National Technical Approval

Approval number:	Z-12.5-96
Applicant:	Stahlwerk Annahütte Max Aicher GmbH & Co.KG 83404 Ainring
Generic type of construction product:	Steel bar anchor St 900/1100 with thread ribs AWM 1100 Nominal diameter 15.0 and 20.0 mm
Validity from: to:	 2. October 2020 2. October 2025

The aforementioned construction product is herewith granted national technical approval.
This National Technical Approval contains eight pages and two annexes.
The aforementioned construction product was first granted a National Technical Approval on 13 September 2005.

Translation of the original German version of these Nation Technical Approval is not proved by Deutsches Institut für Bautechnik (DIBt)

I. GENERAL PROVISIONS

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

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

3. This Notification 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. In case of differences between the German version of the approval and the English translation, the German version is valid. 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 Notification 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 relates to the information and documents submitted by the applicant. A change in these principles is not covered by this notification and must be disclosed to the Deutsches Institut für Bautechnik immediately.

8. The general type approval included in this notification is also considered to be the general building inspectorate approval for the type of construction.

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 heat-treated steel bar anchors St 900/1100 with thread ribs and a nearly circular cross section. The nominal diameter is 15.0 mm or 20.0 mm. Two opposing rib rows are rolled onto its surface to form a single right-hand thread (see Annex 1).

1.2 Intended use

Steel bar anchors St 900/1100 with thread ribs are suitable for use as form ties and components of scaffold anchors. They will hereinafter be referred to as steel 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 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% 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) The requirements for the mechanical-technological properties of the steel bar anchor AWM 1100 are specified in Annex 2, table 2. The stress-strain curve is given in Appendix 2, Figure 2.

(2) The data listed in Annex 2. table 2 are fractile values relative to the main unit; 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 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.

2.1.3 Composition

The chemical composition and manufacturing conditions for steel bar anchors AWM 1100 in accordance with this National Technical Approval have been deposited with the Deutsches Institut für Bautechnik and must be observed.

2.1.4 Mechanical properties for proof of stability

2.1.4.1 Strain

(1) The characteristic elongation of the anchor rod steel at maximum load is assumed to be A_{gt} = 3,0 %

2.1.4.2 Strengths

(1) The characteristic value of the 0.2% yield point of the anchor rod steel is to be assumed with R_m = 900 N/mm²

(2) The characteristic value of the tensile strength of the anchor rod steel is to be assumed with R_m = 1100 N/mm²

2.1.4.3 Modulus of elasticity

The calculated value for the modulus of elasticity of the anchor rod is E_P = 198,000 N / mm²

2.2 Production, transport, storage and marking

2.2.1 Production

(1) Steel bar anchors St 900/1100 are hot-rolled and tempered from the rolling heat. On the surface two opposite rows of ribs are rolled, that complement the ribs to a catchy right-hand thread.

(2) The manufacturing conditions must be complied with, as they are stored at the Deutsches Institut für Bautechnik and the external monitoring body.

2.2.2 Packing, transport, storage

(1) Normally, the steel bar anchors AWM 1100 are delivered in a straight bar shape, singly or bundled. In exceptional cases, steel bar anchors AWM 1100 may be delivered in a bent shape; in this case the data specified in section 3.4 must be fully observed. The data specified in section 3.4 (3) and (4) shall be added to the delivery note according to section 2.2.3.

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

(3) Special care shall be taken to ensure that the steel bar anchors AWM 1100 are not mechanically damaged or soiled.

2.2.3 Marking and delivery note

(1) The steel bar anchors 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: ... Caution! Sensitive Steel bar anchor!

Steel bar anchor AWM 1100
according to Approval No. Z-12.5-96

Type: St 900/1100 – threaded
Nominal diameter: ...mm
Melt No.: ...
Order No.: ...
Date: ...

Transport and store protected against corrosion!
Do not damage, do not soil!

(2) The delivery note of the steel bar anchor AWM 1100 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 steel 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 steel bar anchors AWM 1100 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 “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.

In addition, the reduction in the load-bearing capacity following a one-time bending to and fro by 180º (bending block diameter $6 \bullet d_p$) shall be tested. The absence of cracks in the bending test by 180 ° must be proven (bending roll diameter $4 \bullet d_p$). The notched impact strength close to EN ISO 148-1 at -20 ° C is to be measured. Each individual value must be at least 27J.

(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 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 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 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 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

$S_d = \gamma_F \bullet S_k$

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) Use of bar anchor as form tie

Partial safety factor for actions
$\gamma_F = 1.5$

Partial safety factor for steel 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 Bending

(1) Smaller radii of curvature than $R = 6 \cdot d_p$ are not permissible.
(2) For cold bending, only machines may be used that produce an even curvature and do not cause damage (abrasions) to the steel.
(3) In the area of curvature, cold-forming reduces the strength properties defined in Annex 3 to 80% of the initial values.
(4) Back-bending is not permitted.
(5) The areas of the curvature radii must be free of weld spatter.

3.4 Bond

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 steel bar anchor AWM 1100 at the installation site shall be observed.
(2) Immediately before the planned further use of the tie rods, suitable means must be used at its point of use to check whether an intended initial state is present, which is suitable for the planned use to be carried out properly.
(3) Prior to installation, the steel bar anchor AWM 1100 shall be carefully examined for corrosion pits. If corrosion pits are discovered, the steel bar anchor AWM 1100 shall be disposed of.
(4) The steel bar anchor AWM 1100 shall also be protected against mechanical damage during installation. Damaged steel bar anchors AWM 1100 may not be used.
(5) The weldability of the anchor rod steel has not been proven within the scope of the approval process.
(6) An attachment of the reinforcement at the anchor steel and ignition points and current brands of adjacent welds and improper welding current leadership are not allowed.
(7) Weld spatter from adjacent welds (e.g. on reinforcement) does not affect the performance characteristics of steel bar anchors AWM 1100 to be used as form ties.

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

DIN EN ISO 15630-3:2011-02	Stähle für die Bewehrung und das Vorspannen von Beton – Prüfverfahren – Teil 3: Spannstähle (ISO 15630-3:2010); Deutsche Fassung EN ISO 15630-3:2010
DIN EN ISO 148-1:2011-01	Metallic materials - Charpy impact test - Part 1: Test method (ISO 148-1: 2009); German version EN ISO 148-1: 2010
Deutsches Institut für Bautechnik:	“Richtlinie für Zulassungs- und Überwachungsprüfungen für Spannstähle“ [Guideline for approval and inspection testing], edition 2004

Dr. Ing. Lars Eckfeldt
Head of division

Picture 1: Shaping

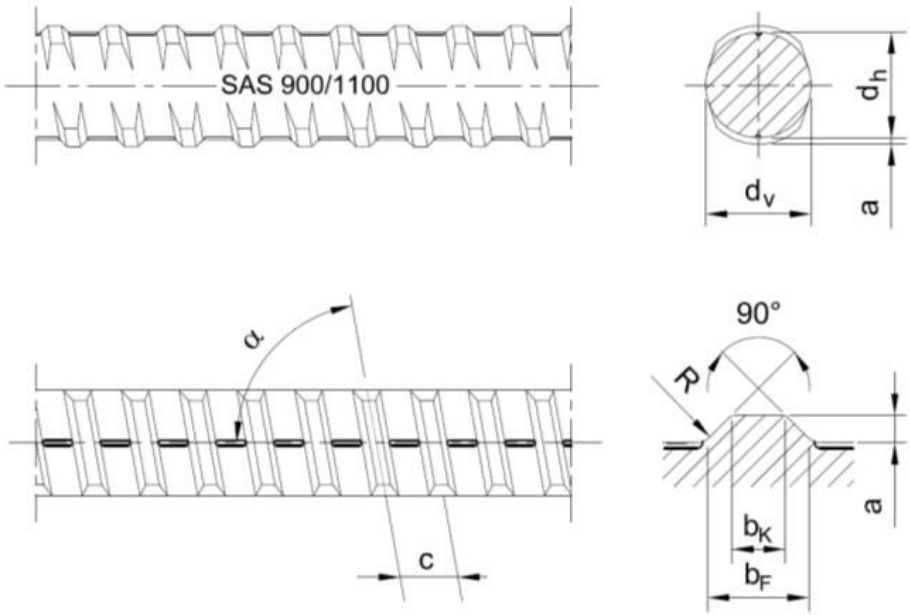


Table 1: Nominal dimensions, weight per meter and rib geometry

Nominal diameter	Nominal weight[1)]	Nominal cross section	Core diameter		Thread ribs (right-hand)					
					Height	Width (foot)	Width (head)	Spacing	Pitch	Radius
Øp = dp	**g**	**Ap**	**dh**	**dv**	**a**	**b_F**	**b_K**	**c**	**α**	**R**
mm	kg/m	mm²	mm	mm	mm	mm	mm	mm	degree	mm
15,0	1,41	173	14,8	14,7	1,15	4,8	2,5	10,0	78,5	1,5
20,0	2,51	309	19,8	19,6	1,30	4,8	2,2	10,0	81,5	2,0

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

The information for tolerances of the core diameter to the dimensions of the thread ribs and screwability are deposited with the external auditor and DIBt.

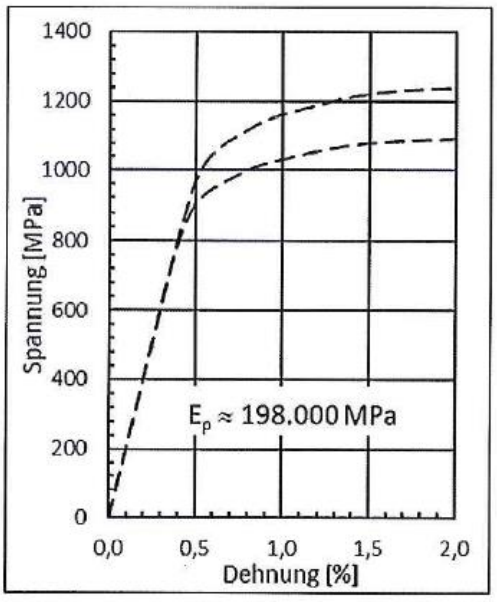
Steel bar anchor St 900/1100 with thread ribs AWM 1100, diameter 15 and 20	Attachment 1
Shaping, Nominal dimensions, weight and rib geometry	

Table 2: Strength and deformation properties

1		**Strength classes** of steel bar with thread ribs		**St 900/1100**	**Quantiles** [a] **[%]**
2	**0,2 % yield point**	$R_{p0,2}$	[N/mm²]	900	5,0
3	**tensile strength**	R_m	[N/mm²]	1100	5,0
4	**Traction at 0,2% strain** $Ø_p$ 15 mm $Ø_p$ 20 mm	$F_{p0,2}$	[kN]	 156 278	5,0
5	**max. tensile load** $Ø_p$ 15 mm $Ø_p$ 20 mm	F_m	[kN]	 190 340	5,0
6	**max. drop in load capacity (T** [b]**)** after bending back and forth through 180° (Bending roll diameter: dbr = 6 x dp) Acc. DIN 488-1:1984-09	T	[%]	10,0	-- [c]
7	**Elongation at break**	$A_{11,3}$	[%]	7,0	5,0
8	**Total elongation at maximum force**	A_{gt}	[%]	3,0	5,0
9	**Mandrel diameter** for bending test acc. DIN EN ISO 15630-3:2020-02, Section 6 with a bending angle of 180 °	$ØD_m$	[mm]	$4xd_p$	-- [c]
10	**Impact work** Acc. DIN EN ISO 148-1:2011-01 at -20°C	KV_2	[J]	27	-- [c]

a) Quantiles for a statistical probability of W = 1 – α = 0,95 (one-sided)
b) When $T = (1 - R_{m,ist\ afterBending} / R_{m,ist}) \times 100$
c) Each single value

Picture 2: Principal stress-strain curve



The lines give an orientation for the basic stress-strain curve assuming the calculated value of the E-module (E_p) of 198,000 N/mm²

Steel bar anchor St 900/1100 with thread ribsAWM 1100, diameter 15 and 20 mm	Attachment 2
Strength and deformation properties and principal stress-strain curve	

Expert opinion No. 155 95/10

Strength testing of welded bar anchors

Annahütte Steelworks
Max Aicher GmbH & Co. KG
Plant 3 +4 - 83404 Ainring - Hammerau

The test report contains 5 pages.

Accredited testing laboratory - DAR registration number: DAP-PL-4000.08

Expert opinion number: 15595/10

Title: Strength testing on welded bar anchors

Client: Annahütte Steelworks
Max Aicher GmbH & Co KG
Plant 3 + 4
83404 Ainring - Hammerau

1. Preface

1.1 Data provided by the client:

Test sample: Steel bar anchors St 900/1100 with AWM thread ribs and St 750/875, type FS, with continuous thread

Receipt of test sample: 17 February 2010

Dimensions: 15 mm Ø

Material: St 900/1100 - AWM and St 750/875 - FS

1.2 Objective of testing

Determination of the strength properties of welded bars

1.3 Test sample designation

Sample no.	Annotation
1-5	St 750/875 – FS, 15 mm Ø, welding method 111
6-10	St 750/875 – FS, 15 mm Ø, welding method 135
FS1-FS3	St 750/875 – FS, 15 mm Ø, unwelded bar
11-15	St 900/1100 – AWM 1100, 15 mm Ø, welding method 111
16-20	St 900/1100 – AWM 1100, 15 mm Ø, welding method 135
AWM1-AWM3	St 900/1100 – AWM 1100, 15 mm Ø, unwelded bar

1.4 Tests to be performed

Tensile test

2. Results

2.1 Tensile test

Dependent on the welding method (111 and 135), 5 bars of each material type were welded onto a steel plate according to DIN 4099-1, Fig. 8, and the enclosed welding instructions and then subjected to a tensile test. By way of comparison, the tensile strength was determined on 3 unwelded bars of each material type and the resulting decrease in strength between unwelded and welded bars was determined. The results were statistically evaluated according to ISO Guide 35 and the applicable standard DIN ISO 162-69-6.
According to these standards, the following formulas must be used to statistically evaluate the measurement results:

Sample mean

Sample standard deviation:

Lower limit of the statistical tolerance interval:

Determination of the 50%, 75% and 99% safety values listed below was based on the following assumptions:

Number of sample inspections:
$n = 5$

Minimum percentage of the statistical unit which can be said to lie within the statistical tolerance interval:
$p = 50\% / 75\% / 99\%$

Level of reliability, asserting that the percentage of the statistical unit within the tolerance interval is larger or equal to the specified p:
$1 - \alpha = 95\%$

The results are listed in the tables below.

Tensile test according to DIN EN ISO 6892-1:2009B

Material St 750/875 – FS

Sample	Initial cross section	Tensile force	Tensile strength	Fracture location	Strength decrease
FS-1	188.57	179.00	949.2		
FS-2	188.57	179.00	949.2		
FS-3	188.57	179.00	949.2		
Mean value:			949.2		
1	188.57	179.00	928.0	Ü	2.2
2	188.57	179.00	943.9	G	0.6
3	188.57	179.00	949.2	G	0.0
4	188.57	179.00	949.2	G	0.0
5	188.57	179.00	949.2	G	0.0
Mean value (111):			943.9		0.6
With a safety of 50%			935.1		1.5
With a safety of 75%			929.5		2.1
With a safety of 99%			914.5		3.7
6	188.57	179.00	949.2	G	0.0
7	188.57	179.00	949.2	G	0.0
8	188.57	179.00	949.2	G	0.0
9	188.57	179.00	943.9	G	0.6
10	188.57	179.00	949.2	G	0.0
Mean value (135):			948.2		0.1
With a safety of 50%			945.9		0.4
With a safety of 75%			944.5		0.5
With a safety 99%of			940.6		0.9

Table 1: Tensile tests according to DIN EN ISO 6892-1:2009B

S. Errouhi / 19 April 2010

Tensile test according to DIN EN ISO 6892-1:2009B

Material St 900/1100 - AWM 1100

Sample	Initial cross section	Tensile force	Tensile strength	Fracture location	Strength decrease
AWM-1	172.73	204.00	1,181.0		
AWM-2	172.73	203.00	1,175.2		
AWM-3	172.73	204.00	1,181.0		
Mean value:			1,179.1		
11	172.73	180.00	1,042.1	Ü	11.6
12	172.73	176.00	1,018.9	Ü	13.6
13	172.73	179.00	1,036.3	Ü	12.1
14	172.73	176.00	1,018.9	Ü	13.6
15	172.73	176.00	1,018.9	Ü	13.6
Mean value (111):			1,027.0		12.9
With a safety of 50%			1,016.2		13.8
With a safety of 75%			1,009.3		14.4
With a safety of 99%			990.9		16.0
16	172.73	202.00	1,169.5	Ü	0.8
17	172.73	203.00	1,175.2	Ü	0.3
18	172.73	202.00	1,169.5	Ü	0.8
19	172.73	203.00	1,175.2	Ü	0.3
20	172.73	193.00	1,117.4	Ü	5.2
Mean value (135):			1,161.4		1.5
With a safety of 50%			1,137.6		3.5
With a safety of 75%			1,122.4		4.8
With a safety 99%of			1,082.0		8.2

Table 2: Tensile tests according to DIN EN ISO 6892-1:2009B

S. Errouhi / 19 April 2010

3. Summary and evaluation

The tests have shown that both tested materials can be welded onto other steel parts using the two standard methods of manual metal arc welding (111) and gas-shielded welding (135). The two materials, however, behave differently. Whereas the strength of the St 750/875 steel bar anchors with continuous thread, type FS, decreases only minimally (Table 1), the strength of the St 900/1100 steel bar anchors with AWM 1100 thread ribs decreases noticeably, particularly when using arc welding (Table 2). In both cases, the decrease in strength is larger for arc welding than for gas-shielded welding, which can be explained by the fact that for this welding task, method 111 generates more heat than method 135.

Based on an accuracy of 95% and a probability that 99% of the products will behave in this way, the following decreases in tensile strength can be assumed for welding these products:

St 750/875 - type FS, 111:	949 N/mm^2	915 N/mm^2 = - 3.7%
St 750/875 - type FS, 135:	949 N/mm^2	941 N/mm^2 = - 0.9%
St 900/1100 - AWM 1100, 111:	1179 N/mm^2	991 N/mm^2 = - 16.0%
St 900/1100 - AWM 1100, 351:	1179 N/mm^2	1082 N/mm^2 = - 8.2%

Test engineer | Managing director | Laboratory executive

Munich, 19 May 2010

Welding instructions (WPS) No. 02 Specimen

Welder: Michael Huber no. 1-5

Test centre: SLV Munich, branch of the GSI mbH

Welding task

Welding method **Manual** metal **arc welding (111)**

Weld type: FW [fillet weld]

Pre-product

Material type: FS bar anchor

Dimensions: See drawing

Weld position: PB [horizontal rotated]

Weld preparation, welding sequence

Test specimen dimensions	Seam preparation	Welding sequence, weld build-up
Cleaning of welded joint by grinding		

Welding data

Weld bead	Pencil electrode type	Pencil electrode diameter	Type of current, polarity	Current strength [ampere]
		2.5 mm ø	+ pole	approx. 93 A
		2.5 mm ø	+ pole	approx.83 A
		2.5 mm ø	+ pole	approx.83 A

Pencil electrode type: DIN EN 757 E 69 6 Mn2NiCrMo B 42 H 5

Pencil electrode pretreatment: Quick drying 2h/300-350 C, keep warm at approx. 100 C

Pre-heating: None

Specifics: Air cooling after each weld bead to room temperature

Tacking: Grind tacker prior to welding

Welding lugs: Grind

Instructions issued on 25 February 2010

Welding instructions (WPS) No. 6-10

Welder: Heiner Martin

Test centre: SLV Munich, branch of the GSI mbH

Welding task

Welding method **Metal arc active gas welding (135)**

Weld type: FW

Pre-product

Material type: FS anchor bar

Dimensions: See drawing

Weld position: PB

Weld preparation, welding sequence

Test specimen dimensions in mm	Welding sequence, weld build-up
Cleaning of welded joint: metallic bright	

Welding data

Weld bead	**Wire feed speed**	Current strength	**Arc voltage**	**Flow meter setting**	**Contact tube spacing**	**Torch (arc tube ?) guidance**
	6.9		**23.2**	**Medium**		**neutral**
	8.4		**25.8**	**Medium**		**neutral**
	8.4		**25.8**	**Medium**		**neutral**

Current type /polarity: Direct current, + pole

Wire electrode type: DIN EN ISO 14341 A G 46 6 M G2Ni2

Wire electrode diameter: 1.0 mm

Inert gas type: DIN EN ISO 14175 M21

Inert gas quantity: 12l/min

Gas nozzle diameter: 16

Pre-heating:

Tacking: Grind out tack welds

Welding lugs: Grind

Instructions issued on 25 February 2010

Welding instructions (WPS) No. 01 Specimen

Welder: Michael Huber no. 11-15

Test centre: SLV Munich, branch of the GSI mbH

Welding task

Welding method **Arc welding by hand (111)**

Weld type: FW [fillet weld]

Pre-product

Material type: AWM 1100

Dimensions: See drawing

Weld position: PB [horizontal rotated]

Weld preparation, welding sequence

Test specimen dimensions	Seam preparation	Welding sequence, weld build-up
Cleaning of welded joint by grinding		

Welding data

Weld bead	Pencil electrode type	Pencil electrode diameter	Type of current, polarity	Current strength [ampere]
		2.5 mm ø	+ pole	approx. 93 A
		2.5 mm ø	+ pole	approx.83 A
		2.5 mm ø	+ pole	approx.83 A

Pencil electrode type: DIN EN 757 E 69 6 Mn2NiCrMo B 42 H 5

Pencil electrode pretreatment: Quick drying 2h/300-350 C, keep warm at approx. 100 C

Pre-heating: None

Specifics: Air cooling after each weld bead to room temperature

Tacking: Grind tacker prior to welding

Welding lugs: Grind

Instructions issued on 25 February 2010

Welding instructions (WPS) No. 6-10

Welder: Michael Huber

Test centre: SLV Munich, branch of the GSI mbH

Welding task

Welding method **Metal active gas welding (135)**

Weld type: FW

Pre-product

Material type: FS anchor bar

Dimensions: See drawing

Weld position: PB

Weld preparation, welding sequence

Test specimen dimensions in mm	Welding sequence, weld build-up
Cleaning of welded joint: metallic bright	

Welding data

Weld bead	**Wire feed speed**	Current strength	**Arc voltage**	**Flow meter setting**	**Contact tube spacing**	**Torch (arc tube ?) guidance**
	6.9		**23.2**	**Medium**		**neutral**
	8.4		**25.8**	**Medium**		**neutral**
	8.4		**25.8**	**Medium**		**neutral**

Current type /polarity: Direct current, + pole

Wire electrode type: DIN EN ISO 14341 A G 46 6 M G2Ni2

Wire diameter: 1.0 mm

Inert gas type: DIN EN ISO 14175 M21

Inert gas quantity: 12l/min

Gas nozzle diameter: 16

Pre-heating:

Tacking: Grind out tack welds

Welding lugs: Grind

Instructions issued on 25 February 2010