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Comportement des vitrages feuilletés sous impacts perforants

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Laminated glazings, as used in building applications (protection for shops and commercial buildings, guarding and balustrading...), are essentially designed for protection against accidental shocks, against the risk of injury and against intruders and vandalism. Shock and penetration resistance, residual strength, reduction of fragment projection and laceration risk are evaluated by standard tests. This work is a contribution to the experimental investigation of the impact behaviour until perforation of laminated glazings. From an experimental study of hard body impact, the chronology and phenomenology of the damage evolution were identified and made it possible to define the energy balance of the impact. Then, the mechanical phenomena responsible for input energy dissipation (fragmentation, projection of fragments, interlayer deformation and glass/polymer debonding) were described and quantified. This investigation showed, for the impact categories used, the preponderance of the interlayer deformation for energy dissipation and the necessity to consider this mechanism jointly with the adhesion conditions. Finally, with an original interrupted impact facility which discretizes damage evolution, the glazing's ability to degrade impact energy was evaluated versus time. The principle of this device is to vary the perforation distance of the projectile for the same input energy. Instrumentation of the latter gives us displacement evolution during the impact. Thus, the damage evolution can be described and compared with the energy dissipation in order to characterize the impact resistance of laminated glazings.

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