

DEUTSCHES INSTITUT FÜR BAUTECHNIK

(German Institute for Civil Engineering)

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Ref No.: I 18-1.12.5-11/05

National Technical Approval

Approval number:

Z-12.5-96

Applicant:

Stahlwerk Annahütte
Max Aicher GmbH & Co. KG
83404 Ainring

Generic type of construction product:

Bar anchor St 900/1100
with thread ribs AWM 1100
nominal diameter 15 and 20 mm

Valid until:

30. September 2010

The aforementioned construction product is herewith generally approved by the Deutsches Institut für Bautechnik in accordance with German building legislation.

This National Technical Approval comprises six pages and two annexes.

Important Notice

The approval in hand 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 wording and/or 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

This National Technical Approval attests to the usability and applicability of the aforementioned construction product in accordance with German federal state building regulations.

This National Technical Approval does not replace the permits, licences and certificates required by German law for the execution of construction projects.

This National Technical Approval is granted without prejudice to third party rights, in particular private property rights.

Irrespective of further provisions laid down in the “Specific Provisions” section, the manufacturer and supplier of the aforementioned construction product shall provide users and appliers of the construction product with copies of the National Technical Approval and inform them that the National Technical Approval must be available at the construction site. On request, copies of the National technical Approval shall be submitted to all authorities involved.

Reproduction of this National Technical Approval shall be in full. However, partial reproduction can be made with the written consent of the Deutsches Institut für Bautechnik. Texts and drawings of advertising brochures shall not contradict the National Technical Approval.

This National Technical Approval is not granted irrevocably. The provisions of the National Technical Approval may be subsequently amended or modified, particularly if made necessary as a result of new technical developments.

II. SPECIFIC PROVISIONS

1 Definition of product and intended use

1.1 Definition of the construction product

This National Technical Approval applies to hot-rolled and tempered bar anchors St 900/1100 with a nearly circular cross section (see Annex 1). Two opposing rib rows are rolled onto its surface to form a single right-hand thread. The nominal diameter is 15.0 or 20.0 mm.

1.2 Intended use

Threaded bar anchors St 900/1100 are suitable for use as form ties and components of scaffold anchors. In the following they are referred to as bar anchors AWM 1100.

2 Provisions for bar anchors AWM 1100

2.1 Characteristics and composition

2.1.1 Dimensions and weight per meter

(1) Nominal diameter, nominal weight, nominal cross section and cross sectional tolerances are specified in Annex 1. The tolerance data of the thread have been submitted to the Deutsches Institut für Bautechnik.

(2) The value resulting from the the cross section area tolerance of -2% is defined as the 5% fractile of the main unit. Production shall be adjusted so as to ensure that the mean cross section area \bar{A}_s is not smaller than the nominal cross section.

(3) The cross section area \bar{A}_s is determined by weighing. Thereby, the apparent density of the steel is assumed to be 7.85 g/cm^3 . The cross section area calculated from the weight must be reduced by 3.5%, since the threaded ribs contribute only partly to the load transfer. The value reduced by 3.5% shall also be used to determine the mechanical properties.

2.1.2 Mechanical properties

(1) Requirements for the mechanical-technological properties of the bar anchors are specified in Annex 2.

(2) The data listed in Annex 2 are fractile values relative to the main unit; the characteristics yield strength $R_{p0.2}$, tensile strength R_m , elongation at fracture A_{10} and overall elongation at ultimate load A_{gt} may be lower than the required values by maximally 5%.

(3) The 95%-fractile of the tensile strength R_m of one production run (melt or batch) may not exceed 1.250 N/mm.

2.1.3 Chemical composition

The chemical composition of the bar anchors in accordance with this approval has been submitted to the Deutsches Institut für Bautechnik.

2.2 Production, transport, storage and marking

2.2.1 Production

The bar anchor AWM 1100 is hot-rolled and tempered from the rolling heat.

2.2.2 Transport and storage

The bar anchor AWM 1100 shall always be free from corrosion-stimulating substances (e.g. chlorides, nitrates, acids).

Special care shall be taken that the bar anchor AWM 1100 is not mechanically damaged or soiled.

2.2.3 Marking and delivery note

(1) The bar anchor AWM 1100, bundled and cut to specifications or into standard delivery lengths, shall be provided with a weather- and mechanical damage-resistant label that includes the following information:

Manufacturing plant: ...	<u>Caution! Sensitive bar anchor!</u>
Bar anchor AWM 1100 according to Approval No. Z-12.5-96	
Type: St 900/1100 – threaded	Transport and store protected against corrosion!
Nominal diameter: ...mm	Do not damage, do not soil!
Melt No.: ...	
Order No.: ...	
Date: ...	

(2) The delivery note of the bar anchor shall contain the same information as the label according to 2.2.3 (1). In addition, the manufacturer shall affix the conformity marking (Ü-marking) on the delivery note in accordance with the conformity marking regulations of the German federal states. The Ü-marking may only be affixed, if the requirements according to section 2.3 for the attestation of conformity are met.

2.3 Attestation of Conformity

2.3.1 General

(1) To attest the bar anchors' conformity with the provisions of this National Technical Approval a certificate of conformity shall be issued for each manufacturing plant based on factory production control and continuous surveillance including initial type-testing of the bar anchors in accordance with the following provisions.

(2) The manufacturer of the bar anchors shall involve an approved certification body to issue the certificate of conformity and an approved inspection body to perform continuous surveillance including product inspection.

(3) The certification body shall submit a copy of the issued certificate of conformity to the Deutsches Institut für Bautechnik.

2.3.2 Factory production control

(1) Each manufacturing plant shall establish and implement a factory production control

system. Factory production control entails the permanent internal control of production exercised by the manufacturer in order to ensure that the construction product produced by him is in conformity with the provisions of this National Technical Approval.

(2) Factory production control shall include at least the elements specified in the “Approval and inspection guidelines for prestressing steel”, issued in 2004 by the Deutsches Institut für Bautechnik. Testing of fatigue strength, relaxation and resistance to hydrogen-induced stress corrosion cracking is not required.

(3) The results of factory production control shall be recorded and evaluated in accordance with the criteria specified in the guidelines. The records shall include at least the following information:

- Identification of the product or parent material
- Type of control or test
- Date of production and testing of the product or parent material
- Results of controls and tests and comparison with requirements
- Signature of the person responsible for factory production control

(4) The records shall be kept for at least five years and shall be submitted to the inspection body responsible for continuous surveillance. On request, these records shall be submitted to the Deutsches Institut für Bautechnik and the relevant supreme building control authority.

(5) In case of unsatisfactory test results, the manufacturer shall take immediate measures to eliminate the deficiency. Products that do not comply with the requirements shall be handled such that they cannot be mistaken for products complying with the requirements. After elimination of the deficiency the respective test shall be immediately repeated as far as it is technically possible and necessary to verify that the deficiency has been eliminated.

2.3.3 Continuous surveillance

(1) Factory production control of each manufacturing plant shall be verified by continuous surveillance, at least however twice a year.

(2) During surveillance inspections, tests in accordance with the guidelines specified in section 2.3.2 (2) shall be performed. In addition, the reduction in the load-bearing capacity following a one-time bending to and fro by 180° (bending block diameter $6 \cdot d_s$) shall be examined. The reduction of the tensile strength may not exceed 5%. Surveillance shall also include the taking of samples for audit testing. The respective approved inspection body is responsible for sampling and testing.

(3) The results of certification and surveillance shall be kept for at least five years. On request, they shall be submitted by the certification body or inspection body to the Deutsches Institut für Bautechnik and the relevant supreme building control authority.

3 Provisions for design and dimensioning

3.1 Verification

(1) For all possible load combinations the following shall be verified:

$$S_d \leq R_d$$

where:

S_d = design value of actions

R_d = design value of bearing capacity

$$S_d = \gamma_F \cdot S_k$$

where:

S_k = characteristic value of actions

γ_F = partial safety factor of actions

$$R_d = R_k / \gamma_S$$

where:

R_k = characteristic value of bearing capacity

γ_S = partial safety factor of material resistance

3.2 Partial safety factors

(1) Use of bar anchor as form tie

Partial safety factor for actions

$$\gamma_F = 1.5$$

Partial safety factor for bar anchor AWM 1100

$$\gamma_S = 1.15$$

(2) Use of bar anchor as component of scaffold anchors

The partial safety factors are specified in the respective approvals of the scaffold anchors.

3.3 Modulus of elasticity

(1) For calculation purposes, the modulus of elasticity is assumed to be 195,000 N/mm².

3.4 Bond

(1) The bond behaviour was not verified in the course of the approval procedure.

4 Provisions for installation

(1) The relevant provisions for the handling and protection of the bar anchor AWM 1100 at the installation site shall be observed.

(2) Prior to installation, the bar anchor AWM 1100 shall be carefully examined for corrosion pits. If corrosion pits are discovered, the bar anchor AW1100 shall be disposed of.

(3) The bar anchor AWM 1100 shall also be protected against mechanical damage during installation. Damaged bar anchors AWM 1100 may not be used.

(4) The weldability of the bar anchor AWM 1100 was not verified in the course of the approval procedure.

(5) Weld spots do not affect the performance characteristics of bar anchors to be used as form ties.

Shaping

Thread rib

Nominal diameter Ø	Nominal weight G Kg/m	Nominal cross section A _s mm ²	Core diameter		Thread ribs (right-hand)				
					Height	Width	Pitch	Incline	Radius
d _s mm	G Kg/m	A _s mm ²	d _h mm	d _v mm	min a mm	b mm	c mm	α degree	R mm
15.0	1.41	173	14.8	14.7	1.00	4.8	10.0	78.5	1.5
20.0	2.51	309	19.8	19.6	1.20	4.8	10.0	81.5	2.0

1) Weight includes 3.5% non-load bearing thread ribs. Tolerance +3%/-2%

<p>Stahlwerk Annahütte Max Aicher GmbH&Co.KG Hammerau D-83404 Ainring</p>	<p>Threaded bar anchor St 900/1100 for form ties AWM 1100</p> <p>Nominal dimensions and weight Rib geometry</p>	<p>Annex 1 of National Technical Approval</p> <p>No.: Z-12.5-96</p> <p>issued on 13 September 2005</p>
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Strength properties						
1	Nominal diameter d_s	Yield strength $R_{p0.2}$	Tensile strength R_m	Characteristic		Value $p^{1)}$
				yield load $F_{p0.2}$	ultimate load F_m	
	[mm]	[Nmm ²]	[Nmm ²]	[kN]	[kN]	[%]
	15.0	900	1100	156	190	5.0
20.0	900	1100	278	340	5.0	
Deformation properties						
2	Elongation at fracture		A_{10}	[%]	7	5.0
3	Elongation at ultimate load (calculated from $A_g + \frac{R_m}{E} \cdot 100\%$) ²⁾		A_{gt}	[%]	3	5.0
4	Pin diameter for bend test bend angle 180°				$4 \cdot d_s$	5.0
5	Notched bar impact work ISO-V (-20° C)				≥ 27	
1) Fractile for a statistic probability of $W = 1 - \alpha = 0.95$ (one-side)						
2) $E \approx 195,000 \text{ N/mm}^2$						
Stahlwerk Annahütte Max Aicher GmbH&Co.KG Hammerau D-83404 Ainring		Threaded bar anchor St 900/1100 for form ties AWM 1100		Annex 2 of National Technical approval No.: Z-12.5-96 issued on 13 September 2005		
		Mechanical-technological properties				