

Compilation of documents for the certification of fire resistance of Gebofix PRO VE-SF

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G&B FISSAGGI
Corso Savona, 22
10029 Villatellone, (TO)
Italy

Letter**8675/2013**

Our Ref.: (3468/595/13)-NB
Customer-No.: 11893
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Your Ref.:
Your message of:

Date: 30.05.2013

**Extension of the validity of Test Report No. (3738/803/09)-NB of 30/04/2009,
“G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchor**

Dear Sir or Madam,

In reply to your enquiry we wish to inform you that the statements made in the above Test Report No. (3738/803/09)-NB of 30/04/2009 regarding the reaction to fire of centrally tensioned

“G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete”

bonded anchors, with M8 to M30 anchor rods made from electrogalvanised steel (strength class ≥ 5.8) or

with M8 to M30 anchor rods made from A4 stainless steel or HCR steel (strength class $\geq A70$),

which are set in uncracked reinforced concrete (strength class between $\geq C20/25$ and $\leq C50/60$) and exposed on one side to a fire in accordance with the DIN EN 1363-1 : 1999-10 standard temperature-time curve (ETK), continue to apply until 6 March 2018.

This letter consists of 4 pages and contains an abstract of the above Test Report.

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1 General

In view of the results that were achieved in the fire test, the fire resistance times that are listed in the tables in section 2 below can be assigned to the "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors as a function of the maximum tensile loads, due consideration being to the notes in section 3 below. The edge and centre distances have to be selected so that the steel failure / the mortar failure (failure as a result of ETK temperature exposure) becomes decisive.

If the edge distance c is so large that steel failure becomes the failure mode, the load values in tables 1 to 2 can also be transferred to anchors that are subjected to lateral loads.

2 Evaluation of test results

Table 1: Fire resistance times of the "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchor in conjunction with M8 to M30 anchor rods made from electrogalvanised steel strength class ≥ 5.8) as a function of the maximum tensile load

Designation	Fire resistance time in minutes			
	30 max. N [kN]	60 max. N [kN]	90 max. N [kN]	120 max. N [kN]
"G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchor ¹⁾				
M8	≤ 1.64	≤ 1.12	≤ 0.59	≤ 0.33
M10	≤ 2.60	≤ 1.77	≤ 0.94	≤ 0.52
M12	≤ 3.35	≤ 2.59	≤ 1.82	≤ 1.44
M16	≤ 6.25	≤ 4.82	≤ 3.40	≤ 2.69
M20	≤ 9.75	≤ 7.52	≤ 5.30	≤ 4.19
M24	≤ 14.04	≤ 10.84	≤ 7.64	≤ 6.04
M30	≤ 18.26	≤ 14.10	≤ 9.94	≤ 7.86

¹⁾ When rating fasteners it has to be checked whether the permissible loads of the general type approvals (e.g. ETA-09/0078) are decisive.

Table 2: Fire resistance times of the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchor in conjunction with M8 to M30 anchor rods made from A4 stainless steel or HCR steel as a function of the maximum tensile load

Designation	Fire resistance time in minutes			
	30 max. N [kN]	60 max. N [kN]	90 max. N [kN]	120 max. N [kN]
“G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchor ¹⁾				
M8	≤ 1.64	≤ 1.12	≤ 0.59	≤ 0.33
M10	≤ 2.60	≤ 1.77	≤ 0.94	≤ 0.52
M12	≤ 3.35	≤ 2.59	≤ 1.82	≤ 1.44
M16	≤ 6.25	≤ 4.82	≤ 3.40	≤ 2.69
M20	≤ 9.75	≤ 7.52	≤ 5.30	≤ 4.19
M24	≤ 14.04	≤ 10.84	≤ 7.64	≤ 6.04
M30	≤ 18.26	≤ 14.10	≤ 9.94	≤ 7.86

- ¹⁾ When rating fasteners it has to be checked whether the permissible loads of the general type approvals (e.g. ETA-09/0078) are decisive.

3 Special notes


The above-mentioned Test Report, together with this extension, does not replace an approval (Building Code Test Certificate - abP, National Technical Approval - abZ, European Technical Approval - ETA) that is required under the German building code procedure. It should, in addition, be noted that load values under fire exposure conditions may in the future be regulated by European Technical Approvals.

The above assessment only applies to the tested “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors on the basis of the conditions that are set out in the Technical Data Sheets of G&B Fissaggi. The anchors must be installed in accordance with the specification provided by G&B Fissaggi and in accordance with valid type approval (ETA, abZ).

The assessment for the above "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors only applies in connection with substrates made from reinforced concrete (strength class \geq C20/25 and \leq C50/60) that can at least be classified under a fire resistance class that corresponds to the fire resistance class of the anchors.

The validity of Test Report No. (3738/803/09)-NB of 30/04/2009 will in connection with this letter expire on 06/03/2018.

Yours sincerely

i. A. 
ORR Dr.-Ing. Rohling
Head of Testing Laboratory

i. A. 
Dipl.-Ing. Bollmohr
Engineer in Charge

Companion Sheet to Test Report

- Translation -

Document No.: (3738/803/09)-NB dd. 30/04/2009

Client: G&B FISSAGGI
Corso Savona, 22
10029 Villatellone (TO)
Italy

Order date: 09/02/2009

Order Ref.: -

Order received: 09/02/2009

Subject: "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete"
bonded anchors, placed in the non-cracked tension zone of RC floor
sections, strength class $\geq C20/25$, and subjected to centric tension
loads, to be tested and evaluated in connection with anchor rods
(dimensions M8 to M30) for their reaction to fire to determine their fire
resistance time

Test basis: DIN EN 1363-1 : 1999-10

Test material received: Week 46/2006

Sampling: The Testing House does not have any information indicating official
sampling.

Test material marking: None

Test date: 21/11/2006, 28/11/2006, 06/12/2006, 24/01/2007 and 20/02/2007

Valid until: 06/03/2013

This Companion Sheet consist of 4 pages, incl. cover sheet.



This Companion Sheet may not be copied unless as a complete text and without any changes. Excerpts and abridged versions of this document are subject to approval in writing of MPA Braunschweig. Documents that do not carry a signature and the official stamp are invalid. The first sheet of this document and the page carrying the signatures bear the official stamp of MPA Braunschweig. The test material has been fully used. Accreditations are valid for the testing methods specified in the current documents. A list showing fields for which accreditation has been obtained can be made available upon request.

1 Background and general statement

Under the order placed with the Testing House, a Test Report was to be drawn up on the reaction to fire of "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors, which are subjected to centric tension and tested for steel failure in compliance with section 2.3 of TR 020 : 2004-05, when exposed to a fire in compliance with DIN EN 1363-1 : 1999-10 to determine their fire resistance time.

Related documents:

- (1) DIN EN 1363-1 : 1999-10, Fire resistance tests - Part 1: General requirements,
- (2) EOTA Technical Report TR 020 : 2004-05 - Evaluation of anchorages in concrete concerning resistance to fire,
- (3) "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete", European Technical Approval ETA-09/0078 of 03-03-2009, issued by DIBt, Berlin.

Using the results achieved in the fire test, the "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors were to be examined and evaluated respecting requirements (steel failure, pullout) specified in EOTA Technical Report TR 020 : 2004-05.

2 Proposed rating for the "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors (dimensions M8 to M30) in connection with anchor rods made from electro-galvanized steel (strength class ≥ 5.8)

Using the results achieved in the tests as a basis, fire resistance periods are proposed for the "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors (dimensions M8 to M30) made from electro-galvanized steel as shown in table 2-1 below as a function of the maximum centric tensile load.

Based on the results achieved in the tests, and departing from the evaluation specifications in TR 020 : 2004-05, the ratings for "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors made from electro-galvanized steel have been increased with regard to the 30-minute fire resistance time.

Table 2-1: Proposed rating for "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors (dimensions M8 – M30) made from electro-galvanized steel and stainless steel, regarding their fire resistance times as a function of stress σ_s when exposed to centric tensile loads

Designation	"G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchor						
	Maximum tensile load ¹⁾						
Fire resistance time t_u [min]	F [kN]						
	M8	M10	M12	M16	M20	M24	M30
Minimum set depth [mm]	80	90	110	125	175	210	280
30	1.64	2.60	3.35	6.25	9.75	14.04	18.26
60	1.12	1.77	2.59	4.82	7.52	10.84	14.10
90	0.59	0.94	1.82	3.40	5.30	7.64	9.94
120	0.33	0.52	1.44	2.69	4.19	6.04	7.86

¹⁾ Loads resulting from European Technical Approval ETA-09/0078 may be decisive for the service condition.

3 Proposed rating for the "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors (dimensions M8 – M30) in connection with anchor rods made from stainless steel

Starting from the results achieved in the tests, the same characteristic tensile stresses (cf. table 2-1) are recommended for the "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors, when adequate anchor rods made from stainless steel (material No. 1.4401 (A4) or 1.4571 (A5), 1.4529 (HCR) strength class 70) and nuts made from stainless steel (A4, strength class A-70) are used.

4 Annotations

- 4.1** This Test Report does not replace the attestation (General Building Code Test Certificate - abP; National Technical Approval - abZ, ETA) required under the German building code procedure. It should, in particular, be noted that the fire load density values of "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors can in the future be regulated by European Technical Approvals.
- 4.2** The above evaluation shall only apply to the tested "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors, due consideration being given to the boundary conditions shown in the technical annexes attached to this Test Report and/or the technical data sheets of G&B Fissaggi.
- 4.3** The "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors may be used for anchoring applications in non-cracked reinforced concrete (strength class C20/25 as a minimum and C50/60 as a maximum) when primarily subjected to static loads.
- 4.4** The evaluation shall only apply in connection with members made from reinforced concrete, which can as a minimum be classified under the same fire resistance class as that of the anchors.
- 4.5** The validity of the Test Report will expire on 06/03/2013.



Rohling
ORR Dr.-Ing. Rohling
Head of Testing Laboratory

i.A. *Bollmohr*
Dipl.-Ing. Bollmohr
Engineer in charge

Braunschweig, dated 30 April 2009

Test Report

- Translation -

Document No.: (3738/803/09)-NB dd. 30/04/2009

Client: G&B FISSAGGI
Corso Savona, 22
10029 Villatellone (TO)
Italy

Order date: 09/02/2009

Order Ref.: -

Order received: 09/02/2009

Subject: "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete", bonded anchors placed in the non-cracked tension zone of RC floor sections, strength class $\geq C20/25$, and subjected to centric tension loads, to be tested and evaluated in connection with anchor rods (dimensions M8 to M30) for their reaction to fire to determine their fire resistance time

Test basis: DIN EN 1363-1 : 1999-10

Test material received: Week 46/2006

Sampling: The Testing House does not have any information indicating official sampling.

Test material marking: None

Test date: 21/11/2006, 28/11/2006, 06/12/2006, 24/01/2007 and 20/02/2007

Valid until: 06/03/2013

This Test Report consist of 8 pages, incl. cover and 11 annexes.

The Test Report No. (3319/384/09)-NB dated 04/03/2009 does not replace a General Building Code Test Certificate (abP; abZ, ETA) according to the German Laender Building Regulations.



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1 Background and general statement

Under the order placed with the Testing House, a Test Report was to be drawn up on the reaction to fire of “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors, which are subjected to centric tension and tested for steel failure in compliance with section 2.3 of TR 020 : 2004-05, when exposed to a fire in compliance with DIN EN 1363-1 : 1999-10 to determine their fire resistance time.

Related documents:

- (1) DIN EN 1363-1 : 1999-10, Fire resistance tests - Part 1: General requirements,
- (2) EOTA Technical Report TR 020 : 2004-05 - Evaluation of anchorages in concrete concerning resistance to fire,
- (3) “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete”, European Technical Approval ETA-09/0078 of 03-03-2009, issued by DIBt, Berlin,

- (4) is a transfer of Test Report No. (3290/0966)-NB dated 06-03-2008. The injection adhesive anchors evaluated in the present Test Report are per statement of the client identical with the anchors evaluated in the Test Report No. (3290/0966)-NB. This document is the translated version of Test Report No. (3290/0966)-NB dated 06-03-2008. The german version is the only legally binding text.

Using the results achieved in the fire test, the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” were to be examined and evaluated respecting requirements (steel failure, pullout) specified in EOTA Technical Report TR 020 : 2004-05.

2 Description of system tested

The “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchor is an injection system that uses the bonding effect between anchor rod, bonding mortar and concrete to become anchored in the substrate. According to the type approval for cold design of anchoring means primarily subjected to static loads, the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchor may be used in reinforced and non-reinforced normal-weight concrete (strength class C20/25 as a minimum and C50/60 as a maximum) in the non-cracked concrete.

Main elements of the tested “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchor are a two-component mortar cartridge (injection mortar: styrene-free vinylester resin system with cement, water and sand) and cold-formed anchor rods (dimensions M8 to M30), together with a hexagon nut and a washer. The anchor rods and the nuts and washers are made from electro-galvanized steel (strength class ≥ 5.8) and from stainless steel (material No. 1.4401 (A4) and 1.4571 (A5), 1.4529 (HCR), strength class 70). Forces are transmitted by the bond stress between the anchor rod and the anchoring substrate. For the service conditions, the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchor is regulated by the above-named approval.

As specified in the above type approval, the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors were installed with the installation tools (hammer drill and drill, cleaning device and injection device) defined in these documents.

Further structural details and details of the as-installed condition of the bonded anchors are shown annexes 1.1 to 1.4 of this Test Report.

3 Test set-up and testing

The “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors were fire tested in a small-sized furnace with the inside dimensions 1,000mm x 1,500mm x 1,500mm (WxDxH). RC slabs (strength class C20/25) formed the horizontal barrier, into the tension zones of which the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors were placed.

In compliance with TR 020 : 2004-05, section 2.3.1, external loading systems and protected steel elements (dead loads) of the required weight, which were suspended for an unsupported and unprotected length of $l \leq 500\text{mm}$ with tension rods and an additional steel adapter, were used for introducing the centric loads into the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete”. bonded anchors

The furnace was exposed to a fire in compliance with the standard temperature-time curve (ETK) as specified in DIN EN 1363-1 : 1999-10, section 5.1.1. The temperatures in the furnace were measured with 2 plate thermometers with measuring heads made from Ni-Cr/Ni-Al wire (type K) dia. 1.0mm in compliance with DIN EN 1363-1 : 1999-10, section 4.5.1.1.

The temperatures measured in the furnace during the fire tests are illustrated by the graphs in annexes 2.1, 3.1, 4.1, 5.1 and 6.1.

4 Test results, evaluation and conclusions

4.1 Evaluation of test results respecting centric tension loading

On 21/11/2006, 28/11/2006, 06/12/2006, 24/01/2007 and 20/02/2007, a total of 23 “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors were placed in the non-cracked tension zone of RC floor sections (strength class C20/25) and tested for their reaction to fire when subjected to centric tension loads in compliance with DIN EN 1363-1 : 1999-10 to determine their fire resistance time.

Tables 4-1 to 4-5 in Test Report No. (3290/0966)-NB dated 06-03-2008 list the test results for the 23 “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors in connection with anchor rods made from electro-galvanized steel and stainless steel and make reference to the cause of failures.

4.2 Evaluation of test results respecting steel failure

4.2.1 General

The basis used for evaluation was section 2.3.1 of EOTA Technical Report TR 020 : 2004-05:

$$\sigma_{s1} = c_1 + c_2 / t_u \quad \text{equation: regression curve}$$

$$\sigma_{s2} = c_3 (c_1 + c_2 / t_u) \quad \text{equation: design curve}$$

Equations for determination of the characteristic steel stress for fire resistance times of 60 min., 90 min. and 120 min:

$$\sigma_{Rk,s,fi(60)} = c_3 (c_1 + c_2 / 60\text{min})$$

$$\sigma_{Rk,s,fi(90)} = c_3 (c_1 + c_2 / 90\text{min})$$

$$\sigma_{Rk,s,fi(120)} = c_3 (c_1 + c_2 / 120\text{min})$$

Equation for determination of the characteristic steel stress for fire resistance times of 30 min., using the equation of the straight line through points $t_u = 60 \text{ min} / \sigma_{Rk,s,fi(60)}$ and $t_u = 90 \text{ min} / \sigma_{Rk,s,fi(90)}$:

$$\sigma_{Rk,s,fi(30)} = c_4 - c_5 \times 30\text{min}$$

To calculate the tensile stress, the stress cross section A_s of the corresponding diameter of the "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors was entered in the computation.

4.2.2 Presentation of test results and evaluation

The graphs in annex 7.1 show the test results as a function of the stress σ_s of the "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors made from electro-galvanized steel and stainless steel A4 (diameter M8 to M16) when subjected to centric tensile loads.

The "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors with the dimensions M24 to M30 are evaluated on the basis of the steel stress utilization level in relation to the stress cross section.

4.2.3 Proposed rating for the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors (dimensions M8 to M30) in connection with anchor rods made from electro-galvanized steel (strength class ≥ 5.8)

Using the results achieved in the tests as a basis, fire resistance periods are proposed for the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors (dimensions M8 to M30) made from electro-galvanized steel as shown in table 4-1 below as a function of the maximum centric tensile load.

Based on the results achieved in the tests, and departing from the evaluation specifications in TR 020 : 2004-05, the ratings for “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors made from electro-galvanized steel have been increased with regard to the 30-minute fire resistance time.

Table 4-1: Proposed rating for “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors (dimensions M8 – M30) made from electro-galvanized steel and stainless steel, regarding their fire resistance times as a function of stress σ_s when exposed to centric tensile loads

Designation	“G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchor						
Fire resistance time t_u [min]	Maximum tensile load ¹⁾						
	F [kN]						
	M8	M10	M12	M16	M20	M24	M30
Minimum set depth [mm]	80	90	110	125	175	210	280
30	1.64	2.60	3.35	6.25	9.75	14.04	18.26
60	1.12	1.77	2.59	4.82	7.52	10.84	14.10
90	0.59	0.94	1.82	3.40	5.30	7.64	9.94
120	0.33	0.52	1.44	2.69	4.19	6.04	7.86

¹⁾ Loads resulting from European Technical Approval ETA-09/0078 may be decisive for the service condition.

4.2.4 Proposed rating for the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors (dimensions M8 – M30) in connection with anchor rods made from stainless steel


Starting from the results achieved in the tests, the same characteristic tensile stresses (cf. table 4-1) are recommended for the “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for

concrete” bonded anchors, when adequate anchor rods made from stainless steel (material No. 1.4401 (A4) or 1.4571 (A5), 1.4529 /HCR) strength class 70) and nuts made from stainless steel (A4, strength class A-70) are used.

5 Annotations

- 5.1** This Test Report does not replace the attestation (General Building Code Test Certificate - abP; National Technical Approval - abZ, ETA) required under the German building code procedure. It should, in particular, be noted that the fire load density values of “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors can in the future be regulated by European Technical Approvals.
- 5.2** The above evaluation shall only apply to the tested “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete”, bonded anchors due consideration being given to the boundary conditions shown in the technical annexes attached to this Test Report and/or the technical data sheets of G&B Fissaggi.
- 5.3** The “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete” bonded anchors may be used for anchoring applications in non-cracked reinforced concrete (strength class C20/25 as a minimum and C50/60 as a maximum) when primarily subjected to static loads.
- 5.4** The evaluation shall only apply in connection with members made from reinforced concrete, which can as a minimum be classified under the same fire resistance class as that of the anchors.
- 5.5** The validity of the Test Report will expire on 06/03/2013.

This document is the translated version of Test Report No. (3290/0966)-NB dated 06-03-2008. The legally binding text is the aforementioned German Test Report.


ORR Dr.-Ing. Röhling
Head of Testing Laboratory



Braunschweig, dated 30 April 2009

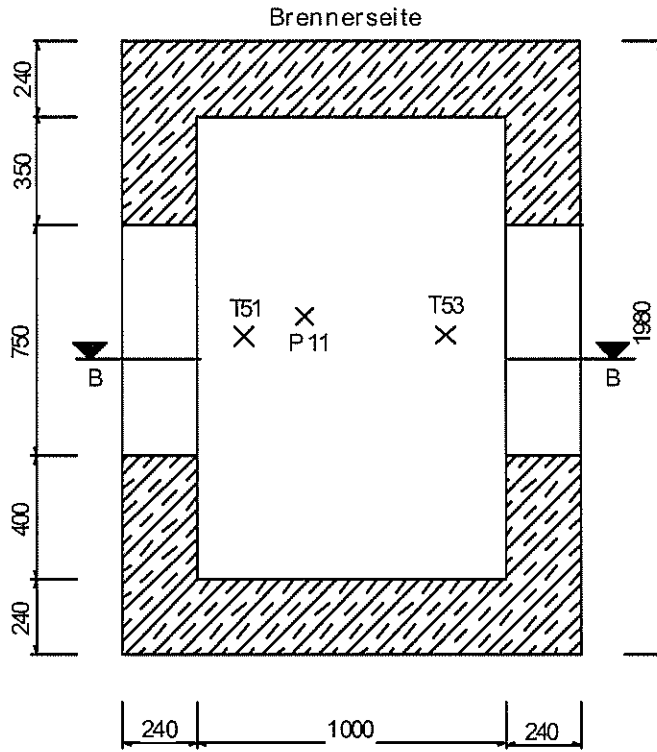
i.A. 
Dipl.-Ing. Bollmohr
Engineer in charge

List of annexes

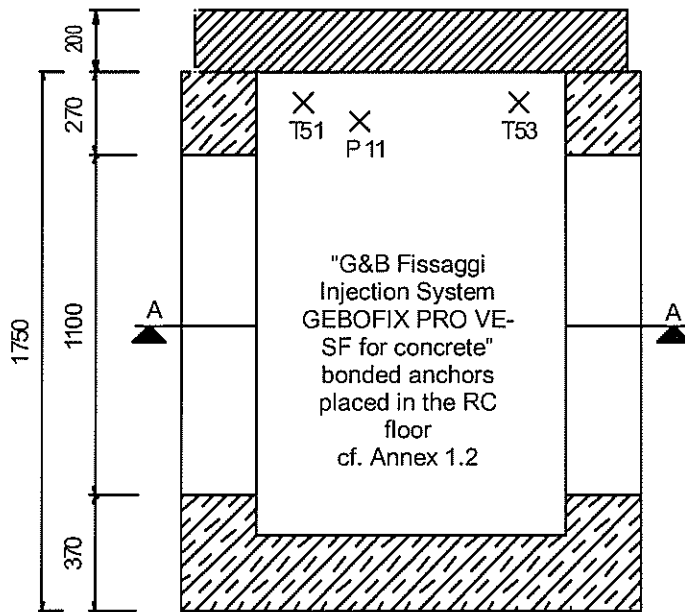
- Annex 1.1: Structural design of the test installation
- Annex 1.2: "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors after installation
- Annex 1.3: Technical details of "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete"
- Annex 1.4: Technical details of "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete"
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- Annex 2.1: Furnace temperatures – test 1
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- Annex 6.1: Furnace temperatures – test 5
- Annex 7.1: Evaluation of test results - "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete"

Furnace: chamber 6

Schnitt A-A



Schnitt B-B Deckenelement



T51 and T53 measuring points of furnace temperature, thermocouples with measuring points made of Ni-Cr/Ni-Al-wires (type K)
P11 Pressure measuring head

Dimensions in mm

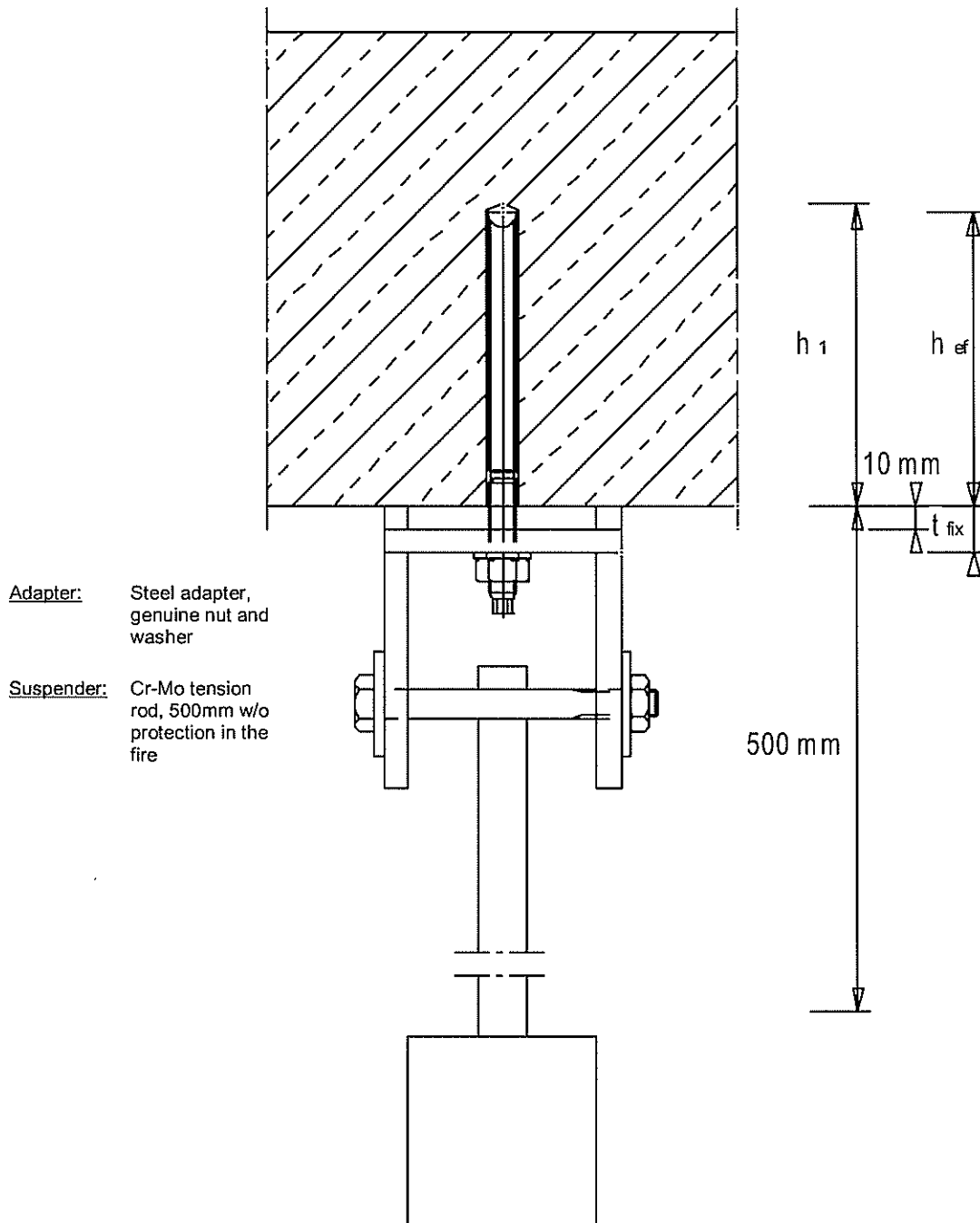
Structural design of specimen
Illustration of test chamber

Materialprüfanstalt für das Bauwesen
Institut für Baustoffe, Massivbau und Brandschutz
der Technischen Universität Braunschweig

Annex 1.1 of
Test Report

No.: (3738/803/09)-NB
dd. 30/04/2009

"G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors placed in RC slab / $d \geq 200\text{mm}$ / 20/C25



Placed "G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors
(in accordance with TR 020 : 2004-05)

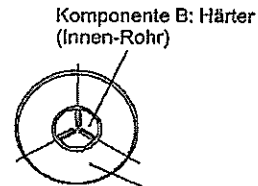
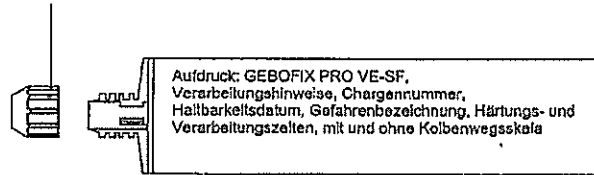
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der Technischen Universität Braunschweig

Annex 1.2 of
Test Report
No.: (3738/803/09)-NB
dd. 30/04/2009

"G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete" bonded anchors

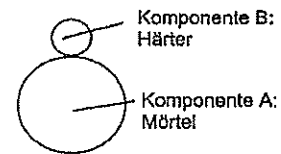
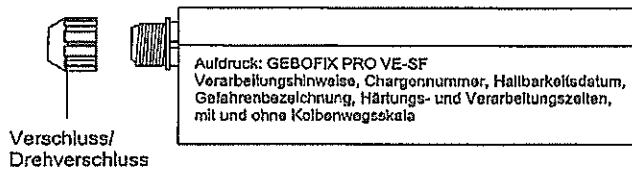
150 ml, 280 ml, 300 ml, 330 ml, 380 ml, 410 ml und 420 ml Kartusche (Typ: coaxial)

Verschluss/Drehverschluss

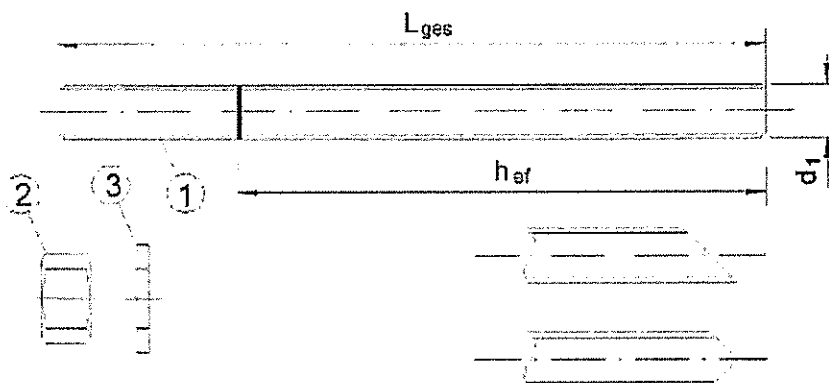


Komponente A: Mörtel (Außen-Rohr)

235 ml, 345 ml und 825 ml Kartusche (Typ: "side-by-side")



Statikmischer



Technical data

"G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete"

Materialprüfanstalt für das Bauwesen
 Institut für Baustoffe, Massivbau und Brandschutz
 der Technischen Universität Braunschweig

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“G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete”

Part	Designation	Material
Steel, zinc plated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042 or Steel, hot-dip galvanised $\geq 40 \mu\text{m}$ acc. to EN ISO 1461		
1	Anchor rod	Steel, EN 10087 or EN 10263 Property class 5.8, 8.8, EN ISO 898-1:1999
2	Hexagon nut, EN 24032	Property class 5 (for class 5.8 rod) EN 20898-2, Property class 8 (for class 8.8 rod) EN 20898-2
3	Washer, EN ISO 7089, EN ISO 7093, or EN ISO 7094	Steel, zinc plated
Stainless steel		
1	Anchor rod	Material 1.4401 / 1.4571, EN 10088-1:2005, > M24: Property class 50 EN ISO 3506 \leq M24: Property class 70 EN ISO 3506
2	Hexagon nut, EN 24032	Material 1.4401 / 1.4571 EN 10088, > M24: Property class 50 (for class 50 rod) EN ISO 3506 \leq M24: Property class 70 (for class 70 rod) EN ISO 3506
3	Washer, EN ISO 7089, EN ISO 7093, or EN ISO 7094	Material 1.4401 or 1.4571, EN 10088
High corrosion resistance steel		
1	Anchor rod	Material 1.4529 / 1.4565, EN 10088-1:2005, > M24: Property class 50 EN ISO 3506 \leq M24: Property class 70 EN ISO 3506
2	Hexagon nut, EN 24032	Material 1.4529 / 1.4565 EN 10088, > M24: Property class 50 (for class 50 rod) EN ISO 3506 \leq M24: Property class 70 (for class 70 rod) EN ISO 3506
3	Washer, EN ISO 7089, EN ISO 7093, or EN ISO 7094	Material 1.4529 / 1.4565, EN 10088

Commercial standard rod with:

- Materials, dimensions and mechanical properties acc. Table 1a
- Inspection certificate acc. to EN 10204:2004
- Marking of embedment depth

Technical data

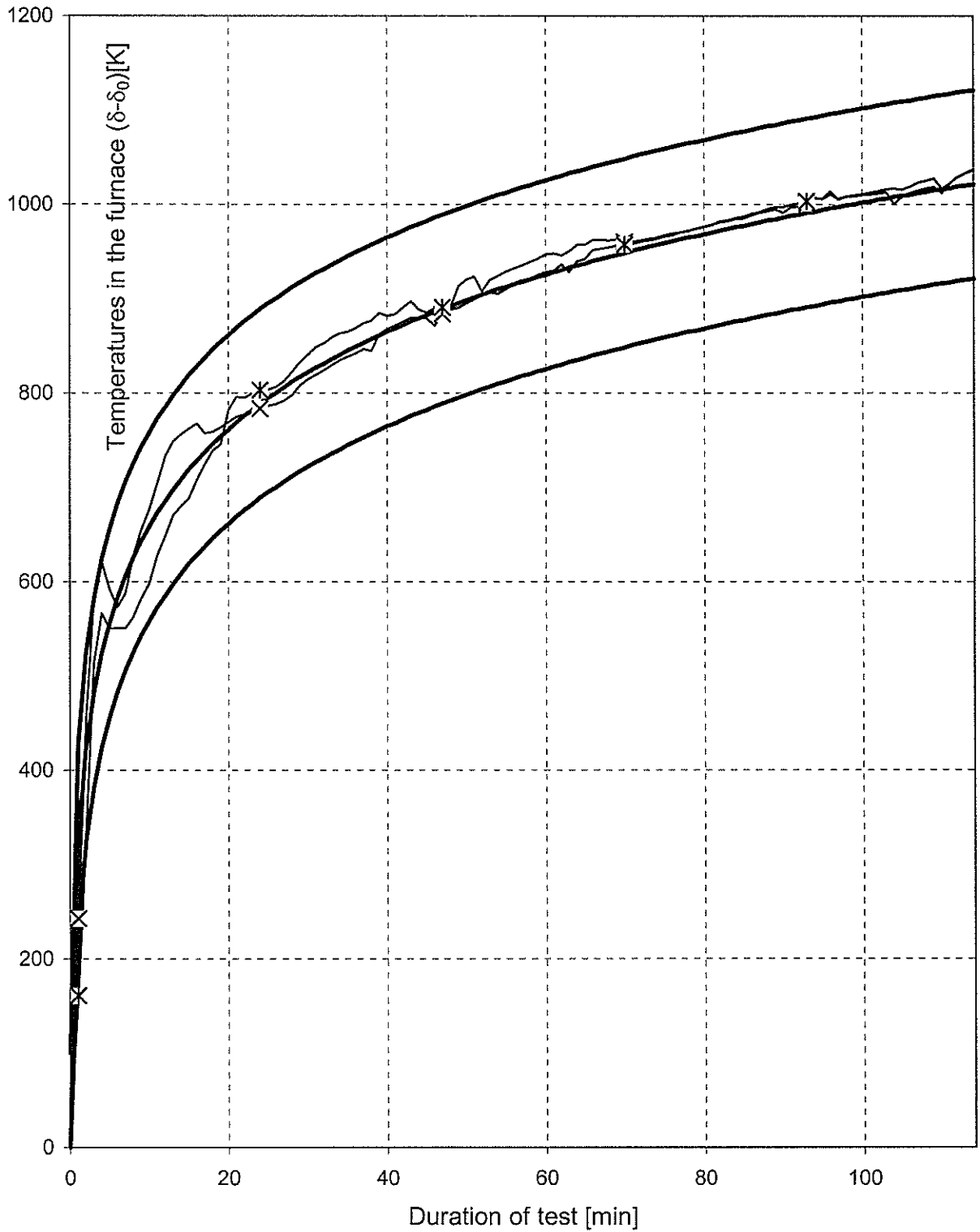
“G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete”

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Annex 1.4 of
Test Report

No.: (3738/803/09)-NB
dd. 30/04/2009

ETK DIN EN 1363-1



$\delta_0 = 16 \text{ }^\circ\text{C}$

test date: 21.11.06

Temperatures in the furnace
test 1

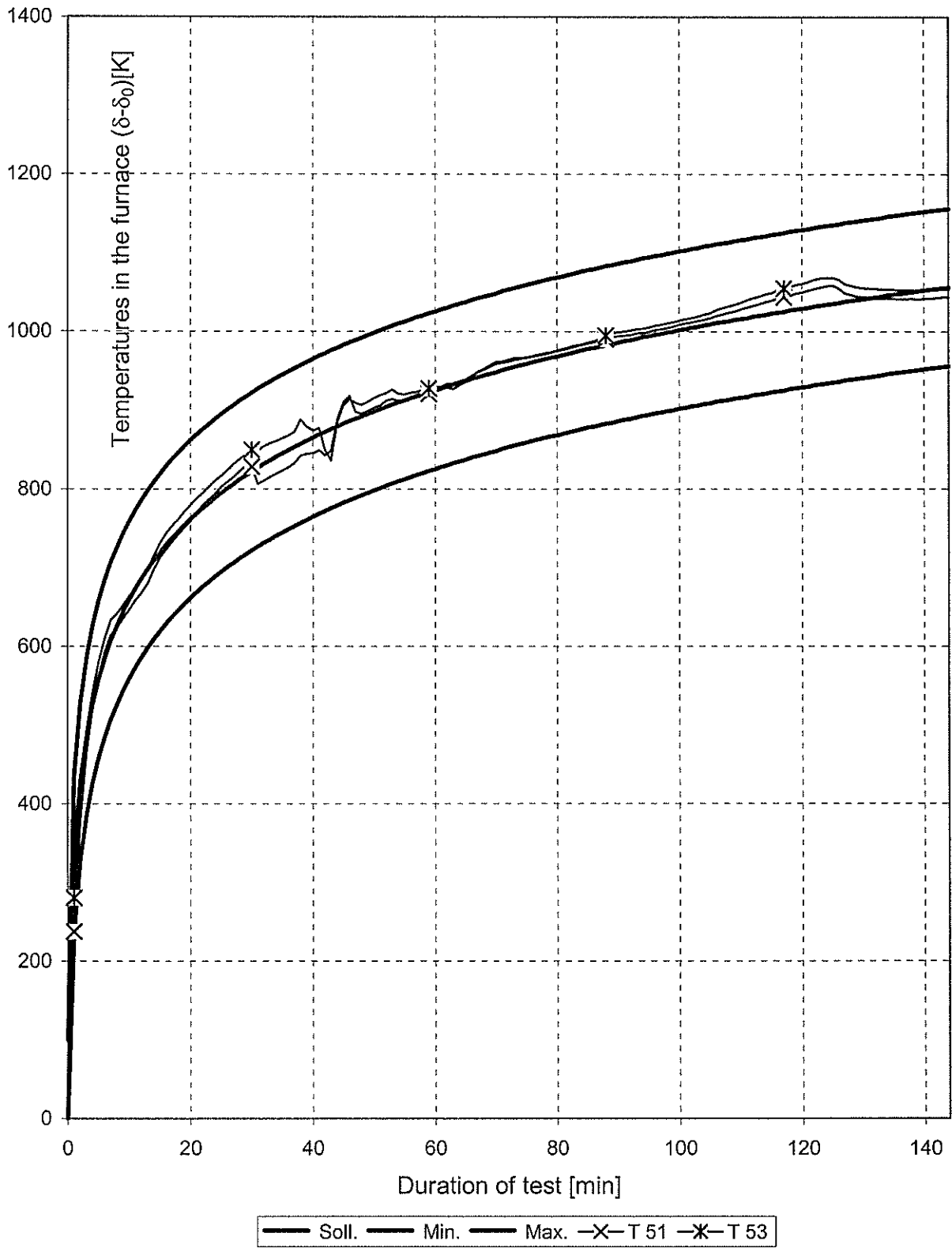
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Annex 2.1 of

Test Report

No.: (3738/803/09)-NB

ETK DIN EN 1363-1



$\delta_0 = 17 \text{ }^\circ\text{C}$

test date: 28.11.06

Temperatures in the furnace
test 2

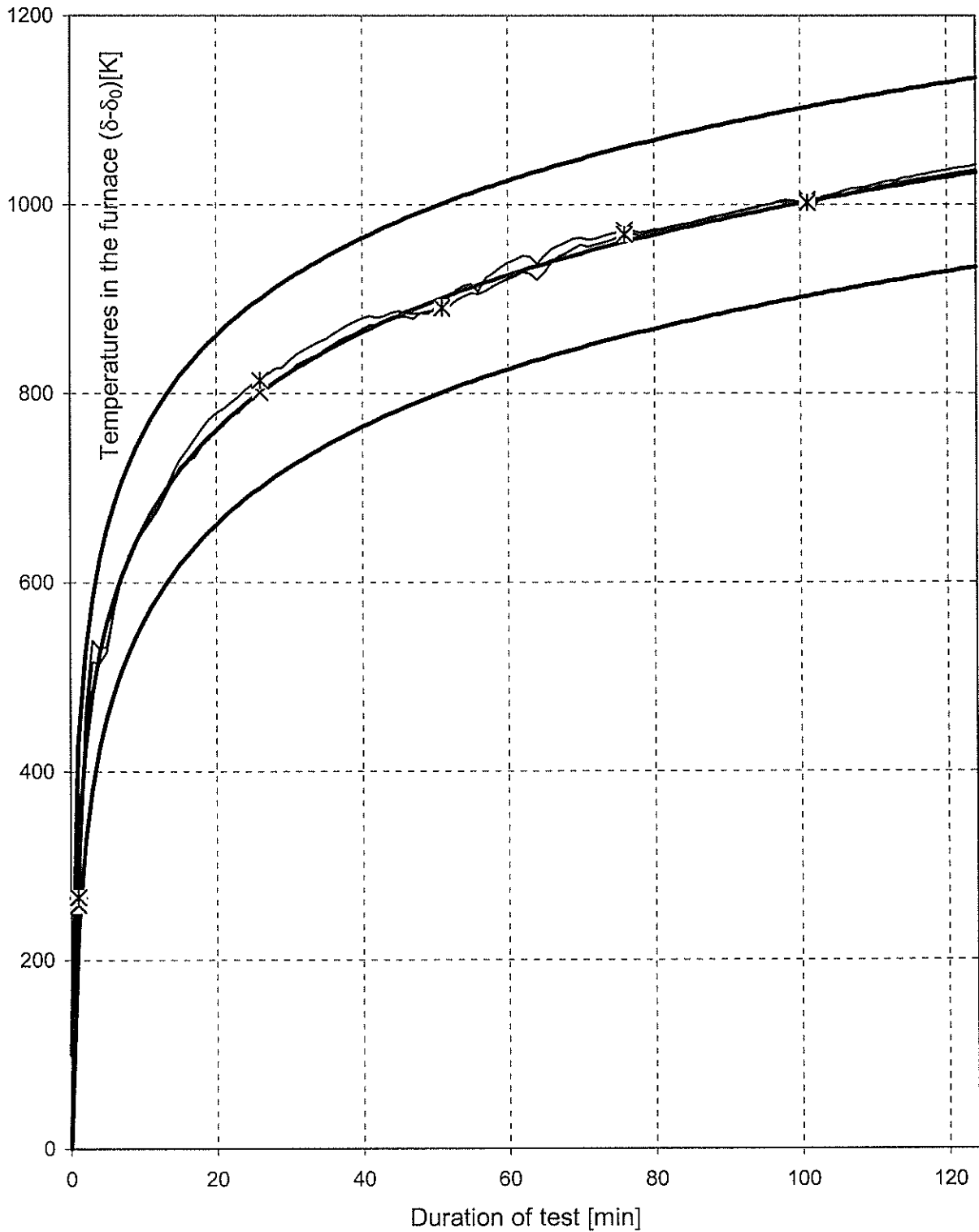
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Annex 3.1 of

Test Report

No.: (3738/803/09)-NB

ETK DIN EN 1363-1



$\delta_0 = 18 \text{ }^\circ\text{C}$

test date: 06.12.06

Temperatures in the furnace
test 3

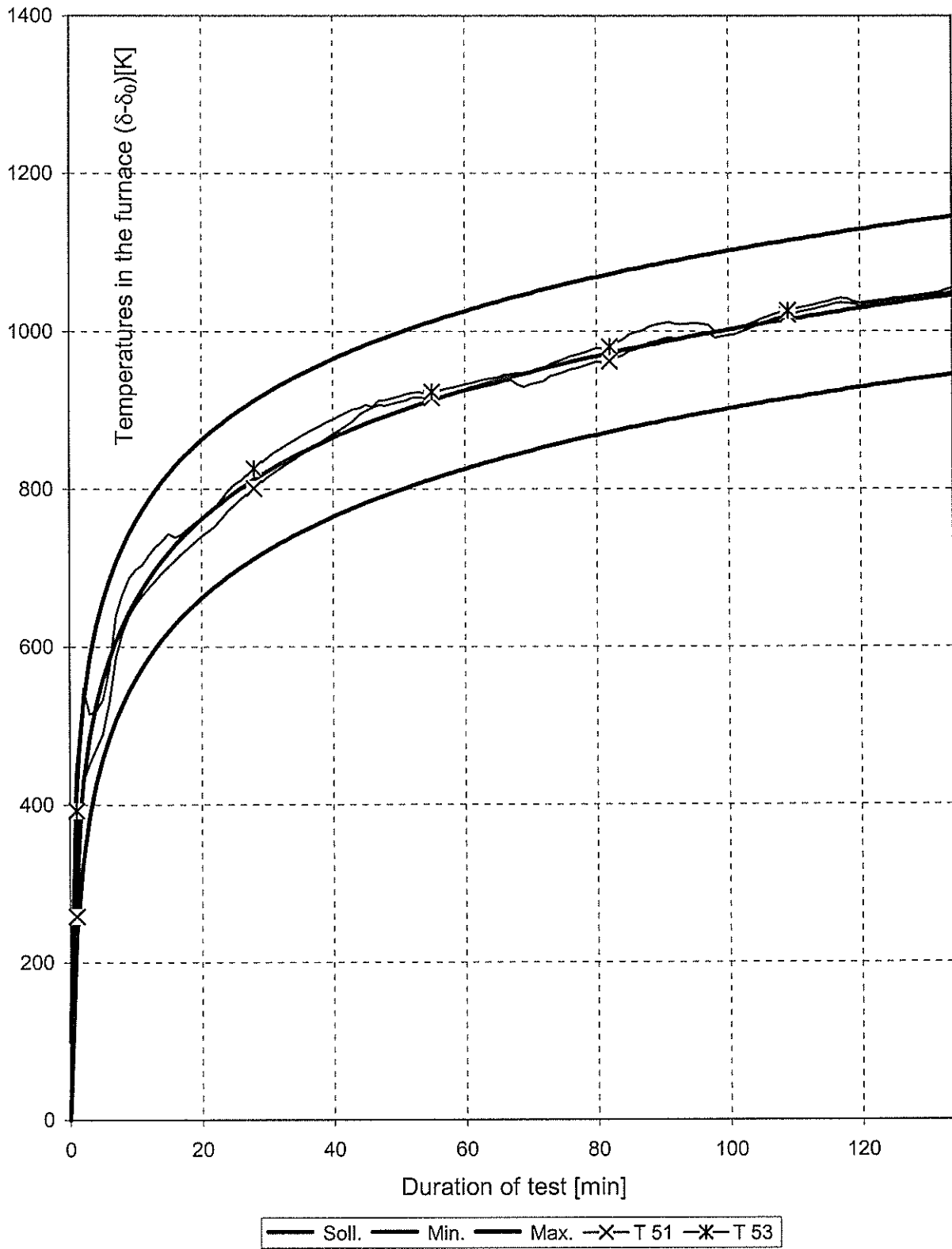
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der Technischen Universität Braunschweig

Annex 4.1 of

Test Report

No.: (3738/803/09)-NB

ETK DIN EN 1363-1



$\delta_0 = 18 \text{ }^\circ\text{C}$

test date: 24.01.07

Temperatures in the furnace
test 4

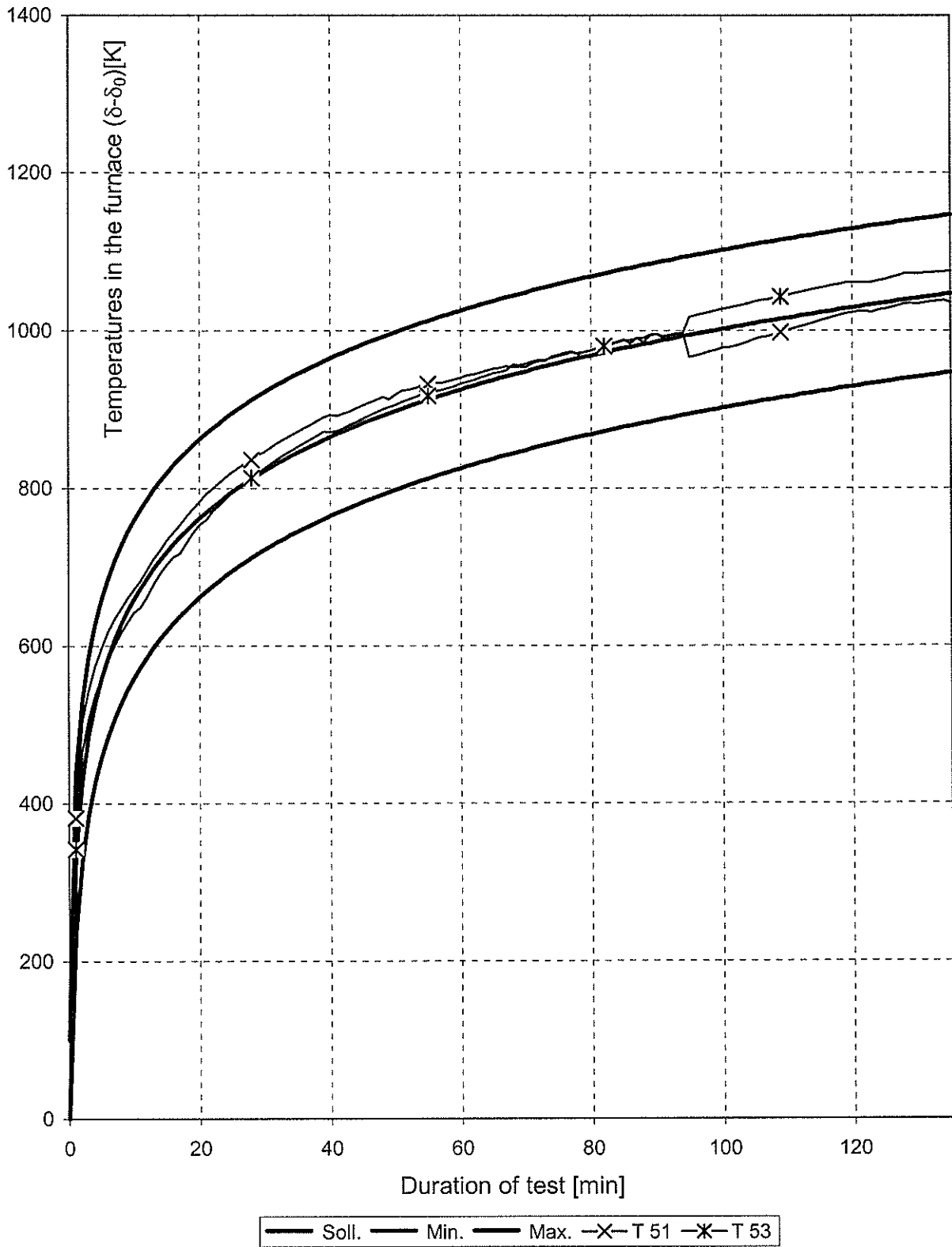
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Annex 5.1 of

Test Report

No.: (3738/803/09)-NB

ETK DIN EN 1363-1



$\delta_0 = 19 \text{ }^\circ\text{C}$

test date: 20.02.07

Temperatures in the furnace
test 5

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der Technischen Universität Braunschweig

Annex 6.1 of

Test Report

No.: (3738/803/09)-NB

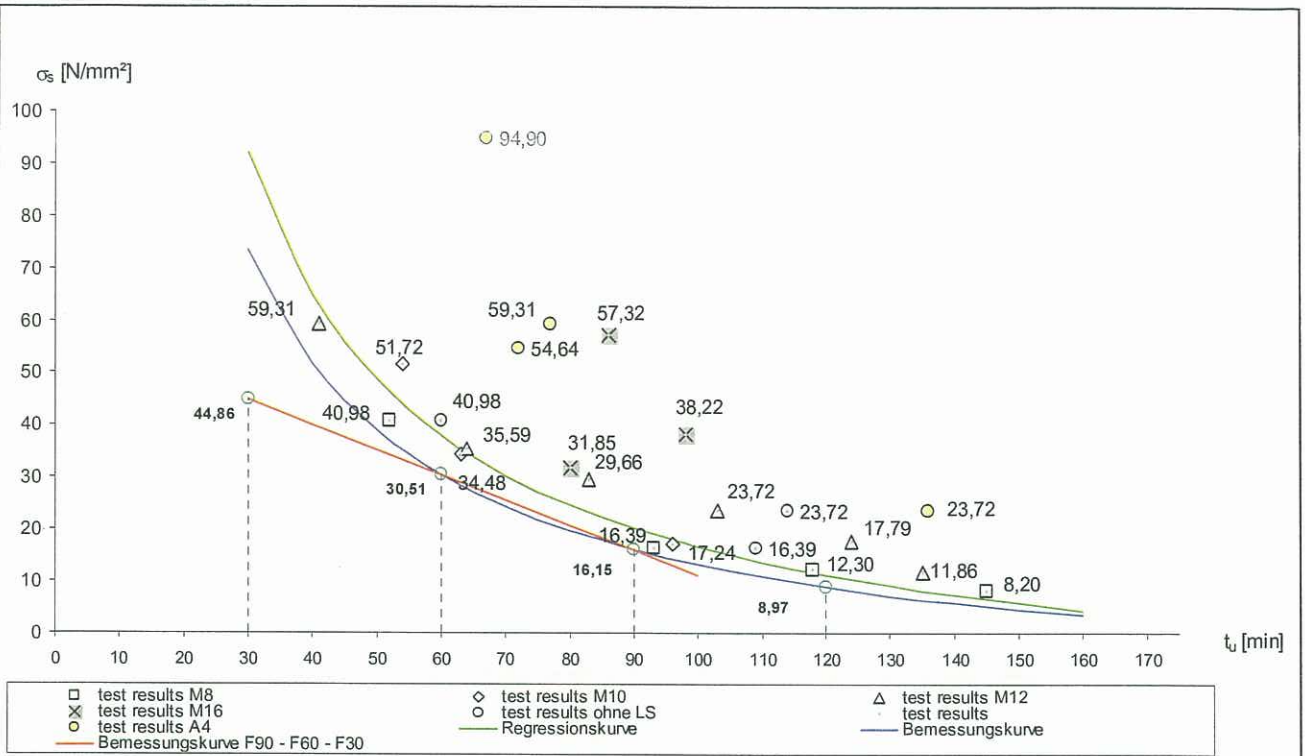


Fig. 1: Evaluation M8 to M10

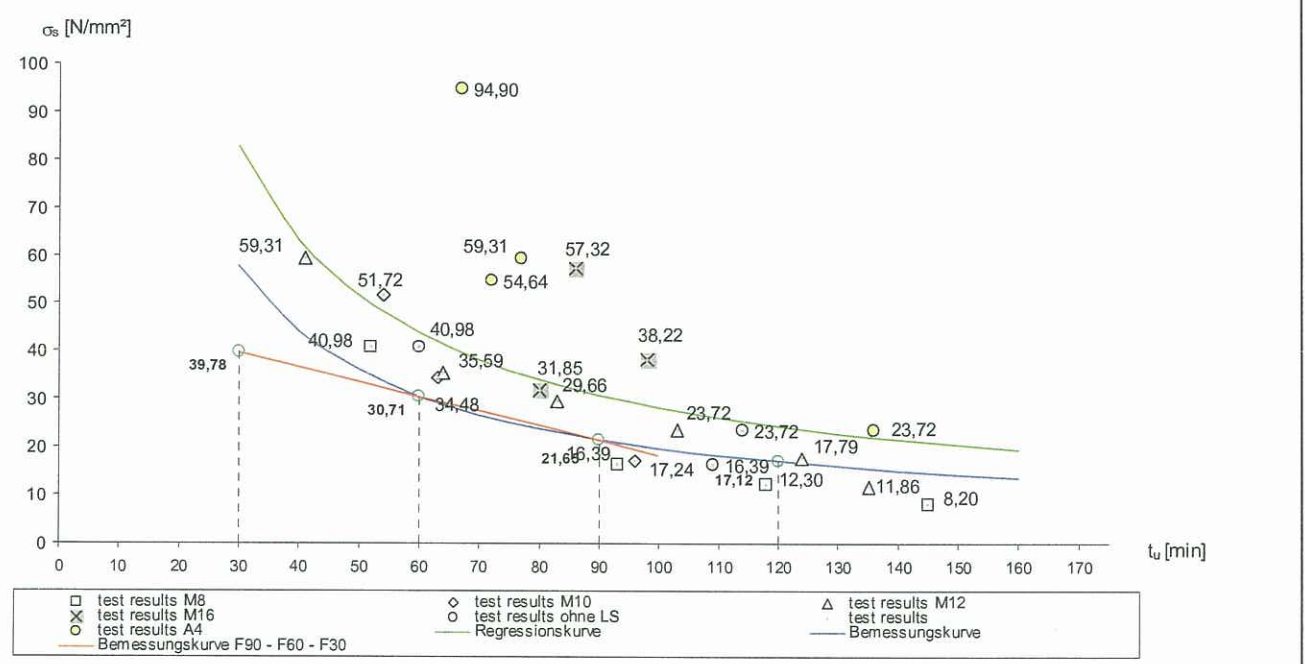


Fig. 2: Evaluation M12 to M30

<p align="center">Evaluation of test results “G&B Fissaggi Injection System GEBOFIX PRO VE-SF for concrete”</p>	<p align="center">Annex 7.1 of Test Report No.: (3738/803/09)-NB dd. 30/04/2009</p>
<p align="center">Materialprüfanstalt für das Bauwesen Institut für Baustoffe, Massivbau und Brandschutz der Technischen Universität Braunschweig</p>	