



**TEST REPORT  
EN 12467**

**Fibre-cement flat sheets - Product specification and test methods**

Report Reference No.....: 130624001GZU-001  
Tested by (name and signature) .....: Jacky Yao *Jacky Yao*  
Approved by (name and signature) ...: Jeff Deng *Jeff Deng*  
Date of issue.....: January 23, 2014  
Contents.....: Total test report 22 pages including:  
Report text: 9 pages.  
Appendix A for copy of test report (Issued by: NB 1023): 7 pages.  
Appendix B for ISO 9001 certificate: 1 page.  
Appendix C for Product photos: 4 pages.  
Appendix D for Revision page: 1 page.

**Testing Laboratory name** .....: Intertek Testing Services Shenzhen Ltd. Guangzhou Branch  
**Address**.....: Block E, No.7-2 Guang Dong Software Science Park, Caipin Road,  
Guangzhou Science City, GETDD, Guangzhou, China  
**Testing location** .....: Same as above and Notified Body No. 1390

**Applicant's name**.....: NINGBO YIHE GREENBOARD CO., LTD.  
**Address**.....: #189, LONGZHEN ROAD, LONGSHAN TOWN, CIXI CITY,  
ZHEJIANG

**Test specification:**  
**Standard**.....: EN 12467:2012  
**Non-standard test method**.....: N/A

**Test Report Form No.**.....: TTRF EN 12467:2012 A  
**TTRF Originator**.....: Intertek Testing Services Shenzhen Ltd. Guangzhou Branch  
**Master TTRF**.....: Dated 2014-01

**Test item description**.....: FIBER CEMENT BOARD  
**Trade Mark**.....: —  
**Model and/or type reference**.....: 8mm, 9mm, 10mm, 12mm, 15mm 16mm, 18mm and 20mm  
**Manufacturer**.....: NINGBO YIHE GREENBOARD CO., LTD.  
**Rating(s)**.....: Reaction to fire Class A1

Copy of marking plate:

Marking on accompanied document

Take model 8mm as a example:


NINGBO YIHE GREENBOARD CO., LTD. #189, LONGZHEN ROAD, LONGSHAN TOWN, CIXI CITY, ZHEJIANG <b>14</b> XXXXX-CPR-2014/1/17
<b>EN 12467:2012</b> FIBER CEMENT BOARD for internal and external walls and ceilings NT Width 1220mm, Thickness 8mm Class 1, Category A Reaction to fire: Class A1 Release of dangerous substances: NPD

Note:

1. If the CE marking is reduced or enlarged the proportions given in the above graduated drawing must be respected.
2. The various components of the CE marking must have substantially the same vertical dimension, which may not be less than 5 mm.
3. CE marking and label shall be affixed visibly, legibly and indelibly.
4. "00001-CPR-2014/1/17" should be the reference number of the Declaration of Performance.

Summary of testing:

The submitted samples were tested and found to comply with applicable requirements of EN 12467:2012.

<b>Test item particulars</b>
Intend use ..... : —
<b>Possible test case verdicts:</b>
- test case does not apply to the test object ..... : N/A
- test object does meet the requirement ..... : P(Pass)
- test object does not meet the requirement ..... : F(Fail)
<b>Testing</b>
Date of receipt of test item ..... : June 24, 2013
Date (s) of performance of tests ..... : June 24, 2013 to January 10, 2014
<b>General remarks:</b>
<p>This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.</p> <p>"(See remark #)" refers to a remark appended to the report.  "(See Appendix #)" refers to an appendix appended to the report.  Throughout this report a comma (point) is used as the decimal separator.</p> <p>When determining the test result, measurement uncertainty has been considered.</p> <p>The clause which indicated with * is the subcontract test item.</p>

<b>General product information:</b>
<p>Submitted samples are Calcium Silicate material, which named FIBER CEMENT BOARD, intended use as construction material. The product includes 8mm, 9mm, 10mm, 12mm, 15mm 16mm, 18mm and 20mm thickness, the client claimed that all the models are the same in formula, product process and material, the only difference is thickness and color. All test results based on 8mm (white color) and 20mm (grey color) thickness.</p> <p>Reaction to fire (Class A1) was conducted by Notified Body Lab No.1390.Centrum stavebního inženýrství a.s. Fire Technical Laboratory.</p> <p>See Appendix C for products' appearance.</p>

EN 12467				
Clause	Requirement - Test	Result - Remark	Verdict	
5.3	Dimensions and tolerances			
5.3.2	Nominal length and width The manufacturer shall specify the nominal length and width of the sheets.....:	1220*2440mm	—	
5.3.3	Thickness The manufacturer shall specify the nominal thickness of the sheets.....:	8mm, 9mm, 10mm, 12mm, 15mm 16mm, 18mm and 20mm	—	
5.3.4	Tolerance on nominal dimensions			
5.3.4.1	Tolerance on length and width Tolerance on length and width shall be in accordance with Table 1, for the appropriate level.		<b>8mm sample</b> Measured: average 1219*2439mm Deviation: -0.1% and -1mm <b>20mm sample</b> Measured: average 1218*2439mm Maximum deviation: -0.2% and -2mm	
	Nominal dimension a	Level I		Level II
	a ≤ 600mm	±3mm		±4mm
	600mm < a ≤ 1000mm	±3mm		±5mm
	1000mm < a ≤ 1600mm	±0,3% a		±0,5% a
	1600mm < a	±5mm		±8mm
a is the nominal width or length				
5.3.4.2	Tolerance on thickness For textured sheets, tolerance shall be in accordance with Table 3.		<b>8mm sample</b> Measured: average 8.04mm Max deviation: -3.1% <b>20mm sample</b> Measured: average 19.76mm Max deviation: -4.20%	
	e ≤ 6mm	±0,6mm		
	6 < e ≤ 20mm	±10% e		
	e > 20mm	±2mm		
5.3.5.1	Straightness of edges The tolerance on the straightness of edges are defined as a percentage of the length of the edge of the relevant dimensions (length or width), and shall be in accordance with Table 4 for the appropriate level.		<b>8mm sample</b> Measured: average 0,06%(length) and 0.08%(width) Maximum: 0.08% and 0.10% <b>20mm sample</b> Measured: average 0,07%(length) and 0.10%(width) Maximum: 0.08% and 0.13% Complied Level I	
	Level I	Level II		
	0,1%	0,3%		

EN 12467							
Clause	Requirement - Test	Result - Remark	Verdict				
5.3.5.2	Squareness of edges The tolerances on squareness of sheets shall be in accordance with Table 5, for the appropriate level. <table border="1" data-bbox="312 510 796 584"> <thead> <tr> <th>Level I</th> <th>Level II</th> </tr> </thead> <tbody> <tr> <td>2mm/m</td> <td>4mm/m</td> </tr> </tbody> </table>	Level I	Level II	2mm/m	4mm/m	<b>8mm sample</b> Measured: average 0,26mm/m Maximum: 0,30mm/m <b>20mm sample</b> Measured: average 0,26mm/m Maximum: 0,40 mm/m Complied Level I	P
Level I	Level II						
2mm/m	4mm/m						
5.4	Physical requirement and characteristics						
5.4.1	General Mechanical and material properties are normally determined on sheets as delivered. The results shall be indentified as applying to coated or uncoated material.....:	—	—				
5.4.2	Apparent density The manufacturer shall specify in his literature the minimum apparent density for each category of sheet. When tested in accordance with the method specified in 7.3.1 the density shall be not less than this value.....:	<b>Claimed:</b> $\geq 1,20 \text{ g/cm}^3$ <b>8mm sample</b> Measured: average $1,52 \text{ g/cm}^3$ From $1,49 \text{ g/cm}^3$ to $1,55 \text{ g/cm}^3$ <b>20mm sample</b> Measured: average $1,33 \text{ g/cm}^3$ From $1,21 \text{ g/cm}^3$ to $1,52 \text{ g/cm}^3$	P				
5.4.3	Moisture movement The manufacturer's literature shall state the percentage value of linear sheet moisture movement measured when the sheet is exposed to a relative humidity change from 30 % to 90 %. The stated value shall be determined in accordance with 7.3.7 using the test method given in Annex C.	Thickness 8mm and 20mm: The percentage value of linear sheet moisture movement: 0.05%	—				

EN 12467			
Clause	Requirement - Test	Result - Remark	Verdict
5.4.4	<p>Mechanical characteristics –Bending strength (<i>MOR</i>) – Modulus of elasticity (<i>MOE</i>)</p> <p>When tested as specified in 7.3.2, the minimum modulus of rupture of the sheets, expressed in megapascals, shall be as specified in Table 6. The MOR shall be the average of the values obtained from testing the sample in both directions.....:</p>	<p><b>8mm sample</b> Wet condition: MOR average 10,5Mpa, minimum 9,8Mpa(along length) MOR average 14,3Mpa, minimum 13,2Mpa (along width) MOE average: 6178Mpa(along length) and 8125Mpa(along width)</p> <p><b>20mm sample</b> Wet condition: MOR average 12,4Mpa, minimum 11,5Mpa(along length) MOR average 16,8Mpa, minimum 15,9Mpa (along width) MOE average: 3260Mpa(along length) and 4051Mpa(along width) Classes 2</p>	P
5.4.5	<p>Water impermeability for Categories A, B and D</p> <p>When tested in accordance with 7.3.3, traces of moisture may appear on the under surface of the sheet, but in no instance shall there be any formation of drops of water.....:</p>	<p>Test samples thickness: 8mm and 20mm No formation of drops of water after being tested</p>	P
5.4.5	Water vapour permeability for Category D	The product is Category A	N/A
5.5	Durability requirements		
5.5.1	<p>Mechanical and material properties are normally determined for sheets as delivered. The results shall be identified as applying to coated or uncoated material. The performance of the coating in the following tests shall not be considered in the assessment of the product.....:</p>	—	—

EN 12467			
Clause	Requirement - Test	Result - Remark	Verdict
5.5.2	Freeze-thaw for categories A, B and D When tested in accordance with 7.4.1, after 100 freeze-thaw cycles for Category A and 25 cycles for Category B and D, the ratio RL as defined in 7.4.1.4 shall be not less than 0,75.....:	<b>8mm sample</b> Wet condition: average 11,9Mpa,minimum 11,0Mpa(along length) average 16,3Mpa,minimum 15,9Mpa (along width) RL=1,10  <b>20mm sample</b> Wet condition: average 12,2Mpa,minimum 11,8Mpa(along length) average 15,9Mpa,minimum 13,4Mpa (along width) RL=0,90	P
5.5.3	Heat-rain for categories A and B When tested in accordance with 7.4.2,after 50 heat-rain cycles for Category A and 25 cycles for Category B, any visible cracks, delamination, warping and bowing or other defects in the sheets shall not be of such a degree as to affect their performance in use. Water tightness is tested according to 5.5.4. Warping and bowing are visually assessed.....:	Test samples thickness: 8mm and 20mm 1) No formation of drops of water; 2) No visible cracks, delamination, warping and bowing or other defects in the sheets.	P
5.5.4	Warm water for categories A, B, C and D When tested in accordance with 7.3.5, after 56 days at 60°C, the ratio RL as defined in 7.3.5.4 shall be not less than 0, 75.....:	<b>8mm sample</b> Wet condition: average 12,1Mpa,minimum 11,2Mpa(along length) average 16,1Mpa,minimum 15,6Mpa (along width) RL=1,09  <b>20mm sample</b> Wet condition: average 11,7Mpa,minimum 10,7Mpa(along length) average 16,4Mpa,minimum 14,7Mpa (along width) RL=0,90	P

EN 12467			
Clause	Requirement - Test	Result - Remark	Verdict
5.5.5	Soak-dry for categories A, B, C and D When tested in accordance with 7.3.6, after 50 soak-dry cycles for category A and 25 cycles for Category B, C and D the ratio RL as defined in 7.3.6.4 shall be not less than 0, 75.....:	<b>8mm sample</b> Wet condition: average 11,7Mpa,minimum 10,5Mpa(along length) average 16,2Mpa,minimum 15,8Mpa (along width) RL=1,07  <b>20mm sample</b> Wet condition: average 12,7Mpa,minimum 11,6Mpa(along length) average 17,8Mpa,minimum 14,9Mpa (along width) RL=0,98	P
5.6	Fire and safety		
5.6.1	Reaction to fire When subject to regulatory requirements, the reaction to fire of the sheets shall be declared in accordance with 7.5.....:	Class A1, refer to copy of the report (Issue by: NB 1390)	P
5.6.2	Release of dangerous substances For products containing substance(s) defined in Council Directive 76/769/EEC, the content shall be declared by the manufacturer. This applies to substances contained in the original formulation or created during the manufacturing process. In addition see Annex ZA.....:	Declared	—
5.7	Product information The manufacturer shall include the following in his literature: a) designation of the sheet: - type of product: NT (see 5.1.1); - name of the sheet, - category - class, - level of tolerances; b) nominal values for: - thickness - length and width c) minimum apparent density d) instructions relevant to the handling and installation.....:	See "Copy of marking plate"	P
6	Evaluation of conformity		



EN 12467			
Clause	Requirement - Test	Result - Remark	Verdict
6.1	<p>General</p> <p>The conformity of products with the requirements of this document shall be demonstrated by:</p> <ul style="list-style-type: none"> <li>— initial type testing; and</li> <li>— factory production control by the manufacturer</li> </ul>		—
6.2	<p>Initial type testing or assessment</p> <p>Type test shall be carried out on sheets as delivered. If several formats, sizes and nominal thicknesses are being produced from the same composition and by the same production method, type tests only need to be carried out on the maximum and minimum thickness. If the ratio of the maximum to minimum thickness is greater than three then an additional intermediate thickness shall be tested.....:</p>	Refer to clause 5.3 to 5.6	—
6.3	<p>Factory product control (FPC)</p> <p>The manufacturer shall establish, document and maintain a FPC system to ensure that the products placed on the market conform with the stated performance characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.</p> <p>A manufacturer, who has established a Quality management system according to EN ISO 9001, is considered to satisfy the above requirement.</p>	Factory operates in accordance with ISO 9001, and is deemed to satisfy the requirement of FPC	P

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## Appendix A

## Copy of Test Report (Issued by: NB 1390)

**Centrum stavebního inženýrství a.s.**

Fire Technical Laboratory

AUTHORIZED  
BODY No. 212NOTIFIED  
BODY No. 1390**CLASSIFICATION OF REACTION TO FIRE IN  
ACCORDANCE WITH  
ČSN EN 13501-1+A1:2010**

**Applicant:** Ningbo Yihe GreenBoard Co., Ltd.  
No. 189, Longzhen Road  
Longshan Town  
Cixi City, Zhejiang  
P.R. China

**Prepared by:** Centrum stavebního inženýrství a.s.  
Pražská 16  
102 00 Praha 10  
Czech Republic

**Product name:** *Fiber Cement Board*

**Classification  
report No.:** PK-14-001

**Issue number:** 1/2

**Date of issue:** 8<sup>th</sup> January 2014

This classification report consists of 4 pages and may only  
be used or reproduced in its entirety.

Address:  
PRAŽSKÁ 16, 102 00 PRAHA 10, Czech Republic, E mail: csias@csias.cz, http://www.csias.cz  
Reg. No. 45274860, VAT No. CZ45274860. The Company is registered in the Commercial Register  
administered by the Municipal Court of Prague (section B, inset 1595).  
Fire Technical Laboratory, E-mail: ptl@csias.cz  
Phone: +420 281 017 111, Fax: +420 281 017 455

**Appendix A (continued)**  
**Copy of Test Report (Issued by: NB 1390)**

REACTION TO FIRE CLASSIFICATION REPORT No. PK-14-001

Page 2

## 1. DETAILS OF CLASSIFIED PRODUCT

### Nature and end use application:

Classification of the product *Fiber Cement Board* is valid for the following end use application:

Construction board.

### Description:

The product *Fiber Cement Board* is fully described in the test reports in support of the classification listed in clause 2.

## 2. TEST REPORTS AND TEST RESULTS IN SUPPORT OF THIS CLASSIFICATION

### Test reports

Name of laboratory	Name of sponsor	Test report ref. no.	Test method
CSI a.s. Fire Technical Laboratory	Intertek Testing Services (GZ) Ltd.	16957-1/2	ČSN EN ISO 1716
		16957-2/2	ČSN EN ISO 1182

### Measured values and test results

Test method	Parameter	Number of test	Results	
			Continuous parameter mean (m)	Compliance parameters
ČSN EN ISO 1716	PCS (MJ/kg)	3	0,94	≤ 2 (A1)
ČSN EN ISO 1182	$\Delta T$ (°C)	5	8,4	≤ 30 (A1)
	$\Delta m$ (%)	5	11,0	≤ 50 (A1)
	$t_f$ (s)	5	0	= 0 (A1)

**Appendix A (continued)**  
**Copy of Test Report (Issued by: NB 1390)**

REACTION TO FIRE CLASSIFICATION REPORT No. PK-14-001

Page 3

### 3. CLASSIFICATION AND DIRECT FIELD OF APPLICATION

#### Reference and direct field of application

This classification has been carried out in accordance with the clauses 11.8.1 of ČSN EN 13501-1+A1:2010.

#### Classification

The product *Fiber Cement Board* in relation to its reaction to fire behaviour is classified:

**A1**

The additional classification in relation to smoke production is:

**not classified**

The additional classification in relation to flaming droplets/particles is:

**not classified**

The format of the reaction to fire classification for *Fiber Cement Board* is:

Fire behaviour		Smoke production			Flaming droplets	
A1	-	s	not classified	,	d	not classified

**Reaction to fire classification: A1**

#### Field of application

This classification is valid for the following product parameters:

- density  $\geq 1600 \text{ kg/m}^3$
- thickness: without limitation

**Appendix A (continued)**  
**Copy of Test Report (Issued by: NB 1390)**

REACTION TO FIRE CLASSIFICATION REPORT No. PK-14-001

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#### 4. LIMITATIONS

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##### Restrictions

This classification report is valid until 8<sup>th</sup> January 2019, provided that the technical specifications of the product will not be changed.

##### Warning

This document does not represent type approval or certification of the product.

Prepared:



.....  
Jiří Socha



Reviewed:



.....  
Vít Slaboch  
head of laboratory


**Appendix A (continued)**  
**Copy of Test Report (Issued by: NB 1390)**

Centrum stavebního inženýrství a.s., Fire technical laboratory, Pražská 16, 102 00 Praha 10  
 phone +420281017111, fax +420281017455, mail ptl@csias.cz, www.csias.cz/ptl



Accredited Testing Laboratory No. 1007.7  
**TEST REPORT** No. 16957-1/2  
 on Fire and Technical Characteristics



Our ref.: PTL - 283/13		Number of pages: 1			
<b>Sponsor:</b> Intertek Testing Services (GZ) Ltd., Building T52-8, No. 1201 Gui Qiao Road, Jinqiao Development Area, Pudong District, Shanghai, China 201206					
<b>THE TEST ITEM</b>					
<b>Product Name:</b> Fiber Cement Board					
<b>Standard:</b> Undeclared		<b>Manufacturer:</b> Ningbo Yihe GreenBoard Co., Ltd., China No. 189, Longzhen Road, Longshan Town, Cixi City, Zhejiang, P.R. China			
<b>Composition:</b> Cement, quartz sand, fiber					
<b>Appearance:</b> Gray fibre-cement board, total density ca 1600 kg/m <sup>3</sup>					
<b>Date of receipt of the sample:</b> 2013-11-28			<b>Sampling:</b> The samples were delivered by the sponsor		
<b>Date of realization of tests:</b> 2013-12-13					
<b>TEST METHOD for determination of:</b> - gross heat of combustion (PCS): ČSN EN ISO 1716					
<b>Conditioning:</b> according to the ČSN EN 13 238					
<b>Water equivalent of the calorimeter:</b> 9747,5 J/K					
<b>MEASURED VALUES AND TEST RESULTS</b>					
Measured values	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	Results	Expanded uncertainty
PCS [ MJ/kg ]	0,962	0,906	0,947	0,94	0,07
<b>Conclusion:</b>					
The mentioned expanded uncertainty is obtained by multiplying the standard uncertainty by a coverage factor k=2, which corresponded to a level of confidence of 95 %.					
The test results relate to the behaviour of the test specimen of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product of use. The results of tests are concerned only with the subject of testing. The protocol shall not be reproduced except in full without the written approval of the testing laboratory.					
Responsible person: Vít Slaboch					
Date: 2014-01-08 					



**Appendix A (continued)**  
**Copy of Test Report (Issued by: NB 1390)**

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tel. +420281017111, fax +420281017455, e-mail ptl@csias.cz, www.csias.cz/ptl



Accredited Testing Laboratory No. 1007.7

**TEST REPORT** No. 16957 – 2/2  
on Fire and Technical Characteristics



Our ref.: PTL – 283/13		Number of pages: I + appendix					
<b>Sponsor:</b> Intertek Testing Services (GZ) Ltd., Building T52-8, No. 1201 Gui Qiao Road, Jinqiao Development Area, Pudong District, Shanghai, China 201206							
<b>THE TEST ITEM</b>							
<b>Product name:</b> Fiber Cement Board							
<b>Standard:</b> Undeclared		<b>Manufacturer:</b> Ningbo Yihe GreenBoard Co., Ltd. No. 189, Longzhen Road, Longshan Town, Cixi City, Zhejiang, P.R. China					
<b>Composition:</b> Cement, Quartz Sand, Fiber							
<b>Appearance:</b> Gray fiber-cement board, total density ca 1600 kg/m <sup>3</sup>							
<b>Date of receipt of the sample:</b> 2013-11-28			<b>Sampling:</b> The samples were delivered by sponsor				
<b>Date of realization of tests:</b> 2014-01-03							
<b>TEST METHOD:</b> ČSN EN ISO 1182							
<b>Calibration of the furnace:</b> See appendix							
<b>Conditioning:</b> 20 – 24 hours prior the test at the temperature 60 °C							
<b>MEASURED VALUES AND TEST RESULTS</b>							
<b>Test specimen no.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Ø</b>	<b>Expanded uncertainty</b>
<b>Date of test</b>	01-03	01-03	01-03	01-03	01-03		
<b>ΔT [°C]</b>	8	12	7	6	9	8,4	6,8
<b>ΔT<sub>surface</sub> [°C]</b>	(-)	(-)	(-)	(-)	(-)	(-)	(-)
<b>ΔT<sub>centre</sub> [°C]</b>	(-)	(-)	(-)	(-)	(-)	(-)	(-)
<b>t<sub>f</sub> [s]</b>	0	0	0	0	0	0,0	(-)
<b>Δm [%]</b>	10,7	11,5	10,4	10,1	12,5	11,0	2,7
<b>Behaviour during the tests:</b> The test specimens did not burn.							

**Conclusion:** The product "Fiber Cement Board" gives the average furnace thermocouple temperature rise 8,4 °C, the average mass loss 11,0 % and the mean duration of sustained flaming 0 s. The mentioned expanded uncertainty is obtained by multiplying the standard uncertainty by a coverage factor k=2, which corresponded to a level of confidence of 95 %.

The test results relate to the behaviour of the test specimen of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product of use. The results of tests are concerned only with the subject of testing. The protocol shall not be reproduced except in full without the written approval of the testing laboratory.

**Responsible person:** Vít Slaboch

**Date:** 2014-01-08

*Vít Slaboch*

Annotation: (-) = data was not determined/measured



**Appendix A (continued)**  
**Copy of Test Report (Issued by: NB 1390)**

Appendix of the test report no. 16957-2/2

**Date of calibration: 2013-09-23**

**Furnace wall temperature [°C]:**

Vertical axis	Level		
	a 30 mm	b 0 mm	c -30 mm
1	785	809	773
2	788	802	768
3	785	800	767

T avg = 786,4 °C

T avg.axis1 = 789,0 °C

T avg.axis2 = 786,1 °C

T avg.axis3 = 784,0 °C

T dev.axis1 = 0,334878 %

T dev.axis2 = 0,033921 %

T dev.axis3 = 0,300957 %

**T avg.dev.axis = 0,223252 %**

T avg.level a = 786,1 °C

T avg.level b = 803,7 °C

T avg.level c = 769,3 °C

T dev.level a = 0,033921 %

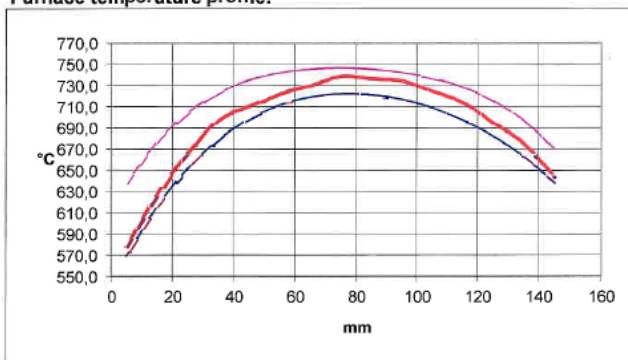
T dev.level b = 2,199997 %

T dev.level c = 2,166076 %

**T avg.dev.level = 1,466664 %**

Furnace height [mm]	T min [°C]	T max [°C]	T down [°C]	T up [°C]	T avg [°C]
145	639,4	671,0	639,9	649,9	644,9
135	663,5	697,5	681,2	670,6	675,9
125	682,8	716,1	692,6	699,0	695,8
115	697,9	728,9	710,5	718,6	714,6
105	709,3	737,4	734,9	714,9	724,9
95	717,3	742,8	734,1	735,3	734,7
85	721,8	745,9	733,2	740,2	736,7
75	722,7	747,0	735,2	742,6	738,9
65	719,6	746,0	727,6	732,9	730,2
55	711,9	742,5	719,1	726,7	722,9
45	698,8	735,5	708,6	712,6	710,6
35	679,3	723,5	680,6	716,2	698,4
25	652,2	705,0	658,3	674,4	666,3
15	616,2	677,5	630,4	625,1	627,8
5	569,5	638,6	579,2	577,6	578,4

**Furnace temperature profile:**



\*\*\*\*\*End of page\*\*\*\*\*



Appendix B

ISO 9001 certificate



\*\*\*\*\*End of page\*\*\*\*\*

Appendix C

**Products photos**



C.1 Model 8mm



C.2 Model 20mm

\*\*\*\*\*End of page\*\*\*\*\*

**Appendix C (continued)**

**Products photos**



C.3 Model 9mm



C.4 Model 10mm

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**Appendix C (continued)**

**Products photos**



C.5 Model 12mm



C.6 Model 15mm

\*\*\*\*\*End of page\*\*\*\*\*

**Appendix C (continued)**

**Products photos**



C.7 Model 16mm



C.8 Model 18mm

\*\*\*\*\*End of page\*\*\*\*\*

Appendix D

Revision page

Revision No.	Date	Changes	Author	Reviewer
0	January 23, 2013	First issue	Jacky Yau	Jett Deng

\*\*\*\*\*End of report\*\*\*\*\*