Project No: 1 05 178
(Z210050108)

PAVUS, a. s.
AUTHORIZED
BODY AO 216

FIRE TEST LABORATORY IN VESELÍ NAD LUŽNICÍ
Accredited Test Laboratory - accreditation issued by
the Czech Institute for Accreditation, o. p. s.
Registered under Identification No. 1026

FIRE RESISTANCE TEST REPORT

No. Pr-05-1.02.086

Issued on: 2005-07-23

For the products:
Horizontal glazing EI30
PYROBEL EI30H/19
in steel construction

Sponsor: S.A. GLAVERBEL
Parc Industriel Zone C
B-7180 Seneffe

Test methods:

EN 1365-2:1999 (E)
Fire resistance tests for loadbearing elements – Part 2: Floors and roofs

ČSN EN 1365-2:2000
Fire resistance tests for loadbearing elements – Part 2: Floors and roofs
(Zkoušení požární odolnosti – Část 2: Stropy a střechy)

The report consists of:

37 pages (incl. 4 Annexes)
Number of issues: 3
Issue No.: 1

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1 INTRODUCTION

Fire resistance test for Horizontal glazing EI30 with PYROBEL EI30H/19 in steel construction was provided for the company S.A. GLAVERBEL by the PAVUS, a. s. accredited test laboratory in Veselí nad Lužnicí.

The test was prepared, implemented and test results were analysed on the basis of the following documents:

[1] EN 1363-1:1999 Fire resistance tests – Part 1: General requirements

[2] EN 1365-2:1999 (E) Fire resistance tests for loadbearing elements – Part 2: Floors and roofs

[3] ČSN (Czech National Standard) EN 1363-1:200 Fire resistance tests – Part 1: General requirements
(Zkoušení požární odolnosti – Část 1: Základní požadavky)

[4] ČSN (Czech National Standard) EN 1365-2:2000 Fire resistance tests for loadbearing elements – Part 2: Floors and roofs
(Zkoušení požární odolnosti – Část 2: Stropy a střechy)

[5] Technical documentation for the specimens (provided by the sponsor)

For the purposes of this Test Report the definitions stated in [1] to [5] apply, together with the following abbreviations:

TC	thermocouple
STC	sheathed thermocouple made of a cable with mineral insulation
PT	plate thermometer with STC ∅ 1 mm
ES	fire exposed side of the specimen or supporting construction
US	unexposed side of the specimen or supporting construction
IC	initial conditions according to [1]: 10.3.

2 TEST SPECIMEN

The test was performed on Horizontal glazing EI30 with PYROBEL EI30H/19 in steel construction. The test specimen was erected within the standard low density rigid wall construction with the clear horizontal opening of dimensions 3000 mm (width) x 6000 mm (length).

The used glass was Pyrobel EI30H/19 type with structure of 6:3/3/3, where:

6 = float glass with thickness of 6 mm oriented on top,

3 = float glass with thickness of 3 mm,

/ = fire resistant layer,

: = PVB folium with thickness of 0.76 mm.

The glass was laid on the steel construction (topped by PROMAGLAF 4 mm pad made by PROMAT). The steel construction consisted of 3 free segments of dimensions 3 m x 2 m with 9 openings for glass panes (max. glass dimensions were 1.1 m x 2.1 m). The steel construction was insulated by PROMATECT-H 15 mm boards (made by PROMAT). The glass/steel joints were sealed with fire resistant silicones made by PROMAT (PROMASEAL Mastic acrylate sealant, Promat SYSTEMGLAS silicone, Silicone DC 895, respectively within particular thirds of the specimen).

The steel construction was finally fixed to the wall using steel L – profiles and screws designed for aerated concrete. Wall/construction joints were insulated by mineral wool. The glass/glass and glass/wall gaps were filled with mineral wool and sealed with fire resistant silicones made by PROMAT (PROMASEAL Mastic acrylate sealant, Promat SYSTEMGLAS silicone, Silicone 791, respectively within particular thirds of the specimen).

The test specimen was assembled by the employees of the sponsor in conjunction with JH CB s. r. o. České Budějovice (a steel construction) and Promat s. r. o Praha (sealants, a protection of steel construction) from 18th to 21nd April 2005.

On 21nd April 2005 the test specimen was handed over in accordance with the documentation, free and clear.

3 TEST PROCEDURES

3.1 General information

The fire resistance test was performed on 13th May 2005.

The preparation, test procedures and the evaluation were performed in accordance with EN 1365-2:1999 (E) Annex A: "Specific requirements for testing floors and roofs incorporating glazing" and EN 1363-1:1999. (At the same time the test complied with ČSN EN 1365-2 and ČSN EN 1363-1.)

The test equipment and measurement equipment used for the test are stated in Annex 1.

The representatives of the sponsor witnessed the test procedure.

3.2 Conditioning

From the handover date to the test date the specimen was kept in a closed testing hall with the following parameters: the ambient temperature (20 to 23) °C, the relative humidity (51 to 54) %.

3.3 Installation of the specimen

The test was carried out on a horizontal test furnace of the following internal dimensions: 3000 mm (width) x 8500 mm (length) x 2150 mm (height); in the longitudinal direction the furnace was adjusted to an internal length of 6000 mm.

The standard supporting construction was performed as the low density rigid wall construction according to [2]: 7.2.2.2.1 and was made from aerated concrete blocks with density of 650 kg/m^3 and the thickness of 250 mm.

The test specimen was installed as a slab fixed to the walls on four sides and loaded only by the dead weight of the construction.

3.4 Control of the test equipment

The furnaces were heated by an oil burner system. The furnace was controlled in accordance with [2]: 5.1 i. e. particular sections of [1]: 5:

The used PTs were produced in accordance with [1]: 4.5.1.1. The temperatures in the furnace were measured by PTs placed according to [1]: 9.1.1 and recorded at one-minute intervals. The temperatures in the furnace were regulated automatically so that the average temperature measured by all PTs (within a tolerance according to [1]: Article 5.1.2) corresponded to the equation stated in [1]: 5.1.1

$$T = 345.\log(8t+1) + 20 \qquad (°C),$$

where:

T (°C) is the temperature required by the standard and measured in the time *t*;

t (min) is the time, which begins to run at the commencement of the test.

Overpressure in the test furnace was measured by a differential pressure transducer and regulated automatically by an exhaust fan so that the overpressure values in the furnace corresponded to the conditions stated in [2]: 5.2.

3.5 Measurements on the specimen

Unexposed surface temperatures were measured using K-type thermocouples made in accordance with [1]: 4.5.1.2 attached and located in accordance with [2]: A.3.2 and A.3.3.

Internal temperatures were measured using K-type thermocouples made in accordance with [1]: 4.5.1.4 attached in accordance with the sponsor request.

The temperatures were recorded at one-minute intervals.

The vertical deflection was measured at the location where the maximum deflection was expected to occur as given in [2]: 9.3. Two locations were appointed at mid-span of two inner transoms oriented in the longitudinal direction of specimen and the specimen deflection was assessed as average value of these measured deflections. At sponsor's request the deflection of mid point of mid glass span was measured too. The deflections were recorded at five-minute intervals.

3.6 Ambient temperature

The ambient temperature was measured by measurement equipment in accordance with [1]: 5.6.

4 TEST PROCEDURES

The initial conditions of the tests corresponded to standard values according to [2]: 10.3. Observations made during the tests and afterwards are given in the following tables:

Time	Observation
1st min	Glass cracking on ES
2nd min	Reaction of the first active layer – glass is getting opaque
3rd min	Opaque glass in the whole area
6th min	Glass is getting dark
10th min	Glass is white for the most part, surroundings of cracks is getting dark
13th min	Smoke leaking from cracks
15th min	Midpoints of glass panes bended into the furnace less than 5 cm
	Light-through in some places
18th min	Deflection of 1st layer of glass into the furnace
20th min	Longitudial cracks and vertical shift in longitudinal cracks
22nd min	Vertical shift by 10 mm in longitudinal cracks
23rd min	Falling-off of 1st layer of glass into the furnace
25th min	Smoke leaking from longitudinal cracks
29th min	Vertical shift by 30 mm in longitudinal cracks
31st min s	Sustained flaming around opening, collapse of part of a pane
32nd min s	Termination of test

Tabular and graphical depictions of the output from all measurement devices are reported in Annex 2.

The field of temperature in the furnace during the tests fulfilled to the requirements of [1]: 5.1; the pressure in the furnace fulfilled to the requirements of [2]: 5.2.

5 TEST RESULTS

5.1 Performance criteria

Performance criteria for the tested specimens in accordance with [2]: 11 and A.4 are:

Loadbearing capacity

This is the time in completed minutes for which the test specimen continues to maintain its ability to support the test load (i. e. dead weight in this instance) during the test following [1]: 11.1. Failure to support the load is deemed to have occurred when both of the following criteria have been exceeded:

- limiting deflection $D = L^2/(400\ d)$, in mm, and
- limiting rate of deflection $dD/dt = L^2/(9000\ d)$, in mm/min, when $D > L/30$

where:

L = 5960 mm is the clear span of the test specimen;
d = 70 mm is the distance from the extreme fibre of the cold design compression zone to the extreme fibre of the cold design tension zone of the structural section.

Integrity

These are the times in completed minutes for which the test specimen continues to maintain its separating function during the test without either:

a) causing the ignition of cotton pad applied in accordance with [1]: 10.4.5.2; [2]: 8.2.3; or

b) permitting the penetration of gap gauge as specified in [1]: 10.4.5.3; or

c) resulting in sustained flaming.

Insulation

This is the time in completed minutes for which the test specimen continues to maintain its separating function during the test without developing temperatures on its unexposed surface which either:

a) increase the average temperature (derived from thermocouples specified in [2]: A.3.2) above the initial average temperature by more than 140 °C;

b) increase the temperature at any location (derived from thermocouples specified in [2]: A.3.3) above the initial average temperature by more than 180 °C.

(The initial average temperature equals the average temperature on the unexposed surface at the commencement of the test.)

5.2 Expression of the test results

Expression of the test results in accordance with [1]: 12.3:

-	Loadbearing capacity	**31 minutes**,	no failure[1)]
-	Integrity		
	- Cotton pad	**30 minutes**	
	- Gap gauge	**30 minutes**	
	- Sustained flaming	**30 minutes**	
-	Insulation		
	- increase of the average temperature	**30 minutes**[2)]	no failure[1)]
	- temperature increase at any location	**30 minutes**	

6 CONCLUSION

The results of the test are valid only for the tested specimen.

This report details method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in EN 1363-1, EN 1365-2 (and at present following the procedure outlined in ČSN EN 1363-1 and ČSN EN 1365-2). Any significant deviation with respect to size, construction details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant method is not covered by this report.

Report sheets and Annexes are valid only if stamped with an embossed stamp.

Approved by: .....
Mirko Louma
Assistant Manager
of the Fire Test Laboratory

Požární zkušebna Veselí nad Lužnicí, AKREDITOVANÁ ZKUŠEBNÍ LABORATOŘ č. 1026, PAVUS, a. s.

Worked out by: .....
Radek Hruska
Engineer of the Fire Test Laboratory

[1)] No failure during the period of 31 min of the test duration (the test having discontinued at the collapse of the glass pane).
[2)] According to [1]: 11.4.2 the performance criteria „insulation“ shall be assumed not to be satisfied when the „integrity“ criterion ceases to be satisfied.

TEST AND MEASURING EQUIPMENT, MEASUREMENT UNCERTAINTY

Test equipment:	Registration No.:
Horizontal furnace (+ equipment pressure and temperature control inside the furnace)	2.001
Wall furnace (+ equipment pressure and temperature control inside the furnace)	2.003
Test frame	2.007/1
Pressure probe in the furnace	2.006/1
Frame for the cotton cushion	2.013/1.2

Measuring equipment:	Measured quantity	Metrological registration No.:
Differential pressure transducer	pressure (voltage)	3 09 10
Datalogger	temperature	3 10 06
Datalogger	voltage	3 11 65
Plate thermometers in the furnace (STC K ∅ 1 mm)	temperature (emf)	3 10 08
Device for measuring ambient temperature (STC K ∅ 3 mm)	temperature (emf)	3 10 15
TC (K) – temperature on the US	temperature (emf)	3 10 09
Roving TC (K)	temperature (emf)	3 10 06
Deflectometer	deflection	3 01 01
Stopwatch	time	3 05 01
Measuring tape	dimension	3 01 05

The metrological relationships of the device are defined in the metrological registration card of the device; this card is expressly identified by the metrological registration number of the device.

Quantity			**Expanded uncertainties**
Term	Denotation	Unit	
Time from commencement of test	t	(min)	< 0,03 min, if $t \leq 240$ min
Time of integrity failure		(min)	< 0,5 min
Temperature (type K thermocouple, compensating cables - tolerance class 1 according to IEC 584-2 and IEC 584-3, respectively)	T	(°C)	$\sqrt{(6{,}40.10^{-6}.T^2 + 6{,}06\,°C^2)}$, if -40 °C ≤ T ≤ 375 °C) $\sqrt{(2{,}76.10^{-5}.T^2 + 3{,}03\,°C^2)}$, if +375 °C ≤ T ≤ 1000 °C,
Overpressure in the furnace	p	(Pa)	$\sqrt{(5.3.10^{-4}.p^2 + 1{,}1.10^{-5}\,Pa^2)}$
Horizontal deflection of vertical element		(mm)	< 1,8 mm

The reported expanded uncertainties of measurement are stated as the standard uncertainties of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with ALE Publication EA-4/02 (EAL R2).

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible stated a degree of accuracy of the result.

MEASUREMENTS

Furnace control

Time t	Furnace temperature (°C)														Deviation d_e (%)		Overpressure in the furnace[1] (Pa)		Ambient
(min)	T	64	65	66	67	68	69	70	71	72	73	74	75	T_s	permissible	actual	required	actual	temperature (°C)
IC		13	13	13	13	13	13	13	13	13	14	13	13	13					15
0	20	48	55	53	39	58	51	57	63	55	52	62	51	54	-	-	-	29.8	16
1	349	266	294	267	315	213	307	267	224	255	251	226	315	267	-	-13.2	-	21.8	16
2	445	495	509	453	446	516	530	498	457	430	497	524	464	485	-	-1.0	-	12.0	16
3	502	501	521	466	484	540	569	514	473	447	527	523	489	504	-	-0.5	-	19.3	16
4	544	568	573	522	537	599	613	560	514	490	578	583	557	558	-	0.4	-	16.5	16
5	576	599	598	551	570	623	635	578	535	523	602	611	589	585	-	0.6	-	17.1	16
6	603	619	615	575	586	638	654	605	558	534	621	616	603	602	15	0.5	17±5	16.7	16
10	678	717	699	663	681	718	729	699	665	647	707	697	711	694	15	0.8	17±5	18.5	16
15	739	763	744	715	722	752	760	729	721	724	741	558	772	725	12.5	0.5	17±3	17.3	16
20	781	804	786	760	765	793	802	767	759	764	782	459	814	754	10.0	-0.1	17±3	16.6	17
25	815	834	818	794	798	824	835	804	793	798	815	834	844	816	7.5	-0.3	17±3	16.4	17
30	842	865	847	824	823	849	853	838	822	825	841	844	872	842	5.0	-0.1	17±3	17.3	17
31	847	837	829	817	827	849	856	819	812	819	838	766	871	828	4.9	-0.2	17±3	9.1	17

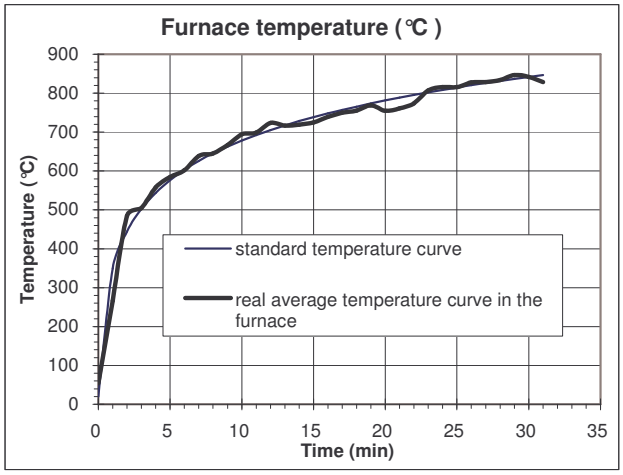
[1] 453 mm below the underside of the separating element

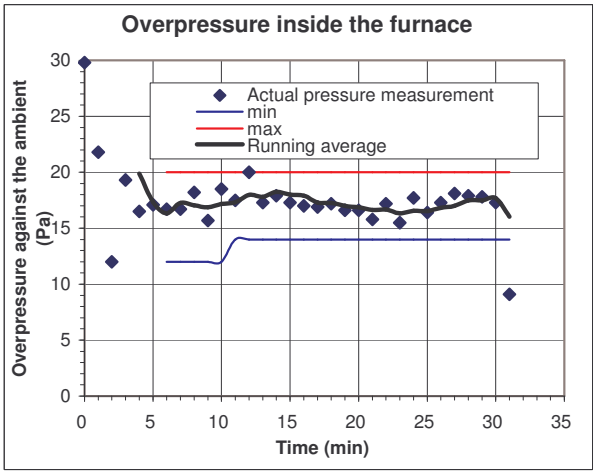
$T = 345 \cdot \log(8 \cdot t + 1) + 20$ $(°C)$ required average furnace temperatur e the according to [1] : 5.1.1

T_s $(°C)$ real average furnace temperatur e according to [1] : 5.1.1

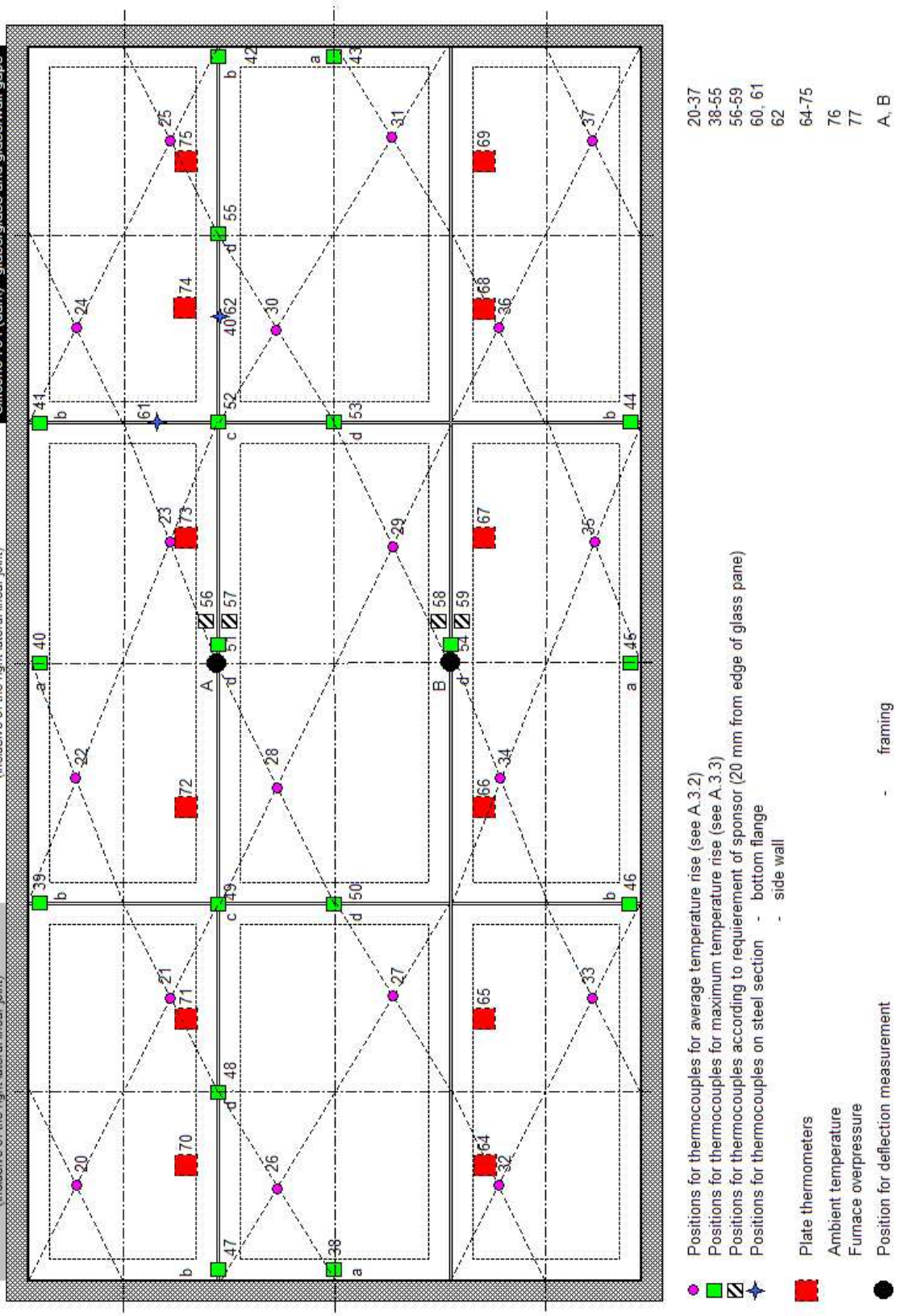
t (min) time since the commenceme nt of the test

d_e $(\%)$ percentage deviation T_s from T according to [1] : 5.1.2





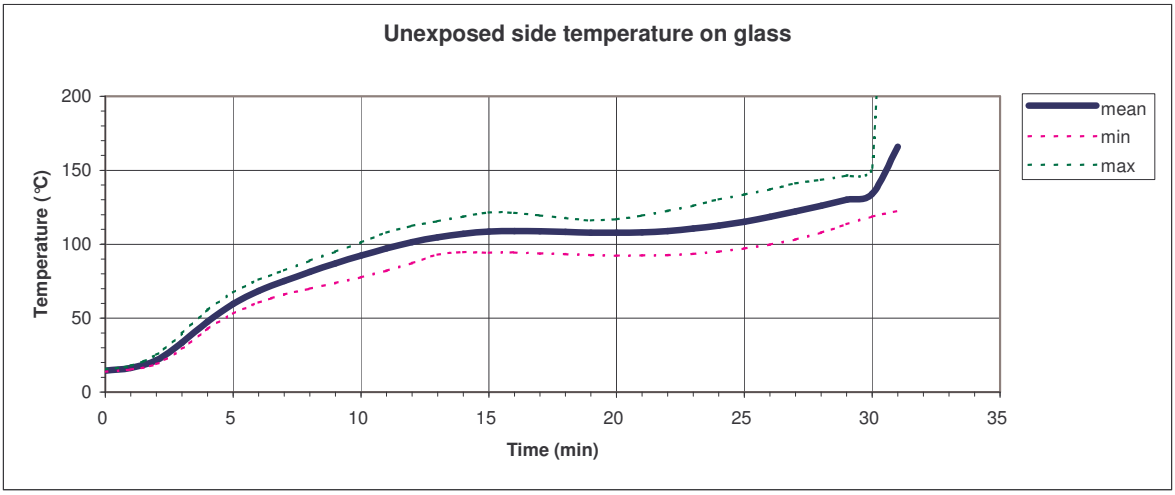
Location of unexposed thermocouples and deflection measurement position according to EN 1365-2:1999: Annex A, and plate thermometers



Unexposed side temperature on glass

Time (min)	Temperatures on the unexposed side (°C)																		mean
	20	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*	*35*	*36*	*37*	
IC	13	14	13	14	14	14	14	14	14	14	14	14	13	14	14	14	14	14	14
0	14	15	14	14	14	14	15	15	15	15	14	15	15	15	14	14	15	15	14
5	63	67	58	59	59	56	63	61	60	53	53	57	67	62	60	56	64	56	60
10	96	99	90	99	91	91	94	88	93	78	86	86	98	95	97	90	101	91	92
15	106	105	115	116	95	100	94	116	111	105	105	104	122	106	112	113	115	114	109
20	106	104	112	109	92	98	99	116	111	109	106	108	116	105	112	110	117	111	108
25	119	120	115	116	97	109	122	120	109	107	116	121	120	111	119	108	134	111	115
29	135	141	127	133	114	128	146	133	117	115	137	140	131	126	134	117	144	123	130
30	137	146	131	138	120	134	152	137	120	119	142	144	133	130	138	120	147	127	134
31	141	152	135	143	126	139	593		123	123	146	147	158	147	142	124	152	132	166

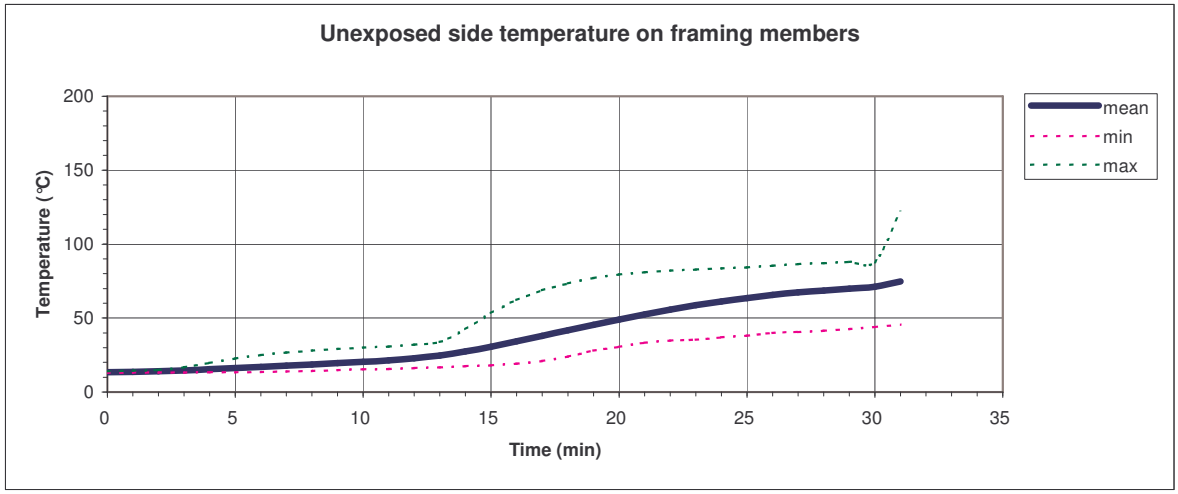
20-37 Thermocouples for average temperature rise (see A.3.2)



Unexposed side temperature on framing members

Time	Temperatures on the unexposed side (°C)																		
(min)	*38*	*39*	*40*	*41*	*42*	*43*	*44*	*45*	*46*	*47*	*48*	*49*	*50*	*51*	*52*	*53*	*54*	*55*	mean
IC	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	14	13
0	13	14	13	13	14	14	13	13	13	13	14	14	13	14	14	14	14	14	14
5	14	15	13	21	20	14	19	14	14	18	15	18	15	14	23	16	15	15	16
10	18	17	15	29	25	16	23	17	15	26	20	23	17	18	30	20	18	19	20
15	25	22	21	37	38	22	26	26	18	41	37	33	27	30	40	26	27	53	31
20	39	51	31	56	61	36	32	40	33	51	61	52	55	56	58	40	51	79	49
25	63	71	48	65	75	62	38	64	56	56	74	59	67	74	65	50	71	84	64
29	75	76	62	70	78	72	43	77	68	60	80	62	73	78	68	52	78	88	70
30	77	76	65	71	78	74	44	79	70	61	82	63	75	79	69	53	81	88	71
31	82	77	68	71	78	76	45	81	72	67	122	70	77	79	68	53	70	88	75

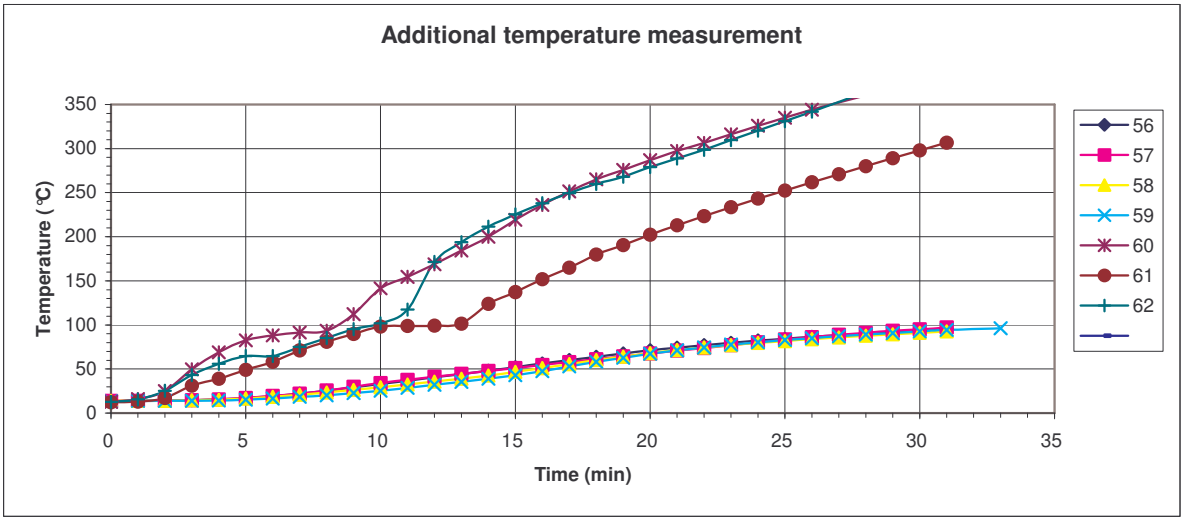
38-55 Thermocouples for maximum temperature rise (see A.3.3)



Additional temperature measurement

Time (min)	Internal temperatures and temperatures on the unexposed side (°C)						
	56	*57*	*58*	*59*	*60*	*61*	*62*
IC	13	13	13	13	13	12	12
0	14	14	14	14	13	12	13
5	17	17	17	17	83	49	65
10	33	34	29	29	141	98	102
15	52	51	47	48	219	137	225
20	71	68	68	71	287	202	279
25	84	84	82	85	335	253	331
29	92	93	90	93	369	289	374
30	94	95	91	94	377	298	385
31	96	97	93	96	385	307	394

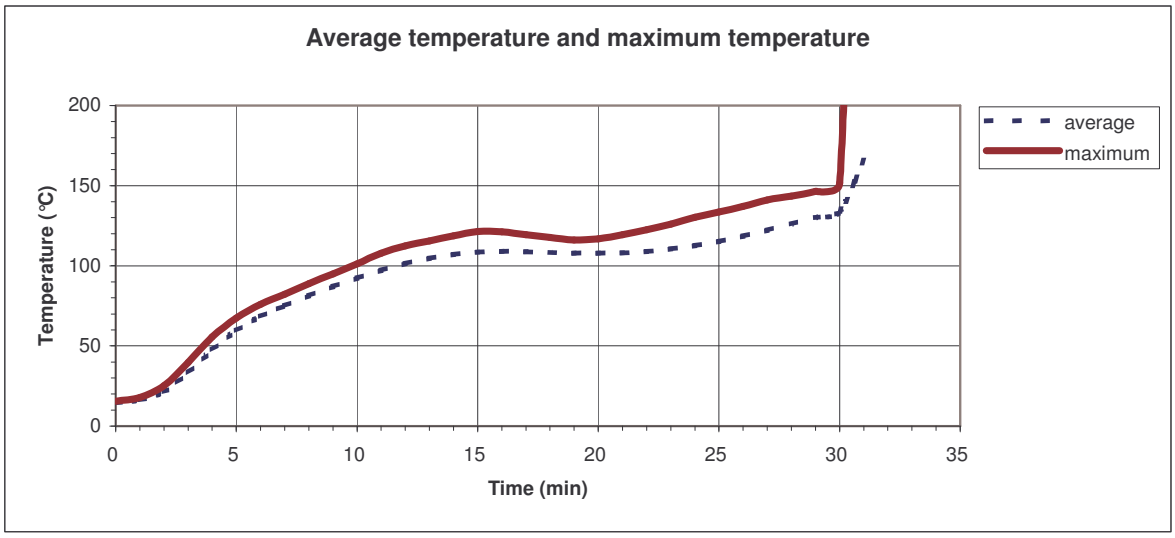
56-59	Thermocouples according to requierement of sponsor (20 mm from edge of glazing pane)
60,62	Thermocouples on steel sections - botom flange
61	Thermocouples on steel sections - side wall



Average temperature rise and maximum temperature rise

Time (min)	Unexposed side temperature (°C)	
	average	*maximum*
IC	14	14
0	14	15
5	60	67
10	92	101
15	109	122
20	108	117
25	115	134
29	130	146
30	134	152
31	166	593

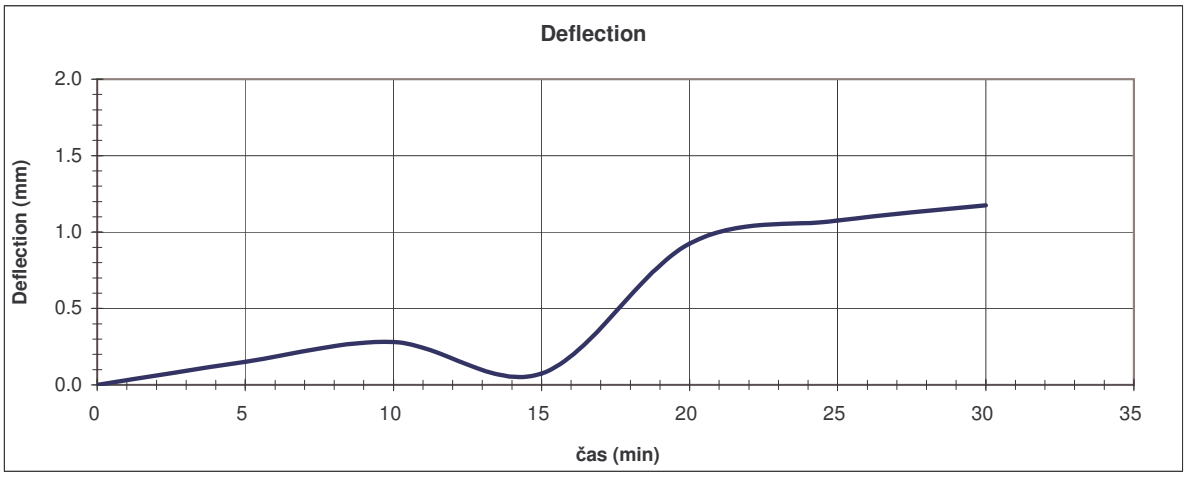
average	Average temperature according to [2]: A.4.2.2 derived from the TCs: 20-37
maximum	Maximum temperature according to [2]: A.4.2.3 derived from the TCs: 20-55



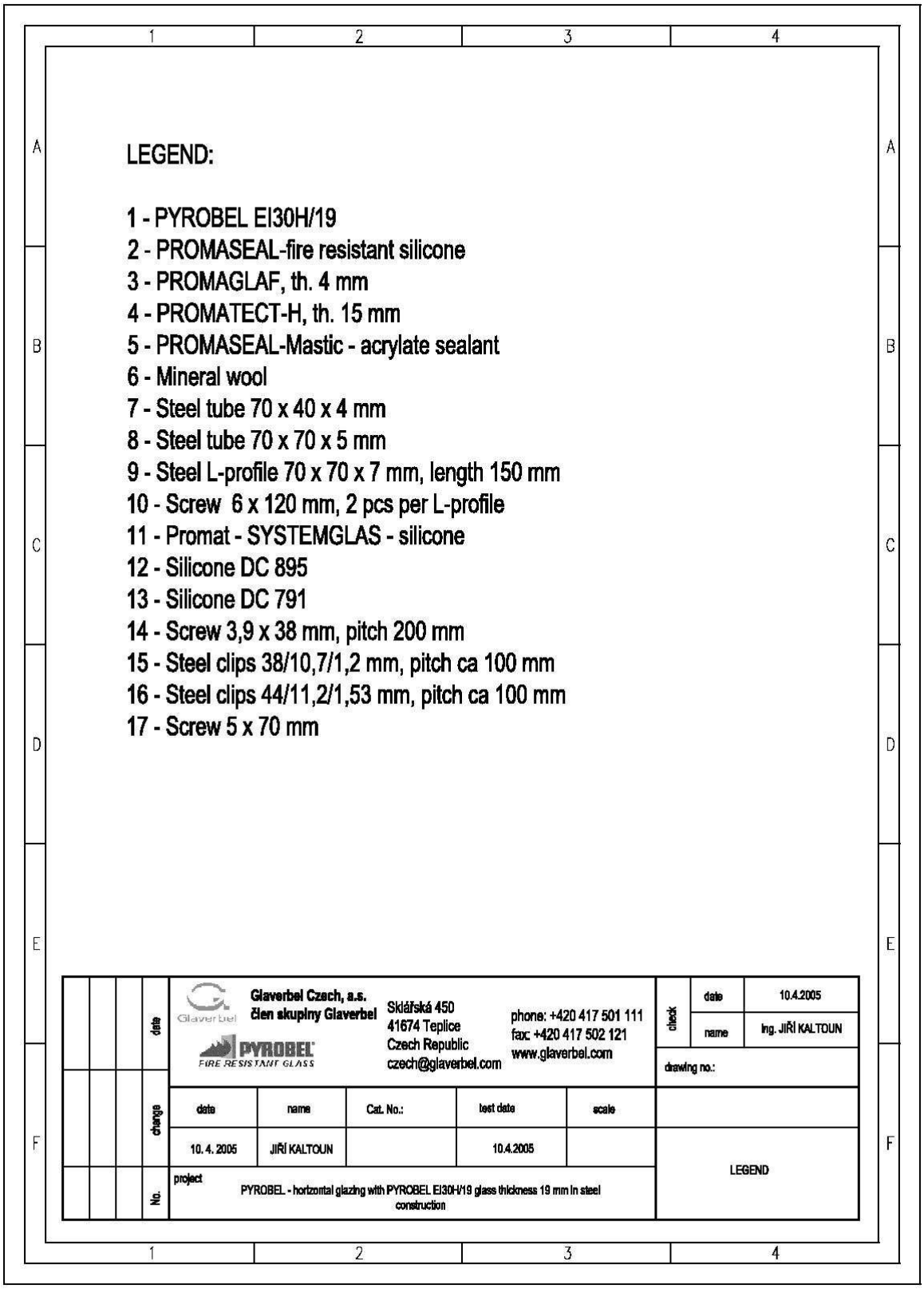
Deflection measurement

Time (min)	Vertical deflections at mesurement points of framing A	B	Mean vertical deflection of midpoint of framing deflection (mm)	rate of deflection (mm.min^{-1})
IC	0.0	0.0	0.0	
0	0.0	0.0	0.0	0.0
5	0.1	0.2	0.2	0.0
10	0.3	0.3	0.3	0.0
15	0.1	0.1	0.1	0.0
20	0.5	1.4	0.9	0.2
25	0.6	1.6	1.1	0.0
30	0.7	1.7	1.2	0.0

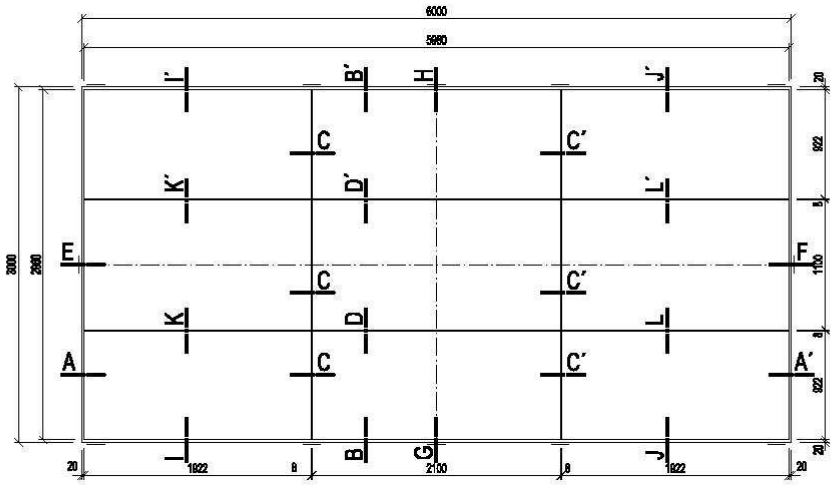
Positive value of deflection corresponds with down-deflection .



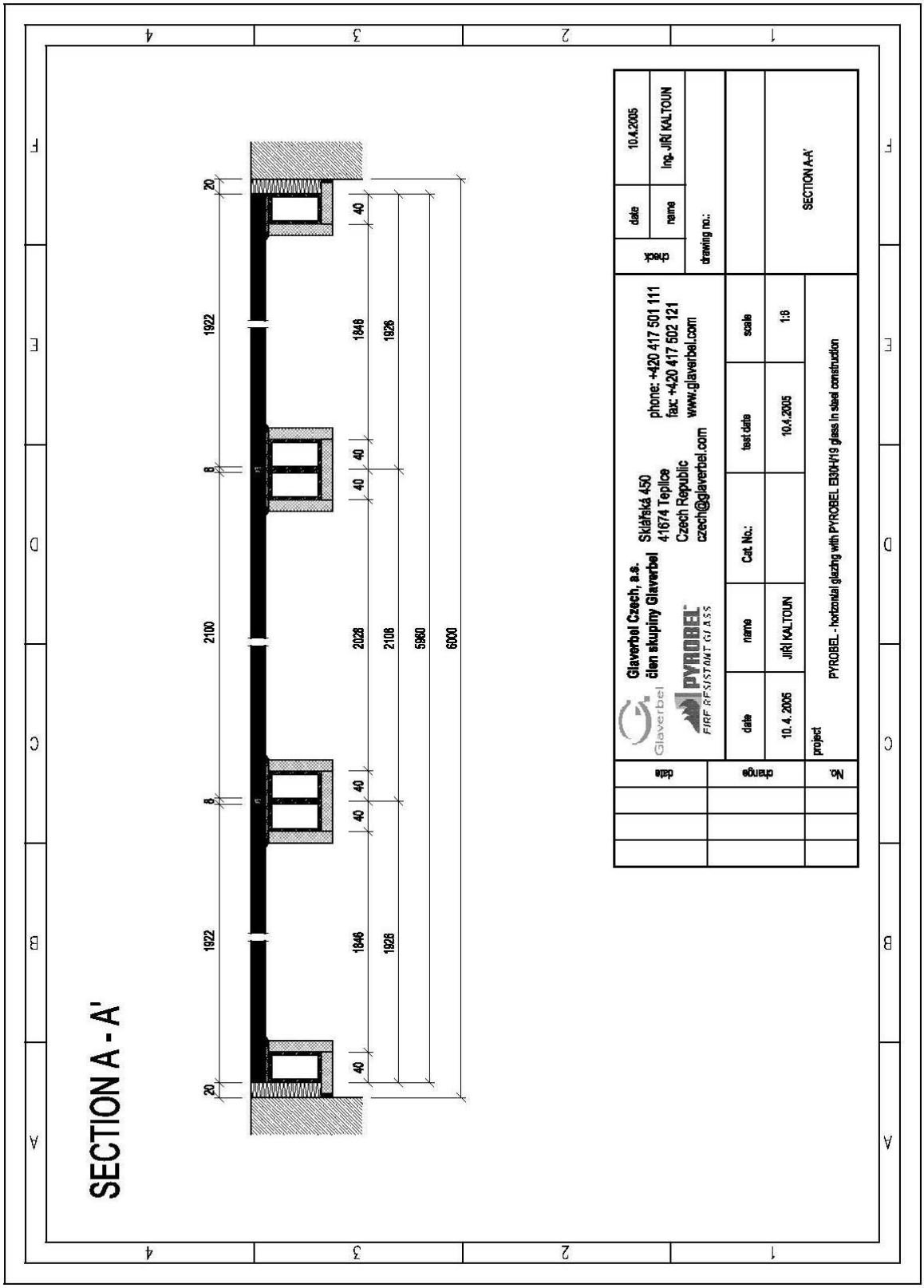
DOCUMENTATION



LAYOUT



			date	Glaverbel Czech, a.s. člen skupiny Glaverbel PYROBEL FIRE RESISTANT GLASS	Sklářská 450 41674 Teplice Czech Republic czech@glaverbel.com	phone: +420 417 501 111 fax: +420 417 502 121 www.glaverbel.com	check: date	10.4.2005
							name	Ing. JIŘÍ KALTOUN
			change				drawing no.:	
				date	name	Cat. No.:	test date	scale
				10. 4. 2005	JIŘÍ KALTOUN		10.4.2005	1:50
			No.	project PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction				LEGEND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6000
Glaverbel Czech, a.s.
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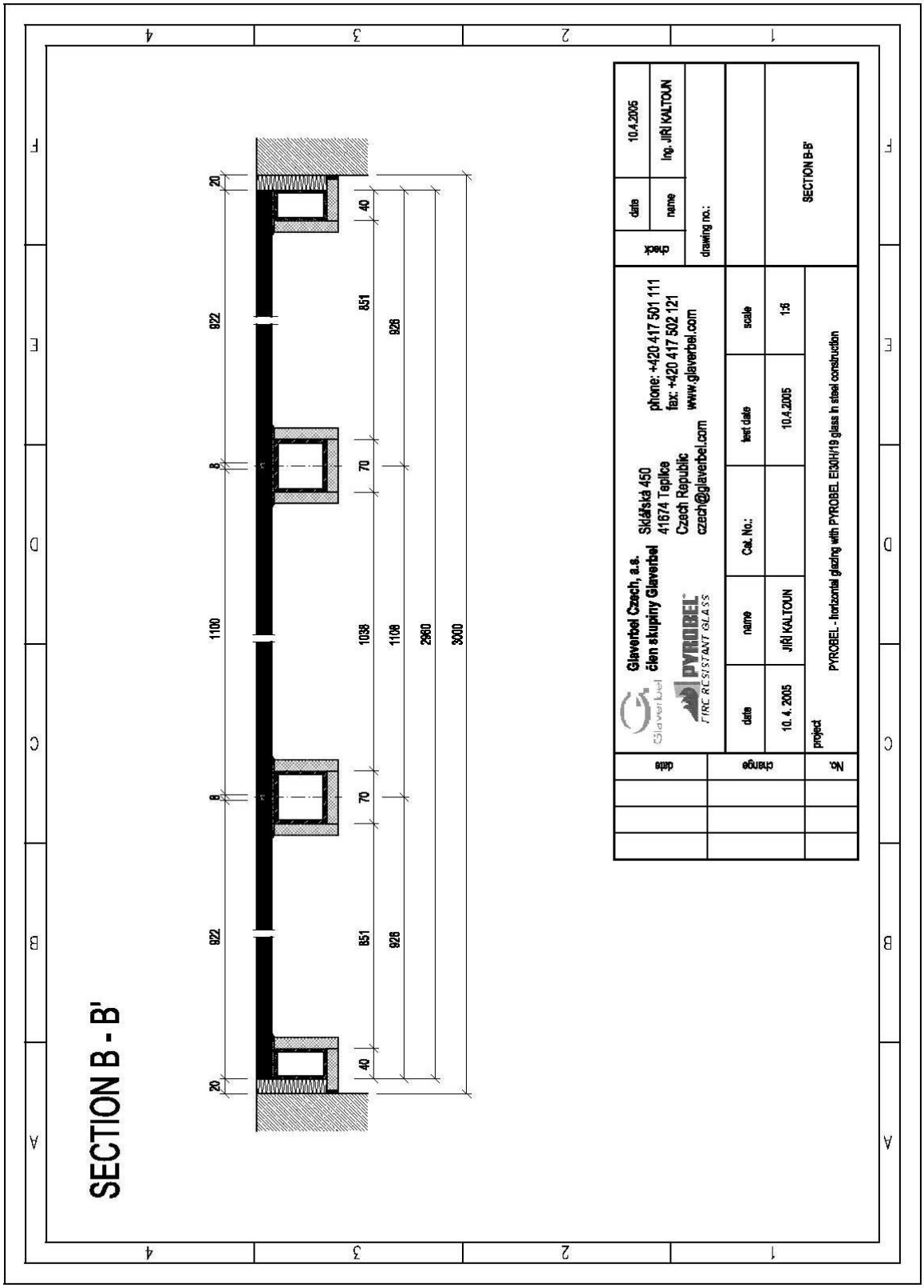
Czech Republic
czech@glaverbel.com
phone: +420 417 501 111
fax: +420 417 502 121
www.glaverbel.com
PYROBEL
FIRE RESISTANT GLASS
check
date
name
drawing no.:
10.4.2005
Ing. JIŘÍ KALTOUN
SECTION A-A'
scale
1:8
test date
10.4.2005
Cat. No.:
name
JIŘÍ KALTOUN
date
10. 4. 2005
project
PYROBEL - horizontal glazing with PYROBEL EI30-H19 glass in steel construction
No.
change
date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2960
3000
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czech@glaverbel.com
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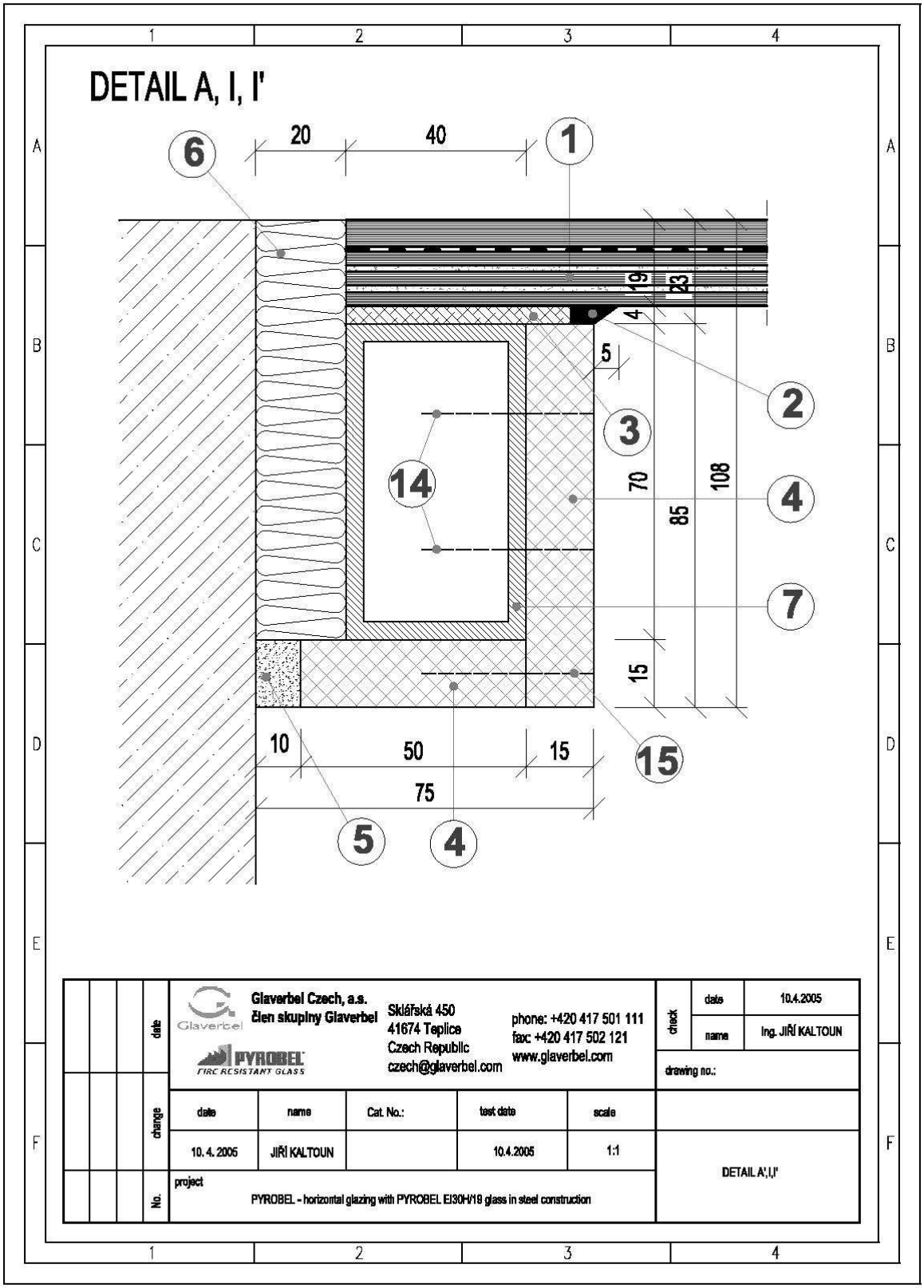
www.glaverbel.com
PYROBEL
FIRE RESISTANT GLASS
check
date
name
10.4.2005
Ing. JIŘÍ KALTOUN
drawing no.:
SECTION B-B'
date
name
Cat. No.:
test date
scale
10. 4. 2005
JIŘÍ KALTOUN
10.4.2005
1:5
project
PYROBEL - horizontal glazing with PYROBEL EI30/I19 glass in steel construction
No.
change
date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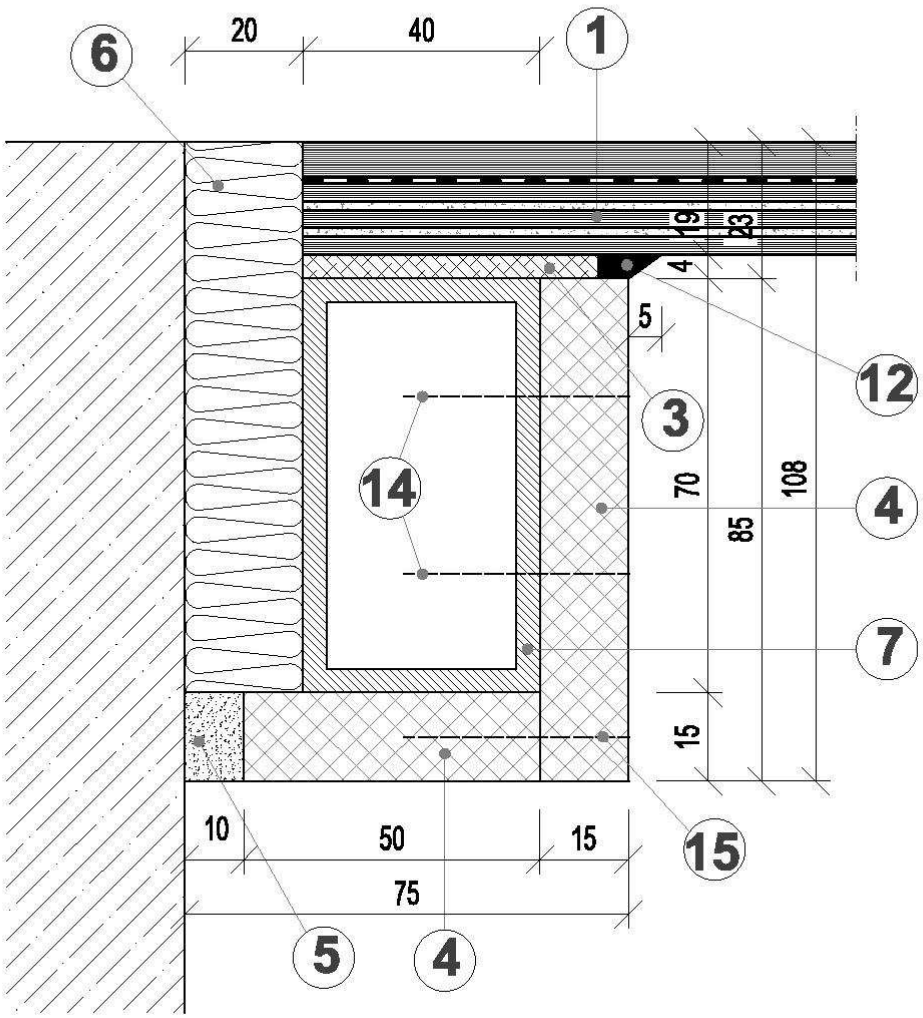
PYROBEL
FIRE RESISTANT GLASS
check
date
10.4.2005
name
Ing. JIŘÍ KALTOUN
drawing no.:
date
name
Cat. No.:
test date
scale
10. 4. 2005
JIŘÍ KALTOUN
10.4.2005
1:1
project
PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction
DETAIL A',I,I'
change
No.

DETAIL A´, J, J'



			date	Glaverbel Czech, a.s. člen skupiny Glaverbel PYROBEL FIRE RESISTANT GLASS	Sklářská 450 41674 Teplice Czech Republic czech@glaverbel.com	phone: +420 417 501 111 fax: +420 417 502 121 www.glaverbel.com	check	date: 10.4.2005 name: Ing. JIŘÍ KALTOUN
			change	date: 10. 4. 2005	name: JIŘÍ KALTOUN	Cat. No.:	test date: 10.4.2005	scale: 1:1	drawing no.: DETAIL A',J,J'
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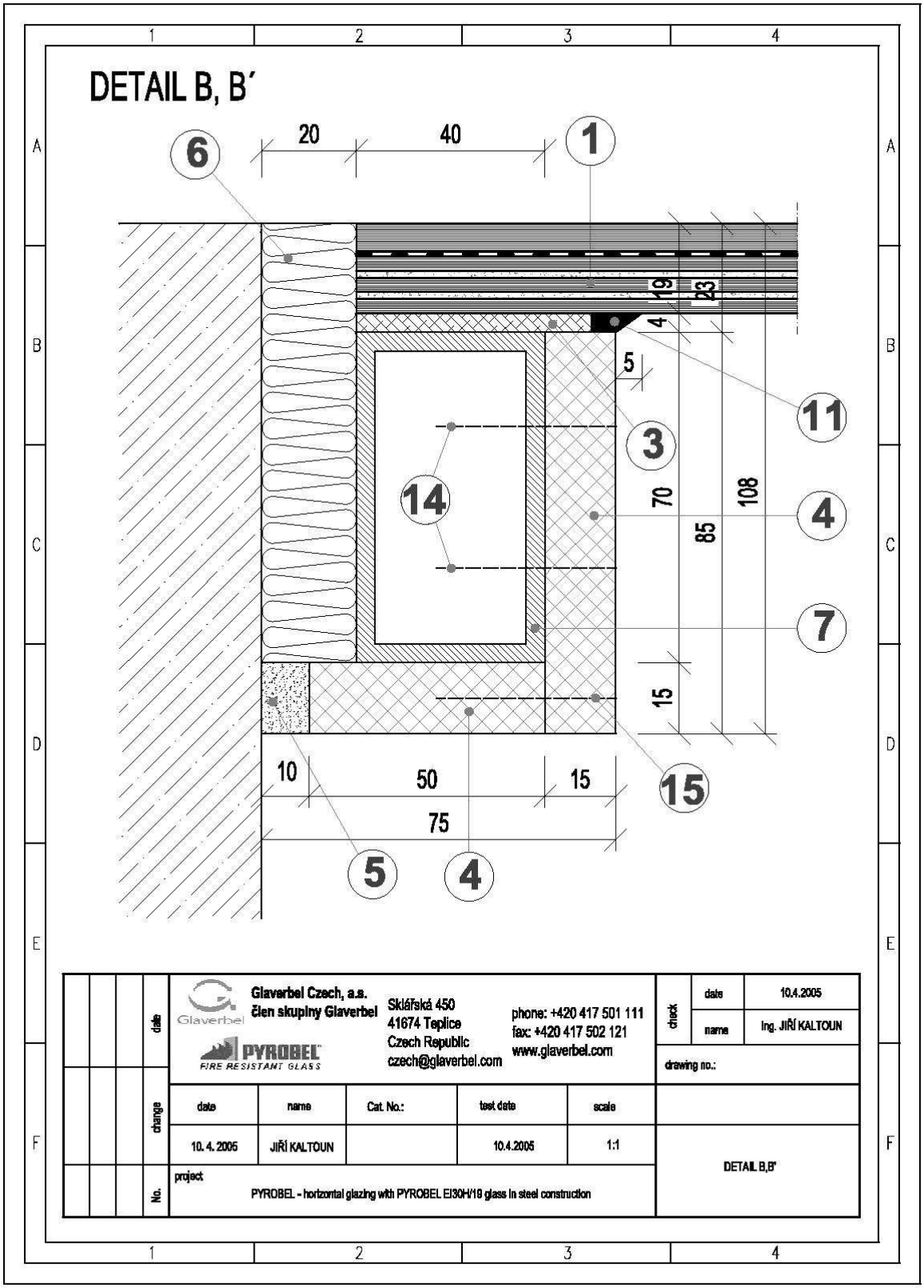
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Glaverbel Czech, a.s.
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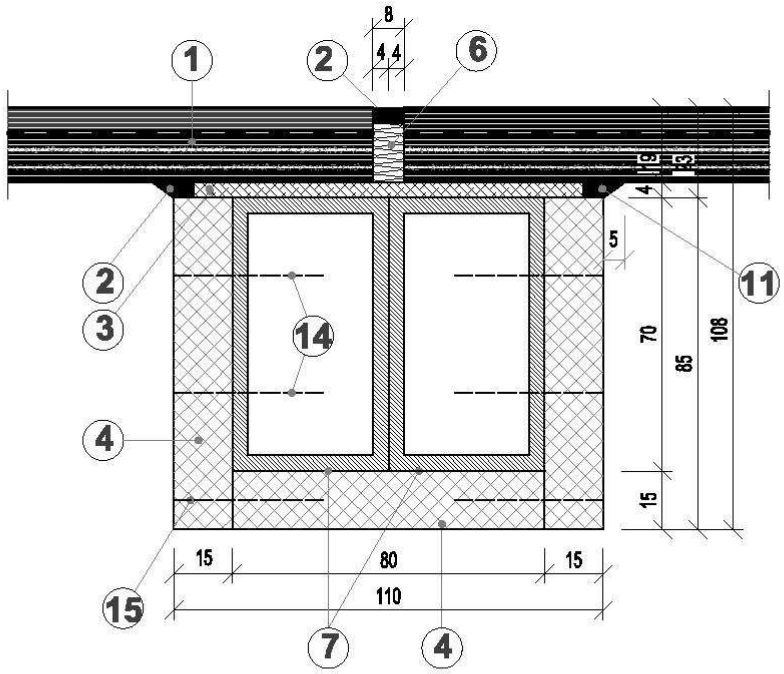
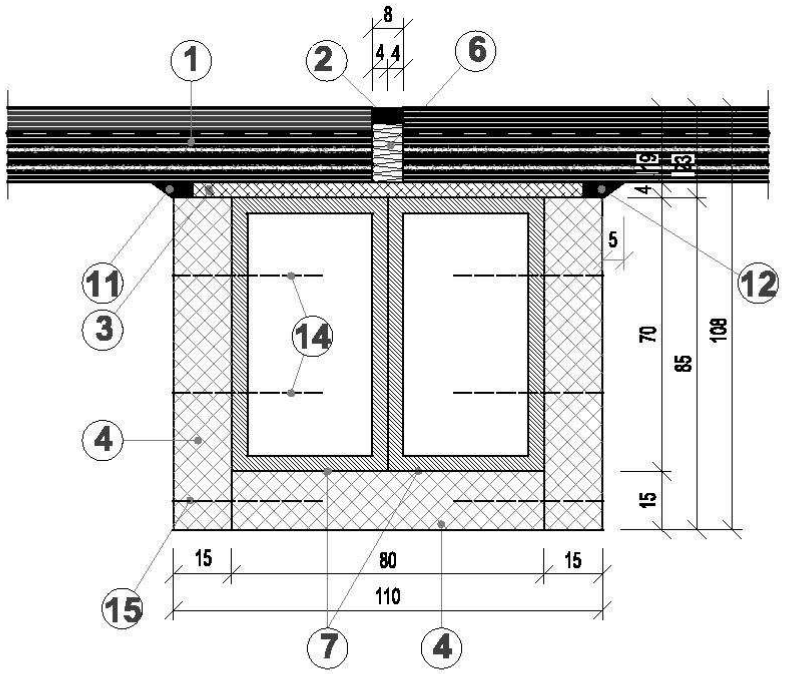
www.glaverbel.com
PYROBEL
FIRE RESISTANT GLASS
date
change
No.
check
date
10.4.2005
name
Ing. JIŘÍ KALTOUN
drawing no.:
date
name
Cat. No.:
test date
scale
10. 4. 2005
JIŘÍ KALTOUN
10.4.2005
1:1
project:
PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction
DETAIL B,B'

DETAIL C



			date	Glaverbel Czech, a.s. člen skupiny Glaverbel PYROBEL FIRE RESISTANT GLASS	Sklářská 450 41674 Teplice Czech Republic czech@glaverbel.com	phone: +420 417 501 111 fax: +420 417 502 121 www.glaverbel.com	check	date	10.4.2005
								name	Ing. JIŘÍ KALTOUN
			change				drawing no.:		
				date	name	Cat. No.:	test date	scale	
				10. 4. 2005	JIŘÍ KALTOUN		10.4.2005	1:1.5	DETAIL C
			No.	project PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction					

DETAIL C´



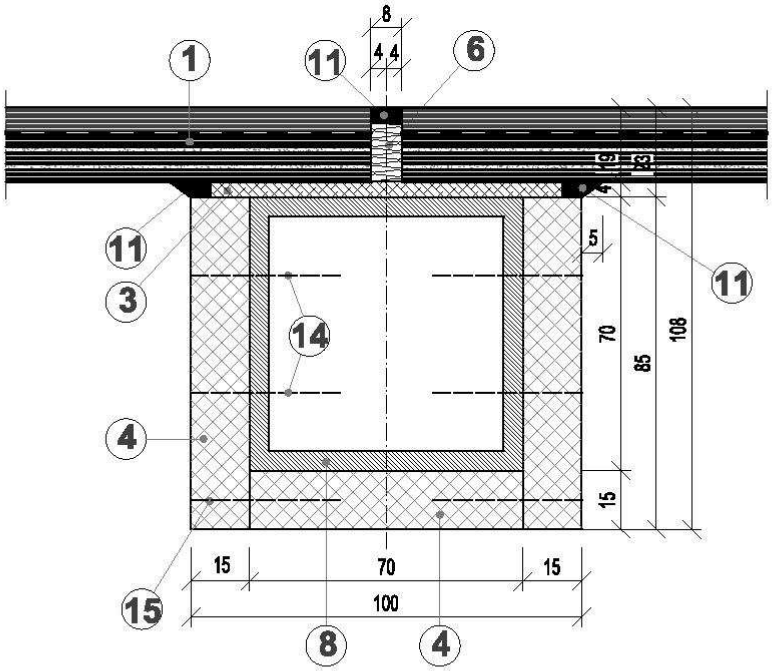
Glaverbel Czech, a.s. člen skupiny Glaverbel PYROBEL FIRE RESISTANT GLASS	Sklářská 450 41674 Teplice Czech Republic czech@glaverbel.com	phone: +420 417 501 111 fax: +420 417 502 121 www.glaverbel.com	check: date 10.4.2005; name Ing. JIŘÍ KALTOUN
			drawing no.:

date	name	Cat. No.:	test date	scale
10. 4. 2005	JIŘÍ KALTOUN		10.4.2005	1:1.5

project: PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction

DETAIL C'

DETAIL D, D'



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								name	Ing. JIŘÍ KALTOUN
			change				drawing no.:		
				date	name	Cat. No.:	test date	scale	
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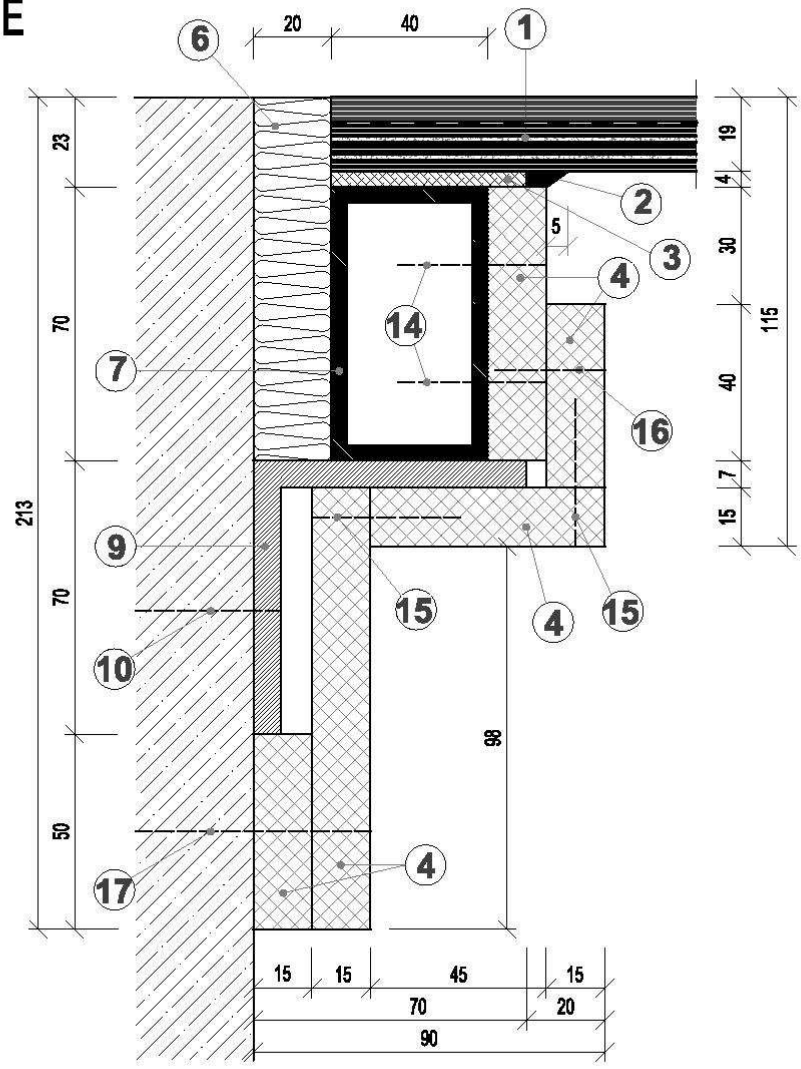
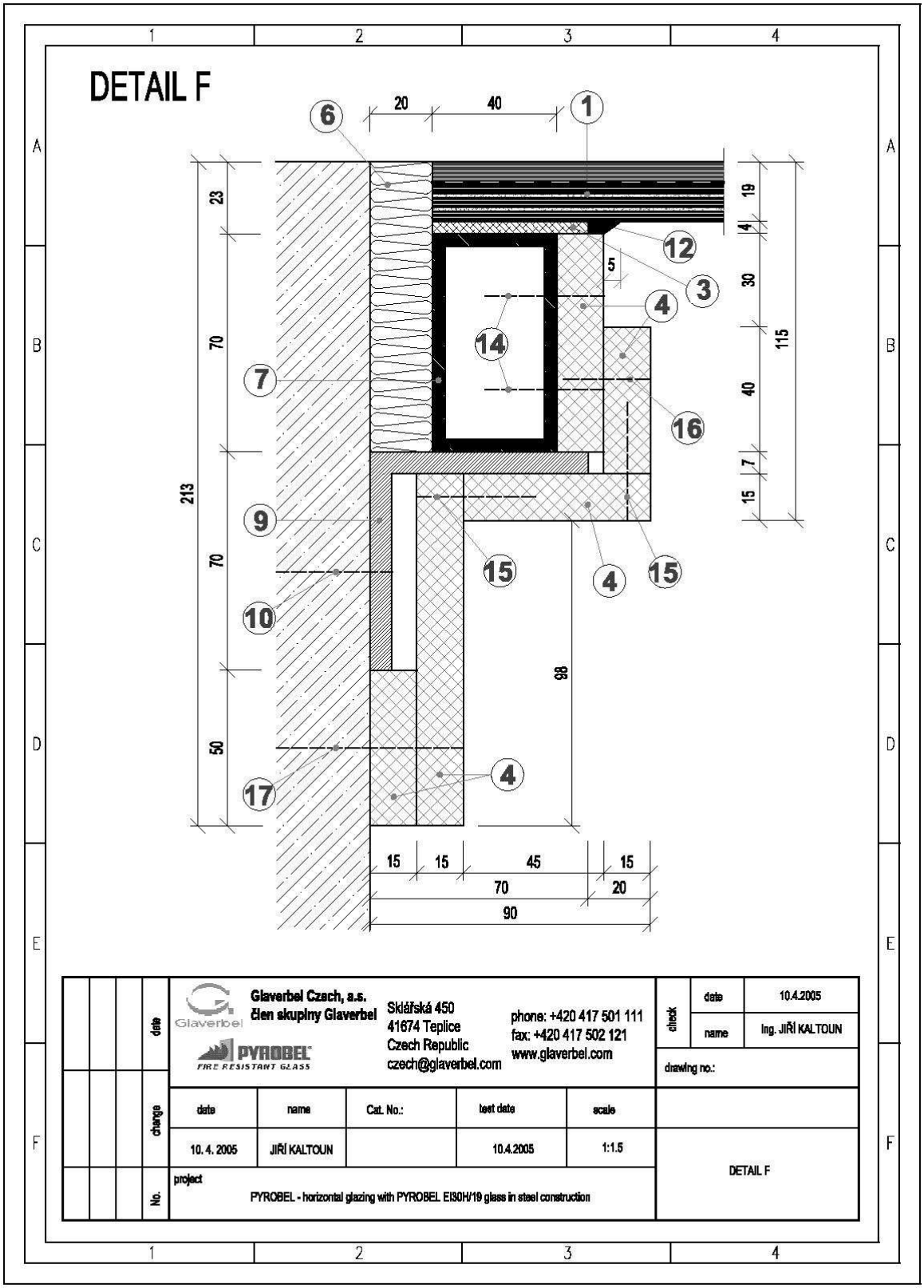
			No.	project PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction					

DETAIL E



			date	Glaverbel Czech, a.s. člen skupiny Glaverbel PYROBEL FIRE RESISTANT GLASS	Sklářská 450 41674 Teplice Czech Republic czech@glaverbel.com	phone: +420 417 501 111 fax: +420 417 502 121 www.glaverbel.com	check	date: 10.4.2005 name: Ing. JIŘÍ KALTOUN
			change	date: 10. 4. 2005	name: JIŘÍ KALTOUN	Cat. No.:	test date: 10.4.2005	scale: 1:1.5	drawing no.:	DETAIL E
			No.	project: PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction						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PYROBEL
FIRE RESISTANT GLASS
date
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name
Ing. JIŘÍ KALTOUN
drawing no.:
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Cat. No.:
test date
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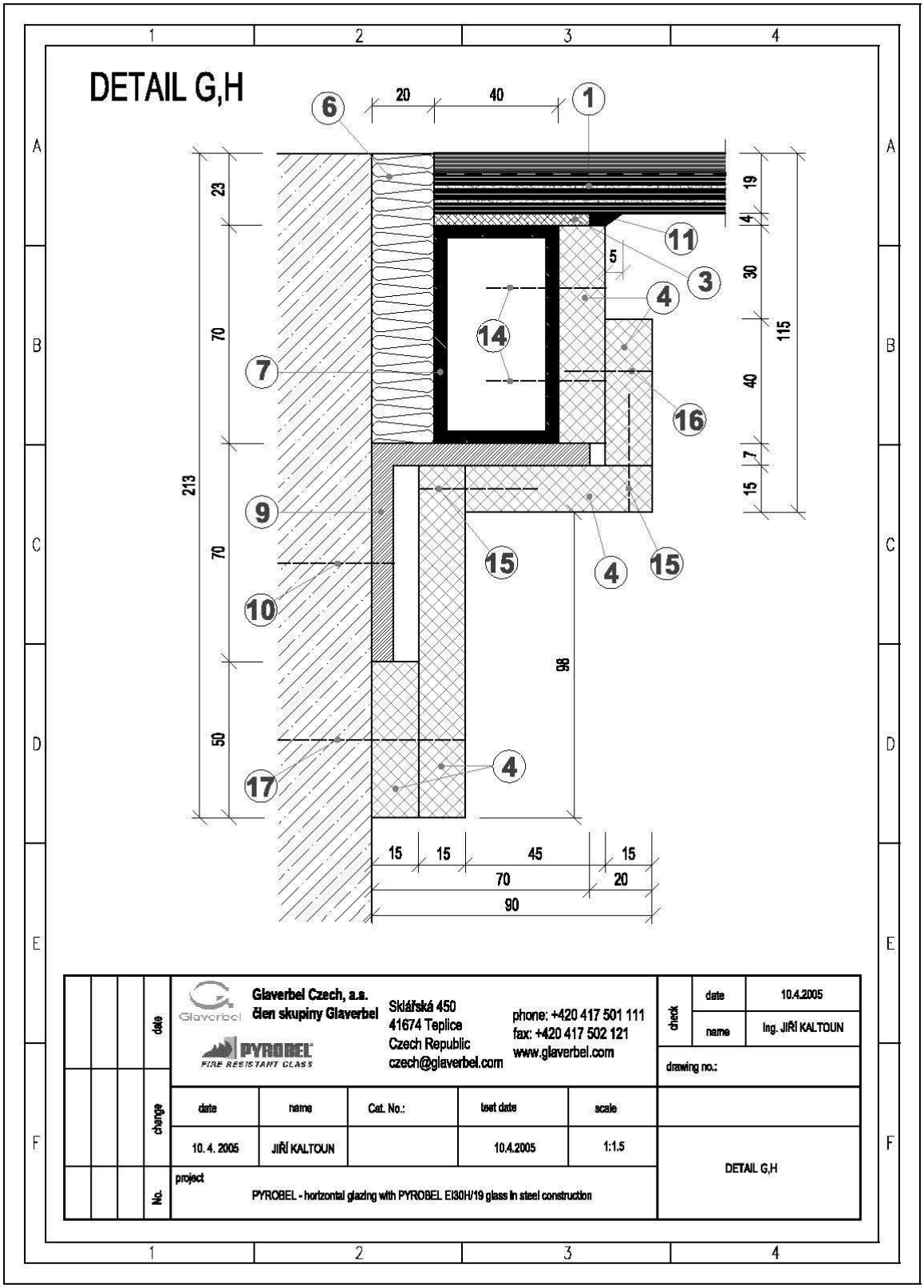
10. 4. 2005
JIŘÍ KALTOUN
10.4.2005
1:1.5
project
PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction
DETAIL F


DETAIL G,H
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PYROBEL
FIRE RESISTANT GLASS
date
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Ing. JIŘÍ KALTOUN
10.4.2005
drawing no.:
Cat. No.:
test date
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JIŘÍ KALTOUN
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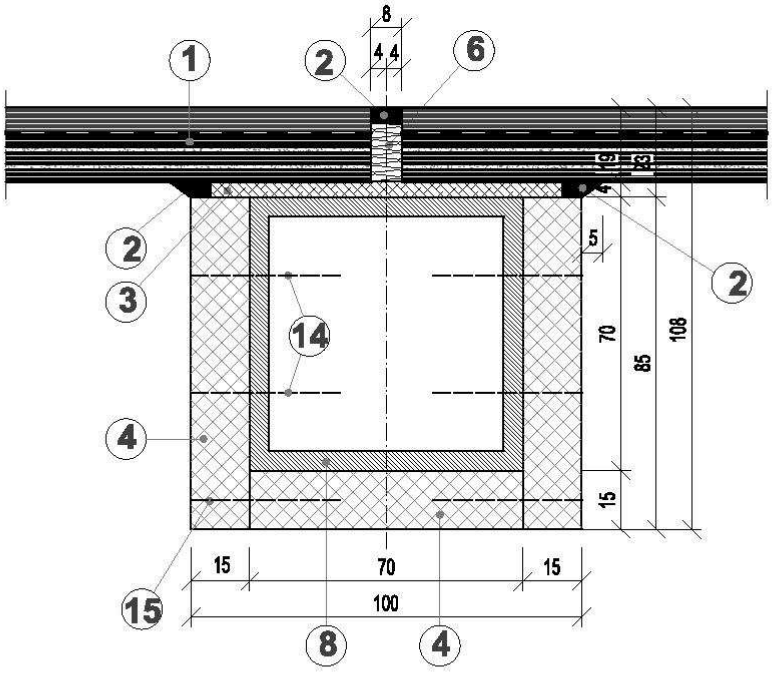
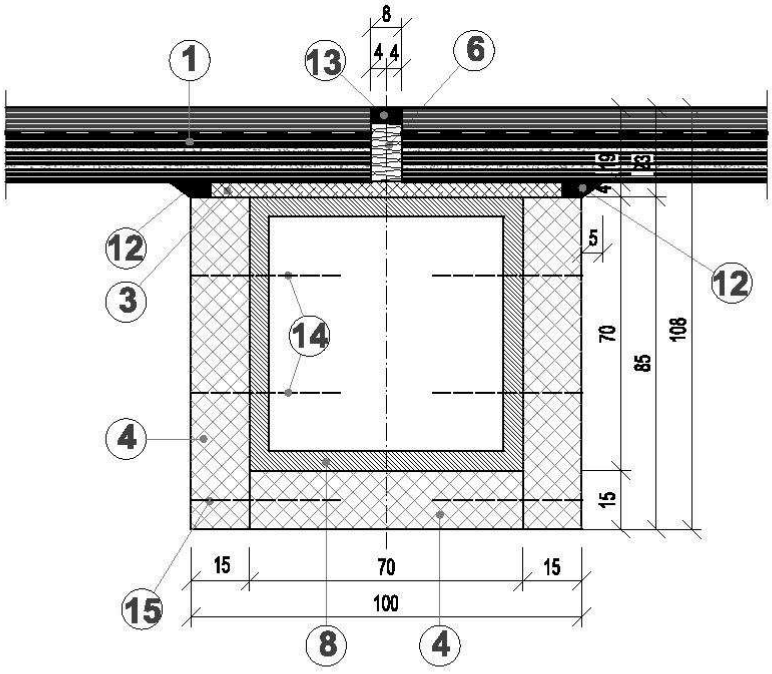
project
PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction
DETAIL G,H

DETAIL K, K'



			date	Glaverbel Czech, a.s. člen skupiny Glaverbel PYROBEL FIRE RESISTANT CLASS	Sklářská 450 41674 Teplice Czech Republic czech@glaverbel.com	phone: +420 417 501 111 fax: +420 417 502 121 www.glaverbel.com	check	date: 10.4.2005 name: Ing. JIŘÍ KALTOUN
			change	date: 10. 4. 2005	name: JIŘÍ KALTOUN	Cat. No.:	test date: 10.4.2005	scale: 1:1.5	drawing no.: DETAIL K,K'
			No.	project: PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction				

DETAIL L, L'



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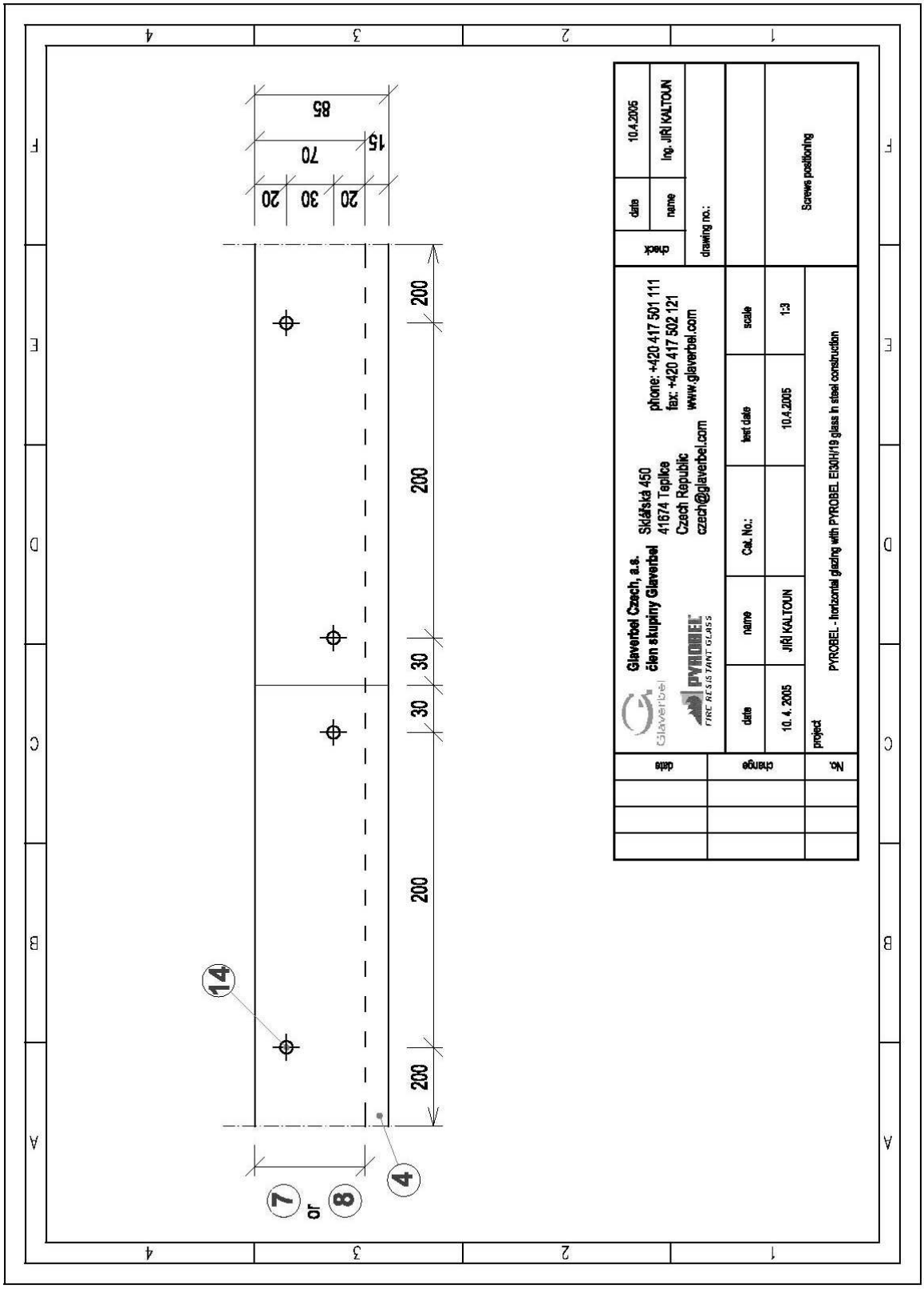
								name	Ing. JIŘÍ KALTOUN
			change				drawing no.:		
				date	name	Cat. No.:	test date	scale	
				10. 4. 2005	JIŘÍ KALTOUN		10.4.2005	1:1.5	DETAIL L,L'
			No.	project PYROBEL - horizontal glazing with PYROBEL EI30H/19 glass in steel construction					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Glaverbel Czech, a.s.
člen skupiny Glaverbel
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41674 Teplice
Czech Republic
czech@glaverbel.com
phone: +420 417 501 111
fax: +420 417 502 121
www.glaverbel.com
PYROBEL
FIRE RESISTANT GLASS
check
date
name
10.4.2005
Ing. JIŘÍ KALTOUN
drawing no.:
Screws positioning
scale
1:3
test date
10.4.2005
Cat. No.:
name
JIŘÍ KALTOUN
date
10. 4. 2005
project
PYROBEL - horizontal glazing with PYROBEL E30/I/19 glass in steel construction
No.
change
date

Photo documentation

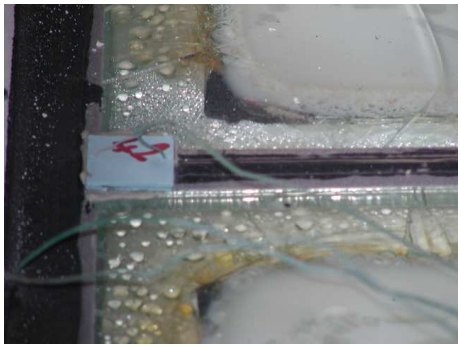
The US before the test commencement

The US before the test commencement

The US before the test commencement

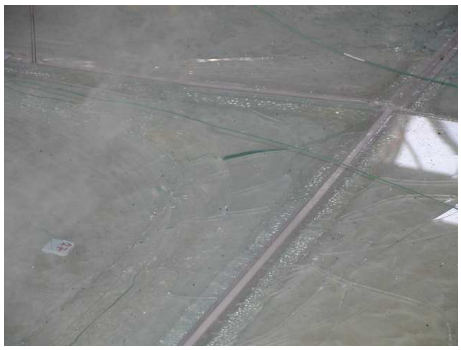
TheUS at 2nd min

The US at 11th min



Details of the US after 10 min

The US at 15 min



Details of theUS after 15 min

Details of the ES after 15 min

The US at 21st min

Detail of the US after 21 min

Detail of the ES after 21 min

Detail of the US after from 25 min to 29 min

TheUS at 30th min

Details of the ES at 31st min

The US immediately after the end of the test

The ES after the end of the test