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Film Solutions That Provide Future Security Already Today

Makrofol® ID Platilon® ID



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Covestro – leading in material solutions

As the world's leading manufacturer of aliphatic and aromatic polyisocyanates, Covestro offers an extensive range of innovative products and solutions for the coatings and adhesives industries. As your customers become more demanding in their expectations for the quality, durability, workability and sustainability of your products, we can help you to turn these challenges into a competitive advantage. That is what drives us to push the boundaries of what is possible.

The key to creating added value for you, our customers, as well as for society and the environment is innovation. At Covestro, we innovate not only to address the key global challenges of population growth, urbanization, climate change, digitization and increasing mobility; we innovate to have a sustainable business that enables us to live up to our business purpose of "making the world a bright place". In the final analysis, this comes down to developing sustainable solutions that take the entire life cycle of a product into account. We are



increasing our on-site efficiency, e.g., by recycling salt and water in our production plants. We are expanding our resource base, e.g., by turning CO₂ into a raw material in the manufacturing of plastics. And we are developing materials that are more energy-efficient and save natural resources.

In our Coatings, Adhesives, Specialties (CAS) segment we systematically develop and supply aliphatic and aromatic isocyanates and their derivatives as well as polyurethane dispersions. Our raw materials are used for coatings, adhesives, sealants and specialty products, such as elastomers, high-quality films for automotive and ID security, 3D printing products, cosmetics, textiles, and medical products. The main application areas

are in the automotive, transportation, infrastructure, construction, wood processing and furniture industries. In this segment our innovative efforts are focusing on enhancing efficiency, improving quality, boosting sustainability and environmental aspects such as reducing solvent content.

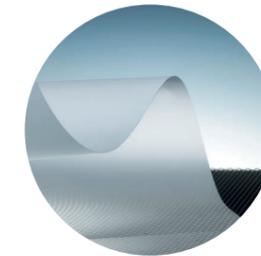
We are proud of over 80 years of groundbreaking innovations. But we are not defined by our past. Even with decades of experience behind us, Covestro remains a young enterprise. In a corporate world that can often be dull and uninspiring, we want to act in a curious, courageous, and colorful way: trying out new things, questioning established ways, and pushing boundaries – for your benefit.



We deliver the ultimate feature in security: **trust**

The best value in security is a renowned identity. And this we certainly have. The security market knows us as the inventor of films. As one of the global market leaders in security films. As a trusted partner for tailored film solutions for all kinds of ID documents. In short, as Covestro.

Because that's who we were. And whose exceptional know-how and expertise we still own. As Covestro, we now add even more value to our offers for you: film solutions that provide future security already today.



Makrofol® ID
For unsurpassed protection
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Platilon® ID
For sophisticated ID card design
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Makrofol® ID
Platilon® ID

Unsurpassed protection against copying and forgery

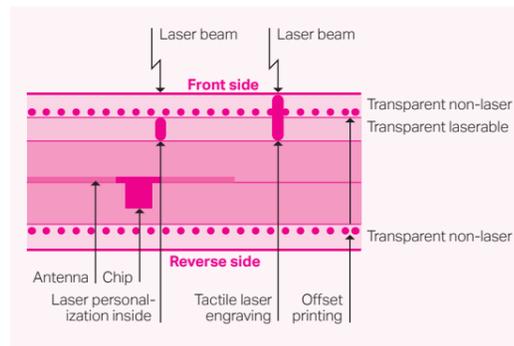
If security is an issue, Makrofol® ID is the choice. The films provide documents with outstanding properties with regard to copying and forgery – two of today's major challenges for card manufacturers and issuers.

Makrofol® ID films have been used for national identity cards, passports, and driver's licenses for many years. Forgery prevention is a big issue with these documents, and this is where the benefits of Makrofol® ID come into play.

Integrity of fused film layers

The major advantage of Makrofol® ID: Several layers of film can be optimally laminated together. Once laminated at high temperature and pressure, Makrofol® ID layers are inseparably bonded without requiring an adhesive. It is no longer possible to gain access to the inside of the card without causing damage. This means that cards made of 100% Makrofol® ID offer unsurpassed protection against copying and forgery – not to mention an almost unlimited service life.

Suitability of laser engraving



Structure of a Makrofol® ID card

Tailored security solutions

Makrofol® ID films are manufactured to extremely tight tolerances to satisfy even the most exacting requirements.

Our application-specific know-how, together with laboratory and technical center support, enables us to develop specific problem solutions in collaboration with our customers.



A material with striking benefits

- Approved durability
- High stiffness
- Excellent bending resistance
- Wide service temperature range
- Forgery resistance
- Least shrinkage during lamination
- Excellent clarity of the transparent grades (light transmission)
- High-contrast laser engraving
- High scratch-resistance



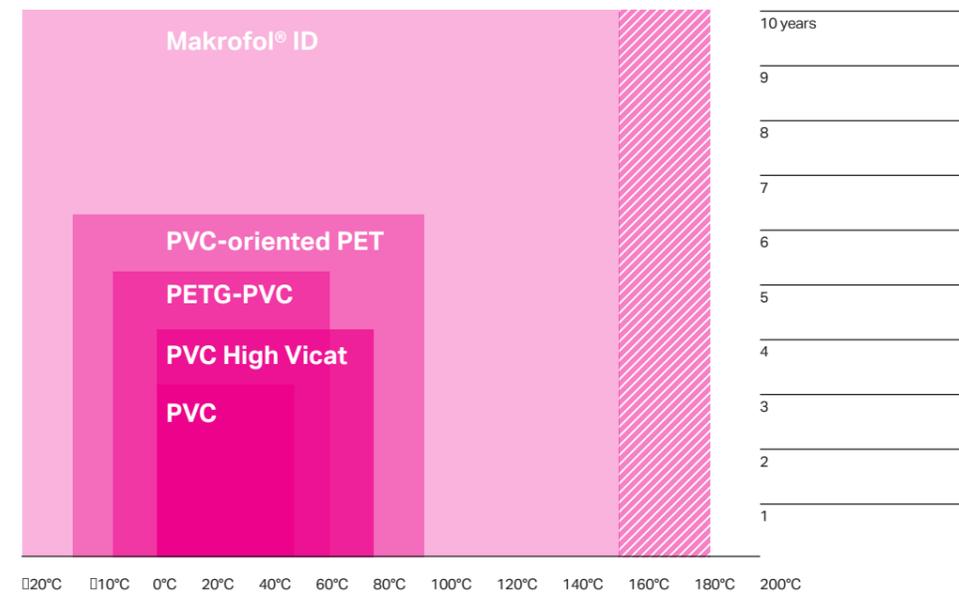
At the core of security

Makrofol® ID is manufactured as a white core film, as a transparent film, and as a transparent, laser-optimized overlay film in standard thicknesses from 30 to 300 µm.

White core films are available in opaque and translucent colors. Coextruded films are made up of two different grades of Makrofol® ID. The film typically has a total thickness between 100 and 300 µm.

Makrofol® ID films can be supplied in rolls or as sheets from 30 µm upwards, and are available with a variety of surface textures.

Service life and service temperature range of various card films



We are happy to provide other film thicknesses upon request.

Grade of film	Surface texture*	Color	Thickness						
			30 µm	50 µm	100 µm	150 µm	200 µm	250 µm	300 µm
Core films									
Makrofol® ID	4-4	White	•	•	•	•	•	•	•
Makrofol® ID	6-4	White			•	•		•	
Overlay films									
Makrofol® ID	6-2	Transparent non-laser	•	•	•	•			•
Makrofol® ID	6-2	Transparent laser	•	•	•	•			
Duplex films									
Makrofol® ID 234	6-4	White/laser				•	•	•	•
Makrofol® ID 236	6-2	Transparent/laser				•	•		

* Surface texture: 2 = very fine matte, 4 = fine matte, 6 = fine velet.

Sophisticated ID card design and production

When the going gets rough, there's one that stays tough: Platilon® ID. Its excellent adhesion, melt flow, flexibility, and unbeatable durability in the harshest conditions make these films our strong recommendation for sophisticated ID card design and production.



For a long life

Platilon® ID is an ideal material for a passport hinge. It has good bonding properties and stays flexible over the whole lifetime of the passport. Incorporated into a hinge, it offers excellent durability over bending cycles and has superior tear resistance. Additionally, the hinge can be securely sewed into the passport or any other identity booklet.



Intelligence inside

While electronic chips and modules are becoming smaller, more and more functions need to be integrated. This makes today's integration of electronics into security documents a highly demanding challenge. Not for Platilon® ID however. Its melt behavior is ideally suited to protect delicate electronic structures and thus support higher yields. Additionally, the soft texture of the film reduces the required pressure applied to the components and their contacts to the antenna.

For a hard life

Platilon® ID is perfect for brand protection securitized labels – as a non-elastic core for an official seal, a printed patch overlay, or a bonding adhesive between different materials. It also makes an excellent tielayer between a substrate and the adhesive.

For a stressful life

Platilon® ID has excellent flexibility that allows stress between dissimilar materials to be absorbed.

Hard facts about a tough material

- Excellent adhesion
- High elasticity
- UV stability
- Tamper-evident hot melts
- Tailored melting behavior
- Slow change in viscosity
- High temperature stability (specific grades)

All types of films for all types of applications

Platilon® ID grade	Thickness (µm)	Application
Platilon® ID 5021 (TPU ether)	25–500 µm	Passport hinge Embedding of electronics
Platilon® ID 5051 (TPU ether)	35–140 g/m ²	Adhesive or compensation layer for: cards and passports
Latent reactive adhesive (PU cross-linked)	25, 50 and ~100 g/m ²	Adhesive for: cards and passports
Platilon® ID 9144 (TPU multilayer)	150, 250 µm	Passport hinge Available in transparent & white, other thicknesses on demand

Platilon® ID products are ideally suited to be used with Makrofol® ID.

Platilon® ID is offered in natural and customized colors.

Secure the best performance

The best material can only unfold its exceptional performance if it is processed in the best ways possible. For our high-performance films, these include:

Printing

Makrofol® ID offers excellent security printing results in wet or waterless offset printing processes, with UV-curing, or IR-curing inks. The film also can be printed with optical variable inks or metallic inks using screen printing processes. Digital printing and personalization on Makrofol® ID works without problems using the following techniques:

- Inkjet, solvent-based and UV-curing inks
- Direct or transfer printing (special Makrofol® ID grades)
- Toner printing (special Makrofol® ID grades)
- Special grades of Platilon® ID are printable by screen printing and also digitally printable by inkjet printing.

Embossing

Engraved or embossed security features from lamination plates can be perfectly transferred onto documents made of Makrofol® ID, maintaining the flatness of the documents, as well as the dimensional stability and durability of the security features.

Lamination

Several layers of Makrofol® ID are inseparably bonded when laminated at high temperature (180–190°C) and pressure (up to 400 N/cm²). This means it is no longer possible to access the inside of the document without damaging it. No special measures have to be taken during lamination to prevent irregular shrinkage of Makrofol® ID or to prevent laminates adhering to the lamination plates. Once the lamination process is complete, separating the films from the lamination plates is easy. The result is a shorter cycle time on the laminating press and reduction of waste.

Makrofol® ID can also be combined with Platilon® ID and laminated under the same conditions as documents made purely from Makrofol® ID. Special grades of Platilon® ID do not require measures to be taken during lamination for preventing laminates adhering to the lamination plates.

Die cutting

Makrofol® ID permits clean die cutting with sharp edges. It can be cut with full section tools. Material combinations of Platilon® ID and Makrofol® ID can also be punched without problems by using full section tools.

Chip implanting

Contactless chips combined with printed antennas or laid copper wire antennas can be laminated inside documents made of Makrofol® ID. Chips with contacts can be embedded without problems in cards made of Makrofol® ID by using transfer or reaction adhesives. The use of flexible adhesives is recommended to better withstand bending loads. Combinations of Makrofol® ID with Platilon® ID are particularly suited for encapsulation of electronic components into documents. The hard shell built of Makrofol® ID and the soft core built of Platilon® ID offer excellent protection of high-tech documents, providing unbeatable flexibility and durability.

Personalization

Documents made of Makrofol® ID can be personalized with high resolution pictures via laser engraving technology. Manufacturers can achieve any gray tone they require by using laser optimized Makrofol® ID films in the document construction. Choosing the appropriate intensity and focus of the laser beam enables documents to be personalized either as a relief structure on the surface of the document or inside the document without modifying the surface.

Providing tomorrow's security already today

We have been developing special polymer films and innovative solutions for the card and security market for quite some time already. And we've always been ahead of the times – as this is one, if not the most important, need for security solutions everywhere and for every purpose. You have to be one up on those who intend to copy, forge, and defraud.

The card and security market is a very specialized, high-tech industry with diverse needs throughout the world. We are thus globally present with our films team, close to our customers, and take care of market requirements in the various regions. The team is supported by a global network of technical competence centers.

We work closely with many partners in the global ID cards business and strive to meet the demands made on future documents already today.

No matter what your specific needs are today or will be tomorrow: We will identify them – and deliver a perfectly tailored solution.



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