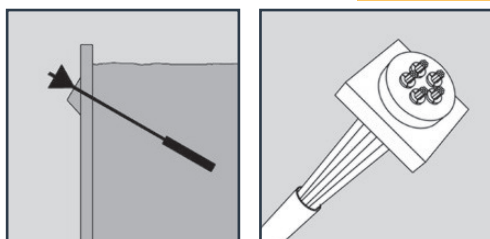


## Geotechnical Systems

**DYWIDAG SYSTEMS**



**Anchor Heads for Ground  
Anchors for 2 up to 22 Strands**

**Approval Number  
Z-13.8-152**

Validity  
31 August 2017 - 31 August 2022

**Deutsches Institut für Bautechnik DIBt**  
(German Institute for Civil Engineering)

**Approval Office for Construction  
Products and Construction Methods  
Testing Office for Structural Engineering**

A statutory body commonly sponsored by  
the German national government and  
regional states  
Member of the EOTA, UEAtc and WFTAO

# General Construction Supervisory Authority Approval

Date: August 31, 2017      Reference No.: I 16-1.13.8-11/15

**Approval No.:**  
**Z-13.8-152**

**Period of validity:**  
from: **August 31, 2017**  
to: **August 31, 2022**

**Applicant:**  
**DYWIDAG-Systems  
International GmbH**  
Siemensstrasse 8  
85716 Unterschleissheim

**Subject of approval:**  
**Anchor Heads for Ground Anchors for 2 up to 22 Strands**

The above-mentioned subject of approval is hereby granted a general construction supervisory authority approval.  
This general construction supervisory authority approval comprises six pages and one appended sheet.

### **Important Notice**

This general construction supervisory authority approval is the translation of a document originally prepared in the German language which has not been verified and officially authorized by the "Deutsches Institut für Bautechnik" (German Institute for Civil Engineering). In case of doubt in respect to the wording and interpretation of this approval, the original German version of this document shall prevail exclusively. Therefore, no liability is assumed for translation errors or inaccuracies.

## I GENERAL PROVISIONS

- 1 This general construction supervisory authority approval verifies the fitness for the intended purpose of the subject of approval in keeping with the regional building codes.
- 2 This general construction supervisory authority approval does not replace any permissions, agreements and certifications required by law for the construction projects to be carried out.
- 3 This general construction supervisory authority approval is granted without prejudice to the rights of third parties, especially private property rights.
- 4 Notwithstanding any further regulations in the "Special Provisions" section, the manufacturer and distributor of the subject of approval must provide the user with copies of the relevant general construction supervisory authority approval; furthermore, they have to inform the user that the relevant general construction supervisory authority approval must be available at the place of use. Copies of this general construction supervisory authority approval must additionally be made available to the involved authorities on request.
- 5 This general construction supervisory authority approval may only be copied in its entirety. The publication of extracts is subject to the approval by the DIBt. Texts and drawings of advertising material may not contradict this general construction supervisory authority approval. Translations of the general construction supervisory authority approval must contain the note "Translation of the German original which has not been verified by the DIBt".
- 6 This general construction supervisory authority approval is granted subject to revocation. The provisions of this general construction supervisory authority approval can be subsequently amended or changed, especially if the latest technical findings give reason for this.
- 7 This notice refers to the information made available and documents provided by the applicant on the subject of approval during the approval proceedings. Any amendment of that approval basis is not covered by this notice and must be promptly disclosed to the DIBt.

## II. SPECIAL PROVISIONS

### 1 Subject of approval and scope of application

Subject of this general construction supervisory authority approval is anchor heads for ground anchors according to DIN EN 1537 in conjunction with DIN SPEC 18537 with steel tendons made of 2 to 22

prestressing strands grade St 1570/1770, (dia. = 0.6"), nominal cross section 140mm<sup>2</sup>, or  
 prestressing strands grade St 1660/1860, (dia. = 0.6"), nominal cross section 140mm<sup>2</sup>, or  
 prestressing strands grade St 1570/1770, (dia. = 0.62"), nominal cross section 150mm<sup>2</sup>, or  
 prestressing strands grade St 1660/1860, (dia. = 0.62"), nominal cross section 150mm<sup>2</sup>.

### 2 Provisions covering the construction product

#### 2.1 Features and constituents

##### 2.1.1 General

Accessories conforming to the Annexes and technical delivery terms, in which the dimensions, material and material characteristics of the accessories including permissible tolerances are indicated, must be used. The technical delivery terms are filed with the DIBt, the certification body, and the monitoring body.

##### 2.1.2 Steel tendon

Only 7-wire prestressing strands may be used which have obtained a general construction supervisory authority approval for the following steel grades and dimensions:

Prestressing strand 15.3mm diameter, steel grade: St 1570/1770 or St 1660/1860:

Strand:	Nominal diameter $d_P \approx 3 d_A =$	15.3mm or 0.6"
	Nominal cross section	140mm <sup>2</sup>
Individual wires:	Outer wire diameter $d_A$	
	Core wire diameter $d_K \geq$	1.03 $d_A$

Prestressing strand 15.7mm diameter, steel grade: St 1570/1770 or St 1660/1860:

Strand:	Nominal diameter $d_P \approx 3 d_A =$	15.7mm or 0.62"
	Nominal cross section	150mm <sup>2</sup>
Individual wires:	Outer wire diameter $d_A$	
	Core wire diameter $d_K \geq$	1.03 $d_A$

Only prestressing strands with very low relaxation may be used.

To avoid confusion, only prestressing strands of the same nominal diameter and of the same steel grade may be used during a construction phase.

The maximally admissible angular deviation of the tendon from the normal to the anchor head is 2.6°.

##### 2.1.3 Wedges

The prestressing strands must be anchored one by one in wedge plates (see Section 2.1.4), as shown in Appendix 1, using two-part wedges (round wedges).

Depending on the nominal cross section of the prestressing strand, two types of wedges are used: type H6N for the 0.6" prestressing strands (nominal cross section 140mm<sup>2</sup>), and type H6S for the 0.62" prestressing strands (nominal cross section 150mm<sup>2</sup>). The wedges must be marked according to the prestressing strands to be used as defined by Annex 1.

### 2.1.4 Wedge plates

The dimensions of the wedge plates must correspond to Appendix 1. For verification purposes, the wedge plates can be provided with an external thread.

The wedge plates rest with their entire surface on the anchor plates. They are fixed by the perimeter of the strand bundle  $\varnothing L$  in the opening of the individual anchor plate comprising the diameter L in accordance with Appendix 1. The steel anchor plate and the transmission of load must be measured in accordance with the applicable technical building regulations.

When locking off the anchors, a slip of 6mm occurring within the anchorage must be considered.

Restressing of the ground anchors, including the loosening and reuse of the wedges, is admissible if the wedge positions resulting from the previous lock-off operation are shifted within the wedges outwards by at least 15mm after restressing and anchoring.

## 2.2 Marking

The delivery note for the anchor head parts (wedges and wedge plates) must be marked with the conformity symbol by the manufacturer pursuant to the conformity symbol regulations issued by the German Laender. The marking may only be carried out if the requirements as prescribed by Section 2.3 have been met.

The delivery note must, among other things, state for which ground anchors the components are designated and in which factory they have been manufactured. It must be possible to obtain clear assignment of the components from the delivery note.

## 2.3 Certificate of conformity

### 2.3.1 General

Conformity of the building product (wedge plates and wedges) with the provisions of this general construction supervisory authority approval and the technical delivery terms must be confirmed for each manufacturing plant with a certificate of conformity based on a factory production inspection and a regular external monitoring including a first testing of the building product in accordance with the provisions below.

The manufacturer of the building product must commission a recognized certification body and a recognized monitoring body to issue the certificate of conformity and conduct the external monitoring, including product inspection/testing, that has to be carried out.

The declaration that a certificate of conformity has been issued must be made by the manufacturer by marking the building products with the mark of conformity, indicating the intended purpose of use.

The certification body must send a copy of the issued certificate of conformity to the DIBt for information.

### 2.3.2 Factory production control

#### 2.3.2.1 General

Each manufacturing plant must set up and carry out its own factory production control. A factory production control is understood to be the continual monitoring of the production to be conducted by the manufacturer, who thus ensures that the building products manufactured meet the requirements of this general construction supervisory authority approval.

The factory production control must include at least the measures listed in Sections 2.3.2.2 and 2.3.2.3 below.

The results of the factory production control must be recorded and evaluated. The records must contain at least the following information:

- description of the building product or of the basic material and its components,
- nature of the control or inspection,
- date of manufacture and date of inspection of the building product or of the basic material or of the components,
- results of the controls and inspections and, if applicable, comparison with the relevant requirements,
- the signature by the person responsible for the factory production control.

The records must be kept for a minimum of five years and submitted to the monitoring body assigned with the external monitoring. On request, they must be submitted to the DIBt and to the competent highest construction supervisory authority.

If the test results are unsatisfactory, the manufacturer must immediately take the necessary steps to eliminate the specific problem. Building products which do not meet the requirements must be handled in such a manner that they cannot be mistaken for conforming products. Once the deficiency has been eliminated, the test in question must be repeated immediately, provided that this is technically feasible and required to verify the elimination of the deficiency.

#### **2.3.2.2 Wedges**

Evidence for the material and wedging properties must be produced with inspection certificate "3.1" in accordance with DIN EN 10204.

At least 5% of all wedges manufactured must be inspected and verified with regard to their:

- a) dimensional accuracy.
- b) surface hardness.

At least 0.5% of all wedges manufactured must be inspected and verified with regard to their case hardening depth/insert depth and core strength.

All wedges must be visibly inspected with regard to the condition of their teeth, their cone surface, and their remaining surfaces by means of a yes/no check (no records required thereof).

#### **2.3.2.3 Wedge plates**

Evidence for the material properties must be produced with inspection certificate "3.1" in accordance with DIN EN 10204. The minimum values for the yield strength and tensile strength are filed with the DIBt.

All cone holes that accommodate strands must be inspected and verified with regard to their angle, diameter, and surface quality.

At least 5% of all wedge plates must be inspected and verified with regard to their dimensions, where required, their diameter and the position of the boreholes, and the thread dimensions according to Appendix 1, and the construction drawings filed.

In addition, each wedge plate must be visibly inspected with regard to its dimensions and gross faults by means of a yes/no check (no records required thereof).

### **2.3.3 External monitoring**

The factory production control in each manufacturing plant must be monitored by external monitoring on a regular basis, but at least half-yearly.

Within the scope of external monitoring, a first testing of the building product must be conducted; additionally, samples for sample checks can be taken. Sampling and testing are incumbent on the respective recognized monitoring body.

The results of the certification and external monitoring must be kept for a minimum of five years. On request, they must be presented to the DIBt and to the competent highest construction supervisory authority by the certification or monitoring body.

This general construction supervisory authority approval makes reference to the following standards:

- DIN EN 1537:2001-01            Execution of special geotechnical works - Ground anchors
- DIN EN 1537 Correction 1:2011-12
- DIN SPEC 18537:2012-02      Supplementary provisions to DIN EN 1537:2001-01, Execution of  
special geotechnical works - Ground anchors
- DIN EN 10204:2005-01        Metallic products - Types of inspection documents; German version  
EN 10204:2004

Dr.-Ing. Lars Eckfeldt  
Section Head

Certified

*/Illegible signature/*

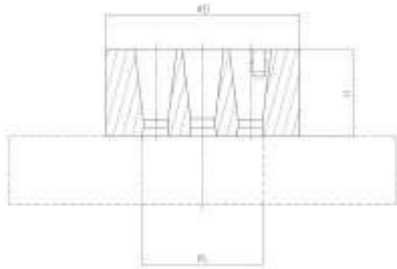
*/Stamp mark:/*  
*/Bear emblem/*  
Deutsches Institut  
für Bautechnik  
12

Wedge plates	Unit	6-2	6-3	6-4	6-5	6-7	6-9	6-12	6-15	6-19	6-22
Number of strands	-	2	3	4	5	6-7	8-9	10-12	13-15	16-19	20-22
Diameter [D]	mm	90	95	110	135	135	155	170	200	210	230
Thread [G]	mm	TR90 x6	TR95 x6	TR110 x6	TR135 x6	TR135 x6	TR155 x6	TR170 x6	TR200 x6	TR210 x6	TR230 x8
Height [H]	mm	50	50	55	60	60	65	75	85	95	100

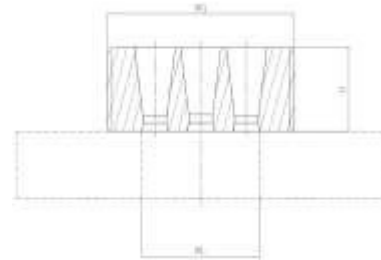
Anchor plate hole [L]	mm	52	58	72	86	86	112	120	150	152	175
-----------------------	----	----	----	----	----	----	-----	-----	-----	-----	-----

The amount of strands is to be reduced by removal of strands distributed in radial symmetric position in the wedge plate (maximum of 3 strands), where the prescriptions for anchors with totally full anchorages (basic types) are also valid for anchors with only a part of the anchorages in use. Not used cones are to be occupied with short pieces of strands and wedges.

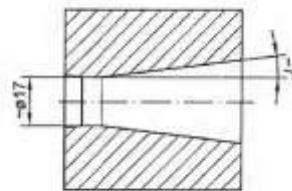
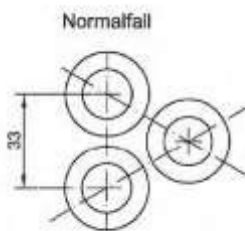
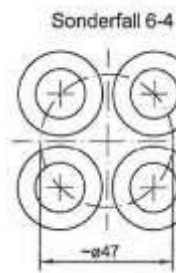
Wedge plate



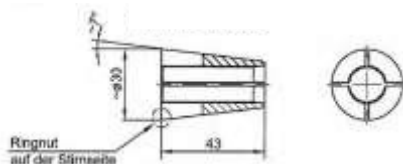
Wedge plate with thread



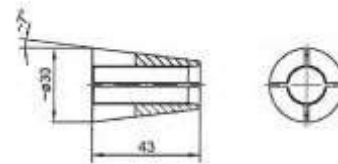
Geometry of the holes



Wedge type H6S  
(for 150 mm<sup>2</sup> strand)



Wedge type H6N  
(for 140 mm<sup>2</sup> strand)



Wedges for different sizes of strands must be clearly distinguishable:  
Wedges for strands with a nominal section of 150 mm<sup>2</sup> are to be distinguished either with a groove or an inscription type H6S, 0,62".

Anchor head for anchors from 2 up to 22 strands

Technical Data – Wedge plates and wedges

Annex 1



**DYWIDAG-Systems International GmbH**

Germanenstrasse 8  
86343 Koenigsbrunn, Germany  
Phone +49-8231-96 07 0  
Fax +49-8231-96 07 40  
E-mail [geotechnik@dywidag-systems.com](mailto:geotechnik@dywidag-systems.com)  
[www.dywidag-systems.de](http://www.dywidag-systems.de)

**DYWIDAG-Systems International GmbH**

Max-Planck-Ring 1  
40764 Langenfeld, Germany  
Phone +49-2173-79 02 0  
Fax +49-2173-79 02 20  
E-mail [suspa@dywidag-systems.com](mailto:suspa@dywidag-systems.com)  
[www.dywidag-systems.de](http://www.dywidag-systems.de)

**DYWIDAG-Systems International GmbH**

Schuetzenstrasse 20  
14641 Nauen, Germany  
Phone +49-3321-44 18 0  
Fax +49-3321-44 18 18  
E-mail [suspa@dywidag-systems.com](mailto:suspa@dywidag-systems.com)  
[www.dywidag-systems.de](http://www.dywidag-systems.de)

AUSTRIA  
ARGENTINA  
AUSTRALIA  
BELGIUM  
BOSNIA AND HERZEGOVINA  
BRAZIL  
CANADA  
CHILE  
COLOMBIA  
COSTA RICA  
CROATIA  
CZECH REPUBLIC  
DENMARK  
EGYPT  
ESTONIA  
FINLAND  
FRANCE  
GERMANY  
GREECE  
GUATEMALA  
HONDURAS  
HONG KONG  
INDONESIA  
ITALY  
JAPAN  
KOREA  
LEBANON  
LUXEMBOURG  
MALAYSIA  
MEXICO  
NETHERLANDS  
NORWAY  
OMAN  
PANAMA  
PARAGUAY  
PERU  
POLAND  
PORTUGAL  
QATAR  
SAUDI ARABIA  
SINGAPORE  
SOUTH AFRICA  
SPAIN  
SWEDEN  
SWITZERLAND  
TAIWAN  
THAILAND  
TURKEY  
UNITED ARAB EMIRATES  
UNITED KINGDOM  
URUGUAY  
USA  
VENEZUELA