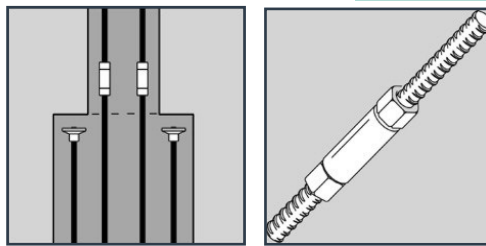


## DYWIDAG Reinforcement Systems

**GEWI®**  
**Coupler Splices**  
**63.5 mm**



**Coupler splices and anchorages**  
**for steel bars with thread ribs**  
**S 555/700**  
**Ø 63.5 mm**

**Approval Number**  
**Z-1.5-2**  
**Validity**  
**18 December 1998 -**  
**31 December 2008**

# DEUTSCHES INSTITUT FÜR BAUTECHNIK

Statutory Body

10829 Berlin, 27 August 2007  
Kolonnenstrasse 30 L  
Tel.: 030 78730-312  
Fax: 030 78730-320  
Ref. No.: I 19-1.1.5-10/07

## General Construction Supervisory Authority Approval

**Approval No.:**

Z-1.5-2

**Applicant:**

DYWIDAG-Systems  
International GmbH  
Siemensstrasse 8  
85716 Unterschleissheim

**Subject of Approval:**

Coupler splices and anchorages for steel bars  
with thread ribs S 555/700  
nominal diameter: 63.5 mm

**Valid until:**

31 December 2008

The above-mentioned subject of the approval is herewith granted a general construction supervisory authority approval.\*

This general construction supervisory authority approval consists of eight pages and seven appendices.

### 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 authorised by the "Deutsches Institut für Bautechnik" (DIBt; German Institute for Building Technology). In case of doubt in respect to wording and/or interpretation of this approval, the original German version of this document shall prevail exclusively. No liability is therefore assumed for translation errors or inaccuracies.

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\* This general construction supervisory authority approval supersedes the general construction supervisory authority approval of 8 April 2005.  
The subject of approval was granted a general construction supervisory authority approval on 18 December 1998 for the very first time.

## I. GENERAL REGULATIONS

- 1 This general construction supervisory authority approval verifies the suitability (fitness for the intended purpose) of the subject of the approval in keeping with the state construction ordinances.
- 2 The general construction supervisory authority approval does not replace the permissions, agreements and certifications required by law for a construction project to be carried out.
- 3 The general construction supervisory authority approval is granted without prejudicing the rights of third parties, especially private protection rights.
- 4 Notwithstanding any further regulations in the "Special Provisions" section, the manufacturer and distributor of the subject of approval shall provide the user with copies of the certificate of approval; furthermore, they shall inform the user that the certificate of approval must be available at the place of use. Copies of the general construction supervisory authority approval must be made available to involved authorities on request.
- 5 The general construction supervisory authority approval may only be copied completely. The publication of extracts is subject to approval by the DIBt. Texts and drawings of advertising material may not contradict the 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 checked by the DIBt'.
- 6 The general construction supervisory authority approval is granted, but is revocable. The provisions in the general construction supervisory authority approval can be subsequently supplemented or changed, especially if the latest technical findings give reason for this.

## II. SPECIAL REGULATIONS

### 1 Subject of approval and area of application

#### 1.1 Subject of approval

(1) Object of this approval are mechanical couplings and anchorages for the GEWI Steel Bar S 555/700 by means of screwed couplers or screwed-on anchoring components (see Appendix 1).

(2) The nominal diameter of the GEWI Steel Bar S 555/700, which is governed by the general construction supervisory authority approvals No. Z-1.1-1 and Z-1.1-198.1, is 63.5 mm.

(3) To reduce slip, the internal threads of the coupling and anchoring elements are tensioned against the thread of the bar by lock nuts with a defined torque (except for contact splices and coupler splices with shrink sleeve).

(4) Standard couplers (T 3003) are used to form tension and compression splices for threadbars having identical diameters.

(5) Contact couplers (T 3006 or T 3106) are used to form sheer compression splices. The coupler ensures the centric position of the bars whose end faces are pressed onto each other by hand-tight fastening.

(6) Threadbars are anchored by means of anchor plates (T 2139) that are retained by anchor nuts (T 2002 or T 2163 G). These are fastened with the thread of the bar via lock nuts (T 2040 or T 2040 G).

(6) Alternatively, threadbars are anchored by means of anchor pieces (T 2073 G) or double anchor pieces (T 2179 G) that are either retained by anchor nuts (T 2002 or T 2163 G) or fastened with lock nuts (T 2040 or T 2040 G), depending on the type of load.

#### 1.2 Area of application

GEWI Steel Bars S 555/700 having a nominal diameter of 63.5 mm spliced or anchored with couplers and anchoring components in line with this general construction supervisory authority approval are used as steel load-carrying elements of injection piles (composite piles) and of soil nailing in accordance with the relevant general construction supervisory authority approval.

### 2 Regulations covering the construction product

#### 2.1 Features and constituents

The materials used for coupling components and the geometrical dimensions for couplers and coupling components are specified in Appendices 2 to 4 and 7.

The shop drawings including indicated tolerances are deposited with the DIBt and the external surveillance authority.

#### 2.2 Manufacture, packaging, transport, storage and marking

##### 2.2.1 Manufacture

Depending on the material used (see Appendix 7), the coupling and anchoring components either are cast into their final form or cut as blanks from the bar stock into sections, drilled and provided with a cut interior thread analogous to the GEWI Threadbar at the plant.

### 2.2.2 Packaging, transport and storage

The coupling and anchoring components shall be packed, transported and stored so that they are protected from corrosion, mechanical damage and dirt accumulation prior to their use on the construction site.

### 2.2.3 Marking and delivery note

(1) The coupling and anchoring components shall be marked at the positions indicated in Appendices 2 to 4 so that the manufacturer can be gathered therefrom. If the manufacturer is indicated in an encrypted manner, a list including complete data and the encryptions assigned shall be deposited with DIBt and the external surveillance agency.

(2) The manufacturer shall mark the delivery note for coupling and anchoring components with the compliance mark pursuant to the compliance mark regulations issued by the German States. If the coupling and anchoring components are manufactured by a supplier, the surveillance report for those products shall be submitted to the manufacturer for the marking. The marking may only be affixed if all requirements of the certificate of compliance pursuant to Section 2.3 have been met fully.

## 2.3 Compliance certificate

### 2.3.1 General

(1) Every manufacturer and supplier must comply with the following provisions to confirm compliance of the coupling and anchoring components on the basis of a factory production control and regular external surveillance including initial inspection with the provisions of this general construction supervisory authority approval.

(2) The manufacturer shall commission a recognised certification institution and a recognised inspection agency to issue the certificate of conformity and perform the external surveillance, including the inspection of products, of both the manufacturer and its suppliers.

(3) The certification authority must send a copy of the certificate of conformity issued to the DIBt.

### 2.3.2 Factory production control

(1) Each manufacturer and each supplier must set up and also carry out its own factory production control. Factory production control is understood to be the continual monitoring of production by the manufacturer or supplier who thus ensures that the construction products manufactured by it meet the requirements of this general construction supervisory authority approval.

(2) If a manufacturer uses semi-finished products not manufactured at its plant, but by suppliers, those products shall be subjected to an appropriate incoming inspection.

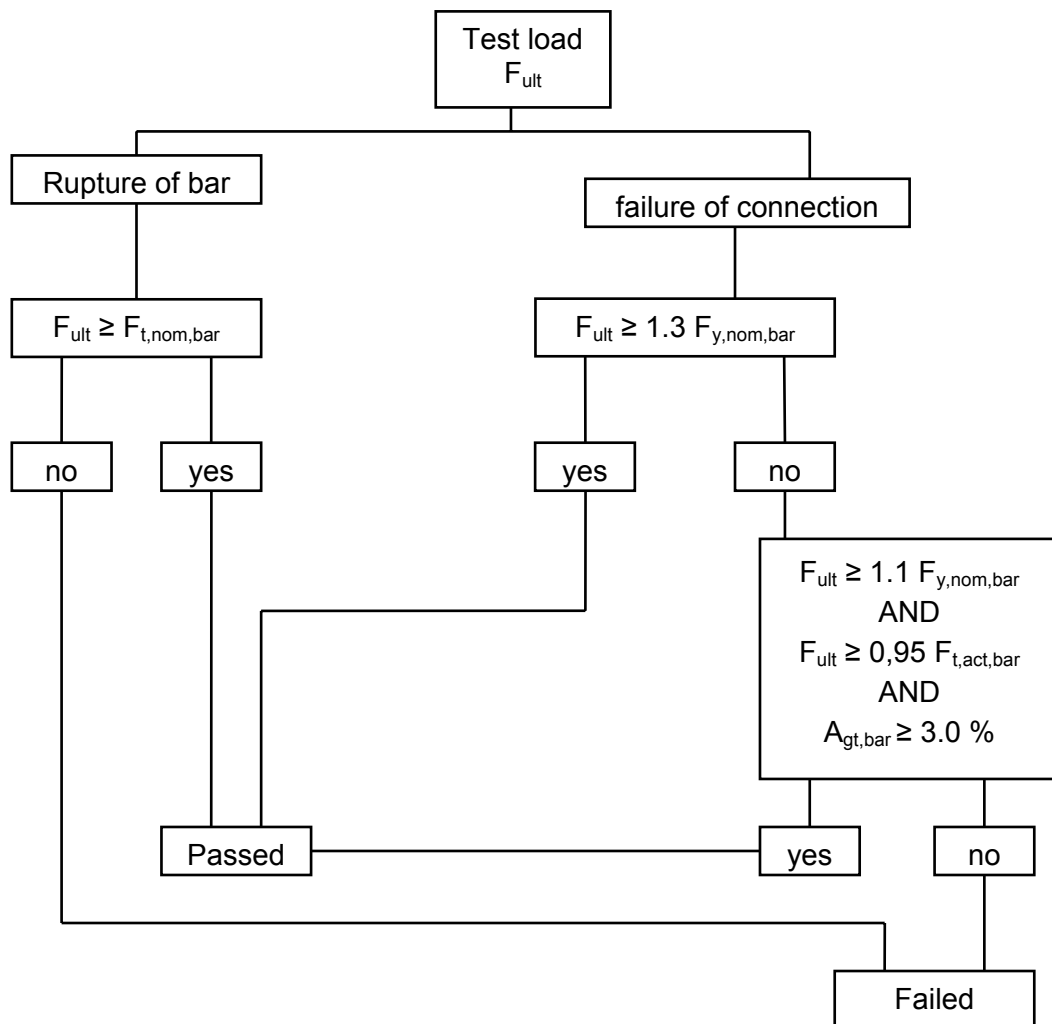
(3) The factory production control must include at least the measures specified in the "Principles for approval and monitoring examinations of mechanical reinforcing steel connections" in the edition of May 2007.

(4) The geometry of coupler and bar threads shall be checked by means of a yes/no check (statistical evaluation not required). Samples of the finished coupling and anchoring components shall be taken under statistical aspects and their outer dimensions checked.

(5) One sample in form of an individual coupling component or assembled connection or anchorage respectively shall be taken for each 1000 coupling components of each coupling type or anchoring components manufactured.

(6) This coupling or anchoring component or this connection respectively shall be tested with regard to its load capacity in a tensile test. The test has been passed, when one of the following conditions is met:

- a) Bar breaks outside of the coupling and/or anchorage.
- b) Connection and/or anchorage failure (break of the coupler or of the anchor piece, shearing off a thread, break of a bar inside the coupler or within the anchor piece) above a test load of  $F_{Soll} = 1.3 \cdot \text{nominal yield point of the bar} = 1.3 \cdot R_{e,Nenn} \cdot A_{s,Nenn,Stab}$
- c) Failure (shearing off a thread, break of a bar inside the coupler or within the anchorage) for an ultimate load below  $F_{Soll}$ , but above the 1.1 fold nominal yield point of the bars, as long as the load capacity of the connection is at least 95% of the actual load capacity of the bar and the uniform elongation  $A_{gt,v}$  is at least 3% for the maximum load in case of connection failure.  
The actual load capacity of the bar and uniform elongation  $A_{gt,v}$  shall be determined on the bar involved in the failure.



whereas:

- $F_{t,nom,bar}$  = nominal ultimate load of the bar
- $F_{y,nom,bar}$  = nominal yield load of the bar
- $F_{t,act,bar}$  = actual ultimate load of the bar

(7) The results of the factory production control shall be recorded and evaluated by each manufacturer and each supplier. The records shall include at least:

- Designation of the construction product and/or the raw material and the components.
- Type of control or testing.
- Date of manufacture and inspection / testing of the construction product and/or the raw material or the components.
- Results of controls and inspections and, if applicable, comparison with the requirements.
- Signature of the person in charge of the factory production control.

(8) The records must be filed for at least five years and presented to the inspection agency commissioned with external surveillance. On request, they must be submitted to the DIBt and the highest construction supervisory authority responsible.

(9) If the inspection results are unsatisfactory, the manufacturer or supplier shall immediately take the necessary actions to eliminate the problem. Construction products which do not meet requirements must be treated so that they cannot be confused with complying products. Once the problem has been eliminated, the relevant inspection must be repeated immediately, provided that this is technically feasible and also required, to verify elimination of the problem.

### 2.3.3 External surveillance

(1) The factory production control set up by each manufacturer and each supplier must regularly, but at least twice a year, be checked in accordance with the principles specified under Section 2.3.2 (3).

(2) As part of the external surveillance, samples for sampling shall be taken.

(3) The evaluations of tensile tests to be carried out within the scope of the factory production control shall be checked as per Section 2.3.2 (6).

(4) The required fatigue tests shall be conducted in accordance with the principles stated in Section 2.3.2 (3) to determine the stress-number curve within the scope of the surveillance within the period of validity of this general construction supervisory authority approval.

(5) The results of the certification and of external surveillance shall be kept for at least five years. On request, they must be presented to the DIBt and to the highest construction supervisory authority by the certification authority and the surveillance authority.

## 3 Regulations covering design and dimensions

### 3.1 General

(1) Both Section 1.2 and the following provisions shall apply to design and dimensions.

(2) The position and dimension of coupler splices and anchorages must be plotted in the reinforcement drawings, and the prerequisites specified in the installation regulations must be fulfilled.

### 3.2 Permissible load

#### 3.2.1 Predominantly static load

Splices and anchorages as per this general construction supervisory authority approval may be loaded 100% like an unspliced GEWI Steel Bar having a nominal diameter of 63.5 mm in case of predominantly static tensile and compressive loads.

### 3.2.2 Not predominantly static load

(1) The permissible fatigue stress range of steel stresses is  $2 \cdot \sigma_A = 60 \text{ N/mm}^2$  within the range from zero to  $2 \cdot 10^6$  load cycles for the coupler splice countered with a longer nut (see Appendix 5) and for anchorages.

(2) Evidence for the transfer of the bar force into the structural member to be connected shall be produced in accordance with the relevant technical building specifications. As regards calculation and construction, special attention shall be paid to the accommodation of transverse tensile stresses or, where appropriate, trailing of force by appropriate reinforcement including their anchoring.

### 3.3 Concrete cover and bar spacing

Concrete cover and corrosion protection shall be provided in keeping with the regulations of the relevant general construction supervisory authority approval for injection piles (composite piles) and soil nailing.

### 3.4 Centre and edge distances of anchorages

The centre and edge distances as stated in Appendix 6 shall apply.

## 4. Regulations for work execution

### 4.1 General

(1) The coupler connections and anchorages may only be made by trained personnel. To this end, the applicant shall provide written work instructions that must be part of the delivery papers.

(2) Only individual components marked as per Section 2.2.3 may be used.

(3) To torque the screwed coupler connections and anchorages only torque equipment may be used that has been checked with regard to operability and accuracy, that enables reliable reading of the required torque moment or switches off if the torque moment set has been achieved.

(4) The force of the torque to be applied is specified in Appendices 5 and 6.

(5) The dimensions of the coupling and anchoring components, especially the length of nuts and their arrangement, must comply with the specifications put forth in the constructional drawings (reinforcement drawings).

(6) The threads of bars, coupling and anchoring components must be clean as well as free of grease and rust.

### 4.2 Coupler connections

#### 4.2.1 Installation

Any coupler connection shall be made and torqued as per Appendix 5.

#### 4.2.2 Tension splice, torqued compression splice, splice in case of alternating load

(1) One of the bars to be connected must be longitudinally movable and freely rotatable.

(2) An appropriate permanent marking shall be affixed in sufficient intervals from the ends of the bars to be spliced so that the central seat of the couplers can be verified.

#### 4.2.3 Compression splice (contact splice)

(1) One of the bars to be connected must be longitudinally movable and freely rotatable.

(2) The end faces of the bars must be sawn and deburred in vertical direction to the axis of the bar so that surface contact of the bar ends is ensured.

(3) Central arrangement of the contact coupler shall be verified in the sight hole.



**4.3 Anchorages (tensile and compression)**

- (1) Any anchorage shall be assembled and torqued as per Appendix 6.
- (2) The strength class of the concrete to receive the anchorage must at least be B25 resp. C20/25.
- (3) The correct arrangement of the anchoring components subject to the type of load shall be verified in accordance with the representations of Appendix 6.

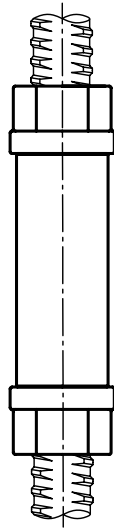
**4.4 Notification to the construction supervision authority**

The construction supervision authority or the person/institution charged with construction supervision must be notified about the making of screwed coupler connections and/or anchorages of GEWI Steel Bar S 555/700, nominal diameter 63.5 mm, beforehand.

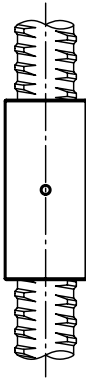
Häusler

Certified by  
*/Illegible signature/*  
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**Coupler splices**

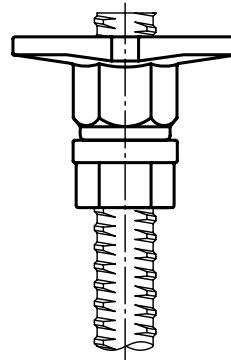


e.g. tension splice with coupler

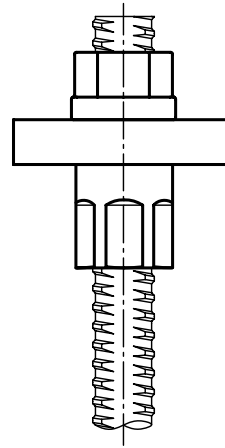


e.g. compression splice with contact coupler

**Anchorage**



e.g. anchor piece anchorage (tension)



e.g. plate anchorage (compression)

	GEWI-fitting	Type	Appendix
Coupler splices	Coupler	T 3003	2
	Contact coupler	T 3006	2
	Contact coupler (A/F)	T 3106	2
Anchorages	Anchor nut	T 2002	3
	Flanged anchor nut	T 2163G	3
	Anchor plate	T 2139	3
	Anchor piece	T 2073G	3
	Double anchor piece	T 2179G	4
	Lock nut	T 2003 / T 2040	4



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**System overview**

GEWI-System S 555/700  $\varnothing$ 63,5 mm

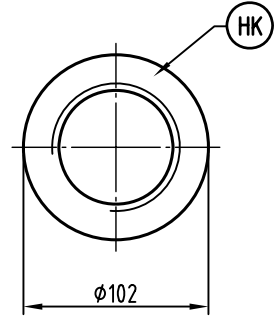
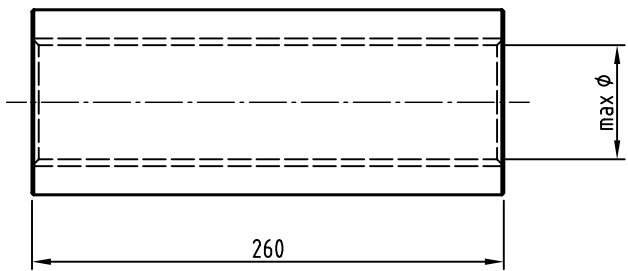
**Appendix 1**

to the approval  
No. Z-15-2

2007-august-27

Coupler

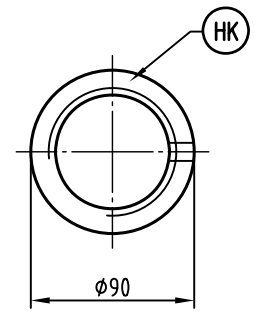
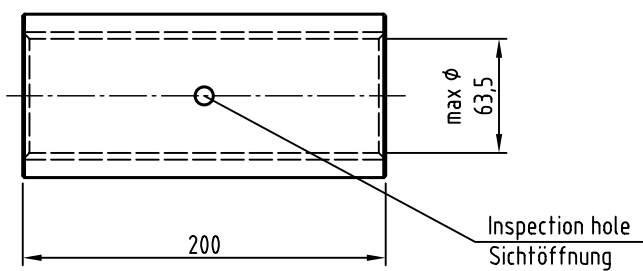
63 T 3003



material S355J0, S355J2, L355	maxφ 63,2
material G42CrMo4	maxφ 63,5

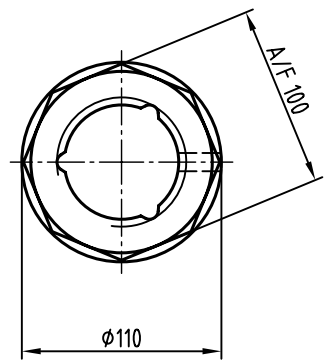
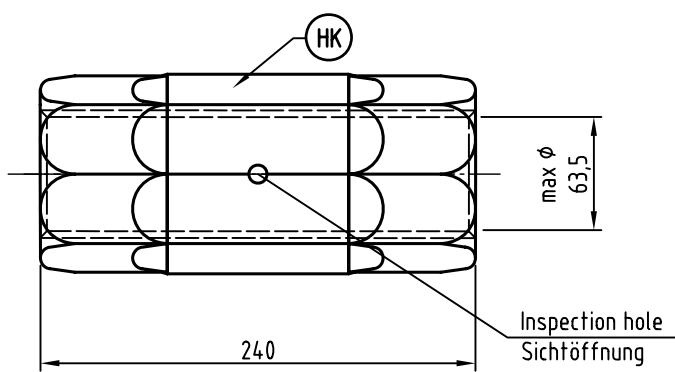
Contact coupler

63 T 3006



Contact coupler (A/F)

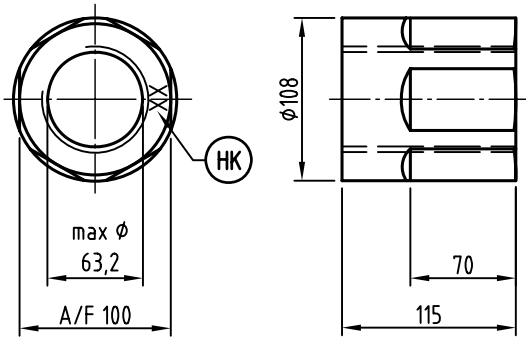
63 T 3106



### Anchor nut

63 T 2002

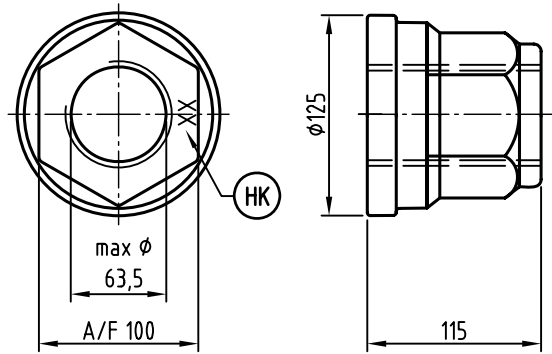
(also applicable as lock nut-long)



### Flanged anchor nut

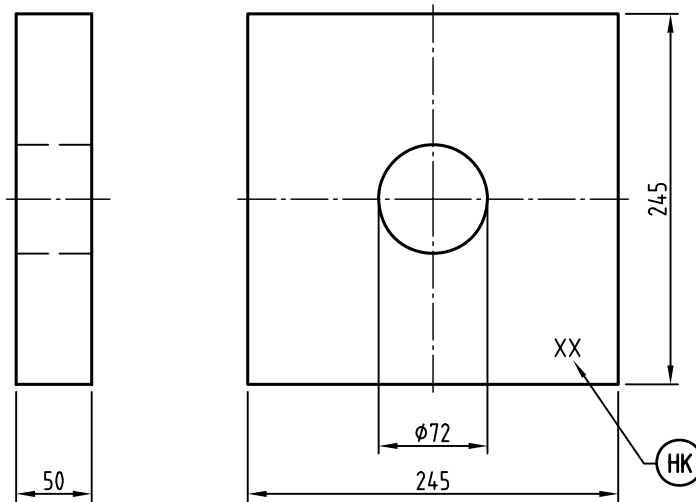
63 T 2163 G

(also applicable as lock nut-long)



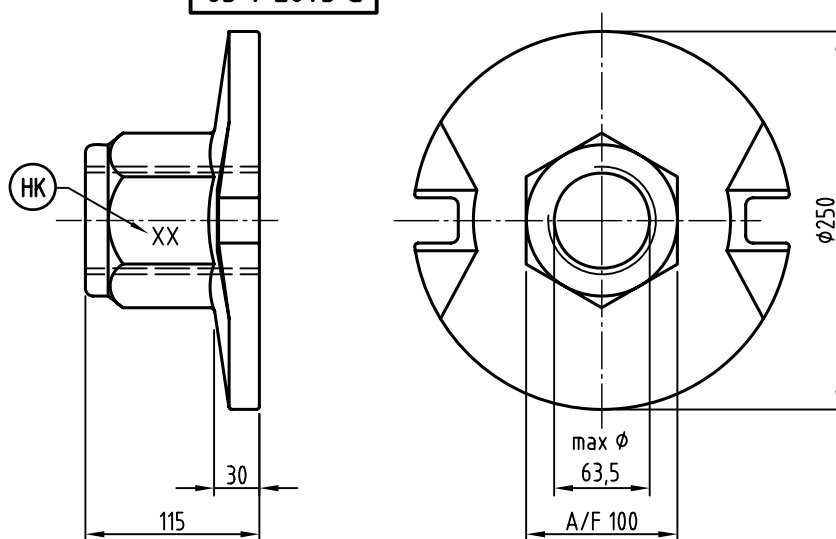
### Anchor plate

63 T 2139



### Anchor piece

63 T 2073 G



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Anchor nut, Anchor plate  
Anchor piece

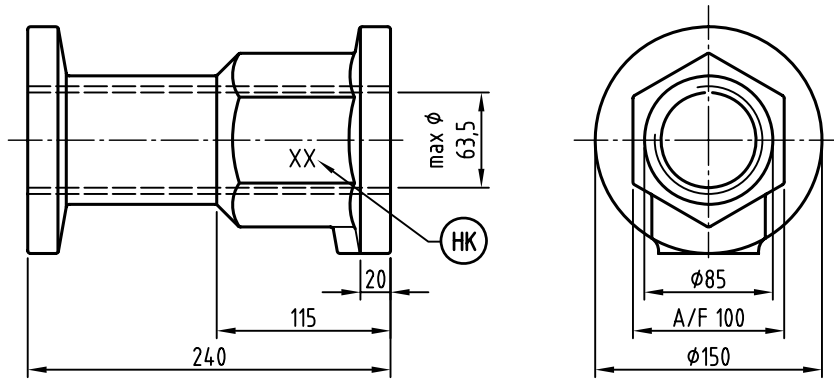
GEWI-System S 555/700  $\phi$ 63,5 mm

Appendix 3  
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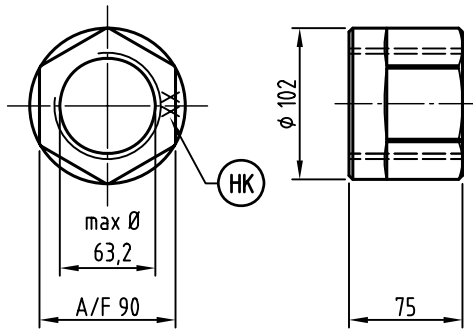
Double anchor piece

63 T 2179 G



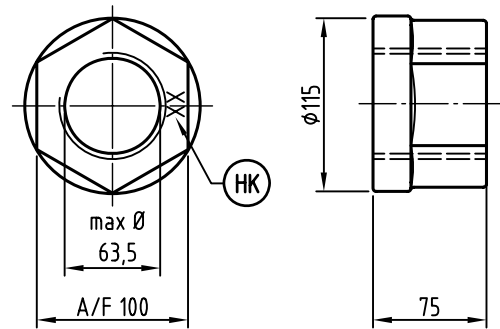
Lock nut-short

63 T 2040



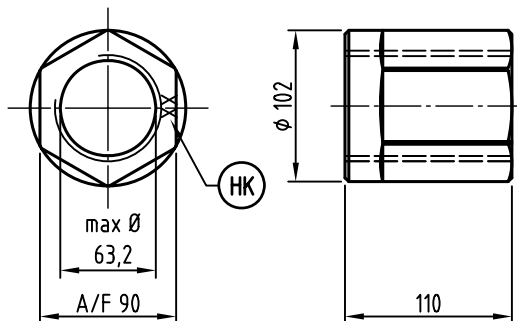
Lock nut-short cast

63 T 2040 G



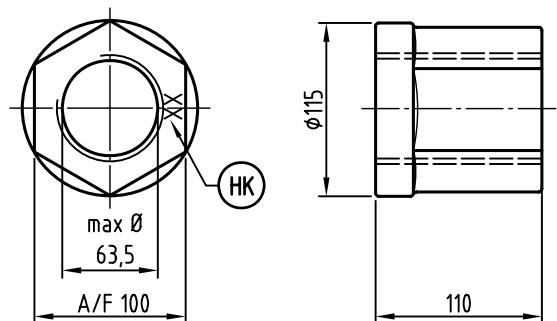
Lock nut-long

63 T 2003



Lock nut-long cast

63 T 2003 G



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Double anchor piece  
Lock nuts

GEWI-System S 555/700  $\varnothing$ 63,5 mm

Appendix 4  
to the approval  
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	Tension	Compression	Alternating							
predominantly static	<p>SATM-heat shrinkable sleeve</p> <p>bars torqued by hand</p> <table border="1"> <tr> <th>stress [N/mm<sup>2</sup>]</th> <th>slip [mm]</th> </tr> <tr> <td>165</td> <td>2</td> </tr> <tr> <td>317</td> <td>3</td> </tr> </table>	stress [N/mm <sup>2</sup> ]	slip [mm]	165	2	317	3	<p>torqued with 12 kNm</p>	<p>bars torqued by hand</p> <p>torqued with 12 kNm</p>	<p>torqued with 12 kNm</p>
	stress [N/mm <sup>2</sup> ]	slip [mm]								
165	2									
317	3									
not predominantly static	<p>torqued with 12 kNm</p>	<p>torqued with 12 kNm</p>	<p>torqued with 12 kNm</p>							

① Coupler 63 T 3003 (appendix 2)

③ Lock nut-long 63 T 2003 (appendix 4)  
Lock nut-long cast 63 T 2003 G (appendix 4)

② Contact coupler 63 T 3006 (appendix 2)  
Contact coupler (A/F) 63 T 3106 (appendix 2)

④ Lock nut-short 63 T 2040 (appendix 4)  
Lock nut-short cast 63 T 2040 G (appendix 4)

**Remarks:**

- Rotary prevention: pin, set screw, heat shrinkable sleeve, glue, lock nut

- Voids in couplers and nuts are filled in all cases with

corrosion protection compound whose suitability is proven (e.g. Petroplast, Denso-Jet, Nontribus).



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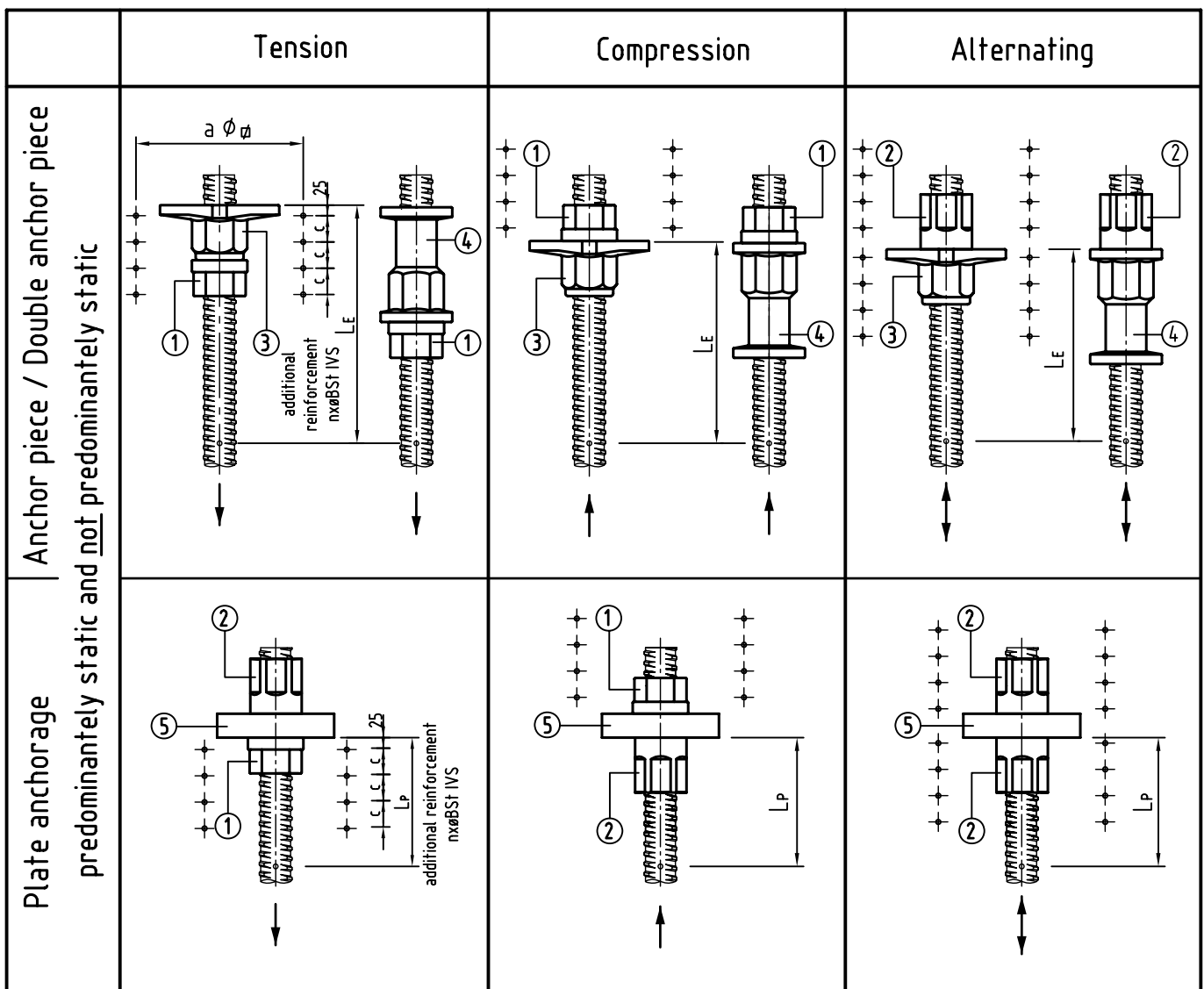
## Assembly of coupler splices Torque moment

GEWI-System S 555/700 ø63,5 mm

## Appendix 5

to the approval  
No. Z-15-2

2007-august-27



- |  |  |
|--|--|
| ① Lock nut-short 63 T 2040 (appendix 4)      | ③ Anchor piece 63 T 2073 G (appendix 3)        |
| Lock nut-short cast 63 T 2040 G (appendix 4) | ④ Double anchor piece 63 T 2179 G (appendix 4) |
| ② Anchor nut 63 T 2002 (appendix 3)          | ⑤ Anchor plate 63 T 2139 (appendix 3)          |
| Flanged anchor nut 63 T 2163 G (appendix 3)  |  |

The required reinforcement for transferring the pile load to and in the structure has to be calculated for the single project acc. to the valid general construction standards.

Anchorages torqued with 8 kNm	bond-length min. $l_E, l_P$ [mm]	additional reinforcement <sup>*)</sup>					centre distance A [mm]	edge distance R [mm]	concrete strength $f_{ck}$ <sup>**)</sup> [N/mm <sup>2</sup> ]
		Tension or Compression quantity n	Alternating quantity n	bar $d_s$ [mm]	a [mm]	c [mm]			
Anchor piece	$L_E = 800$	5	10	16	350	55	380	230	≥ 20
Double anchor piece		-	-	-	-	-	760	400	
Plate anchorage	$L_P = 340$	4	8	16	350	70	380	230	

<sup>\*)</sup> additional reinforcement can be neglected if the centre and edge distances are doubled

<sup>\*\*)</sup>  $f_{ck}$  acc. to DIN 1045-1:2001-07 (equivalent acc. to DIN 1045:1988-08  $\beta_{WN} \geq 25 \text{ N/mm}^2$ )



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Anchorage: additional reinforcement,  
centre and edge distance, torque moment

GEWI-System S 555/700  $\phi 63,5 \text{ mm}$

Appendix 6  
to the approval  
No. Z-1.5-2

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Material overview	Appendix	DIN EN 10025-2:2005-04 S235 (1.0038)	DIN EN 10224:2003-07 L355 (1.0419)	DIN EN 10025-2:2005-04 S355J0 (1.0553) DIN EN 10025-2:2005-04 S355J2 (1.0570)	DIN EN 10293:2005-06 G42CrMo4 (1.7231)	EN 1563:2003-02 EN-GJS-400-15 (EN-JS1030)	EN 1563:2003-02 EN-GJS-500-7 (EN-JS1050)
Coupler	2		○	○	○		
Contact coupler	2		○	○			
Contact coupler (A/F)	2					○	○
Anchor nut	3		○	○			
Flanged anchor nut	3					○	○
Anchor plate	3	○					
Anchor piece	3					○	○
Double anchor piece	4					○	○
Lock nut-short /-long	4		○	○			
Lock nut-short /-long cast	4					○	○



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International GmbH

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## Material

GEWI-System S 555/700 ø63,5 mm

## Appendix 7

to the approval  
No. Z-1.5-2

2007-august-27



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