



IV. BRANDS AND PRODUCTS

5. FIRE-RESISTANT GLASSES

5.0 Introduction	362
5.1 Pyrobel and Pyrobelite	365
5.2 Pyropane	372

INTRODUCTION

▼ GENERAL

Fire-resistant properties in a glass construction element determine how far that element can limit the spread of fire by restricting it to a specific area.

The fire resistance of a glass construction element is measured against a number of criteria:

- > Stability: the glass does not break
- > Integrity in flames, hot gases and smoke: the glass prevents flames, smoke and hot gases (but not heat) from passing through. The fire remains contained.
- > Limiting radiation: the glass restricts the amount of heat passing through it to the side which is to be protected
- > Thermal insulation: the average temperature of the glass on the protected side remains below 140°C which eliminates the risk of self-combustion either due to radiation or convection of exposed materials and means that buildings can be evacuated safely and calmly.

The new European classification standards for glass use the following system:

- > R: Stability
- > E: Flame integrity – the time during which the flames do not pass from the unexposed side of the wall
- > W: Radiation limitation: time during which the radiation does not exceed a specific level on the opposite side to the fire
- > I: Thermal insulation – time during which the temperature does not rise above a certain thermal threshold on the unexposed side.

Classification of the glass construction element	Integrity E	Reduction in heat transfer EW	Thermal insulation EI
Flame-retardant	✓		
Flame-retardant (limited radiation)	✓	✓	
Fire-resistant	✓	✓	✓

The fire resistance of each element is determined by the time (in minutes) during which the element has simultaneously met one or more of the relevant criteria.

Therefore, for example, a door which remains fire-resistant for half an hour in terms of integrity will be classified as E30; a wall which is fire-resistant for one hour in terms of reduction in heat transfer will be classified EW60; a wall which is fire-resistant for one hour in terms of thermal insulation will be classified EI60.

The fire-resistance rating applies to the entire construction element, not just a part thereof.

▼ BRANDS OF FIRE-RESISTANT GLASS

AGC offers a range of both thermally toughened and thermally toughened coated products (Pyropane*) as well as laminated glass with an intumescent interlayer (Pyrobelite and Pyrobel) covering the various performance levels of fire-resistant glass. The table below shows details of the available range.

	Thermally-toughened and thermally-toughened coated glass	Laminated glass with an intumescent interlayer
E	Pyropane*	
EW	Pyropane*	Pyrobelite - Pyrobel
EI		Pyrobel

* Availability depending on market.

▼ INSTALLING PRODUCTS

In all cases, fire-resistance test reports pertain to construction elements as a whole and not to individual glasses. Projects should be conducted in accordance with all aspects of the test report. No components may be altered without first obtaining an extension, a site report or similar documentation from an official laboratory.

The desired level of classification will only be achieved if the limits regarding size and installation indicated in reports and other official documents are adhered to.

PYROBEL and PYROBELITE



Justice Law Court, Antwerp, Belgium - Architect: Richard Rogers -
Pyrobel partition

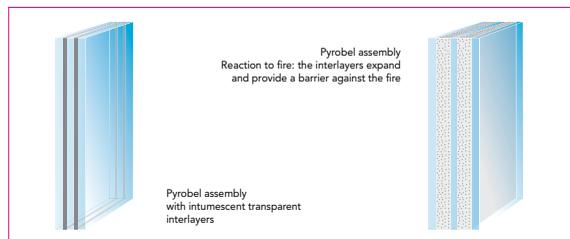
▼ DESCRIPTION

Made of clear Planibel glasses and transparent interlayers, in the event of fire these glasses transform into opaque screens which keep out flames and reduce or arrest heat transmission:

- > Pyrobelite EW glasses – Limited integrity and radiation – limit heat radiation through the glazing for 30 or 60 minutes
- > Pyrobel EI glasses – Integrity and Insulation – arrest heat radiation for 30, 45, 60, 90 or 120 minutes.

The choice depends on:

- > the level of fire resistance required under national regulations
- > the type of application
- > the typed approvals available for frames and sizes in each country.



▼ RANGE

The Pyrobel and Pyrobelite range

Pyrobel and Pyrobelite	Fire resistance
Internal grade	
Pyrobelite 7	EW30
Pyrobelite 12	EI20/EW60
Pyrobel 8	EI15/EW30
Pyrobel 16	EI30/EW60
Pyrobel 17	EI45
Pyrobel 21	EI45/EW60
Pyrobel 21 EG	EI45/EW60
Pyrobel 25	EI60
Pyrobel 35	EI90
Pyrobel 53	EI120
External grade	
Pyrobelite 7 EG	EW30
Pyrobelite 12 EG	EI20/EW60
Pyrobel 8 EG	EI15/EW30
Pyrobel 16 EG	EI30/EW60
Pyrobel 17 EG	EI45
Pyrobel 25 EG	EI60
Pyrobel 35 EG	EI90
Pyrobel 53 EG	EI120
Horizontal grade	
Pyrobel 19	EI30
Pyrobel 23	EI45
Pyrobel 28	EI60

▼ BENEFITS

> Transparency

- No metallic mesh
- Light transmission equivalent to that of float glass of the same thickness.

> Safety

- Meets safety tests depending on standards in force
- Can be reinforced and made anti-bandit or bullet-proof
- It is possible to combine Pyrobel with accident prevention, anti-burglar and fire-protection functions.

> Sound insulation

Higher level than that of traditional double glazing.

> Sizes

Large sizes available.

> Installation

Easy to install in approved wooden or steel frames.

▼ PERFORMANCE

Products	Nominal thickness (nm)	Thickness tolerance	Weight (kg/m ²)	Resistance to fire EN 13501-2	Impact resistance EN 12600	Acoustic EN 12758: R _w (C;C _v) (dB)	U _g (W/m ² .K) EN 673	TL-EN 410 τ _v /ρ _v (%)	FS-EN 410 τ _e /ρ _e (%)
Internal grade									
Pyrobelite 7	7.9	+/-0.9	17	EW30	3B3	34 (0;-3)	5.7	89/8	73/7
Pyrobelite 12	12.3	+/-1	27	EI 20/EW60	2B2	36 (-1;-3)	5.6	86/8	65/7
Pyrobel 8	9.3	+/-1	20	EI 15/EW30	NPD	34 (-1;-3)	5.6	88/8	70/7
Pyrobel 16	17.3	+/-1	40	EI 30/EW60	2B2	39 (-1;-3)	5.4	84/8	60/6
Pyrobel 17	17.4	+/-1.5	40	EI 45	2B2	37 (-1;-3)	5.4	84/8	61/6
Pyrobel 21	21.6	+/-2	47	EI 45/EW60	1B1	38 (0;-3)	5.3	82/7/7	59/6/6
Pyrobel 25	26.6	+/-2	60	EI 60	1B1	40 (-1;-3)	5.2	81/7	53/6
Pyrobel 35	34.7	+/-2	81	EI 90	1B1	41 (-1;-4)	4.9	79/7	49/6
Pyrobel 53	52.5	+/-3	122	EI 120	1B1	45 (-1;-4)	4.5	72/7	40/5
External grade									
Pyrobelite 7 EG	11.3	+/-1	25	EW30	1B1	35 (-1;-2)	5.5	87/8	65/7
Pyrobelite 12 EG	16.1	+/-1	35	EI 20/EW60	1B1	38 (-1;-3)	5.4	85/8	58/6
Pyrobel 8 EG	13.1	+/-1.3	28	EI 15/EW30	1B1	36 (-1;-3)	5.4	86/8	62/6

Products	Nominal thickness (nm)	Thickness tolerance	Weight (kg/m ²)	Resistance to fire EN 13501-2	Impact resistance EN 12600	Acoustic EN 12758: R _w (C;C _v) (dB)	U _g (W/m ² .K) EN 673	TL-EN 410 τ _v /ρ _v (%)	FS-EN 410 τ _e /ρ _e (%)
Pyrobel 16 EG	21.1	+/-1.5	48	EI 30/EW60	1B1	39 (-1;-3)	5.2	83/7	54/6
Pyrobel 17 EG	21.2	+/-2	48	EI 45	1B1	38 (0;-3)	5.2	84/8	56/6
Pyrobel 21 EG	25.4	+/-2	55	EI 45/EW60	1B1	40 (-1;-3)	5.1	81/7/7	54/6/6
Pyrobel 25 EG	30.4	+/-2	68	EI 60	1B1	43 (-1;-4)	5.0	80/7	48/6
Pyrobel 35 EG	38.5	+/-2	89	EI 90	1B1	42 (-1;-4)	4.8	77/7	46/6
Pyrobel 53 EG	56.2	+/-3	130	EI 120	1B1	46 (-2;-5)	4.3	71/7	38/5
Horizontal grade									
Pyrobel 19	19.1	+/-1.5	43	EI 30	1B1	38 (-1;-3)	5.2	81/7	53/6
Pyrobel 23	23.7	+/-1.8	54	EI 45	1B1	39 (0;-3)	5.0	80/7	49/6
Pyrobel 28	28.4	+/-2	63	EI 60	1B1	41 (0;-3)	4.9	78/7	47/6

Light properties in accordance with EN 410:

τ_v: light transmission

ρ_v: light reflectance

Solar energy properties in accordance with EN 410:

τ_g: solar direct transmittance

ρ_g: solar direct reflectance

▼ USES

Monolithic glass	Yes
Insulating glazing	Yes

▼ APPLICATIONS

Interior	Yes
Exterior	No

▼ INSTALLATION INSTRUCTIONS

> General instructions

- Pyrobel glasses are supplied in ready-to-mount units and cannot be cut or processed
- The outer edge of the glass is protected and this protection should not be damaged or removed
- The glass should not be exposed to temperatures above 40°C for long periods or to localised heat sources
- The edges of the glass should not come into contact with water
- AGC's installation instructions, which are based on information contained in the test reports, should be followed.

> Instructions for external applications

- When exposed to solar radiation, installed Pyrobel glass should be of the "external" type with an anti-UV filter (0.76 mm PVB film). This type of glass should be fitted correctly, with the PVB side facing the radiation source. The indelible marking generally appears on the non-PVB side
- The glass should be fitted in a drained and ventilated frame to prevent any water entering the rebates

- Pyrobel glass fitted in a façade should not be exposed to temperatures above 40°C for any length of time. The location of the building and the direction it faces should therefore be taken into consideration. Incorporating a solar-control glass into the Pyrobel glazing will allow it to remain cooler
- Pyrobel and Pyrobelite glasses must be installed in a frame which has also been approved. All details concerning application included in the test reports (type of project, direction and size of the glazings, characteristics of the seals, compliance with lateral- and edge-clearance requirements, height of mechanical edge cover, etc.) must be respected.

Please do not hesitate to contact us for further details.

PYROPANE

▼ DESCRIPTION

- > Pyropane is AGC's range of toughened flame-retardant glasses
- > The range includes products obtained by treating and toughening glasses which may or may not be coated with a special metallic coating
- > They conform to specific European standards and are classified according to tests in appropriate frames. Multiple applications:
 - Flame-retardant insulating double glazing (E/EW 30 and E/EW 60) for facades
 - Interior glazing for partitions and doors (E 30/EW 20)
 - Smoke barrier (DH 30).

As a toughened glass, Pyropane offers all the usual safety benefits in terms of protection from injury.

▼ BENEFITS

> Facades: solar and thermal protection

- In the EW60 double glazing version, Pyropane performance in terms of thermal insulation (U value) and solar control (Solar Factor) is unparalleled among fire protection glazings.

> Safety

- Pyropane flame-retardant single and double glazings are made from toughened glass
- If broken, the risk of injury is considerably reduced because the glass fractures into small, blunt pieces. Pyropane is a toughened safety glass, classified 1C1 under standard EN 12600.

> Vision

- Pyropane flame-retardant glasses provide perfect vision. They remain clear under all circumstances, are neither wired nor fibre-reinforced, and have a high light transmission rating.

▼ PERFORMANCE

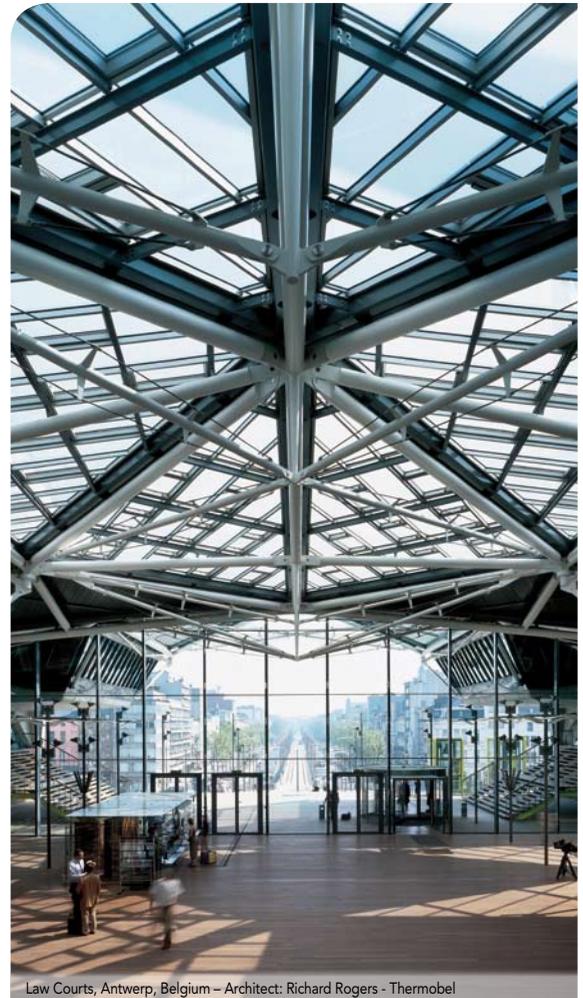
	Pyropane 100 E30	Pyropane SB 100 DH 30	Pyropane 211-44 E30/60 – EW30/60
Type of glazing	Single glazing	Single glazing	Double glazing
Use	Interior/exterior	Interior	Exterior, façade
Fire protection	Bi-directional	Bi-directional	Mono-directional (Pyropane component opposite? Do we mean against the fire?? the fire)
Glass thickness	6 mm	6 mm	24 mm in 6/12/6, space filled with air or argon 27 mm in 6/15/6, spaced filled with air or argon
Weight	15 kg/m ²	15 kg/m ²	30 kg/m ²
Tolerance (thickness)	+/- 0.2 mm	+/- 0.2 mm	-0.8 +1 mm
Tolerance (dimensions)	+0 -2 mm	+0 -2 mm	+2 - 2 mm
Light transmission – LT % (EN 410)	89	89	69
Light reflection – LR % (EN 410)	8	8	12
Solar factor – SF % (EN 410)	84	84	41
U _g coefficient (EN 673)	5.7 W/(m ² .K)		1.1 W/(m ² .K) with Ar 90% 15 mm
Acoustic insulation R _w (C; C _{tr}) (EN ISO 717-1)	31 (-2; -3) dB		31 (-1; -4) dB
Impact resistance – class EN 12600	1C1	1C1	1C1 / 1C3
Fire reaction – class EN 13501	A1	A1	
UV resistance	Yes	Yes	Yes
Transparency	Yes: No mesh – remains clear in case of fire		
CE marking	Conforms to EN 14179-2	Conforms to EN 12101-1 et EN 14179-2	Conforms to EN 1279-5
Fire resistance	E30 per EN 13501-2	DH 30 per EN 12101-1	E30/60 – EW30/60 per EN 13501-2

▼ UTILISATIONS

Monolithic glass	Yes
Double glazing	Yes

▼ APPLICATIONS

Interior	Yes
Exterior	Yes



Law Courts, Antwerp, Belgium – Architect: Richard Rogers - Thermobel