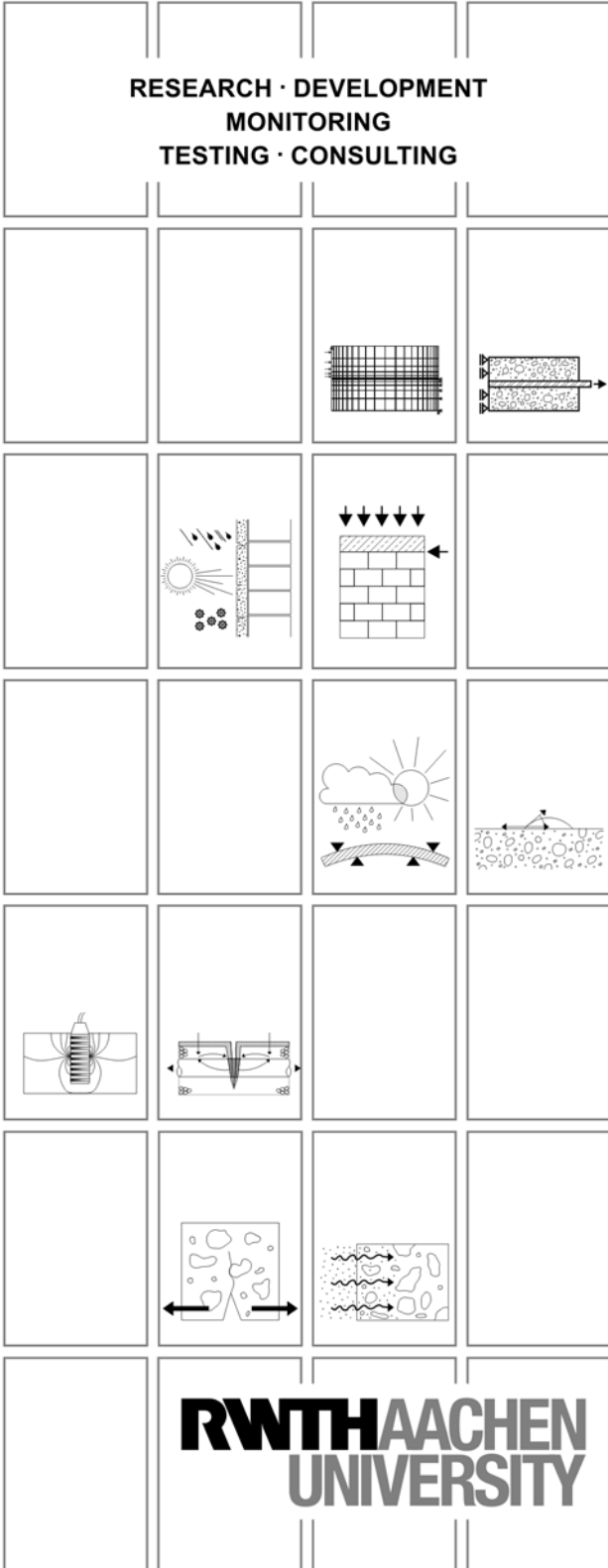


INSTITUTE OF BUILDING MATERIALS RESEARCH

RESEARCH · DEVELOPMENT
MONITORING
TESTING · CONSULTING



Test Report G 8294

Tests of Griptec Standard Couplers
Swaged onto
B500NC

RWTHAACHEN
UNIVERSITY

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SUBJECT

Tests of Griptec Standard Couplers
Swaged onto
B500NC

Report no.

G 8294

October 22. 2013

Project execution

Univ.-Prof. Dr.-Ing. M. Raupach

Dipl.-Ing. J. Leißner

Contracting authority/Funder

Betomax GmbH+Co KG

Dyckhofstr. 1

41460 Neuss

Contract/Acknowledgement date

13.07.99

Your Reference

Ü-309

This report includes 8 pages, among there 4 pages of text.

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1 GENERAL

The company Betomax GmbH+Co KG in Dyckhofstr. 1, 41460 Neuss (D) ordered tests of Griptec Standard couplers swaged onto reinforcing bars which are certified for B500NC in Norway at the Institut für Bauforschung der RWTH Aachen (ibac) (Institute of Building Materials Research of RWTH Aachen University) following the international standard ISO/FDIS 15835-1:2009-04.

2 SAMPLING

In the plant of BETOMAX in Neuss two Griptec standard couplers were swaged onto bars B500NC which are certified for Norway with a nominal diameter of $d = 20$ mm. The delivery note of the producer of the bars "Henningsdorfer Elektrostahlwerk GmbH" and their certification for Norway are given in the pictures in the annex, page A3 and A4.

The samples were shipped to ibac on October 09, 2013. The marking of the bars was determined as "1/9".

3 TESTS

3.1 Dimensions

Length, outer diameter and inside diameter of the threads of the sleeves are given in table A1, page A1. The length of one swaged bar was round about 600 mm.

The samples are shown in the photo of figure 1.



Figure 1: Photo of the shipped couplers

3.2 Tensile tests

Tensile Tests were conducted according to ISO 15835-1:2009-04(E) on a tensile testing machine with a respective maximum load of 600 kN, which was calibrated according to EN ISO 7500. The sleeves were screwed and the pretension torque of 60 Nm was examined by means of a torque wrench.

4 RESULTS

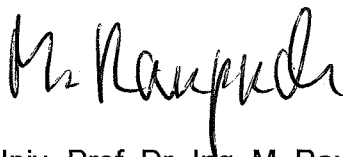
Test results are given in the annex in the order of:

Table	Page	Tests
1	2	3
A1	A1	Dimensions
A2	A2	Tensile test of the couplers

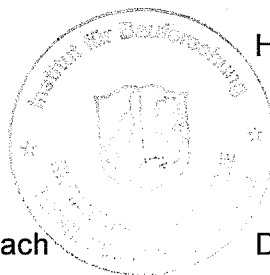
The dimensions of the sleeves are in the tolerances of the target values of the technical approval of Germany.

The ultimate tensile forces couplers and the ductility of the bars fulfill the requirements of ISO/FDIS 15835-1:2009-04 and NS 3576-3:2012 (Norsk Standard)

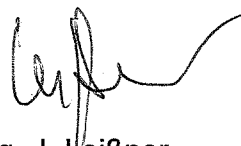
Director of certification body



Univ.-Prof. Dr.-Ing. M. Raupach



Head of testing and inspection body



Dipl.-Ing. J. Leißner

Table A1: Dimensions of Griptec Standard Couplers
 Samples shipped to ibac 09th October 2013
 Swaged onto Reinforcing bars certificated for Norway

Nominal diameter / No.	Coupler part	Sleeves length (swaged)	Outer diameter of the sleeves	Inside Diameter of sleeve or ²⁾	free length of stud ¹⁾	
		L1/L4/L5	D2	M _I	L3	
		mm				
1	2	3	4	5	6	
20 / 1	male	87,4	29,9	21,8	19,9	
	female	88,0	30,0	19,9	26,6	
20 / 2	male	86,5	29,9	21,9	20,0	
	female	87,7	29,9	19,8	26,5	
Nominal values laid in German Approval	Standard sleeves	75,0-85,0	29,7-30,2	19,3	-	d=20 Female
		75,0-85,0	29,2-30,2	22*2,5	19-20	d=20 Male

¹⁾ Length of stud or depth of thread of sleeve (approximately)

²⁾ Outer diameter of stud

Tabelle A2: Tensile Strength of Griptec Standard Couplers

Samples shipped to ibac 09th October 2013

Swaged onto Reinforcing bars certificated for Norway B500NC

Nominal diameter / No.	Nominal Cross section	Ultimate load	location of break	elongation at ultimate load of the bar	criterion fulfilled
	$A_{s,Nenn}$	$F_{u,ist}$		A_{gt}	
	mm ²	kN		%	
1	2	3	4	5	6
20 /1	314,2	198,8	break outside the coupler in the bar	19,0	1
20/2	314,2	200,0		13,4	1
Required tensile load	1	172,8	$R_{m,Nenn} * A_{s,Nenn}$ (break outside the coupler in the bar)	-	

Tensile strength tests fail outside the length of the mechanical splice and the test results satisfy the product standard of the bar

ISO/FDIS 15835-1:2009-04

<p>HENNIGSDORFER ELEKTROSTAHLWERKE GMBH Wolfgang-Kantscher-Strasse 18 D-16761 HENNIGSDORF Tel. 03302/806-0 Fax 03302/806 211 E-Mail: Direktion.HBS@rivagroup.com Internet: www.rivagroup.com</p>		PRÜFBESCHREIBUNG INSPECTION DOCUMENT CERTIFICAT DE CONTROLE nach 3.1/3.1.1		N°: 25896 HL DATUM: 12/09/13 DATE: 12/09/13						
STAHLPARTNER SUEZLE GMBH HAUFFSTR. 14 72348 ROSENFELD		STAHL-SORTE STEEL ACIER B500NC-00		CHARGE HEAT COULEE 66401						
RSCHEIN BERY NOTE STN D'EXPEDITION 22068/13 VOM 11/09/13		DURCHMESSER DIAMETER DIAMETRE 20,00		E - OFEN E - FURNACE <input checked="" type="checkbox"/> LD - VERFAHREN LD - PROCESS <input type="checkbox"/>						
TOLERANZ / TOLERANCE / TOLERANCE 1305006482 25035		AUFTRAGSBESTÄTIGUNG CONFIRMATION CONF. DE COMM. 07 YU842/001		BESTELLUNG / ORDER / COMMANDE						
CHEMISCHE ZUSAMMENSETZUNG % - CHEMICAL ANALYSIS % - COMPOSITION CHIMIQUE % <input checked="" type="checkbox"/> SCHWELZE / CAST / COULÉE <input type="checkbox"/> STÜCK / CHECK ANALYSIS / ANALYSE PAR PIÈCES										
C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Sn	As
0,16	1,15	0,46	0,029	0,035	0,12	0,10	0,02	0,22	0,015	0,013
Al	Ti	V	Nb	B	N	Ca	Σ Al, Ti, V, Nb	Σ Cr, Ni, Mn, Cu	Σ Cr, Ni, Mo	CEV
0,003	0,001	0,005	0,001	0,0003	0,011		0,010	0,46	0,24	0,40
MECHANISCHE EIGENSCHAFTEN - MECHANICAL PROPERTIES - CARACTERISTIQUES MECANQUES										
R _m /R _{eH}	R _m	Agt	Agt		R _{p0,2}	METERGEWICHT	ε	BIEGEVERUCH	BEHANDLUNGSZUSTAND	
MPa	MPa	%	%			kg/m			CONDITION OF TREATMENT	
554	664	11,4	11,4		1,19	2,460	0,077	OK	ETAT DE TRAITEMENT	
STIRNABSCHRECKVERSUCH HARDENABILITY TEST BY END QUENCHING ESSAI DE TREMPABILITE PAR TREMPER EN BOUT								AUSTENTISIERUNGSTEMPERATUR AUSTENIZING TEMP. TEMP. D'AUSTENTISATION		
HRC								°C		
KORNGRÖSSE - GRAIN SIZE - GROSSEUR DE GRAIN										
AUSTENIT <input type="checkbox"/>								nach / by / conforme a EN ISO 643		
FERRIT / PERLIT <input type="checkbox"/>										
NICHTMETALLISCHE MIKROEINSCHLÜSSE - MICRO INCLUSION RATING - TAUX DE MICROINCLUSION										
								ASTM E 45 DIN 50602		
BEPROBUNGEN - OTHER TESTS - AUTRES ESSAIS										
Bemerkungen - Note - Remarks										
								ABNIMMELBEAUFTRAGTER Laudahn Leiter Qualitätsstelle		

Delivery Note of Henningsdorfer Elektrostahlwerke GmbH



GlobeCert AB



CERTIFICATE

Produktcertifikat

PRODUCT CERTIFICATE

HÄRMED INTYGAS ATT TILLVERKAREN VID NEDANSTÄENDE PRODUKTIONSANLÄGGNING
We hereby certify that the producer for steel production stated below

Hennigsdorfer Elektrostahlwerke GmbH
Hennigsdorf, Germany

UPPFYLLER KRAVEN ENLIGT
fulfill the requirements according to

According to SS-EN 10 080:2006 + SS212540:2011 (Sweden)
According to NS 3576-2:2012 and NS 3576-3:2012 (Norway)

För Produktcertifiering
For product certification

K500B-T and K500C-T, Diameter 10 – 32 mm (Sweden)
B500NB and B500NC, Diameter 10 – 32 mm (Norway)

OCH DÄRMED TILLDELAS CERTIFIERINGSNUMMER
and have been assigned the following number of certificate

0901

Production and marking shall be according to GlobeCert AB:s certification regulations ed. 3.
Produktion och märkning skall vara enligt GlobeCert AB:s certifieringsregler utg. 3.
The mark of origin are 1 + 9 on the bars. Ursprungsmärkning är 1 + 9 på stängerna.
GlobeCert AB:s certification mark and number shall be on marking labels and test certificates.
GlobeCert AB:s certifieringsmärke och nummer skall finnas på märklapp och provningscertifikat.

UTFÄRDAT
2013-06-10

CERTIFIKATETS GILTIGHETSTID
Valid till

2016-03-04

GlobeCert AB
Anders Behm
Chief Executive

Certification for Norway