Copyright Materials

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glass made of ideas

SCHOTT Fire Resistant Glazing

Learning by Burning

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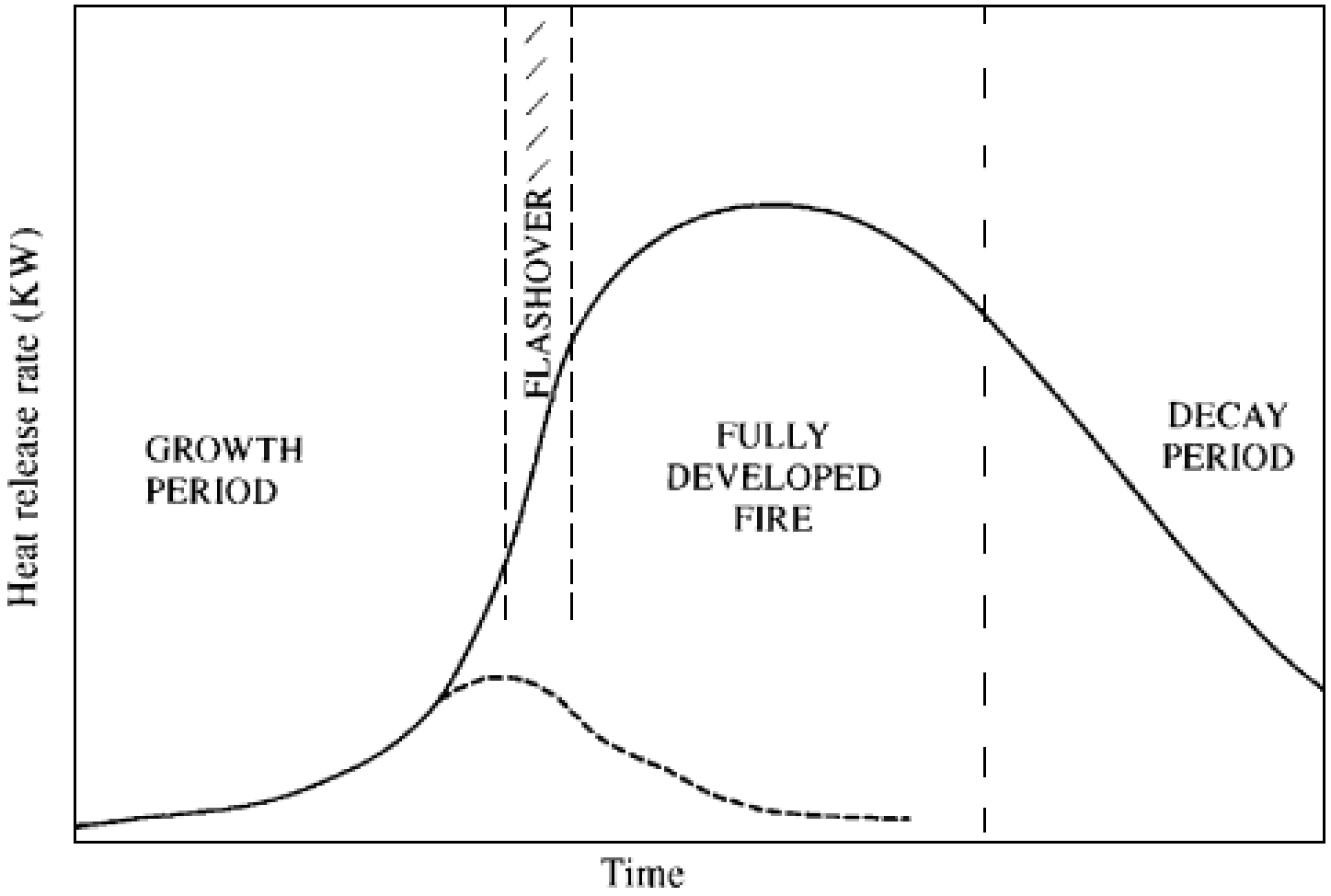
Learning Objectives

1. Why do we need Fire Resistant Glazing?
2. What are Fire Resistant Glazing?
3. Types of Fire Resistant Glazing
4. Suitable Framing Systems
5. SCHOTT Fire Resistant Glazing
6. Innovations
7. Way to Market
8. Reference Projects
9. Contacts@SCHOTT

Fire Growth Curve



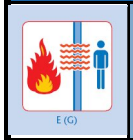
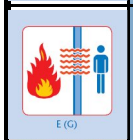
Fire Resistance Test acc. EN1363-1

Objective of determining fire resistance:

- assess behaviour of specimen of an element of building construction, when subjected to defined heating and pressure conditions

- Regulations regarding test equipment such as furnace, loading equipment, test frames, instrumentation (thermocouples and positioning), test conditions, installation

Fire Classification acc. EN 13501-2

	Integrity	Radiation	Insulation
Performance criteria	**E**	**EW***	**EI**
 **Prevention of passage of flames**	✓	✓	✓
 **Prevention of passage of smoke**	✓	✓	✓
 **Restricted heat transfer of max. 15 kW/m²**		✓	
 **Prevention the increasing of temperature ≤ 140 K average, max. 180 K**			✓
 **Prevention of self-ignition (cotton pad test)**			✓

Requirement integrity

The ability of the test specimen **to prevent**:

- the collapsing of the test specimen
- the passage of flames and hot and or cold gases through the test specimen and the occurrence of flames on the unexposed side (no sustained flaming of more than 10 seconds on the unexposed side)
- the arising of gaps within the test specimen which are exceeding the dimensions of 6 mm by 150 mm
- ***to restrict*** *the heat radiation rise (measured in 1 m distance from the test specimen) to below max. 15 kW/m²*
  (only in case of requirement EW)

Requirement insulation

The ability of the test specimen to **comply with**:

- the requirements of **integrity and additional**

The ability of the test specimen **to restrict**:

- the temperature rise on the unexposed (sur)face to below the specified levels of either:
  - average temperature of more than 140 K above the initial average temperature
  - maximum temperature of more than 180 K above the initial average

There are more things to do than a fire test…

Full Scale Fire Test
on a whole system
acc. UL, NFPA, UBC, ASTM

Hose Stream Test
acc. ASTM, UL if more than a 20-minute rating is required

Impact Test
acc. CPSC, ANSI
required for laminated and filmed products

Environmental test
Energy Test
Sound Proofing

Full Scale Fire Test

ASTM

- Description of fire tests for:
  - Door assemblies (E 2047-00)
  - Window assemblies (E 2010-01)
  - Transparent wall units (E 119)
- Testing a full-scale specimen incl.
  - maximum width and height
  - maximum area
  - frame with same fire-rating
- Specimen faces a standard fire exposure as defined by the time-temperature curve for furnace temperatures
- Fire endurance tests 20 min to 3 hrs

Hose Stream Test

UL 9

- Conduction of hose stream test following immediately the fire endurance test
- within 1-1/2 minutes on the fire exposed side
- Defined distance from the plane surface of the test assembly
- Use of ´National Standard Playpipe´
- Follow prescribed pattern
- Water pressure and duration of hose stream test depend on fire endurance and area of specimen

Hose Stream Test

- All FRG in locations other than the 20-minute door (door itself, transoms, sidelites, window assemblies) require at least the 45-minute rating that can withstand the hose stream test !

Fire endurance	Water pressure	Duration
45 minutes	30 psi	0.6 sec/ft²
60 minutes	30 psi	0.9 sec/ft²
90 minutes	30 psi	1.5 sec/ft²

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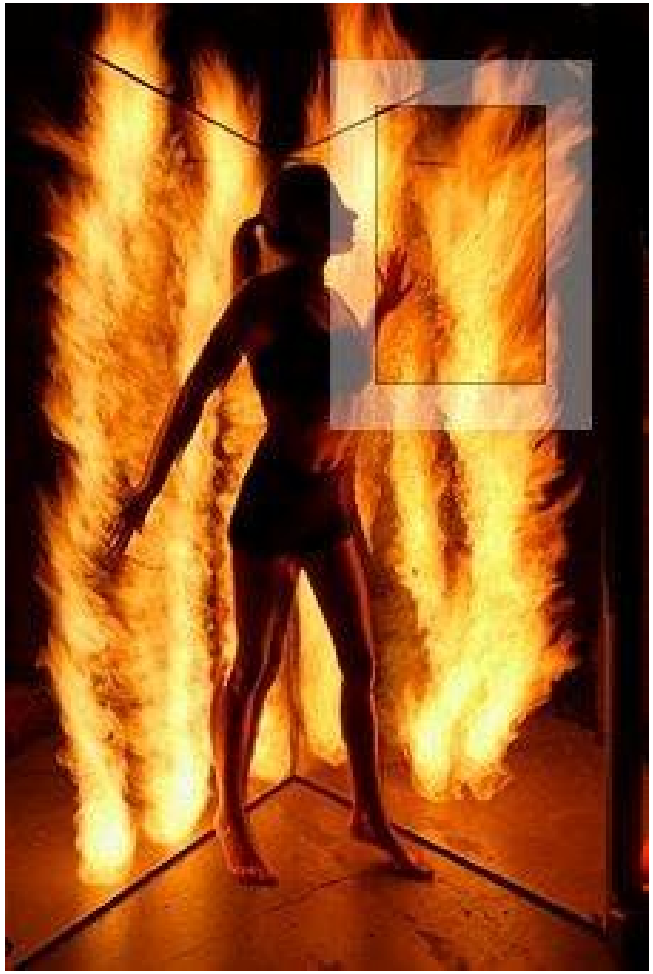
7. SCHOTT and its Competition
8. Way to Market
9. Reference Projects
10. Contacts@SCHOTT

Glass or Glazing?



- The most beautiful glass…

  … is nothing without the right system!

Fire Resistant Glazing have to be used:

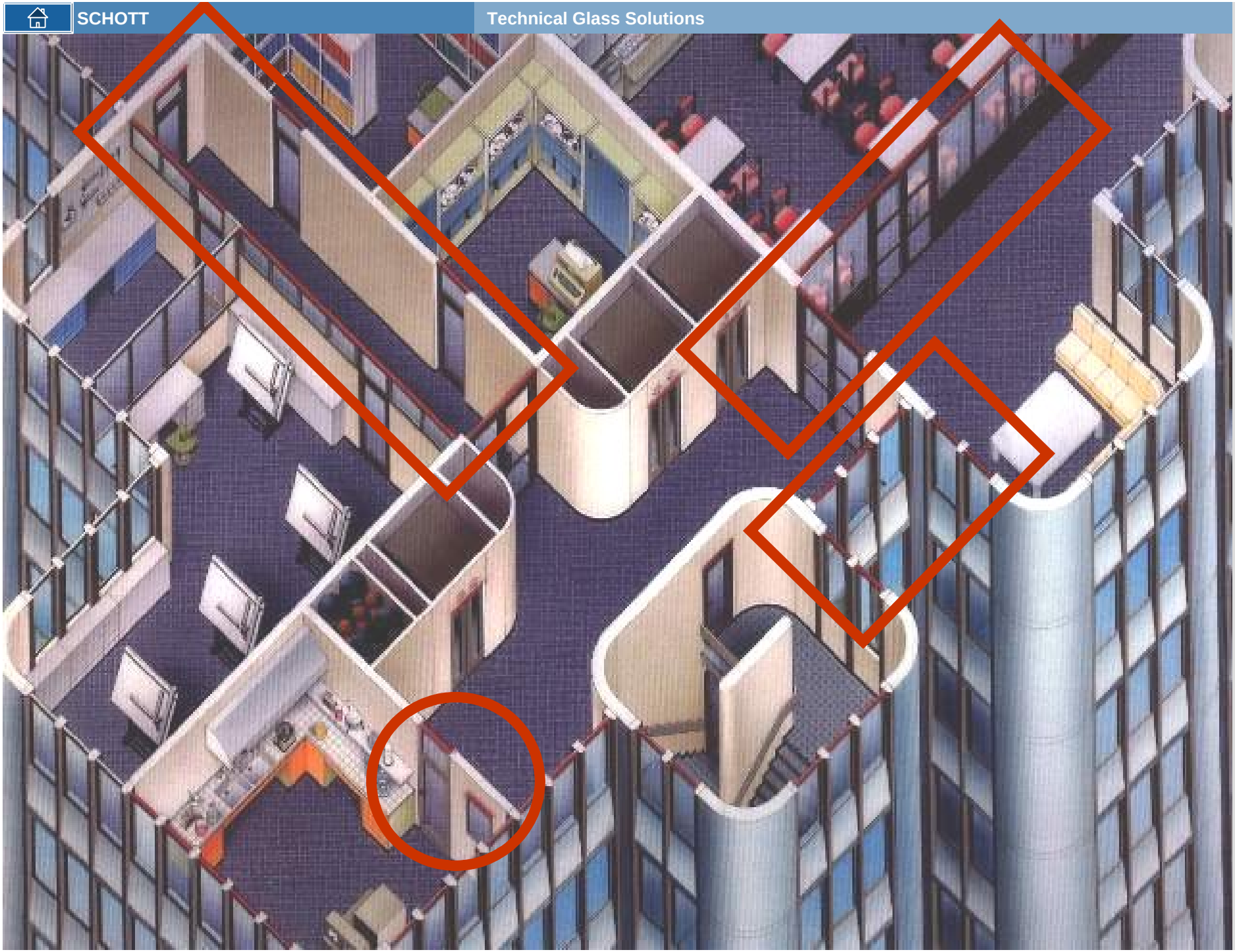
to

- Avoid occurence of fire
- Avoid broadening of fire & smoke
- Secure rescue and extinguish measures

Possible Application Fields

Architecture	Traffic	Industrial
Hospitals Hotels Administration Buildings Shopping Malls Schools Airports Sport Grounds Theater Leasure Park	Ship & Offshore Railway Application	Crane cabins Machine Protection

- ⇨ Partitions
- ⇨ Transoms
- ⇨ Doors & windows
- ⇨ Roofs / Overhead Applications
- ⇨ Facades
- ⇨ Smoke Screens



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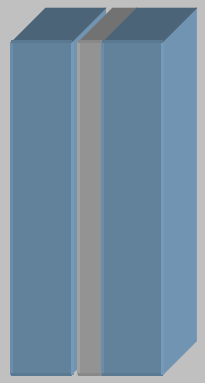
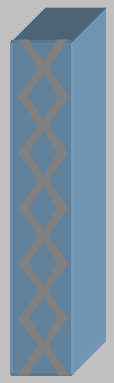
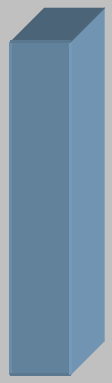
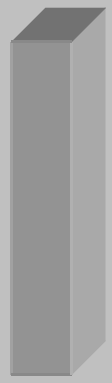
Types of Integrity Rated Glass

Intumescent laminated	Wired glass*	Monolithic soda-lime float glass	Monolithic borosilicate glass	Glass Ceramics
				
Pyrodur (Pilkington) **Pyrobelite** (AGC) **Pyrogard** (CGI)	**Pyroshield** (Pilkington) …..	**Pyroswiss** **Pyroswiss ex.** **Vetroflam** (Vetrotech) **Pyroclear** (Pilkington)	**PYRAN® S** **PYRAN® white** (SCHOTT)	**PYRAN®** **Platinum** (SCHOTT) **Keralite** (Vetrotech) **Firelite** (NEG)

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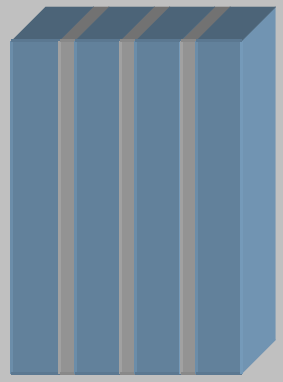
Types of Integrity & Insulation Rated Glass



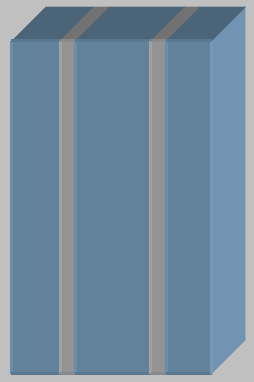
Intumescent laminated

Pyrostop

(Pilkington)

PYRANOVA

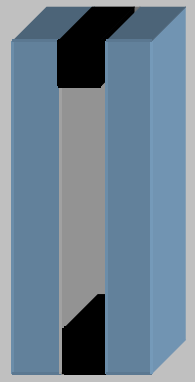
(SCHOTT)



Intumescent laminated

Pyrobel

(AGC)



Gel-Filled DGU

Contraflam

(Vetrotech)

Hydro-Gel Products

(Paraflam…)

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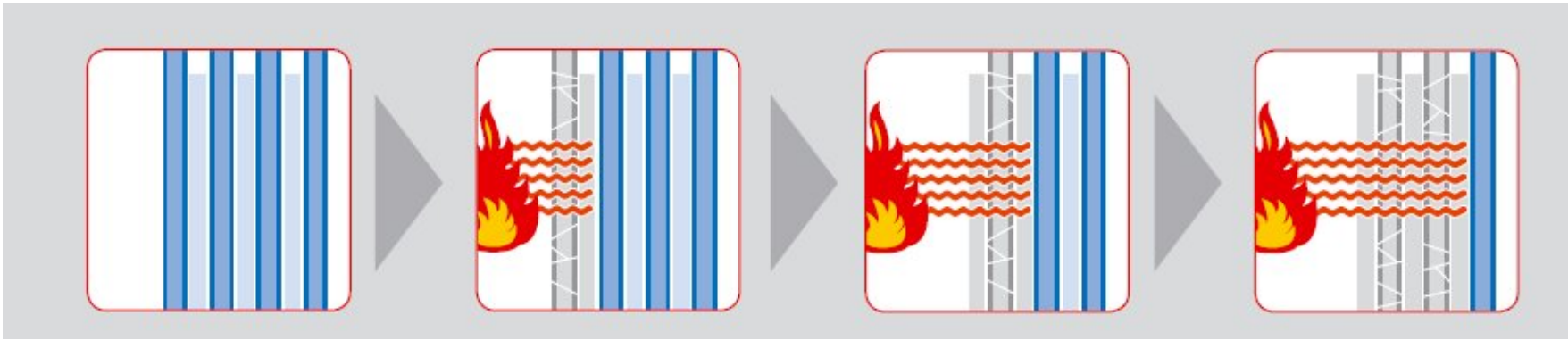
Behaviour in Fire: Integrity & Insulation Rated Glass



- Exposed to fire, the glass offers a physical barrier against flame, hot gases and smoke as well as a reduced surface temperature and resistance against spontaneous ignition on the unexposed side. The float glass pane facing the fire shatters. The enclosed, transparent fire resistant layers foam up and form an opaque heat shield, which prevents the passage of heat radiation.

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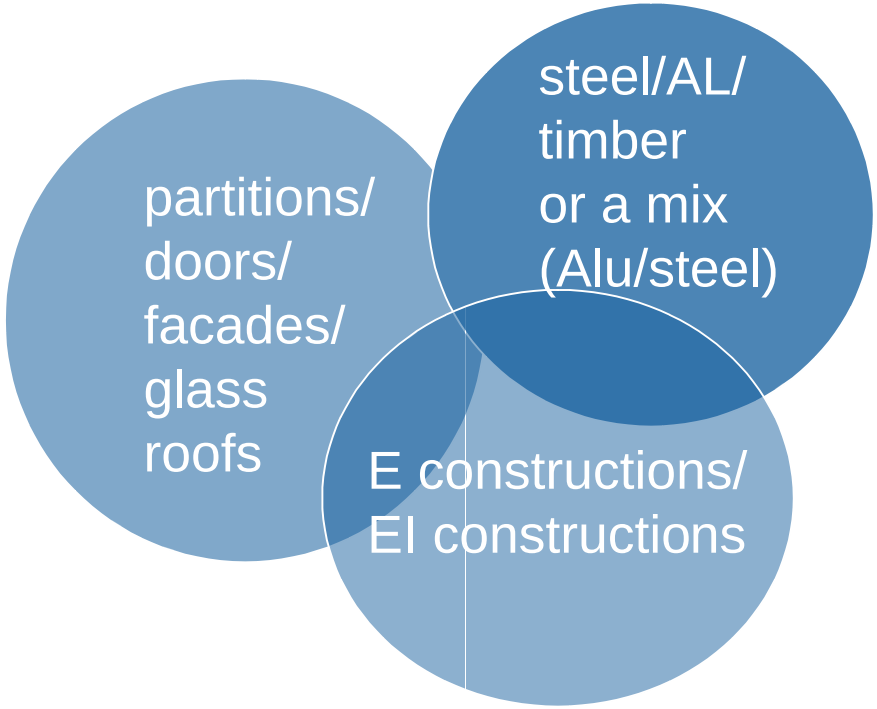
Importance of Framing Systems

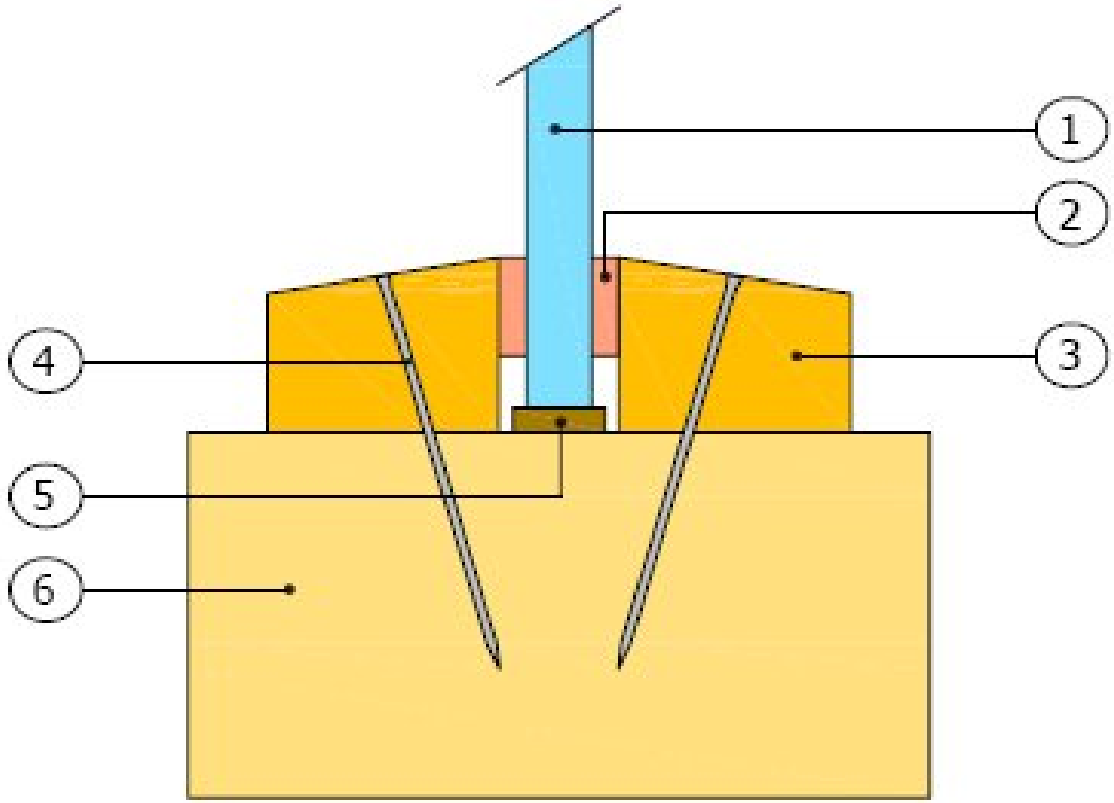
- Support glass panes and therefore are critical
- Used to achieve required design details which the glass needs to perform adequately
- Incorrect fitted frames can result in premature failure
- Attention should be paid to the supporting structure, this can influence the performance of the system
- Each framing system has its particular requirements

Categories of Framing Systems

- Softwood
- Hardwood
- Un-insulated steel based
- Composite systems
- Insulated steel based
- Aluminium clad steel based
- Doorsets

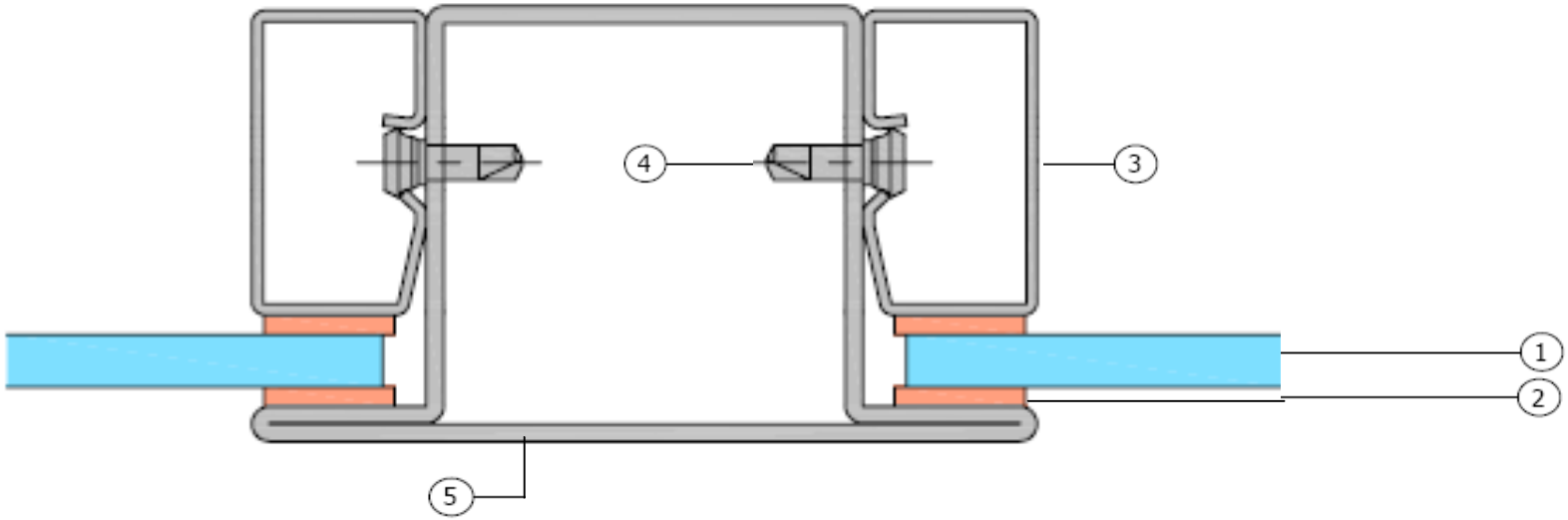


Glazing into Timber



1. Glass, eg PYRAN S
2. Glazing material
3. Glazing beads
4. Steel pins or screws
5. Setting blocks
6. Timber frame

Glazing into Steel



1. Glass, eg PYRAN S
2. Glazing material
3. Glazing beads
4. Steel screws
5. Steel frame

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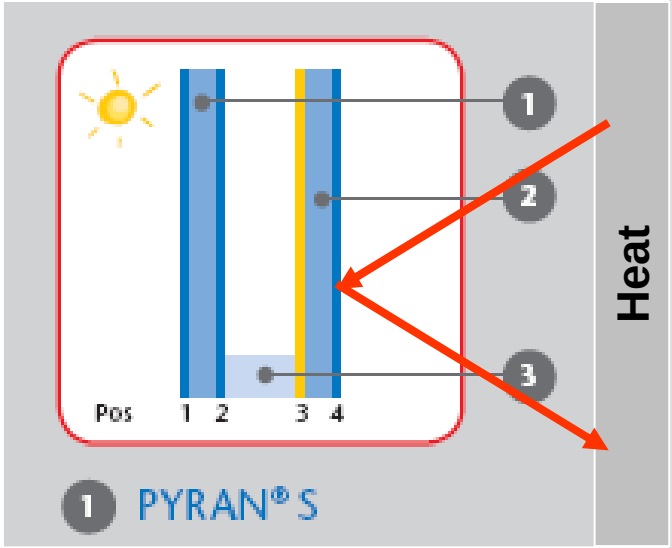
IGU – Insulating Glass Units
Fire Resistance & Heat Insulation

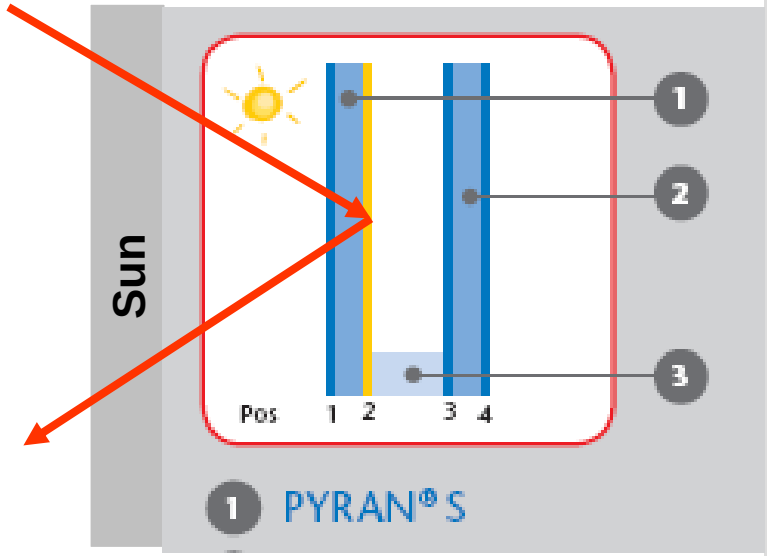
- To keep as much heat as possible in the space, while cold air is left outside
- May be influenced by:
  - Highly effective, wafer thin coatings of noble metal
  - Inert gases such as argon in the space
  - Optimal pane spacing



U-value:
the lower the value, the better the performance of the glass

IGU – Insulating Glass Units
Fire Resistance & Sun Protection

- To avoid heating up of the room by sunshine via absorbtion or reflection
- May be influenced by:
  - Highly effective, wafer thin coatings of noble metal
  - Integrated venetian blinds in the space



g-value:
the lower the value, the better the performance of the glass

IGU – Insulating Glass Units
Fire Resistance & Sound Insulation

- Difference between noise levels within and outside of a building
- May be influenced by:
  - Larger space between glass panes
  - Asymmetrical glass compositions
  - Laminates with sound reduction films / resin interlayers

R_w-value:
the larger the value, the better the performance of the glass

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SCHOTT PYRAN® S butt joint glazing

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SCHOTT PYRANOVA® butt joint glazing

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SCHOTT PYRAN® G

SCHOTT PYRAN® S Smoke Screens

SCHOTT PYRAN® S Structural Glazing

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Different target groups need to be addressed

Architects
- Design & Dimensions
- Special / unique solutions

System supplier / Installer
- Product range
- Technical Know-How

Authorities
- Stable and trustworthy products
- Experience

More effective than any laboratory: People with practical experience.

We offer:

- Development of systems in cooperation with partners
- Made-to-measure consultancy
- Training programme
- Efficient logistics

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European Investmentbank Luxembourg
SCHOTT PYRANOVA®

Red Bull Hangar Salzburg, Austria
SCHOTT PYRAN® S Butt Joint

Hotel Intercontinental Düsseldorf, Germany
SCHOTT PYRAN® S

BMW Museum Munich, Germany
SCHOTT PYRAN® S DGU

Mercedes Benz Museum Stuttgart, Germany
SCHOTT PYRAN® S Butt Joint

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Thank you for your time!

QUESTIONS??

This concludes The American Institute of Architects Continuing Education Systems Course

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Instruction Material FRG V1009, AKn

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