

EFFECTIVE PROTECTION

EDUCATION GUIDE



High-performance, glazed protection solutions to maximise well-being, enhance safety, and increase the ability to learn in educational institutions



vetrotech
SAINT-GOBAIN

ENSURING COMFORT FOR ALL

Did you know that we spend 90% of
our time indoors?

*That's why the buildings in which we live, work, play, and receive
treatment can significantly impact our health and comfort.*

It is therefore vital that the homes, factories, shops, offices and
other buildings in which we spend our lives offer the comfort
necessary to ensure the well-being of all those who use them.

With more than 35 years spent providing development, consultancy
and technical assistance solutions to our customers, we have
learned to understand and appreciate the specific requirements
and expectations of each end user of the buildings we service. Our
solutions are therefore fully modular and tailored to your needs.

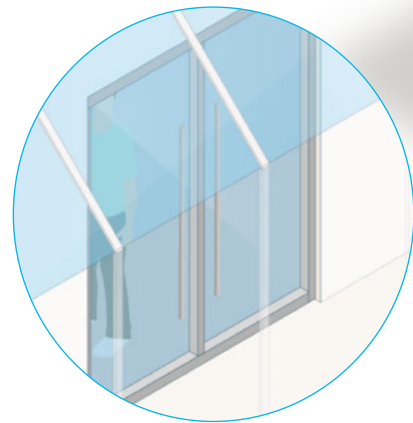
Promoting learning, whilst ensuring the well-being and safety of all

Schools, colleges, universities.... all of these buildings have passageways which present a multitude of constantly-evolving issues for pupils, students and teaching staff, not to mention those in charge of ongoing servicing and maintenance. Our solutions have been designed to meet the actual needs of each room, and to play an active role in:

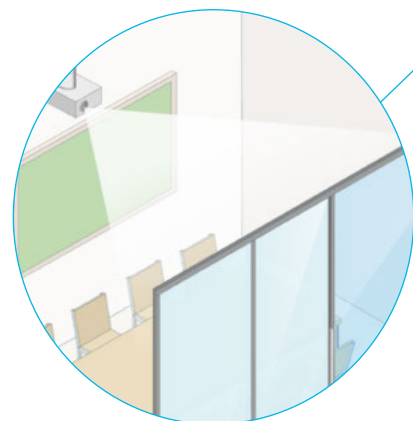
- Ensuring the well-being of each individual
- Maximising their ability to work and to learn
- Providing safety for all

Discover how Vetrotech solutions can address these issues.

Burglar resistance, able to withstand ball impacts



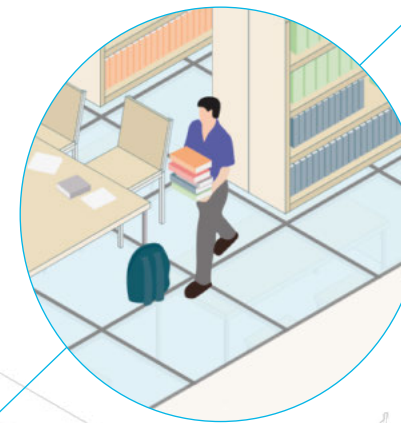
Fire resistance with obscuration control and video projection option



Fire resistance (skylight)

Butt-jointed fire resistance with screen-printed corners

Translucent fire resistance with anti-slip treatment



Fire and burglar resistance with emergency exit system

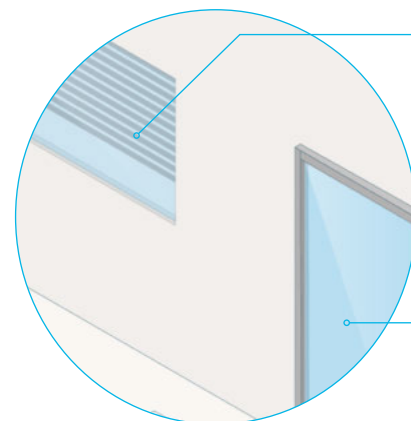
Coloured fire resistance

Fire resistance to prevent fire from spreading to upper floors (C+D)

Curtain wall burglar resistance

Butt-jointed large format fire resistance with enamel coating

Fire resistance with integrated blinds



Fire and burglar resistance with integrated alarm

Fire resistance

Fire resistance with photo printing





ENSURING THE
WELL-BEING OF ALL

LIGHT AND TRANSPARENCY

Glazed protection solutions to ensure the well-being of all

Installing large glazed areas in schools, colleges and universities **bathes these spaces in natural light, opening them up to nature and the environment.** Numerous studies have demonstrated the benefits this has on health¹:

- Fostering the growth of children, benefiting their vision, immune system, etc.²
- Encouraging physical activity³, a crucial factor in limiting the screen time of children and adolescents.
- Increasing adaptability, alertness and creativity, and having a positive effect on mood; pupils and students are happier at school, teachers are more dynamic and hold their students' attention longer.
- Reducing stress and lowering heart rate.

1/3

A lack of light intensity may explain one third of attention deficit hyperactivity disorder (ADHD) cases in children, and up to 57% in adults.⁴



© Olaf Rohl/EPFL, Lausanne, Switzerland/Architect: Richter Dahl Rocha & Associés architectes SA

Natural light also regulates the circadian rhythm, key to a balanced life as it improves the quality of our sleep. Teachers and students will come to class well-rested, and will find it easier to concentrate.

Light and a view outside are not the only elements which help to turn an educational establishment into a hub of well-being. Classrooms also need to have **good thermal and sound insulation, and benefit from clean, fresh air.** Carefully selected glazing can contribute greatly to the comfort and well-being of classroom occupants thanks to its thermal and acoustic properties, and ability to reflect or transmit light.

Finally, there is a movement in architecture towards **biophilic design**, which advocates the introduction of elements evoking nature and biodiversity in every way in buildings to promote the well-being of their occupants. Installing large glazed areas in educational establishments fits perfectly with this trend, by rebuilding the link between pupils, teachers, and nature.

Vetrotech solutions

For **maximum outward visibility**, we offer the extra-large format **CONTRAFLAM MEGA** glazed protection solution, and the **CONTRAFLAM STRUCTURE** butt-jointed glazed protection solution with no intermediate frame.

Our fire resistance solutions can be combined with a self-cleaning outer coating designed to **keep glazing cleaner for longer, SGG BIOCLEAR.**

Thanks to the exceptional **thermal insulation** and **solar control** offered by the **PLANITHERM/PLANISTAR SUN/COOL-LITE** solutions, significant changes in temperature can be managed, helping promote the well-being of occupants.

With the aim of optimising the **comfort and tranquillity** of students and educational staff, we have also developed glazed protection solutions for classrooms, offices and communal spaces offering **enhanced acoustic insulation – STADIP SILENCE.**



Furthermore, an unrestricted view outside helps **reduce the feeling of confinement.** To make the school working areas and passageways even warmer and more welcoming, we offer **"designer" protection solutions, with patterns, colours, images, screen-printing, etc.,** which give occupants a **more positive experience** of the space and stimulate the creativity of both the pupils and the teaching team. Choose from **MASTERGLASS, SGG DECORGLASS, STADIP COLOR, SERALIT, PICTUREit, PARSOL.**

Because our solutions are made from glass, **they facilitate maintenance.** They are designed to withstand powerful household products and **minimise the risk of graffiti, common on walls and doors.**

¹. Keep, P. & others (1980). 'Windows in the intensive therapy unit'. Anaesthesia. Beute, F. (2014). 'Powered by nature : the psychological benefits of natural views and daylight'.
². Edwards, L. & Torcellini, P. (2002). 'A Literature Review of the Effects of Natural Light on Building Occupants'. Liberman, J. (1991). 'Light : Medicine of the Future'. Hathaway, W.E. & others (1992).
³. Aggio, D. & others (2015). 'Association of Light Exposure on Physical Activity and Sedentary Time in Young People'.
⁴. Riou-Milliot, S. & Sender, E. (2015). '7 bienfaits de la lumière du soleil'.



MAXIMISING THE ABILITY TO LEARN



© Olaf Rohl/Carnal Hall, Rolle, Switzerland/Architect: Bernard Tschumi Architects

LIGHT, CONCENTRATION AND RETENTION

Protective glazing to optimise the ability to learn

The transparency of glass allows **natural light** to pass through. This not only enhances the well-being of pupils, teachers and staff, but also enables **an improvement in the ability to learn and results of students**.

It has been demonstrated that natural light promotes concentration, making pupils more alert and responsive. They are less tired, irritable and stressed⁵, and consequently **better able to retain information and participate in class**. Their ability to learn is improved and this is reflected in test results⁶.

21%

The learning rate of students increases by 21% when they are in a room with maximum natural light. (HMG, 2001)

15%

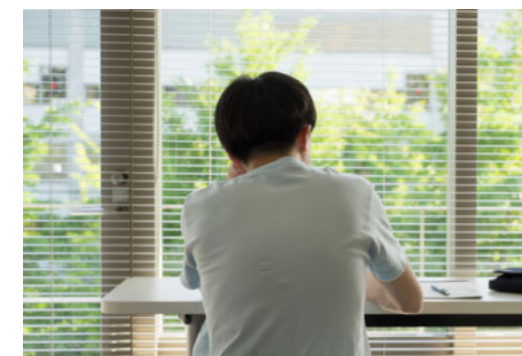
This is the improvement in results in mathematics and logic observed in the classrooms containing larger windows. (Maesano, 2015)

Furthermore, other studies have shown that the presence of natural light in classrooms results in a **decrease in absenteeism amongst both pupils and teachers**, along with an improvement in their physical and mental state⁸.

So, by opting to include large glazed areas in your establishment, you will be doing everything in your power to **create an environment conducive to learning, which helps to stimulate both pupils and teachers**.

Vetrotech solutions

To optimise this provision of natural light, we offer **CONTRAFLAM STRUCTURE MEGA**, a fire-resistant glazed protection solution, in an extra-large format (up to 4.6-m high) with no intermediate frame.



To guarantee the optimal working environment, it is sometimes necessary to control visibility, and the provision of natural light and heat. We also now offer the **VETROFLAM and CONTRAFLAM SCREEN** solutions, which are fire-resistant glazing with integrated blinds to enable pupils to maintain their concentration in the classroom.

Our **CONTRAFLAM PRIVA-LITE and CONTRAFLAM LITE PRIVA-LITE** solutions are perfect for offices and classrooms: they provide fire protection whilst giving the room modularity. The teacher will have the option to **obscure part of the partition on demand**. This enables it to be transformed into a projection screen, using the **PRIVA-LITE XL** solution.



⁵ Ott, J.N. (1973). 'Health and Light: The Effects of Natural and Artificial Light on Man and Other Living Things'. Ott, J.N. (1976). 'Influence of fluorescent lights on hyperactivity and learning disabilities'. Boubekri, M. (2008). 'Daylighting, Architecture and Health: Building Design Strategies'. Hathaway, W.E. & others (1992). 'A Study into the Effects of Light on Children of Elementary School Age – A Case of Daylight Robbery'. Liberman, J. (1991). 'Light: Medicine of the Future'. Edwards, L. & Torcellini, P. (2002). 'A Literature Review of the Effects of Natural Light on Building Occupants'. Küller, R. & Lindsten, C. (1992). 'Health and behavior of children in classrooms with and without windows'. Heschong, L., Wright, R. & Okura, S. (2002). 'Daylighting Impacts on Human Performance in School'. Tikkanen, K. (1979). 'Spectral eye fatigue in a school environment'.

⁶ Heschong-Mahone Group (1999). 'Daylight in Schools: An Investigation into the 14 Relationship between Daylighting and Human Performance. Detailed Report'. Heschong-Mahone Group (2001). 'Re-Analysis Report: Daylight in Schools'. Maesano, C. & Annesi-Maesano, I. (2015). 'Impact of Lighting on School Performance in European Classrooms'. Nicklas, M.H. & Bailey, G.B. (1997). 'Daylighting in Schools, Energy Costs Reduced ...Student Performance Improved'. Kim, T. & others (2014). 'Daylight evaluation for educational facilities established in high-rise housing complexes in Daegu, South Korea'. Elzeyadi, I. (2002). 'Designing for Indoor Comfort: A systemic model for assessing occupant comfort in sustainable office buildings'.
⁷ Edwards, L. & Torcellini, P. (2002). 'A Literature Review of the Effects of Natural Light on Building Occupants'.
⁸ Larson, C.T. & others (1965). 'The effect of windowless classroom on elementary school children'. Hathaway, W.E., Hargreaves, J.A., Thompson, G.W. & Novitsky, D. (1998). 'A Study into the Effects of Light on Children of Elementary School Age – A Case of Daylight Robbery'. Edwards, L. & Torcellini, P. (2002). 'A Literature Review of the Effects of Natural Light on Building Occupants'.



ENSURING PERFECT SAFETY FOR PREMISES

SAFETY, SURVEILLANCE AND PROTECTION

Greater transparency for greater levels of safety

Safety is a priority within educational establishments and must be a key part of the design process for these buildings.

The risks they most commonly face are:

- Confrontations between pupils, or between pupils and educational staff.
- The risk of fire (playing with lighters, matches, etc.).
- Vandalism (thrown objects, deliberate breakages, etc.).
- Burglary (computer rooms, projectors, scientific equipment, etc.).
- Accidents linked to pushing and shoving.

49%

49% of the members of the French teaching profession who have experienced aggression have been subjected to physical attacks.⁹



Studies¹⁰ have shown that the location and number of safety devices have the tendency to increase vulnerability in the face of any threats. By adopting glazed protection solutions, you are ensuring **optimum, invisible protection**.

In fact, **visibility** enables some of these risks to be countered or anticipated by promoting surveillance, key to avoiding confrontations or identifying malicious behaviour. It also **reduces the time** taken for bystanders to attend the scene and help those in difficulty.

⁹. Guedj, H. & Beaumont, B. (2014). 'Éducation nationale : des métiers exposés aux menaces et aux insultes'.
¹⁰. Boucher, I. (2006). 'La sécurité et l'aménagement : l'impact du 11 septembre 2001'.

Vetrotech solutions

All Vetrotech solutions are made from **toughened glass**, which makes them more **secure** than armoured glass. In the event of deliberate breakage or accidental impact, the **high-quality toughened** glass used in these solutions forms small cubes instead of shards.

To ensure visibility whilst **preventing the risk of fire**, we offer glazing for all types of application – **PYROSWISS, VETROFLAM and CONTRAFLAM solutions** – resistant to flames, smoke and hot gases for up to 120 minutes.

We also manufacture fire-resistant **emergency exit doors**, to aid evacuation of the premises if needed.

Our glazed protection solutions are specially designed to **withstand impacts from balls or pushing and shoving**, perfect for use as partitions, doors and windows in sports halls, for example, or externally close to recreation areas.



© Hennie Raaymakers/Het College, Weert, Netherlands



To ensure that internal and external partitions and doors provide enhanced protection, we offer glazed solutions **tested using the most powerful objects and tools to prevent breakage and attempted break-ins, VETROGARD and POLYGARD solutions**. The solutions in the **VETROGARD AND POLYGARD BULLET/BLAST** ranges can also withstand gunshots and explosions.

Finally, the **SECURIT ALARM** solution provides partitions and doors with an **integrated alarm**, which is triggered as soon as the first impact strikes the glazing, perfect for securing computer or science rooms, for example.

To guarantee the performance of our glazing, it is essential that the complete system (frame, glazing and environment) of partitions, doors and windows has been tested by a certified organisation. Most acts of vandalism and break-ins are made possible by **defects in window framing systems or locks**.

VETROTECH EXPERTISE

ADVANTAGES OF VETROTECH SAINT-GOBAIN



Choice: We offer a wide range of glazed protection solutions providing resistance of various types (fire resistance, burglar resistance, explosion resistance and/or bulletproofing).



Customisation: Do you have aesthetic, acoustic or thermal requirements? Do you need obscuration? All the protection solutions are able to meet one or more environmental requirements.



Listening: Whatever the project and its challenges, our technical and sales teams will ensure you are offered the solution best suited to your needs.



Expertise: The bespoke nature of the protection solutions requires our teams to constantly check and certify their resistance, while conforming to the standards and requirements imposed by different environments and countries.



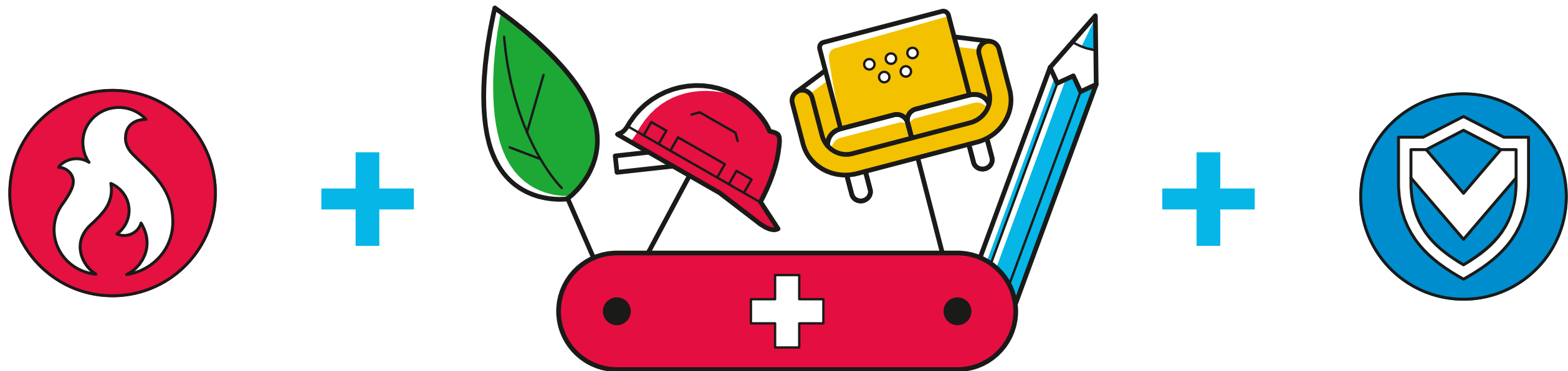
Reliability: Vetrotech is a subsidiary of the Saint-Gobain Group, an expert in glazed solutions for over 350 years.



FIRE RESISTANCE AND SAFETY: PROTECTING PEOPLE AND EQUIPMENT

Vetrotech is a Saint-Gobain Group company that specialises in consultancy and provision of glazed protection systems to combat fire and ensure the safety of people and equipment.

All Vetrotech glazed protection solutions are tested in specific environments and with framing systems made from steel, wood and aluminium. The report, which is issued by an approved test laboratory, is the document that attests to successful resistance testing of the glazed elements (specific glazing, framing systems and environments), and therefore constitutes the authorisation for sale.



FIRE RESISTANCE

Pyroswiss, Vetrolam, Contraflam

The Vetrotech glazed fire resistance ranges allow for compliance with the different protection classes defined in standard EN 357 for fire resistant glazed elements:

- Class E, integrity against flames, smoke and hot gases: PYROSWISS.
- Class EW, integrity and reduction of heat radiation: VETROFLAM, CONTRAFLAM LITE, CONTRAFLAM LITE STRUCTURE.
- Class EI, integrity and thermal insulation: CONTRAFLAM, CONTRAFLAM MEGA and CONTRAFLAM STRUCTURE.

30' to 120'

The glazed elements have fire resistance durations from 30 to 120 minutes.



Added safety

Integrated alarm – SECURIT ALARM
X-ray protection – SUPERCONTRYX
GSM protection
Radar protection – CONTRARADAR



Sustainable development

Double or triple glazing – CLIMAPLUS / CLIMATOP
Solar control – COOL-LITE / ANTELIO
Self-cleaning glazing – SGG BIOCLEAR

Specific solutions for clean rooms

Vetrotech develops specific glazed fire resistance solutions for clean rooms which conform to the requirements of applicable standard NF EN ISO 14644-1 of 1999.



Comfort

Obscuration control – CONTRAFLAM SCREEN (integrated blinds) / PRIVA-LITE
Thermal insulation – PLANITHERM, PLANISTAR SUN
Acoustic insulation – STADIP SILENCE
Dynamic glazing – SageGlass®



Design

Colour film, printing, textured glass patterns, tinting – STADIP COLOR / PICTUREIT / MASTERGLASS / DECORGLASS / PARSOL
Screen printing – SERALIT EVOLUTION
Butt-jointed – CONTRAFLAM STRUCTURE LITE / CONTRAFLAM STRUCTURE
Glazed floor – LITE-FLOOR
Extra-large format – CONTRAFLAM MEGA
Extra-light – DIAMANT
Anti-reflective – SGG VISION LITE
Mirror – MIRALITE
Shaped glazing, curved, etc.

PROTECTION OF PEOPLE AND EQUIPMENT

Vetrogard, Polygard

Safety glazing to protect people and property in the VETROGARD and POLYGARD ranges are only sold once they pass a complete system test (glazing, frame and environment), in addition to ensuring they meet regulatory requirements.

They conform to the highest levels of resistance defined by European standards (EN):

- Burglar resistance
Glazing standard EN 356B (P6B to P8B).
- Bulletproofing
Glazing standard EN 1063 (BR1 to BR7 + SG1/SG2 specific to shotguns).
- Explosion resistance
Glazing standard EN 13541 (ER1 to ER4).

These glazing solutions are classified as either Splinters or No Splinters (S or NS) for the side opposite the impact.

For more information on our glazing ranges, please refer to our technical documentation.





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