



Liquid Optically Clear Adhesives A new Revolution in Glass Lamination



H.B. Fuller



KÖMMERLING



A new Revolution in Glass Lamination

The H.B. Fuller | KÖMMERLING range of Liquid Optical Clear Adhesives (LOCA) for liquid lamination products are perfectly designed for the stress free manufacture of versatile, high quality value added laminated glass constructions using passive manufacturing processes with green credentials.

Low viscosity, UV stabilised materials with great optical qualities and high performing bonds provide a solid platform for the development and production of engineered laminated glass solutions in the following building products, automotive and marine applications:

- Structural
- Attack Resistance
- Comfort and Well Being
- Embedding Functional Components

Becoming a LOCA liquid composite partner with H.B. Fuller | KÖMMERLING means investing in the future together. A philosophy assured by our reputation for technical excellence in the supply and development of market leading products and unrivalled process and product technical support.

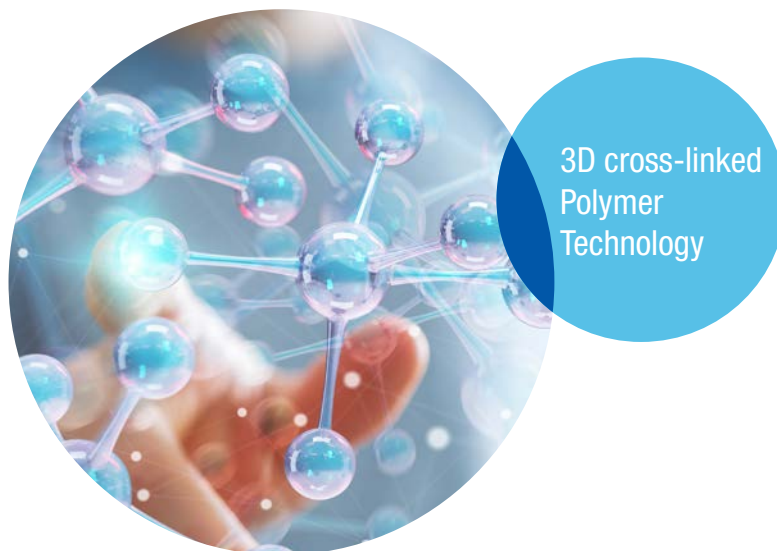
SOLUTIONS FOR HIGH PERFORMANCE LAMINATED GLASS

Expansive modern design constantly presents new challenges for glass based materials in both construction and automotive applications. Challenges often met with progressive adhesive polymer technology bonding differing types, thickness and shapes of substrate materials.

Glass technology must deliver ever improving levels of well being, security, safety and structural integrity. From sound reduction to attack resistance made possible with complex substrate combinations and sophisticated laminating technology.

The H.B. Fuller | KÖMMERLING range of highly developed, tried and tested lamination materials are recognised as market leaders for successfully laminating glass to many differing substrate types. Passive lamination with liquids offers an enhanced scope of substrate materials that can be laminated together thus providing the perfect platform for encapsulation and embedment technologies that bring function between glass.

As climatic conditions throughout the world change and temperatures become less predictable, engineers have recognised the value of three dimensional cross-linked materials with chemical type adhesion and predictable load behaviour over time and temperature.



Passive laminating using our catalytic or UV curing thermoset interlayers offers a host of production and performance benefits over conventional thermoplastic type materials and processes.

Material behaviours with

- + lower temperature dependency in service.
- + defined layered performance benefits through creep, shear and relaxation.
- + relatively high softening temperatures.
- + chemical type adhesion offering high levels of post fracture performance.
- + naturally hydrophobic behaviour without residual moisture content.
- + optical quality materials with constant colour rendition and haze values.

Processes that are intrinsically passive

- + use flowing materials completely filling the natural shape of the envelope.
- + low cost passive curing at normal room temperature without vacuum pressures.
- + offering ultra-low “post cure” rejection rates.
- + low material wastage when using liquids rather than cutting from pre-formed sheets.
- + are intrinsically Green.

At H.B. Fuller | KÖMMERLING we fully recognise the value of securing a safe future for the natural world. We have worked tirelessly to promote the green credentials of our passive liquid lamination products using low levels of power to create durable and sustainable bonds.



“H.B. FULLER | KÖMMERLING NOT ONLY SUPPLY MARKET LEADING PRODUCTS BUT ENSURE THAT SERVICE REMAINS A CORE VALUE HELPING US DELIVER TECHNICALLY COMPLEX LAMINATED GLASS TO PRESTIGE CLIENTS WITH COMPLETE CONFIDENCE.”

Sunil Sharda - Managing Director My Glass Projects

STRUCTURAL

With the desire for architectural transparency in the modern era of glass design it is difficult to imagine glass not performing additional structural functions and withstanding multiple concurrent load types in differing applications and climates.

Interlayers must offer an efficient, dependable and predictable transition between the monolithic and layered condition. In a panel of laminated glass this requires detailed understanding of the individual temperature variant shear modulus behaviour of each material. This is essential for modern design to conform to a myriad of evolving international standards.

The full range of H.B. Fuller | KÖMMERLING crosslinked interlayers demonstrate predictable viscoelastic behaviour long into the future with a range of materials offering a variety of stiffness factors for different applications.

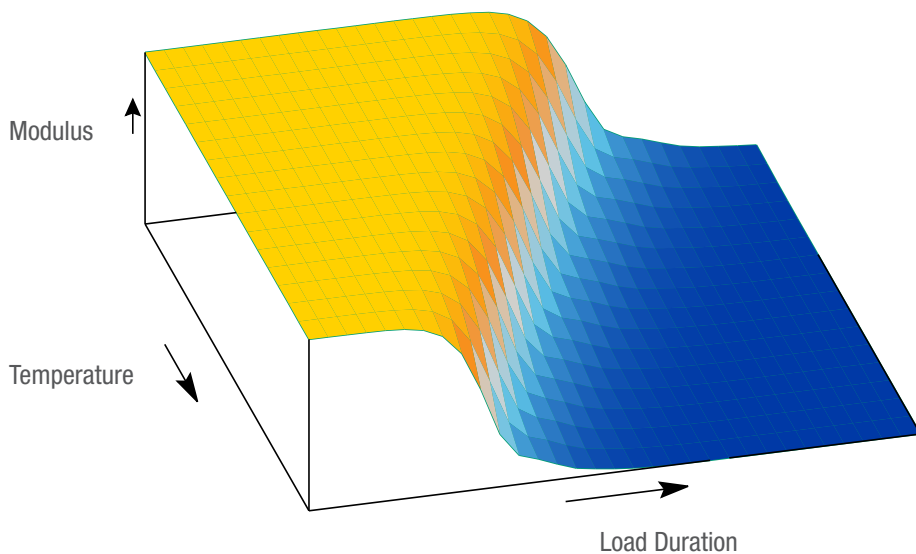
Our **Ködiguard** range of liquid laminating materials offering solutions for

Barriers	Horizontal Protection	Load Carriers
Transparent balustrading, Full height panels	Glass Canopies, Roof Systems, Floor Panels	Columns, Beams, Fins and Floors

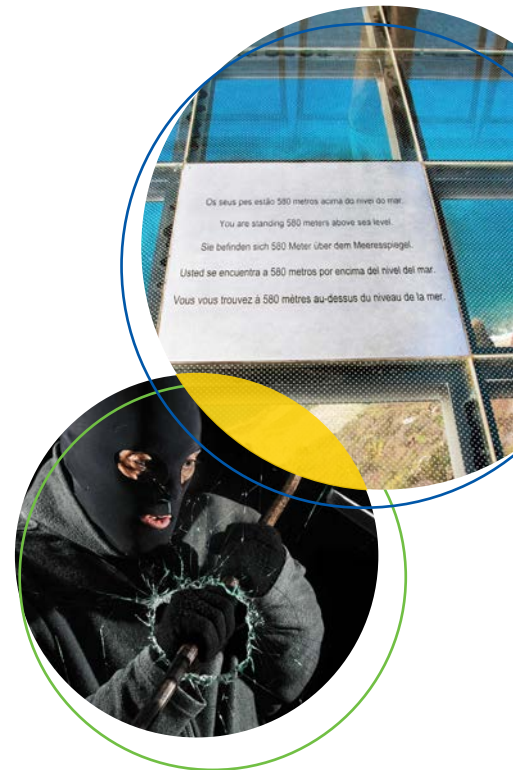
Essential in consideration of structural behaviour is post fracture performance and the vital role of chemical adhesion in ensuring that as much sharp and potentially harmful debris remains bonded to the membrane after failure.

Comprehension of material laws for polymeric interlayers enables us to offer the revolutionary cold bending performance of **Ködistruct** a liquid polymer with stiffness characteristics that restrains formerly flat substrates into 2.5D and 3D shapes providing high quality laminated bends without the visual distortions normally associated with pre-heated curved glass.

H.B. Fuller | KÖMMERLING LOCA Material Law



Modulus depending on time and temperature



For engineering design our material laws, based on the physical properties of the laminated core, are available for all of our standard products. This allows the deformation of laminated glasses manufactured using our LOCA interlayers to be calculated dependant on time, temperature, load and load duration variables.

ATTACK RESISTANCE

Complex laminated and insulated glass constructions now allow designers and engineers to balance the demands for enhancing well-being within buildings and vehicles whilst ensuring occupants are secure and comfortable. H.B. Fuller | KÖMMERLING interlayers have long been the first choice when designing and producing either glass to glass or market leading light weight glass and polycarbonate constructions.

Unfortunately throughout the world shielding life from ballistic or hard body instrument attacks or protecting property from sustained attack has become a regular consideration in modern vehicle and building design. H.B. Fuller | KÖMMERLING LOCA products with optical quality transparency, high performance surface adhesion and specially designed mechanical properties allow the creation of combinations that foil the most determined of attacks. **Ködiguard PC** is recognised as the market leading interlayer for producers determined to achieve high quality glass and polycarbonate composites first time every time.

It is also essential that clear attack resistant panels not only prevent unwanted entry but also eliminate or reduce dangerous fragments tearing from the back of a panel and causing injury all possible with the exceptional adhesion properties of the **Ködiguard** range of products.

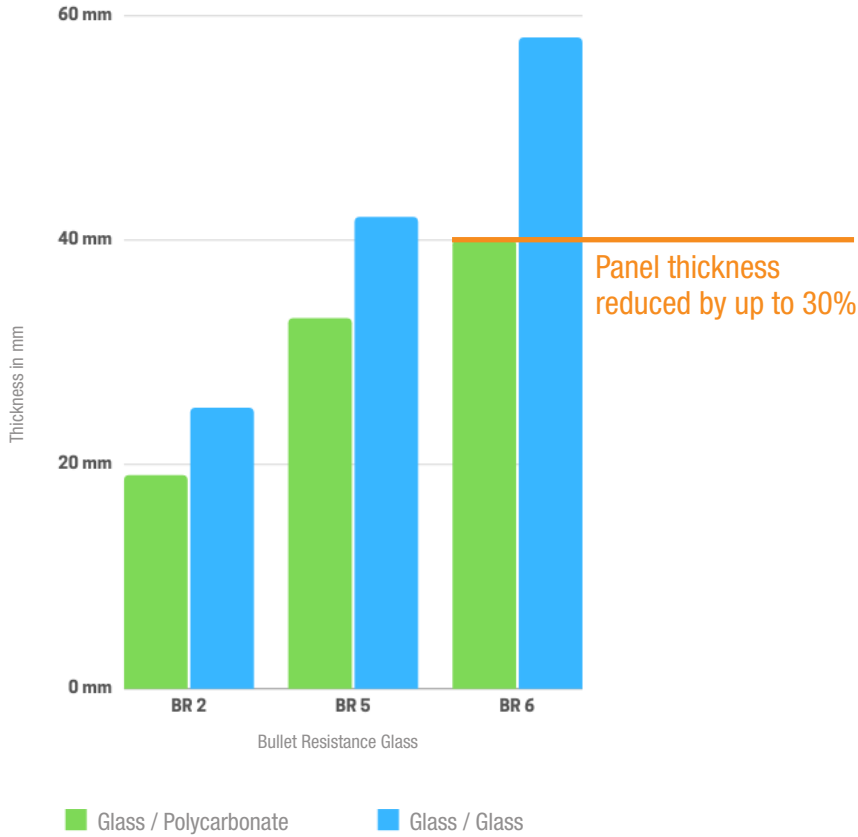
“OUR LONG TERM COLLABORATIVE PARTNERSHIP WITH H.B. FULLER | KÖMMERLING HAS ADDED SIGNIFICANT VALUE TO OUR PRODUCT OFFERING AND PROCESS DEVELOPMENT.”

Jim Erskine - Managing Director Hamilton Erskine



FACTS & FIGURES - YOUR BENEFITS

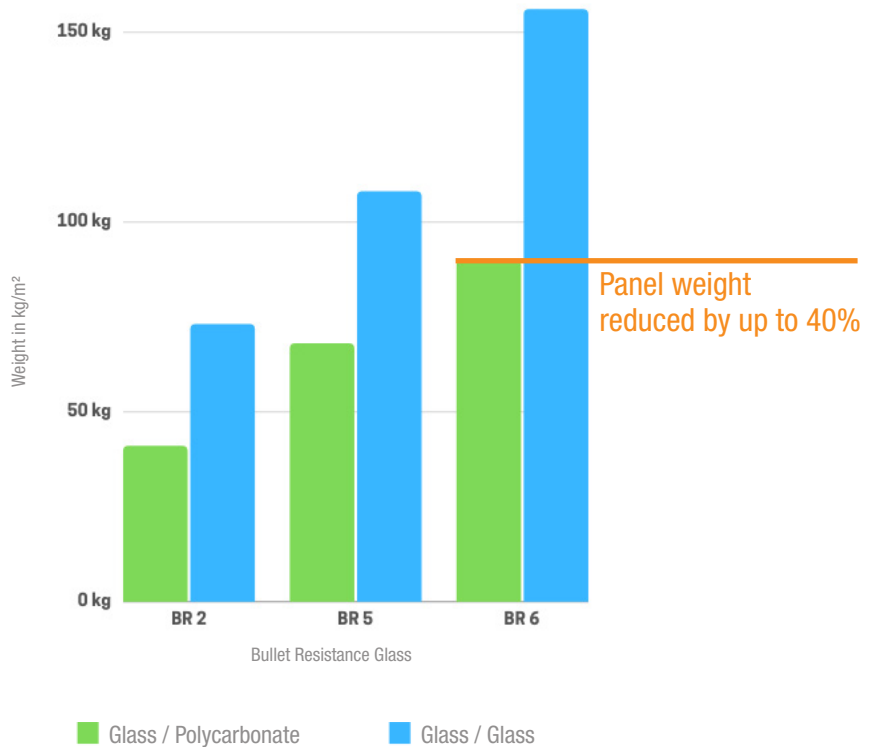
Comparison Unit Thickness



- + REDUCED THICKNESS**
- + LIGHTWEIGHT CONSTRUCTION**
- + CRYSTAL CLEAR**
- + STRONG AND DURABLE**



Comparison Unit Weight



PROVIDING WELL BEING

Transparent fenestration has long been central to enhancing the well being experience in building and vehicle envelopes a philosophy deep seated at H.B. Fuller | KÖMMERLING and firmly meshed with our commitment to find solutions that add value and improve the experience of well-being.

The market has recognised the vital role that our liquid composite range plays. From injury protection, energy reduction, sound absorption to the filtering of harmful or unpleasant light sources such as glare and UV. Well being in every environment is paramount also in designing the H.B. Fuller | KÖMMERLING range of LOCA products we are ever mindful of the need to combine well being whilst protecting human life and property.

Uniquely designed **Ködiphone** sound absorbing interlayers help to dissipate sound pressure energy, de-coupling connected surfaces and offering dramatic reductions in acoustic transmission. As the sizes of glazed areas increase and the demands for a quieter living or working environment intensifies then the greater the reliance on high performing acoustic laminated glass.



CONSERVATION

H.B. Fuller | KÖMMERLING's **Ködiguard Conservation** is a neutral colour highly effective interlayer designed to remove ultra violet light that is harmful to both organic materials and potentially ease sensitive skin conditions. Conversely our ultra-high strength **Ködistruct** material also offers high levels of UV transmission essential in some industrial and botanic applications. Our LOCA laminated glass products are often used in combination with our market leading **Ködispace 4SG**, a thermoplastic warm edge system, adding the ultimate in thermal insulation performances.



EMBEDDING FUNCTIONAL COMPONENTS

The embedment and encapsulation of functional or decorative components between glass substrates are key in the development of multi-functional fenestration products both in building product, automotive and marine applications.

H.B. Fuller | KÖMMERLING's market leading understanding of material behaviour is central to the use of our LOCA laminated solutions for embedment. From the encapsulation of delicate electronic systems providing full scale media façades to laminated glass harnessing energy or protecting dynamic components essential to improve well being. Our **Ködilan** LOCA technology is at the core of the transformation into construction or automotive compliant laminated materials.

The flexibility of LOCA wet chemistry with its passive curing profile greatly increases the scope of materials that can be successfully bonded together. Allowing the formation of beautiful creations with glass, natural stones, glass fibres, and fabrics or alternatively the ultimate flexibility of precisely printed images on glass carefully protected with encapsulation using **Ködilan**.

“UNDERSTANDING THE COMPLEX AND DIVERSE NEEDS OF OUR GLOBAL MEDIA GLASS MARKET HAS BEEN KEY TO OUR SUCCESSFUL PARTNERSHIP WITH H.B. FULLER | KÖMMERLING.”

Sanmukh Bawa - Technical Director G-Smatt Europe



ENVIRONMENTAL CONSIDERATIONS

Our LOCA green revolution for lamination reinforces the long standing commitment at H.B. Fuller | KÖMMERLING to improve the environmental benefits from our products whilst reducing their environmental consequences. We focus on four key sustainability metrics: energy intensity, greenhouse gas emissions intensity, waste intensity and water withdrawal.

- + LOCA offers extremely low power production processes
- + The LOCA process reduces material wastage and disposal
- + H.B. Fuller is fully committed to the Sustainable Development Goals of the United Nations
- + Optimised internal processes with a clear focus on our environmental responsibilities
- + Accreditation to ISO 9001, ISO 14001, ISO 45001 and ISO 50001

TECHNICAL ADVANTAGES

The H.B. Fuller | KÖMMERLING LOCA range benefits from the superior shear, creep and relaxation behaviour of fully cross linked polymer chemistry, through a wide range of service temperatures, load cases and durations.

Our LOCA liquid lamination products form optically clear and well balanced interlayers for the lamination of a wide range of substrates with free-flowing behavior that is particularly valuable for materials of differing thickness or uneven surface flatness.

- + Completely transparent and crystal clear
- + Passive processing at low temperature and low mechanical pressure
- + Excellent chemical type adhesion properties
- + Reliable mechanical performance over a broad temperature range
- + Outstanding durability and stability
- + Extensive range of applications
- + Full range of interlayer characteristics made possible with flexible polymer chemistry
- + Compatibility with H B Fuller | KÖMMERLING façade sealants and adhesives

TECHNICAL AND ENGINEERING SERVICE

The demands placed on the mechanical performance and life cycle properties of our laminating materials require a dedicated team delivering a diverse and comprehensive technical service to our partners across all of our application ranges.

At H.B. Fuller | KÖMMERLING our passion for customer partnerships is best demonstrated by our commitment to technical support for both products and application process assistance utilising our extensive, long term understanding of material behaviour and properties added to first class facilities at our research and development centres. Our support does not stop there, we are renowned for the part we play in improving and perfecting process and application technology on-site with our partners.

We understand the importance of stress testing to establish life cycles in differing heat and UV cases and mechanical testing to measure material behaviours and assimilate performances. From analysing and improving the performance of existing materials, developing materials for new applications or delivering world class training H.B. Fuller | KÖMMERLING is recognised as a market leader.

Our Service Portfolio

- ✚ Material stress tests
- ✚ Life cycle testing
- ✚ Modulus analysis
- ✚ Market leading laboratory facilities
- ✚ On-site process assistance
- ✚ In-house training



LOCA TECHNOLOGY CENTER

Product and process improvement go hand in hand. Development at the LOCA Technology Center sited with our collaborative partner TTEC GmbH has provided a hugely important platform. This unique partnership offers a wide range of solutions using innovative application technology with LOCA wet chemistry developed for architectural, automotive and industrial purposes.

We understand that sharing technology shares benefit.

“WITH THIS COOPERATION WE DO NOT ONLY WANT TO MEET FUTURE STANDARDS IN THE KEY AUTOMOTIVE AND ARCHITECTURAL SECTORS. WE INTEND TO DRIVE THEM.”

Bernd Therre - Founder and Managing Director TTEC GmbH

