

Thermoplastic polyurethane (TPU) film  
enables high safety standards for bullet-  
resistant applications.

Reliable material for security glazing protection.

Dureflex®



## Enhanced protection with specialty films for security glazing

**Dureflex® A4700** thermoplastic polyurethane (TPU) film has **good optical properties** and **excellent adhesion to glass, PC and PMMA sheets**, making it a versatile interlayer to use between the various materials that make up bullet-resistant glass. TPU film also imparts toughness to the laminate, **increasing the impact resistance** due to the excellent puncture strength and elongational properties of the film. When lightweighting is needed, a layer of glass can be substituted with polycarbonate and still offer enhanced protection because of the excellent mechanical properties of TPU. Unlike other interlayer films, TPU film does not have plasticizers or require special handling or storage of the material. Our Dureflex® TPU film further **enables the integration of electronics or additional functionality into glass-clad systems** such as those needed for laminated smart glass or PV solutions.

## Processing

Dureflex® A4700 can be laminated via autoclave processing to achieve excellent adhesion to glass and plastics with a recommended temperature range range of 100 – 130°C. Pressure for this process can vary from as little as 25 psi (1,5 bar) to as much as 200 psi (15 bar). Laminating can be done using vacuum bag or vacuum ring de-airing, or nip-roll / calender laminating for symmetrical glass-clad configurations.

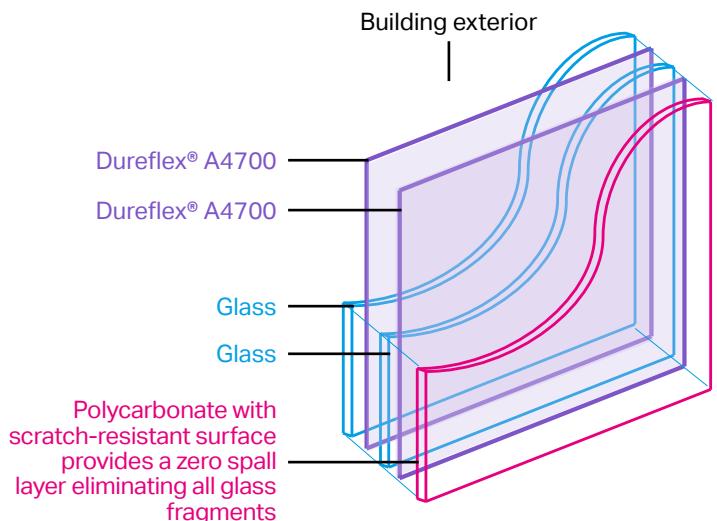
## Security glazing structures

Bullet-resistant glass is constructed with stacked layers of glass and plastic sheets with interlayers of film to bond the sheets. The stacked construction is de-aired and heated to seal all layers together and then fully bonded in an autoclave. Dureflex® A4700 can effectively bond all layers of glass, polycarbonate (PC) film/sheet or PMMA film/sheet. The level of protection can be tuned by the number, type and thickness of the layers. A final layer of PC film/sheet may be placed on the safe side, or inside, to protect occupants against spalling, i.e. ejected shards of glass, in the event of an impact.

## Benefits of Dureflex® A4700 TPU film

- Excellent bondability to glass, acrylic and polycarbonate
- Elasticity for bridging CTE of differing materials
- Absence of plasticizers
- Excellent energy dispersive characteristics
- Excellent UV resistance and fatigue strength
- Highly durable
- Low haze and good optical clarity after processing

## Bullet-resistant, zero spall and glazing



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<sup>1</sup>Please see the "Guidance on Use of Covestro Products in a Medical Application" document.

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