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TEST REPORT

FIRE TEST REPORT 13 - G- 222

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

Test	13 - G -222
Performed on	March 20th, 2013
Regarding	A glazed partition wall made of a steel frame
	Frame : RP ISO Hermetic 70 (RP TECHNIK)
	Glazing : 26 mm thick PYROBEL 25 (AGC)
	Overall dimensions : 4,940 x 4,960 mm (w x h)
Sponsor	RP Technik GmbH Profilsysteme Edisonstrasse 4 D - 59 199 BÖNEN

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 - 222

Test date: March 20th, 2013

5. REFERENCE AND MANUFACTURER OF THE TESTED SPECIMEN

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

Glazing :
Reference : 26 mm thick PYROBEL 25
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 26 mm thick PYROBEL 25 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 RPF 915112 (RP TECHNIK), for the mullion on the free edge and the top transom,
- 70 x 100 mm steel profiles, reference RPF 915212 (RP TECHNIK), for the mullion doing the junction with the second framework,
- 70 x 100 mm steel profiles, reference RPF 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 RPF 915112 (RP TECHNIK), for the mullion on the free edge and the top transom,
- 70 x 100 mm steel profiles, reference RPF 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. The such formed cavity was also insulated by two 12,5 mm thick FERMACELL plates (XELLA), reference 954012 (RP TECHNIK). 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 26,6 mm thick PYROBEL 25 glazing (AGC), made of:
- A 3 mm thick float
- A 1,65 mm intumescent layer
- 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
- 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 920072 (RP TECHNIK) and section 30 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 28 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 : 8 °C.
Initial mean temperature of the element before the test : T_0 = 13 °C.

10.2. DURING THE TEST

Time (min)	Observations
00	Start of the test. See photograph A.
01	Glazing J, K,L and then E to I are cracking.
01'30	Glazing A to C are cracking and the first intumescent layer of glazing E to L is developing.
02	All the glazing have cracked and the first intumescent layer of all of them has developed.
04	The first intumescent layer of glazing E to L is browning.
07	The first intumescent layer of glazing A to D is browning. The second intumescent layer starts to develop.
10	Smoke release on the cracks of glazing K and L as well as at the junctions between the two frames.
13	Important smoke release from all the junctions mullion/transom.
15	Nothing particular to report.
22	The intumescent layers are directly visible on the left peripheral side of glazing I.
25	The third intumescent layer starts to develop.
26	The intumescent layer of glazing H is pushing away the glazing on the unexposed side under thermocouple 47.
29	Incandescent spots from the crack in the left bottom corner of glazing I.
30	Nothing particular to report.
45	Nothing particular to report.
52	Cotton-wool pad test on the opening in the bottom left corner of glazing I negative.
53	Maximal temperature of thermocouple 76 placed on glazing I at mid-width of it at 15 mm from its top transom is rising over 180K compared with the initial temperature of the element. The information given by this thermocouple is only informative because placed at less than 20 mm from a discontinuity and thus the insulation criteria are always fulfilled according to norms EN 1363-1:2012 and EN 1364-1:1999.
58	Gap in the middle of glazing K: the furnace is visible but no opening is observed.
60	Nothing particular to report.
62	Ø 6 mm gap gauge test negative on the opening in the bottom left corner of glazing I.
64	**Cotton-wool pad test on the opening in the bottom left corner of glazing I positive. See photo C.**
65	Gap between glazing C and its top transom : no opening.
66	**Sustained flaming with duration higher than 10 seconds between glazing I and its top transom as well as on the cracking made in the middle of glazing K.**
67	**Ø 6 mm gap gauge test estimated positive between glazing C and its top transom.**
70	**End of the test on request of the Sponsor. See photograph C.**

10.3. AFTER THE TEST AND COOL DOWN

10.3.1. **On the unexposed side :**

See photo D. Glazing I has fallen down. No other disorder was visible.

10.3.2. **On the exposed side :**

See photo E. The glazing beads were still in place. Glazing C was still in place except the top part which bent on the unexposed side and glazing K presented cracks.

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	:	SIXTY-FOUR MINUTES - (64 min)
Cause of failure	:	**Cotton-wool pad test on the opening in the bottom left corner of glazing I positive.**

11.1.2. **Gap gauge**

Duration	:	SIXTY-SEVEN MINUTES - (67 min)
Cause of failure	:	**Ø 6 mm gap gauge test positive between glazing C and its top transom.**

11.1.3. **Sustained flaming**

Duration	:	SIXTY-SIX MINUTES - (66 min)
Cause of failure	:	**Sustained flaming with duration higher than 10 seconds between glazing I and its top transom as well as on the cracking made in the middle of glazing K.**

11.2. THERMAL INSULATION

Duration	:	SIXTY-FOUR MINUTES - (64 min)
Cause of failure	:	**Failure of integrity criterion.**

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. 4,960 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, March 20th 2013

Olivia D'HALLUIN
Product leader of glazing systems

Hervé RYCKEWAERT
Head of section " Tests"

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

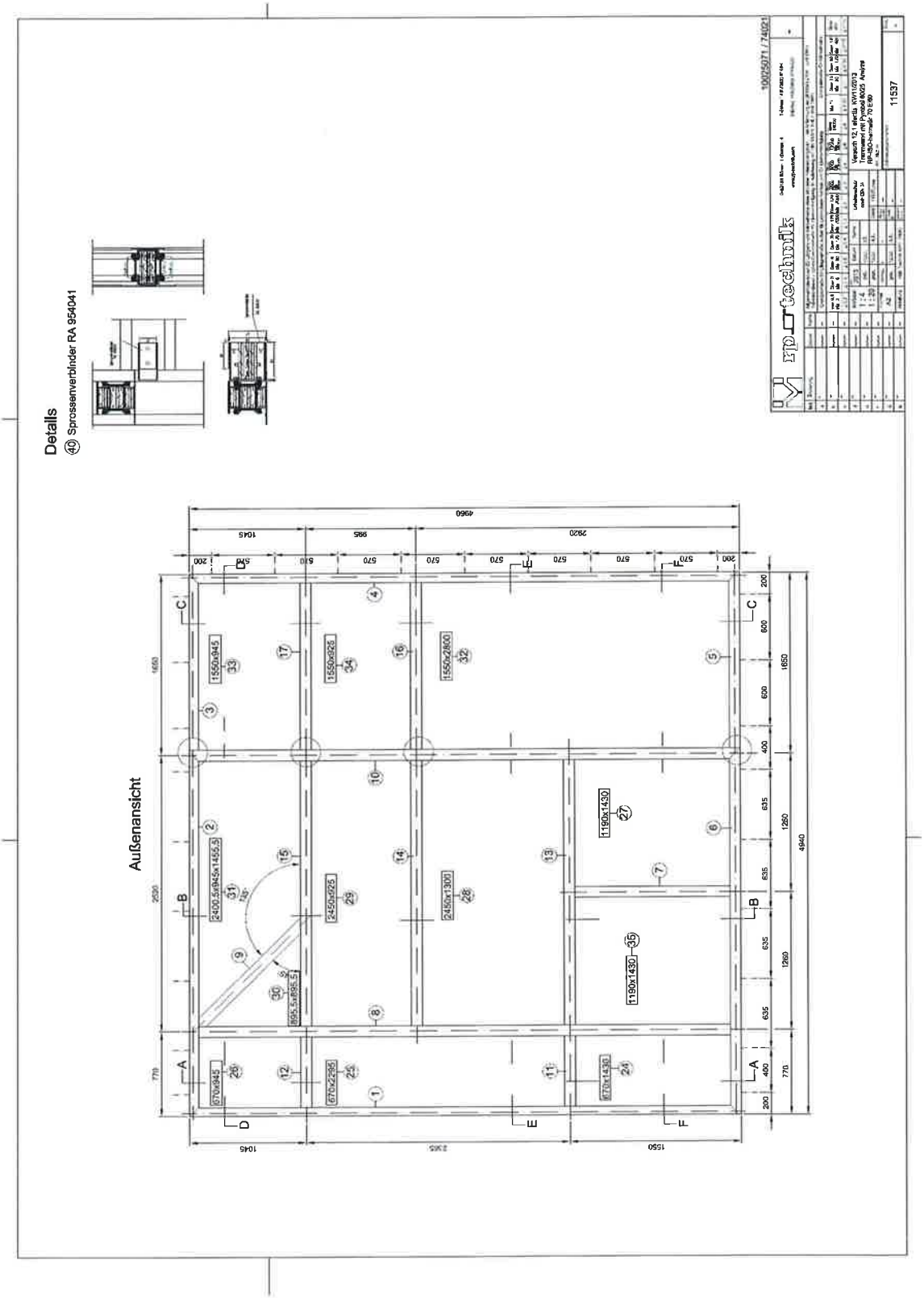

PLATE 2: VERTICAL SECTIONS A-A, B-B AND C-C WITH DETAILS OF THE FIXATION TO THE SUPPORTING CONSTRUCTION

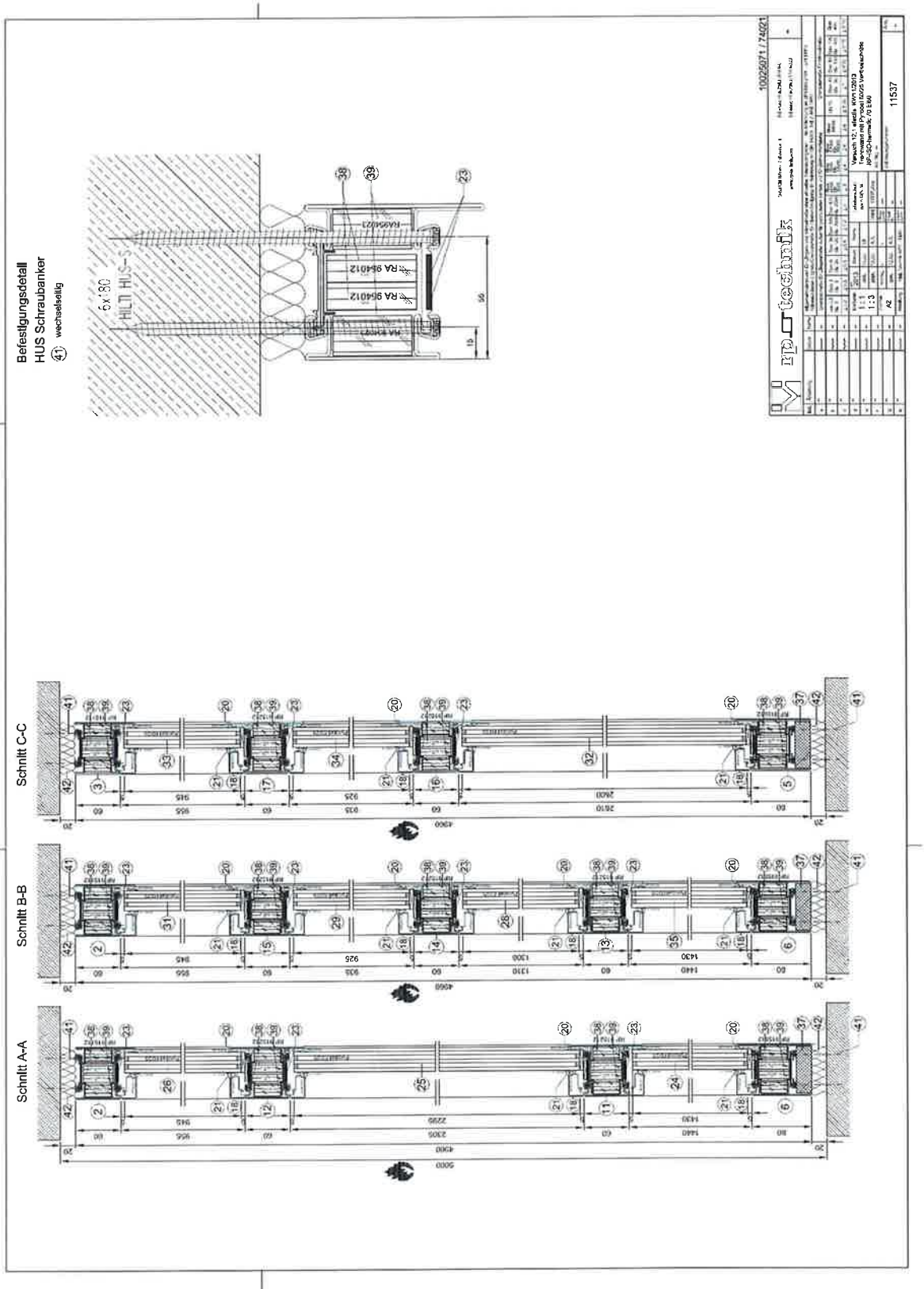

PLATE 3: HORIZONTAL SECTIONS D-D, E-E and F-F

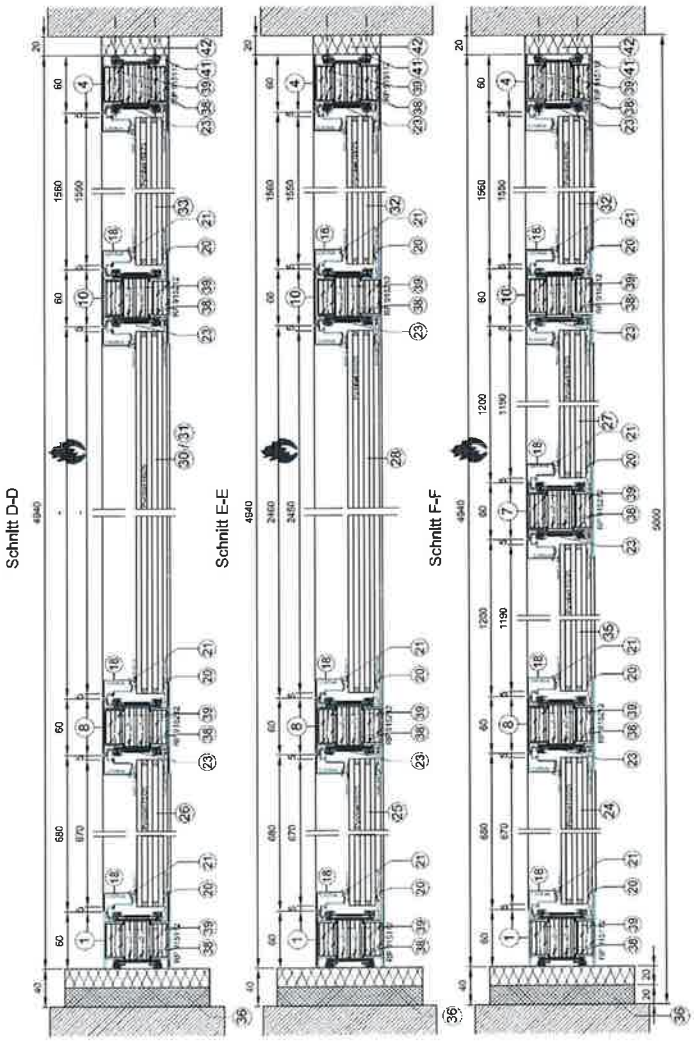

PLATE 4: DETAILS OF THE GLAZING

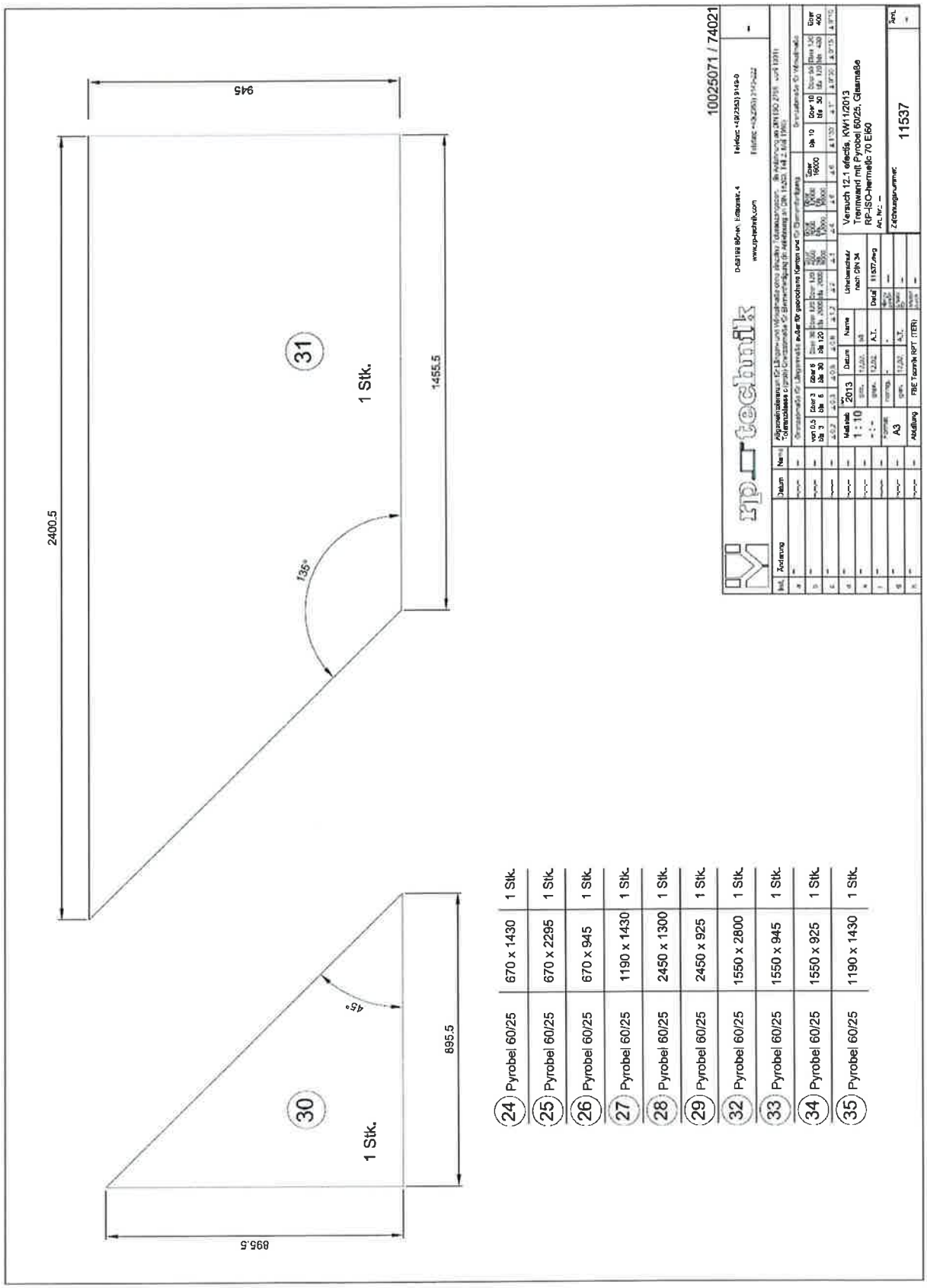

PLATE 5: PARTS LIST

Materialliste

Teil Nr.	Stck/lfm	Art.Nr.	Benennung	Länge (mm)
1	1 Stck	RP 915112	Rahmenprofil	4940
2	1 Stck	RP 915112	Rahmenprofil	3320
3	1 Stck	RP 915112	Rahmenprofil	1620
4	1 Stck	RP 915112	Rahmenprofil	4940
5	1 Stck	RP 915512	Sockelprofil	1640
6	1 Stck	RP 915512	Sockelprofil	3360
7	1 Stck	RP 915212	Sprossenprofil	1440
8	1 Stck	RP 915212	Sprossenprofil	4820
9	1 Stck	RP 915212	Sprossenprofil	anpassen!
10	1 Stck	RP 915212	Sprossenprofil	4980
11	1 Stck	RP 915212	Sprossenprofil	680
12	1 Stck	RP 915212	Sprossenprofil	680
13	1 Stck	RP 915212	Sprossenprofil	2460
14	1 Stck	RP 915212	Sprossenprofil	2460
15	1 Stck	RP 915212	Sprossenprofil	2460
16	1 Stck	RP 915212	Sprossenprofil	1560
17	1 Stck	RP 915212	Sprossenprofil	1560
18	72 lfm	RP 920072	Glashalteleiste	
19	-	-	-	
20	65 lfm	RA 930096	Verglasungsdichtung aussen	
21	66 lfm	RA 930116	Verglasungsdichtung innen	
22	-	-	-	
23	135 lfm	RA 957235	Promaseal LW 12,5X2	2x nebeneinander =25
24	1 Stck		Pyrobel 60/25 (26,6mm)	670 x 1430
25	1 Stck		Pyrobel 60/25 (26,6mm)	670 x 2295
26	1 Stck		Pyrobel 60/25 (26,6mm)	670 x 945
27	1 Stck		Pyrobel 60/25 (26,6mm)	1190 x 1430
28	1 Stck		Pyrobel 60/25 (26,6mm)	2450 x 1300
29	1 Stck		Pyrobel 60/25 (26,6mm)	2450 x 925
30	1 Stck		Pyrobel 60/25 (26,6mm)	895,5 x 895,5
31	1 Stck		Pyrobel 60/25 (26,6mm)	2400,5 x 945 x 1455,5
32	1 Stck		Pyrobel 60/25 (26,6mm)	1550 x 2800
33	1 Stck		Pyrobel 60/25 (26,6mm)	1550 x 945
34	1 Stck		Pyrobel 60/25 (26,6mm)	1550 x 925
35	1 Stck		Pyrobel 60/25 (26,6mm)	1190 x 1430
36	2 Stck		PromatectH Zuschnitt	420 x 20 x 2480
37	2 Stck		PromatectH Zuschnitt	63 x 20 x 2470
38	90 m (75St)	RA 954012	Brandschutz-Isolator	-
39	90 m (75St)	RA 954023	Brandschutz-Isolator	-
40	10 Stck	RA 954041	Sprossenverbinder	
41	27 Stck		Hilti HUS-S 6 x 180	
42	-		Floorrock TE 20 - 3mm	-

10025071 / 74021

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Ind.	Änderung	Datum	Name
a	-	--.--.--	-
b	-	--.--.--	-
c	-	--.--.--	-
d	-	--.--.--	-
e	-	--.--.--	-
f	-	--.--.--	-
g	-	--.--.--	-
h	-	--.--.--	-

Allgemeintoleranzen für Längen- und Winkelmaße ohne einzelne Toleranzangaben (in Anlehnung an DIN ISO 2768 ... Juni 1991)
Toleranzklasse c (grob) Grenzabmaße für Elementfertigung (in Anlehnung an DIN 16203, Teil 2, Mai 1992)

Grenzabmaße für Längenmaße außer für gebrochene Kanten und für Elementfertigung

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
± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 3	± 4	± 6	± 8		

Grenzabmaße für Winkelmaße

bis 10	über 10 bis 50	über 50 bis 120	über 120 bis 400	über 400
± 1°30'	± 1°	± 0°30'	± 0°15'	± 0°10'

Maßstab	1 : 1	- : -	
Format	A1		
Abteilung	FBE Technik RPT (TER)		

	2013	Datum	Name
gez.		12.02.	bä
gepr.		12.02.	A.T.
norm.		-	-
gen.		12.02.	A.T.

Urheberschutz nach DIN 34

Datei: 11537.dwg

Vorsuch 12,1 efectis, KW11/2013
Trennwand mit Pyrobel 60/25, Stückliste
RP-ISO-hermetic 70 EI60
Art. Nr.: -

Zeichnungsnummer: 11537

Anl. -

PLATE 6: SENSORS LOCATION PLAN

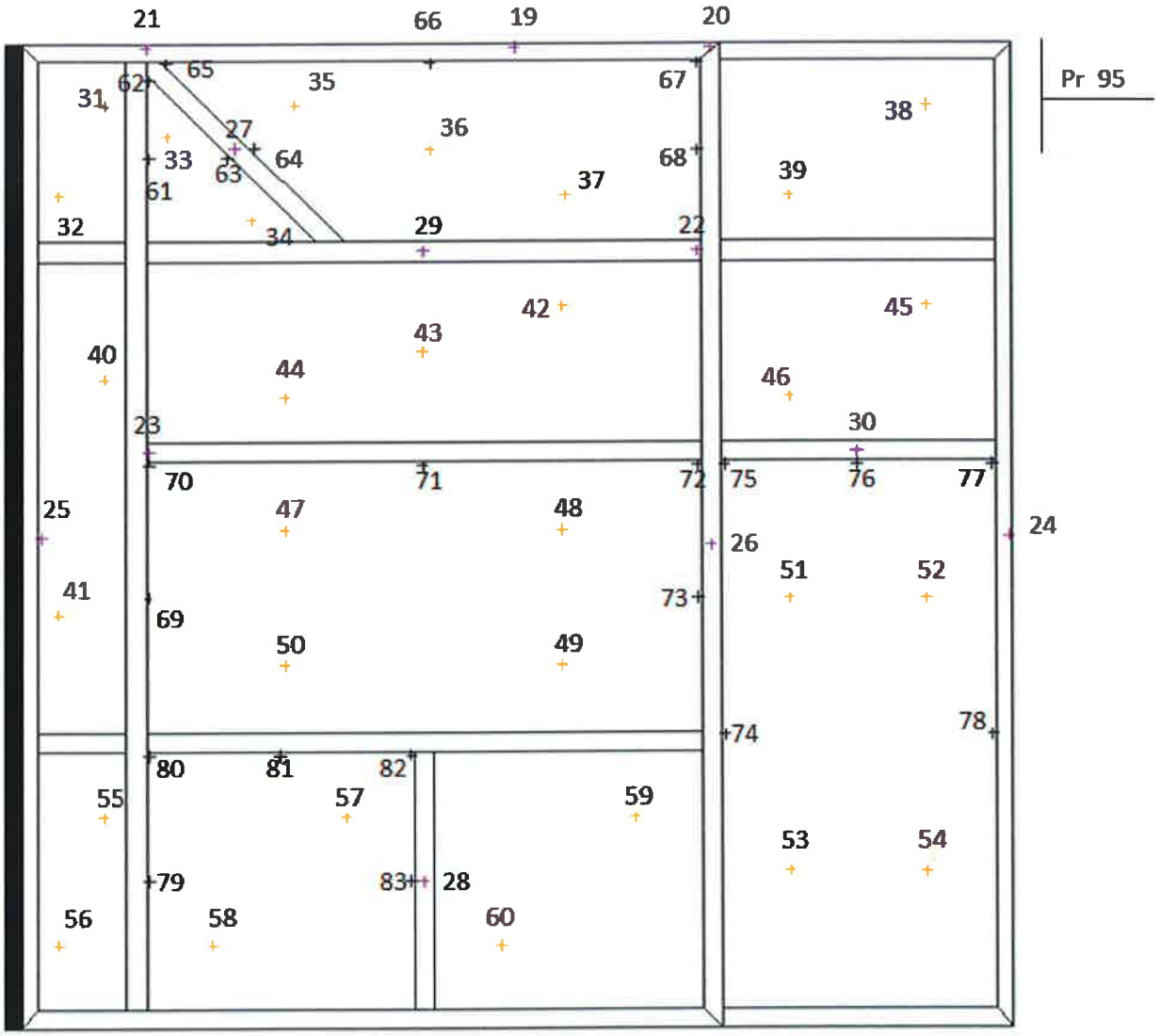
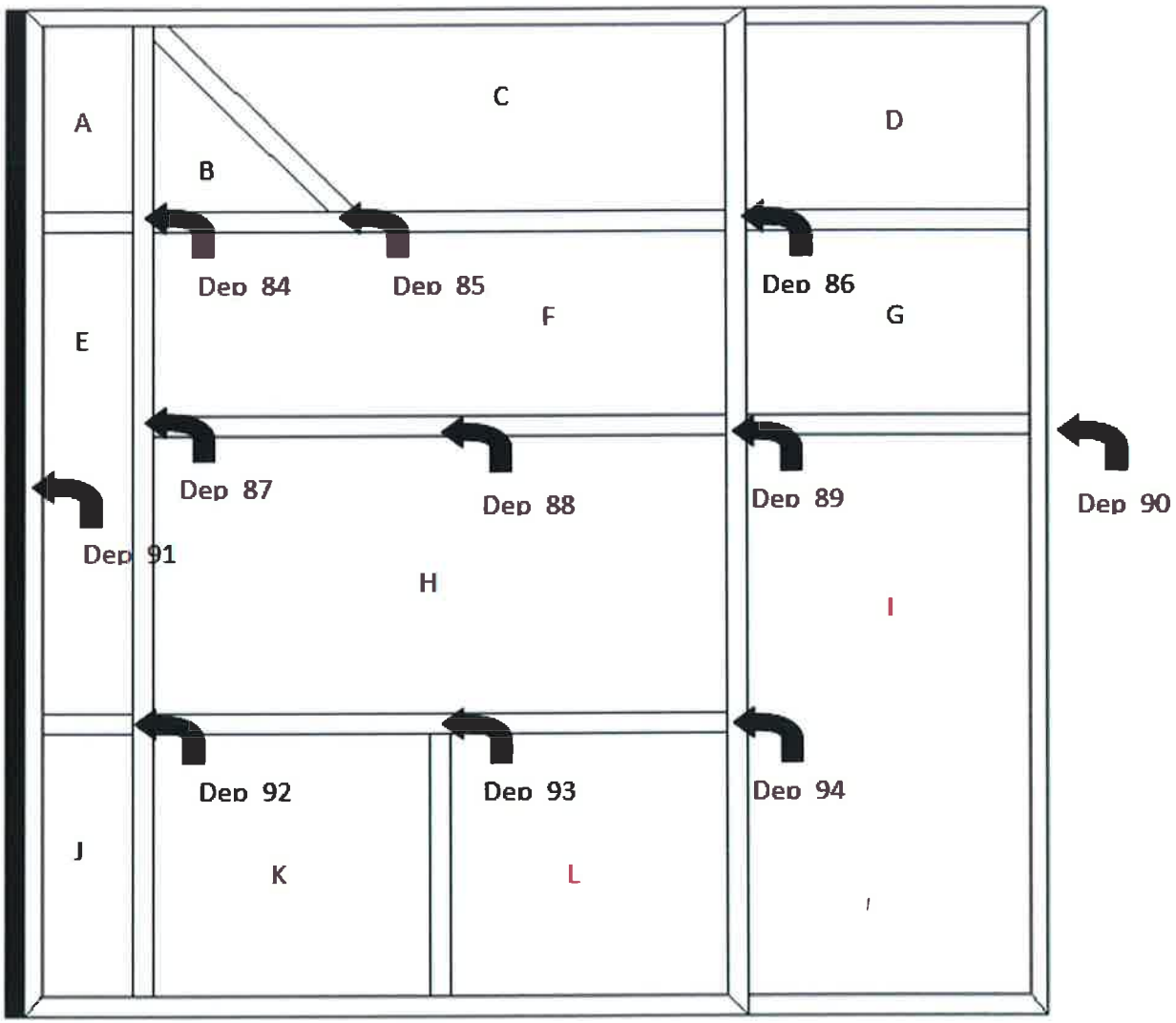
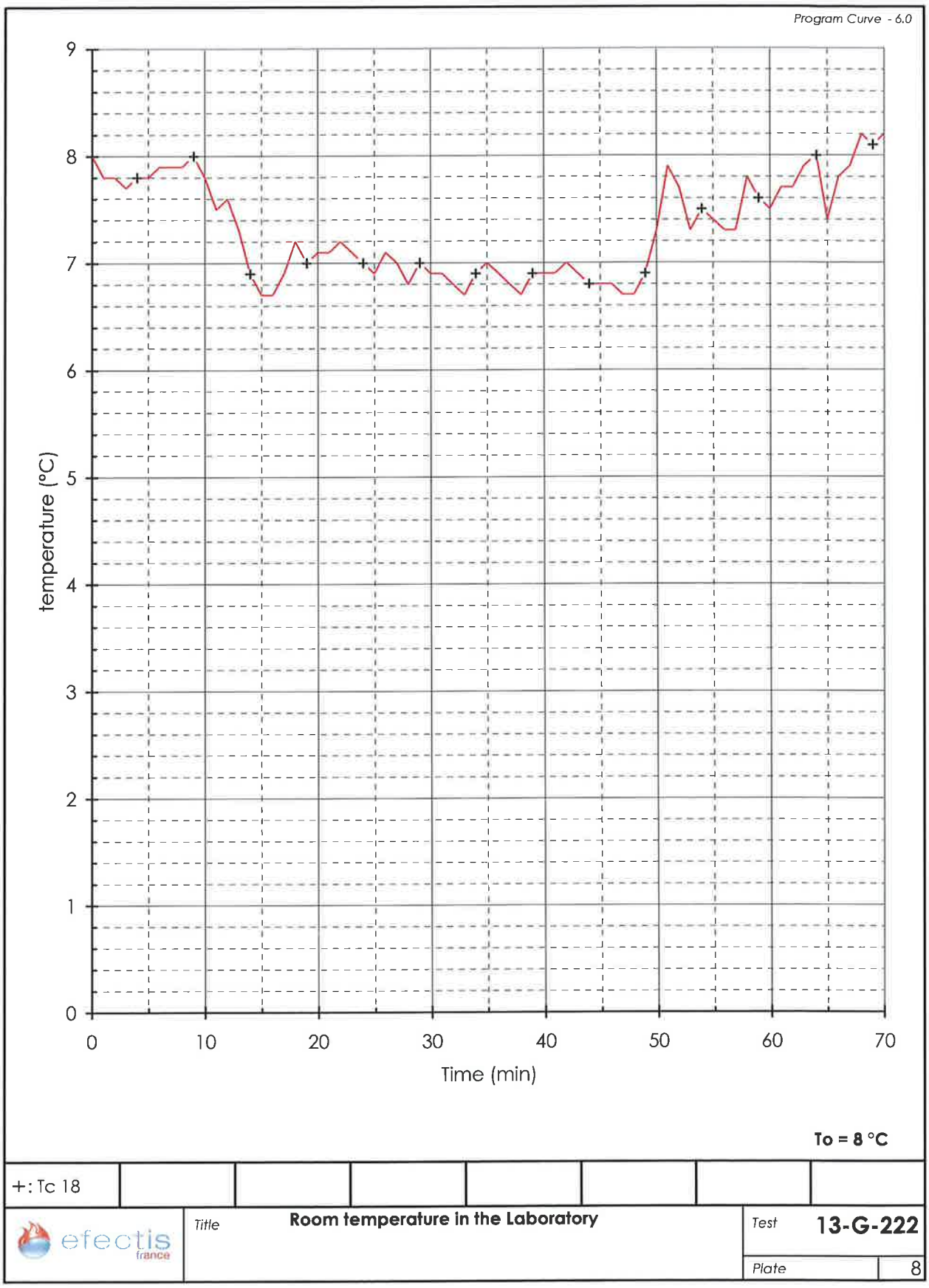
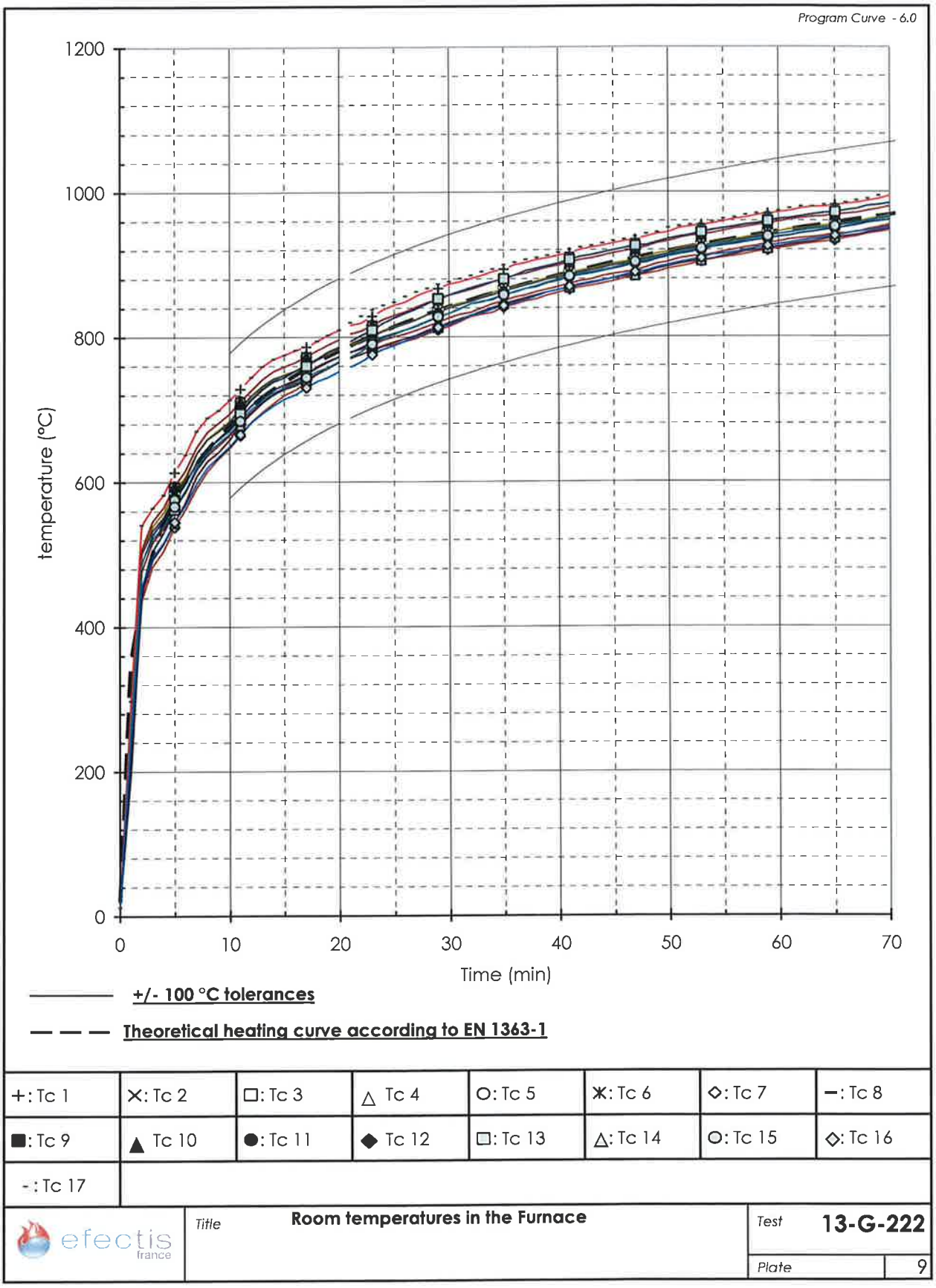
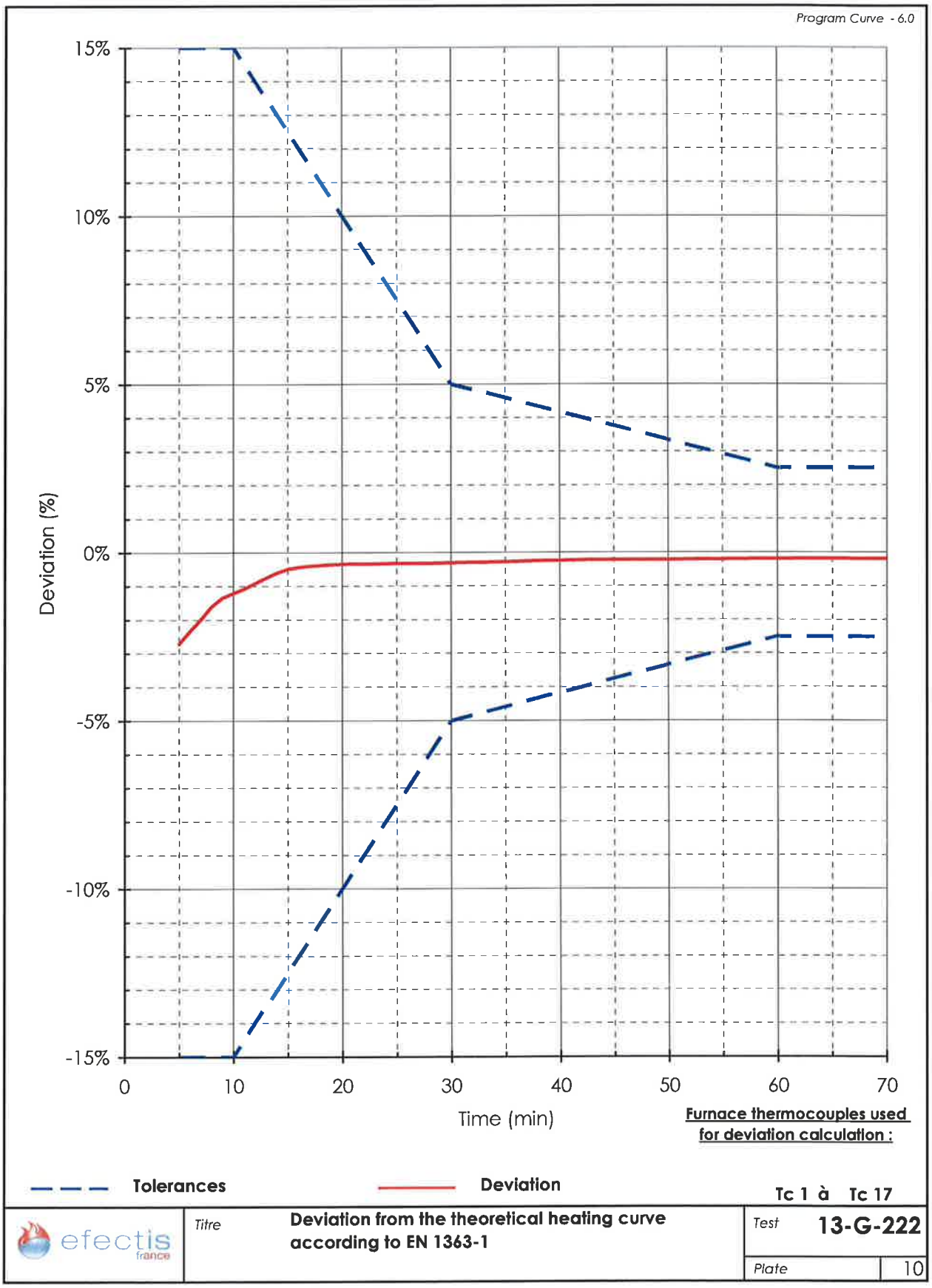


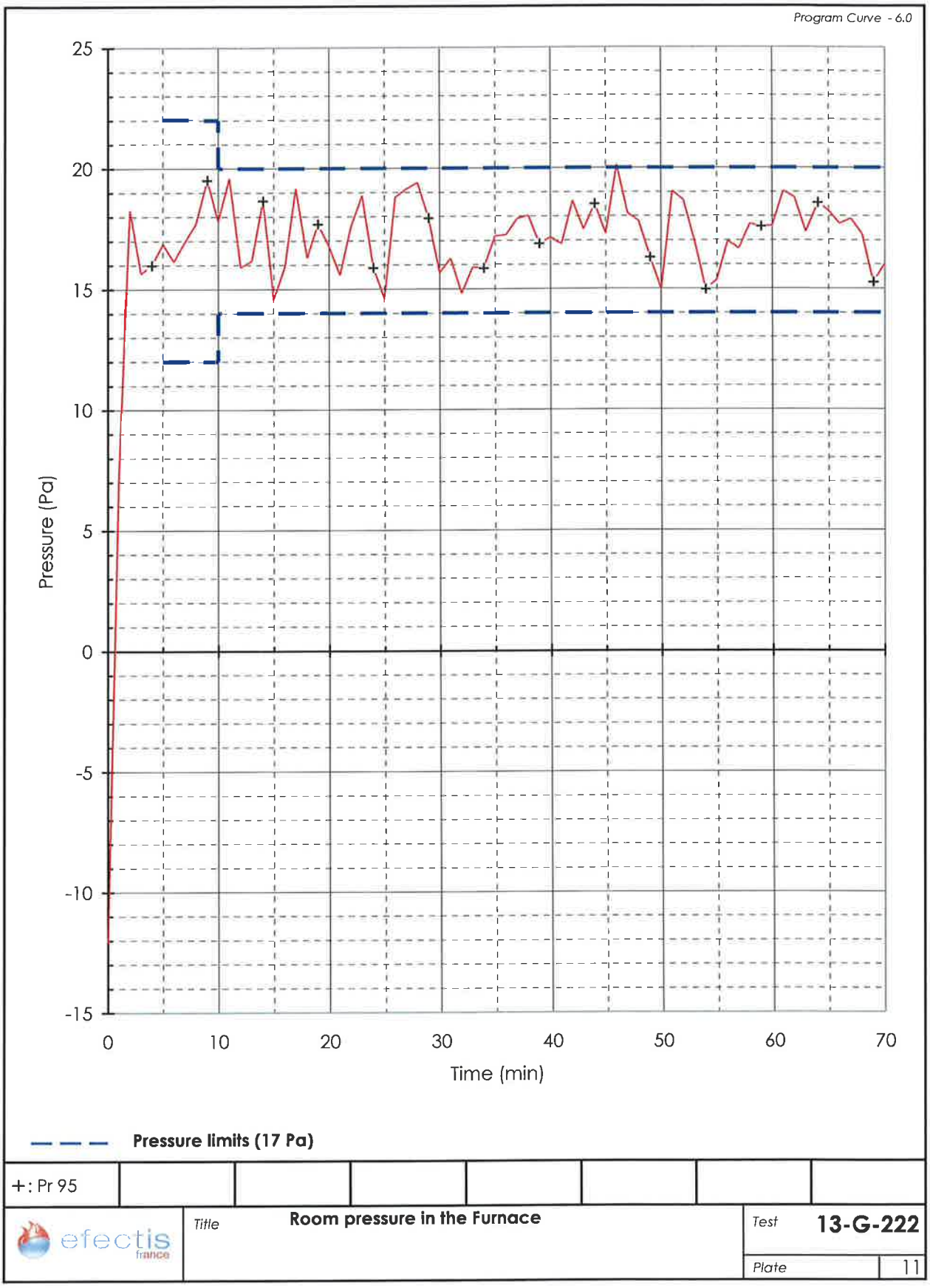
PLATE 7: SENSORS LOCATION PLAN

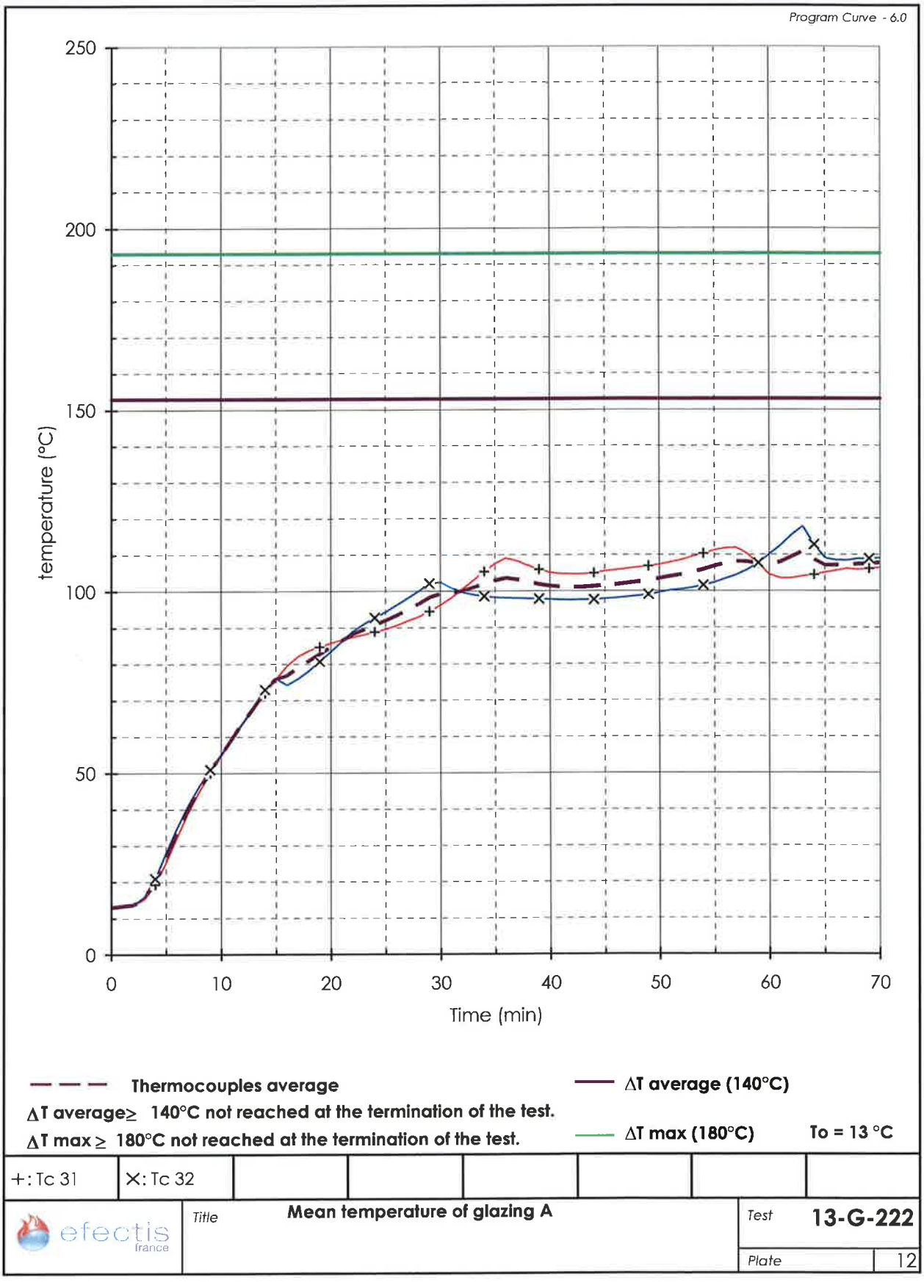


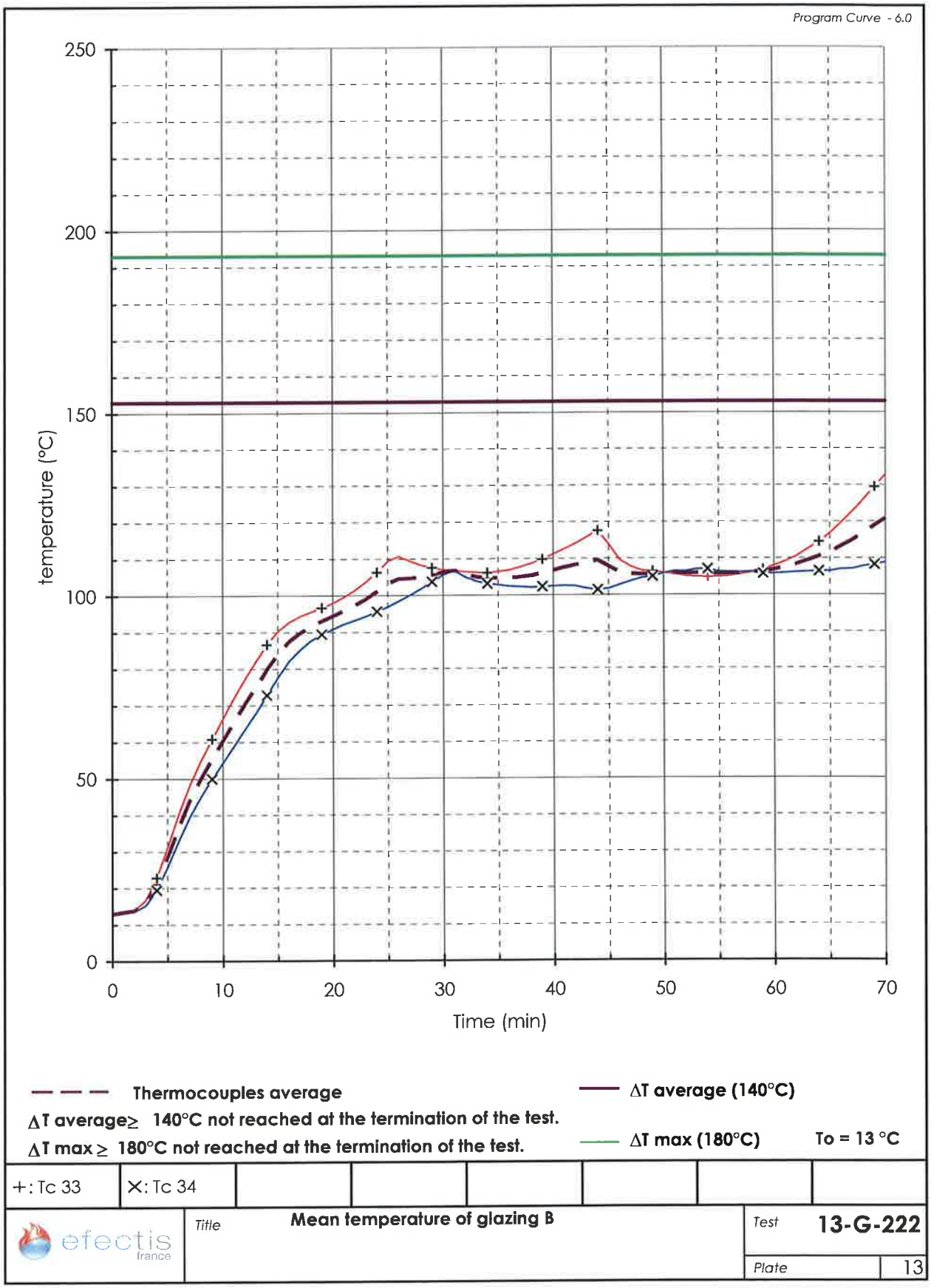

Program Curve - 6.0
temperature (°C)
0
1
2
3
4
5
6
7
8
9
0
10
20
30
40
50
60
70
Time (min)
To = 8 °C
+: Tc 18
Title
Room temperature in the Laboratory
Test
13-G-222
Plate
8

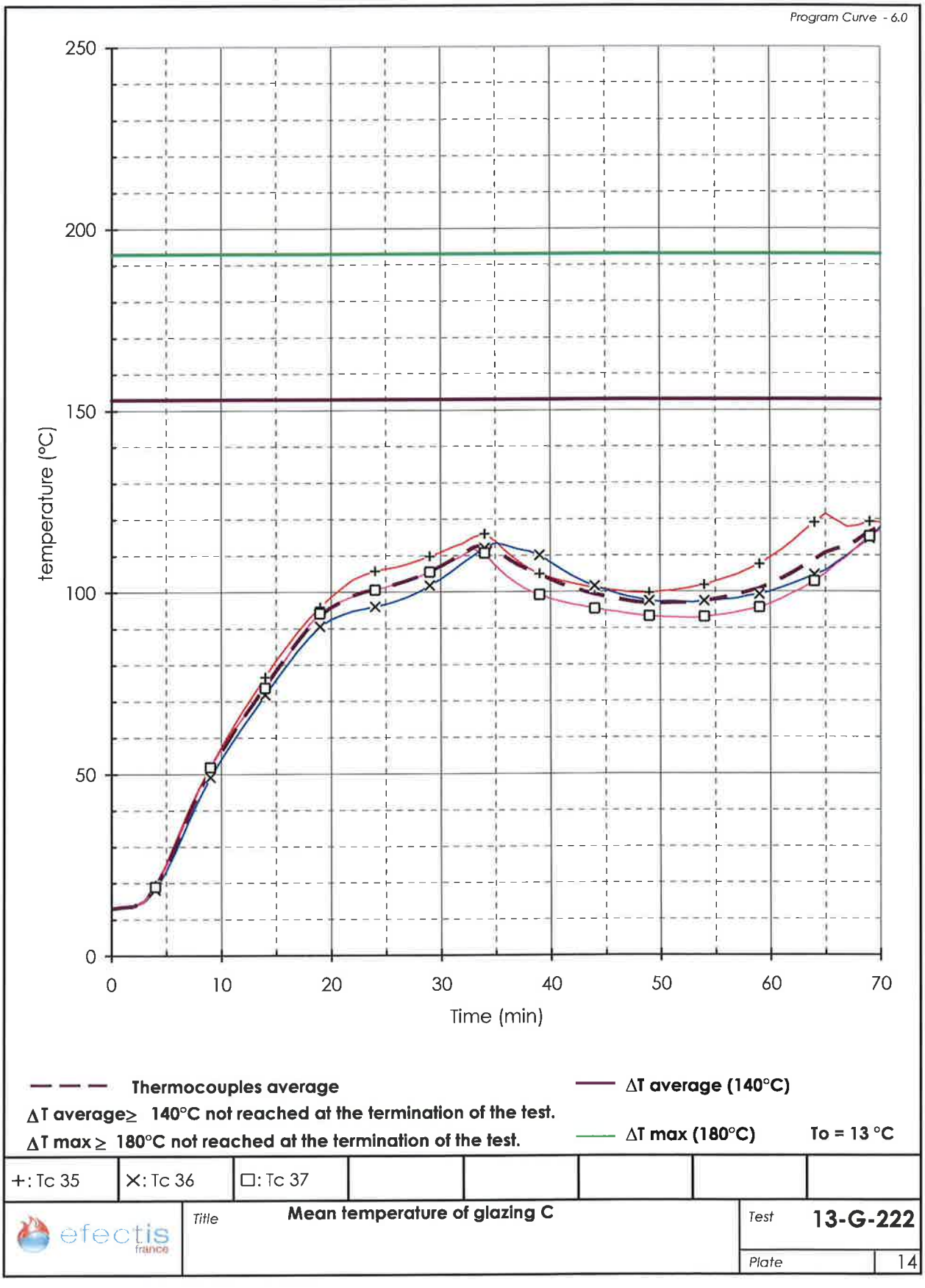

Program Curve - 6.0
1200
1000
800
600
400
200
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
+/- 100 °C tolerances
Theoretical heating curve according to EN 1363-1
+: Tc 1
X: Tc 2
□: Tc 3
△ Tc 4
O: Tc 5
✳: Tc 6
◇: Tc 7
−: Tc 8
■: Tc 9
▲ Tc 10
●: Tc 11
◆ Tc 12
□: Tc 13
△: Tc 14
O: Tc 15
◇: Tc 16
-: Tc 17
efectis france
Title
Room temperatures in the Furnace
Test
13-G-222
Plate
9

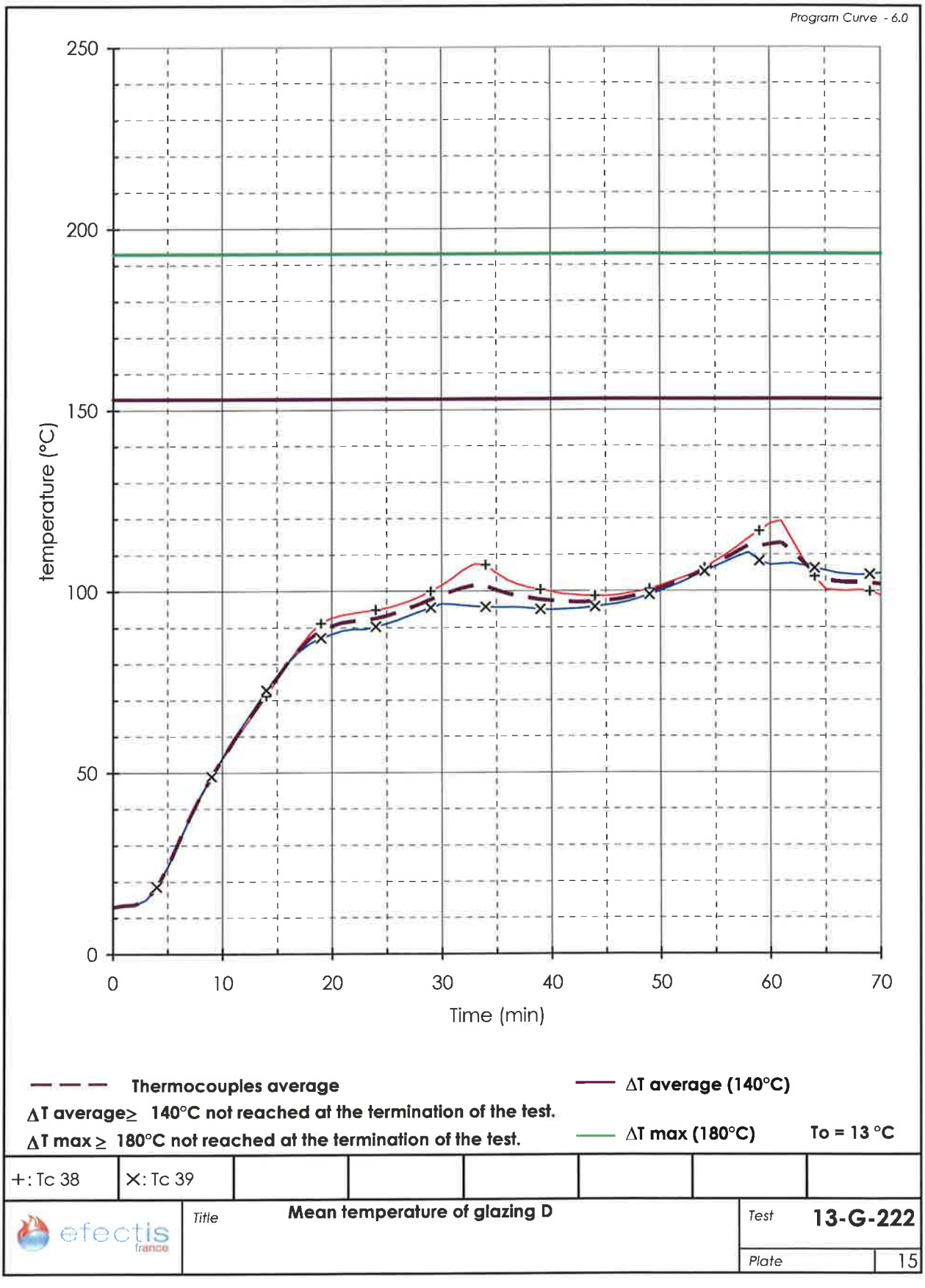

Program Curve - 6.0
15%
10%
5%
0%
-5%
-10%
-15%
Deviation (%)
0
10
20
30
40
50
60
70
Time (min)
Furnace thermocouples used for deviation calculation :
Tolerances
Deviation
Tc 1 à Tc 17
efectis france
Titre
Deviation from the theoretical heating curve according to EN 1363-1
Test
13-G-222
Plate
10

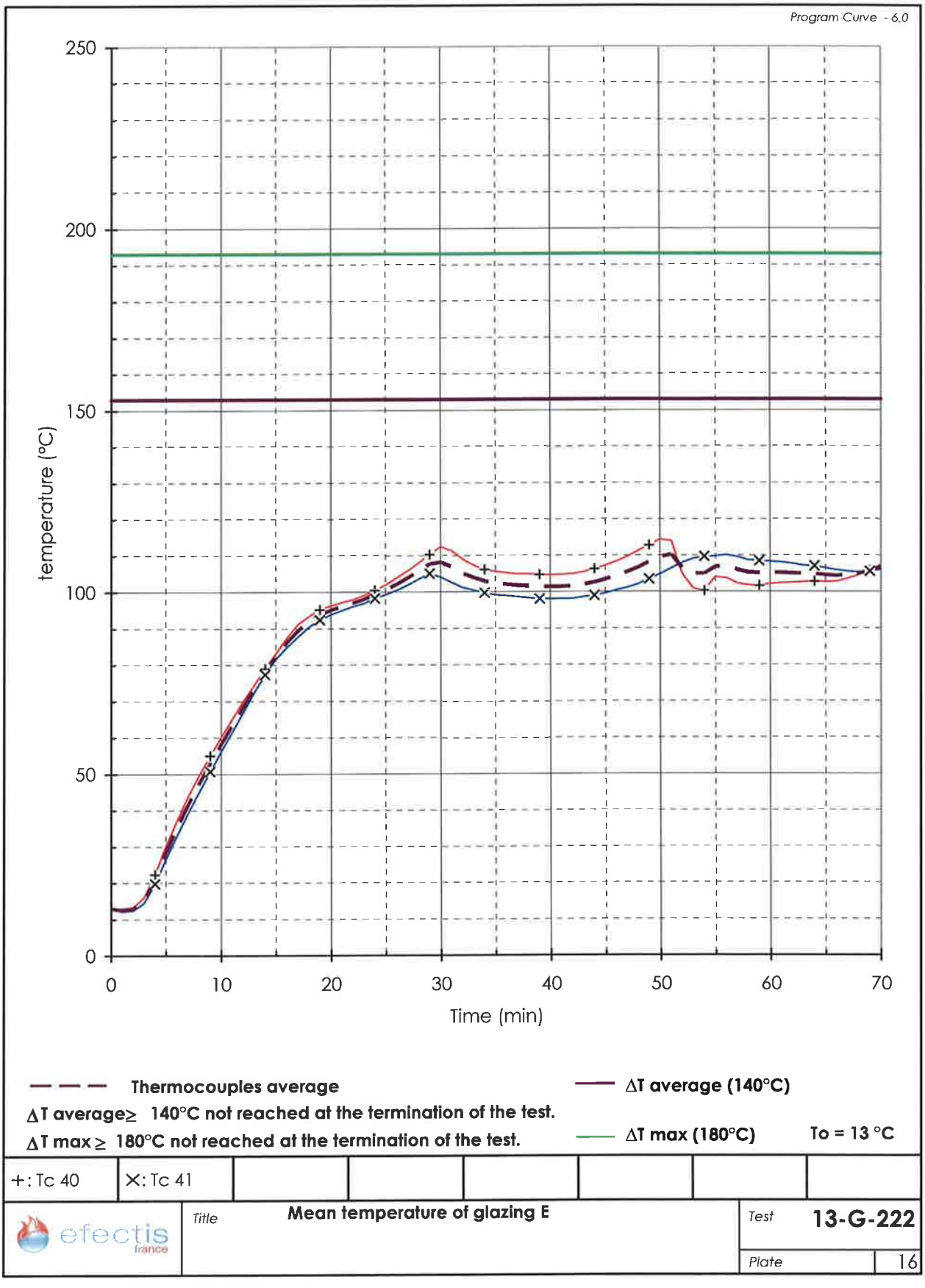

Program Curve - 6.0
25
20
15
10
5
0
-5
-10
-15
Pressure (Pa)
0
10
20
30
40
50
60
70
Time (min)
Pressure limits (17 Pa)
+: Pr 95
efectis france
Title
Room pressure in the Furnace
Test
13-G-222
Plate
11

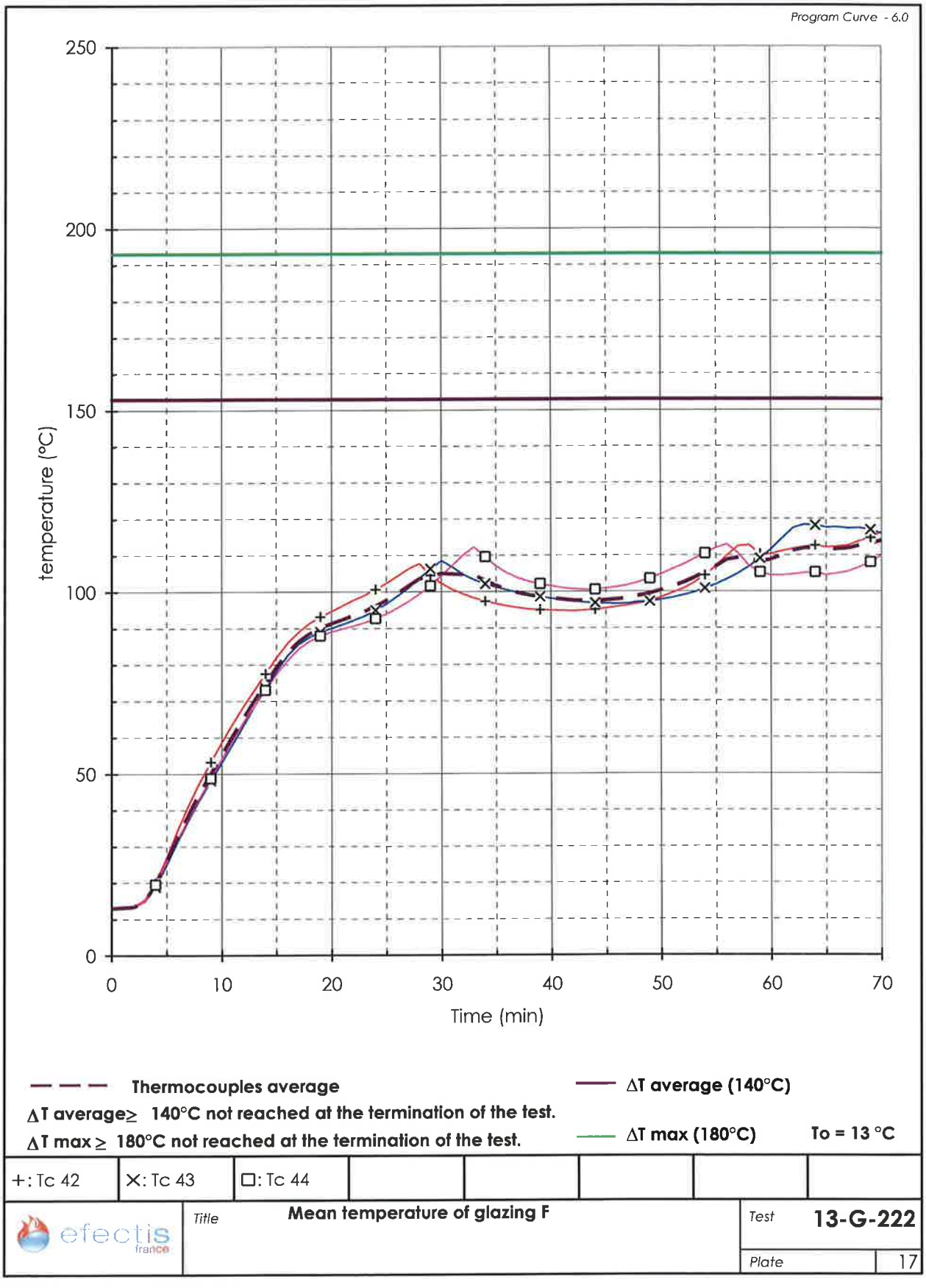

Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 31
×: Tc 32
efectis france
Title
Mean temperature of glazing A
Test
13-G-222
Plate
12

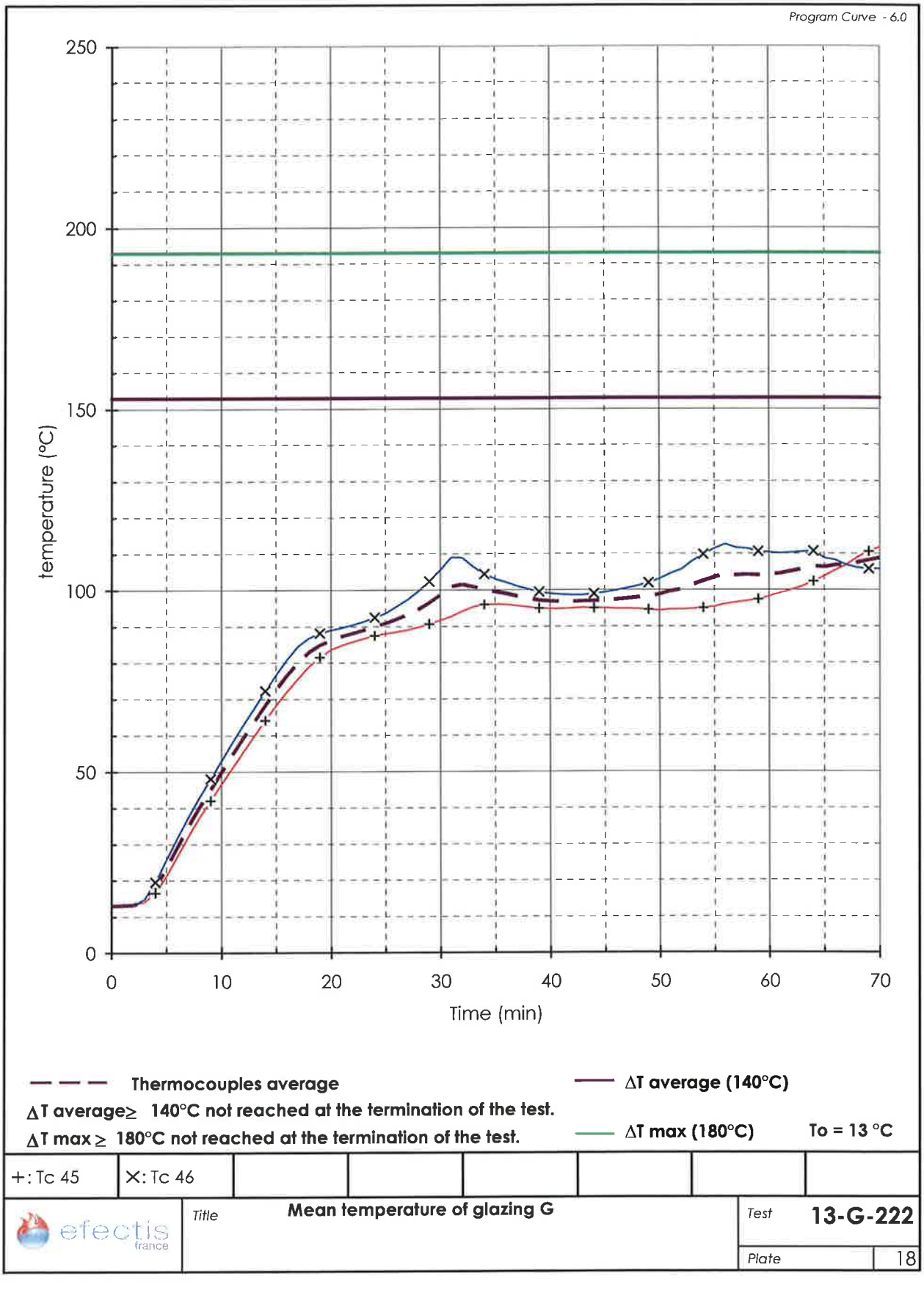

Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 33
×: Tc 34
efectis france
Title
Mean temperature of glazing B
Test
13-G-222
Plate
13

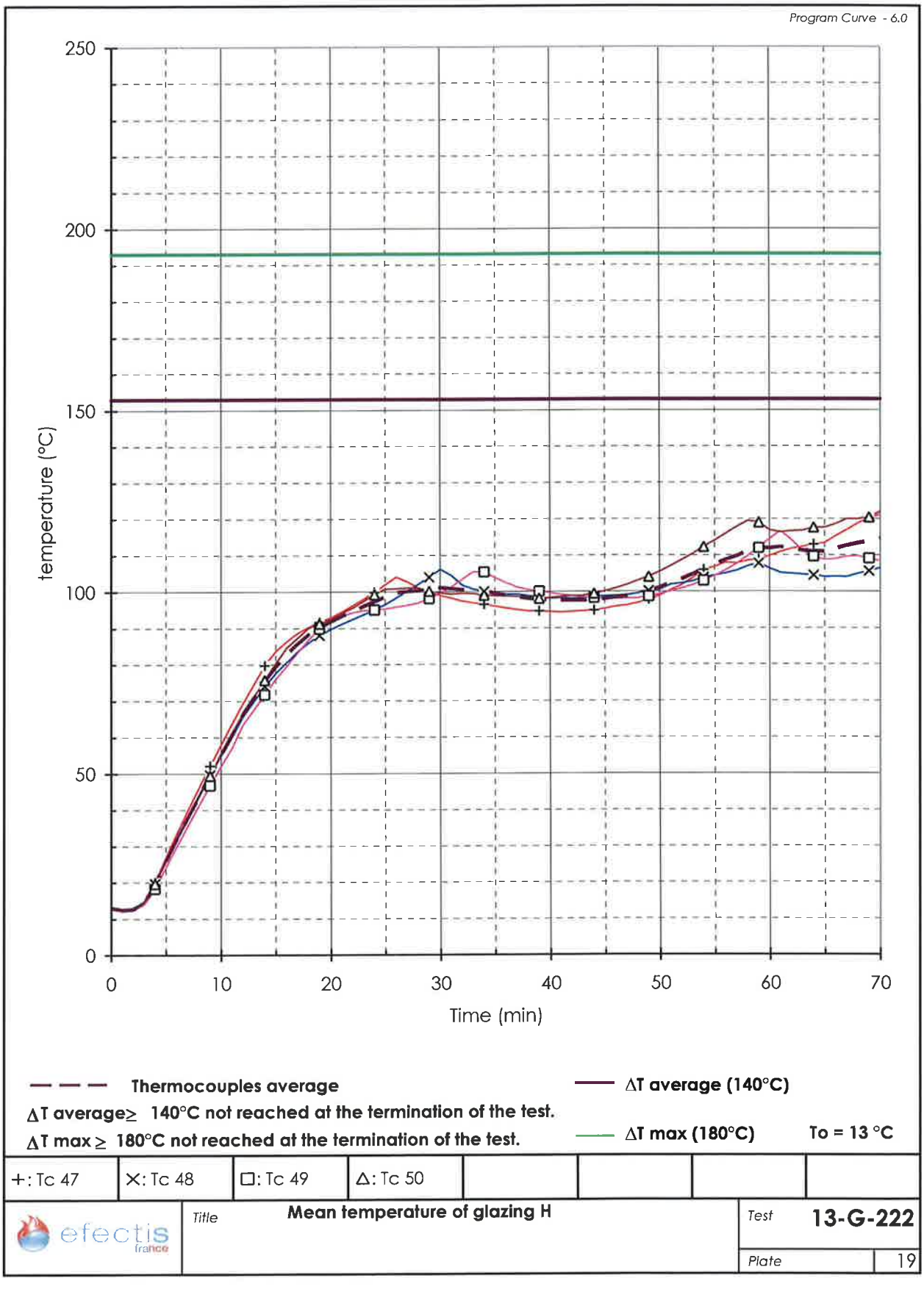

Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 35
×: Tc 36
□: Tc 37
efectis france
Title
Mean temperature of glazing C
Test
13-G-222
Plate
14

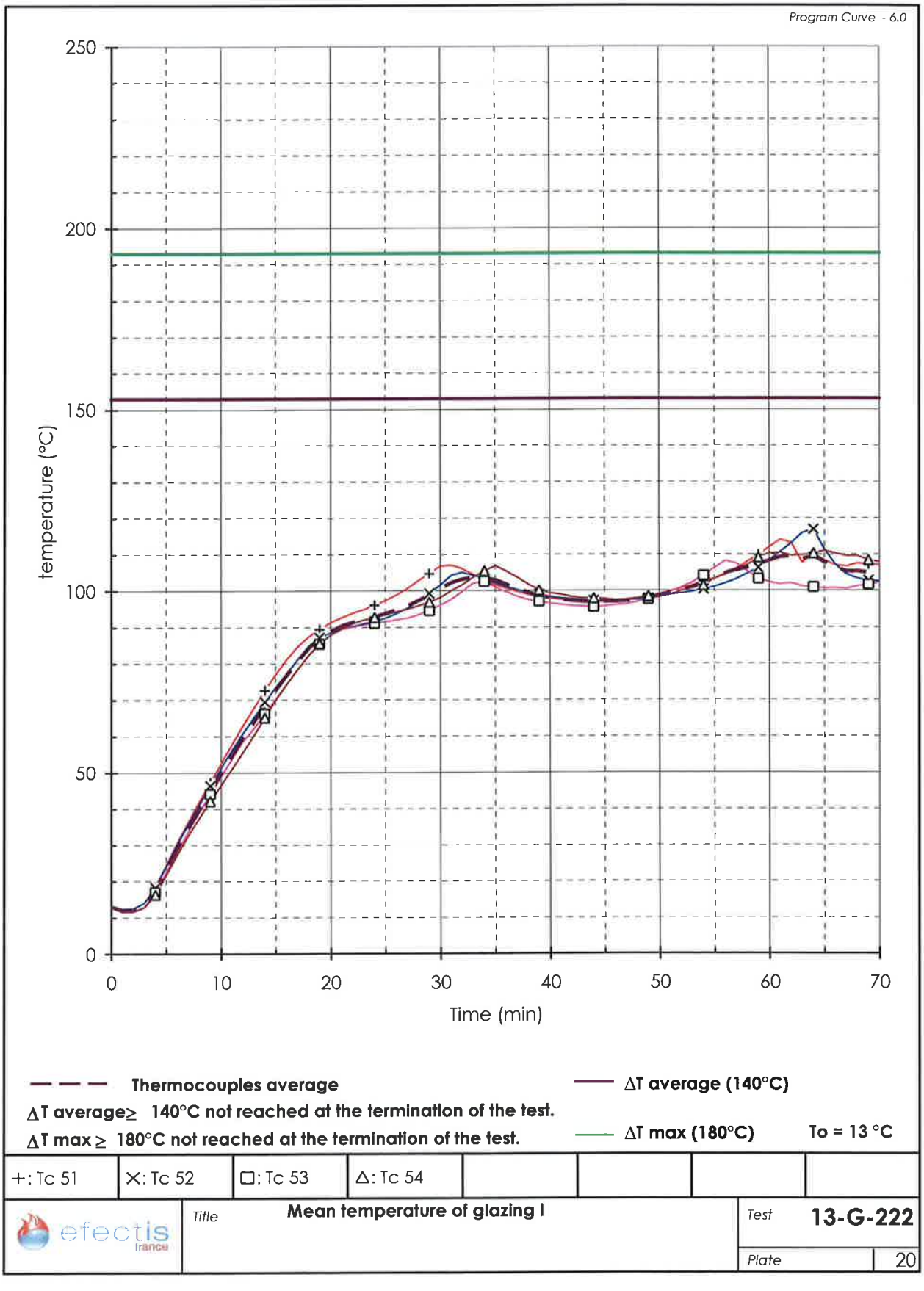

Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 38
×: Tc 39
efectis france
Title
Mean temperature of glazing D
Test
13-G-222
Plate
15

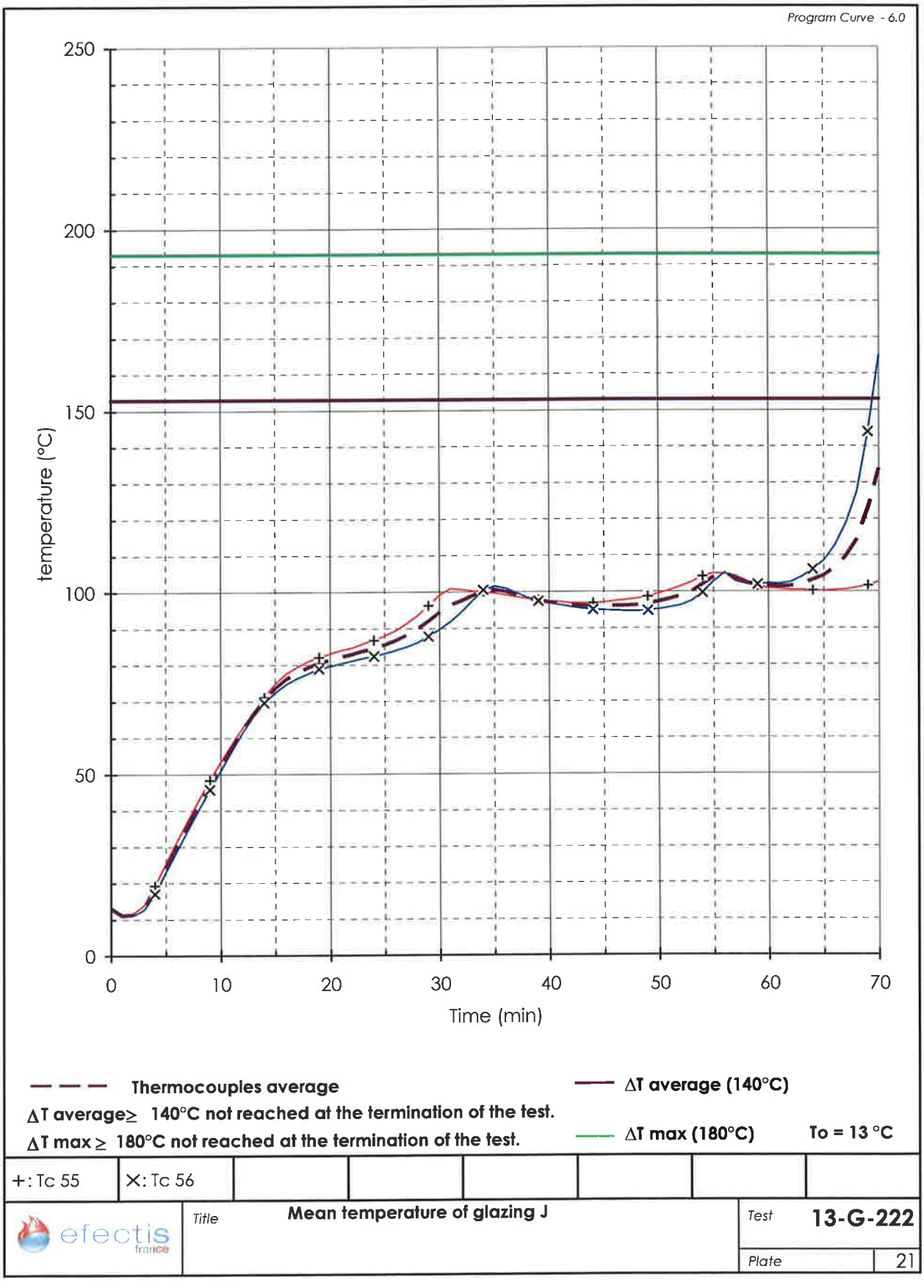

Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 40
×: Tc 41
efectis france
Title
Mean temperature of glazing E
Test
13-G-222
Plate
16

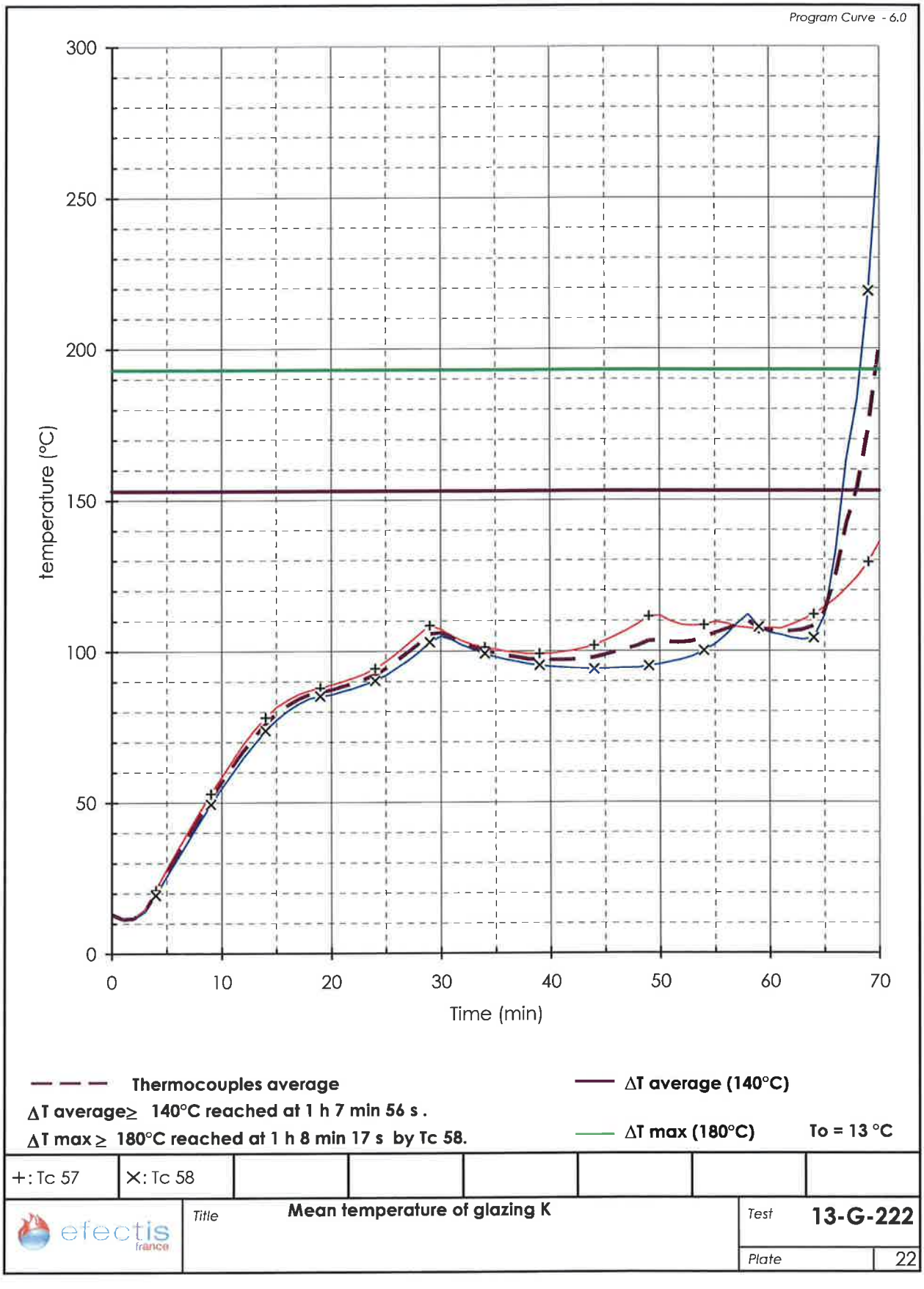

Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 42
×: Tc 43
□: Tc 44
efectis france
Title
Mean temperature of glazing F
Test
13-G-222
Plate
17

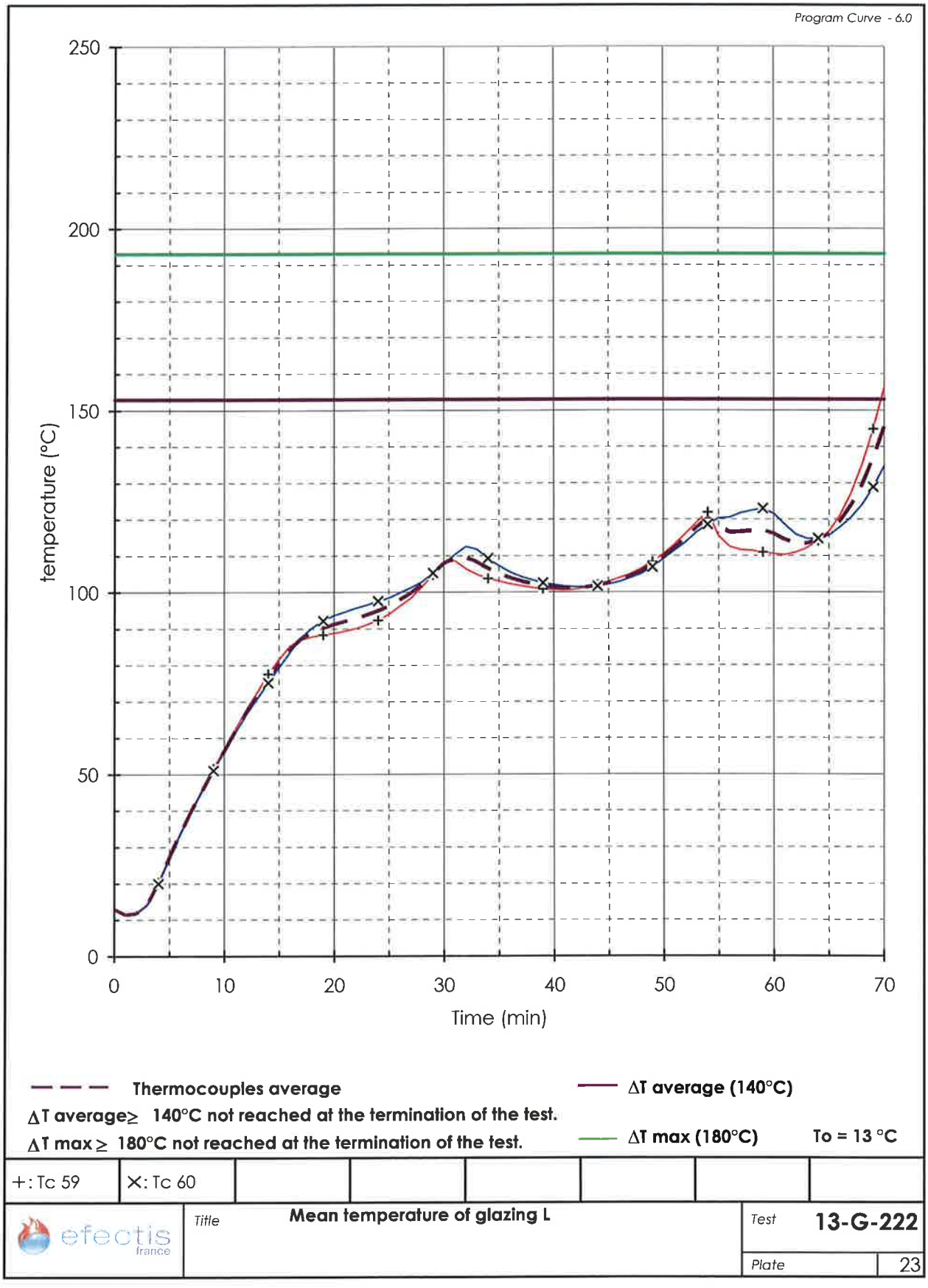

Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 45
×: Tc 46
efectis france
Title
Mean temperature of glazing G
Test
13-G-222
Plate
18

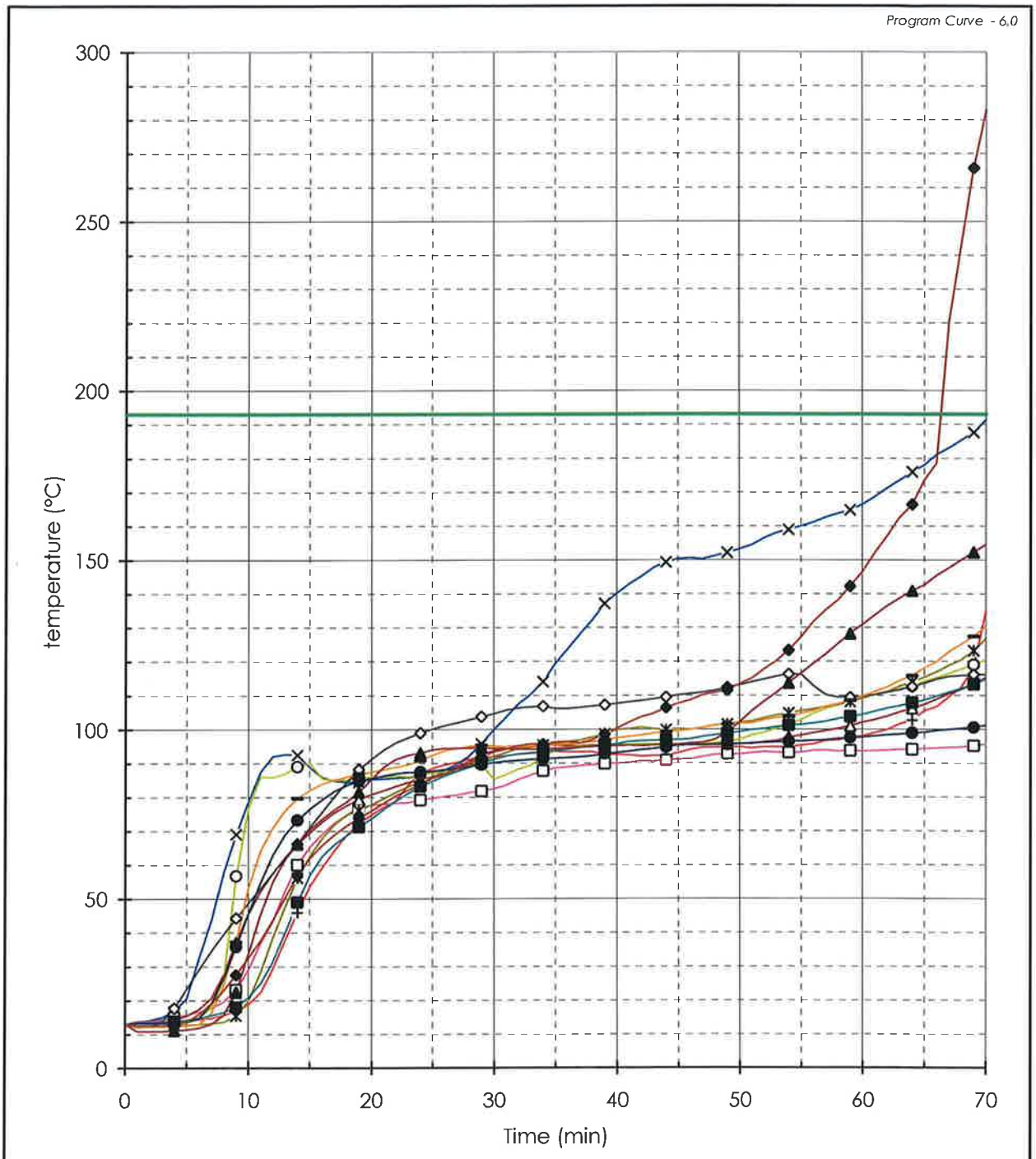

Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 47
×: Tc 48
□: Tc 49
Δ: Tc 50
efectis france
Title
Mean temperature of glazing H
Test
13-G-222
Plate
19


Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 51
×: Tc 52
□: Tc 53
Δ: Tc 54
efectis france
Title
Mean temperature of glazing I
Test
13-G-222
Plate
20


Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 55
×: Tc 56
efectis france
Title
Mean temperature of glazing J
Test
13-G-222
Plate
21


Program Curve - 6.0
300
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C reached at 1 h 7 min 56 s .
ΔT max ≥ 180°C reached at 1 h 8 min 17 s by Tc 58.
ΔT max (180°C)
To = 13 °C
+: Tc 57
×: Tc 58
efectis france
Title
Mean temperature of glazing K
Test
13-G-222
Plate
22


Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
Thermocouples average
ΔT average (140°C)
ΔT average≥ 140°C not reached at the termination of the test.
ΔT max≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 59
×: Tc 60
efectis france
Title
Mean temperature of glazing L
Test
13-G-222
Plate
23



ΔT max ≥ 180°C reached at 1 h 6 min 18 s by Tc 30.

ΔT max (180°C)

To = 13 °C

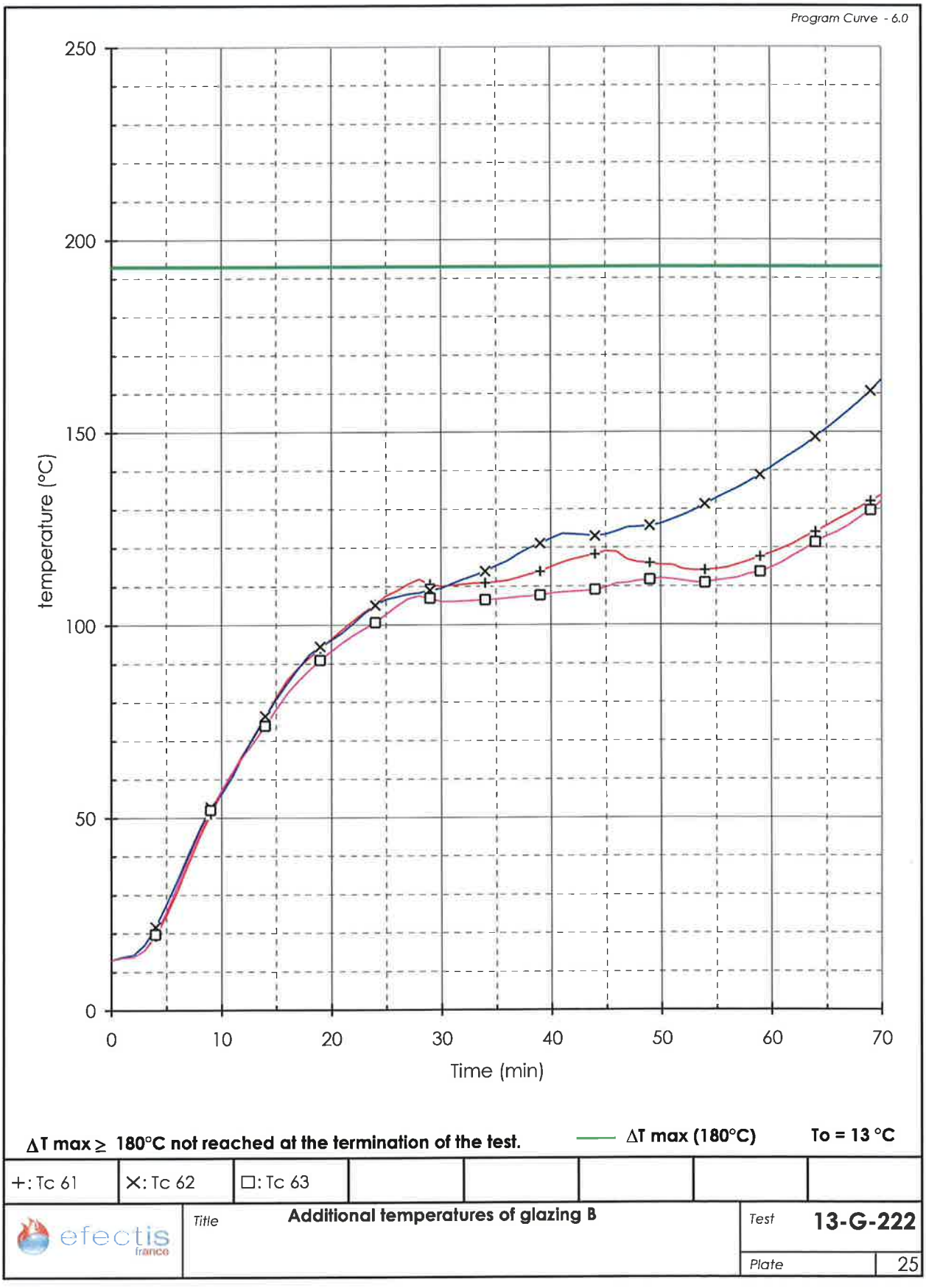
+: Tc 19	×: Tc 20	□: Tc 21	△ Tc 22	○: Tc 23	✳: Tc 24	◇: Tc 25	−: Tc 26
■: Tc 27	▲ Tc 28	●: Tc 29	◆ Tc 30				

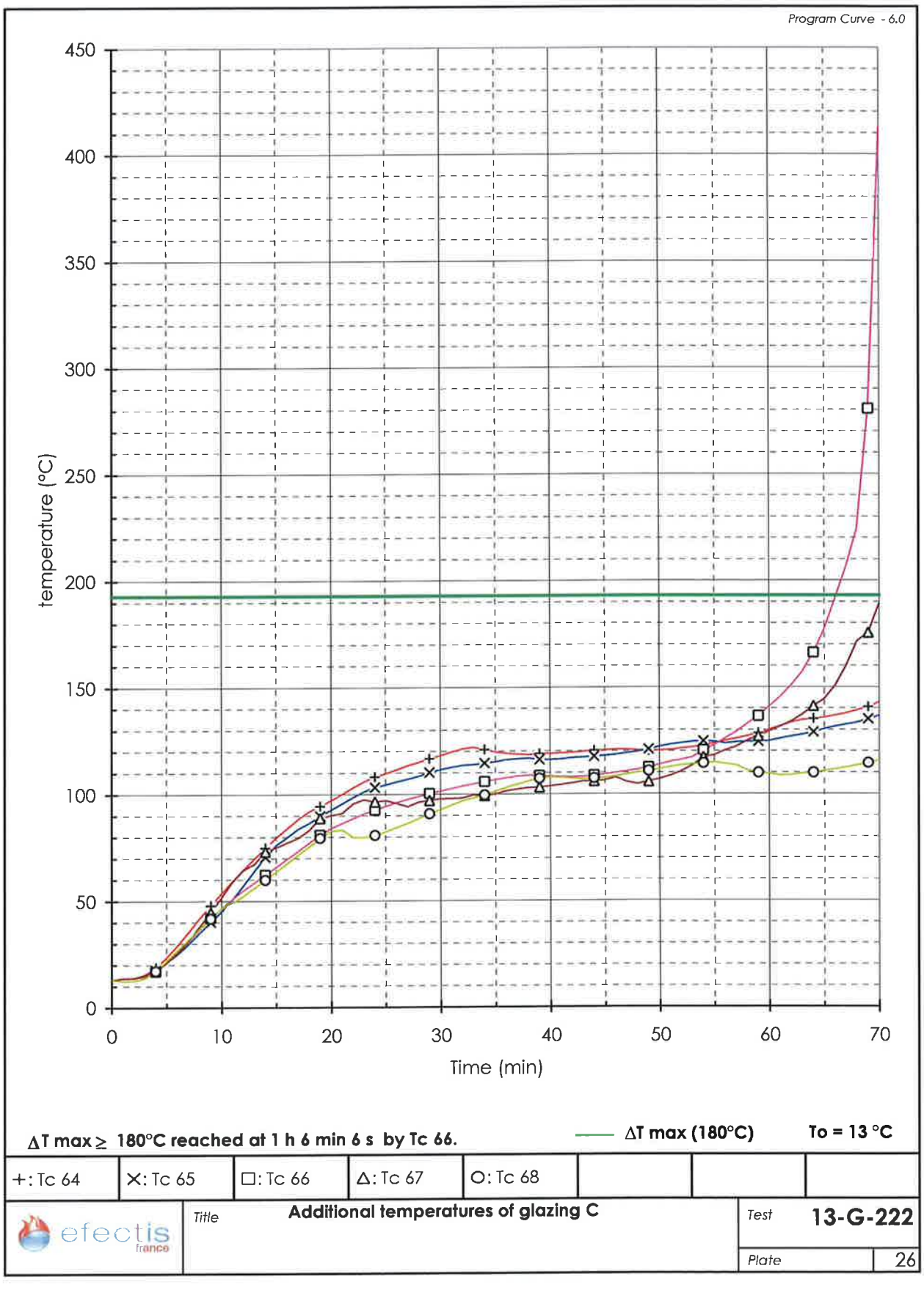
efectis france

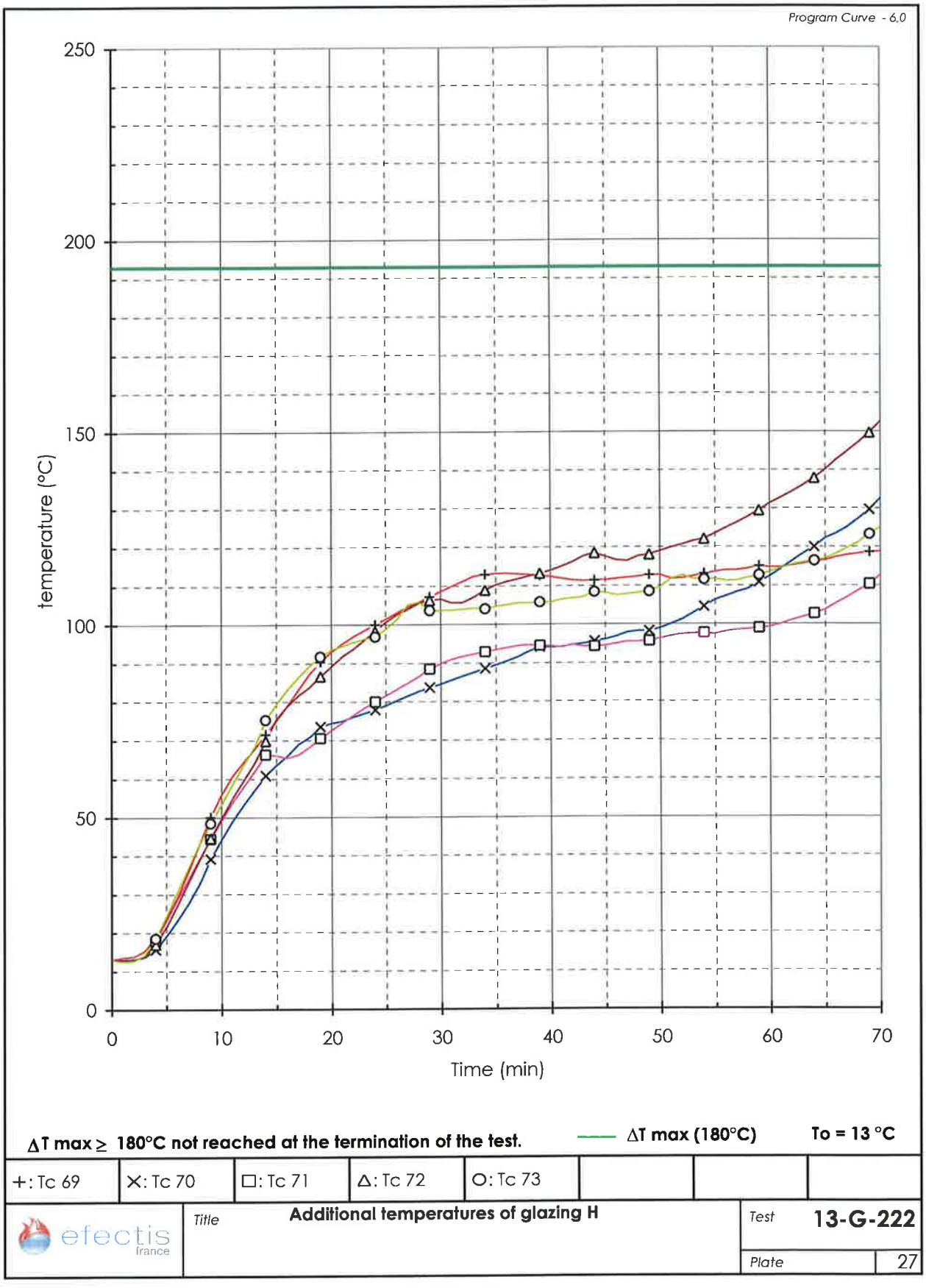
Title: **Maximal temperatures of the frame**

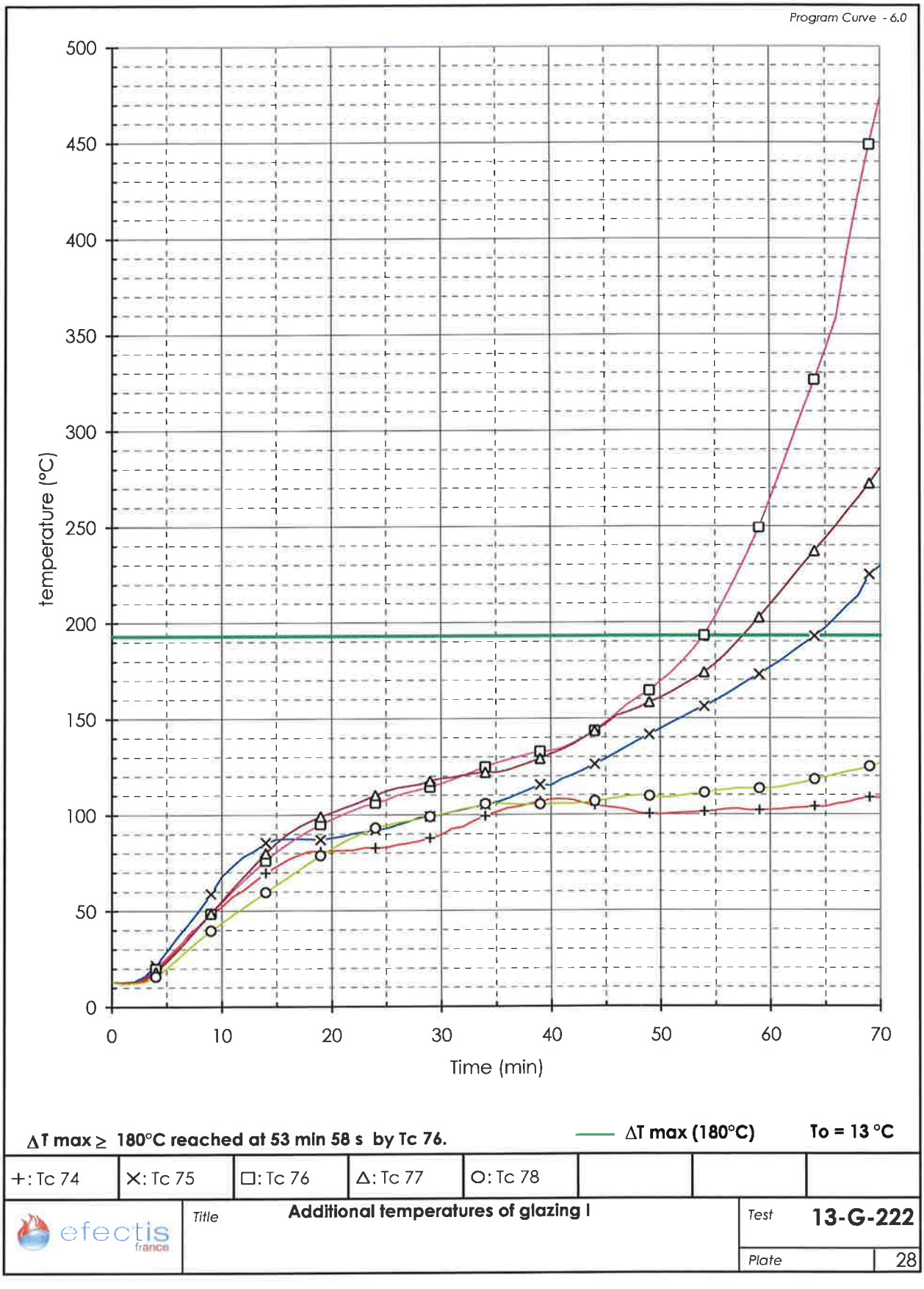
Test: **13-G-222**

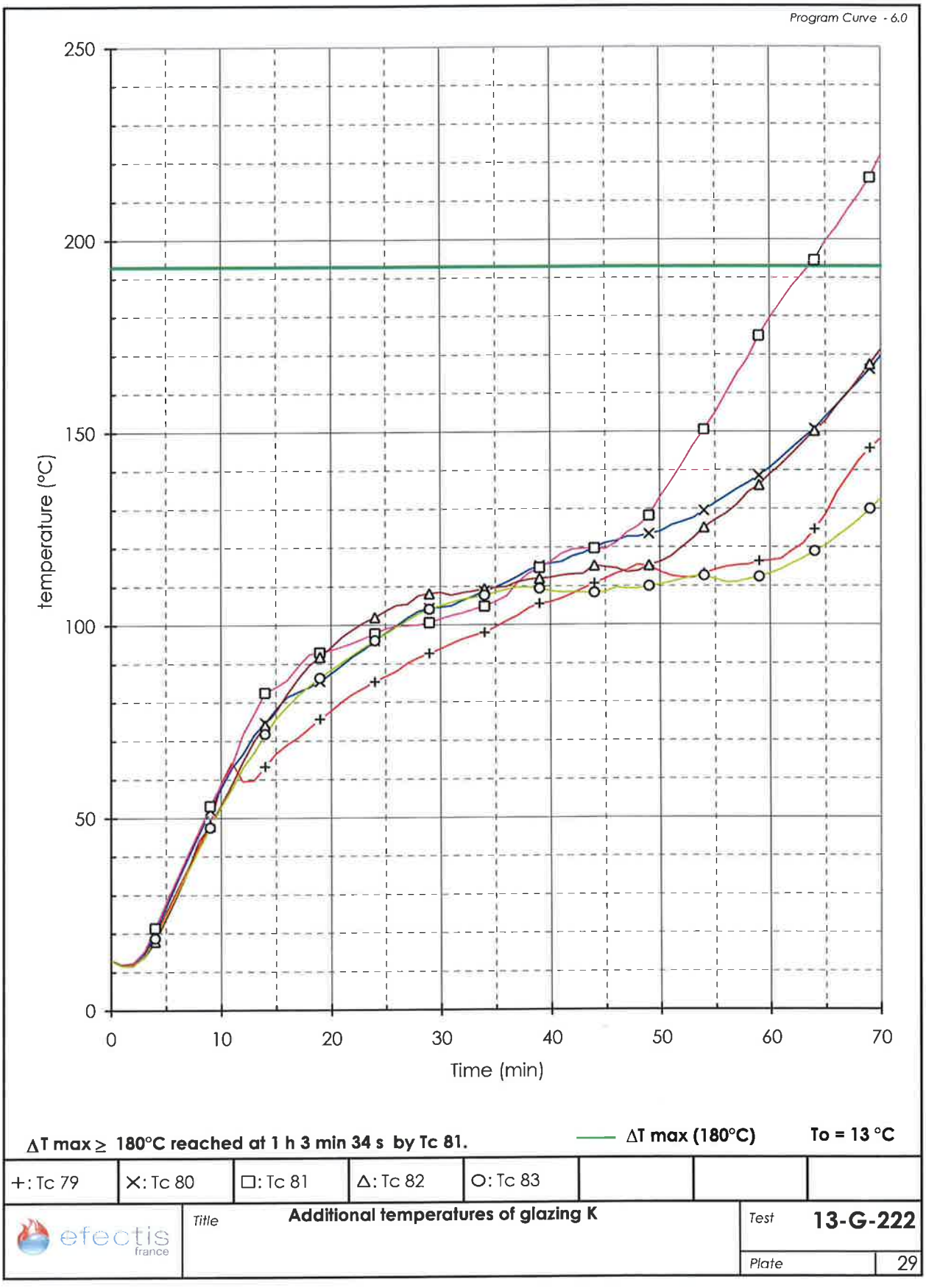
Plate: 24


Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 61
×: Tc 62
□: Tc 63
efectis france
Title
Additional temperatures of glazing B
Test
13-G-222
Plate
25


Program Curve - 6.0
temperature (°C)
Time (min)
0
50
100
150
200
250
300
350
400
450
0
10
20
30
40
50
60
70
ΔT max ≥ 180°C reached at 1 h 6 min 6 s by Tc 66.
ΔT max (180°C)
To = 13 °C
+: Tc 64
×: Tc 65
□: Tc 66
Δ: Tc 67
○: Tc 68
efectis france
Title
Additional temperatures of glazing C
Test
13-G-222
Plate
26


Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
ΔT max ≥ 180°C not reached at the termination of the test.
ΔT max (180°C)
To = 13 °C
+: Tc 69
×: Tc 70
□: Tc 71
Δ: Tc 72
O: Tc 73
Title
Additional temperatures of glazing H
Test
13-G-222
Plate
27


Program Curve - 6.0
temperature (°C)
Time (min)
0
50
100
150
200
250
300
350
400
450
500
0
10
20
30
40
50
60
70
ΔT max ≥ 180°C reached at 53 min 58 s by Tc 76.
ΔT max (180°C)
To = 13 °C
+: Tc 74
×: Tc 75
□: Tc 76
Δ: Tc 77
O: Tc 78
efectis france
Title
Additional temperatures of glazing I
Test
13-G-222
Plate
28


Program Curve - 6.0
250
200
150
100
50
0
temperature (°C)
0
10
20
30
40
50
60
70
Time (min)
ΔT max ≥ 180°C reached at 1 h 3 min 34 s by Tc 81.
ΔT max (180°C)
To = 13 °C
+: Tc 79
×: Tc 80
□: Tc 81
Δ: Tc 82
○: Tc 83
efectis france
Title
Additional temperatures of glazing K
Test
13-G-222
Plate
29

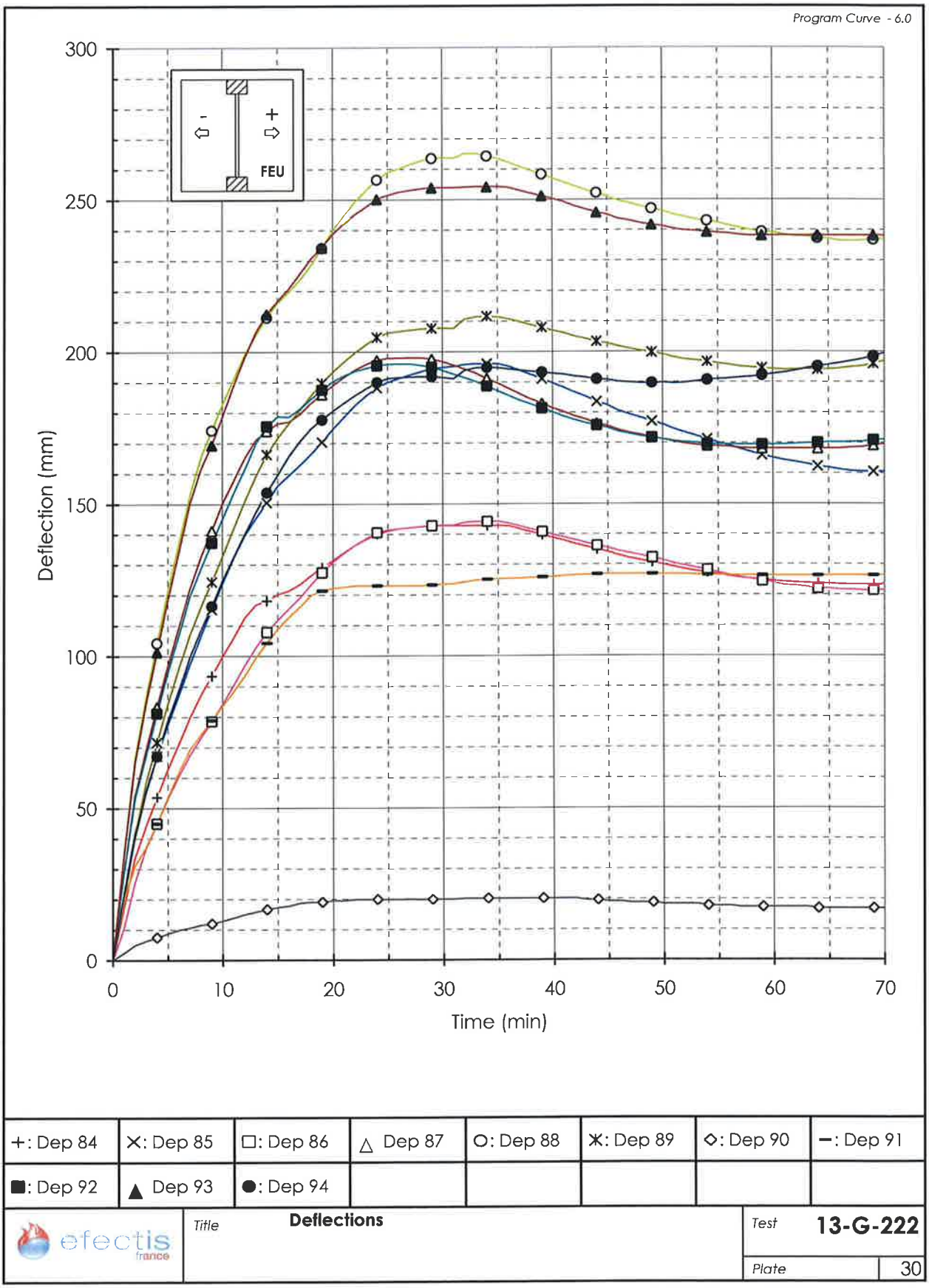

Program Curve - 6.0
Deflection (mm)
Time (min)
0
50
100
150
200
250
300
0
10
20
30
40
50
60
70
FEU
+: Dep 84
×: Dep 85
□: Dep 86
△ Dep 87
○: Dep 88
✳: Dep 89
◇: Dep 90
−: Dep 91
■: Dep 92
▲ Dep 93
●: Dep 94
efectis france
Title
Deflections
Test
13-G-222
Plate
30

Photo A (top)	Element at the beginning of the test.
Photo B (bottom)	Opening in glazing I at the 64th minute.

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