



Protection
against
bomb
attacks

Buildings | Vehicles

 HAVERKAMP

Risk levels

Low risk

Medium risk

High risk

Extremely high risk

Analysing the threat

The threat to a building depends on a wide range of factors. Additionally, different risk zones of varying intensity can be defined, depending on the location of the building (vehicle access possibilities, nature of other buildings located round about, etc.) and its specific architecture. An analysis of the building is therefore the essential first step in devising an optimum security concept.

The greatest weakness in any building in the event of an explosion is conventional, unlaminated glass. Compared to a massive masonry facade, glass offers the lowest physical resistance to a pressure wave. Glass doors, standing glazing, glass facades etc. turn into a life-threatening hazard if a pressure wave should occur.

The panes of glass which are shattered by an explosion produce sharp-edged splinters that are propelled into the building and through the air at velocities of up to 10,000 metres per second, depending on the type and quantity of the explosive material and the distance of the explosive device from the building. According to a study by the US Army, flying glass is the cause of 80% of all fatal and serious injuries.

But also the damage to property within the building caused by a pressure waves can be enormous.

Destruction to computer workplaces, server rooms etc. are only the direct material loss. The consequences arising from potential data loss and the resulting disruption to business may prevent an organisation or company from working for an extended period of time.

To protect a building, therefore, it is essential to prevent damage from flying glass altogether or to at least reduce it as far as possible.

One highly effective way of achieving this is to retrofit all areas of glass with explosion-resistant security films from the PROFILON® product range.

HAVERKAMP has developed a wide assortment of PROFILON® security and splinter-protection films, each of which is designed to meet different risk levels. From PROFILON® ER1, which offers protection for the most severely threatened zones, to PROFILON® FF, which provides

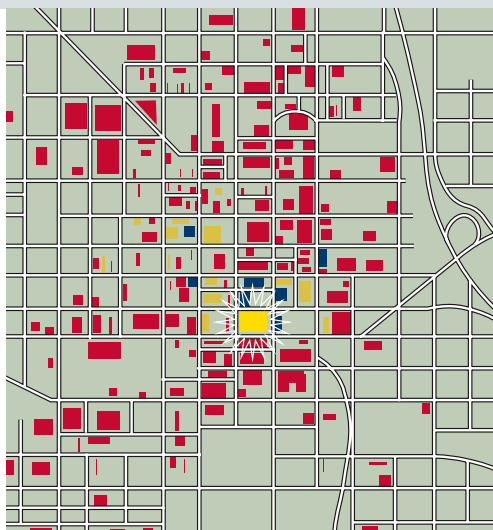


splinter protection for the less endangered areas, PROFILON® security films are available and able to offer invisible protection for the entire building.





As a supplement or alternative to these products, other HAVERKAMP anti-explosive building security systems include:

- STABAGARD® explosion-resistant anti-splinter curtains
- BLASTWIN® and PROFEX® explosion-resistant windows
- BLASTSHIELD® facade protection

Detailed descriptions of all these products can be found in the individual product sheets.



The bomb attack on the Murrah Federal Building in Oklahoma, USA, caused hazard through flying glass over a wide radius.

-  Explosion
-  Collapsed structure
-  Structural damage
-  Disrupted windows/doors



Pressure waves

Combining properties

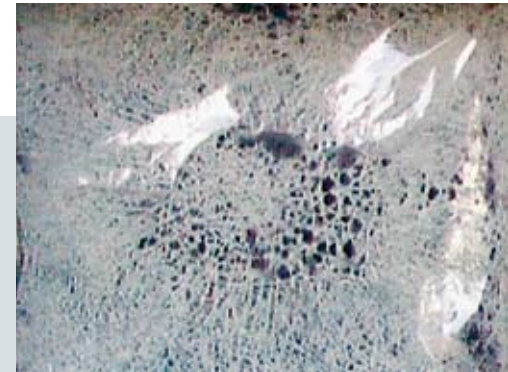
To reduce the risk of injury through flying objects, a combination of explosion resistance and high impact resistance is essential. Because of the flying debris, explosion resistance, i.e. splinter retention, by itself is usually far from sufficient in the high to medium risk zones.

**PROFILON®
security films**

The necessary impact resistance should always be certified in accordance with DIN 52290 Class A1 respectively EN 356 P2A (ball drop test).

In this context, certification to DIN EN 52337 / EN 12600, British Standard BS 6206 or US Standard ANSI Z97.1 (pendular impact test) should be viewed critically. These standards simulate the splinter protection provided by a film in the case of someone walking into a glass door. However, this has only little to do with the reality of an explosion attack.

Just as important as the film itself is the connection between the PROFILON®-laminated glass and the frame in which it is held. Installation of the security film without bonding to the frame effectively creates a predetermined breaking point, with the result that in the event of a pressure wave, the laminated pane is blown out of the frame in one piece (like a



“flying carpet”). In the case of double glazing, this can mean that splinters from the outer, unprotected pane are projected unimpeded into the room behind.

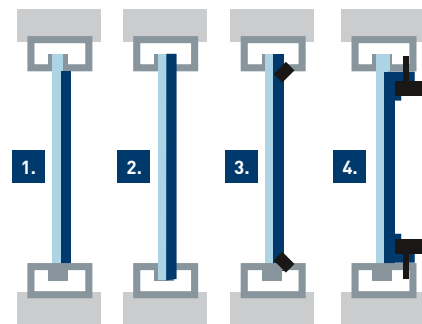
It is therefore essential that the film should also extend under the pane holding profile, if possible in combination with a frame anchoring of special silicone. This ensures a strong and at the same time elastic connection between the glass and the PROFILON® laminate.

Even greater stability can be achieved by mechanical anchoring using an additional “Proficon” profile. In this case, an additional mechanical connection is created between the frame and the laminated glass.

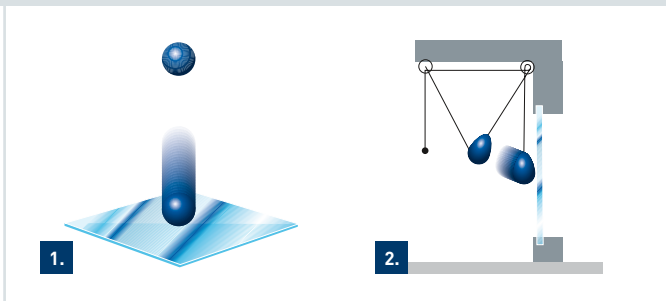
Professional installation of security products, e.g. PROFILON® security films, is a key factor in the properties the security system provides. Therefore, HAVERKAMP offers not only the products themselves, but also installation by qualified and certified fitters. This is done either

by the company’s own personnel, who work all over the world – including also in crisis regions – or by independent, certified partner firms.

Different types of frame anchoring



- 1. Security film fitted only to the edge, without any further anchoring. Risk:** The laminated pane can be projected inside all in one piece.
- 2. Security film extends under the pane holding profile:** Suitable mode of installation for low risk zones.
- 3. Additional frame anchoring with special silicone:** Suitable mode of installation for medium risk zones.
- 4. Additional mechanical anchoring with Proficon security profile:** Suitable mode of installation for high risk zones.



- 1. Impact resistance trial using ball drop test:** Suitable test for determining the impact resistance through high energy impact concentrated on one point.
- 2. Impact resistance trial using pendular impact test:** Less suitable test for impact resistance through energy impact spread over an area.



Shock tube tests (German/European standards (DIN – EN))

For its various norms, the German/European standard assumes a pressure wave with a high level of reflection and lasting for a period of at least 21 ms.

The tests are performed in a shock tube and simulate an extremely

high pressure with a relatively long pressure wave duration.

Very strict definitions also apply to the test results. In contrast to the American GSA test, the German/European test for security films does not permit any damage to the film.

These strict requirements and test methods generally come very close to real-life conditions and needs.



Field tests (GSA Standards and British Standards)

The basis for these standards is an outdoor bomb explosion at various distances from buildings.

Therefore, the test arrangement is only exposed to a single pressure wave, which is reflected only little or not at all.

Under GSA, and in contrast to the German/European standard,

splinters of glass are allowed to penetrate the room. Various risk levels are defined according to the distance and altitude of the splinters.



Generally speaking, it is almost impossible for the results of a bomb attack to be simulated by a standard. The real-life conditions and the many different combinations of them are too varied for this. Reflecting pressure waves arise where there are tall buildings standing close together, as in New York or Singapore, and cause very severe damage – in contrast to pressure waves that occur where there are few or only low-rise buildings.

HAVERKAMP Security at its best

Security is one of the most important and at the same time most sensitive issues of our time. Throughout the world, people with responsibility in business and politics need increasingly effective systems to protect people and property. For more than 20 years now, at its headquarters in Münster, HAVERKAMP has been developing and producing leading technologies for building and perimeter security, and also for solar and privacy protection. HAVERKAMP offers systems that are effective without being obtrusive and that provide security without giving a sense of restriction.



The high-performance materials from HAVERKAMP provide security against burglary and protect people and property even in high-hazard crisis regions. HAVERKAMP combines the individual product elements to create security concepts that meet every need. Working as a separate business division, HAVERKAMP Project is able to design and implement complex and complete problem solutions.

Certification to ISO 9001 guarantees comprehensive quality management, from development right through to installation.



HAVERKAMP is security approved by the government for special facilities and member in following associations:



Verband für Sicherheit in der Wirtschaft (VSW) e.V.
(in NRW/Bayern/Baden Württemberg)



Verband deutscher Sicherheitsingenieure e.V.



American Society for Industrial Security



BHE Bundesverband der Hersteller und Errichter von Sicherheitssystemen e.V.

AIMCAL AIMCAL Association of Industrial Metallizers, Coaters and Laminators

References

The following companies and institutions – to name only a very few – entrust their security to HAVERKAMP:

Bosch, Daimler Chrysler, Siemens, Bayer Leverkusen, IBM, Metro Group, Merck, EON, KFOR Troops, German Foreign Ministry, German Armed Forces, Museum of Modern Art, United Nations organisations, etc.

Authorised and certified partners throughout the world – e.g. in Scandinavia, Switzerland, Netherlands, Japan, Malaysia, Thailand, Korea, South Africa, Kenya, Mexico, Saudi Arabia – ensure international security with HAVERKAMP products. Further information on the company and a comprehensive reference list can be found at www.haverkamp.de and www.profilon.com.



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