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TEST REPORT

FIRE TEST REPORT 13 - G- 277

According to norms EN 1363-1:2012 and EN 1364-1:1999

Test	13 - G -277
Performed on	April 15th, 2013
Regarding	A glazed partition wall made of a steel frame
	Frame : RP ISO Hermetic 70 (RP TECHNIK)
	Glazing : PYROBEL 16 (AGC)
	Overall dimensions : 4940 x 4960 mm (w x h)
Sponsor	RP Technik GmbH Profilsysteme Edisonstrasse 4 D - 59 199 BÖNEN

cofrac ESSAIS

ACCREDITATION # 1-1762
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1. SCOPE OF THIS TEST REPORT

Fire resistance test regarding a glazed partition wall, according to the general requirements of standard EN 13631:2012, the additional or substitute procedures of standard EN 1363-2:1999, and the particular requirements of standard EN 1364-1:1999 " Fire resistance tests of non load-bearing elements - Part 1 : Walls ».

2. TEST LABORATORY

EFECTIS France
Voie Romaine
F-57280 MAIZIERES-LES-METZ

3. SPONSOR

RP Technik GmbH
Profilsysteme
Edisonstrasse 4
D - 59 199 BÖNEN

4. REFERENCES OF THE FIRE TEST

Test number: 13 - G - 277

Test date: April 15th, 2013

5. REFERENCE AND MANUFACTURER OF THE TESTED SPECIMEN

Framework:
Material : RP ISO Hermetic 70
Manufacturer : RP TECHNIK - Bönen (Germany)

Glazing :
Reference : PYROBEL 16
Manufacturer : AGC - SENEFFE (Belgium)

6. DESCRIPTION OF THE TESTED SPECIMEN

6.1. GENERAL

Note :The test specimen (dimensions, fire direction, supporting frame and assembling) was supplied by the Applicant to the Test Laboratory on his own initiative, in conformity with clause 12 of standard EN 1363-1:2012.

See plates nr 1 to 5.

The test specimen was a glazed partition wall made of steel profiles from the series RP ISO Hermetic 70 (RP TECHNIK) which defined twelve openings closed by PYROBEL 16 glazing (AGC).

6.2. LIST OF THE COMPONENTS

According to the information supplied by the sponsor.

See plate nr 5.

6.3. DETAILED DESCRIPTION OF THE SPECIMEN

Note: The drawings in the plates nr 1 to 5 have been supplied by the Sponsor, checked by the test laboratory EFECTIS France, and are in conformity with the tested specimen. The location of the glazing is shown on plate nr 7.

6.3.1. Framework

The framework of the glazed partition wall consisted in two frameworks made of steel profiles from the series RP ISO Hermetic 70 (RP TECHNIK).

The peripheral frame of the first framework was composed of:
- 70 x 80 mm steel profiles, reference RP 915112 (RP TECHNIK), for the mullion on the free edge and the top transom,
- 70 x 100 mm steel profiles, reference RP 915212 (RP TECHNIK), for the mullion doing the junction with the second framework,
- 70 x 100 mm steel profiles, reference RP 915512 (RP TECHNIK), for the bottom transom.

All these profiles were mitre cut and assembled by welding. See plates nr 2 and 3.

The peripheral frame of the second framework was composed of:
- 70 x 80 mm steel profiles, reference RP 915112 (RP TECHNIK), for the mullion on the free edge and the top transom,
- 70 x 100 mm steel profiles, reference RP 915512 (RP TECHNIK), for the bottom transom.

All these profiles were mitre cut and assembled by welding. See plates nr 2 and 3.

The intermediate profiles of the two frameworks were composed of 70 x 100 mm steel profiles, reference RPF 915212 (RP TECHNIK). These profiles were straight cut and assembled together or to the peripheral frames by welding except for the junction between the transoms of the second framework and the mullion doing the junction between the two frameworks, which was realised by connectors, reference RA 954041 (RP TECHNIK), insulated by two 15 mm thick FERMACELL plates (XELLA), fixed to the mullion by two steel screws M5 x 20 mm and to the transoms by four fixing pins Ø 5 x 20 mm. See plate nr 1.

All the profiles were composed of two steel shells, each one insulated by a 18 mm thick FERMACELL plate (XELLA), and then linked together by two polyamide stiffeners. See plates nr 2 and 3.

The bottom transoms were also insulated by a supplementary 20 mm thick Promatect-H plates layer (PROMAT) fixed on the transoms by screws Ø 4,2 x 39 mm located every 600 mm. See plate nr 2.

The framework was assembled within the supporting construction by screws HUS-S Ø 6 x 180 mm (HILTI), staggered in the steel shells of the profiles as shown on plate nr 2 and located as shown on plate nr 1.

The gap between the framework and the supporting construction was insulated laterally by 20 mm thick mineral wool FLOORROCK TE 20 (ROCKWOOL) plates, density 55 kg/m^3. See plates nr 2 and 3.

6.3.2. Glazing

The framework defined twelve openings glazed by PYROBEL 16 glazing (AGC), made of:
- A 3 mm thick float
- A 1,65 mm intumescent layer
- A 8 mm thick float
- A 1,65 mm intumescent layer
- A 3 mm thick float

Glazing dimensions:

Reference	Dimensions (w x h) (mm)	Reference	Dimensions (w x h) (mm)
Glazing A	670 x 945	Glazing G	1550 x 925
Glazing B (triangle)	895,5 x 895,5	Glazing H	2450 x 1300
Glazing C (trapezoid)	2400,5 (biggest base) x 945 (h) x 1455,5 (smallest base)	Glazing I	1550 x 2800
Glazing D	1550 x 945	Glazing J	670 x 1430
Glazing E	670 x 2295	Glazing K	1190 x 1430
Glazing F	2450 x 925	Glazing L	1190 x 1430

See plates nr 1 and 4.

6.3.3. Glazing holding system

The glazing were held by a simple bead system made of steel profiles reference RP 920092 (RP TECHNIK) and section 40 x 20 mm (w x h), pushed onto the profiles of the frameworks. See plates nr 2 and 3.

The glazing beads were associated to an EPDM gasket, reference RA 930116 (RP TECHNIK) whereas the profiles were associated to an EPDM gasket, reference RA 930096 (RP TECHNIK). Two PROMASEAL LW tapes, reference RA 957235 (RP TECHNIK) and section 12 x 2 mm were implemented all around the glazing on the profiles. See plates nr 2 and 3.

The glazing were packed with two superimposed wood BEECH blocks, with section 20 x 80 x 5 mm located at 100 mm from the corners of the openings.

Gap between bottom of glazing and frame : 5 mm.
Edge cover : 15 mm.

6.4. SUPPORTING CONSTRUCTION

The specimen was mounted in a 200 mm concrete frame with a density of 2200 kg/m^3.

6.5. VERIFICATION

The specifications supplied by the Applicant were detailed enough to enable the Test Laboratory to carry out a detailed examination of the test specimen before the test and to check the accuracy of the information supplied.

7. TEST ASSEMBLY

7.1. DEFINITION OF THE TESTED SPECIMEN

The choice and the definition of this test specimen have been carried out by the sponsor in conformity with section 12 of standard EN 1363-1:2012.

7.2. ASSEMBLY OF THE TESTED SPECIMENS

The test specimen was assembled by the Sponsor.

7.2.1. **Supporting construction**

The tested specimen has been assembled within a reinforced concrete frame supplied by the test Laboratory EFECTIS France.

Drying duration : more than 28 days.
Thickness of the frame : 200 mm.
Opening in the frame : 5000 x 5000 mm (w x h).

7.3. RESTRAINT OF THE VERTICAL EDGES

According to §6.3.2 of Norm EN 1364-1:1999 the glazed partition wall was installed with one unrestrained edge, located on the little glazing side, insulated by a 20 mm thick Promatect-H plates layer (PROMAT) and 20 mm thick mineral wool FLOORROCK TE 20 (ROCKWOOL) plates, density 55 kg/m^3.

8. TEST METHOD

8.1. PRELIMINARY CONDITIONING

The conditioning of the elements was realized in conformity with the requirements stated in paragraph 8.1 of norm EN 1363-1:2012 and the hygrometric stability of the test specimen was reached on the day of the test.

8.2. THERMAL PROGRAM

The temperature rise inside the furnace above the ambient temperature has been controlled according to the **standard thermal program** represented by the following function:

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

where :
t = Time (min)
T = Furnace temperature at time t (°C)

8.3. FIRE SIDE

The test was carried out with the following fire sides:
- For the framework: on the beads side
- For the glazing: indifferent

9. MEASUREMENTS DURING THE FIRE TEST AND TEST RESULTS

The locations of the sensors are shown on plates nr 6 and 7.
The readings are recorded on the plates mentioned hereafter.

9.1. TEMPERATURE MEASUREMENTS

9.1.1. **Ambient temperature in the laboratory**

The ambient temperature was measured according to the requirements of the standard EN 1363-1:2012, by the thermocouple 18. See plate nr 8.

9.1.2. **Ambient temperature in the furnace**

It was measured in conformity with the standard EN 1363-1:2012 by 17 plate pyrometers with their metal face towards the back of the furnace: see plates nr 9 and 10.

9.1.3. Temperatures of the element

They were measured by thermocouples in conformity with standard EN 1363-1:2012 and positioned in conformity with standard EN 1364-1:1999:

Position of captors	Thermocouple nr	Plate nr
Mean temperature of glazing A	31 & 32	12
Mean temperature of glazing B	33 & 34	13
Mean temperature of glazing C	35 to 37	14
Mean temperature of glazing D	38 & 39	15
Mean temperature of glazing E	40 & 41	16
Mean temperature of glazing F	42 to 44	17
Mean temperature of glazing G	45 & 46	18
Mean temperature of glazing H	47 to 50	19
Mean temperature of glazing I	51 to 54	20
Mean temperature of glazing J	55 & 56	21
Mean temperature of glazing K	57 & 58	22
Mean temperature of glazing L	59 & 60	23
Maximal temperatures of the framework	19 to 30	24
All the under mentioned thermocouples being placed at 15 mm from the profiles on glazing, i.e. at less than 20 mm from a discontinuity (junction glazing/profiles), they are not taken into account for the insulation criteria.		
Additional temperatures of glazing B (informative)	61 to 63	25
Additional temperatures of glazing C (informative)	64 to 68	26
Additional temperatures of glazing H (informative)	69 to 73	27
Additional temperatures of glazing I (informative)	74 to 78	28
Additional temperatures of glazing K (informative)	79 to 83	29

9.2. PRESSURE MEASUREMENTS

In conformity with the requirements of standard EN 1363-1:2012, the pressure inside the furnace was continuously controlled throughout the whole test.

Taking into account the dimensions of the element and the location of the pressure sensor, the prescribed value was established at 17 Pa.

See plate nr 11.

9.3. DEFLECTION MEASUREMENTS

In conformity with the requirements of standard EN 1364-1:1999, the horizontal bending of the partition was measured and recorded with potentiometric sensors.

Position of captors	Thermocouple nr	Plate nr
On the framework	84 to 94	30

10. OBSERVATIONS

10.1. BEFORE THE TEST

Ambient temperature inside the laboratory before the test : 22 °C.
Initial mean temperature of the element before the test : T_0 = 21 °C.

See photo A.

10.2. DURING THE TEST

Time (min)	Observations
00	**Start of the test.**
01	Glazing K, J and then I, H and E are cracking.
02	The first intumescent layer of all of the glazing is developing. Smoke release at glazing G periphery.
03	All the glazing have cracked.
04	The first intumescent layer of all of the glazing has developed.
05	Bending of the mullions and transoms.
06	Smoke release at glazing C, I, L and H peripheries.
09	The second intumescent layer of all of the glazing is developing.
12	Fall of small glazing parts on exposed side.
15	Nothing particular to report.
16	Smoke release at the level of the mullions.
20	Nothing particular to report.
30	Nothing particular to report.
31	**Average temperature rise of 140°C reached on glazing K. Failure of I criterion.**
33	Cotton-wool pad test on the opening in the bottom left corner of glazing I negative (see photo B).
44	Sporadic flaming with duration lower than 10 seconds in the bottom left corner of glazing I.
45	Nothing particular to report.
49	**Fall of glazing I (see photo C). Failure of E criterion.** **End of the test with the Sponsor agreement.**

10.3. AFTER THE TEST AND COOL DOWN

10.3.1. **On the unexposed side :**

See photo D.

Glazing I and a part of glazing K have fallen down. No other disorder was visible.

10.3.2. **On the exposed side :**

See photo E.

The glazing beads were still in place.

11. FIRE RESISTANCE CRITERIA

In conformity with the standards mentioned in section 1, the times during which the specimens meet the fire resistance criteria may be regarded as follows:

11.1. FIRE INTEGRITY

11.1.1. **Cotton-wool pad**

Duration : FORTY-NINE MINUTES - (49 min)

Cause of failure : **Fall of glazing I.**

11.1.2. **Gap gauge**

Duration : FORTY-NINE MINUTES - (49 min)

Cause of failure : **Fall of glazing I.**

11.1.3. **Sustained flaming**

Duration : FORTY-NINE MINUTES - (49 min)

Cause of failure : **Fall of glazing I.**

11.2. THERMAL INSULATION

Duration : THIRTY-ONE MINUTES - (31 min)

Cause of failure : **Average temperature rise of 140°C reached on glazing K.**

12. FIELD OF DIRECT APPLICATION OF THE TEST RESULTS

The paragraphs with crossed-out characters do not apply to the element forming the object of this test report.

12.1. GENERAL

The field of direct application of the test results is limited to the determination of the permissible modifications of the test specimen following a successful fire resistance test. These modifications may be automatically introduced without the Applicant having to apply for any additional assessment, calculation or agreement.

In conformity with section A.5.1 of standard EN 1364-1:1999, the results of the fire test are directly applicable to similar construction where one or more of the changes listed below are made and the construction continues to comply with the appropriate design code for its stiffness and stability.

Other modifications are not permitted.

a) Decrease in the linear dimensions of panes ;

b) Change in the aspect ratio of panes provided that the largest dimension of the pane and its area are not increased ;

c) Decrease in the distance between mullions and/or transoms ;

d) Decrease in distance between fixing centres;

e) Increase in the dimensions of framing members ;

f) Screwed-on glazing beads, if "clip-on" beads were incorporated in the test specimen;

g) Allowance for expansion if none were incorporated in the test specimen ;

~~h) Change in the angle of installation of up to 10° from the vertical.~~

12.2. WIDTH EXTENSION

In conformity with section A.5.3 of standard EN 1364-1:1999, the results of the fire resistance test recorded in section 10 of this test report are valid for any element identical to that submitted to the test and with unlimited width.

12.3. HEIGHT EXTENSION

In conformity with section A.5.2 of standard EN 1364-1:1999, no height extension is allowed above that tested, i.e. 4960 mm maximum.

12.4. SUPPORTING CONSTRUCTIONS

The result of a test of fire resistant glazing tested in one of the standard supporting constructions given in EN 1363-1:2012 is applicable to any other supporting construction, or the test frame, within the same type (high density rigid, low density rigid or flexible) that has greater fire resistance.

13. WARNING

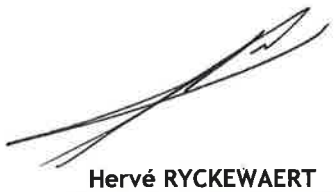
This report gives details about the construction method, the testing conditions and the test results achieved when the specific building element described was tested according to the procedure specified in standard EN 1363-1:2012 and, where applicable, in standard EN 1363-2:1999.

As concerns the dimensions, details, loading, stresses and boundary or end conditions, any significant deviation other than that which is not excluded within the field of direct application of the appropriate test procedure is not covered by this report.

Because of the nature of the fire tests and of the resulting difficulty in quantifying the uncertainty of the fire resistance assessment, it is impossible to establish any level of accuracy of the results.'

Maizières-lès-Metz, May 14th , 2013

Guillaume SIEMONEIT
Testing leader



Hervé RYCKEWAERT
Head of section " Tests"

PLATE 1: OVERALL VIEW WITH DETAILS OF THE FIXATION BETWEEN THE TWO FRAMEWORKS

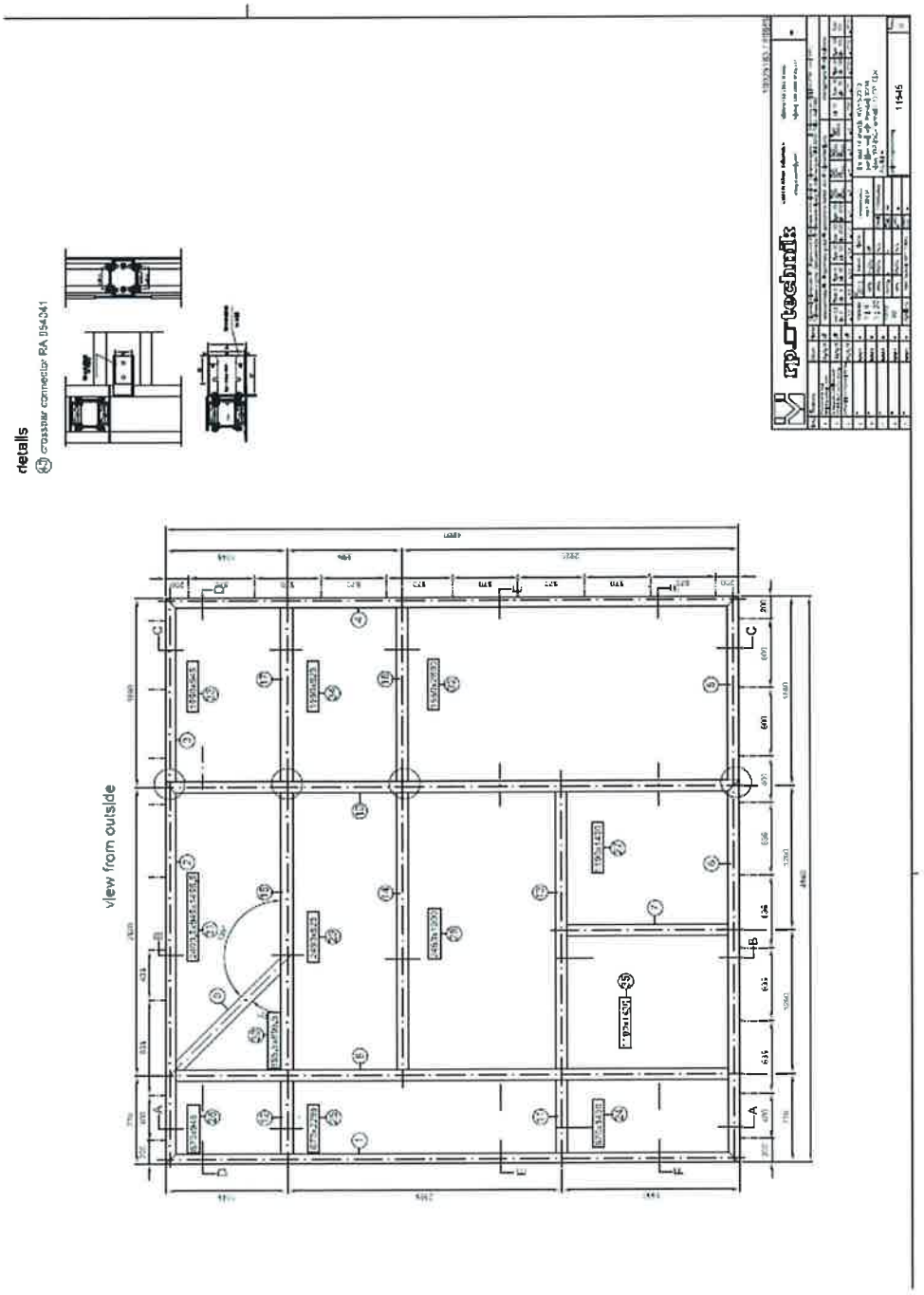


PLATE 2: VERTICAL SECTIONS A-A, B-B AND C-C WITH DETAILS OF THE FIXATION TO THE SUPPORTING CONSTRUCTION

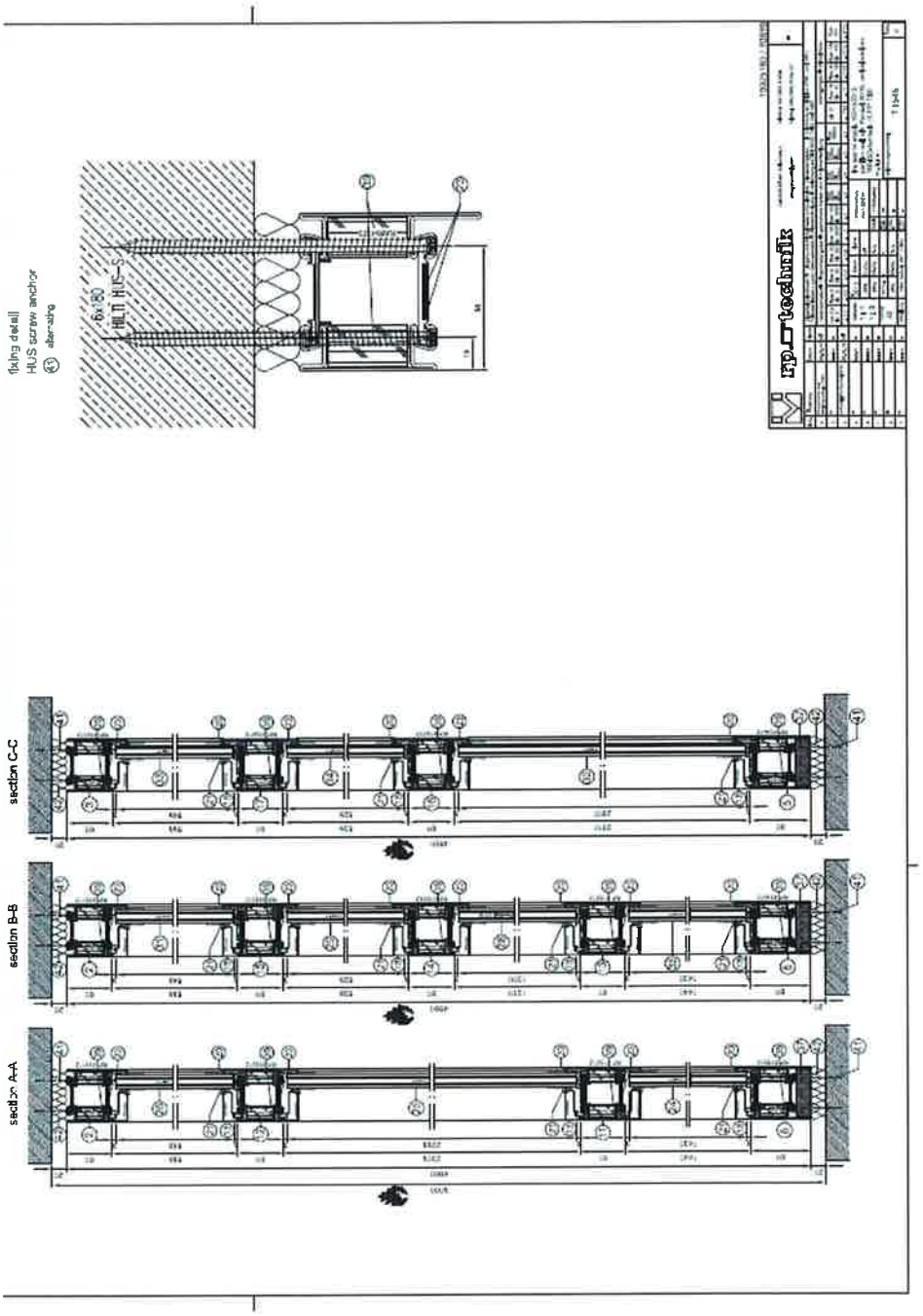


PLATE 3: HORIZONTAL SECTIONS D-D, E-E and F-F

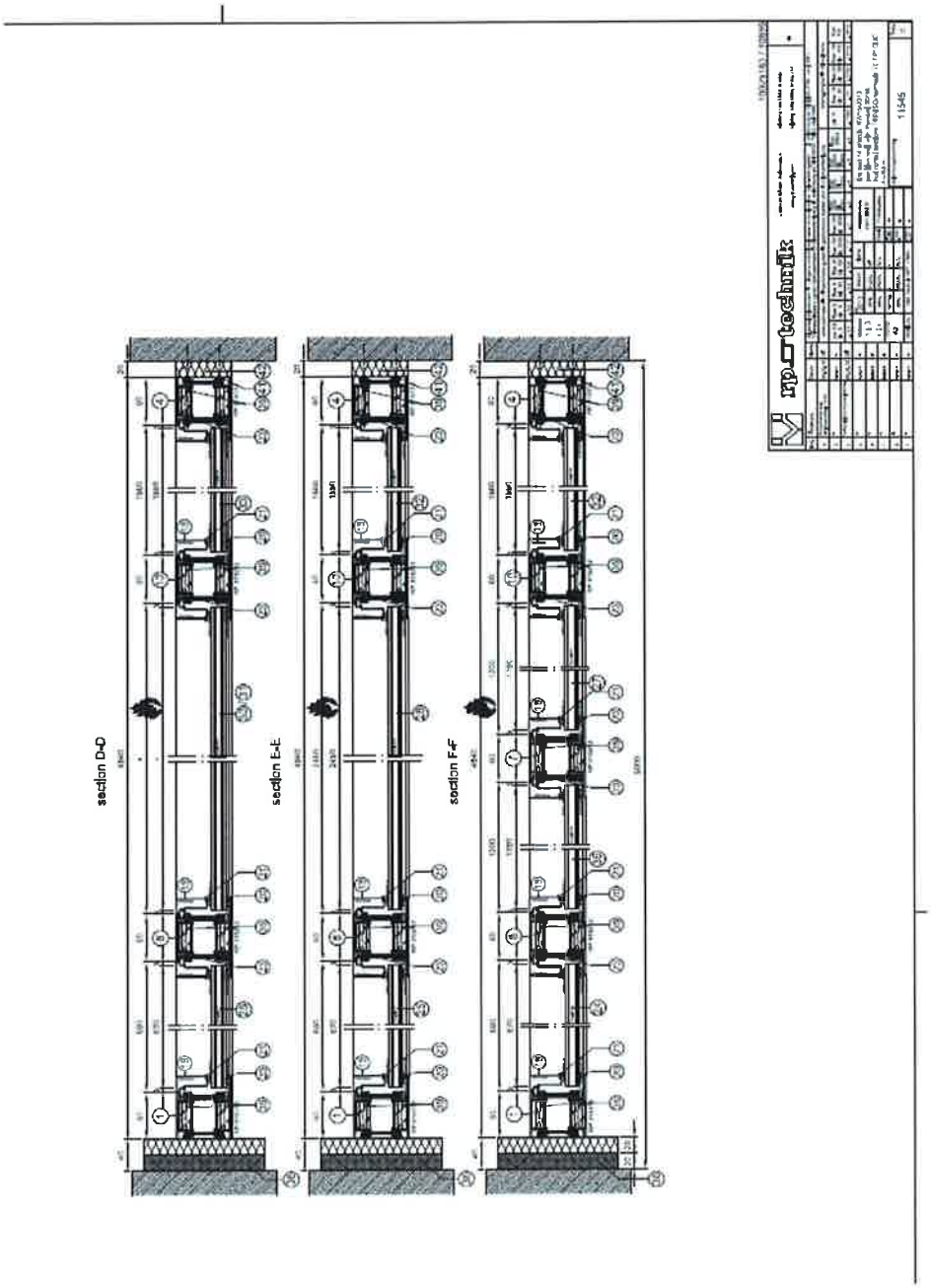


PLATE 4: DETAILS OF THE GLAZING

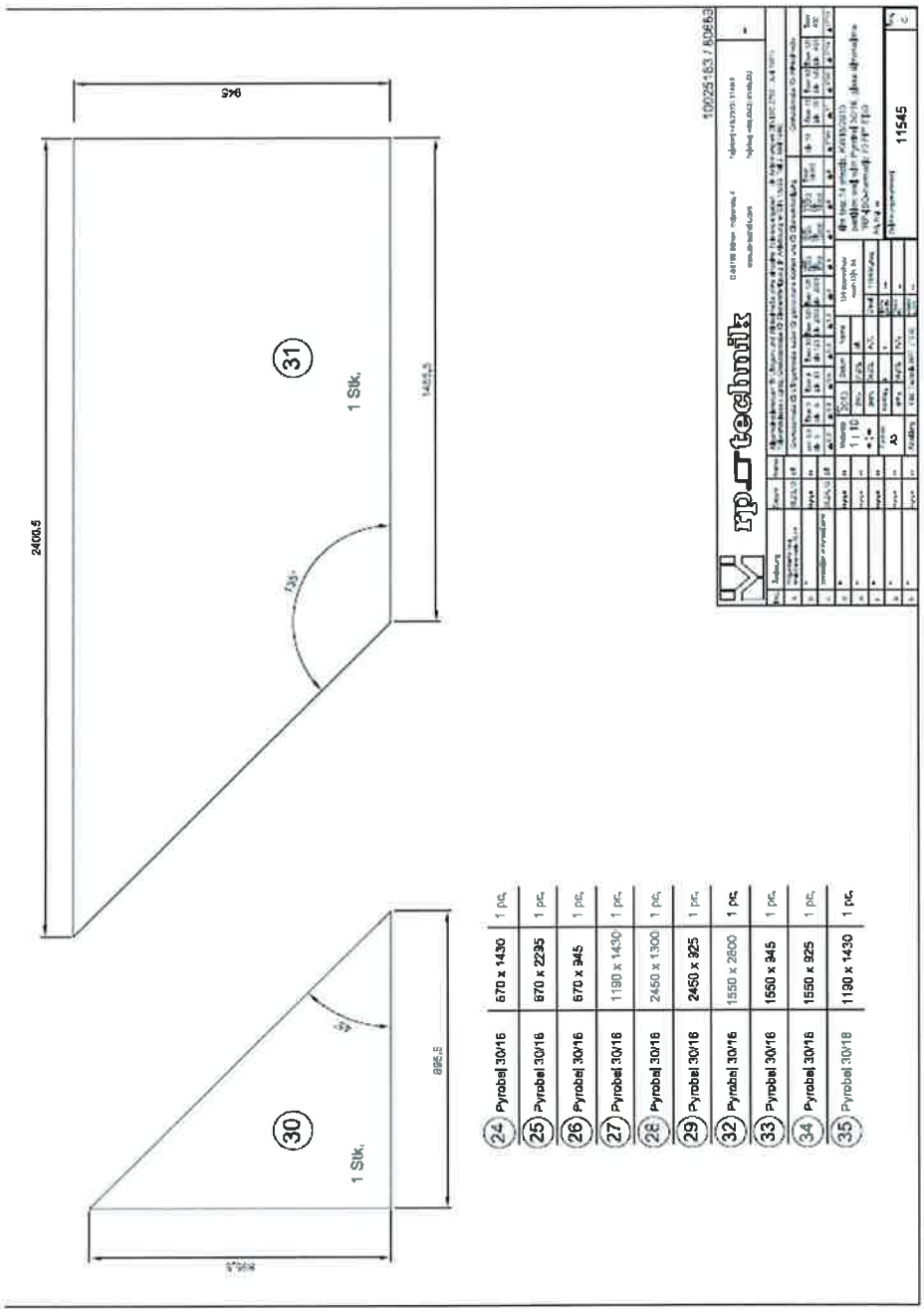


PLATE 5: PARTS LIST

part list

pos.	pc/lfm	part.no.	discription	length (mm)
1	1 pc	RP 915112	frame profile	4940
2	1 pc	RP 915112	frame profile	3320
3	1 pc	RP 915112	frame profile	1620
4	1 pc	RP 915112	frame profile	4940
5	1 pc	RP 915512	bottom rail profile	1640
6	1 pc	RP 915512	bottom rail profile	3340
7	1 pc	RP 915212	crossbar profile	1440
8	1 pc	RP 915212	crossbar profile	4620
9	1 pc	RP 915212	crossbar profile	adapted
10	1 pc	RP 915212	crossbar profile	4980
11	1 pc	RP 915212	crossbar profile	680
12	1 pc	RP 915212	crossbar profile	680
13	1 pc	RP 915212	crossbar profile	2460
14	1 pc	RP 915212	crossbar profile	2460
15	1 pc	RP 915212	crossbar profile	2460
16	1 pc	RP 915212	crossbar profile	1660
17	1 pc	RP 915212	crossbar profile	1560
18	72 lfm	RP 920392	glazing bead	
19	-	-	-	
20	66 lfm	RA 930396	glazing seal	
21	66 lfm	RA 93011E	glazing seal	
22	-	-	-	
23	135 lfm	RA 957235	Promaseal LW 12X2	2x side by side =24
24	1 pc		Pyrobel 33/16 (16mm)	873 x 1433
25	1 pc		Pyrobel 33/16 (16mm)	673 x 2296
26	1 pc		Pyrobel 33/16 (16mm)	873 x 945
27	1 pc		Pyrobel 33/16 (16mm)	1193 x 1433
28	1 pc		Pyrobel 33/16 (16mm)	2453 x 1333
29	1 pc		Pyrobel 33/16 (16mm)	2453 x 925
30	1 pc		Pyrobel 33/16 (16mm)	895,5 x 895,5
31	1 pc		Pyrobel 33/16 (16mm)	2433,5 x 845 x 1455,5
32	1 pc		Pyrobel 33/16 (16mm)	1553 x 2833
33	1 pc		Pyrobel 33/16 (16mm)	1553 x 945
34	1 pc		Pyrobel 33/16 (16mm)	1553 x 925
35	1 pc		Pyrobel 33/16 (16mm)	1193 x 1433
36	2 pcs		Promatect-H Zuschnitt	423 x 20 x 2483
37	2 pcs		Promatect-H Zuschnitt	63 x 20 x 2473
38	-	-	-	-
39	90 m (75pcs)	RA 954023	fire protection insulator	-
40	10 pcs	RA 954041	crossbar connector	
41	27 pcs		Hilti HUS-S 8 x 180	
42	-		Fibertrace TF 20	-

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Ind.	Änderung	Datum	Name
a	Profilbezeichnung RP-ISO-hermetic 70 FP	05.03.13	bä
b	-	-	-
c	Verbindung mit Pyrobel 30/16	30.04.13	bä
d	-	-	-
e	-	-	-
f	-	-	-
g	-	-	-
h	-	-	-

Allgemeintoleranzen für Längen- und Winkelmaße ohne einzelne Tolerierungsangabe: (in Anlehnung an DIN ISO 2768 - Juni 1991)
Toleranzklasse c (grob) Grenzmaße für Elementlänge (in Anlehnung an DIN 18203, Teil 2, Mai 1996)

Grenzmaße für Längenmaße außer für gebrochene Kanten und für Elementlänge										Grenzmaße für Winkelmaße				
von 0,5 bis 3	über 3 bis 6	über 6 bis 30	über 30 bis 120	über 120 bis 400	über 400 bis 1000	über 1000 bis 2000	über 2000 bis 4000	über 4000 bis 8000	über 8000 bis 12000	über 12000 bis 16000	über 16000	bis 10	über 10 bis 50	über 50 bis 120	über 120 bis 400	über 400
±0,2	±0,3	±0,3	±0,5	±1,2	±2	±3	±4	±5	±8	±9		±1°30'	±1°	±0°30'	±0°15'	±0°10'

Maßstab: 1 : 1 — Format: A1 — Abteilung: FBE Technik RPT (TFR)

	Name	Datum
gez.	bä	04.03.2013
gepr.	A.T.	04.03.2013
norm.	-	-
ger.	A.T.	04.03.2013

Urheberschutz nach DIN 34

Datei: 11545c.dwg

fire test 14 efectis, KW15/2013
partition wall with Pyrobel 30/16, part list
"RP-ISO-hermetic 70 FP" EI30

Art.-Nr.: -

Zeichnungsnummer: 11545

Änd.: c

PLATE 6: SENSORS LOCATION PLAN

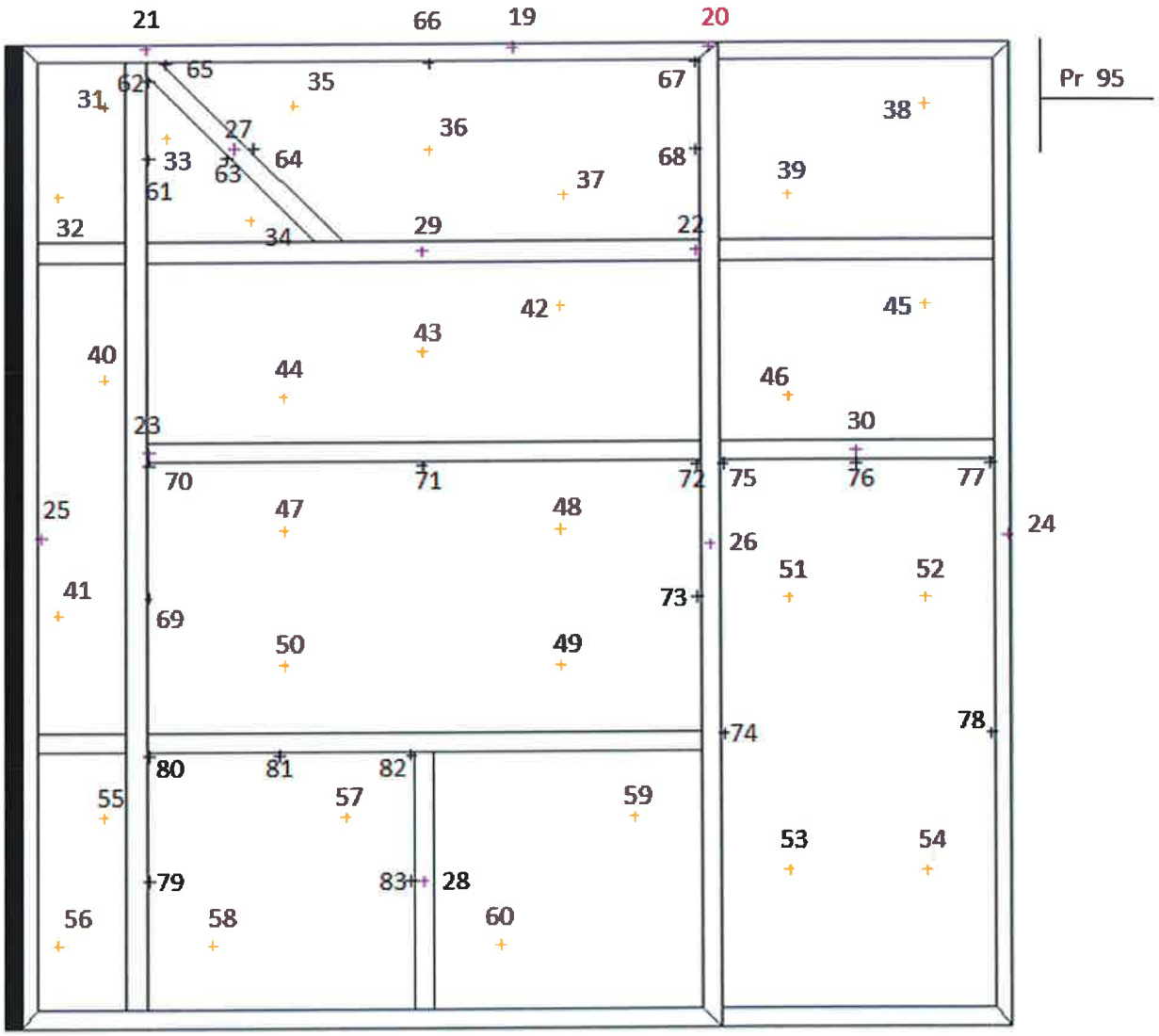
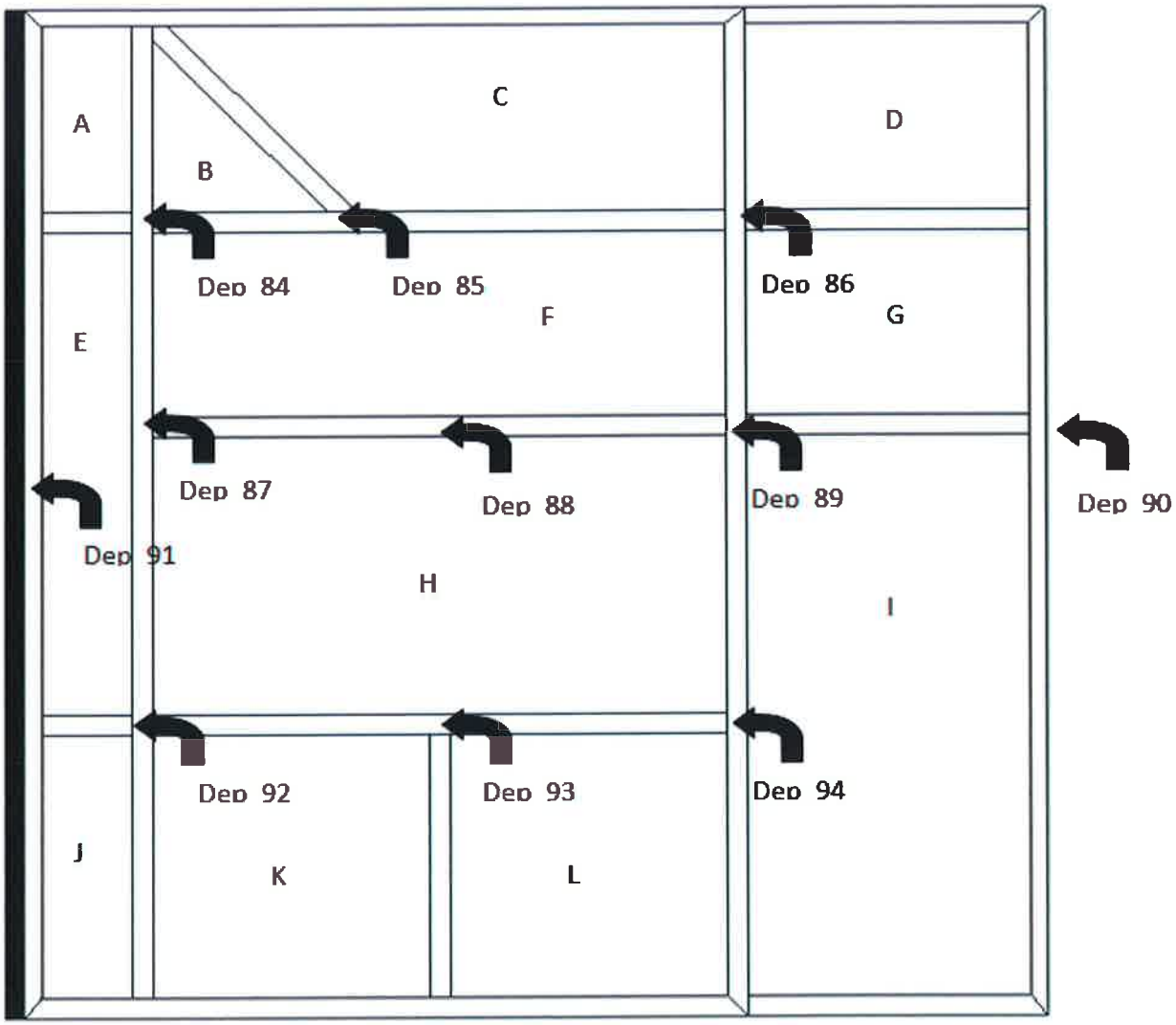
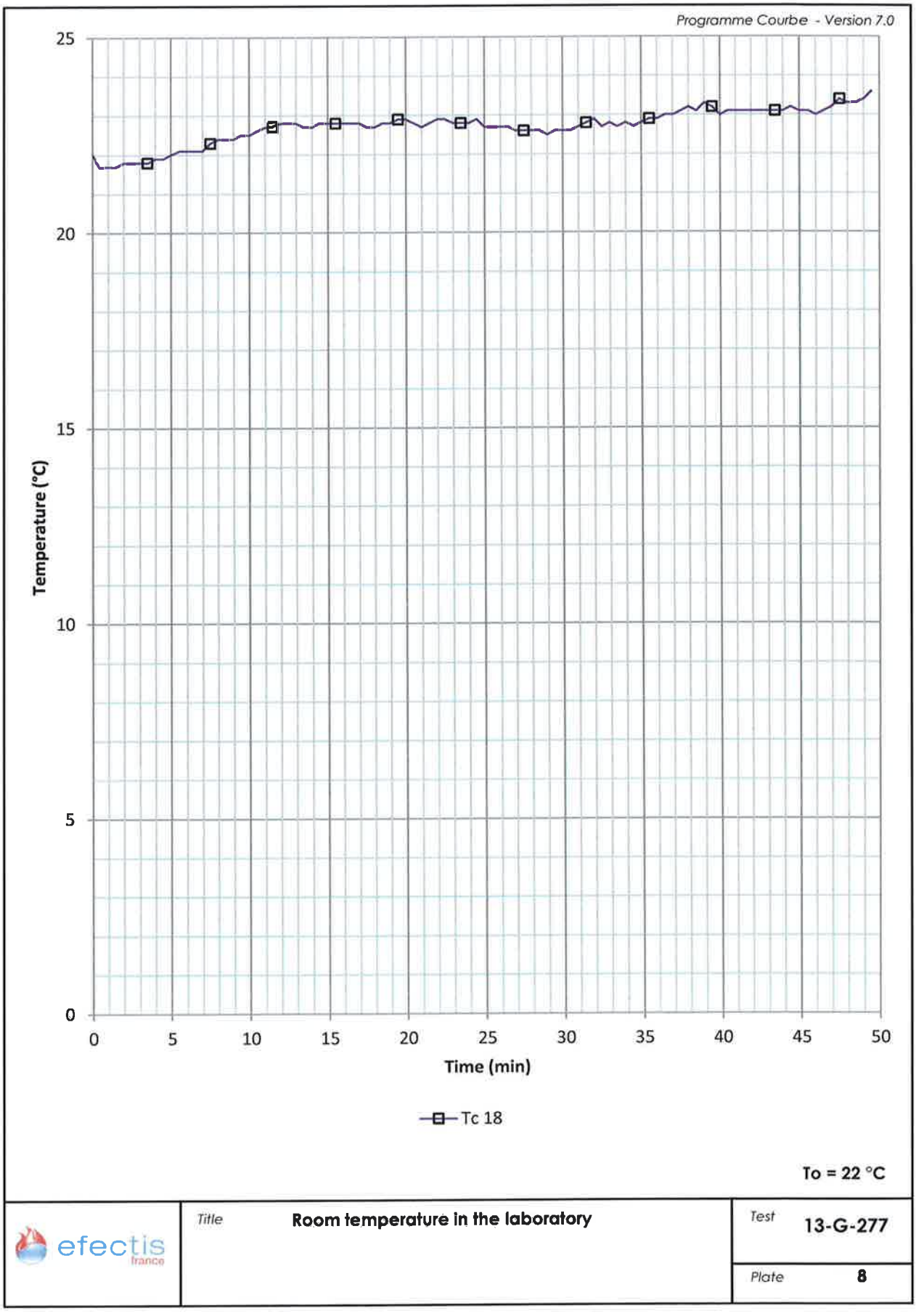
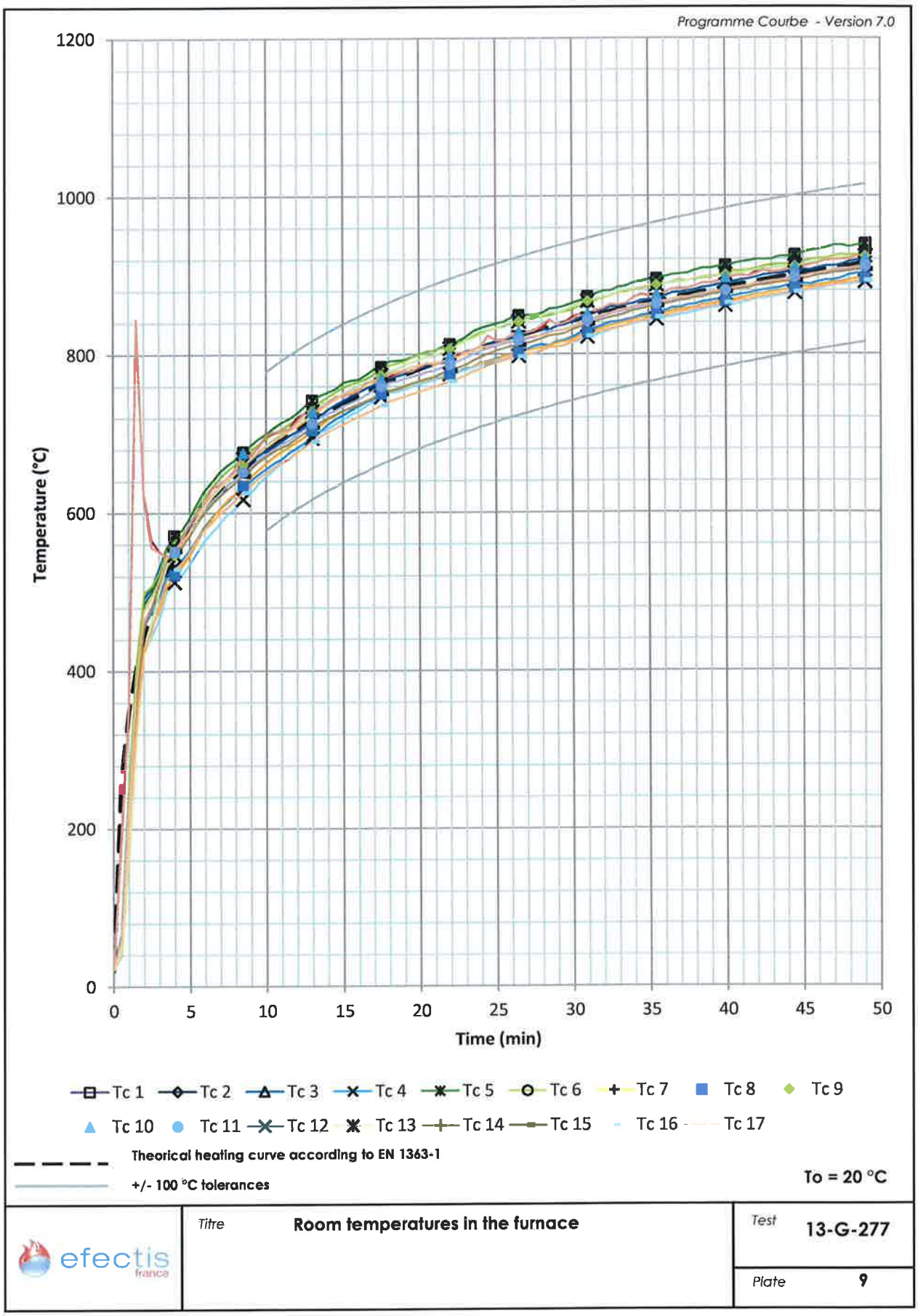


PLATE 7: SENSORS LOCATION PLAN





efectis france	Title: **Room temperature in the laboratory**	Test: **13-G-277**	
		Plate: **8**	

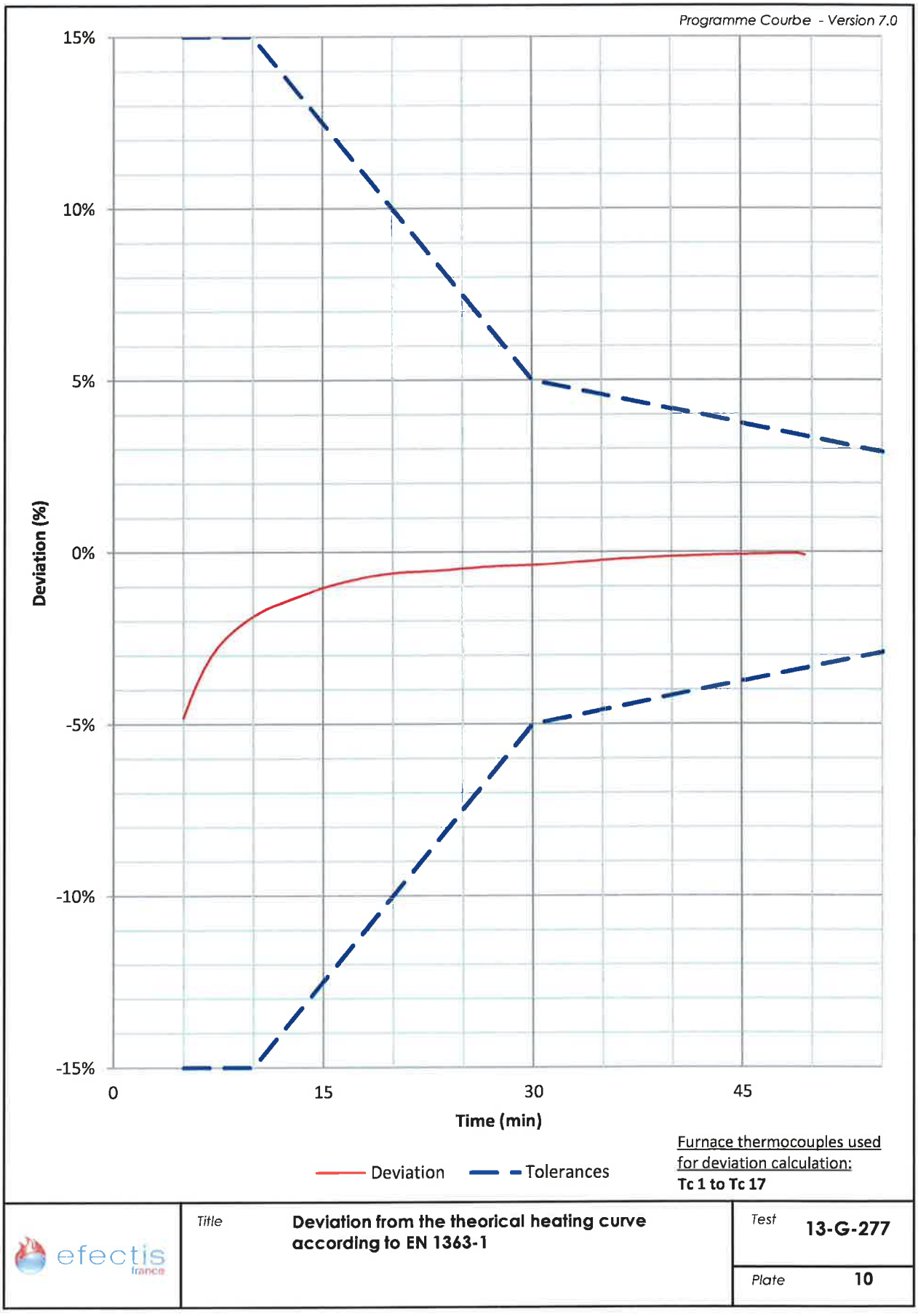


efectis france

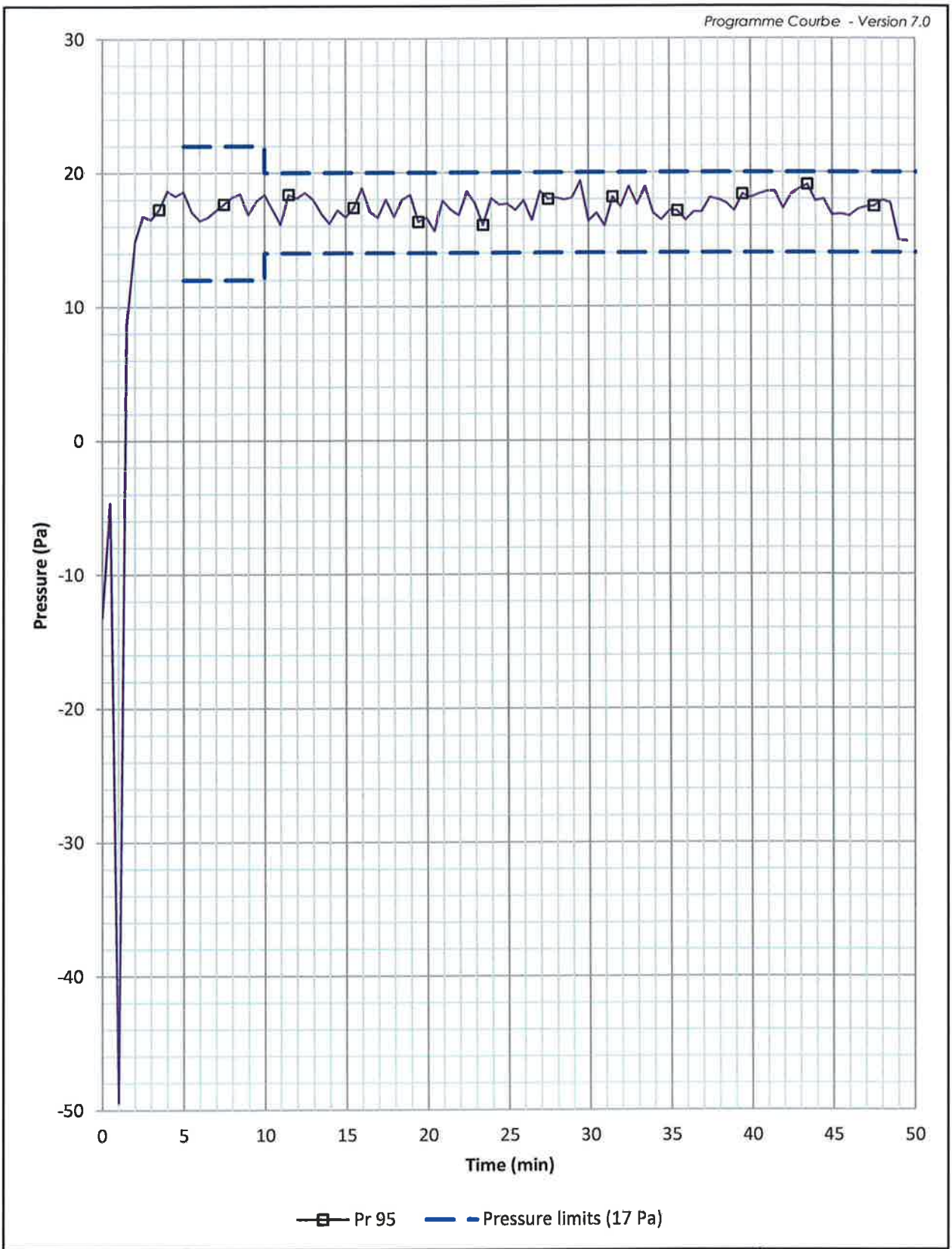
Titre **Room temperatures in the furnace**

Test **13-G-277**

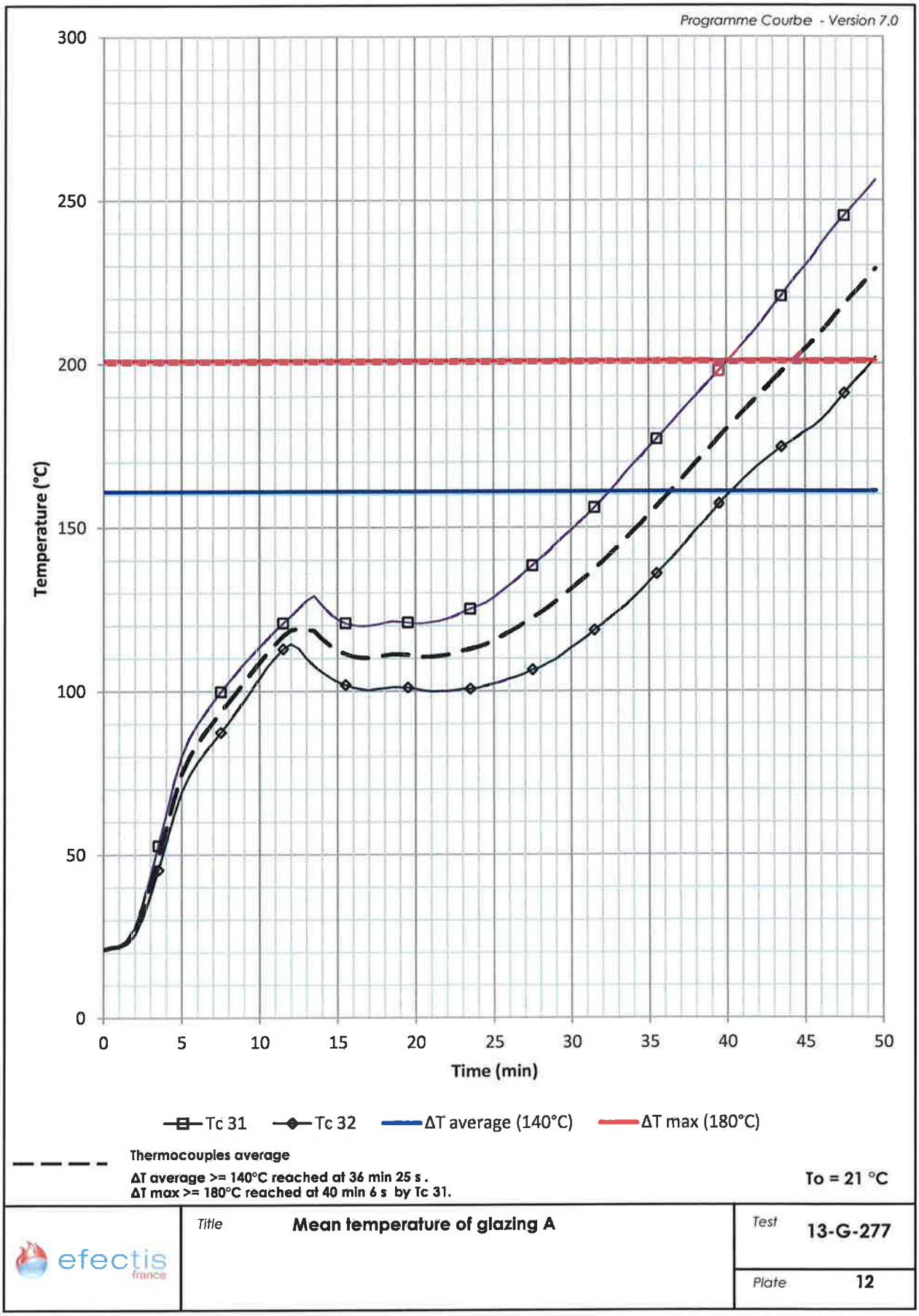
Plate **9**



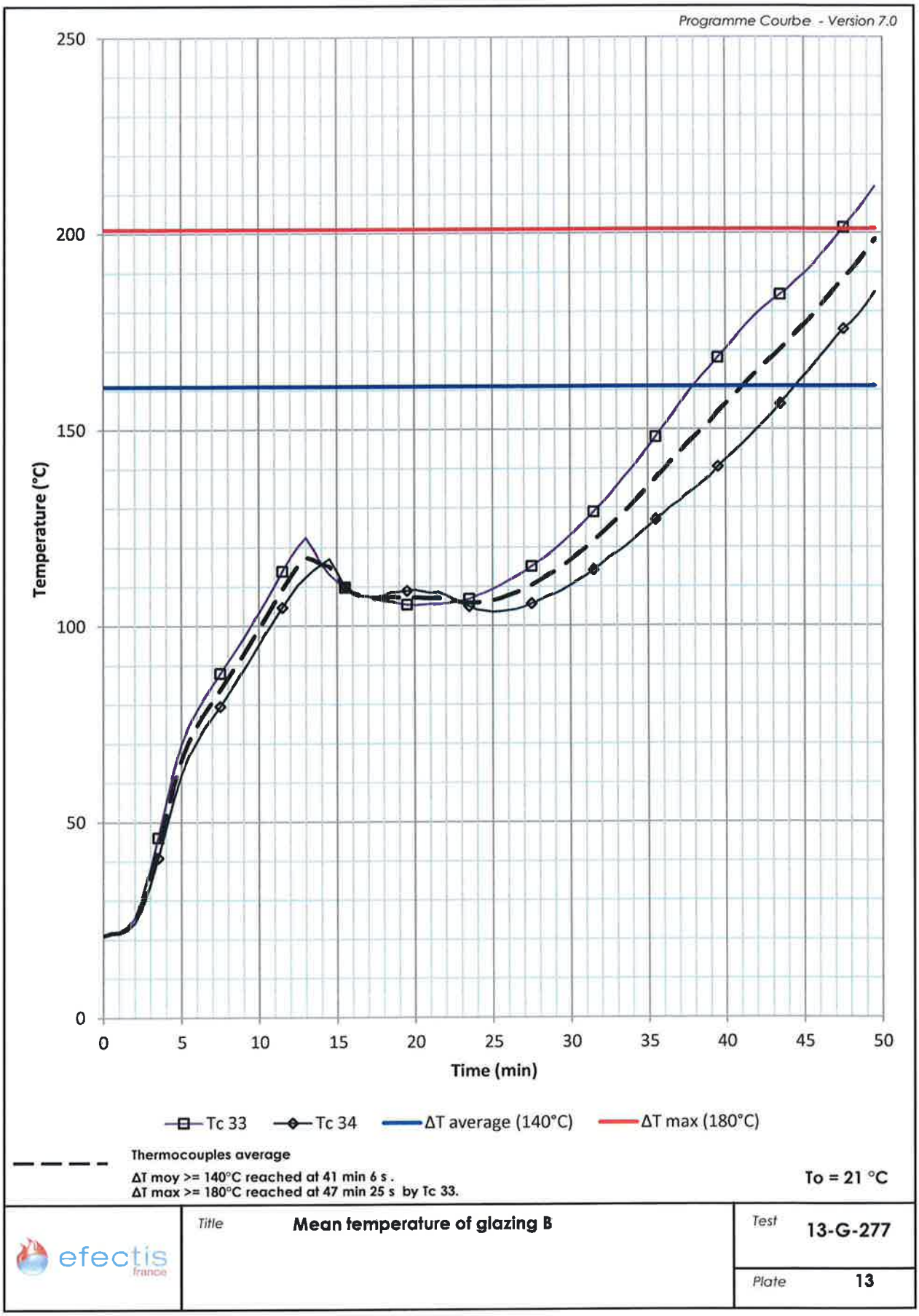
efectis france	Title: **Deviation from the theorical heating curve according to EN 1363-1**	Test: **13-G-277**	
		Plate: **10**	



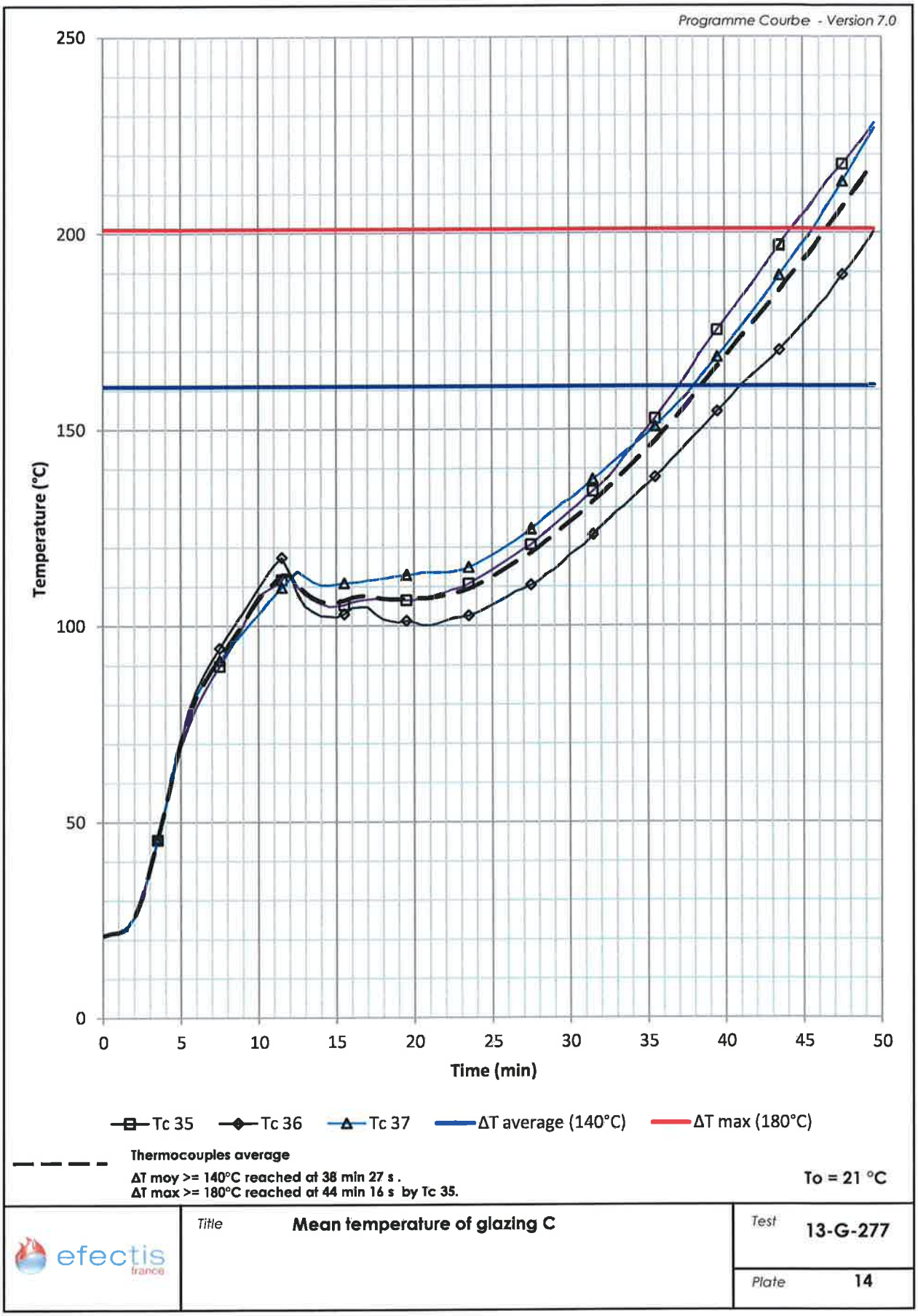
efectis france	Title: **Room pressure in the furnace**	Test: **13-G-277**	
		Plate: **11**	



efectis france	Title: **Mean temperature of glazing A**	Test: **13-G-277**	
		Plate: **12**	



efectis france	Title: **Mean temperature of glazing B**	Test: **13-G-277**	
		Plate: **13**	

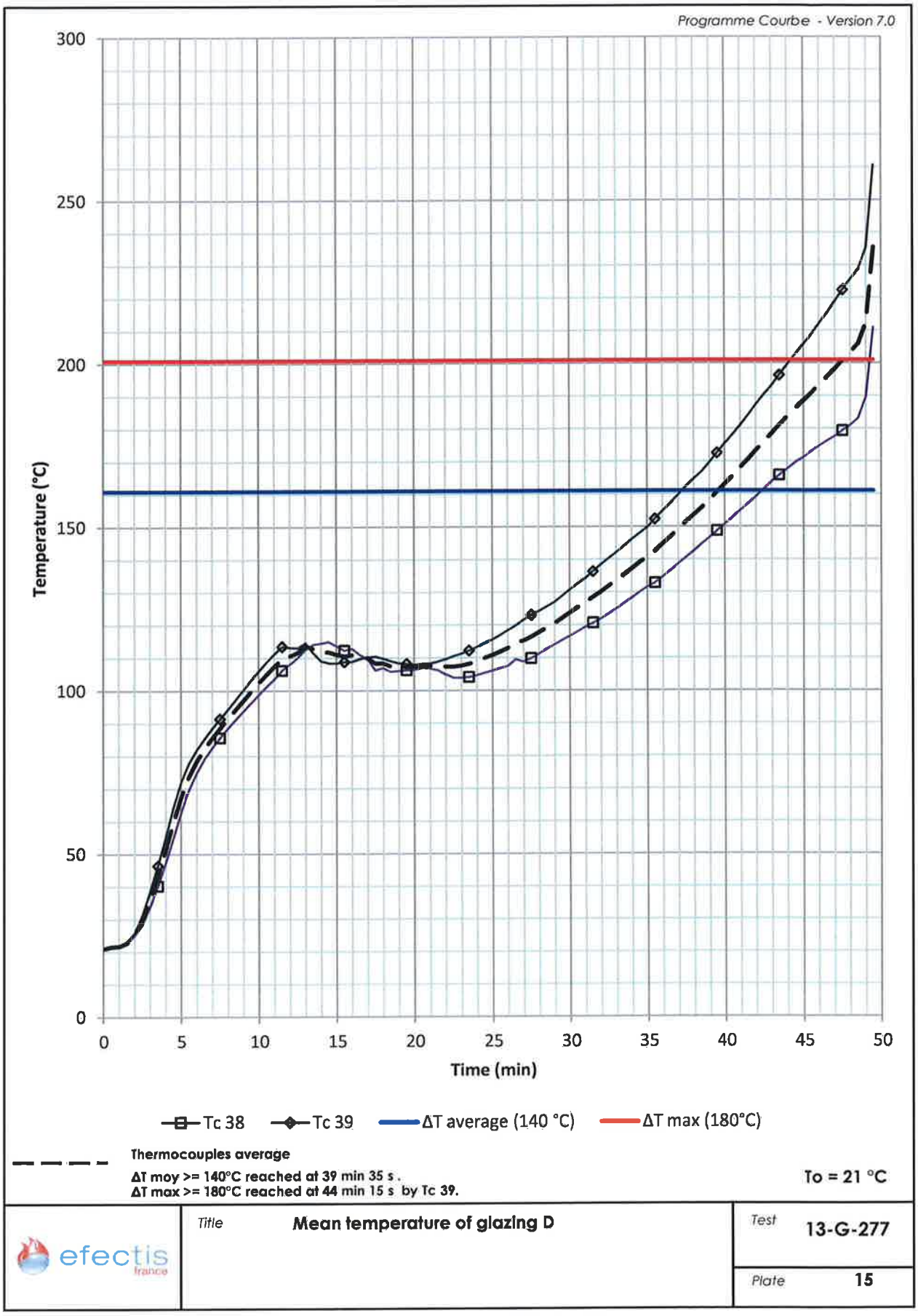


efectis france

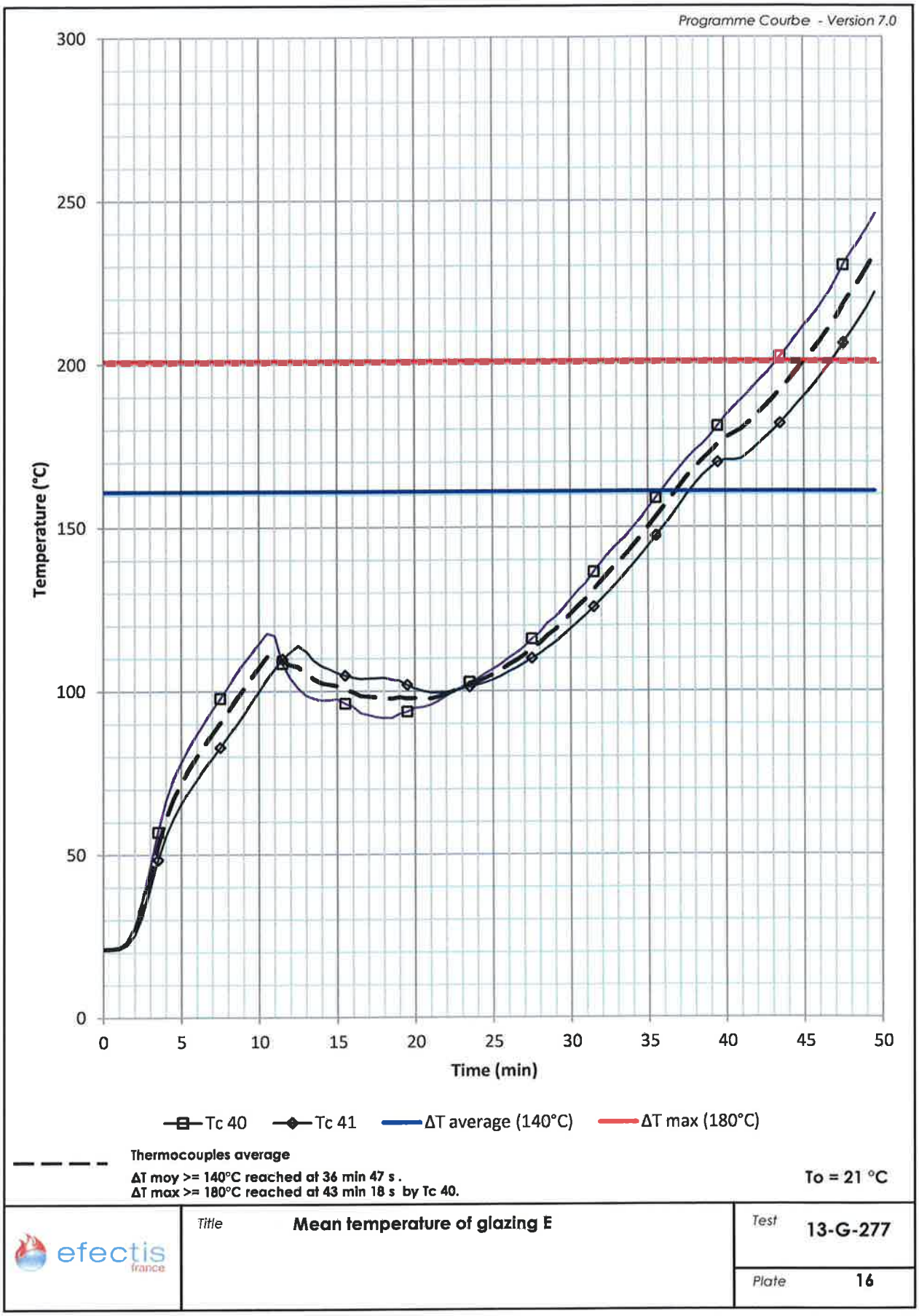
Title **Mean temperature of glazing C**

Test **13-G-277**

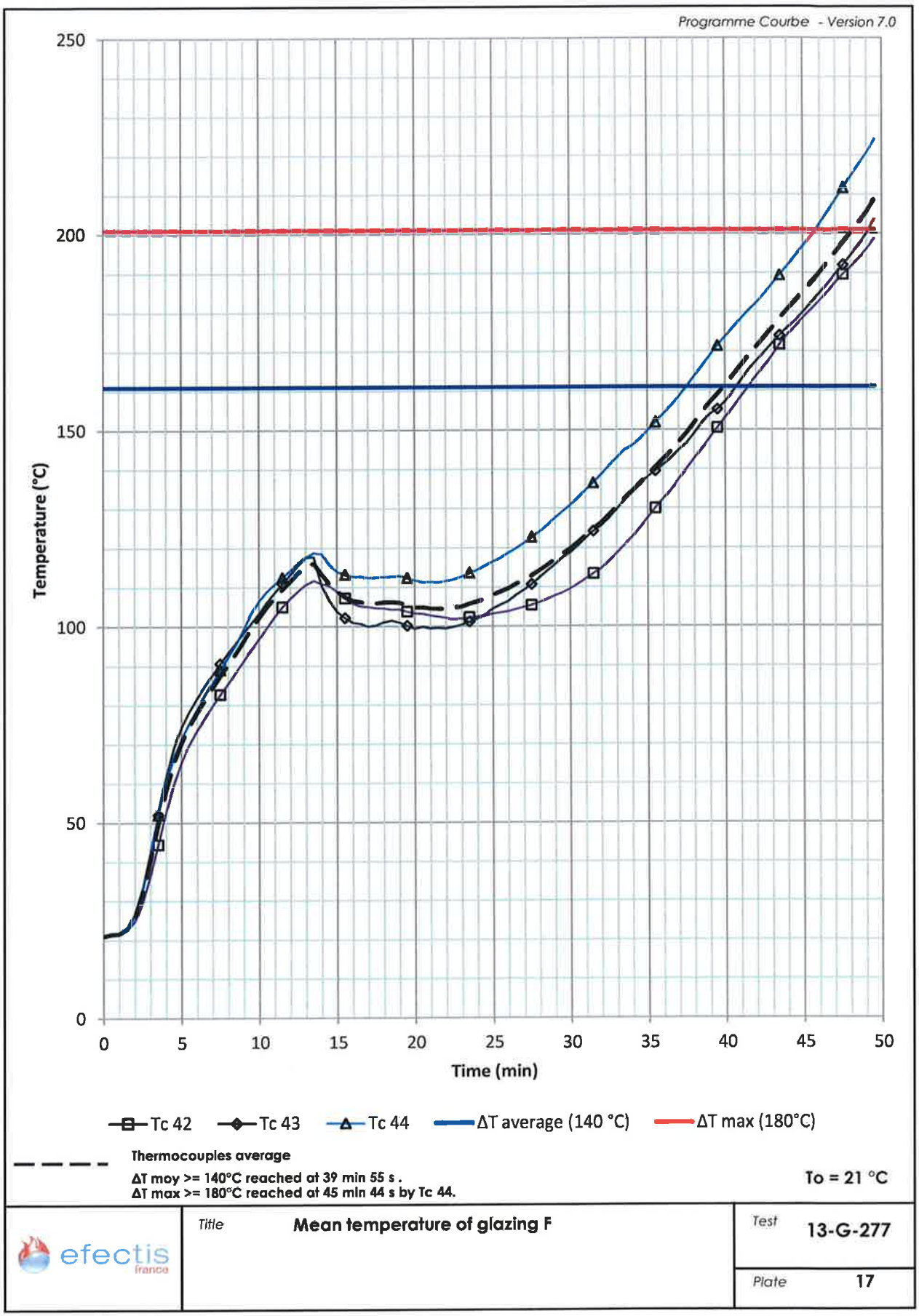
Plate **14**



efectis france	Title: **Mean temperature of glazing D**	Test: **13-G-277**	
		Plate: **15**	



efectis france	Title: **Mean temperature of glazing E**	Test: **13-G-277**	
		Plate: **16**	

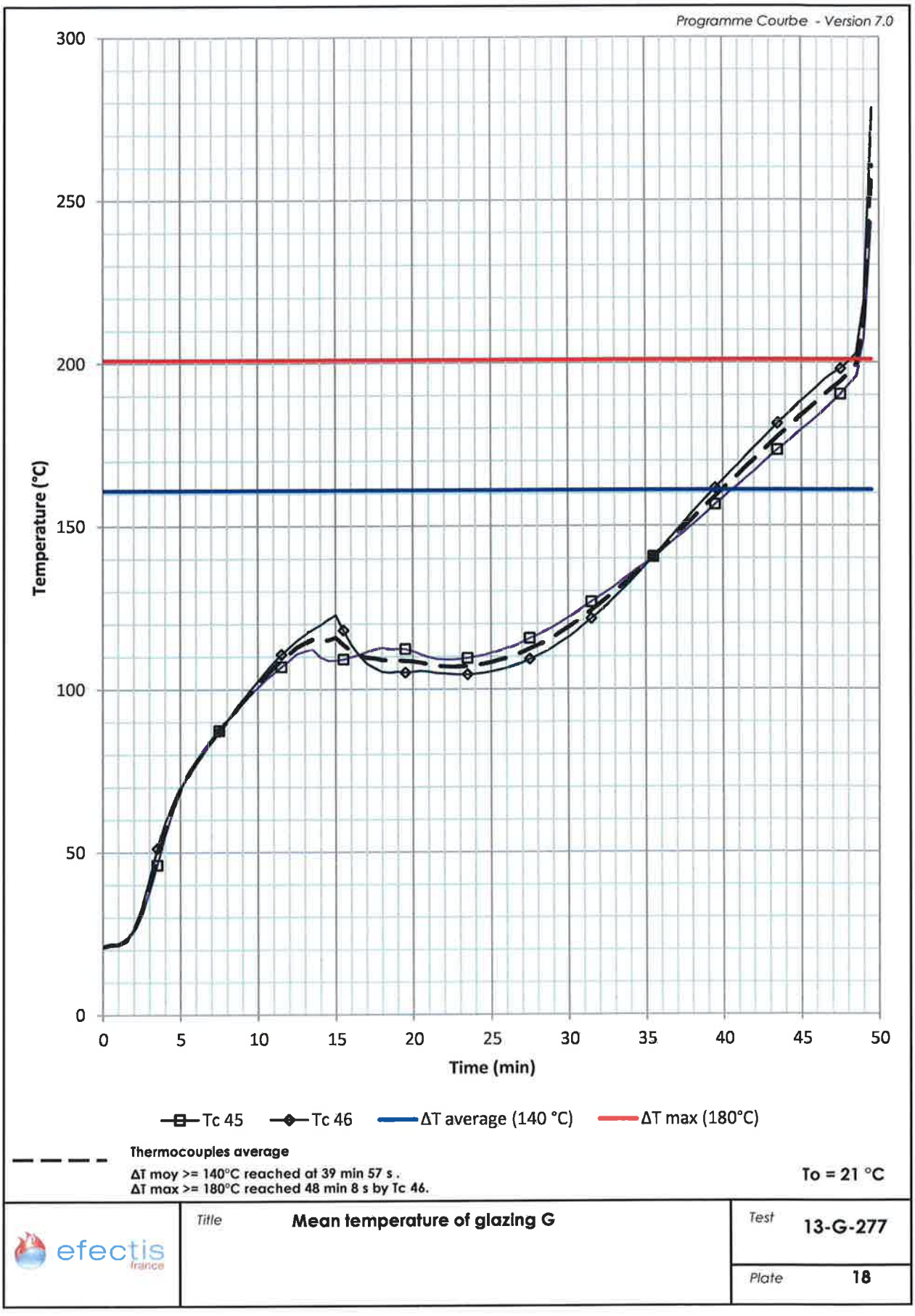


efectis france

Title: **Mean temperature of glazing F**

Test: **13-G-277**

Plate: **17**

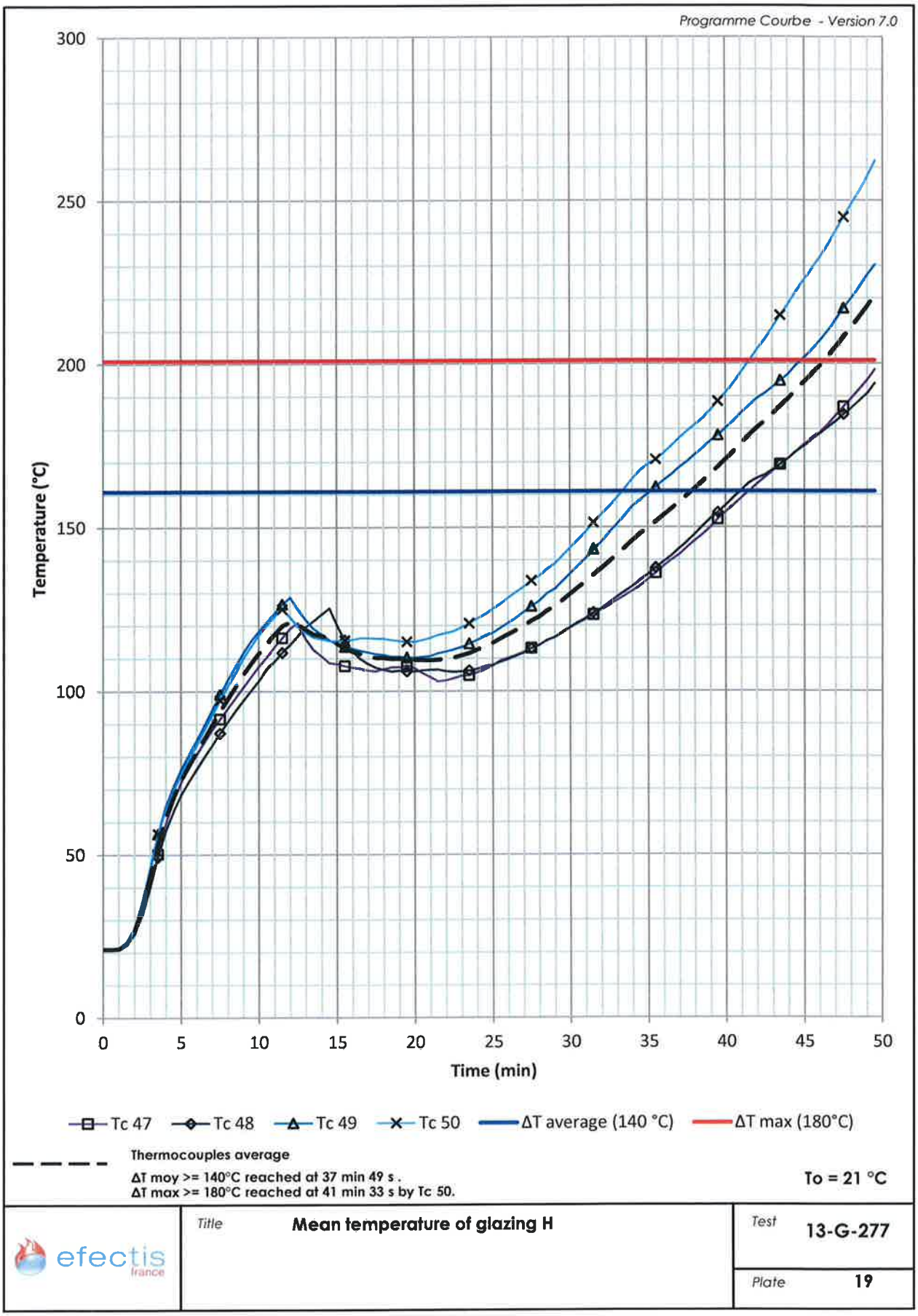


efectis france

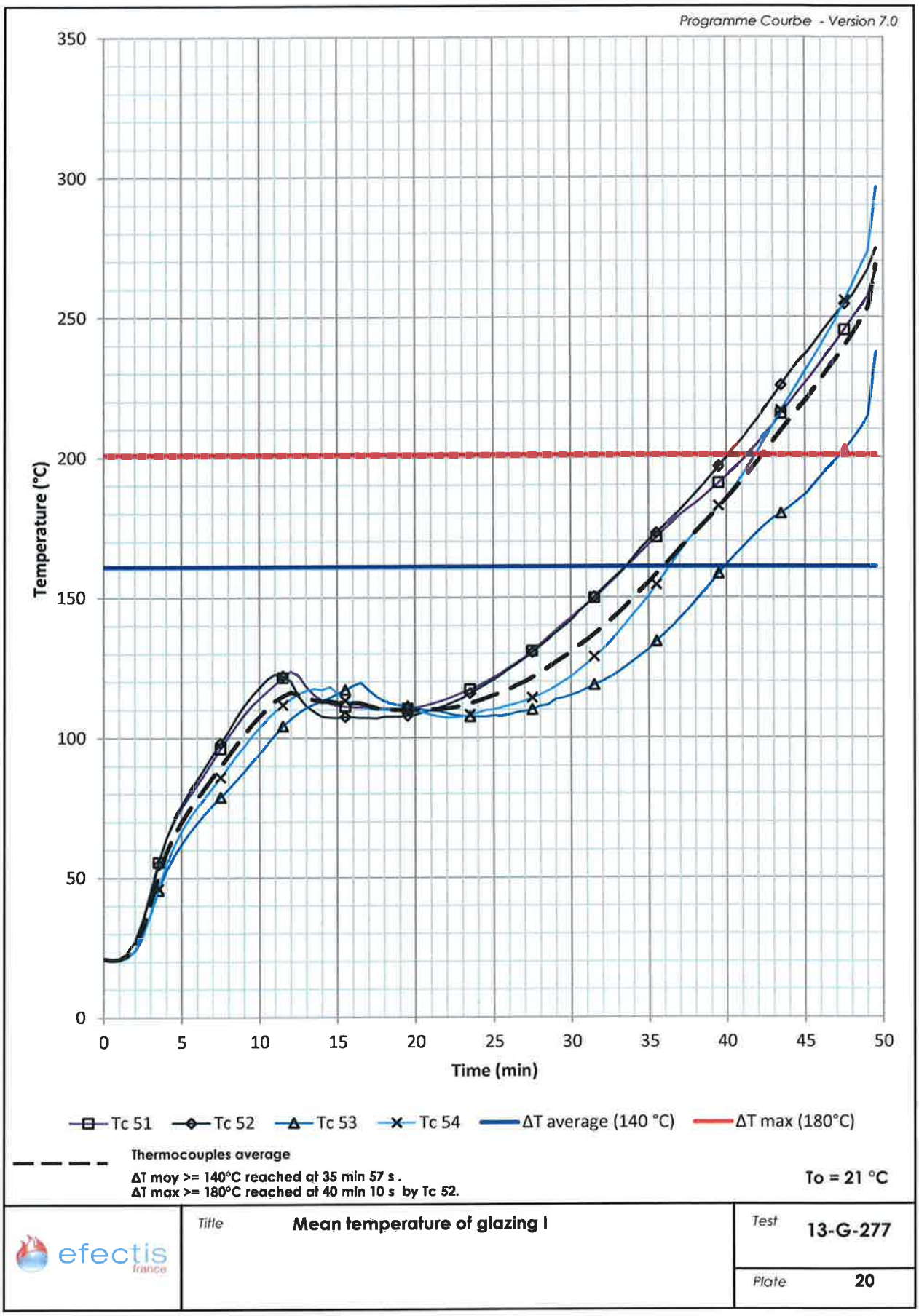
Title: **Mean temperature of glazing G**

Test: **13-G-277**

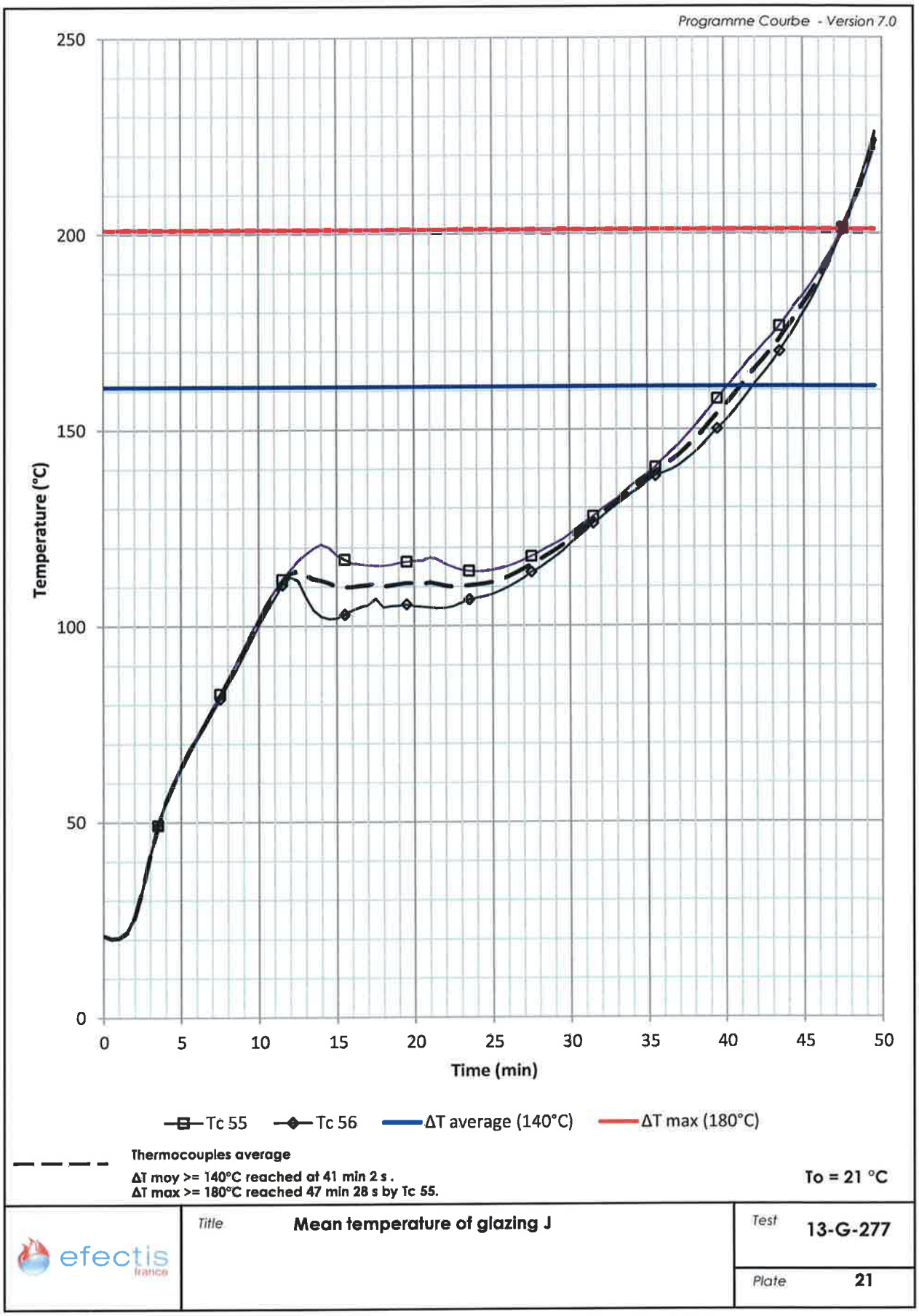
Plate: **18**



efectis france	Title: **Mean temperature of glazing H**	Test: **13-G-277**	
		Plate: **19**	



efectis france	Title: **Mean temperature of glazing I**	Test: **13-G-277**	
		Plate: **20**	

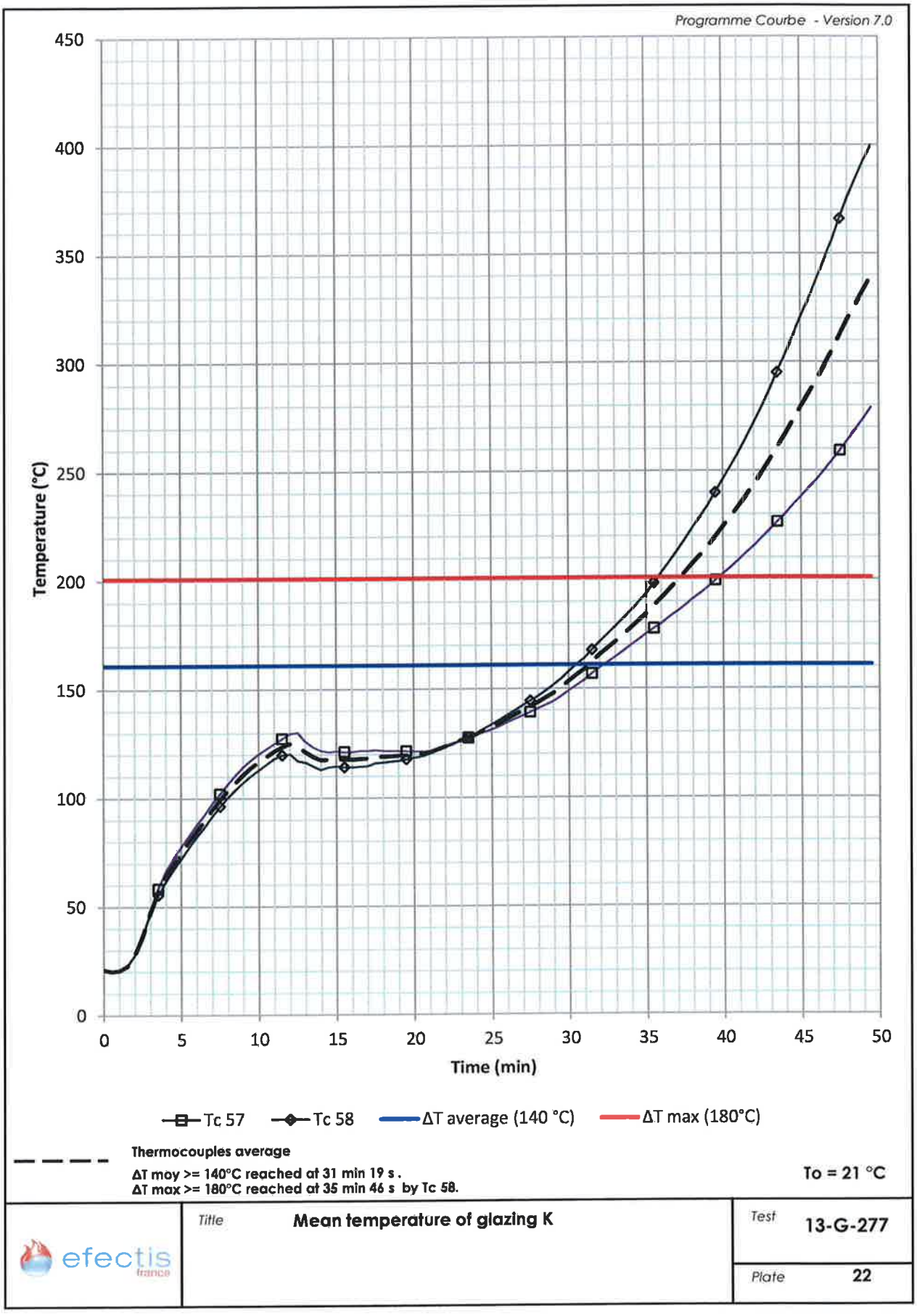


efectis france

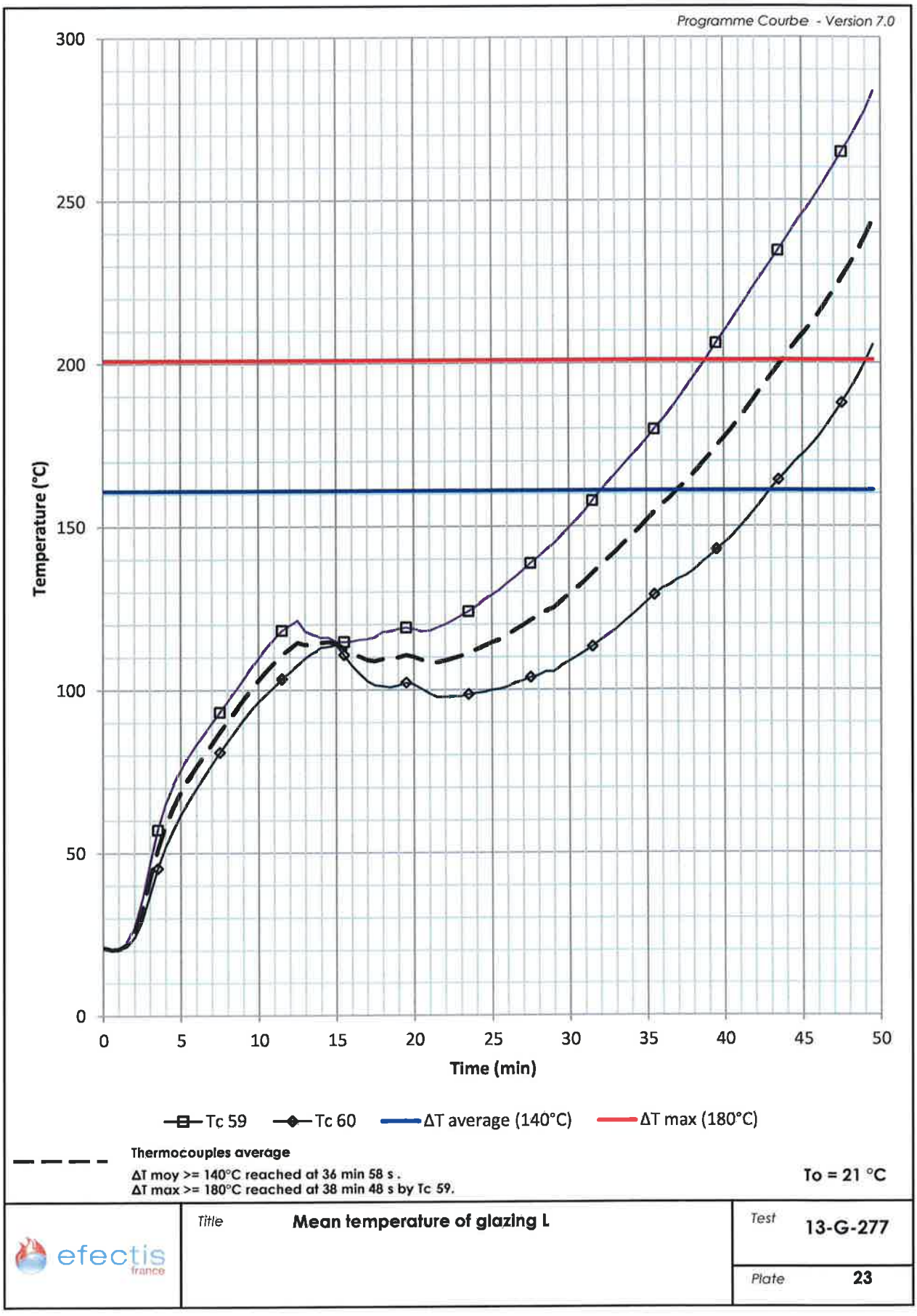
Title: **Mean temperature of glazing J**

Test: **13-G-277**

Plate: **21**



efectis france	Title: **Mean temperature of glazing K**	Test: **13-G-277** Plate: **22**

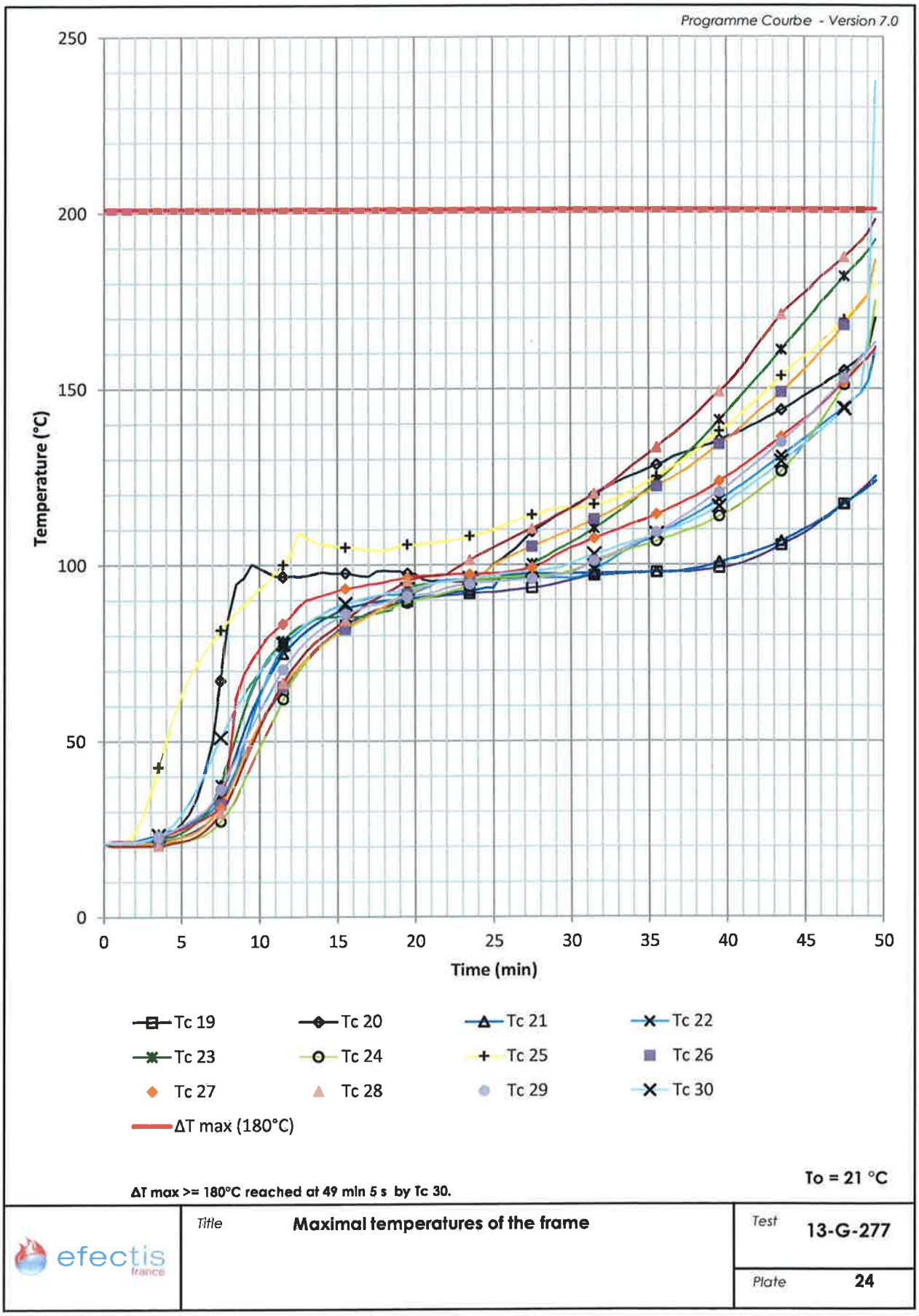


efectis france

Title **Mean temperature of glazing L**

Test **13-G-277**

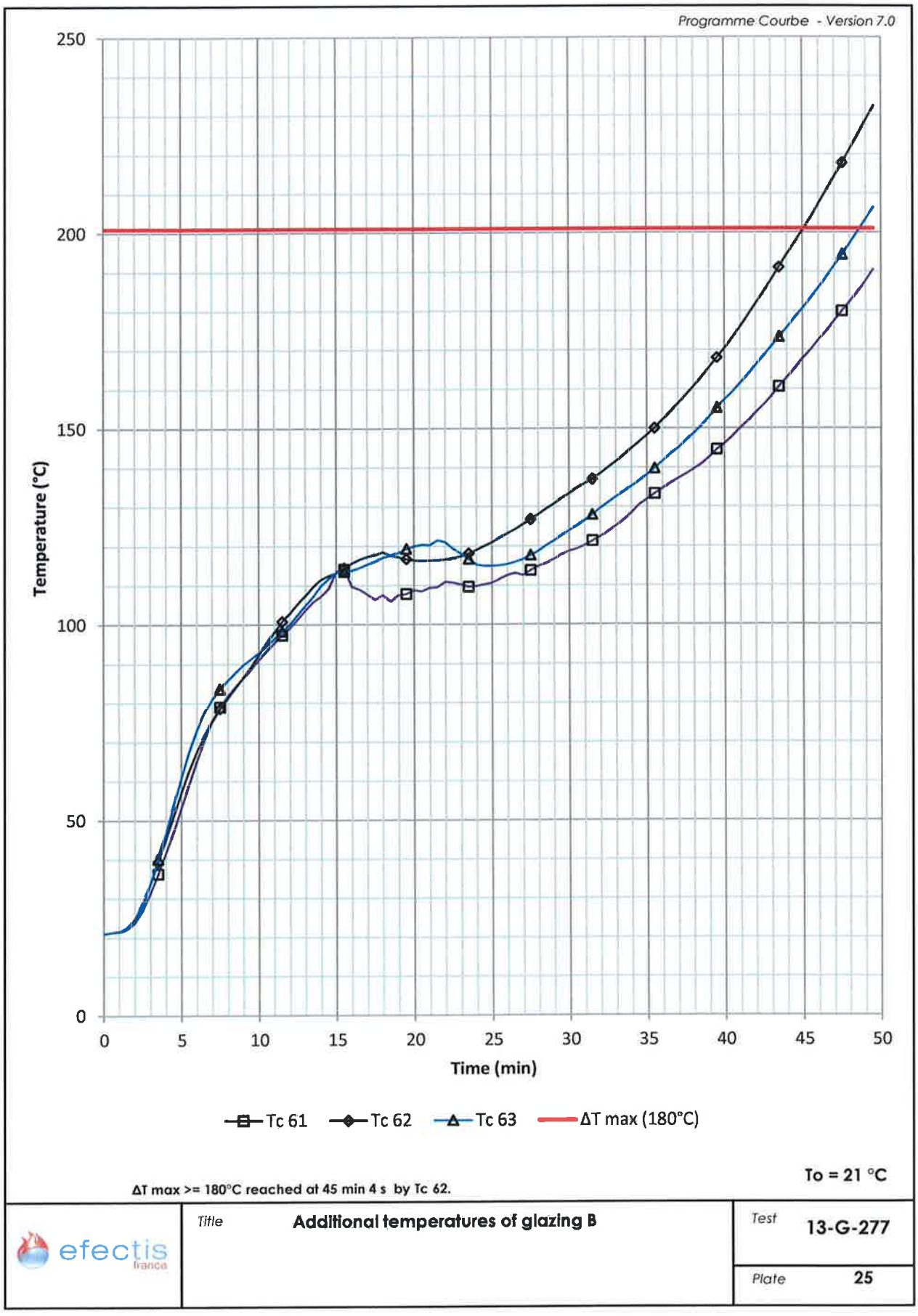
Plate **23**



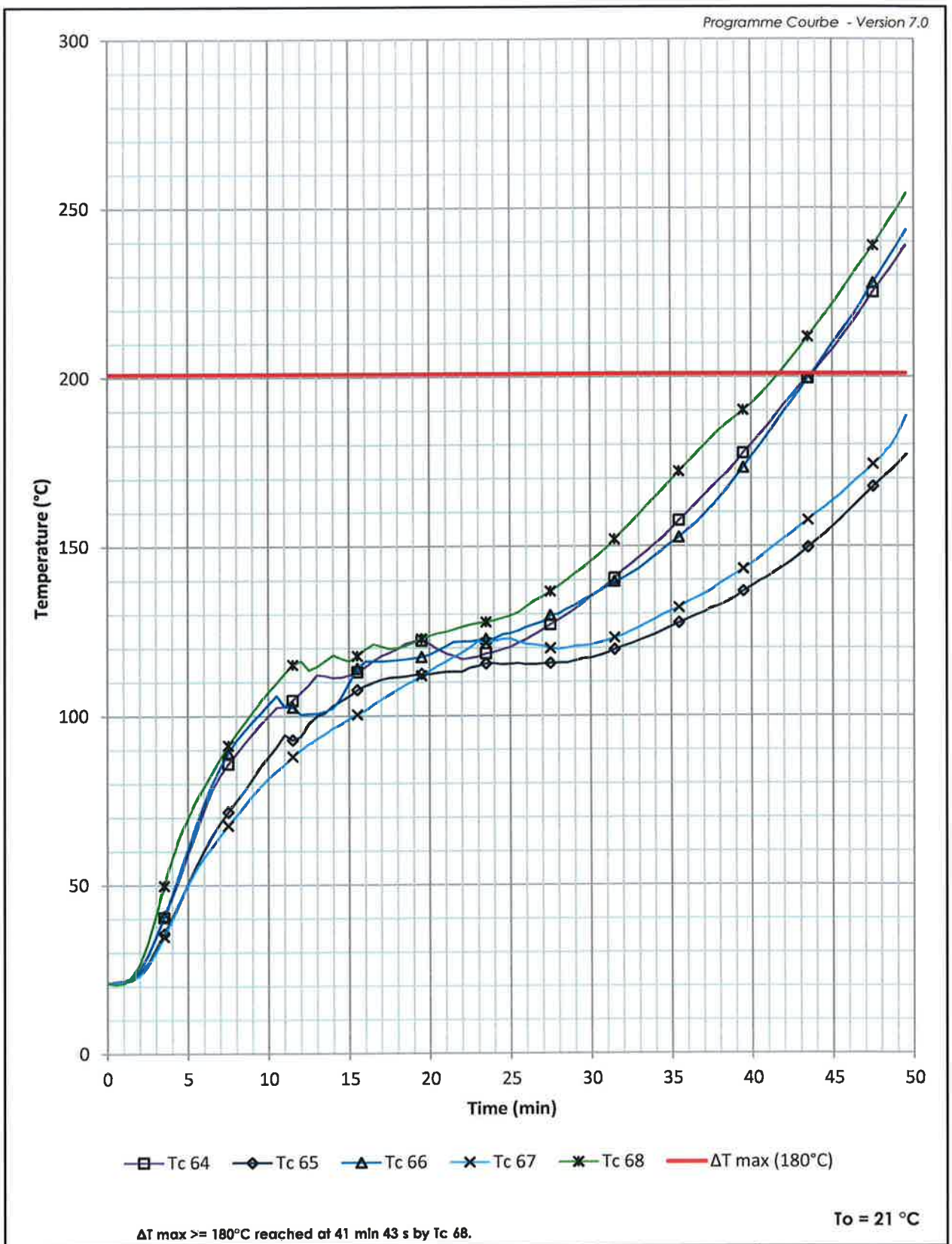
ΔT max >= 180°C reached at 49 min 5 s by Tc 30.

To = 21 °C

efectis france	Title: **Maximal temperatures of the frame**	Test: **13-G-277**	
		Plate: **24**	



efectis france	Title: **Additional temperatures of glazing B**	Test: **13-G-277**	Plate: **25**



To = 21 °C

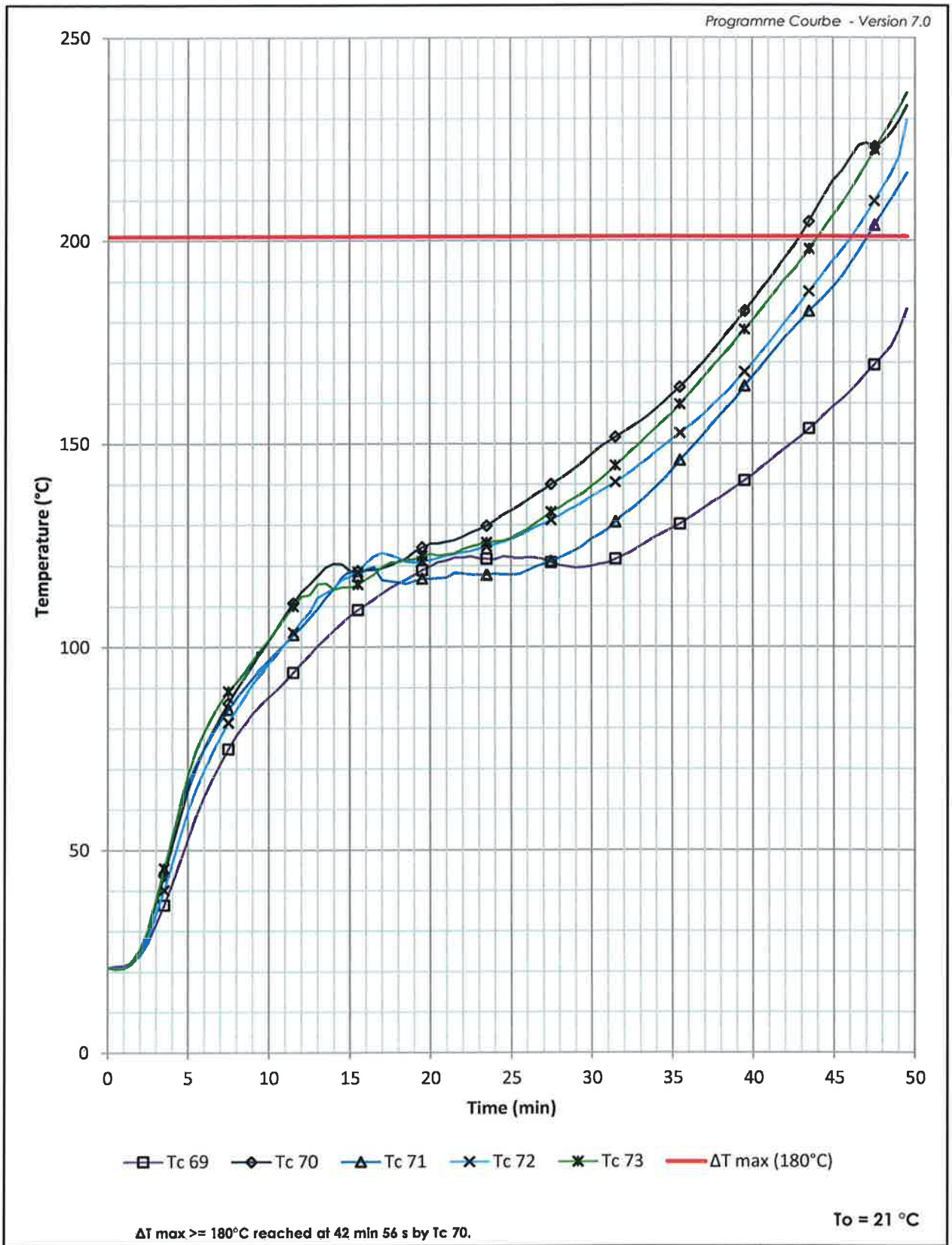
ΔT max >= 180°C reached at 41 min 43 s by Tc 68.

efectis france

Title **Additional temperatures of glazing C**

Test **13-G-277**

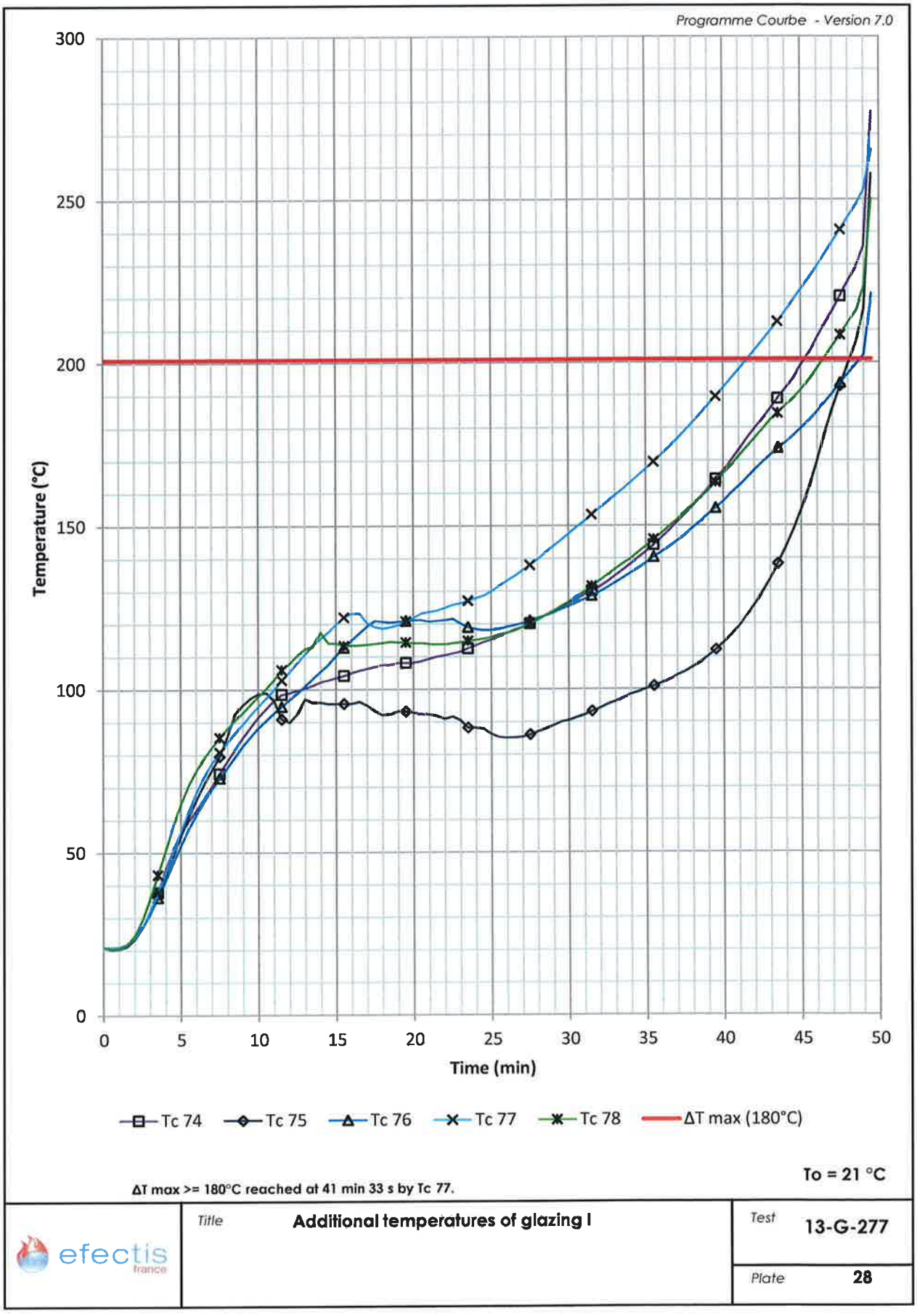
Plate **26**



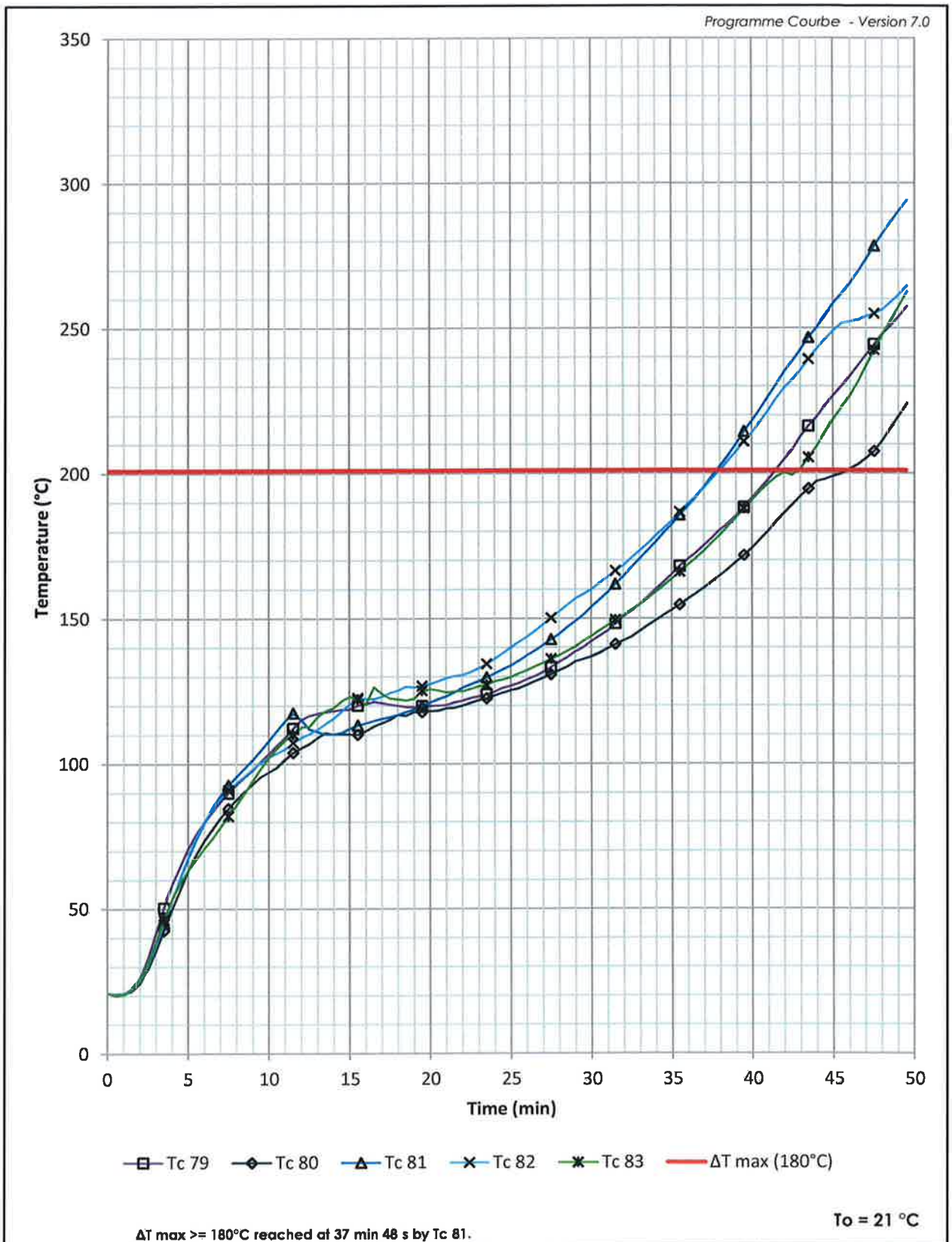
ΔT max >= 180°C reached at 42 min 56 s by Tc 70.

To = 21 °C

efectis france	Title: Additional temperatures of glazing H	Test: 13-G-277	
		Plate: 27	



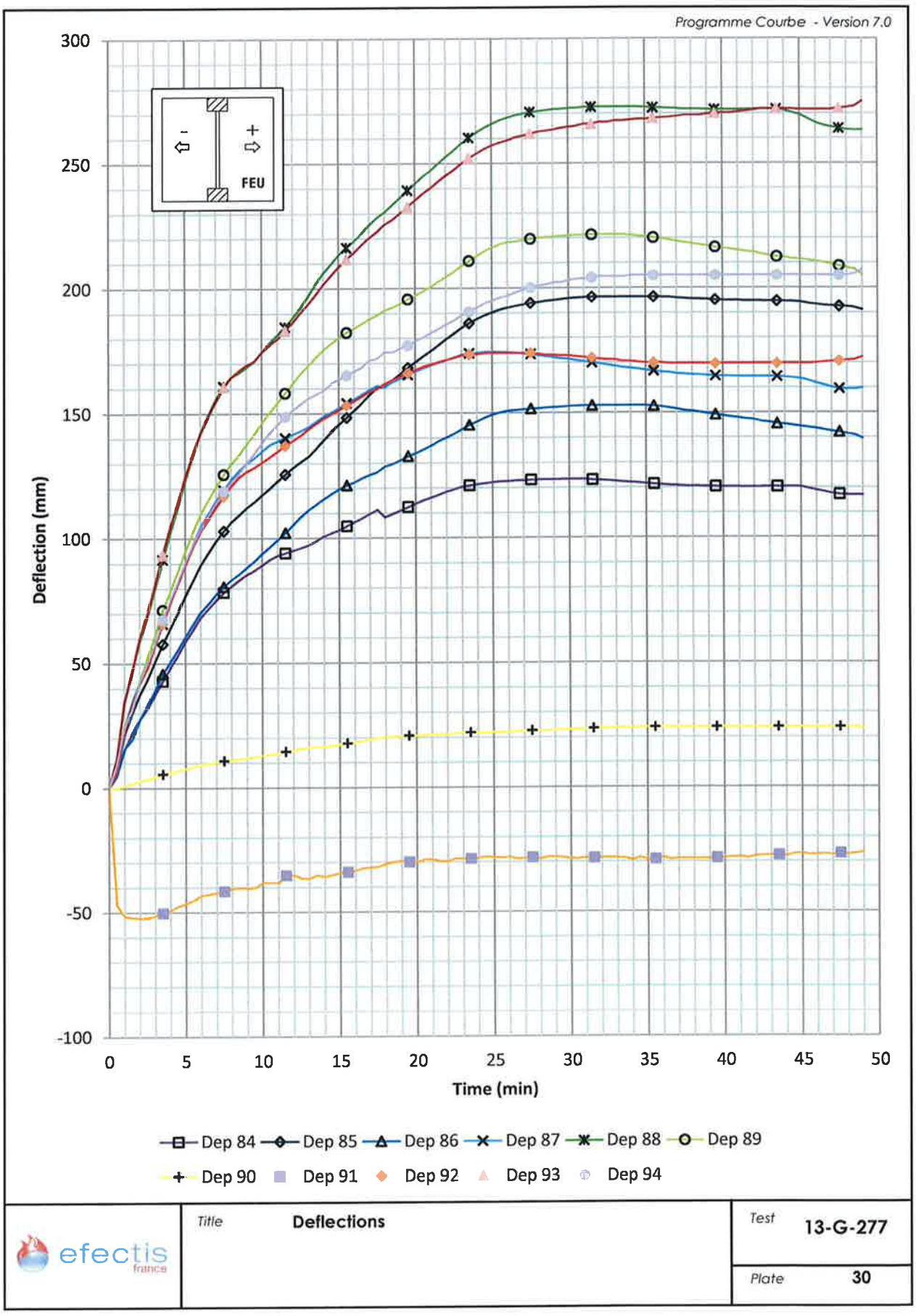
efectis france	Title: **Additional temperatures of glazing I**	Test: **13-G-277**	Plate: **28**



To = 21 °C

ΔT max >= 180°C reached at 37 min 48 s by Tc 81.

efectis france	Title: Additional temperatures of glazing K	Test: 13-G-277
		Plate: 29



efectis france

Title **Deflections**

Test **13-G-277**

Plate **30**

Photo A (top)	Element before the test.
Photo B (bottom)	Opening in glazing I at the 33rd minute.

Photo C (top)	Element at the end of the test.
Photo D (bottom)	Element after test and cool down on the unexposed side.

Photo E (bottom)	Element after test and cool down on the exposed side.