

National Technical Approval

Date:
14 December 2017

Transaction reference No.:
I 12-1.12-5-2/17

Approval number:
Z-12.5-118

Validity
from: **2 August 2017**
to: **2 August 2022**

Applicant:
Stahlwerk Annahütte
Max Aicher GmbH & Co.KG
8304 Ainring - Hammerau

Generic type of construction product:
Threaded anchor rods St 900/1050
SAS 900 FC
Nominal diameter 15 and 20 mm

The aforementioned construction product is herewith granted national technical approval.
This National Technical Approval contains seven pages and two annexes.

This translation was made by Stahlwerk Annahütte.
In the event of discrepancies, the original in German is valid.

I. GENERAL PROVISIONS

1. This National Technical Approval is proof of the usability and applicability of the aforementioned construction product in accordance with German federal state building regulations.
2. This National Technical Approval does not replace the statutory permissions, licences and certificates for the execution of construction projects.
3. This National Technical Approval is granted without prejudice to third party rights, in particular private property rights.
4. 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.
5. 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. Translations of the National Technical Approval shall include the note “Translation from the German original text not certified by Deutsches Institut für Bautechnik”.
6. 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.
7. This notification refers to the information and documents submitted by the applicant in the approval procedure on the subject of approval. A change to this approval basis is not covered by this notification and must be disclosed to the Deutsches Institut für Bautechnik immediately.

II. SPECIFIC PROVISIONS

1 Definition of product and intended use

1.1 Definition of the construction product

This National Technical Approval applies to straight, hot-rolled, heat-treated from the rolling heat, threaded anchor rods St 900/1050 with nearly circular cross sections. The nominal diameters are 15.0 mm or 20.0 mm. Two opposing rib rows are rolled onto the bar surface to form a single right-hand thread (see Annex 1).

1.2 Intended use

The threaded anchor rods St 900/1050 are suitable for use as formwork ties and components of scaffold anchors. They will hereinafter be referred to as SAS 900 FC anchor rods.

2 Provisions for SAS 900 FC anchor rods

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 thread tolerance data have been deposited with the Deutsches Institut für Bautechnik.

(2) The value resulting from the cross section area tolerance of -2% is defined as the 5% quantile of one production run. The production shall be adjusted so as to ensure that the mean cross section area \bar{A}_p is not smaller than the nominal cross section.

(3) The cross section area \bar{A}_p is determined by weighing. Thereby, the density of the steel is assumed to be 7.85 g/cm³. 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) The requirements for the mechanical-technological properties of the SAS 900 FC anchor rod are specified in Annex 2.

(2) The data listed in Annex 2 are quantile values relative to one production run; the characteristics yield strength $R_{p0.2}$, tensile strength R_m , elongation at fracture $A_{11,3}$ and overall elongation at ultimate load A_{gt} may be maximally 5% lower than the required values.

(3) The 95% quantile of the tensile strength R_m of one production run (melt or batch) may exceed the nominal tensile strength by maximally 15%.

2.1.3 Composition

The chemical composition and manufacturing conditions for SAS 900 FC anchor rods in accordance with this National Technical Approval have been deposited with the Deutsches Institut für Bautechnik.

2.2 Production, transport, storage and marking

2.2.1 Production

SAS 900 FC anchor rods are hot-rolled and heat-treated from the rolling heat.

2.2.2 Packing, transport, storage

(1) SAS 900 FC anchor rods shall always be free from corrosion-stimulating substances (e.g. chlorides, nitrates, acids).

(2) Special care shall be taken to ensure that the SAS 900 FC anchor rods are not mechanically damaged or soiled.

2.2.3 Marking and delivery note

(1) The SAS 900 FC anchor rods, bundled and cut to delivery or assembly lengths shall be provided with a weather and mechanical damage resistant label that includes the following information:

Manufacturing plant: ...	<u>Caution! Sensitive anchor rod!</u>
SAS 900 FC anchor rod according to Approval No. Z-12.5-118	
Type: St 900/1050 – thread ribs (right-hand thread)	Transport and store protected against corrosion!
Nominal diameter: ...mm	
Melt No.: ...	Do not damage, do not soil!
Order No.: ...	
Date: ...	Please keep the label for return in case of complaints

(2) The delivery note of the SAS 900 FC anchor rod shall contain the same information as the label according to 2.2.3 (1). In addition, the manufacturer shall affix the conformity marking (CE-marking) on the delivery note in accordance with the conformity marking regulations of the German federal states. The CE-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 anchor rods' 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 anchor rods in accordance with the following provisions.

(2) The manufacturer of the SAS 900 FC anchor rods 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 manufacturer shall declare that a certificate of conformity has been granted by affixing the conformity marking (CE marking) onto the construction product including indication of the intended use.

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

(5) In addition, a copy of the initial type testing report must be submitted to the Deutsches Insitiut 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 at least include the elements specified in the "Richtlinie für Zulassungs- und Überwachungsprüfungen für Spannstähle" [Guideline for approval and inspection testing of prestressing steel], issued by the Deutsches Institut für Bautechnik. Testing of fatigue strength, relaxation and resistance to hydrogen-induced stress corrosion cracking is not required.

In addition, the reduction in the load-bearing capacity following a one-time bending to and fro by 90° (bending block diameter $d_{bb} = 6 \cdot d_p$) shall be tested. Reduction of the tensile strength per sample may not exceed 10%.

(3) The results of factory production control shall be recorded and evaluated in accordance with the criteria specified in "Richtlinie für Zulassungs- und Überwachungsprüfungen für Spannstähle" [Guideline for approval and inspection testing of prestressing steel]. The records shall include at least the following information:

- Identification of the construction product or raw material
- Type of control or test
- Date of production and testing of the construction product or raw 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. Construction products that do not comply with the requirements shall be handled in such a way 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 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 principles 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 shall be tested according to 2.3.2 (2). 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 load-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 load-bearing capacity

γ_s = partial safety factor of material resistance

3.2 Partial safety factors

(1) For anchor rods used in form ties

Partial safety factor for actions

$$\gamma_F = 1.5$$

Partial safety factor for SAS 900 FC anchor rod

$$\gamma_F = 1.15$$

(2) For anchor rods used as component of scaffold anchors

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

3.3 Modulus of elasticity

For calculation purposes, the modulus of elasticity is assumed to be 202.000 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 (e.g. standards, guidelines) for the handling and protection of the SAS 900 FC anchor rods at the installation site shall be observed.

(2) Prior to installation, the SAS 900 FC anchor rods shall be carefully examined for corrosion pits. If corrosion pits are discovered, the SAS 900 FC anchor rods shall be disposed of.

(3) The SAS 900 FC anchor rods shall also be protected against mechanical damage during installation. Damaged SAS 900 FC anchor rods may not be used.

(4) The SAS 900 FC anchor rod may not be welded since its suitability for welding was not verified in the course of the approval procedure.

- (5) Attaching the reinforcement to the steel bar anchor, as well as ignition points and current marks from adjacent welds and impermissible welding current conductors are not permitted.
(6) Weld spatter from adjacent welds (for example on reinforcing steel) does not affect the properties for use as formwork anchors.

Unless otherwise stated in this National Technical Approval, reference is made to the following documents:

- DIN EN ISO 15630-3:2011-02: Steels for the reinforcement and prestressing of concrete - Test methods - Part 3: Prestressing steels (ISO 1630-3:2010); German version EN ISO 16530-3:2010
- Deutsches Institut für Bautechnik: "Richtlinie für Zulassungs- und Überwachungsprüfungen für Spannstähle" [Guideline for approval and inspection testing of prestressing steel], edition 2004

Dr. Ing. Lars Eckfeldt
Head of division

Picture 1: Shaping

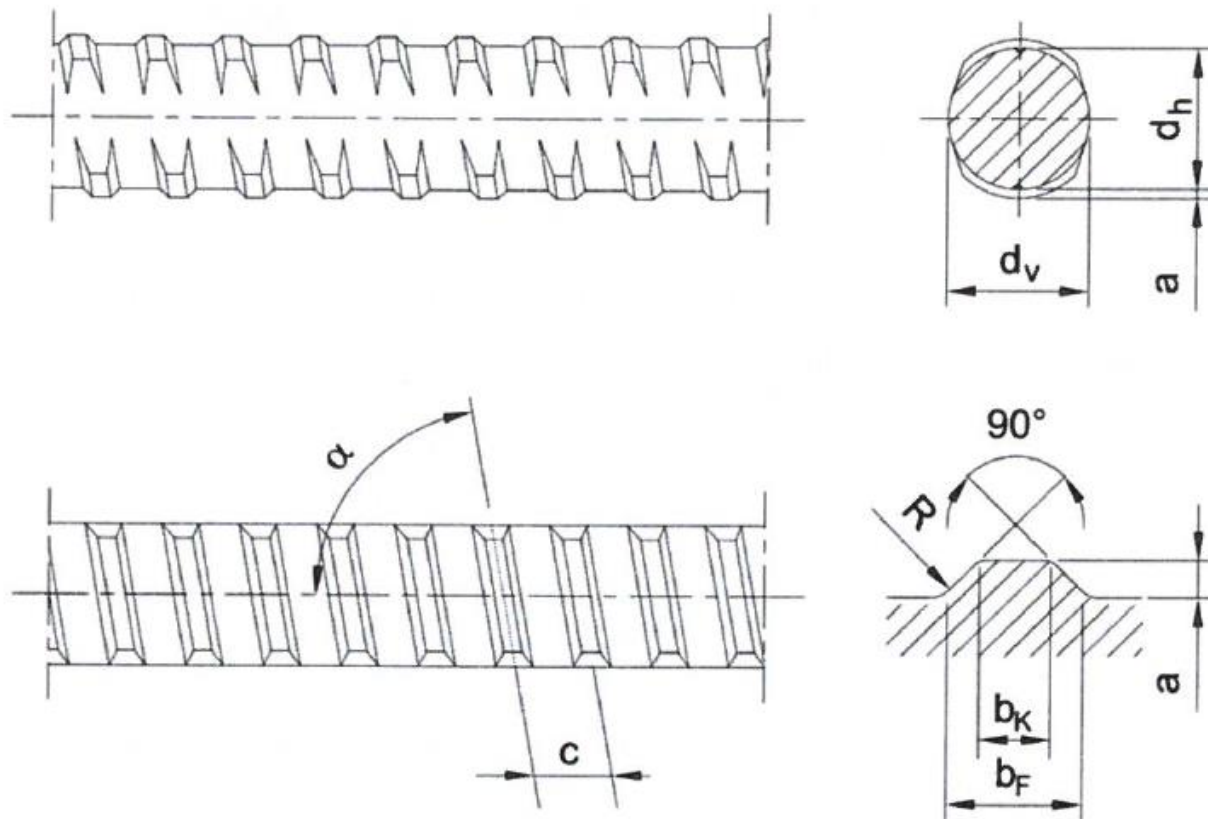


Table 1: Nominal dimensions, weight per meter and geometry

Nominal diameter \varnothing_P	Nominal weight ¹⁾ g kg/m	Nominal cross section A_P mm ²	Core diameter		Thread ribs (right-hand)					
					Height	Width (Foot)	Width (Head)	Spacing	Pitch	Radius
$\varnothing_P = d_P$ mm	g kg/m	A_P mm ²	d_h mm	d_v mm	a mm	b_F mm	B_K mm	c mm	α degree	R mm
15.0	1.422	175	14.8	14.7	1.15	4.8	2,5	10.0	78.5	1.5
20.0	2.526	311	19.8	19.6	1.30	4.8	2,2	10.0	81.5	2.0

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

The information on the tolerances of the core diameter and the dimensions of the thread ribs and the screwability are stored at the German Institute for Structural Engineering and External Supervisors.

Anchor rod St 900/1050 with thread ribs SAS 900 FC

Shaping, Nominal dimension and weights, Rib geometry

Annex 1

Table 2: Strength and deformation properties

Strength properties						
	Nominal diameter	Yield strength	Tensile strength	characteristic		Value
	$\varnothing_P = d_P$	$R_{p0,2}$	R_m	Yield load	Ultimate load	
	mm	[N/mm ²]	[N/mm ²]	$F_{p0,2}$ [kN]	F_m [kN]	$p^{1)}$ [%]
1	15.0	900	1050	158	184	5.0
2	20.0	900	1050	280	327	5.0

Deformation properties						
1	Elongation at fracture	$A_{11,3}$	[%]		7.0	5.0
2	Elongation at ultimate load (calculated from $A_{g+} \frac{R_m}{E} \cdot 100$) ²⁾	A_{gt}	[%]		3,0	5.0
3	Bending test (Folding test (180°)) Acc. DIN EN ISO 15630-3:2011-02 Pin diameter for folding test, bending test $d_{br} = 6 \cdot d_p$			Assessment acc. DIN EN ISO 15630-3 section 6.4	6 d_P	-- ³⁾
4	Maximum drop in load-bearing capacity (T) of an approximately straight specimen after a single bending back and forth by 90 ° with a bending roll diameter (d_{br}) of 6d with a bending process in accordance with DIN EN ISO 15630-3: 2011-02, Section 6 and a reverse bending process without aging by experienced staff based on DIN 488 Part 3: 1986-06, Section 4.3, from 3rd sentence	T	%		10	-- ³⁾

- 1) Quantile for a statistical probability of $W = 1 - \alpha = 0.95$ (one-side)
- 2) $E \approx 202\,000$ N/mm²
- 3) Each single value

Anchor rod St 900/1050 with thread ribs SAS 900 FC Nominal diameter: 15 and 20 mm	Annex 2
Strength, and deformation properties	