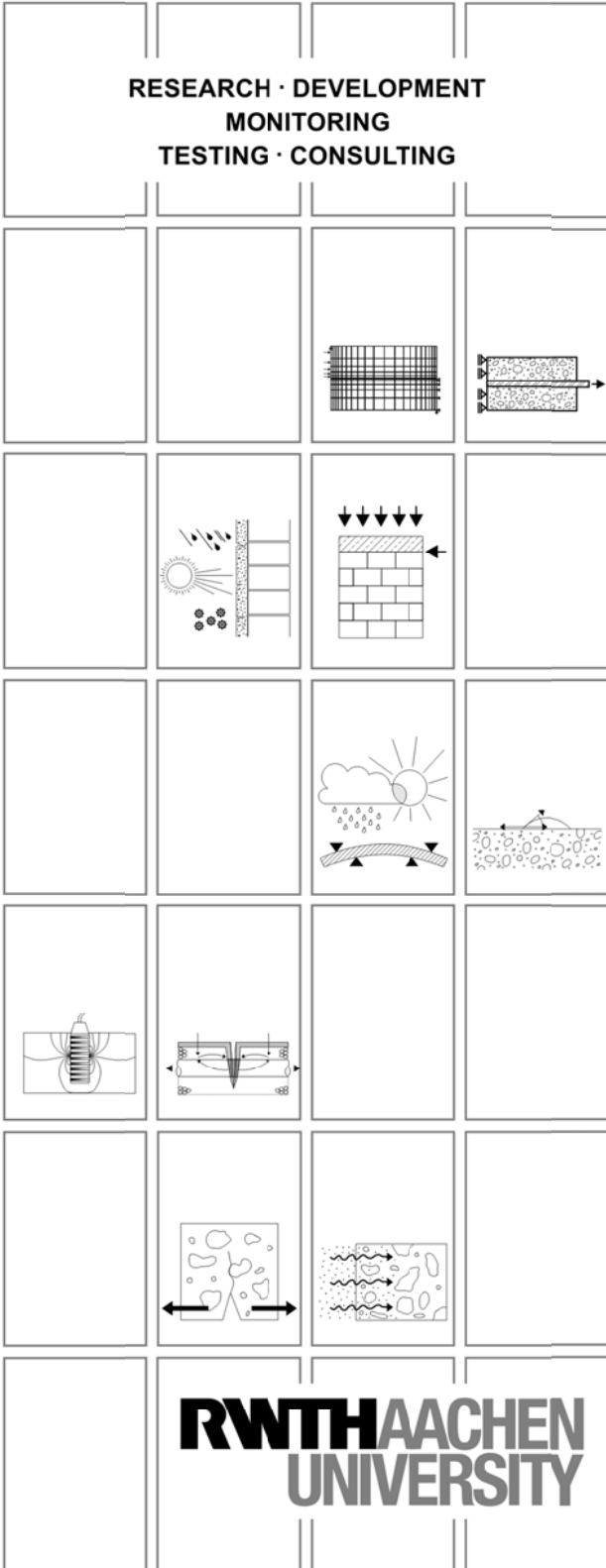


INSTITUTE OF BUILDING MATERIALS RESEARCH

RESEARCH · DEVELOPMENT
MONITORING
TESTING · CONSULTING



Test Report G 8369

Tests of Griptec FT Couplers
B500NC

Le/Sc

Copy no. 1

SUBJECT

Tests of Griptec FTCouplers
for the connection of
B500NC certified for Norway

Report no.

G 8369

14.01.2014

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 3 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 FT couplers for the connection of bars which are certified as 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. With the splicing systems “FT couplers” one bar with Griptec-Female sleeve and one bar with a cold forged parallel threaded can be connected (Figure 1 and 2).

2 SAMPLING

In the plant of BETOMAX in Neuss two Griptec FT couplers of diameter $d = 16$ mm and two Griptec FT couplers of diameter $d = 20$ mm were produced with reinforcing steel B500NC which is certified for Norway.

The samples were shipped to ibac on December 13, 2013. The marking of the bars was determined as “1/9” and “1/26”.

3 TESTS

3.1 Dimensions

The dimensions of the sample are given in table A1, page A1. The length of one connection was round about 1,5 m.

The samples are shown in the photo of figure 1 and 2.



Figure 1: Photo of the shipped couplers, $d = 20$ mm



Figure 2: Photo of the shipped couplers, $d = 16 \text{ mm}$

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. The pretension torque is given in table A2, page A2 and table A3, page A3.

4 RESULTS

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

Table	Page	Tests
1	2	3
A1	A1	Dimensions
A2 and A3	A2 and A3	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

Head of testing and inspection body

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

Dipl.-Ing. J. Leißner

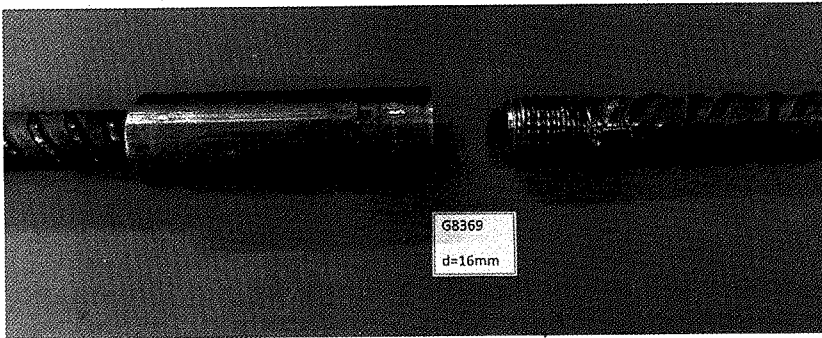


Figure 2: Photo of the shipped couplers, d = 16 mm

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Director of certification body

M. Raupach

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



Head of testing and inspection body

J. Leißner

Dipl.-Ing. J. Leißner

Table A1: Griptec Couplers FT tested with bars certified for Norwegian Dimensions
 Samples shipped to ibac 13 December 2013
 Griptec-Female sleeve swaged onto one reinforcing bar ;
 second bar with a cold forged parallel thread

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	
16	Female with swaged sleeve	74,9	23,8	15,9	18,7	
	forged and parallel threaded end	-	-	17,7	22,7	
20	Female with swaged sleeve	88,0	29,9	19,8	23,9	
	forged and parallel threaded end	-	-	21,4	27,6	
Nominal values laid in German Approval	Standard sleeves	65,0-75,0	23,5-24,0	15,3	-	female d=16mm
		-	-	18*2,5	17	FT d=16mm
		75,0-85,0	29,2-30,2	19,3	-	female d=20mm
		-	-	22*2,5	20	FT d=20mm

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

²⁾ Outer diameter of parallel thread of forged end

Tabelle A2: Griptec Couplers FT tested with bars certified for Norwegian

Tensile Strength of Griptec FT Couplers

Samples shipped to ibac 13 December 2013

Griptec-Female sleeve swaged onto one reinforcing bar ;
second bar with a cold forged parallel thread

Torque: 40 Nm

Nominal diameter / No.	No. of sample	Nominal Cross section	Ultimate load	location of break	elongation at ultimate load of the bar	No. of the criterion of German approval fulfilled
		$A_{s,Nenn}$ mm ²	$F_{u,ist}$ kN		A_{gt} %	
1	2	3	4	5	6	7
16	1	201,1	129,9	break outside the coupler in the bar	10,7	1
16	2	201,1	128,8		10,9	1
Required tensile load			110,6	$R_{m,Nenn} * A_{s,Nenn}$ (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)

Tabelle A3: Griptec Couplers FT tested with bars certified for Norwegian

Tensile Strength of Griptec FT Couplers

Samples shipped to ibac 13 December 2013

Griptec-Female sleeve swaged onto one reinforcing bar ;
second bar with a cold forged parallel thread

Torque: 60 Nm

Nominal diameter / No.	No. of sample	Nominal Cross section	Ultimate load	location of break	elongation at ultimate load of the bar	No. of the criterion of German approval fulfilled
		$A_{s,Nenn}$ mm ²	$F_{u,ist}$ kN		A_{gt} %	
1	2	3	4	5	6	7
20	1	314,2	201,8	break outside the coupler in the bar	15,5	1
20	2	314,2	205,4		14,0	1
Required tensile load			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)



Figure B1: Certificate of Elbe Stahlwerks marking 1/26

 GlobeCert AB	 <small>1962 EN 45 011</small>
<h1>CERTIFICATE</h1>	
<p>Produktcertifikat PRODUCT CERTIFICATE</p>	
<p>HÄRMED INTYGAS ATT TILLVERKAREN VID NEDANSTÄENDE PRODUKTIONSANLÄGGNING We hereby certify that the producer for steel production stated below</p>	
<p>Hennigsdorfer Elektrostahlwerke GmbH Hennigsdorf, Germany</p>	
<p>UPPFYLLER KRAVEN ENLIGT fulfil the requirements according to</p>	
<p>According to SS-EN 10 080:2006 + SS212540:2011 (Sweden) According to NS 3576-2:2012 and NS 3576-3:2012 (Norway)</p>	
<p>För Produktcertifiering For product certification</p>	
<p>K500B-T and K500C-T, Diameter 10 – 32 mm (Sweden) B500NB and B500NC, Diameter 10 – 32 mm (Norway)</p>	
<p>OCH DÄRMED TILLDELAS CERTIFIERINGSNUMMER and have been assigned the following number of certificate</p>	
<p>0901</p>	
<p>Production and marking shall be according to GlobeCert AB:s certification regulations <i>ed. 3</i>. Produktion och märkning skall vara enligt GlobeCert AB:s certifieringsregler <i>utg. 3</i>. 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.</p>	
<p>UTFÄRDAT 2013-06-10</p>	
<p>CERTIFIKATETS GILTIGHETSTID Valid till</p>	
<p>2016-03-04</p>	
	
<p>GlobeCert AB Anders Behm Chief Executive</p>	

Figure B2: Certificate of Hennigsdorfer Stahlwerke marking 1/9