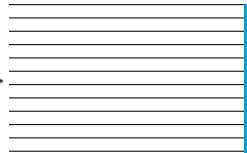
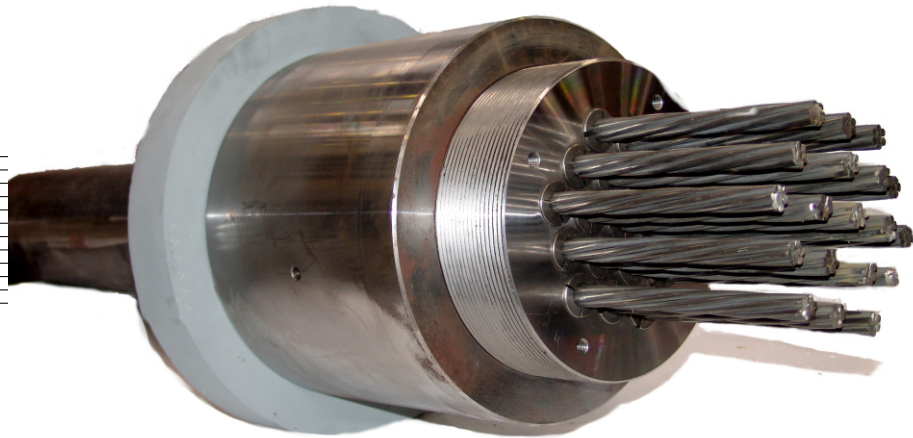


# ANCHORS HEADS FOR GROUTING PILE L2 - L31



Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

ETA-16/0262  
of 14 October 2016

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

BBV Anchor Heads for Ground anchors with 2 to 31  
strands

Product family  
to which the construction product belongs

BBV Anchor Heads for Ground Anchors with 2 to 31  
Strands, 140 mm<sup>2</sup> und 150 mm<sup>2</sup>, Y1770S7 and Y1860S7

Manufacturer

BBV Systems GmbH  
Industriestraße 98  
67240 Bobenheim-Roxheim  
DEUTSCHLAND

Manufacturing plant

BBV Systems GmbH  
Industriestraße 98  
67240 Bobenheim-Roxheim  
DEUTSCHLAND

This European Technical Assessment  
contains

20 pages including 15 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

Guideline for European technical approval of "Post-  
tensioning kits for prestressing of structures", ETAG 013,  
used as European Assessment Document (EAD)  
according to Article 66 Paragraph 3 of Regulation (EU)  
No 305/2011.

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## Specific Part

### 1 Technical description of the product

#### 1.1 Definition of the construction product

The present European Technical Assessment applies to the kit:

##### **BBV Anchor Heads for Ground anchors with 2 to 31 strands**

according to EN 1537:2014, observing the standards and regulations in force at the place of use. The use of EN 1537:2014 requires the consideration of EN 1997-1 with National Annex.

The Anchor heads can be used with 2 to 31 strands with a nominal tensile strength 1770 MPa or 1860 MPa (Y1770S7 or Y1860S7), nominal diameter 15.3 mm (0.6" - 140 mm<sup>2</sup>) or nominal diameter 15.7 mm (0.62" - 150 mm<sup>2</sup>) which are used in normal-weight concrete.

Tensile elements consist in strands made of prestressing steel, complying with the specifications of prEN 10138-3:2009; table 4 in terms of geometry and characteristic force or complying with the regulations in place of use.

The anchorage of the strands in anchor blocks is done by means of wedges.

The components and the system setup of the product are given in Annex A.

#### 1.2 Strands

Only 7-wire strands shall be used in accordance with national provisions and the characteristics given in Table 1:

**Table 1:** Dimensions and properties of 7-wire strands

Designation	Symbol	Unit	Value	
Tensile strength	R <sub>m</sub>	MPa	1770 or 1860	
Strand				
Nominal diameter	D	mm	15.3	15.7
Nominal cross section	A <sub>p</sub>	mm <sup>2</sup>	140	150
Nominal mass	M	g/m	1093	1172
Individual wires				
External wire diameter	D	mm	5.0 ± 0.04	5.2 ± 0.04
Core wire diameter	d'	mm	1.02 to 1.04 d	1.02 to 1.04 d

Only prestressing strands with very low relaxation shall be used.

The maximum deflection angle of the tension member towards the normal to the anchor head is 2.6° for tension number L3 to L22 and L31 strands. For tension number L27 strands the maximum deflection angle is 2.1°.

#### 1.3 Wedges

The strands shall be fixed separately with wedges considering of 3 parts (see Annex A1) in the anchor blocks.

In dependence of the nominal diameter of the strand, two types of wedges are used. One type for 0.6" – strand (nominal cross section 140 mm<sup>2</sup>) and another type for 0.62" – strand (nominal cross section 150 mm<sup>2</sup>). The wedges have to be marked according to the used strand (see Annex A1)

#### 1.4 Anchor head

The dimension of the anchor heads shall be in accordance with Annex A1. To control the force in the anchor, the anchor heads can be provided with an external thread according to the technical documentation.

### 1.5 Bearing plates

The anchorage using patched, round bearing plates according to Annex A2 applies to tendons of 3 to 22 strands.

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

The performances given in Clause 3 are valid only if the PT-System is used in accordance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the Anchor Head of at least 100 years. Limitation of working life according to EN 1537:2014 have to be fulfilled. The working life of the entire System depends on the corrosion protection system according to EN 1537:2014 (observing the standards and regulations in force at the place of use). The corrosion protection system is not part of this ETA. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, 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
Resistance to static load	The PT system as described in the ETA meets the acceptance criteria of ETAG 013, Clause 6.1.1-I
Resistance to fatigue	The PT system as described in the ETA meets the acceptance criteria of ETAG 013, Clause 6.1.2-I *
Load Transfer to structure	The PT systems as described in the ETA meets the acceptance criteria of ETAG 013, Clause 6.1.3-1
Friction coefficient	Not relevant
Deviation/deflection (limits)	Not relevant

\* Annex B, section 2.1 has to be noticed

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

In accordance with guideline for European technical approval ETAG 013, June 2002, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, the applicable European legal act is: [98/456/EC].

The system to be applied is: 1+

**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 14 October 2016 by Deutsches Institut für Bautechnik

Uwe Bender  
Head of Department

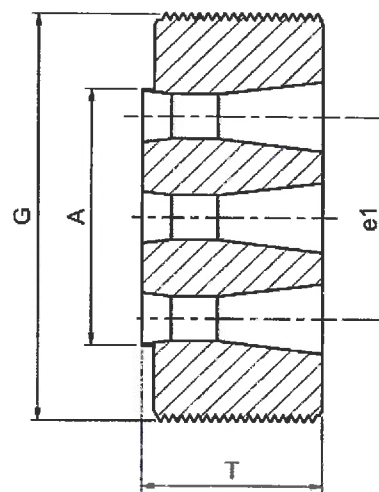
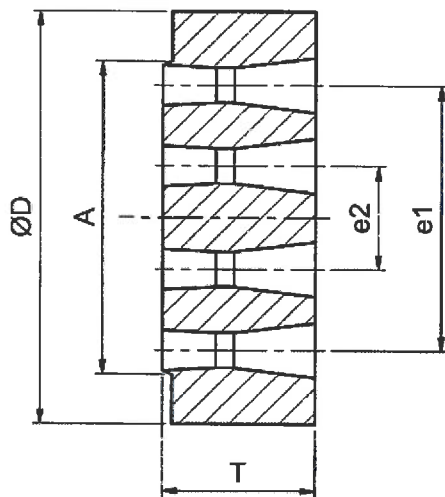
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Technical Details												
Anchor head*	Unit	L3	L4	L5	L7	L9	L12	L15	L19	L22	L27	L31
Number of strands *	-	3	4	5	7	9	12	15	19	22	27	31
Diameter, D	mm	104	104	115	132	160	180	200	220	245	265	280
External thread, G	mm	M110x4	M110x4	M121x4	M138x4	M168x4	M188x4	M208x4	M228x4	M255x4	M275x4	M290x4
Thickness, T	mm	65	65	70	75	75	80	82	92	105	120	125
Diameter, A	mm	68	77	79	89	109	127	146	159	179	195	204
Diameter circle e1	mm	45	54	56	66	86	Grid	120	Grid	Grid	Grid	Grid
Diameter circle e2	mm							56				
Hole Diameter, Di	mm	72	81	83	93	113	131	150	163	183	199	208

\* The number of strands in a tendon can be reduced by leaving out strands lying radial symmetrically in the anchor head (max. 4 strands). The provisions for tendons with completely filled anchors (basic types) also apply to tendons with only partly filled anchor heads. Into the free boreholes in the anchor head, short pieces of strands with wedges have to be pressed in.

Anchor head

Anchor head with external thread



BBV Anchor Heads for Ground anchors with 2 to 31 strands

**Product Description**  
Technical Details  
Anchor Head, Wedges and Thread Sleeve

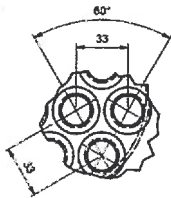
Annex A1  
Page 1 of 2

English translation prepared by DIBt

**Technical Details - Continued**

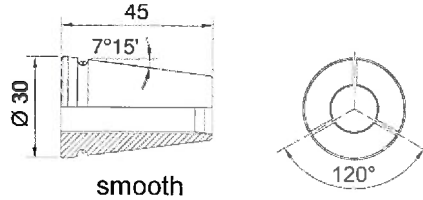
Strand Pattern BBV L12; L19; L22; L27; L31

Conical borings are in line, lines result in a grid.



Wedges Type 30

Wedges for different strand sizes have to be distinguishable. Wedges for 150 mm<sup>2</sup> strands are marked with "0.62" on the front face.

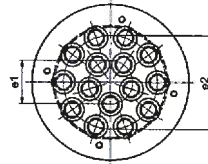


smooth

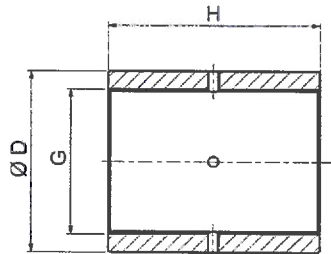
Strand Pattern BBV L3; L4; L5; L7; L9; L15

All conical borings are aligned on one or two circles (e1 and e2), s. table above.

Example: BBV L15:



Threaded sleeve



Threaded sleeve	Unit	L3	L4	L5	L7	L9	L12	L15	L19	L22	L27	L31
Number of strands	-	3	4	5	7	9	12	15	19	22	27	31
External Diameter, D	mm	140	140	155	180	210	240	265	300	325	355	380
Thread, G	mm	M111x4	M111x4	M122x4	M139x4	M169x4	M189x4	M209x4	M229x4	M256x4	M276x4	M291x4
Length, H ≥	mm	190	190	200	210	210	220	224	244	270	300	310

BBV Anchor Heads for Ground anchors with 2 to 31 strands

**Product Description**  
Technical Details  
Anchor Head, Wedges and Thread Sleeve

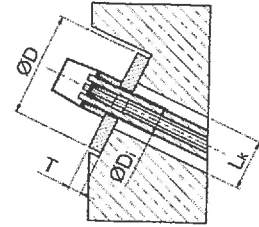
Annex A1  
Page 2 of 2



## Anchorage on Concrete with Bearing Plates

### Designations:

- D: Diameter of the bearing plate  
 D<sub>i</sub>: Hole diameter in the bearing plate (see Annex A1)  
 T: Thickness of the bearing plate  
 L<sub>k</sub>: Hole diameter in the concrete bedding



Steel grade Y 1770, Cross Section 140 mm<sup>2</sup>

D x T mm	max. Hole diameter concrete bedding L <sub>k</sub> in mm													
	250	230	225	220	210	200	190	180	170	160	150	140		
Number of strands L2 to L22	2	-	-	-	-	-	-	-	-	-	205x45	200x40	190x40	
	3	-	-	-	-	-	-	-	-	-	225x45	220x45	210x40	
	4	-	-	-	-	-	-	-	-	-	245x50	235x45	230x45	
	5	-	-	-	-	-	-	-	-	275x55	265x50	260x50	255x45	250x45
	6	-	-	-	-	-	-	-	-	285x55	280x50	275x50	270x50	-
	7	-	-	-	-	-	-	-	-	300x55	295x55	290x50	285x50	-
	8	-	-	-	-	-	-	-	320x60	315x55	310x55	305x50	300x50	-
	9	-	-	-	-	-	-	-	335x60	330x55	320x55	315x50	310x50	-
	10	-	-	-	-	-	-	350x60	345x60	340x55	335x55	330x50	325x50	-
	11	-	-	-	-	-	-	360x60	355x60	350x55	345x55	340x50	335x50	-
	12	-	-	-	-	-	-	375x65	370x60	365x60	360x55	355x55	350x50	-
	13	-	-	400x65	395x65	390x65	385x60	380x60	375x55	370x55	365x50	-	-	
	14	-	-	410x70	405x65	400x65	395x65	390x60	385x60	380x55	375x55	-	-	
	15	-	-	420x70	415x70	410x65	405x65	400x60	395x60	390x60	385x55	-	-	
	19	-	460x75	-	455x70	-	445x65	440x65	435x60	-	-	-	-	
	22	495x80	-	-	480x70	-	470x65	465x65	465x60	-	-	-	-	

Minimal centre distance  $a \times a$ ,  $f_{cmj,cube} = 38 \text{ N/mm}^2$ :

Tendon Type	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L19	L22
Min. Centre-/ Edge Distance* mm	235	270	300	335	360	385	410	430	455	470	490	515	535	555	620	675

\* Edge distance: Centre distance/2 + 20mm (rounding up at 5mm intervals)

The Centre-/ Edge distances can be converted to the similar area from square to rectangular; the shorter side has to be min. 85% of the square side length. The anchorage distances in one direction can be reduced to 85% of the table values, if the distances correspondingly increased in the other direction.

### Note:

In the anchorage zone, an uniformly distributed steel reinforcement orthogonal to the force direction at all sides with a minimum reinforcement ratio of  $\rho_{w,min} = 0.005$  is assumed.

BBV Anchor Heads for Ground anchors with 2 to 31 strands

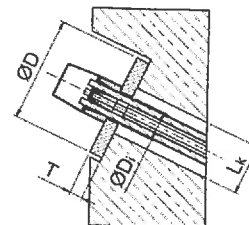
**Product Description**  
 Anchorages on Concrete  
 Steel Grade Y1770S7, Cross Section 140 mm<sup>2</sup>

Annex A2  
 Page 1 of 2

## Anchorage on Concrete with Bearing Plates

### Designations:

- D: Diameter of the bearing plate  
D<sub>j</sub>: Hole diameter in the bearing plate (see Annex A1)  
T: Thickness of the bearing plate  
L<sub>k</sub>: Hole diameter in the concrete bedding



### Steel grade Y 1860, Cross Section 150 mm<sup>2</sup>

D x T mm	Max. Hole Diameter concrete bedding L <sub>k</sub> in mm												
	250	230	225	220	210	200	190	180	170	160	150	140	
Number of strands L2 to L22	2	-	-	-	-	-	-	-	-	-	210x45	205x40	195x40
	3	-	-	-	-	-	-	-	-	-	235x45	225x45	220x40
	4	-	-	-	-	-	-	-	-	-	250x50	245x45	240x45
	5	-	-	-	-	-	-	-	280x55	275x55	270x50	265x50	260x45
	6	-	-	-	-	-	-	-	300x55	290x55	285x50	280x50	-
	7	-	-	-	-	-	-	-	315x60	310x55	300x55	295x50	-
	8	-	-	-	-	-	-	335x60	330x55	320x55	315x50	310x50	-
	9	-	-	-	-	-	-	345x60	340x60	335x55	330x55	325x50	-
	10	-	-	-	-	-	365x60	360x60	355x60	350x55	345x55	340x50	-
	11	-	-	-	-	-	380x65	375x60	370x60	365x55	360x55	355x50	-
	12	-	-	-	-	-	390x65	385x65	380x60	375x60	370x55	365x55	-
	13	-	-	415x70	410x70	405x65	400x65	395x60	390x60	385x55	385x55	-	-
	14	-	-	425x70	425x70	420x65	415x65	410x60	405x60	400x60	395x55	-	-
	15	-	-	435x70	435x70	430x70	425x65	420x65	415x60	410x60	405x60	-	-
	19	-	480x75	-	475x75	-	465x70	460x70	455x65	-	-	-	-
	22	515x80	-	-	505x75	-	495x70	490x70	485x65	-	-	-	-

### Minimal centre distance a x a, f<sub>cmj,cube</sub> = 38 N/mm<sup>2</sup>:

Tendon Type	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L19	L22
Min. Centre-/ Edge Distance* mm	245	280	315	350	380	405	430	450	475	500	520	545	565	580	660	720

\* Edge distance: Centre distance/2 + 20mm (rounding up at 5mm intervals)

The Centre-/ Edge distances can be converted to the similar area from square to rectangular; the shorter side has to be min. 85% of the square side length. The anchorage distances in one direction can be reduced to 85% of the table values, if the distances correspondingly increased in the other direction.

### Note:

In the anchorage zone, an uniformly distributed steel reinforcement orthogonal to the force direction at all sides with a minimum reinforcement ratio of  $\rho_{w,min} = 0.005$  is assumed.

BBV Anchor Heads for Ground anchors with 2 to 31 strands

**Product Description**  
Anchorage on Concrete  
Steel Grade Y1770S7, Cross Section 150 mm<sup>2</sup>

Annex A2  
Page 2 of 2

### Dimensions and Properties of 7-wire Strands

Designation	Symbol	Unit	Value	
Tensile strength	$R_m/F_{pk}$	MPa	1770 or 1860	
<b>Strand</b>				
Nominal diameter	D	mm	15.3	15.7
Nominal cross section	$A_p$	mm <sup>2</sup>	140	150
Nominal mass	M	g/m	1093	1172
Surface configuration	-	-	plain	
Strength at 0,1%	$f_{p0.1k}$	MPa	1520 or 1600*	
Strength at 0,2%	$f_{p0.2}$	MPa	1570 or 1660	
Modulus of elasticity	E	MPa	≈ 195,000	
<b>Individual wires</b>				
External wire diameter	d	mm	5.0 ± 0.04	5.2 ± 0.04
Core wire diameter	d'	mm	1.02 to 1.04 d	1.02 to 1.04 d

\* If admissible in the place of use, strands with higher characteristic yield stresses might be used, but not more than  $f_{p0.1k} = 1560$  MPa (Y1770S7) or 1640 MPa (Y1860S7).

As long as prEN 10138-3:2009-08 has not been adopted 7-wire strands in accordance with national provisions and with the characteristics given in the table above shall be used.

BBV Anchor Heads for Ground anchors with 2 to 31 strands	Annex A3
<b>Product Description</b> Dimensions and Properties of 7-wire Strands	

## 1 Intended use

### 1.1 General

Components corresponding to the annex A and the technical documentation of this European Technical Assessment, in which dimensions, material and material properties of the components with the allowed tolerances are indicated, shall be used. The technical documentation of this European Technical Assessment is deposited with Deutsches Institut für Bautechnik.

Concerning corrosion protection the requirements given in EN 1537:2014 have to be fulfilled, observing the standards and regulations in force at the place of use.

### 1.2 Anchor head

The anchor head must lie in full contact on a steel bearing plate. The anchor head shall be fixed by inserting the offset with the diameter A according to Annex A1 in the opening of the bearing plate with the hole diameter Di according to Annex A1. The static calculation of the steel bearing plate shall be in accordance with the technical regulations. The anchor head may be provided with holes for fixing an anchor cap and if applicable for filling the anchor head with corrosion protection mass, whose diameter and location is detailed on the deposited design drawings.

For restressing or releasing the anchor force, a threaded sleeve is used according to Annex A1, which is screwed onto the threaded anchor head and lifts the anchor head without loosening of the wedges. For this purpose, the screwed sleeve is raised with the stressing jack, which is supported on the abutment by a pressing chair. Resulting strain differences are balanced with the threaded sleeve. In this case, it can be adjusted via the blind holes, which are located at the sides of the threaded sleeve. The threaded anchor head can be extended to ensure sufficient screwing.

Between threaded sleeve and steel bearing plate, spacer plates (flat washers or pipe sections, divided into two parts, according to the documents deposited with the Deutsches Institut für Bautechnik), whose height corresponds to the displacement resulted from restressing or releasing, may also be inserted.

For this, the threaded anchor head is raised via a screwed threaded sleeve using a stressing jack, which is supported on the abutment by a stressing chair and, if necessary, spacer plates are removed or added.

Tendons can be restressed by releasing and re-using the wedges, if after restressing and anchoring, the wedge marks on strands resulting from first stressing are moved to the outside by at least 15 mm.

## 2 Methods of verification

### 2.1 Resistance to fatigue

With the fatigue test for the anchors carried out in accordance with ETAG 013, the stress range of 80 N/mm<sup>2</sup> of the strands at the maximum stress of 0,65 f<sub>pk</sub> at 2×10<sup>6</sup> load cycles was verified.

It has to be verified that the stress range at air side of the anchorage is lower than 0,7 of this value. Load cycles higher than 2×10<sup>6</sup> are not verified.

### 2.2 Slip at the anchorages

The slip to be taken into account is 3 mm in the case of pre-wedging with 0.1 P<sub>mo</sub>(x) and 6 mm without pre-wedging (the wedges shall be secured by securing caps).

BBV Anchor Heads for Ground anchors with 2 to 31 strands

**Intended Use**  
Intended Use and Methods of Verification

Annex B  
Page 1 of 2

### 2.3 Load transfer in the structural concrete

The anchorages (including reinforcement) are verified by means of tests for the transfer of the prestressing forces to the structural concrete.

For the anchors which are subsequently patched on concrete according to Annex A2, if no uniformly distributed steel reinforcement orthogonal to the force direction at all sides with a minimum reinforcement ratio of  $\rho_{w,min} = 0.005$  can be assumed in the anchorage zone, the load transfer to the structure has to be verified separately. For adjacent bearing plates, the unfavourable influence of the superposition of concrete stresses due to the load transfer has to be taken into account. The bearing plates have constantly to rest even on the entire surface (outside of the core bore holes). The strength of the existing concrete has to be verified by material testing if necessary.

BBV Anchor Heads for Ground anchors with 2 to 31 strands

**Intended Use**  
Intended Use and Methods of Verification

Annex B  
Page 2 of 2

## 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:

### System 1+

- (a) The manufacturer shall carry out:
  - (1) factory production control;
  - (2) further testing of samples taken at the manufacturing plant by the manufacturer in accordance with a prescribed test plan.
- (b) The notified product certification body shall decide on the issuing, restriction, suspension or withdrawal of the certificate of constancy of performance of the construction product on the basis of the outcome of the following assessments and verifications carried out by that body:
  - (1) initial inspection of the manufacturing plant and of factory production control;
  - (2) continuing surveillance, assessment and evaluation of factory production control;
  - (3) audit-testing of samples taken by the notified product certification body at the manufacturing plant or at the manufacturer's storage facilities.

## 2 Responsibilities

### 2.1 Tasks of the manufacturer

#### 2.1.1 Factory production control

The kit manufacturer shall keep available an updated list of all component manufacturers. The list is to be made available to the notified product certification body and to the Technical Assessment Body.

The kit manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the kit 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 Assessment.

The kit manufacturer may only use basic materials stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the Control Plan relating to the European Technical Assessment ETA-16/0262 (latest version) which is part of the technical documentation of this European Technical Assessment. The Control Plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Deutsches Institut für Bautechnik.<sup>1</sup>

The basic elements of the Control Plan comply with ETAG 013, Annex E.1.

<sup>1</sup> The Control Plan is a confidential part of the European Technical Assessment and only handed over to the notified product certification body involved in the system of assessment and verification of constancy of performance (see Annex C1, section 2.2).

BBV Anchor Heads for Ground anchors with 2 to 31 strands

**Constancy of Performance and CE marking**  
System and Responsibilities

Annex C1  
Page 1 of 3

The records shall contain at least the following information:

- Designation of the product or of the basic material and the components;
- Type of control or testing;
- Date of manufacture and of testing of product or components and of basic material of components;
- Results of controls and tests and, where relevant, comparison with the requirements;
- Signature of person responsible for the factory production control.

The records shall be kept for at least ten years and submitted to the notified product certification body. On request, they shall be presented to Deutsches Institut für Bautechnik.

If the test result is not satisfactory, the kit manufacturer shall take immediate measures to eliminate the deficiency. Construction products and components which do not comply with the requirements shall be handled in such way that they cannot be mistaken for products complying with the requirements. After elimination of the deficiency the relevant test shall be immediately repeated as far as is technically possible and necessary for verifying the deficiency elimination.

**2.1.2 Declaration of performance and other tasks of manufacturer**

The kit manufacturer shall, on the basis of a contract, involve a product certification body which is notified for the tasks referred to in Annex C1, section 1 in the field of Post-Tensioning Kits for prestressing of structures in order to undertake the actions laid down in Annex C1, section 2.2. For this purpose, the control plan referred to in Annex C1, sections 2.1.1 and 2.2 shall be handed over to the notified product certification body by the manufacturer.

For the product a declaration of performance shall be drawn up. The manufacturer can make a declaration of performance for the essential characteristics due to section 3 of specific part of this European Technical Assessment if the acceptance criteria due to ETAG 013 are fulfilled and the certificate of constancy of performance of a notified product certification body is available.

The control of the manufacturer of the components, the sampling and tests in the factory production control as well as a series of single tensile element tests shall be carried out in consideration of ETAG 013, section 8.2.1.1. The results of this test series must be given to the notified product certification body for information.

**2.2 Tasks of the notified product certification body**

**2.2.1 General**

The notified product certification product certification body shall perform the measures according to Annex C1, sections 2.2.2 to 2.2.4 and in accordance with the provisions laid down in the Control Plan in the latest version.

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

The notified product certification body involved by the kit manufacturer shall issue a certificate of constancy of performance of the product stating that all provisions for the assessment and verification of constancy of performance and the performance named in the European Technical Assessment are applied due to System 1+ and stating compliance of the construction product with all applicable requirements.

In cases where the provisions of the European Technical Assessment and its "Control Plan" are no longer fulfilled the notified product certification body shall withdraw the declaration of conformity and inform Deutsches Institut für Bautechnik without delay.

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**2.2.2 Initial inspection of the manufacturing plant and of factory production control**

The notified product certification body shall 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 Post-tensioning system with the specifications mentioned in section 1 of the Specific Part of the European Technical Assessment as well as in the Annexes to the European Technical Assessment.

**2.2.3 Continuing surveillance, assessment and evaluation of factory production control**

The notified product certification body shall inspect the manufacturing plant at least once a year. The production of components shall be included in the surveillance with consideration of ETAG 013, Section 8.2.2.4 (8). It has to be verified that the system of factory production control and the specified manufacturing process are carried out in accordance with the control plan's latest version.

Continuing surveillance, assessment and evaluation of factory production control have to be performed according to the latest version of the control plan.

The results of continuing surveillance, assessment and evaluation of factory production control shall be made available on demand by the notified product certification body to the Deutsches Institut für Bautechnik.

**2.2.4 Audit-testing of samples**

During surveillance inspections, the notified product certification body shall take samples of components of the Post-tensioning system for independent testing. For the most important components, Annex C3 contains the minimum procedures which have to be performed by the notified product certification body.

The basic elements of the Audit testing comply with ETAG 013, Annex E.2 (see Annex C3).

**3 CE marking**

The CE marking shall be affixed on the delivery note. The letters "CE" shall be followed by the following additional information:

- the two last digits of the year in which it was first affixed;
- the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;
- the unique identification code of the product-type;
- the reference number of the declaration of performance;
- the level or class of the performance declared;
- the reference to the harmonised technical specification applied;
- the identification number of the notified product certification body, if applicable;
- the intended use as laid down in the harmonised technical specification applied.

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### Criteria of the Control Plan

Component	Item	Test/Check	Traceability <sup>4</sup>	Minimum frequency	Documentation
Anchor Head	material	check	full	100 %	"3.1" <sup>2</sup>
	detailed dimensions <sup>5</sup>	test		5 % ≥ 2 specimen	yes
	visual inspection <sup>3</sup>	check		100 %	no
Patched Bearing Plate for 3 to 22 strands	material	check	bulk	100 %	"2.2" <sup>1</sup>
	detailed dimensions <sup>5</sup>	test		3 % ≥ 2 specimen	yes
	visual inspection <sup>3</sup>	check		100 %	no
Wedge	material	check	full	100 %	"3.1" <sup>2</sup>
	treatment, hardness	test		0,5 % ≥ 2 specimen	yes
	detailed dimensions <sup>5</sup>	test		5 % ≥ 2 specimen	yes
	visual inspection <sup>3</sup>	check		100 %	no
Tensile element (strand)	material <sup>6</sup>	check	full	100 %	yes
	diameter	test		each coil/bundle	no
	visual inspection <sup>3</sup>	check		each coil/bundle	no

Continued table and footnotes see Annex C2, page 2

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**Constancy of Performance and CE marking**  
Criteria of the Control Plan

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### Criteria of the Control Plan – continued

Bestandteil	Aspekt	Prüfung/ Kontrolle	Rückver- folgbarkeit <sup>4</sup>	Mindest- anzahl	Dokumen- tation
Grease	material <sup>7</sup>	check	full	100 %	"CE" <sup>9</sup>
Wax	material <sup>8</sup>	check	full	100 %	"CE" <sup>9</sup>

<sup>1</sup> "2.2": Test report type "2.2" according to EN 10204.

<sup>2</sup> "3.1": Inspection certificate type "3.1" according to EN 10204.

<sup>3</sup> visual inspections means e.g.: main dimensions, gauge testing, correct marking or labelling, appropriate performance, surface, fins, kinks, smoothness, corrosion, coating, etc., as given in the control plan.

<sup>4</sup> full: Full traceability of each component to its raw material.  
bulk: Traceability of each delivery of components to a defined point.

<sup>5</sup> detailed dimensions, measuring of all dimensions and angles according to the specification as given in the control plan.

<sup>6</sup> characteristic material properties, see Annex E1.

<sup>7</sup> corrosion protection mass (grease), according to component deposited at the Deutsches Institut für Bautechnik. Characteristics shall comply with ETAG 013, Annex C.4.1.

<sup>8</sup> corrosion protection mass (wax), according to component deposited at the Deutsches Institut für Bautechnik. Characteristics shall comply with ETAG 013, Annex C.4.2.

<sup>9</sup> If the basis of CE marking is not available, the prescribed control plan has to include appropriate measures. The certificate shall be based on specific testing on the fabrication lot from which the supply has been produced, to confirm specified properties, and shall be prepared by a department of the supplier which is independent of the production department.

All samples shall be randomly selected and clearly identified.

BBV Anchor Heads for Ground anchors with 2 to 31 strands

**Constancy of Performance and CE marking**  
Criteria of the Control Plan

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### Criteria of Audit Testing

Component	Item	Test/ Check	Sampling Number of components per audit
Anchor Head	material according to specification	check / test	1
	detailed dimensions	test	
	visual inspection <sup>1</sup>	check	
Wedge	material according to specification	check / test	2
	treatment	test	2
	detailed dimensions	test	1
	main dimensions, surface hardness	test	5
	visual inspection <sup>1</sup>	check	5
Single tensile element test	ETAG 013, Annex E.3	test	1 series

<sup>1</sup> visual inspections means e.g.: main dimensions, gauge testing, correct marking or labelling, appropriate performance, surface, fins, kinks, smoothness, corrosion, etc.

All samples shall be randomly selected and clearly identified.

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### Material of Components

Designation	Material	Number	Standard
<b>Anchorage</b>			
Bearing Plate	deposited at DIBt		EN 10025-2:2005-04
Wedges	deposited at DIBt		
Anchor Head	deposited at DIBt		EN 10083-2:2006-10
Additional Reinforcement	ripped reinforcing steel $R_e \geq 500$ MPa		valid provisions at the place of use
<b>Corrosion Protection Mass</b>			
Vaseline FC 284 <sup>*)</sup>	deposited at DIBt		
Unigel 128F-1 <sup>*)</sup>	deposited at DIBt		
Nontribos MP-2	deposited at DIBt		

further details (e.g. minimum strength) of the components in deposited delivery conditions

<sup>\*)</sup> according to the supplier's material composition deposited at the Deutsches Institut für Bautechnik, characteristic material properties shall comply with ETAG 013, Annex C.4.1 or C.4.2

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**Materials and References**  
Material of Components

Annex D1

## Codes and References

- EN 1537:2014-07 Execution of special geotechnical works – Ground anchors
- prEN 10138-3:2009-08 Prestressing steels - Part 3: Strand
- ETAG 013:2002-06 Guideline for European Technical Approval of post-tensioning kits for prestressing of structures
- EN 10204:2005-01 Metallic products - Types of inspection documents
- EN 1997-1:2009-09 Geotechnical design – Part 1: General rules

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**Materials and References**  
Codes and References

Annex D2