TECHNICAL DEVELOPMENT CENTRE

Test Report

20161122-TA -504-CO- WTR – Colombia test Campaign

TSRR 3443 : Resistance to fire of a single layer partition – D121,8/90 – Standard 5/8”

Written by	Validated by
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Revision History	
Date:	Description of modifications:

DIFFUSION LIST	
Internal (Siniat): addressee’s name and addressee’s Division or Local Company	
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Summary of the report

This report relates to the fire resistance of a single layer partition in accordance with the requirements of standard ASTM E119.

However due to technical limitation, the thermal program applied during the test is those defined in EN 1363-1 instead of those defined in ASTM E119.

The measured performance has been corrected according to ASTM E119 §8 note 5 in order to correct the slight differences between the two thermal program.

The test sponsor was Gyplac.

The tested partition was built as described below :

- 1 layer of 15,9 mm Standard boards produced by Gyplac in Colombia
- 90 mm metal studs @610 / 88.9 mm glass wool layer
- 1 layer of 15,9 mm Standard boards produced by Gyplac in Colombia

The characteristics of the boards were the following :

- Dry weight : 10,88 ± 0.16 kg/m^2
- Glass wool insulation : 10,83 kg/m^3

The target classification of the partition tested was 30 minutes.

Due to a temperature above 209°C measured with the mobile thermocouple the insulation has been lost at 55 minutes and at 62 minutes with the TC16.

According to ASTM E119, the tested partition full fill the requirements to reach a 45 minutes resistance period.

TABLE OF CONTENTS

1. INTRODUCTION

This report relates to the fire resistance of a single layer partition in accordance with the requirements of standard ASTM E119.

The test sponsor was Gyplac.

The test took place on 28th of July 2016 at TDC.

2. MATERIALS & SYSTEMS TESTED

2.1.GENERALITIES

The test specimen was installed by TDC Products & Systems Technical Officers. The construction of the specimen took place between the 22th and 26th July 2016. The TDC Fire Expert and Gyplac Technical Manager, designed the partition system and selected the materials that comprised the test system.

2.2.COMPONENT LIST

Designation	***Description***	***Characteristics***	***Origin***
Plasterboards	Gyplac SA Placa ST 1.22x15.9mm 11/11/2015 16:16:07	2440x1220x15,9mm 10,88 ± 0,1 kg/m2	Gyplac
Head and base tracks	Colmena LTDA PA 3526 3.05m 09 sep 10 NTC 5680	92,1 x 31,75 x 0,46 mm	Gyplac
Studs	Paral collmena PI01808803103050G NTC 5680 21 may 2014	88,9 x 31,8 x 0,46 mm	Gyplac
Dowels	PR06 6x30	Ø 6 x 30 mm	/
Screws	TF212 x 35 RT 421x13	Ø 3,9 x 35 mm	Siniat France
Boards joints and Finishing	Gyplac compound		Gyplac
Joints tape	Micro perforated paper tape	52,5 mm wide	Siniat France
Glasswool	Lana gyplac R8	e=88,9mm mv=10,83kg/m3	Gyplac

2.3.DESCRIPTION OF THE TEST SPECIMEN

The specimen was constructed in a refractory concrete lined steel restraint frame having an opening of 3000mm high x 3000mm wide.

The head and base tracks were fixed to the restraint frame with studs fitted between at 610 mm centers one from the others. The left and right edges were fixed to the concrete frame.

Tracks and studs on fixed edges were fixed on the supporting refractory concrete frame by means of Ø 6 x 30 mm plastic plugs and Ø 3,5 mm x 35 mm screws at 500 mm center spacing.

Studs were screwed with the tracks by means the screws RT 421x13.

The partition was installed with 4 fixed edges.

The facing was made with a single layer of 15,9 mm Standard boards installed vertically.

The vertical joints were 610 mm staggered between the exposed and non exposed face. The boards were screwed at nominally 200 mm and 300mm for respectively the perimeter and the center of the board.

The horizontal joints were staggered and located respectively at 600 mm and 2440mm for the exposed and non exposed face.

Compound and jointing tape were used for horizontally and vertically joints of both sides and for screw heads too.

3. TEST CONDITIONS

3.1. THERMAL PROGRAM

The furnace temperature rise above ambient was conducted according to the conventional thermal program represented by the following function:

$$T = 345 \log_{10}(8t+1) + 20$$

Where: t = time [min]
T = temperature of the furnace at time t

This thermal program is close from those defined in the ASTM E 119 standard.

3.2.AMBIENT PRESSURE

Ambient pressure within the furnace was controlled and set at + 20 ± 3 Pa.

Recording pressure data is shown in Graphic 9.

4. TEST MEASUREMENTS

The location of the thermocouples installed appears in Appendix .

The measurement results are shown in the Appendix on the boards listed below.

4.1.TEMPERATURE MEASUREMENTS

4.1.1. Ambient temperature in the test hall

The initial ambient temperature in the test hall was taken as the average of TC15 to 20 before the start of the test, so **29°C**.

4.1.2. Temperatures in the furnace

Temperatures were measured by 6 thermocouples conform to EN1364-1, installed at 152 mm forward the exposed face of the partition.

Location	*Identification*	*Graphic*
At 152 mm forward the exposed face	PT1 to PT6	1

4.1.3. Temperature on the non exposed face of the specimen

They were measured by thermocouples complying with the requirements of ASTM norm

Location	*Identification*	*Graphic*
Temperatures in the quarters and the intersection of the diagonals of the partition	TC15-16-17-18-19	2
Temperatures of the boards on the non exposed face	TC20-21-22-23-24-25	3

4.1.4. Non mandatory measurements

Sixteen additional thermocouples has been implemented in order to better understand the heat transfer through the partition

4.1.4.1. Temperatures on the framework

Location	*Identification*	*Graphic*
Temperatures on the second stud	TC34-35-36	4
Temperatures on the third stud	TC37-38-39	5

4.1.4.2. Temperatures in the cavity

Location	*Identification*	*Graphic*
On the non exposed face of the first layer of the exposed boards	TC41-42-43-44-45	6
On the exposed face of the first layer of the non exposed boards	TC28-29-30-31-32	7

4.2.PRESSURE MEASUREMENTS

Location	*Identification*	*Graphic*
Ambiant pressure inside the furnace	-	8

5. CALCULATED RESULTS

5.1.INSULATION CRITERIA

According ASTM E 119, the insulation performance of a system is the time (full minutes) , while the separation function is kept until the surface temperature:

a) does not exceed , on average, the initial average temperature of more than 139 K; or

b) does not exceed , on the measurement points, the initial temperature of more than 181 K

The initial average temperature should be the average temperature of the unexposed side before the start of the test.

Location	*Identification*	*Graphic*
Temperature increase	TC15-16-17-18-19-20-21-22-23-24-25	9

5.2.THERMAL TRANSFER THROUGH THE PARTITION

The curves of the average temperature of all the instrumented surfaces have been gathered in a same graphic in order to better see the protecting effect of each layer.

Location	*Identification*	*Graphic*
Protecting effect of the exposed boards	TC1 to TC6 TC41-42-43-44-45	10
Protecting effect of the non exposed boards	TC28-29-30-31-32 TC15-16-17-18-19-20-21-22-23-24-25	

6. OBSERVATIONS

Time (min)	*Face*	*Comments*
00		Test starts
08	Exposed	The joint tape starts to char
11’47	Exposed	Vertical crack is visible on the board E01
12’55	Exposed	Vertical crack is visible on the board E03
17’	Exposed	Limited shrinkage is visible at the joints
18’	Exposed	The cracks opens
22’45	Exposed	The glass wool ignites behind the boards and flames are visible through the cracks
32’	Exposed	All the cracks are opened (vertical and horizontal)
47’	Exposed	A piece of the board E01 fall
55’	**Unexposed**	**TC mobile > 209°C**
62’	Unexposed	TC16 > 209°C
64’	Unexposed	Increase of temperature >140°C
65’		End of the test

7. PERFORMANCE CRITERIA

7.1. FIRE INTEGRITY

Cotton pad

Duration	:	**65minutes**
Failure origin	:	No failure at the end of test

Persistent flame

Duration	:	**65 minutes**
Failure origin	:	No failure at the end of test

7.2. THERMAL INSULATION

Duration	:	**55 minutes**
Failure origin	:	**Temperature measured above 209°C on mobile TC**

8. RESISTANCE TO FIRE PERFORMANCE

8.1. CORRECTED PERFORMANCE CRITERIA

Cotton pad

Duration	:	**65 minutes**
Failure origin	:	No failure at the end of test

Persistent flame

Duration	:	**65 minutes**
Failure origin	:	No failure at the end of test

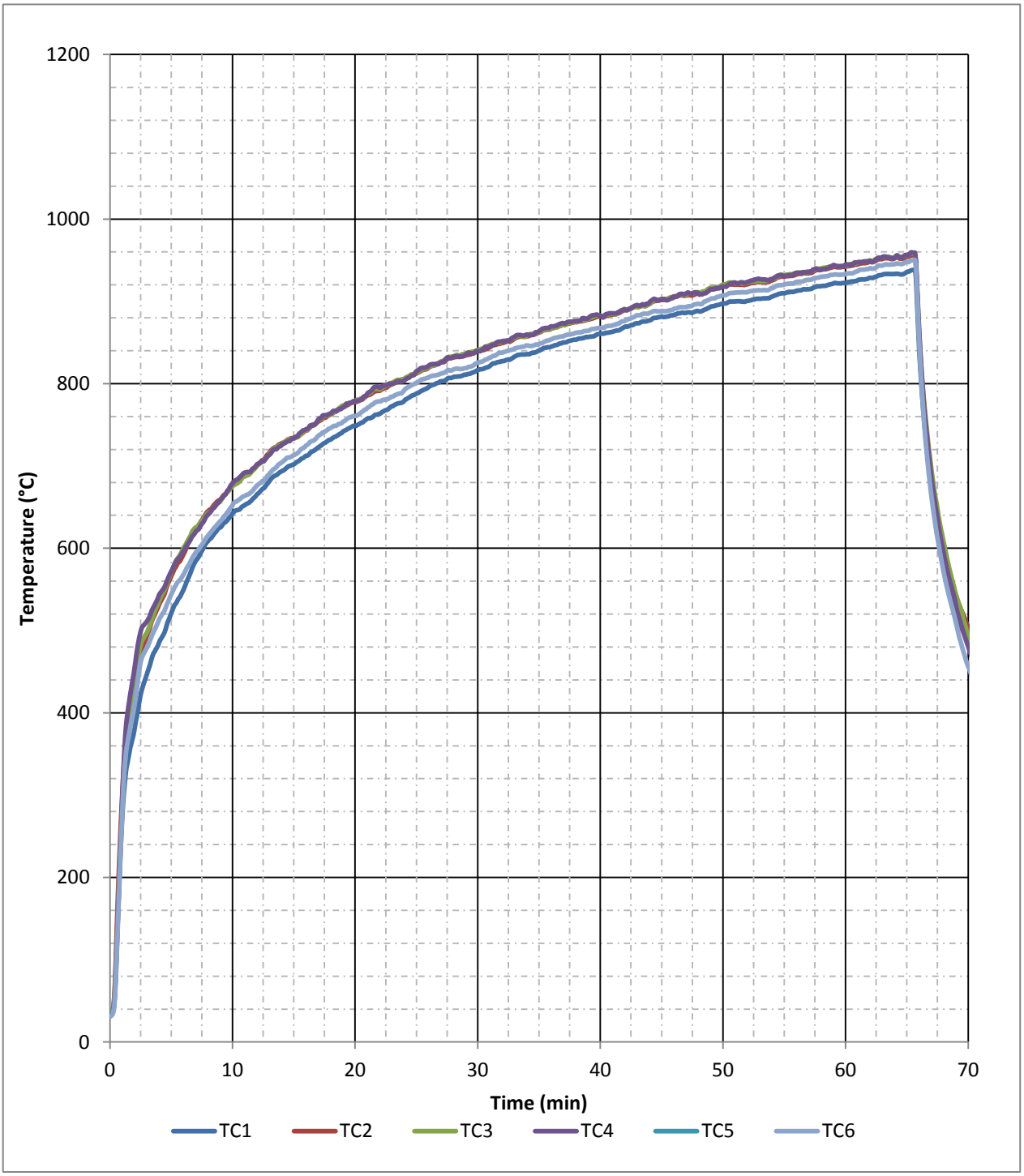
8.2. THERMAL INSULATION

Duration	:	**56 minutes**
Failure origin	:	**Temperature measured above 209°C on mobile TC**

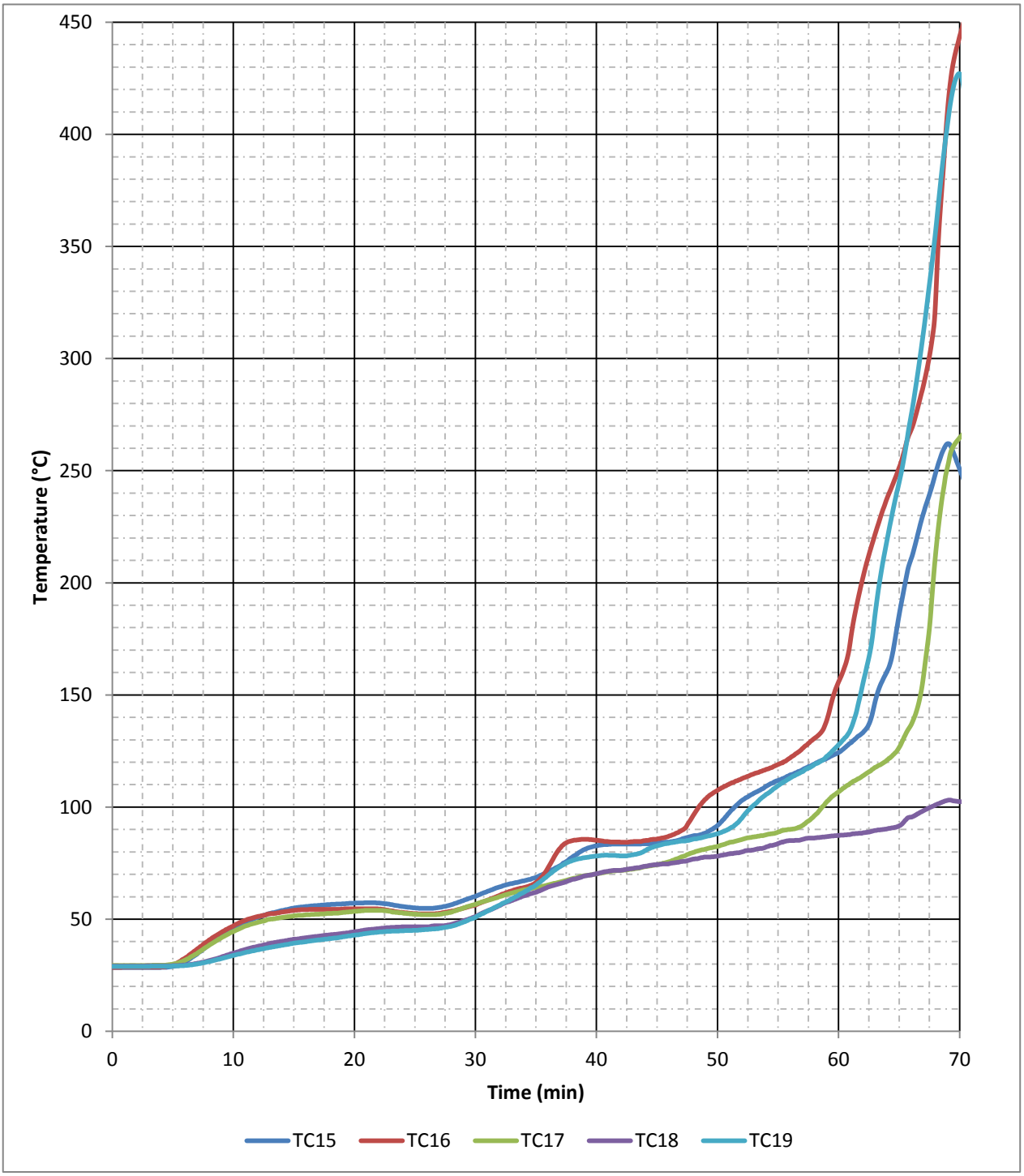
8.3. CONCLUSION

According to ASTM E119, the tested partition full fill the requirements to reach a 45 minutes resistance period.

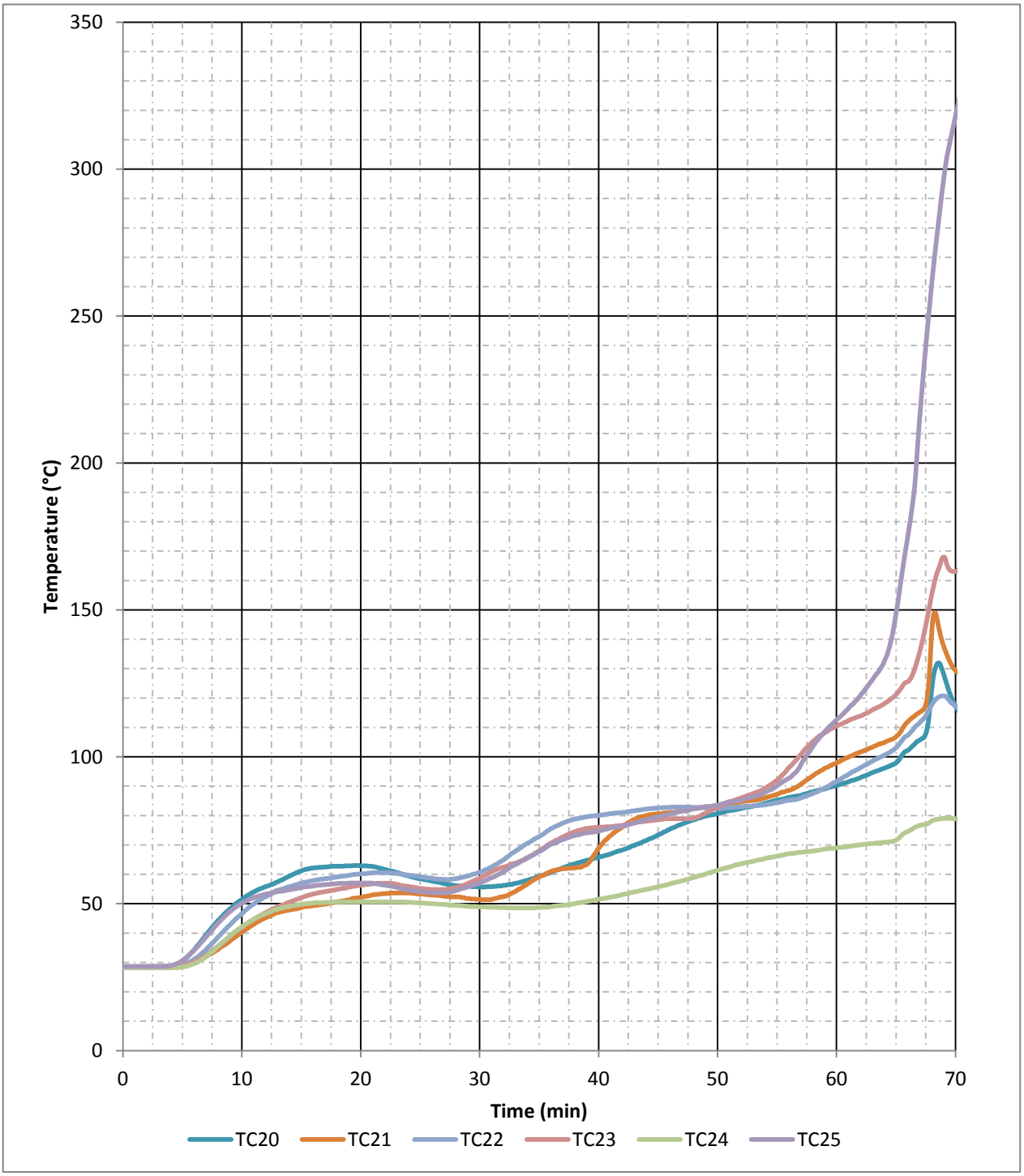
ANNEX 1-GRAPHICS



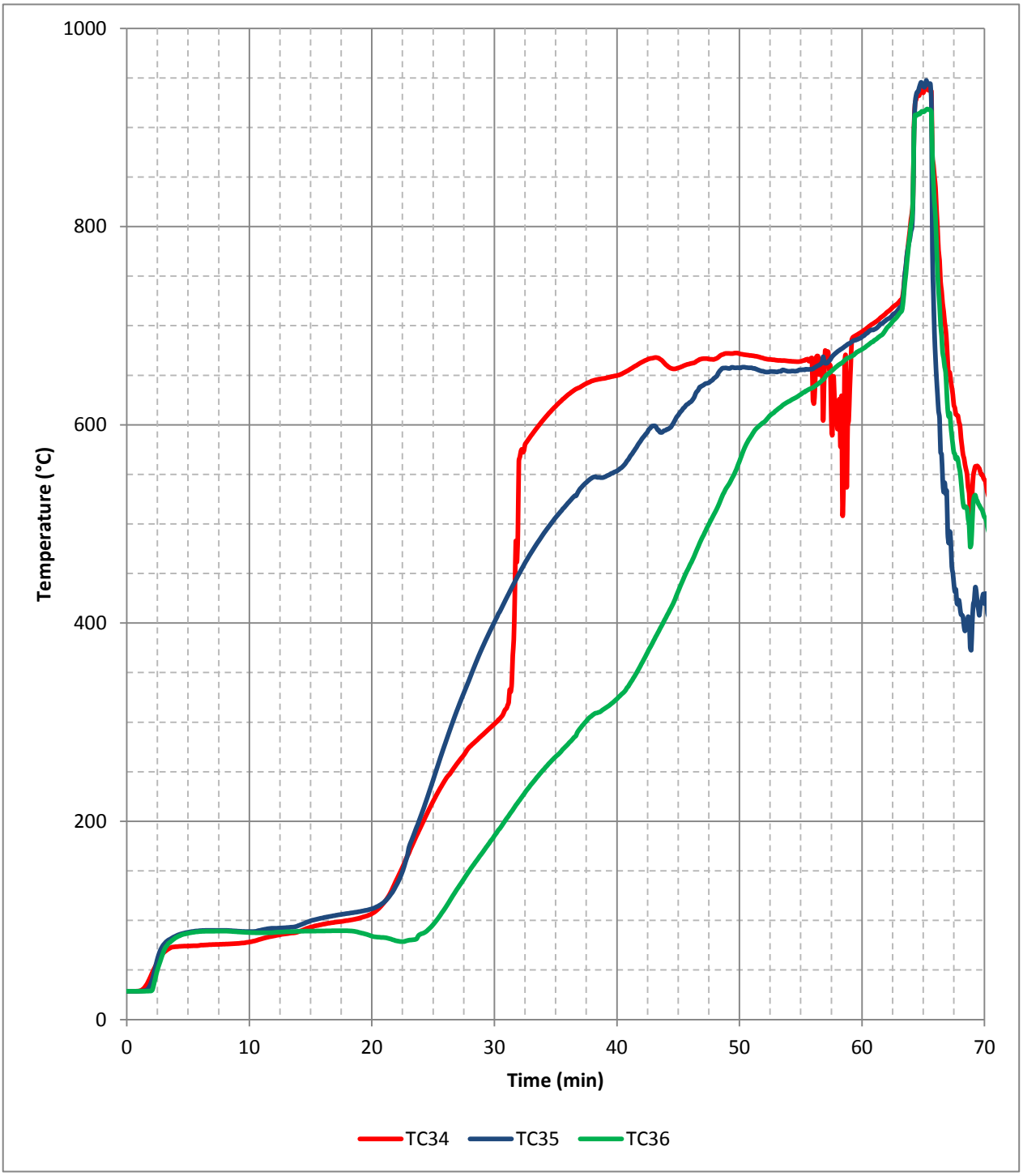
siniat Shaping the way people build	**Temperatures in the furnace**	TSRR	**3443**
		Graphic	**1**



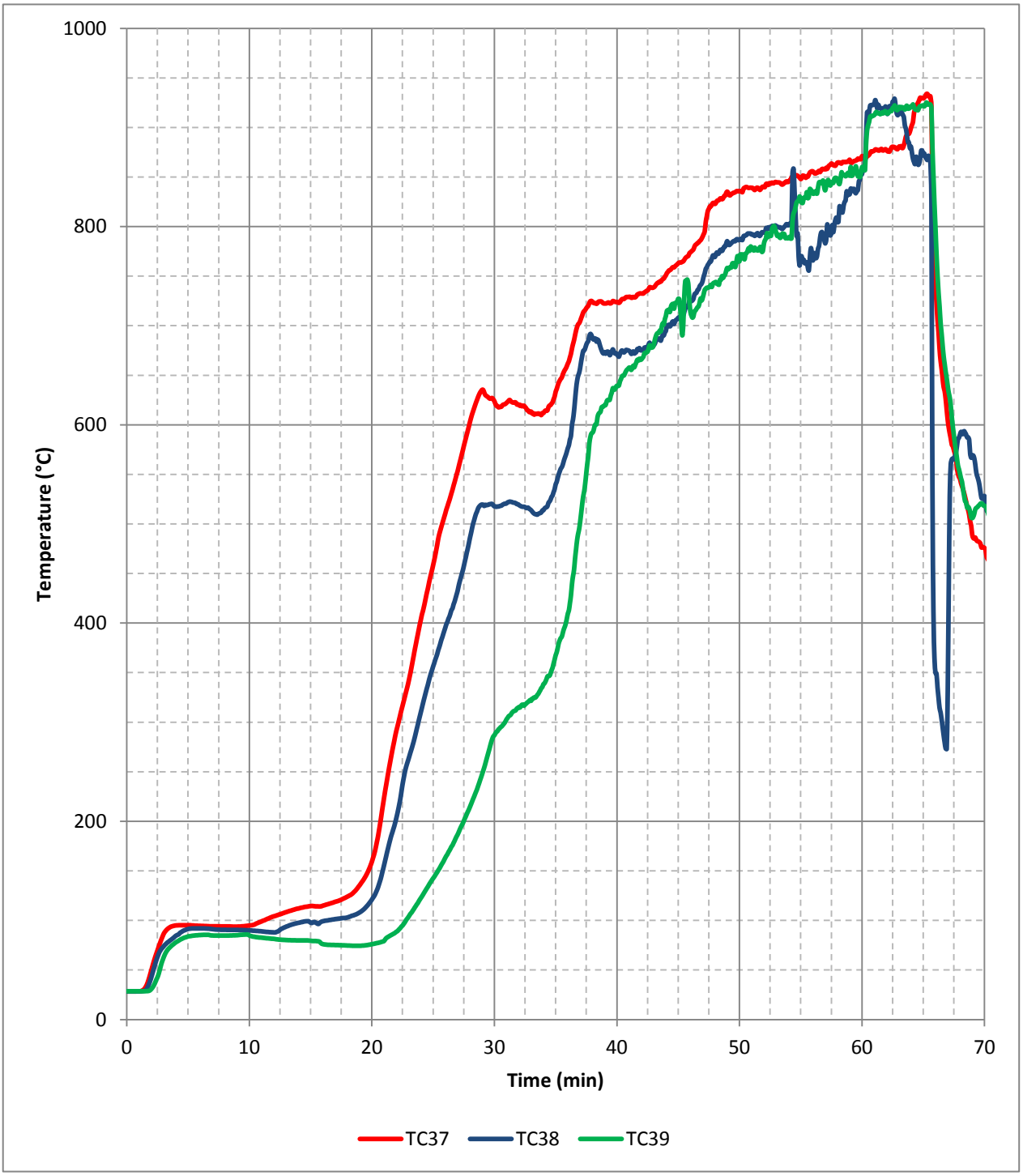
siniat Shaping the way people build	**Temperatures in the quarters and the intersection of the diagonals of the partition**	TSRR	**3443**
		Graphic	**2**



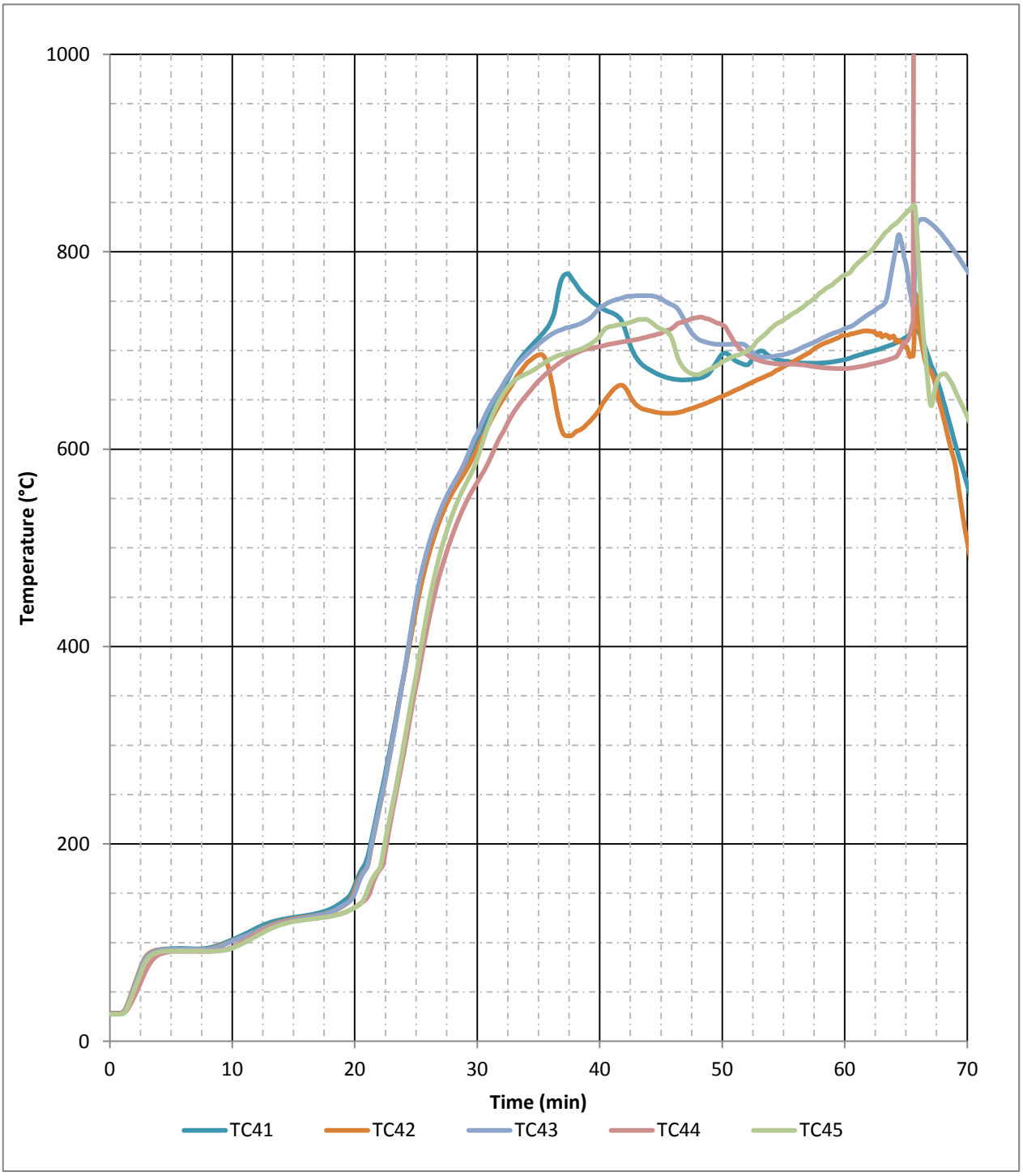
siniat Shaping the way people build	**Temperatures of the boards on the non exposed face**	TSRR	**3443**
		Graphic	**3**



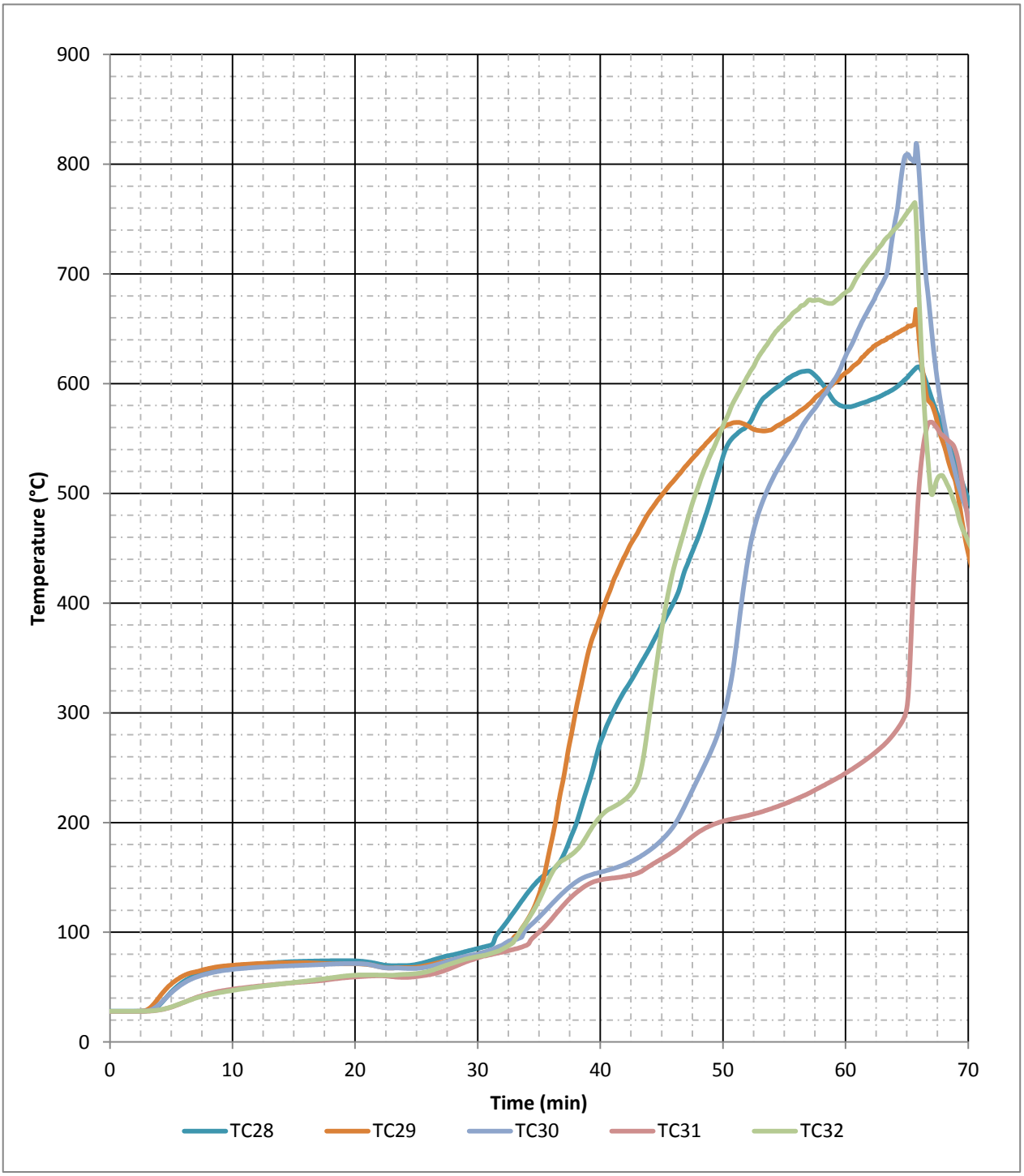
siniat Shaping the way people build	**Temperatures on the second stud**	TSRR	**3443**
		Graphic	**4**



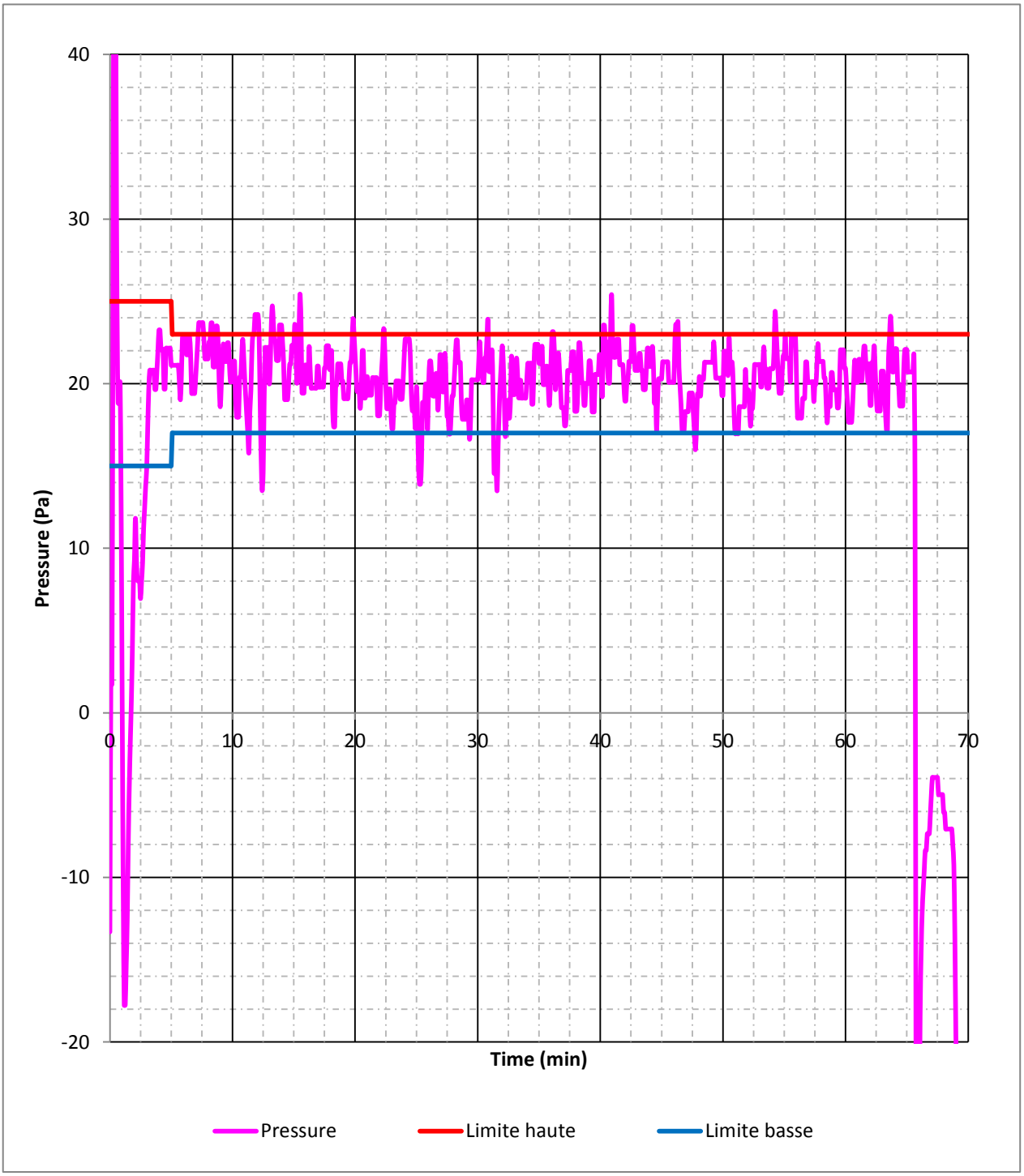
siniat Shaping the way people build	**Temperatures on the third stud**	TSRR	**3443**
		Graphic	**5**



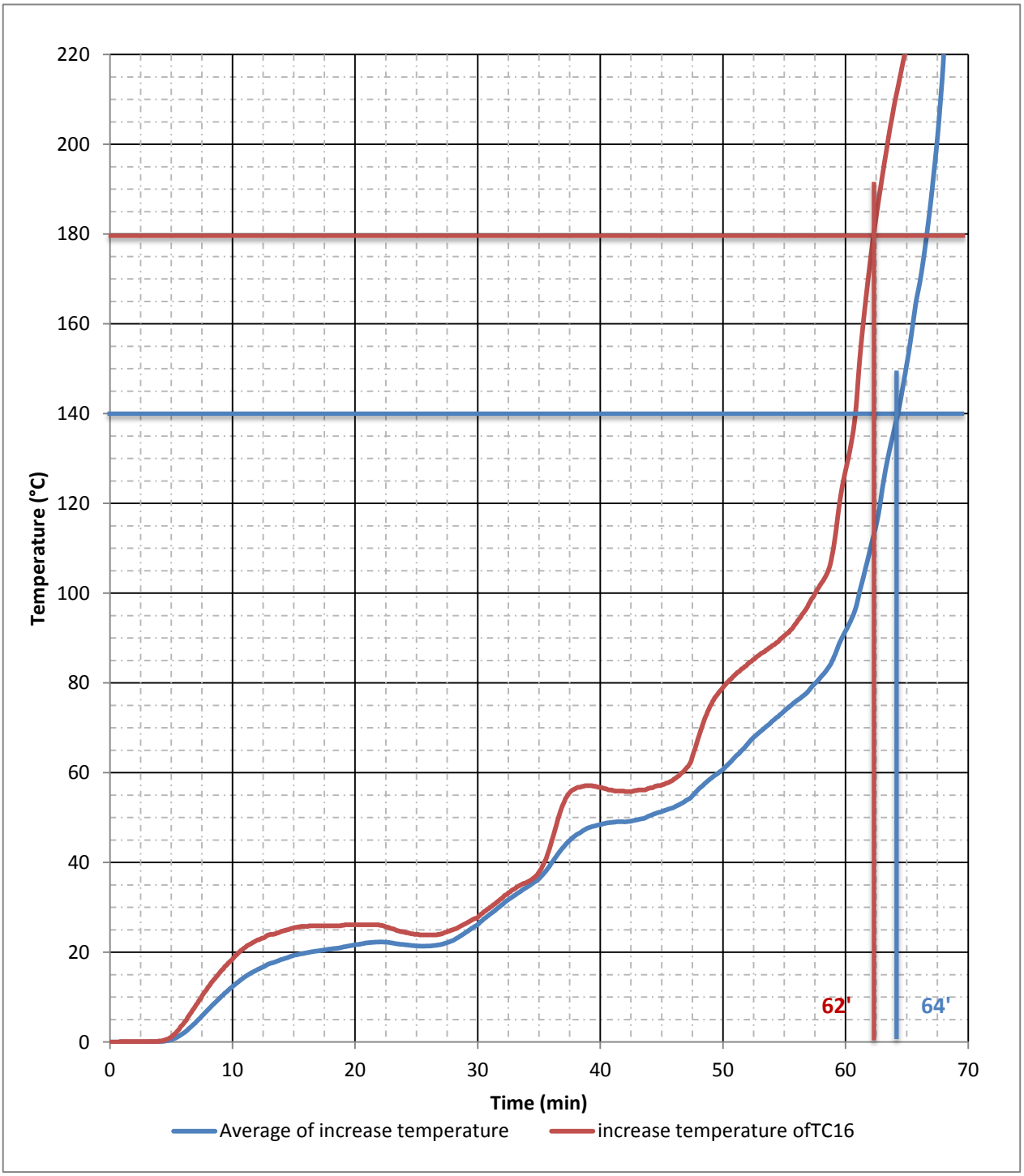
siniat Shaping the way people build	**Temperatures on the non exposed face of the first layer of the exposed boards**	TSRR	**3443**
		Graphic	**6**



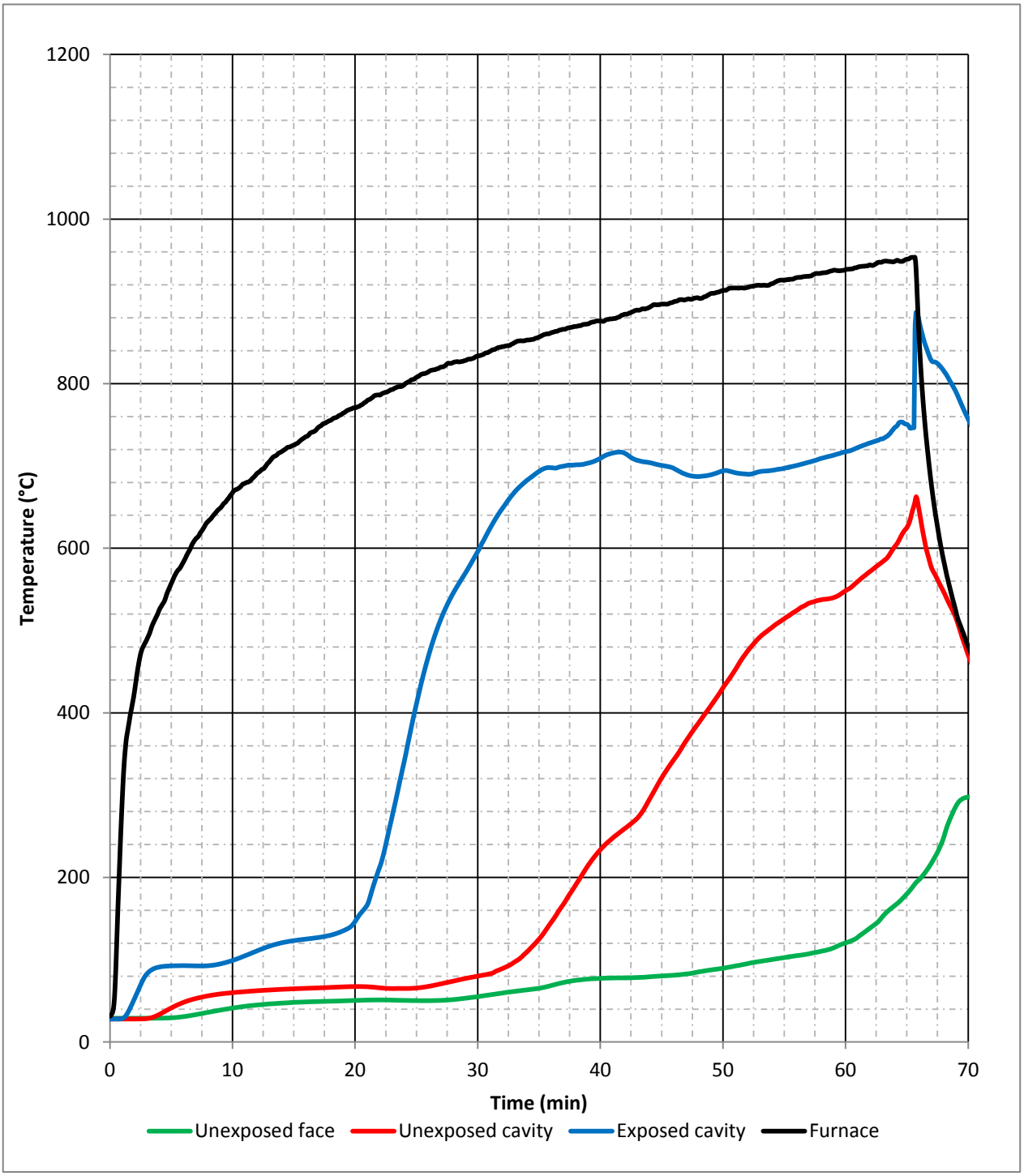
siniat Shaping the way people build	**Temperatures on the exposed face of the first layer of the non exposed boards**	TSRR	**3443**
		Graphic	**7**



siniat Shaping the way people build	**Ambient pressure inside the furnace at 100 mm of the top of the element**	TSRR	**3443**
		Graphic	**8**



siniat Shaping the way people build	**Insulation criteria**	TSRR	**3443**
		Graphic	**9**



siniat Shaping the way people build	**Thermal transfer through the partition**	TSRR	**3443**
		Graphic	**10**

ANNEX 2-MOUNTING PLANS & INSTRUMENTATIONS

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FILE

Resistance to fire
Standard board 15.9mm + glasswool 60mm from Columbia
Test target EI30

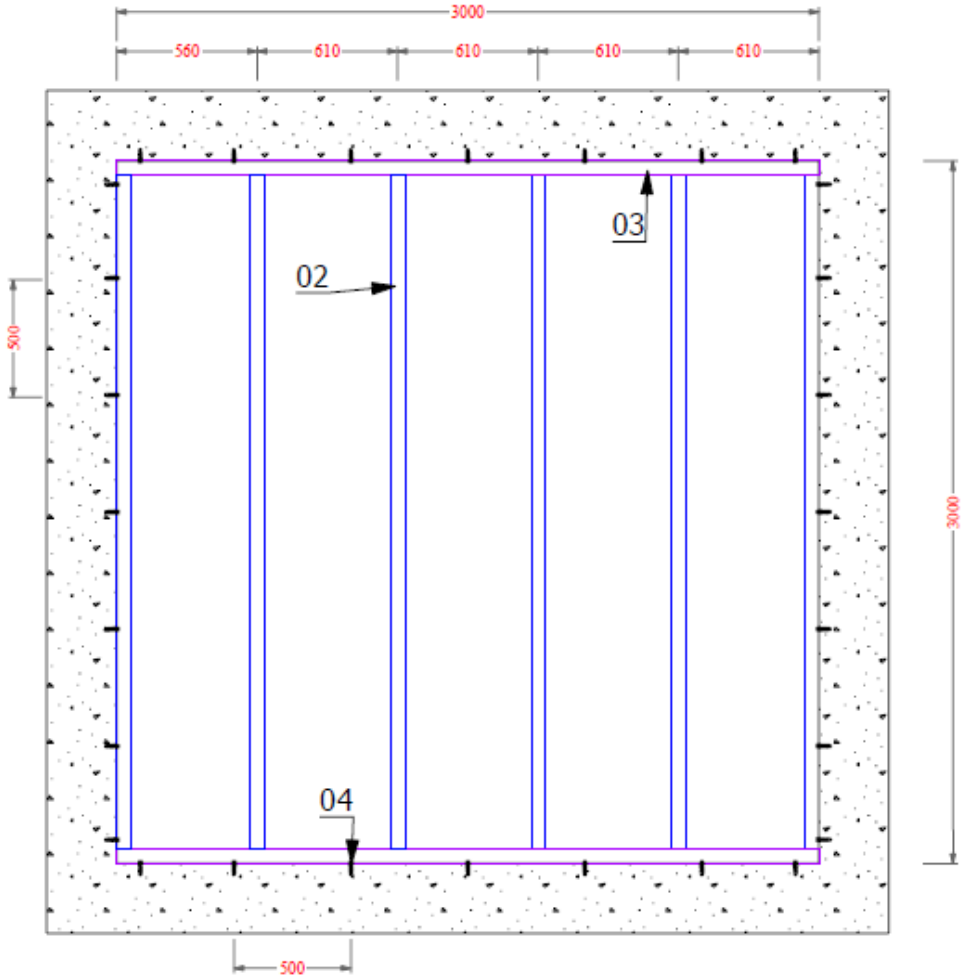
DESCRIPTION

Standard board 15.9mm from Columbia
Glasswool 60mm
Stud M60-35/6
Track R60-30/5.4

Index	Dates	Change	Diffusion	Dessiné par
E				
D				
C				
B				
A				
	27/05/2015	First edition	Mail : SS/FS	F.STACHETTI

This drawing is copyright ETEX and may not be reproduced with out prior permission. Any modification or substitution of comercial components special design invalids the systems technical performance and disclaims Dry-co from liability	Scale : cm/m	Reference file : TSRR 0000	Date : 27/05/2015
Person in charge SINIAT : S.SEGURA	Index : 0	Writer : SF	Number of page : 09

Overview : Frame

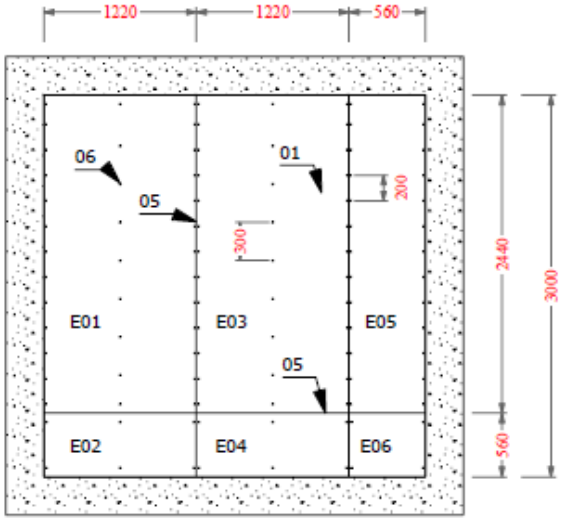


01 - Std board 12.7mm from Columbia
02 - Stud M60-35/6
03 - Track R60-30/5.4
04 - Plug PR06 6x30 + screw Pregy TF 212x35 ultra
05 - Jointing tape Std France + compound Pregyliss 35
06 - Screw Pregy TF 212x25 ultra
07 - Glasswool 60mm

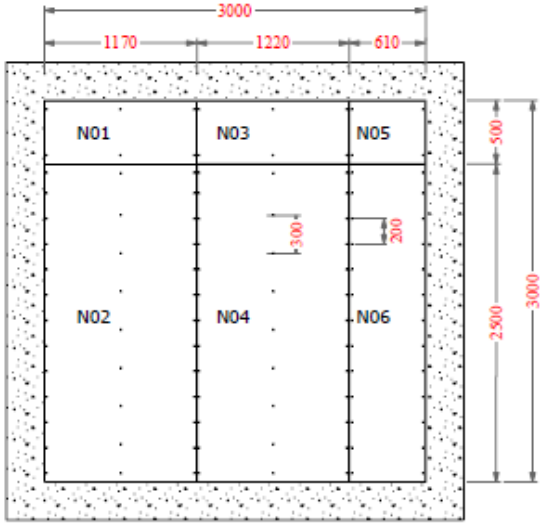
TSRR 0000-TDC-Std board Columbia 12.7mm - 27/05/15 - Page 01

Overview : placarding

Exposed layer viewed from inside the furnace

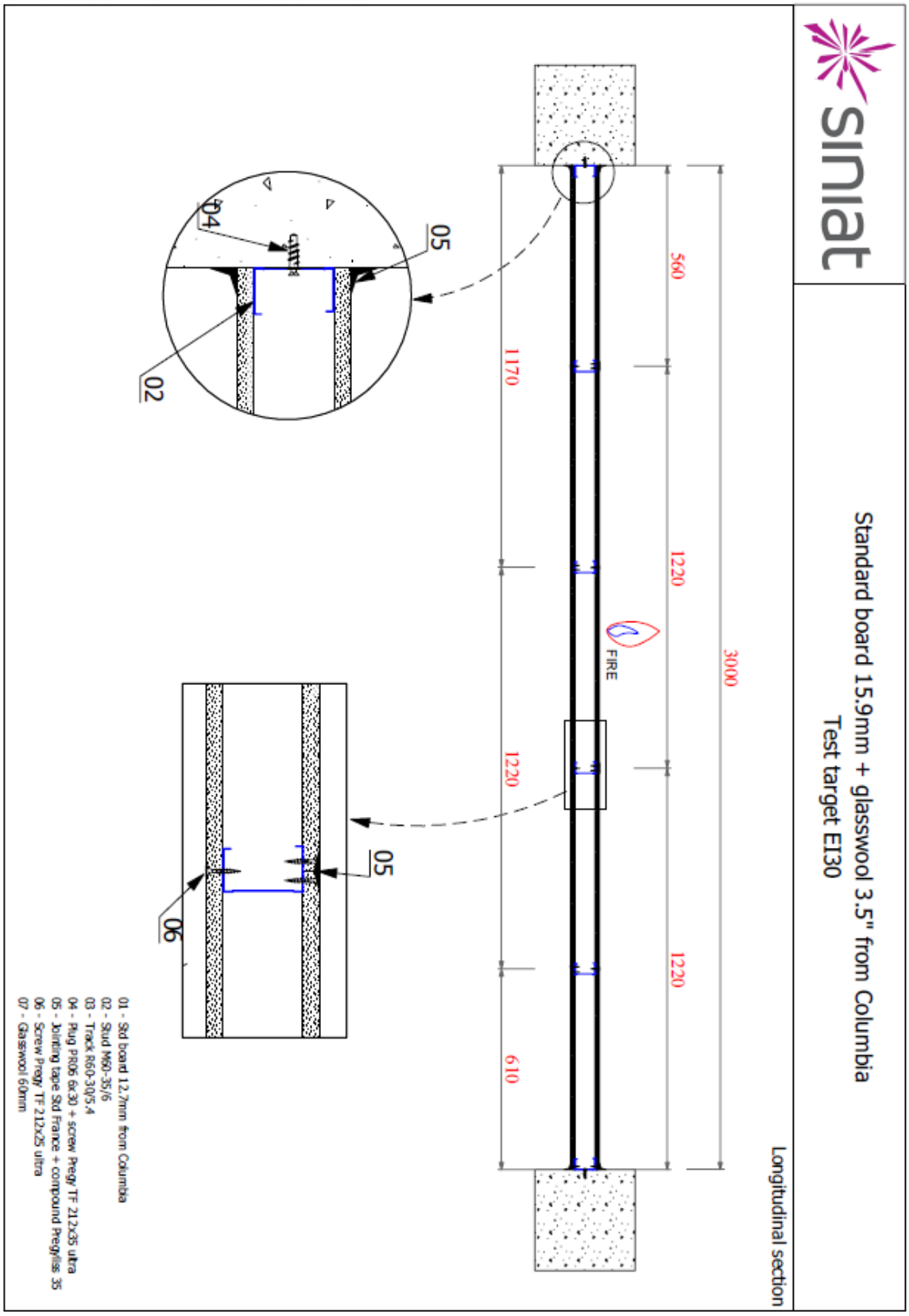


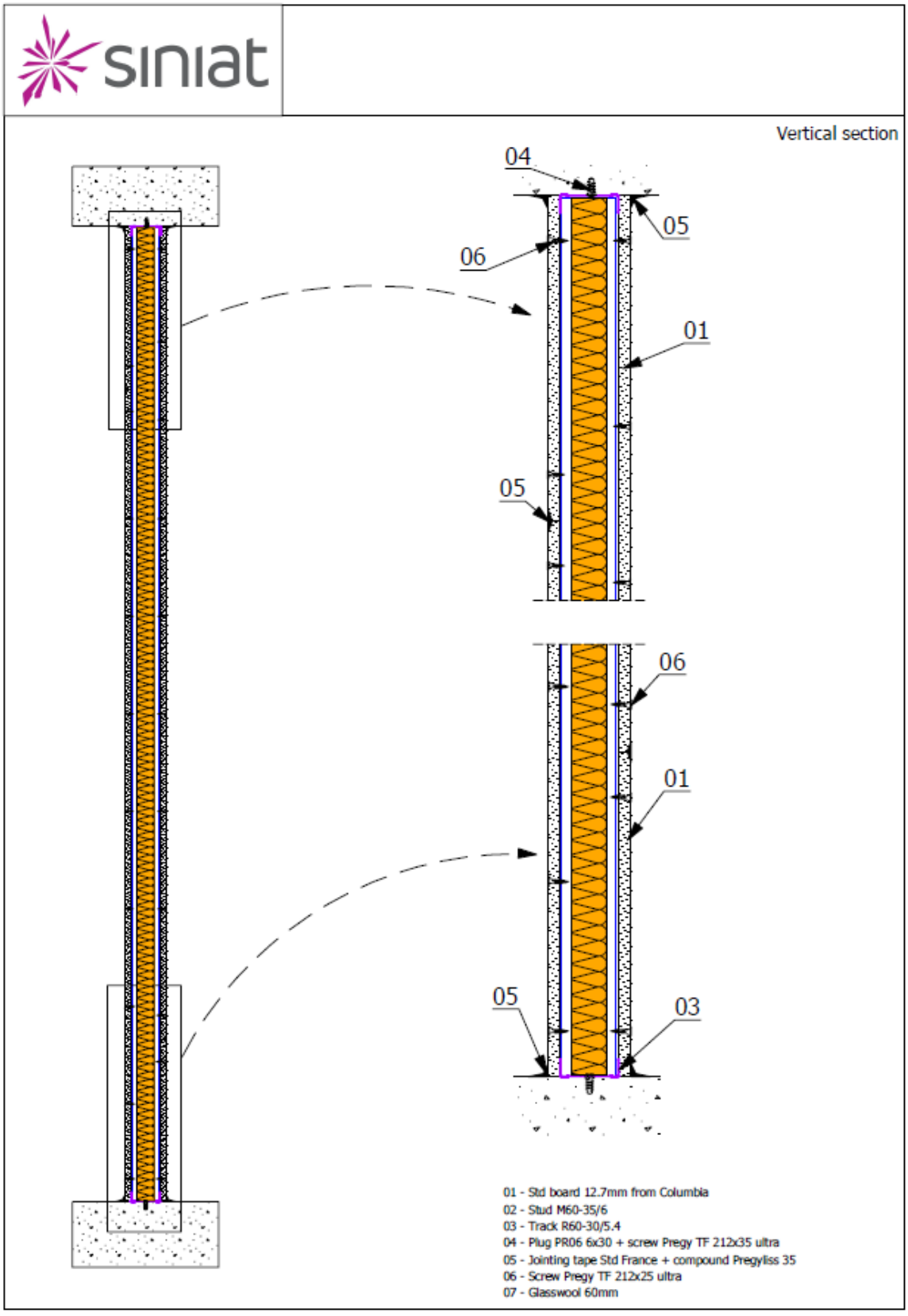
Non exposed layer



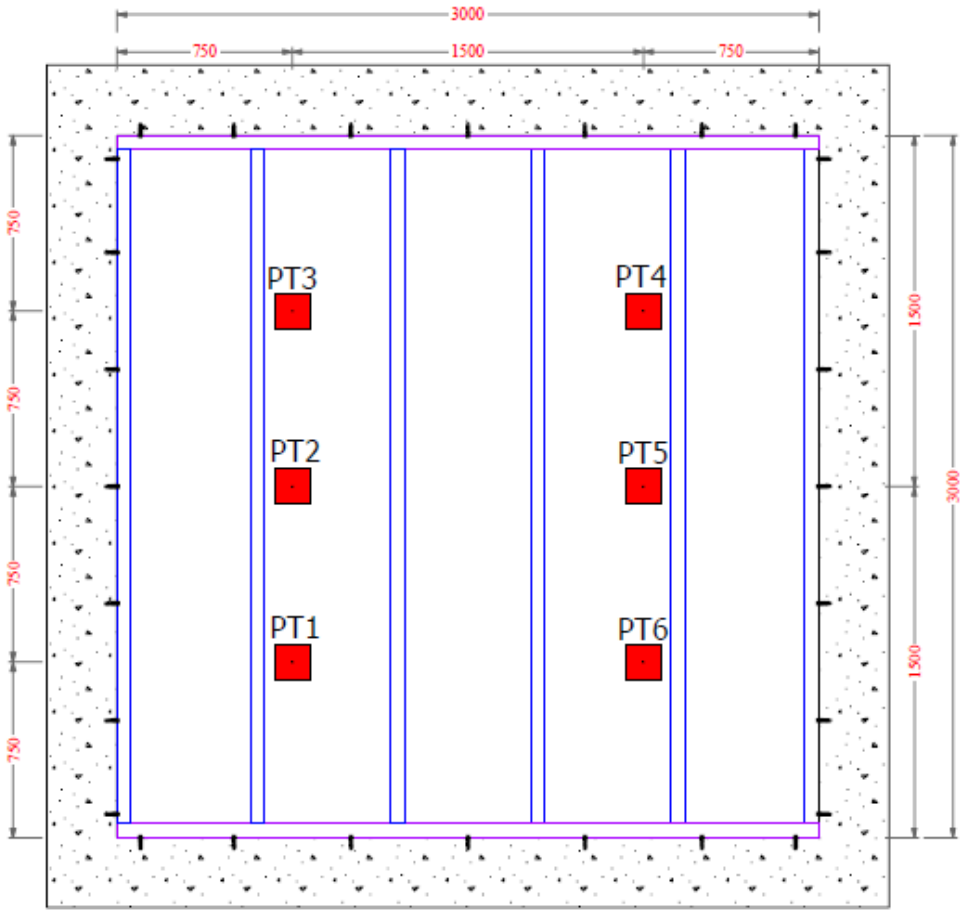
01 - Std board 15,9mm from Colombia
02 - Stud 89
03 - Track 90
04 - Plug PR06 6x30 + screw Pregy TF 212x35 ultra
05 - Jointing tape Std France + compound Pregyliss 35
06 - Screw Pregy TF 212x35 ultra
07 - Glasswool 89mm

TSRR 0000-TDC-Std board Columbia 15,9mm - 27/05/15 - Page 02

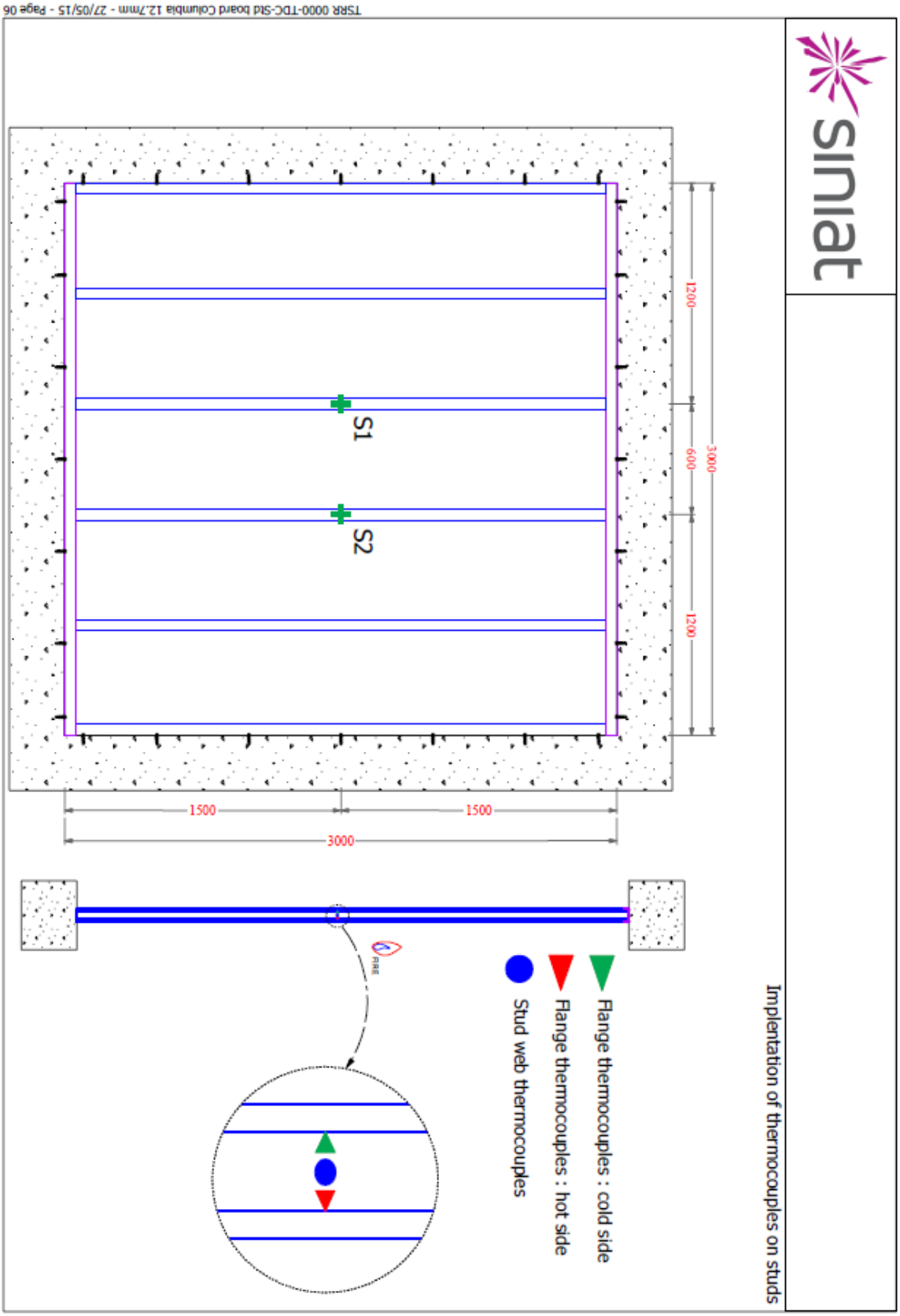


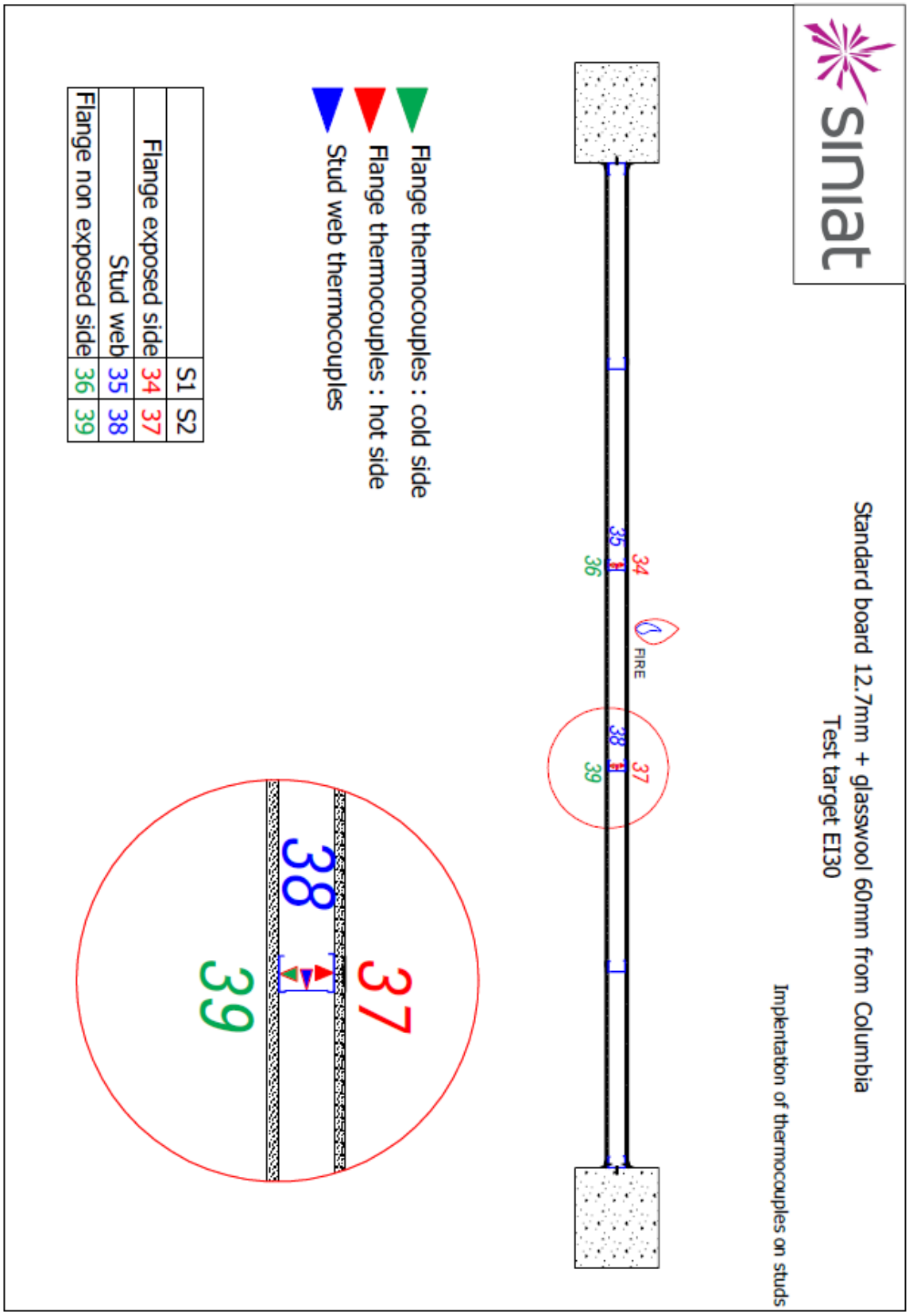


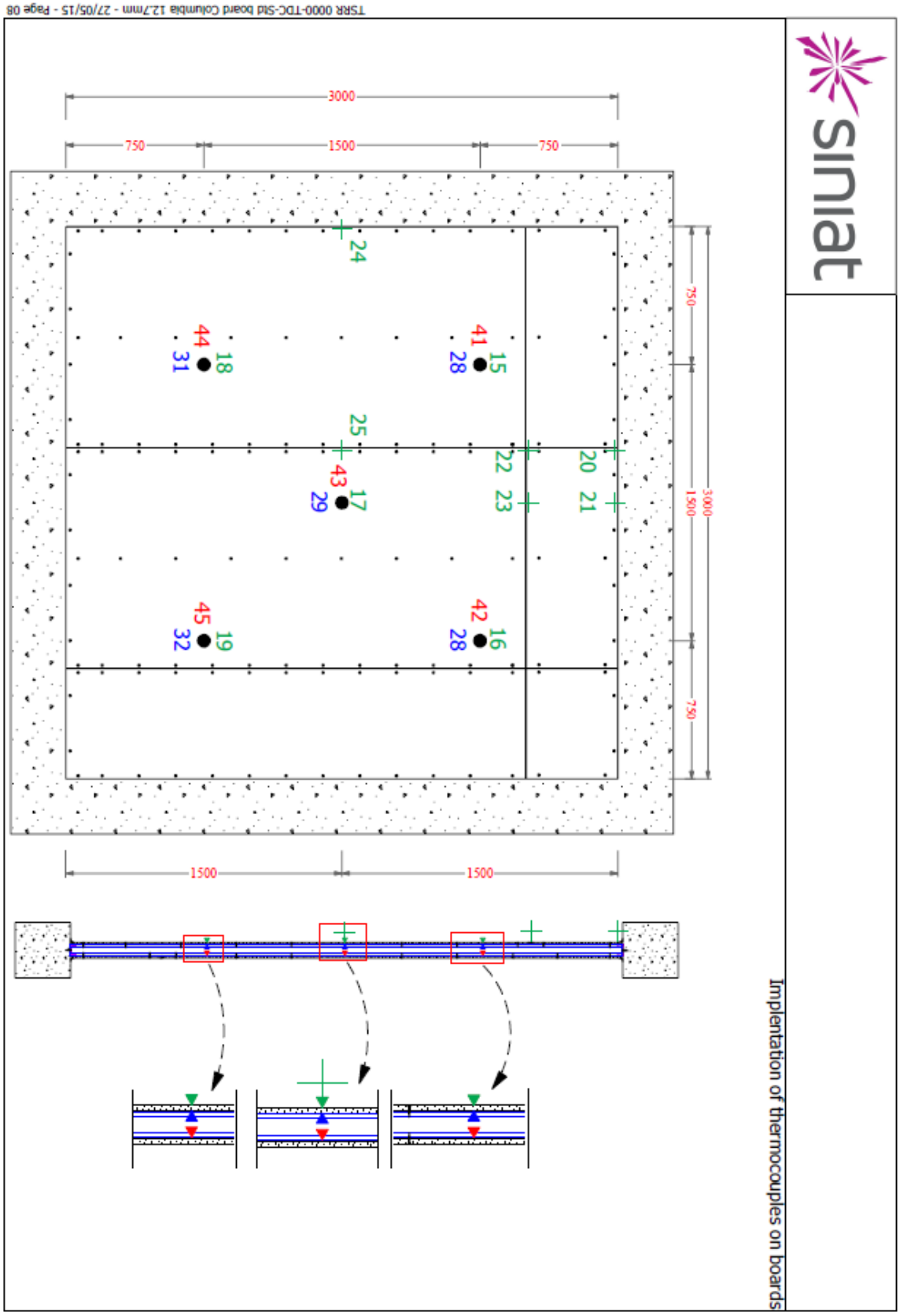
Implentation of thermocouples steering furnace



TSRR 0000-TDC-Std board Columbia 12.7mm - 27/05/15 - Page 06







ANNEX 3-PICTURE OF THE TEST

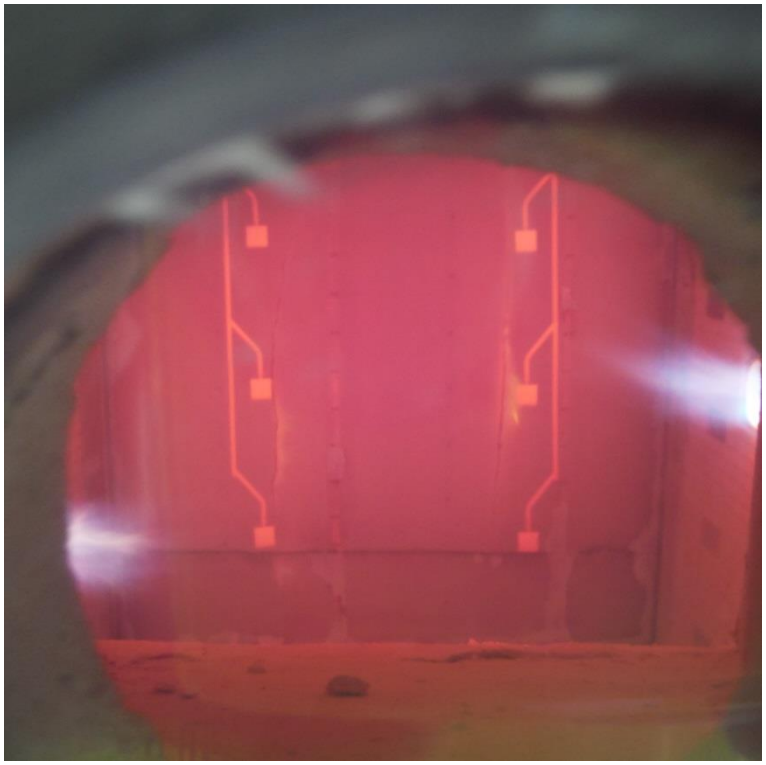


Figure 1 : Interior of the furnace at 22 minutes

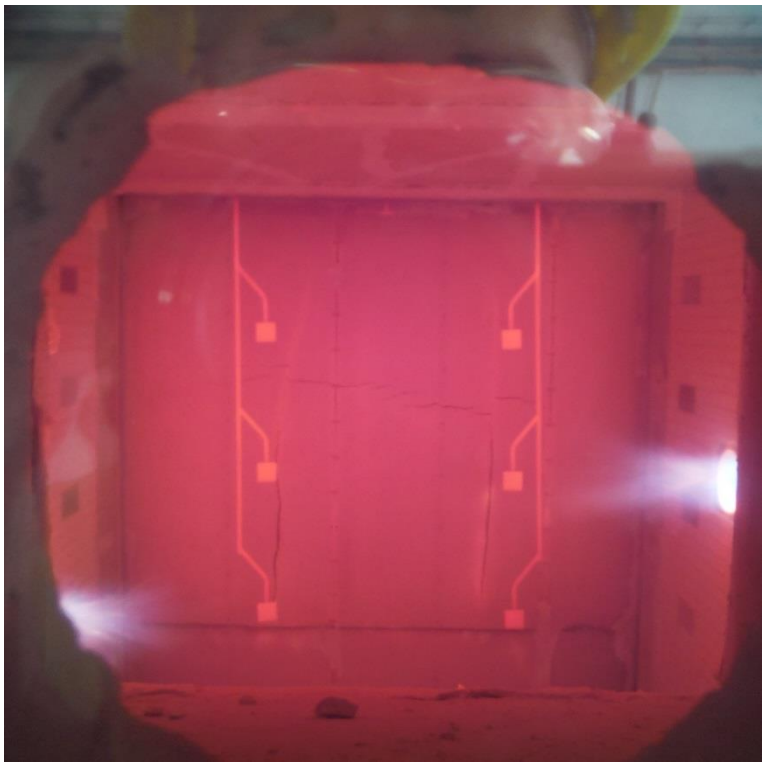


Figure 2 : Interior of the furnace at 24 minutes

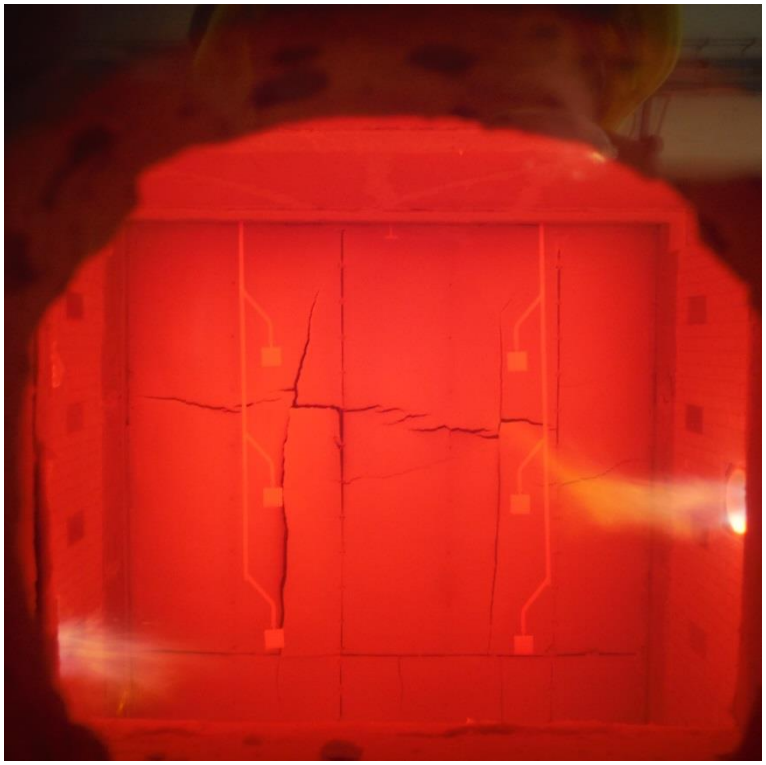


Figure 3 : Interior of the furnace at 34 minutes

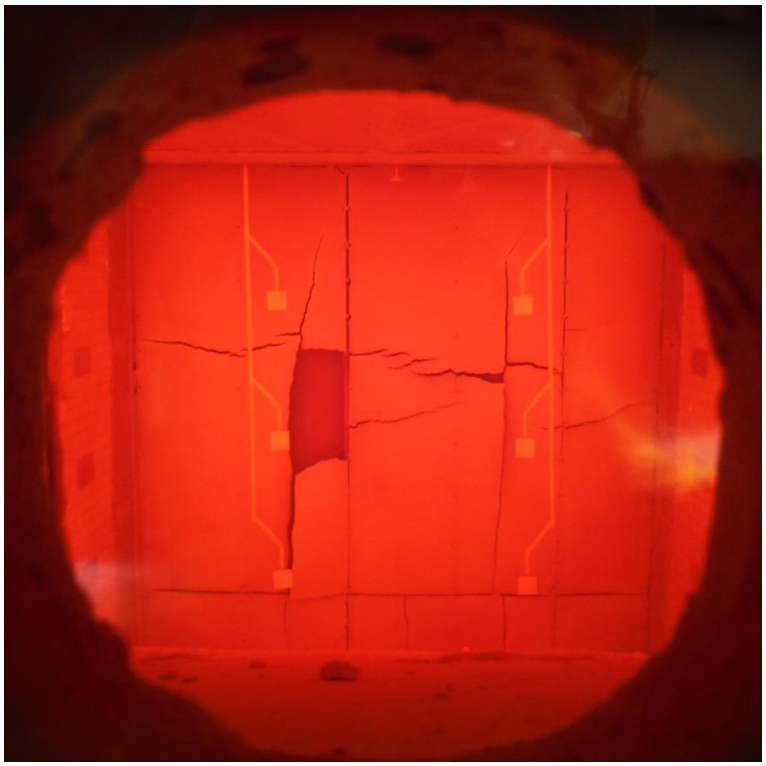


Figure 4 : Interior of the furnace at 47 minutes

Figure 5 : Exterior of the furnace at 55 minutes

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