Kuraray — Here to Innovate.

Adding value to your products - worldwide

KURARAY POVAL™, EXCEVAL™, ELVANOL™ and MOWIFLEX™ are the trademarks for polyvinyl alcohols made by Kuraray. Their key characteristics — high binding strength — add real value to your products. Our polymers are water-soluble, highly reactive, crosslinkable and foamable. They have high pigment binding capacity, protective colloid characteristics and thickening effects. The physical and chemical properties of KURARAY POVAL™ make it ideal for a wide variety of applications, ranging from adhesives through paper and ceramics to packaging.

KURARAY POVAL™ is biodegradable and the fact that continuation does not generate residue. It is available in various particle sizes — from granules to powders.

Kuraray produces its wide range of KURARAY POVAL™ grades in Japan, Singapore, Germany and the USA. Kuraray's global production and service network make us your partner of choice for innovative high-quality PVOH resins.

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Kuraray POVAL™: EXCEVAL™, DIAMOND™ and MOWIFLEX™ are the trademarks for polyvinyl alcohol produced by Kuraray. Their key characteristics — outstanding film-forming properties and high binding strengths — add real value to your products. Our polymers are water-soluble, highly reactive, crosslinkable and foamable. They have high pigment binding capacity, protective colloid characteristics and thickening effects. The physical and chemical properties of KURARAY POVAL™ make it ideal for a wide variety of applications, ranging from adhesives through paper and ceramics to packaging.

KURARAY — Here to Innovate.
EXCEVAL™ – the solution for barrier requirements

EXCEVAL™ is the trademark of Kuraray’s chlorinated barrier resins, exclusively designed for the requirements of the barrier coating industry. The new Ethylene-based copolymer is water-soluble like standard polyvinyl alcohol. However, coatings made of EXCEVAL™ absorb significantly less humidity at average temperature conditions. Therefore, EXCEVAL™ provides coatings with excellent gas barriers, e.g. towards oxygen, nitrogen and carbon dioxide – even at elevated relative humidity. Furthermore, the resulting coatings are highly transparent and glossy, have a strong chemical resistance, and provide good adhesion to metal as well as excellent printability.

EXCEVAL™ enables a barrier of less than 1 cm³·m⁻²·day⁻¹·atm⁻¹ (very high oxygen barrier layer). In such a barrier, the resulting coatings are highly transparent at elevated relative humidity. Furthermore, reducing the viscosity of the EXCEVAL™ solution contributes to a reduction of the foam formation on the gravure rolls. Therefore, reducing the viscosity of the EXCEVAL™ solution may gel. Storage of the coated film at elevated temperatures (50°C for several days) will allow the improvement of the gas-barrier level.

EXCEVAL™ – Performance that is simply convincing

Oxygen Transmission Rate of EXCEVAL™ compared to standard barrier coating materials at 20 °C, 0% relative humidity (%), and 0% concentration (v).

EXCEVAL™ comes outstanding performance as gas barrier layer – even after 20 torsions of the film.

How to dissolve EXCEVAL™?

EXCEVAL™ should be dispersed in cold water and then heated up to 95 °C slow temperature and kept there for 2 hours. The solution should be cooled down slowly.

Storage of EXCEVAL™ solutions!

Upon storage at low temperature as EXCEVAL™ solution may get. Storage at elevated temperature as well as addition of isopropanol (IPA) will reduce the gelation tendency.

How can I increase the coat weight?

Increasing the coating rate will reduce the viscosity. Depending on the coating conditions the total solid content can be increased by increasing the solid content. The drying time can be reduced.

What total solid content can I prepare?

Typically a 30-15% solution should be made.

How much material is required to achieve a high gas barrier level?

A dry weight of 1-2µm is enough to achieve a high gas barrier level performance less than 1 cm³·m⁻²·day⁻¹·atm⁻¹.

How do I improve the barrier properties?

Crosslinking is the driving force behind the barrier performance of EXCEVAL™. Any temperature treatment will improve the barrier performance. Storage of the coated film at elevated temperatures (50°C for several days) will allow the improvement of the gas-barrier level.

How to improve the water resistance?

Crosslinking will improve the water resistance. However, the crosslinking rate will reduce the barrier performance. A metal binding complex is preferred in order to combine good water resistance while maintaining the excellent barrier level.

Can I print on EXCEVAL™?

Yes, it has a very good affinity to metalizing inks.

Does torsion affect barrier performance?

To assess the flexibility of the multilayer film, the barrier properties are measured before and after mechanical torsion (Gelbo-Flex test). Even after 20 torsions EXCEVAL™ barriers demonstrate outstanding performance.

EXCEVAL™ – Frequently asked questions

How can I prepare a film?

No specific temperature is needed. EXCEVAL™ solutions are forming a film upon drying. In contrast, PVDC needs elevated temperatures to enable particles coalescing to form a film.

At what temperature do I need to dry?

No specific temperature is needed as EXCEVAL™ solutions are forming a film upon drying. In contrast, PVDC needs elevated temperatures to enable particles coalescing to form a film.
EXCEVAL™ - the solution for barrier requirements

EXCEVAL™ is the trademark of Kuraray's chlorine-free barrier resin, especially designed for the requirements of the barrier coating industry. The new Ethylene-Modified copolymer is water-soluble like standard polyvinyl alcohol. However, coatings made of EXCEVAL™ absorb significantly less humidity at average temperature conditions.

Therefore, EXCEVAL™ provides coatings with excellent gas barriers, e.g. towards oxygen, nitrogen and carbon dioxide - even eliminated relative humidity. Furthermore, the resulting coatings are highly transparent and glossy, have a strong chemical resistance, and provide good adhesion to metal as well as excellent printability.

EXCEVAL™ enables a barrier of less than 0.01 cm³·m⁻²·day⁻¹ atm⁻¹ (dry weight), even at high degrees of relative humidity. EXCEVAL™ can be applied as a solvent-free, chlorine-free and environmental-friendly functional coating on numerous substrates and provides superior barrier levels compared to traditional coatings.

Because of the need to control gas and water vapour permeation simultaneously whilst providing mechanical performance, the structure of a packaging film will consist of several layers, each of them contributing to one or several properties of the film construction. A base layer that may be constituted of polyethylene materials, has low water vapour permeation and also providing some mechanical resistance will be combined with an EXCEVAL™ oxygen barrier layer. In such a structure there are also further layers that provide specific functionalities like primers, adhesives, inks, etc.

EXCEVAL™ – the solution for barrier requirements at average temperature conditions.

Applications devised for your product

Oxygen Transmission Rate of EXCEVAL™ compared to standard barrier coating materials at 20 °C, 35% relative humidity (RH).

EXCEVAL™ is the trademark of Kuraray’s Ethylene-Modified chlorine-free barrier resin, especially designed for the requirements of the barrier coating industry.

How can I increase the coat weight?

Increasing the coating weight will reduce the viscosity. Depending on the coating temperature the total radiant content can be increased. By increasing the solid content the drying time can be reduced.

How much material is required to achieve a high gas barrier level?

A dry weight of 1-2 µm of EXCEVAL™ is sufficient to achieve a high gas barrier level performance less than 0.01 cm³·m⁻²·day⁻¹ atm⁻¹.

How do I improve the barrier properties?

Crosslinking is the driving force behind the barrier performance of EXCEVAL™. Any temperature treatment will improve the barrier performance. Storage of the coated film at elevated temperatures (50 °C for several days) will allow the improvement of the gas barrier level.

How to improve the water resistance?

Crosslinking will improve the water resistance. However, the crosslinking rate will reduce the barrier performance. A metal binding complex is preferred in order to combine good water resistance while maintaining the excellent barrier performance.

Can I print on EXCEVAL™?

Yes, it has a very good affinity towards printing inks.

Does torsion affect barrier performance?

To assess the suitability of the pass-through film, the barrier properties are evaluated before and after mechanical torsion (Gelbo-Flex test). Even after 20 torsions EXCEVAL™ barriers demonstrate outstanding performance.

Oxygen Transmission Rate of EXCEVAL™ compared to standard barrier coating materials at 20 °C, 35% relative humidity (RH).

What total solid content can I prepare?

Typically a 10-15% solution of isopropanol (IPA) will reduce the gelling tendency.

Upon storage at low temperature an initial concentration (%)

How to dissolve EXCEVAL™?

EXCEVAL™ should be dissolved in cold water and then be heated to 95 °C to achieve the gel formation and then kept there for 2 hours. The solution should be cooled down slowly.

Storage of EXCEVAL™ solutions!

Upon storage at low temperature as EXCEVAL™ solutions may gel. Storage at elevated temperature as well as addition of isopropanol into the EXCEVAL™ solution will reduce the gelling tendency.

How can I prepare EXCEVAL™ solutions?

Increasing the solid content will reduce the foam formation in the coating. A base layer containing 10% isopropanol will reduce the foam formation.

What are the properties of a packaging film?

The Oxygen Transmission Rate of a PE film coated with EXCEVAL™ and metallised is analysed at 23 °C, 65 % RH, in 100 % Oxygen atmosphere.

Oxygen Transmission Rate of a PE film coated with EXCEVAL™ and metallised is analysed at 23 °C, 65 % RH, in 100 % Oxygen atmosphere.

- Frequently asked questions
EXCEVAL™ - the solution for barrier requirements

EXCEVAL™ is the trademark of Kuraray's chlorine-free barrier resins, especially designed for the requirements of the barrier coating industry. The new Ethylene-Modified copolymer is water-soluble like standard polyvinyl alcohol. However, coatings made of EXCEVAL™ absorb significantly less humidity at average temperature conditions.

Therefore, EXCEVAL™ provides coatings with excellent gas barriers, e.g. towards oxygen, nitrogen and carbon dioxide - even at elevated relative humidity. Furthermore, the resulting coatings are highly transparent and glossy, have a strong chemical resistance, and provide good adhesion to metal as well as excellent printable properties.

EXCEVAL™ enables a barrier of less than 1 cm³·m⁻²·day⁻¹·atm⁻¹ even at high degrees of relative humidity. EXCEVAL™ can be applied as a solvent-free, chloride-free and environmental-friendly coating on numerous substrates and provides superior barrier layers compared to traditional coatings.

Because of the need to control gas and water vapour permeation simultaneously while providing mechanical performance, the structure of a packaging film will consist of several layers, each of them contributing to one or several properties of the film construction. A base layer that may be constituted of polyolefin materials, has low water vapour permeation and also providing some mechanical resistance will be combined with an EXCEVAL™ oxygen barrier layer. In such a structure there are also further layers that provide specific functionalities like primers, adhesives, inks, etc.

EXCEVAL™ - Performance that is simply convincing

The Oxygen Transmission Rate of a 25 µm film coated with EXCEVAL™ and metalized is analyzed at 23 °C, 65 % RH, in 100 % Oxygen atmosphere. The Oxygen Transmission Rate of EXCEVAL™ compared to standard barrier coating materials at 20 °C, can vary 30-1000 cm³·m⁻²·day⁻¹·atm⁻¹.

Oxygen Transmission Rate of EXCEVAL™ compared to standard barrier coating materials at 20 °C, can vary 30-1000 cm³·m⁻²·day⁻¹·atm⁻¹.

Viscosity of low-viscous EXCEVAL™ grades: Viscosity (cP/s)

<table>
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<th>Concentration (%)</th>
<th>0.01</th>
<th>0.1</th>
<th>1</th>
<th>10</th>
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<td>400</td>
<td>200</td>
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<td>20</td>
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<tr>
<td>50 °C</td>
<td>200</td>
<td>100</td>
<td>50</td>
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<td>1</td>
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</tbody>
</table>

Oxygen Transmission Rate of EXCEVAL™ compared to standard barrier coating materials at 20 °C, can vary 30-1000 cm³·m⁻²·day⁻¹·atm⁻¹.

EXCEVAL™ shows outstanding performance as gas barrier layer - even after 20 torsions of the film.

EXCEVAL™ - Frequently asked questions

How can I increase the coat weight?
Increasing the coating weight will reduce the viscosity. Depending on the coating temperature the total solid content can be increased by increasing the solid content of the coating. This drying time can be reduced.

How much material is required to achieve a high gas barrier level?
A dry weight of 1-2 µm is enough to achieve a high gas barrier level (permeation less than 1 cm³·m⁻²·day⁻¹·atm⁻¹).

How do I improve the barrier properties?
Crystallization is the driving force behind the barrier performance of EXCEVAL™. Any temperature treatment will improve the barrier performance. Storage of the coated film at elevated temperatures (50 °C for several days) will allow the improvement of the gas barrier level.

How can I print on EXCEVAL™?
Yes, it has a very good affinity towards printing inks.

How does torsion affect barrier performance?
To assess the flexibility of the passageway film, the barrier properties are measured before and after mechanical torsion (Gelbo Flex test). Even after 20 torsions EXCEVAL™ barriers demonstrate outstanding performance.

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