

# ISTITUTO GIORDANO

CENTRO POLITECNICO DI RICERCHE E CERTIFICAZIONI

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## RICONOSCIMENTI UFFICIALI:

- MINISTERO LAVORO PUBBLICI: Legge 1098/71 con D.M. 07/11/80 n. 22913 "Prove ad impianti da costruzione".
- MINISTERO INDUSTRIA COMMERCIO ARTIGIANATO: D.M. 06/11/80 "Certificazione CE per le unità da dipinto".
- MINISTERO INDUSTRIA COMMERCIO ARTIGIANATO: D.M. 31/10/81 "Certificazione CEE delle macchine a motore di macchine da qualità".
- MINISTERO INDUSTRIA COMMERCIO ARTIGIANATO: D.L. 27/01/81 n. 136 "Certificazione CEE delle macchine a motore di macchine di movimento terra".
- MINISTERO INDUSTRIA COMMERCIO ARTIGIANATO: D.M. 08/07/83 "Certificazione CEE concernente la sicurezza dei giocattoli".
- MINISTERO INDUSTRIA COMMERCIO ARTIGIANATO: D.M. 06/07/87 "Certificazioni ed attività di competenza CEE per il rendimento delle caldaie ad acqua calda alimentate con combustibili liquidi e gassosi".
- MINISTERO INDUSTRIA COMMERCIO ARTIGIANATO: Nota n. 78780 del 15/10/88 "Certificazione CEE per gli apparecchi a gas".
- MINISTERO INDUSTRIA COMMERCIO ARTIGIANATO e MINISTERO LAVORO E PREVIDENZA SOCIALE: D.M. 04/07/84 "Certificazione CEE delle macchine".
- MINISTERO INDUSTRIA COMMERCIO ARTIGIANATO: "Rendita di verifica delle dimensioni e caratteristiche dei prodotti nell'ambito della sorveglianza del mercato a tutela del consumatore".
- MINISTERO INDUSTRIA COMMERCIO ARTIGIANATO: D.M. 02/04/84 "Rilascio di attestazioni di conformità delle caratteristiche e prestazioni energetiche dei componenti degli edifici a degli isolati".
- MINISTERO INTERNO: Legge 01/04/84 e D.M. 25/03/85 con autorizzazione del 21/04/88 "Prove di reazione al fuoco secondo D.M. 25/03/84".
- MINISTERO INTERNO: Legge 01/04/84 e D.M. 25/03/85 con autorizzazione del 04/07/82 "Prove di resistenza al fuoco secondo Circolare n. 7 del 08/04/81 e norme CIVILITICI UNI 9727".
- MINISTERO INTERNO: Legge 01/04/84 e D.M. 25/03/85 con autorizzazione del 12/04/88 "Prove su esemplari di campioni portati secondo D.M. 20/12/82".
- MINISTERO UNIVERSITÀ E RICERCA SCIENTIFICA E TECNOLOGICA: Legge 4/02/82 con D.M. 04/10/85 "Validazione nell'uso dei laboratori autorizzati a svolgere attività di carattere applicativo a favore della piccola e media industria".
- MINISTERO PUBBLICA ISTRUZIONE: Protocollo n. 115 del 27/03/87 "Accordo con il Comitato Nazionale delle ricerche con nota n. 25/03/87".
- SINCERT (Accreditamento Organismi Certificazione): Accreditamento n. 0574 del 10/12/80 "Organismo di certificazione di alcuni quadri".
- ENEA (Ente Nazionale per l'Accreditamento di Laboratori): Accreditamento n. 0001 del 14/11/81.
- SIT (Servizi di Testare in Italia): Accreditamento n. 29 "Centro SIT di testare per grandezza termoverifica ed elettrica".
- ICM (Istituto di Certificazione Industriale per la Meccanica): Prova di laboratorio nell'ambito degli esecuti di Certificazione di Prodotto.
- ING (Istituto per il Mercato Quilato): Prova di laboratorio nell'ambito degli esecuti di Certificazione di Prodotto per carne lussuosa.
- UNICAP (Unione Nazionale Certificatori Italiani del Settore Acciaio Leghe): Riconoscimento del 26/03/85 "Laboratori per le prove di certificazione UNICAP su materiali e tecniche speciali".
- UNI (Ente Nazionale Italiano di Unificazione - Settore Certificazione): Prova di laboratorio nell'ambito degli esecuti di Certificazione di Prodotto per testatori di legno con Rumore e circolazione forata e serramenti esterni.

## PARTECIPAZIONI ASSOCIATIVE:

- AIA: Associazione Italiana di Acustica.
- ASCAR: Associazione Italiana Condizionamento dell'Aria Riscaldamento Ventilazione.
- AIQC: Associazione Italiana per la Qualità.
- AIPI: Associazione Italiana Prove non Distruttive.
- ALP: Associazioni Laboratori Italiani Fuoco.
- ALPI: Associazione Laboratori di Prova Indipendenti.
- ASPEM: American Society of Heating, Refrigerating and Air-Conditioning Engineers Inc.
- ASINDUSTRIA: Associazione degli Industriali di Fimili.
- ASTM: American Society for Testing and Materials.
- ATIE: Associazione Tecnica Italiana del Cui.
- CTE: Consiglio del Tattilo della Industrializzazione Edile.
- CTT: Comitato Termocolori Italiano.
- EARMA: European Association of Research Managers and Administrators.
- EARTC: European Association of Research and Technology Organization.
- EGOLF: European Group of Official Laboratories for Fire Testing.
- UNI: Ente Nazionale Italiano di Unificazione.

## CLAUSOLE

Il presente documento si rilascia solamente al campione o recipiente sottoposto a prova.  
"Il presente documento non può essere riprodotto parzialmente, salvo approvazione scritta del laboratorio".

## TEST REPORT N. 180125/2599RF

Place and date of emission: Bellaria, 12/03/2004

Commissioner: BROFER S.r.l. - Via Pio X - Località Fratte - 35010 SANTA GIUSTINA IN COLLE (PD)

Date of test: 27/01/2004

Subject of the test: Determine the fire damper according to the circular n. 91 of the Minister of the Interior - General Management of Fire-prevention Services dated 14/09/1961.

Test site: Giordano Institute S.p.A. - Blocco 3 - Via Verga, 19 - 47030 Gatteo (FO)

Sample origin: provided by the Commissioner.

## Generalities.

At the experimental oven of the Fire Damper laboratory in this Institute a test was carried out according to the prescriptions of Circular n. 91 of the Minister of the Interior - General management of Fire-prevention Services dated 14/09/1961, on n. 3 fire barrier gates called "MTF/30", "BTS/30" and "BTT/30", not subjected to loading, produced and presented by Brofer S.r.l. - Via Pio X, 9 - Località Fratte - 35010 Santa Giustina in Colle (PD).

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SERVIZI

Aggiornamento  
documentale

N. 3359





### Test purpose.

The purpose of the test is to verify the time the sample being examined conserves the stability "R", the seal "E" and the thermic insulation "T" defined by Minister's Decree 30/11/1983 paragraph 1.11.

### Description of the sample\*.

The sample subjected to testing consists of n. 3 fire barrier gates called MTF/30", "BTS/30" and "BTT/30", made up of a tunnel, which a foil shutter on a horizontal axis rotates around, moved by a control mechanism and with the dimensions reported in the following table.

Fire barrier gate	Shape of the section	Internal nominal dimension* (mm)	Nominal depth
MTF/30	Square	400 x 400	300
BTS/30	Square	500 x 500	300
BTT/30	Square	400	300

(\*) section for the fire barrier gate is squared and the diameter for the fire barrier gate is circular.

### **Fire barrier gate "MTF/30".**

The fire barrier gate "MTF/30" consists of:

- a tunnel made by a square section hull in galvanized steel sheet, 1.5 mm thick, folded frontally at both ends in such a way as to form flanges that are 40-mm long each;
- Ledge for the shutter in a closed position made of a plaster of Paris listel, 40 x 15 mm in cross section and 850 kg/m<sup>3</sup> in density, fastened to the upper horizontal wall inside the tunnel by means of n. 2 steel rivets;



(\*) According to customer's declarations and controls of this Institute.



- Foil shutter, total thickness 30 mm, formed by n. 3 fibrosilicate cementite-based plates, each one 9.5 mm thick and 1100 kg/m<sup>3</sup> dense, glued together and covered with a ceramic bonding agent for a total thickness of 1.5 mm for the various layers and assembled by means of n. 2 containment profiles in galvanized steel shaped like a “ L ”, 280 mm long, overall section is 33 x 30 mm and 1.5 mm thick, fastened together by means of a couple of steel screws; the shutter moves by means of n. 2 steel rotational pins, fastened to the containment profiles described above, and they rotate inside the proper brass ferrules fastened by pressure to the vertical walls of the tunnel;
- Graphite-based thermoexpanding gasket, 30 x 3.5 mm cross section, placed inside the tunnel opposite the perimeter edge of the shutter when the shutter is in a closed position;
- Control device consisting of:
  - o steel return spring, placed outside the tunnel and attached to one of the rotational pins described above;
  - o steel lever for manual recocking, placed outside the tunnel and attached directly to the same rotational pin the return spring is attached to;
  - o galvanized steel blocking device;
  - o recockable circuit breaker starting from a thermic fuse in alloy located inside the tunnel;
  - o covering carter in galvanized steel plate;

when the thermic fuse melts the circuit breaker is freed which enables the release of the lever and the action of the spring and the closing of the shutter; the fire barrier gate is recocked manually by means of the lever.

### **Fire barrier gate “BTS/30”.**

The fire barrier gate “BTS/30” consists of:

- a tunnel made by a square section hull in fibrosilicate plate, with a base of silicates, cement and additives, 20 mm thick and 850 kg/m<sup>3</sup> dense, fastened together by means of screwed-on galvanized steel angular profiles, 30 x 30 mm cross section and 1.5 mm thick, covered in galvanized steel sheet on the outside, 1.5 mm thick, and provided with connecting flanges at the ends in galvanized steel sheet, 40 mm wide and 1.5 mm thick;





- Ledge for the shutter in a closed position made of fibrosilicate cement-based listel, 40 x 15 mm in cross section and 1100kg/m<sup>3</sup> in density, fastened to the upper horizontal wall inside the tunnel by means of n. 4 steel clips;
- Foil shutter, total thickness 30 mm, formed by n. 3 fibrosilicate cementite-based plates, each one 9.5 mm thick and 1100 kg/m<sup>3</sup> dense, glued together and covered with a ceramic bonding agent for a total thickness of 1.5 mm for the various layers and assembled by means of n. 2 containment profiles in galvanized steel shaped like a “ L ”, 400 mm long, overall section is 33 x 30 mm and 1.5 mm thick, fastened together by means of a couple of steel screws; the shutter moves by means of n. 2 steel rotational pins, fastened to the containment profiles described above, and they rotate inside the proper brass ferrules fastened by pressure to the vertical walls of the tunnel;
- Graphite-based thermoexpanding gasket, 30 x 3.5 mm cross section, placed inside the tunnel opposite the perimeter edge of the shutter when the shutter is in a closed position;
- Control device consisting of:
  - o steel return spring, placed outside the tunnel and attached to one of the rotational pins described above;
  - o steel lever for manual recocking, placed outside the tunnel and attached directly to the same rotational pin the return spring is attached to;
  - o galvanized steel blocking device;
  - o recockable circuit breaker starting from a thermic fuse in alloy located inside the tunnel;
  - o covering carter in galvanized steel plate;

when the thermic fuse melts the circuit breaker is freed which enables the release of the lever and the action of the spring and the closing of the shutter; the fire barrier gate is recocked manually by means of the lever.





### **Fire barrier gate "BTT/30".**

The fire barrier gate "BTT/30" consists of:

- a tunnel made by a circular section hull in galvanized steel sheet, 1.5 mm thick;
- n. 2 ledges for the shutter in a closed position made of galvanized steel angular profiles, 40 x 15 mm in cross section and 1.5 mm thick, welded to the internal tunnel wall;
- Foil shutter, total thickness 30 mm, formed by n. 3 fibrosilicate cementite-based plates, each one 9.5 mm thick and 1100 kg/m<sup>3</sup> dense, glued together and covered with a ceramic bonding agent for a total thickness of 1.5 mm for the various layers and assembled by means of n. 2 angular profiles in galvanized steel, 1.5 mm thick, fastened by means of steel screws; the shutter moves by means of n. 2 steel rotational pins, fastened to the containment profiles described above, and they rotate inside the proper brass ferrules fastened by pressure to the vertical walls of the tunnel;
- Graphite-based thermoexpanding gasket, 30 x 3.0 mm cross section, placed inside the tunnel opposite the perimeter edge of the shutter when the shutter is in a closed position;
- Control device consisting of:
  - o steel return spring, placed outside the tunnel and attached to one of the rotational pins described above;
  - o steel lever for manual recocking, placed outside the tunnel and attached directly to the same rotational pin the return spring is attached to;
  - o galvanized steel blocking device;
  - o recockable circuit breaker starting from a thermic fuse in alloy located inside the tunnel;
  - o covering carter in galvanized steel plate;

when the thermic fuse melts the circuit breaker is freed which enables the release of the lever and the action of the spring and the closing of the shutter; the fire barrier gate is recocked manually by means of the lever.





The schematic drawings of the sample subjected to testing are reported below.

### KEY

Symbol	Description
<i>Fire barrier gate "MTF/30"</i>	
1	Tunnel: galvanized steel sheet, 1.5 mm thick, connecting flanges at the ends, 40 mm thick
2	Ledge for the shutter in a closed position; plaster of Paris listel, 40 x 15 mm cross section and 850 kg/m <sup>3</sup> dense
3	Steel rivet
4	Foil ledge, total thickness 30 mm, formed by n. 3 plates in cement-based fibrosilicate, 9.5 mm thick and 1100 kg/m <sup>3</sup> dense each, glued together and covered with a ceramic bonding agent for a total thickness of 1.5 mm for the various layers
5	Galvanized steel containment profile shaped like a " $\square$ ", 280 mm long, overall cross section 33 x 30 mm and 1.5 mm thick
6	Steel screws
7	Steel rotational pins
8	Graphite-based thermoexpanding gasket, cross section 30 x 3.5 mm
9	Control device: steel return spring
10	Control device: steel lever for manual recocking
11	Control device: recockable circuit breaker
12	Control device. Thermic fuse in alloy
<i>Fire barrier gate "BTS/30"</i>	
13	Tunnel: fibrosilicate plate based on silicates, cement and additives, 20 mm thick and 850 kg/m <sup>3</sup> dense
14	Tunnel: external covering in galvanized steel sheet, 1.5 mm thick
15	Tunnel: connecting flanges in galvanized steel sheet, 40 mm wide and 1.5 mm thick
16	Ledge for the shutter in a closed position: cementite-based fibrosilicate listel, cross section 40 x 15 mm and 1100 kg/m <sup>3</sup> dense
17	Steel clip



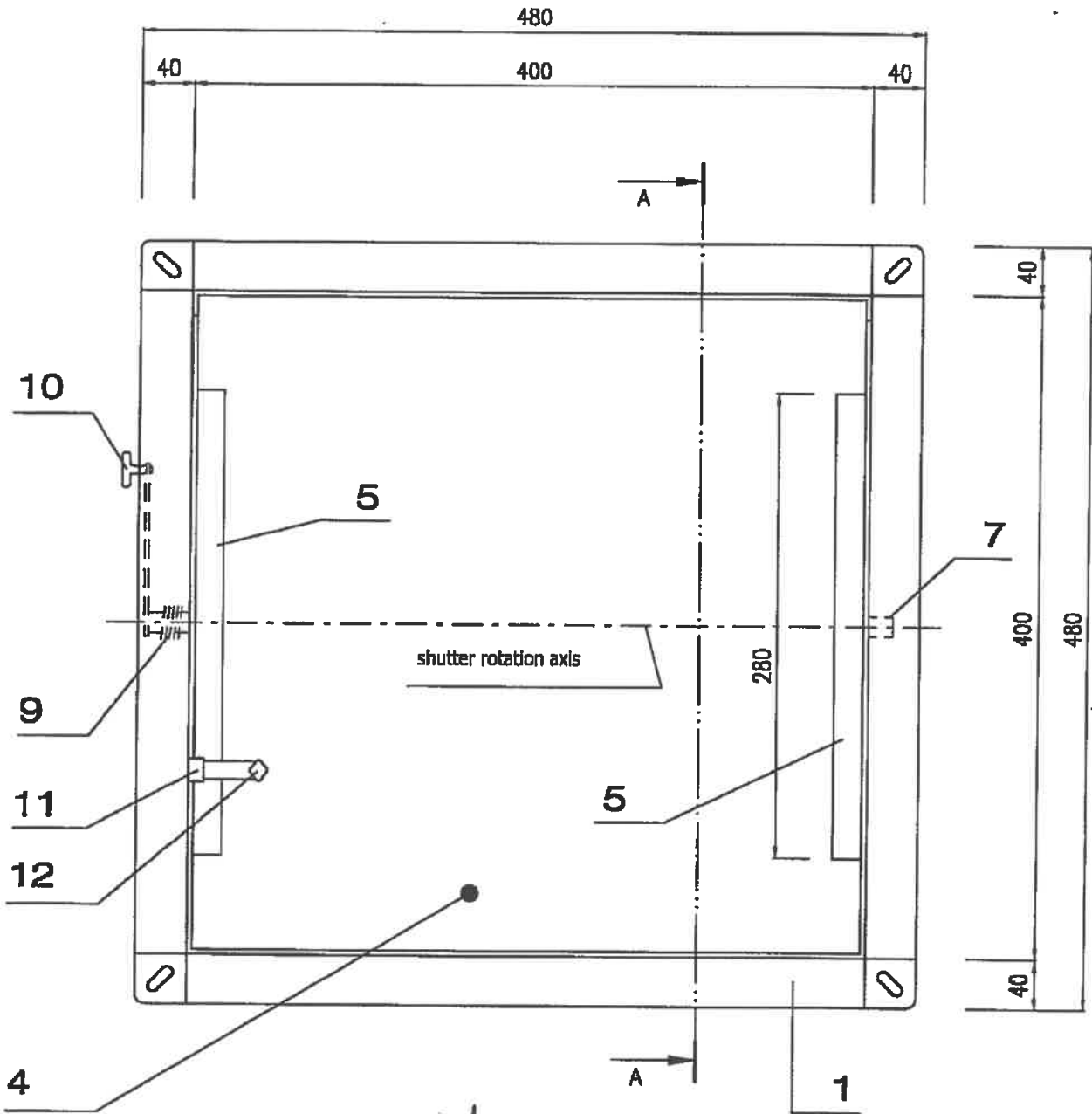


Symbol	Description
18	Foil ledge, total thickness 30 mm, formed by n. 3 plates in cementite-based fibrosilicate, 9.5 mm thick and 1100 kg/m <sup>3</sup> dense each, glued together and covered with a ceramic bonding agent for a total thickness of 1.5 mm for the various layers
19	Containment profile in galvanized steel shaped like a " C ", 400 mm long, overall cross section 33 x 30 mm and 1.5 mm thick
20	Steel screws
21	Steel rotational pins
22	Graphite-based thermoexpanding gasket, cross section 30 x 3.5 mm
23	Control device: steel return spring
24	Control device: steel lever for manual recocking
25	Control device: recockable circuit breaker
26	Control device. Thermic fuse in alloy
<b>Fire barrier gate "BTT/30"</b>	
27	Tunnel: galvanized steel sheet, 1.5 mm thick
28	Ledge for shutter in closed position: galvanized steel angular profile, cross section 25 x 25 mm and 1.5 mm thick
29	Foil ledge, total thickness 30 mm, formed by n. 3 plates in cement-based fibrosilicate, 9.5 mm thick and 1100 kg/m <sup>3</sup> dense each, glued together and covered with a ceramic bonding agent for a total thickness of 1.5 mm for the various layers
30	Angular profile in galvanized steel, 1.5 mm thick
31	Steel screws
32	Steel rotational pins
33	Graphite-based thermoexpanding gasket, cross section 30 x 3.5 mm
34	Control device: steel return spring
35	Control device: steel lever for manual recocking
36	Control device: recockable circuit breaker
37	Control device. Thermic fuse in alloy





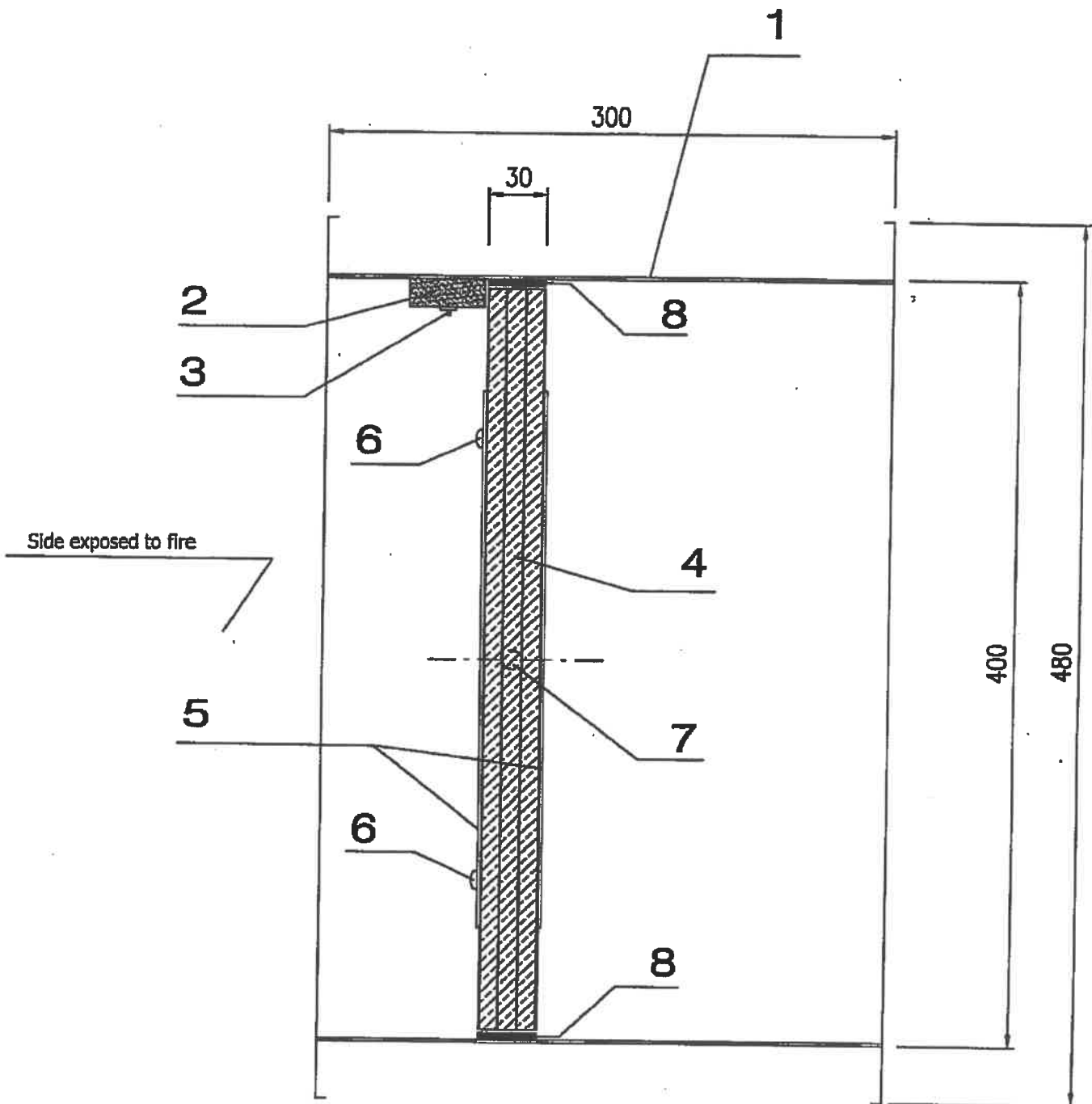
### VIEW OF THE "MTF/30" FIRE BARRIER GATE WITH SHUTTER IN CLOSED POSITION





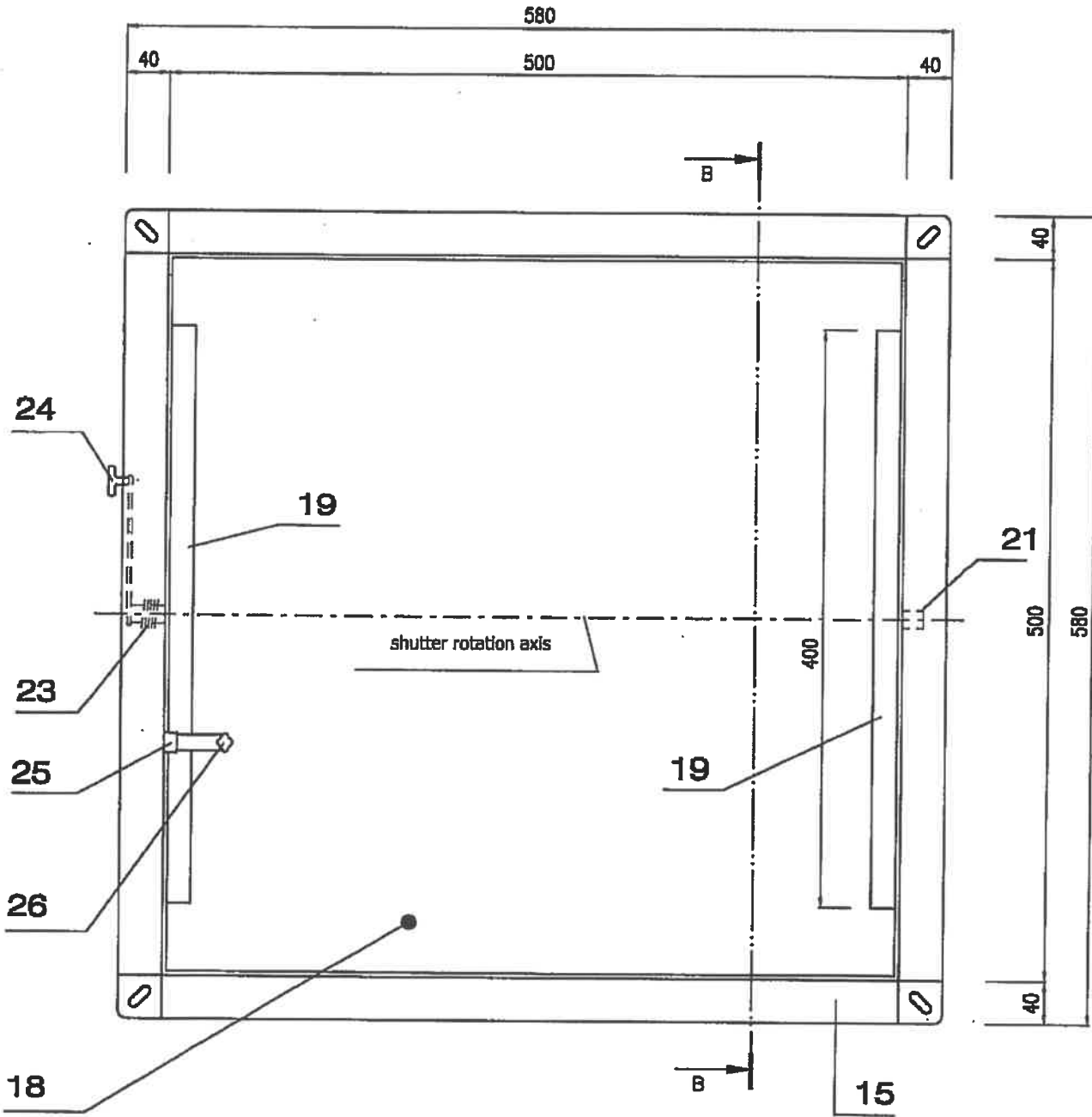


**SECTION A: A OF THE "MTF/30" FIRE BARRIER GATE**



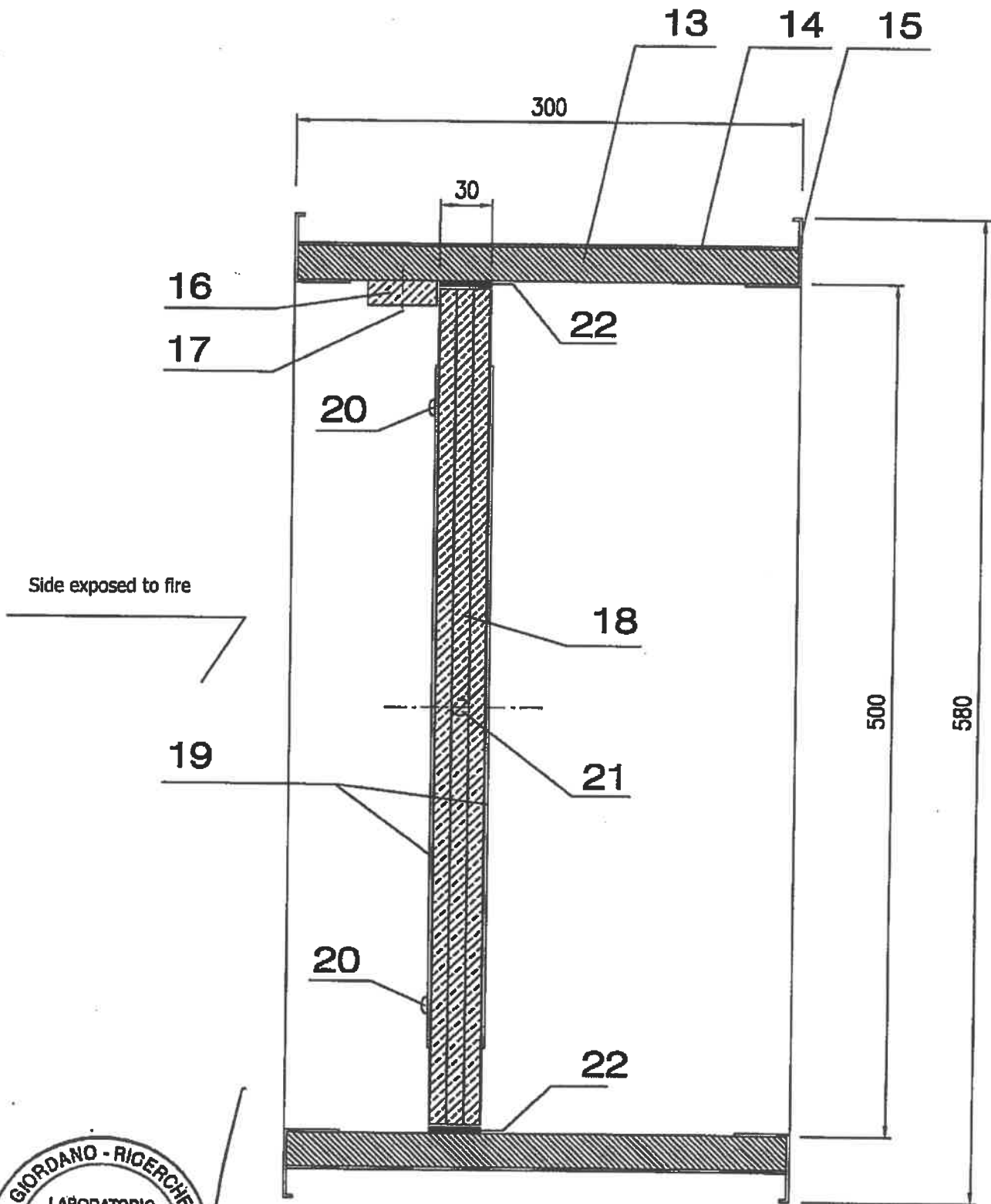


### VIEW OF THE "BTS/30" FIRE BARRIER GATE WITH SHUTTER IN CLOSED POSITION



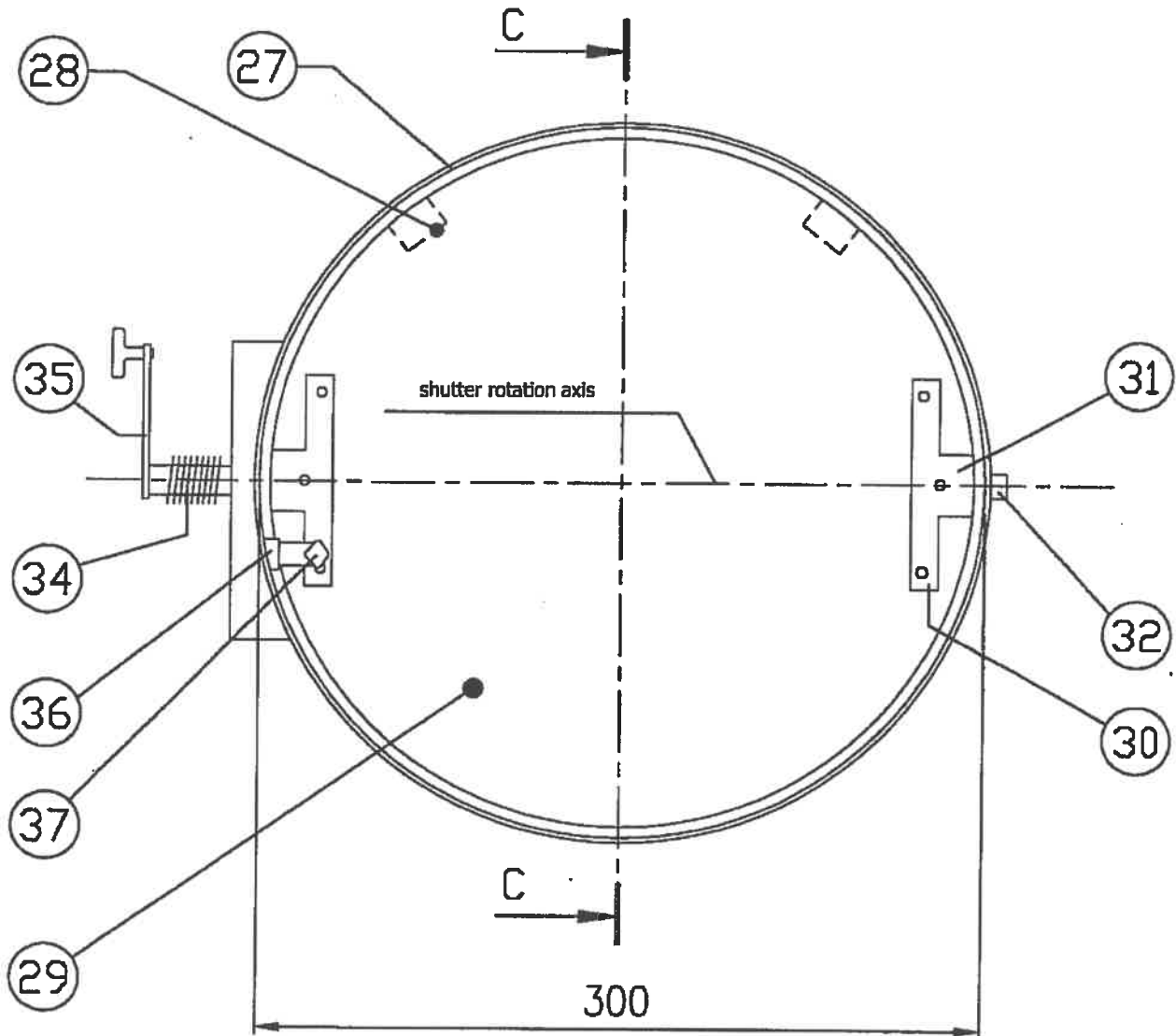


### SECTION B: B OF THE "BTS/30" FIRE BARRIER GATE



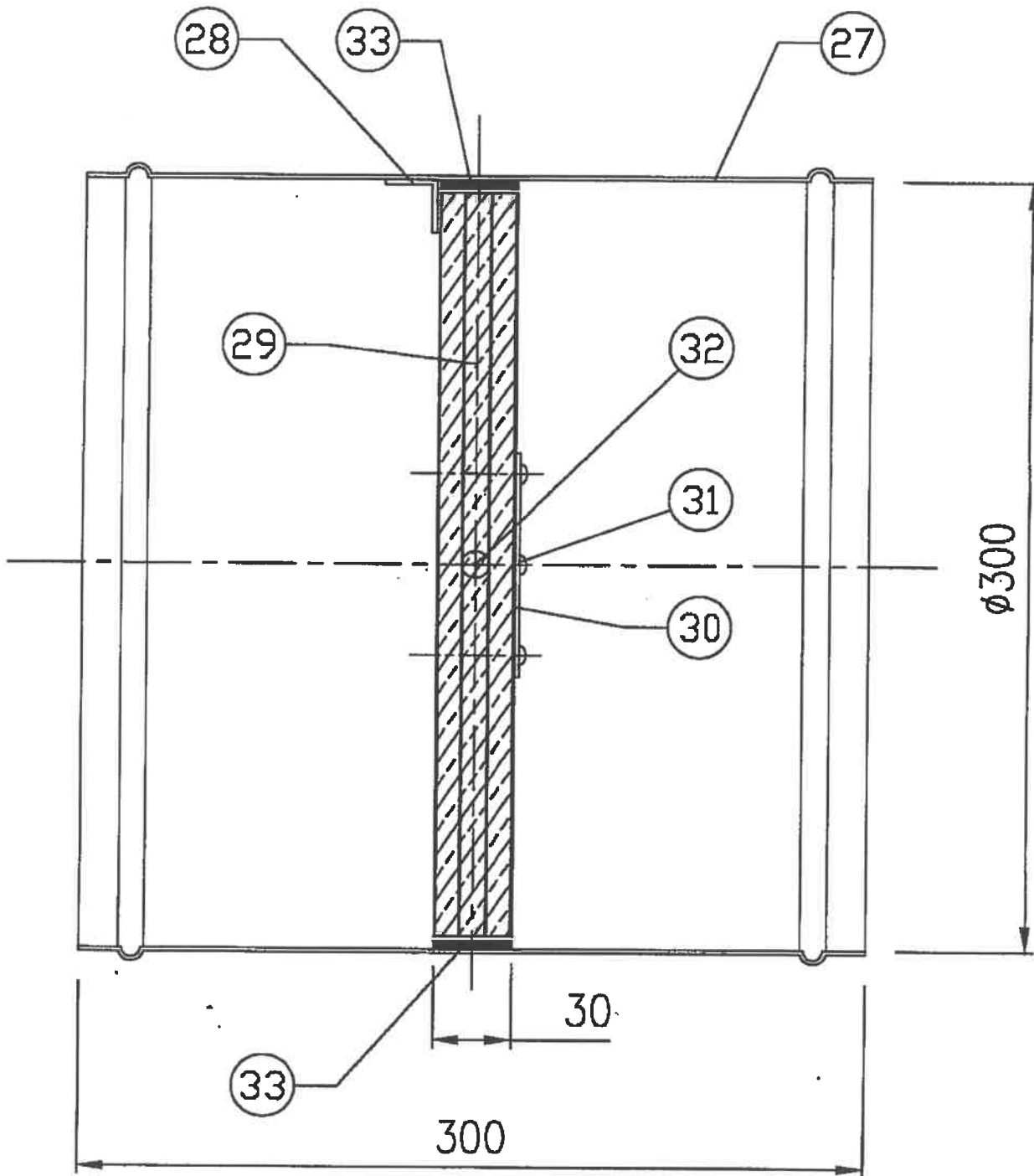


### VIEW OF THE "BTT/30" FIRE BARRIER GATE WITH SHUTTER IN CLOSED POSITION





### SECTION C: C OF THE "BTT/30" FIRE BARRIER GATE





### **Normative references.**

The test was carried out according to the prescriptions of the Circular n. 91 of the Minister of the Interior – General Management of Fire-prevention Services dated 14/09/1961 “Safety norms for protection against fire in steel-structured buildings for civil use.”

### **Testing equipment.**

The following equipment was used to carry out the test:

- experimental oven with opening on the vertical side (oven opening provided with:
  - dual-flame burners fed by gasoline;
  - n. 2 chimneys placed separately, with electronically controlled variation valves on the outlet section;
  - pressure detectors placed at  $\frac{2}{3}$  of the height of the oven opening, connected by an automatic detecting system;
- data acquisition system consisting of:
  - accessory cases placed on the vertical sides of the oven to detect the temperature inside the oven;
  - manual pressure reading system placed on a wall of the oven near its opening;
  - type “K” wire thermocouples connected to a mobile case that is connected to a reader that transforms the potential difference of the thermocouples themselves into temperature
- electronic calculator and management software





### **Test modality.**

The fire barrier gates with the relative shutter in the closed position were assembled on the same support element consisting of a drilled lateriz or "Poroton"-type block wall, 150 mm thick, incorporated on the inside by a shape-retaining perimeter frame in reinforced concrete, 2300 kg/m<sup>3</sup> dense; the support element was then installed on the experimental oven opening in such a way as to create a closed combustion chamber, where a façade of the fire barrier gate was exposed to the fire so that the respective control devices remained on the opposite side.

N. 12 thermocouples (thermocouples from n. 1 to n. 12) were put on the surface of the fire barrier gate that was not exposed to the fire as shown in the following drawing.

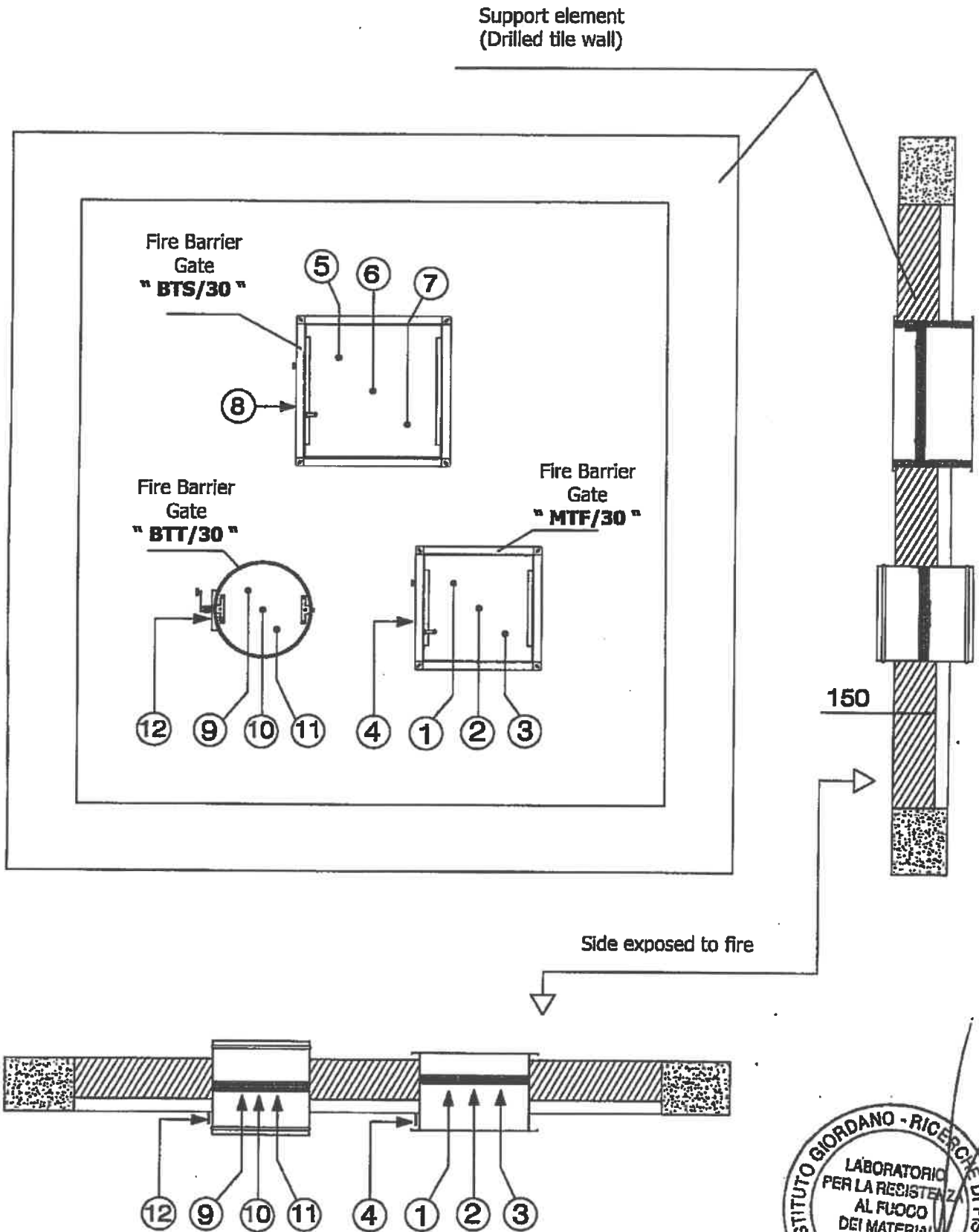
Once the measuring and control equipment was set up the burners were turned on, heating the experimental oven according to the temperature/time curve foreseen by Circular n. 91 of the Minister of the Interior – General Management of Fire-prevention Services dated 14/09/1961 and according to the prescribed tolerances.

The test was carried out by pressurizing the experimental oven to start from the tenth minute to the end, at a value of  $10 \pm 2$  Pa.





# TEST MODALITY AND AVAILABILITY OF THERMOCOUPLES ON THE SURFACE OF THE FIRE BARRIER GATE NOT EXPOSED TO FIRE



①...⑫ THERMOCOUPLE ATTACHMENT POINTS







### Test results.

During the course of the test the significant phenomena reported in the following table were verified.

Minutes of testing	Observations
12	Watery steam started to come out on the surface of the fire barrier gate "BTT/30" that was not exposed to the fire, corresponding to the perimeter edge of the shutter
15	Watery steam started to come out on the surface of the fire barrier gates "MTF/30" and BTS/30" that was not exposed to the fire, corresponding to the perimeter edge of the relative shutters
70	The surfaces of the fire barrier gates not exposed to the fire started to blacken, corresponding to the perimeter edges of the relative shutters with particular accentuation near the corners
123	The "BTT/30" fire barrier gate loss thermic insulation due to the exceeding of 150° C by the average temperature recorded by the three thermocouples of the shutter placed on the surface not exposed to the fire (thermocouples from n. 1 to n. 3)
127	The "BTS/30" fire barrier gate loss thermic insulation due to the exceeding of 150° C by the average temperature recorded by the three thermocouples of the shutter placed on the surface not exposed to the fire (thermocouples from n. 1 to n. 3)
132	The "MTF/30" fire barrier gate loss thermic insulation due to the exceeding of 150° C by the average temperature recorded by the three thermocouples of the shutter placed on the surface not exposed to the fire (thermocouples from n. 1 to n. 3)
184	Interruption of the test without having verified further significant phenomena in the meantime

In the moment thermic insulation was lost the temperatures recorded by the thermocouples on the fire barrier gates being tested had reached the values reported in the following summary.

Room temperature = 10° C

Measuring point		Instant (min)	Thermocouple (n.)	Temperature (°C)
Along a diagonal of the shutter of the "MTF/30" fire barrier gate	Average	132	1 ÷ 3	153
	Maximum	132	1 ÷ 3	175
On the side of the tunnel of the "MTF/30" fire barrier gate, 50 mm from the support element		132	4	138





Measuring point		Instant (min)	Thermocouple (n.)	Temperature (°C)
Along a diagonal of the shutter of the fire barrier gate "BTS/30"	Average	127	5 ÷ 7	151
	Maximum	127	5 ÷ 7	176
On the side of the tunnel of the "BTS/30" fire barrier gate, 50 mm from the support element		127	8	125
Along a diagonal of the shutter of the fire barrier gate "BTT/30"	Average	123	9 ÷ 11	152
	Maximum	123	9 ÷ 11	173
On the side of the tunnel of the "BTT/30" fire barrier gate, 50 mm from the support element		123	12	170

Repeated controls carried out according to the prescriptions of the norm UNI EN 1363-1:2001 on the surface of the fire barrier gate being tested not exposed to the fire did not show that it was less fire-proof.

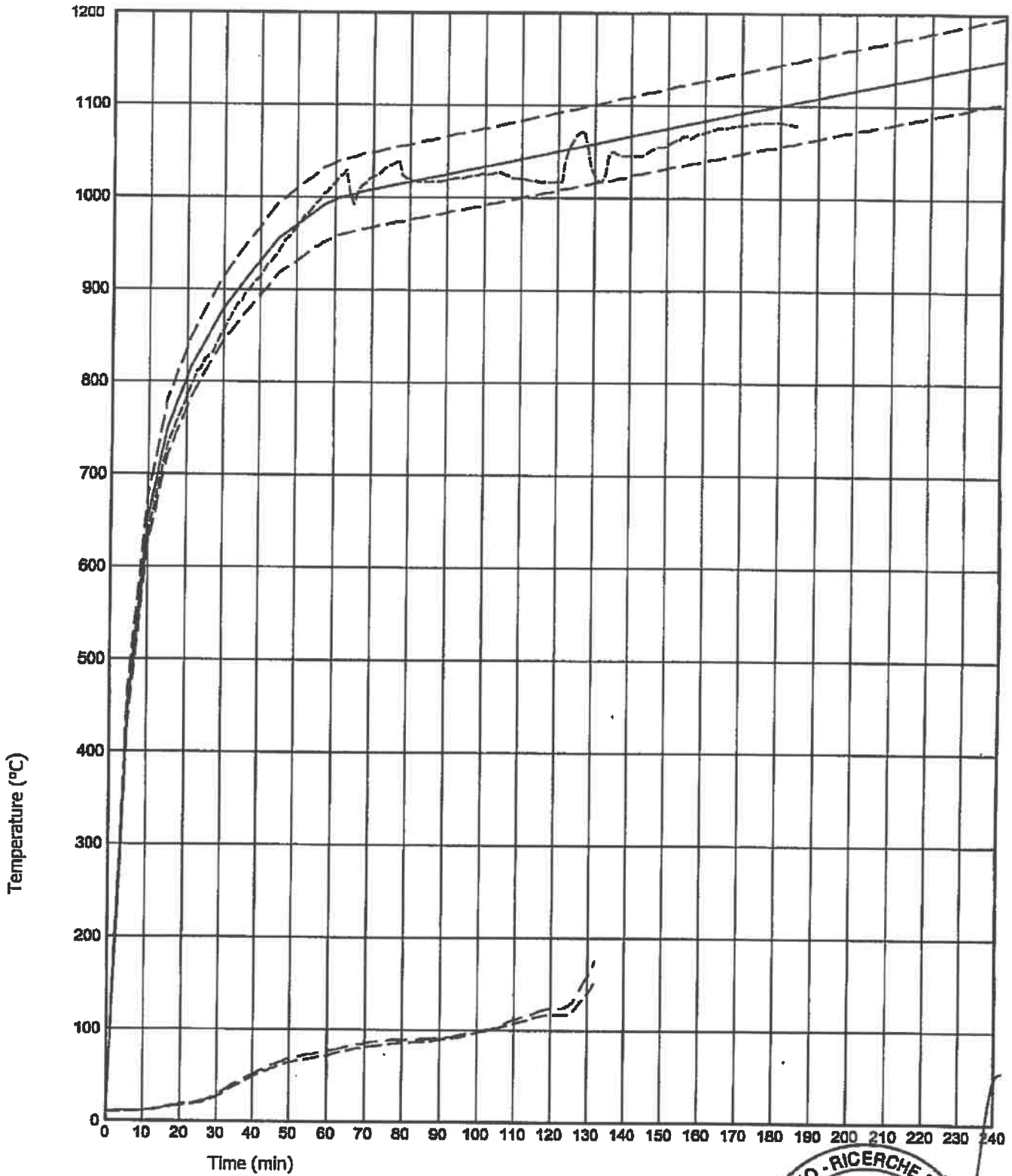
On the following sheets we have reported:

- the diagrams with the temperature/time curves recorded by the thermocouple put on the sample being tested together with the theoretical curve of the oven heating and what was effectively done during the course of the test;
- the photographs of the sample being tested before and after the test.





### TEMPERATURE/TIME DIAGRAM N. 1



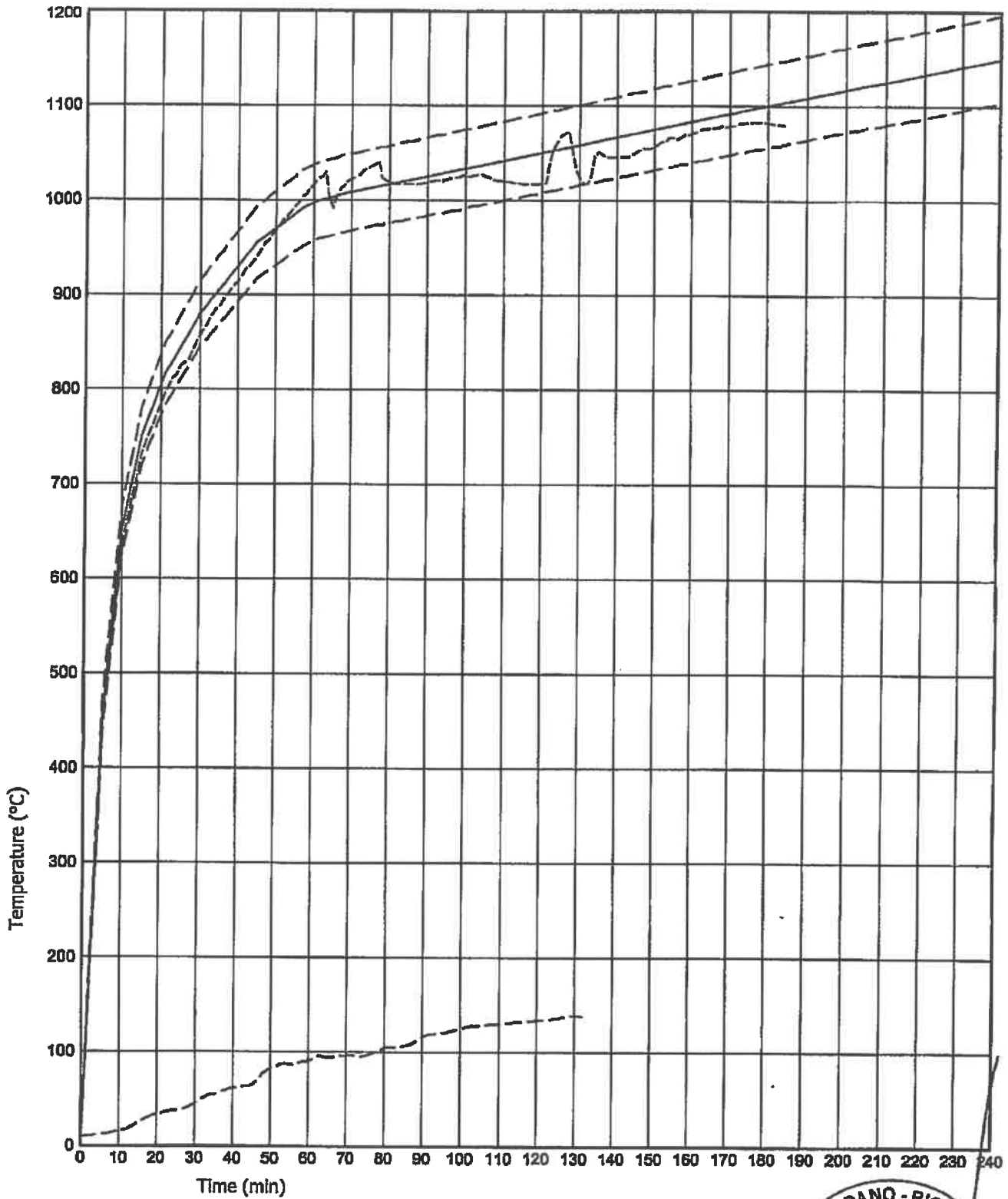
- ==== Theoretical oven heating temperature and tolerance limits
- Experimental oven heating temperature
- ..... Average temperature on the shutter of the "MTF/30" fire barrier gate (T1-T3)
- . - . - Maximum temperature on the shutter of the "MTF/30" fire barrier gate (T1-T3)



*[Handwritten signature]*



### TEMPERATURE/TIME DIAGRAM N. 2

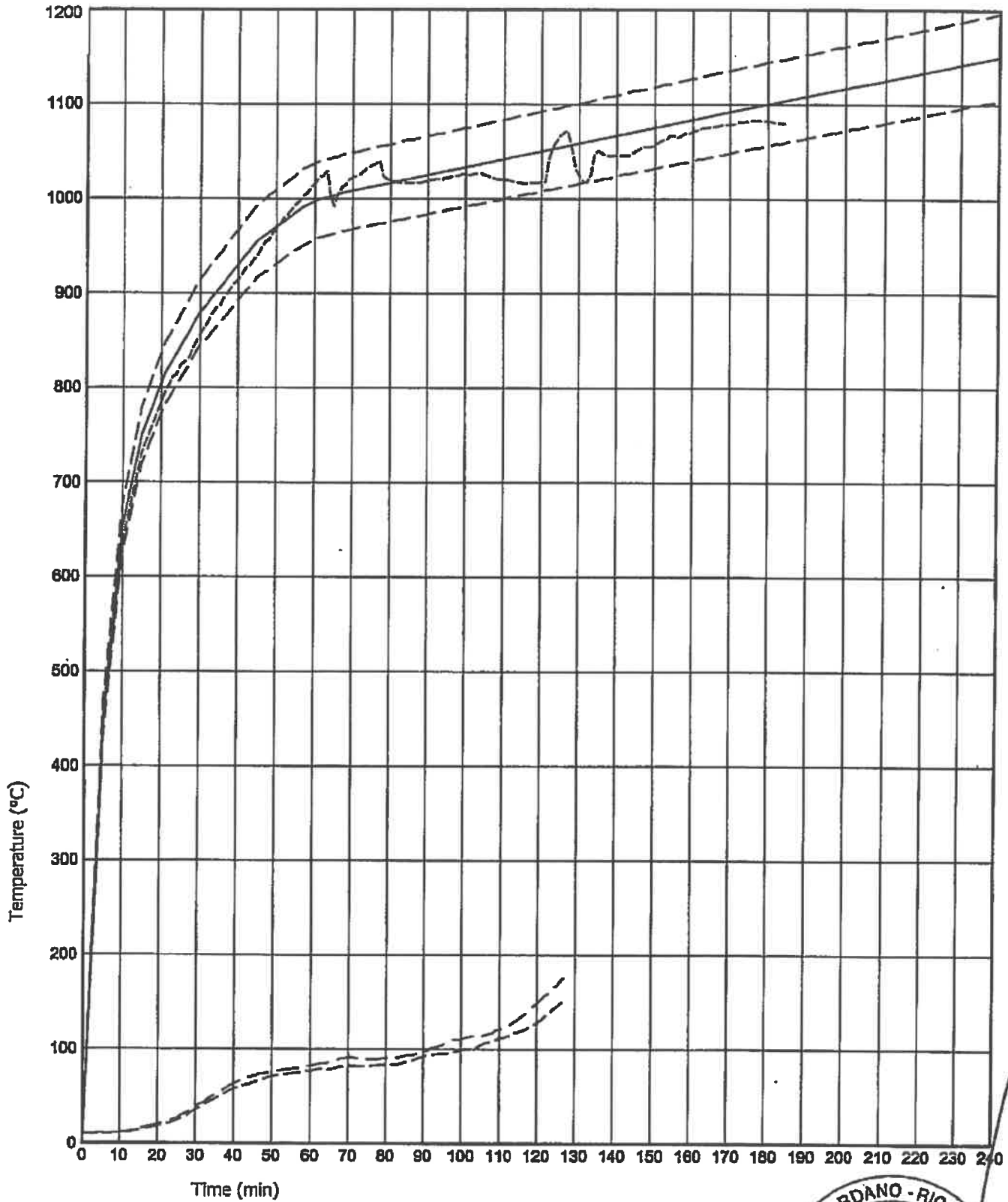


- ==== Theoretical oven heating temperature and tolerance limits
- Experimental oven heating temperature
- . - . Average temperature on the shutter of the "MTF/30" fire barrier gate (T4)





### TEMPERATURE/TIME DIAGRAM N. 3

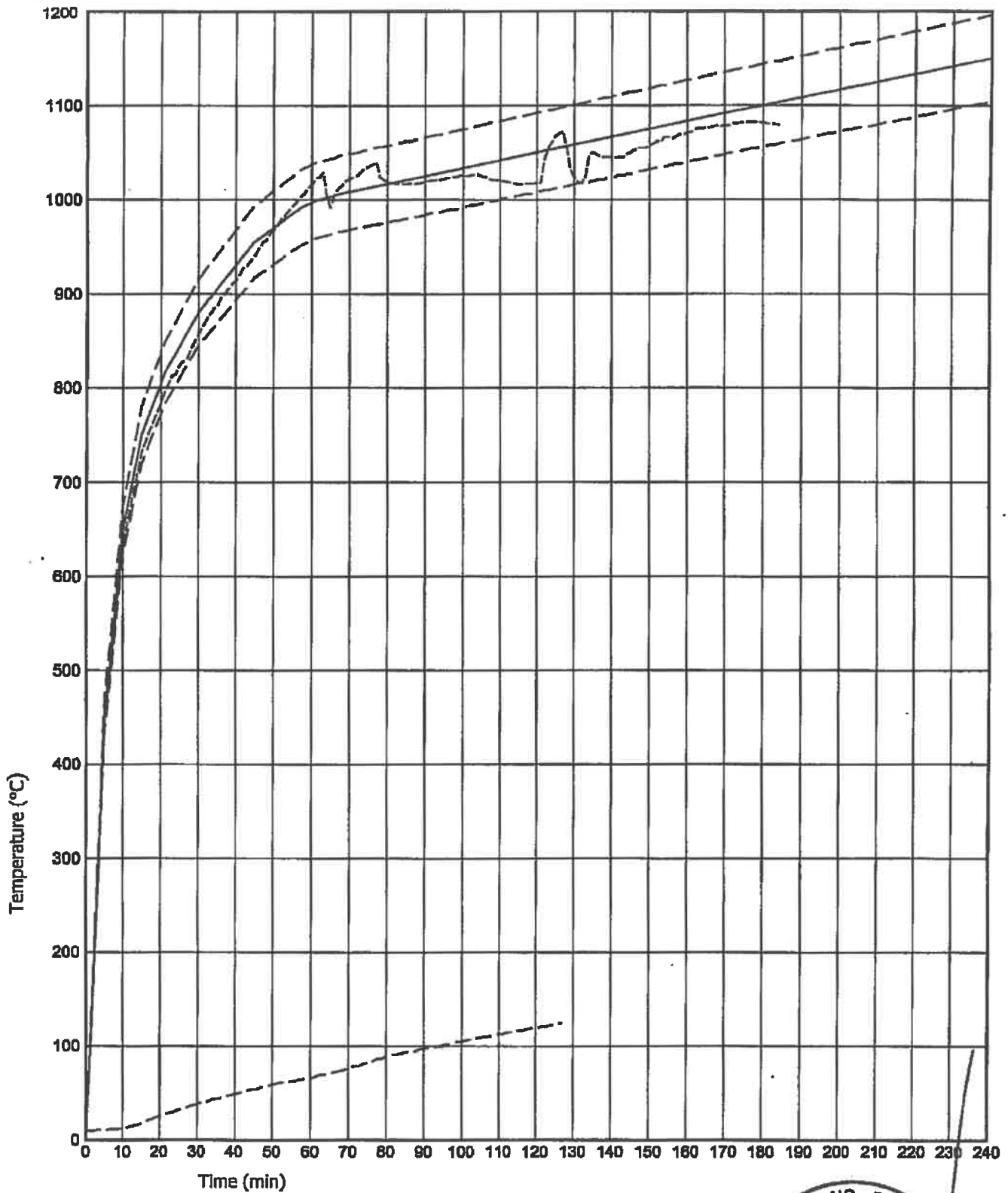


- ==== Theoretical oven heating temperature and tolerance limits
- Experimental oven heating temperature
- Average temperature on the shutter of the "BTS/30" fire barrier gate (T5-T7)
- . - . Maximum temperature on the shutter of the "BTS/30" fire barrier gate (T5-T7)





### TEMPERATURE/TIME DIAGRAM N. 4

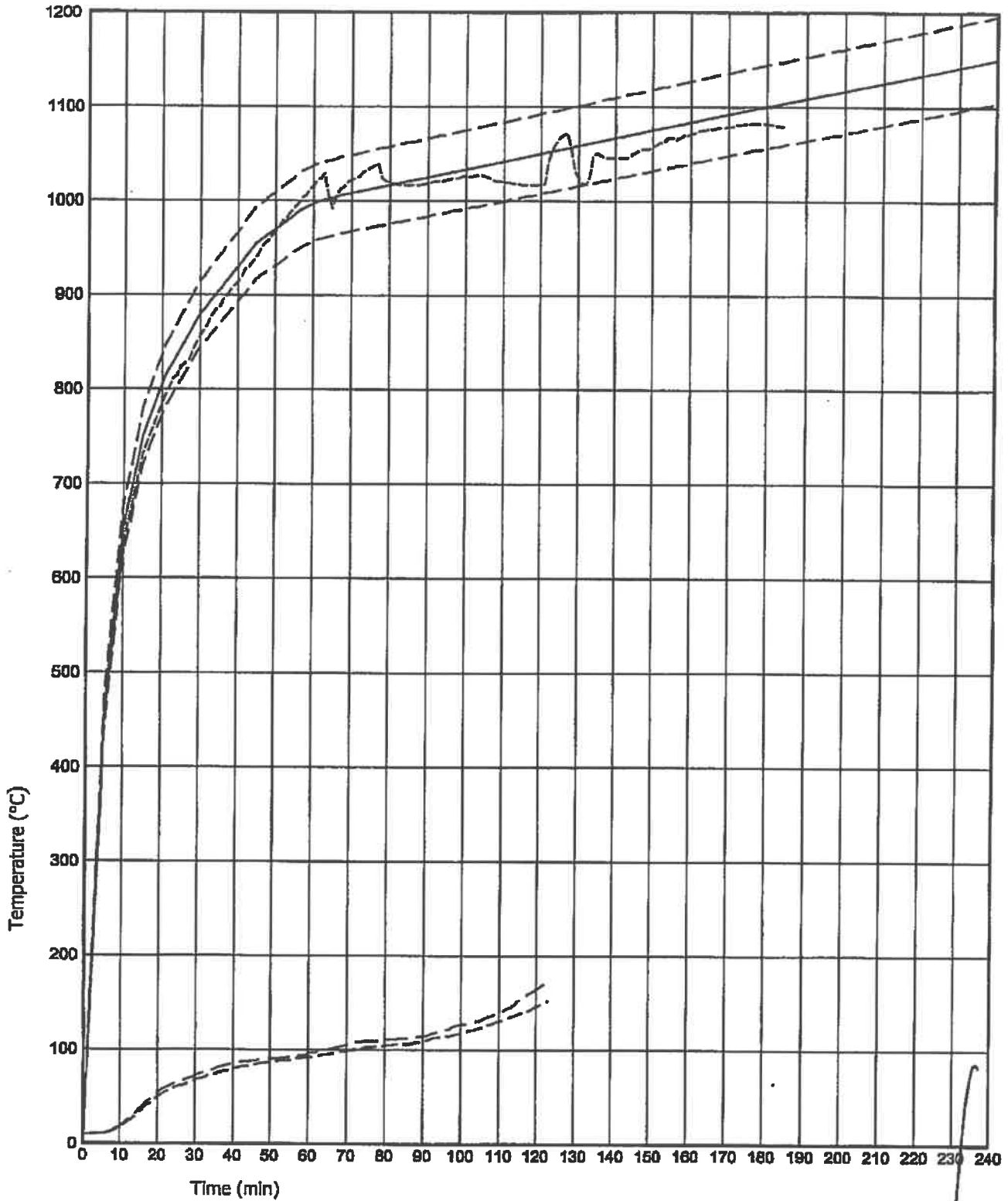


- ==== Theoretical oven heating temperature and tolerance limits
- Experimental oven heating temperature
- ..... Average temperature on the shutter of the "BTS/30" fire barrier gate (T8)





### TEMPERATURE/TIME DIAGRAM N. 5

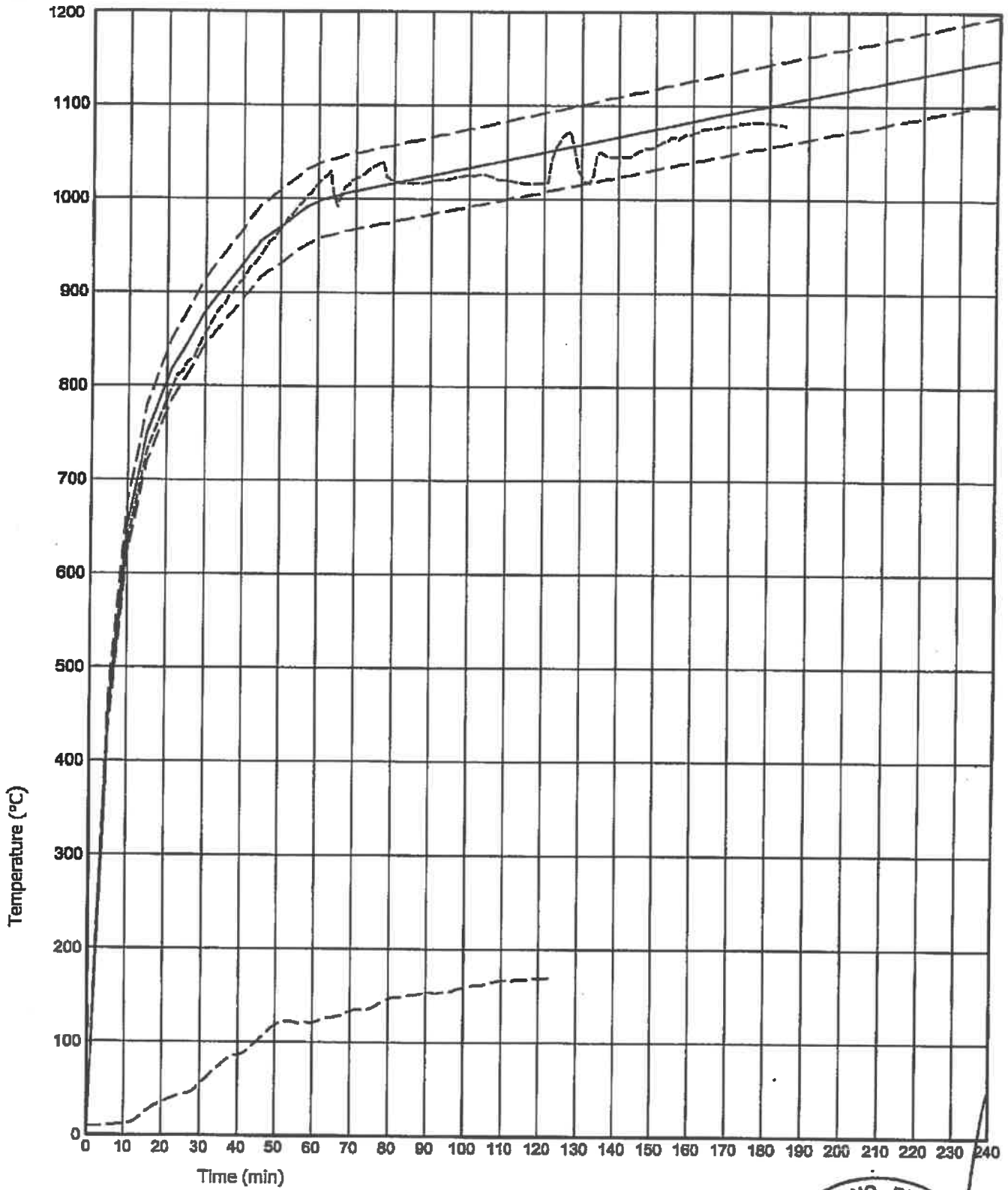


- ==== Theoretical oven heating temperature and tolerance limits
- Experimental oven heating temperature
- - - - - Average temperature on the shutter of the "BTT/30" fire barrier gate (T9-T11)
- . - . - Maximum temperature on the shutter of the "BTT/30" fire barrier gate (T9-T11)





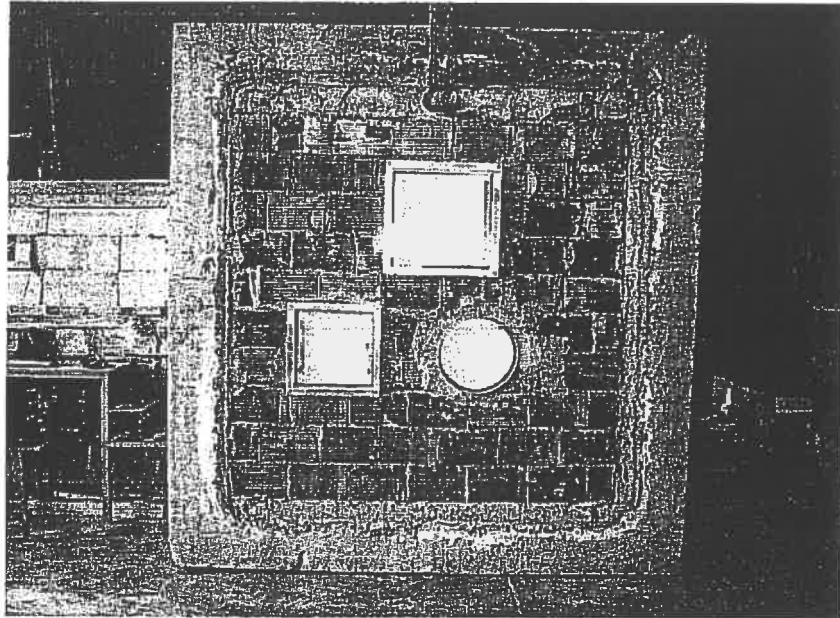
### TEMPERATURE/TIME DIAGRAM N. 6



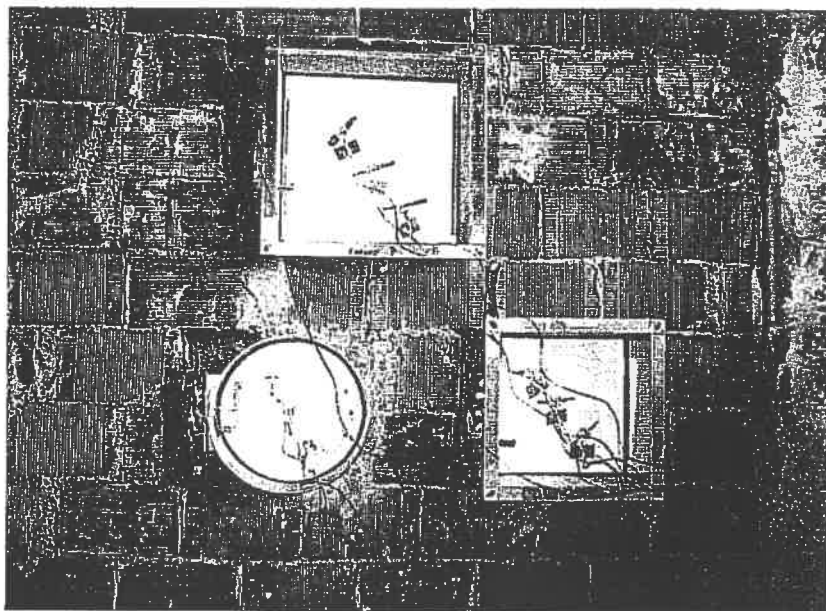
- ==== Theoretical oven heating temperature and tolerance limits
- Experimental oven heating temperature
- .-.-.- Average temperature on the shutter of the "BTT/30" fire barrier gate (T12)





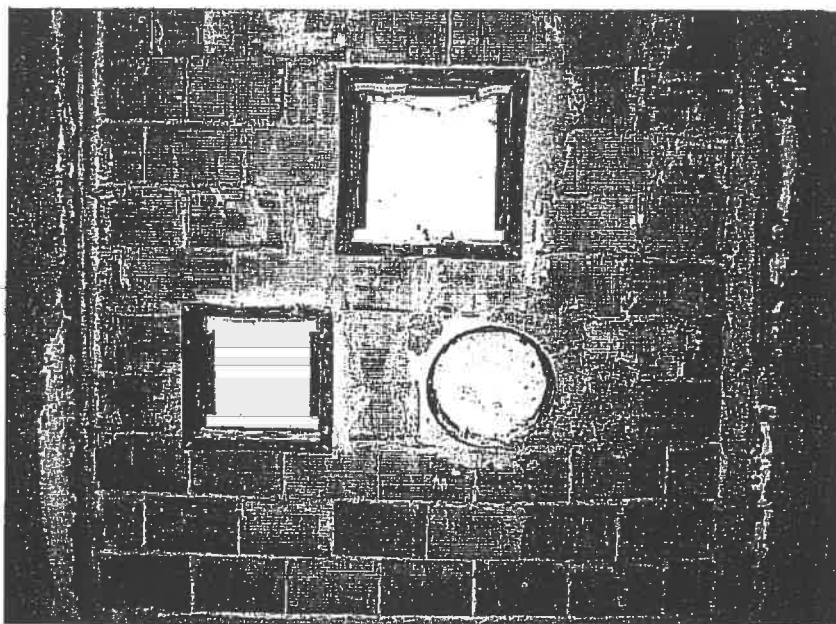


**Photo of the surface of the sample exposed to fire before testing**

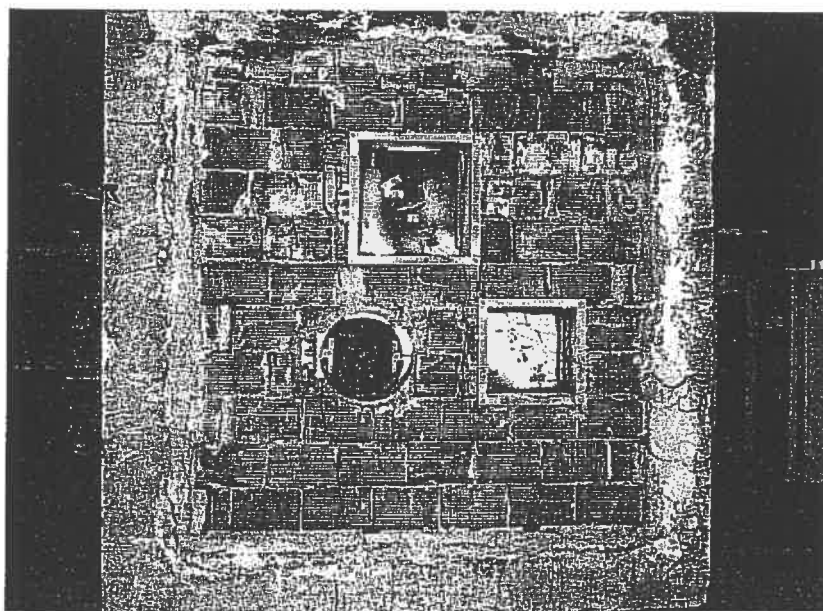


**Photo of the surface of the sample not exposed to fire before testing**





**Photo of the surface of the sample exposed to fire after testing**



**Photo of the surface of the sample not exposed to fire when the test was interrupted**





**Classification.**

From the examination of the results from the test carried out on n. 3 fire barrier gates called "MTF/30", "BTS/30" and "BTT/30", described above, produced and presented by the company Brofer S.r.l. - Via Pio X, 9 - Località Fratte - 35010 Santa Giustina in Colle (PD) we can deduce that:

- the duration of the fire damping of the fire barrier gate "BTT/30" was 123 minutes compared to parameter "T" and over 180 minutes compared to parameters "R" and "E";
- the duration of fire damping of the fire barrier gate "BTS/30" was 127 minutes compared to parameter "T" and over 180 minutes compared to parameters "R" and "E".
- the duration of fire damping of the fire barrier gate "MTF/30" was 132 minutes compared to parameter "T" and over 180 minutes compared to parameters "R" and "E".

Therefore, according to what is stated in the Circular n. 91 of the Minister of the Interior - General Management of Fire-prevention dated 14/09/1961 and in the Minister's Decree dated 30/11/1983, the sample tested is classified as

**REI 120 and RE 180**

And therefore the sample itself can be used in fire-prevention compartments not higher than REI 120 and RE 180.

Bellaria, 12/02/2004

Il Direttore del Laboratorio  
di Resistenza al Fuoco  
(Dott. Ing. Stefano Vasini)



Il Presidente o  
l'Amministratore Delegato

**Dott. Ing. Vincenzo Iommi**

