=1,55mm, d=1,8mm und d=2,02mm - with gold coating	Annex 1.2
Product description: BeA staple with golden coating: 180 VZHZ KMR staple with golden coating: Q Galv	





		Size	Tolerance
Raw-wire		2,02	+0,02/-0,01
flattened wire	a	1,84	±0,03
	b	2,12	±0,02

Length L		min	tolerance total
Nominal size	approx.	L	
mm	inch	mm	mm
40	1 5/8	39,5	±0,5
45	1 3/4	44,5	±0,5
50	2	49,5	±0,5
55	2 5/32	54,5	±0,5
60	2 3/8	59,5	±0,5
63	2 7/16	62,5	±0,5
65	2 5/8	64,5	±0,5
70	2 3/4	69,5	±0,5
75	3	74,5	±0,5
80	3 1/6	79,5	±0,5
85	3 1/3	84,5	±0,5
90	3 9/16	89,5	±0,5
100	4	99,5	±0,5
105	4 2/15	104,5	±0,5
110	4 3/8	109,5	±0,5
120	4 3/4	119,5	±0,5
130	5 1/8	129,5	±0,5
150	5 9/10	149,5	±0,5
160	6 1/3	159,5	±0,5
170	6 7/10	169,5	±0,5

Non-alloy steel rod in accordance with EN ISO 16120
Tensile-strength min. 900N/mm²
Resin coating Typ 3 (DIN EN 14592:2008+A1:2012) -- over their entire length
Galavanized with a zinc-thickness of 12µ

BeA/KMR staples d=1,55mm, d=1,8mm und d=2,02mm - with gold coating

Annex 1.3

Product description:
BeA staple with golden coating: 200 VZHZ; 240 VZHZ
KMR staple with golden coating: SD Galv; BS Galv

Deutsches Institut für Bautechnik DIBt

Annex 2 Specifications of intended use

A.2.1 Loading

- Static and quasi-static loads (not relevant to fatigue)
- Short-, medium-,longterm and permanent load duration withdrawal as well as shear

A.2.2 Connection material

BeA/KMR Staples Type d=1,55mm, d=1,8mm, d=2,02mm with gold coating are used for load bearing connections of the following material.

Material for base building components

- Solid timber (softwood) according to EN 338[1]/ EN 14081-1[2],
- Glued laminated timber (softwood) according to EN 14080[3],
- Glued solid timber according to EN 14080,
- Laminated veneer lumber LVL according to EN 14374[4],
- Cross-laminated timber according to European technical approvals/assessments or national provisions that apply at the installation site.

Material for connected building components

- Oriented Strand Board (OSB) according to EN 300[5] and EN 13986[6],
- Plywood according to EN 636[7] and EN 13986,
- Cement-bonded particle boards according to EN 634-2[8] and EN 13986,
- Fibreboards according to EN 622-2[9], EN 622-3[10] and EN 13986,
- Laminated veneer lumber LVL according to EN 13986 in connection with EN 14279[11] or EN 14374,
- Solid-wood panels according to EN 13353[12] and EN 13986,
- Gypsum boards according to EN 520[13], density ρ ≥ 680 kg/m³ but without Typ D,
  Gypsum boards Typ D with a density of ρ ≥ 800 kg/m³
- Gypsum boards with mat reinforcement according to EN 15283-1[14] and Gypsum fibre boards according to EN 15283-2[15]
- Fibre-cement flat sheets – Product specification and test methods according to EN 12467[16]
- Thermal insultation products for buildings – Factory made wood fibre (WF) products – Specification according to EN 13171[17]

1	EN 338:2016	Timber structures - Strength classes
2	EN 14081-1:2016	Timber structures – Strength graded structural timber with rectangular cross section – Part 1: General requirements
3	EN 14080:2013	Timber structures - Glued laminated timber and glued solid timber - Requirements
4	EN 14374:2004	Timber structures - Structural laminated veneer lumber - Requirements
5	EN 300:2006	Oriented strand boards (OSB) – Definition, classification and specifications
6	EN 13986:2004+A1:2015	Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking
7	EN 636:2012+A1:2015	Plywood - Specifications
8	EN 634-2:2007	Cement-bonded particleboards – Specifications – Part 2: Requirements for OPC bonded particleboards for use in dry, humid and external conditions
9	EN 622-2:2004	Fibreboards - Specifications - Part 2: Requirements for hardboards
10	EN 622-3:2004	Fibreboards - Specifications - Part 3: Requirements for medium boards
11	EN 14279:2009	Laminated Veneer Lumber (LVL) – Definitions, classification and specifications
12	EN 13353:2008+A1:2011	Solid wood panels (SWP) – Requirements
13	EN 520:2004+A1:2009	Gypsum plasterboards – Definitions, requirements and test methods
14	EN 15283-1:2008+A1:2009	Gypsum boards with fibrous reinforcement – Definitions, requirements and test methods – Part 1: Gypsum boards with mat reinforcement Part 2: Gypsum fibre boards
15	EN 15283-2:2008+A1:2009	Gypsum boards with fibrous reinforcement – Definitions, requirements and test methods – Part 2: Gypsum fibre boards
16	EN 12467:2012+A1:2016	Fibre-cement flat sheets – Product specification and test methods
17	EN 13171:2012	Thermal insulation products for buildings – Factory made wood fibre (WF) products – Specification

Deutsches Institut für Bautechnik DIBt

A.2.3 Use conditions (environmental conditions)

A.2.3.1 Durability against corrosion

BeA/KMR Staples d=1,55mm, d=1,8mm, d=2,02mm with gold coating made of non-alloy steel rods are galvanized. The mean thickness of the zinc coating is 12 µm.

A.2.3.2 Durability of the resin coating

The BeA/KMR Staples d=1,55mm, d=1,8mm, d=2,02mm with gold coating are resin-coated over their full length according to Annex 1. The following kind of resin is used:

Harz Typ "BeA Gold/Rot 2018".

Data sheets of chemical compositions (as well as the process of application and drying for resin coatings) are deposited at Deutsches Institut für Bautechnik.

The resin coating fulfills the requirements of the EAD 130019-00-0603, clause 2.2.9 "durability of the resin coating".

A.2.3.3 Installation

EN 1995-1-1[18] in conjunction with the respective national annex applies for the installation of constructions with BeA/KMR Staples d=1,55mm, d=1,8mm, d=2,02mm with gold coating.

The pointside penetration length t_2 of the staples has to be at least 14·d.

For connections of wood fibre insulation material the maximum length of the leg is L= 85·d, the minimum width is b=20mm and the maximum thickness of the insulation is 70·d.

[18] EN 1995-1-1:2004+A1:2008+A2:2014 Eurocode 5: Design of timber structures – Part 1-1: General - Common rules and rules for buildings

Deutsches Institut für Bautechnik DIBt

Annex 3 Specifications of essential characteristics

A.3.1 Characteristic yield moment according to EN 14592

Table A.3.1 Characteristic yield moment $M_{y,k}$ [Nm] of one leg of BeA/KMR staples d=1,55mm, d=1,8mm, d=2,02mm with gold coating

Type	**Nominal diameter** d in [mm]	**Characteristic yield moment** $M_{y,k}$ in [Nm]
155 VZHZ, 146 VZHZ, KG700 Galv, G Galv	1,55	0,60
180 VZHZ, Q Galv	1,80	0,87
200 VZHZ, 246 VZHZ, SD Galv, BS Galv	2,02	1,28

A.3.2 Withdrawal capacity for short-term and medium-term loads

The characteristic withdrawal parameter $f_{ax,k}$ of one leg (at an angle of at least 30° between the width of staple crown and the direction of the grain) for material with a characteristic density $\rho_k \geq 350$ kg/m³ as well as for short-term and medium-term withdrawal loads can be taken from Table A.3.2.

Tabelle A.3.2 Characteristic withdrawal parameter $f_{ax,k}$ of one leg of BeA/KMR staples d=1,55mm, d=1,8mm, d=2,02mm with gold coating

Type	**Nominal diameter** d in [mm]	**Withdrawal parameter short- and medium-term load** $f_{ax,k}$ in [N/mm²]
155 VZHZ, 146 VZHZ, KG700 Galv, G Galv	1,55	5,5
180 VZHZ, Q Galv	1,80	5,4
200 VZHZ, 246 VZHZ, SD Galv, BS Galv	2,02	5,2

The withdrawal parameter according to Table A.3.2 have been determined for a maximum length of staples in the base building components of $14 \cdot d \leq t_2 \leq 20 \cdot d$.

A.3.3 Design value of withdrawal capacity for long-term and permanent loads

The design value of withdrawal capacity for long-term and permanent loads for service class 1 and 2 for one staple may be taken to:

$$R_{ax,d} = 70 \text{ N, mit } \gamma_M = 1,3.$$

The design value of withdrawal capacity applies for a characteristic density of $\rho_k \geq 350$ kg/m³.

A.3.4 Maximum thickness of base building components

The maximum thickness t_1 according to Table A.3.3 applies for base building components (made of material according to chapter A.2.2) depending on the density of base building components.

Table A.3.3 Maximum thickness of connected material

Maximum thickness t_1 [mm]	**Range of density** ρk [kg/m³]	**Material of connected components Examples**
80	$\rho_k \leq 400$	Solid timber of softwood
60	$400 < \rho_k \leq 650$	Wood-based panels and solid timber of hard- and softwood
40	$650 < \rho_k \leq 900$	Wood-based panels and gypsum boards
25	$900 < \rho_k \leq 1200$	Hardboards, gypsum fibreboards, cement-bonded particlebords
20	$1200 < \rho_k \leq 1600$	Highly compressed gypsum fibreboards

The maximum thickness of wood fibre insulation material is $t_1 \leq 70 \cdot d$.

A.3.5 Head pull-through capacity of wood and wood-based panels

The characteristic head pull-through parameters $f_{head,k}$ for one staple of BeA/KMR Staples d=1,55mm, d=1,8mm, d=2,02mm with gold coating for a minimum thickness of material according to Table A.3.4 (for material with a characteristic density of $\rho_k \geq 350$ kg/m³) shall be taken from Table A.3.5:

Table A.3.4 Minimum thickness of wood and wood-based panels

Wood or wood-based panels	**Minimum thickness** t_1 [mm]
Solid timber (softwood)	24
Solid wood panels	7d*
Plywood	6*
Oriented Strand Boards OSB	8*
Resin-bonded particleboards	8*
Cement-bonded particleboards	8*

* if staple crown is countersunk it has to be increased by 2 mm

The characteristic head pull-through capacity may be calculated according to equation (1)

$$R_{ax,2,k} = f_{head,k} \cdot b \cdot d \quad [N] \qquad (1)$$

with: $f_{head,k}$: characteristic head pull-through parameter in [N/mm²]
b: width of staple crown [mm], b ≤ 27 mm
d: nominal diameter of raw staple wire in [mm]

Table A.3.5 Characteristic head pull-through parameter $f_{head,k}$ for material $\rho_k \geq 350$ kg/m³, b ≤ 27 mm

Type	**Nominal diameter** d in [mm]	**Width of staple crown** b in [mm]	**Head pull-through parameter** $f_{head,k}$ in [N/mm²]
155 VZHZ, KG700 Galv, G Galv	1,55	10,5	37
146 VZHZ,146 NRHZ,		25,8	39
180 VZHZ, Q Galv, 180 NRHZ, Q A4	1,80	11,0	33
200 VZHZ, SD Galv,	2,02	11,6	30
246 VZHZ, BS Galv		27,0	36

A.3.6 Head pull-through capacity of wood fibre insulation material

The characteristic head pull-through parameter $f_{head,k}$ for one staple of BeA/KMR Staples with gold coating d=2,02mm (depending on the density) for wood fibre insulation material with a minimum thickness of 60 mm shall be taken from Table A.3.6. The width of the staple crown hast to be at least 20 mm.

Tabelle A.3.6 Charakteristic head pull-through parameter $f_{head,k}$ for wood fibre insulation material

Type	**Nominal diameter** d in [mm]	**Minimum density** ρ in [kg/m³]	**Width of staple crown** b in [mm]	**Head pull-through parameter** $f_{head,k}$ in [N/mm²]
246 VZHZ, BS Galv	2,02	≥ 110	27,3	1,61
		≥ 140		8,59

Deutsches Institut für Bautechnik DIBt

A.3.7 Minimum tensile strength of the wire

Table A.3.7 Minimum tensile strength f_u [N/mm²] of the raw wire of BeA/KMR staples d=1,55mm, d=1,8mm, d=2,02mm with gold coating

Nominal diameter d in [mm]	**1,55**	**1,80**	**2,02**
Galvanised	900		