



including
KURARISTER™

Medical and pharmaceutical



kuraray

More function, less waste. Better protection.

EVAL™ EVOH and KURARISTER™ films help protect the integrity of medical and pharmaceutical products. Value is preserved while safely reducing product and packaging-related waste. Both products are produced using the unique barrier technologies of Kuraray Co., Ltd.

Halogen-free chemistry, and clear alternatives to Al foil

EVAL™ and KURARISTER™ provide outstanding functional gas barrier, offering an alternative to PAN, PVDC and aluminium foil.

All plastic flexible structures are resistant to flex-cracking and pinholes during processing and transport, offering reliable performance. Medical and Pharmaceutical packaging become compatible with metal detectors for improved safety and quality control. Disposal is safe and allows energy recovery, without dioxin or metal residue.

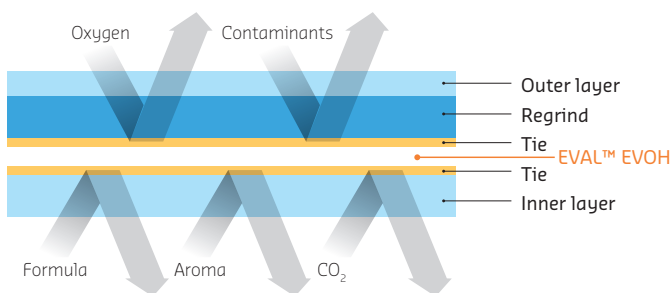
EVAL™ EVOH resins and film



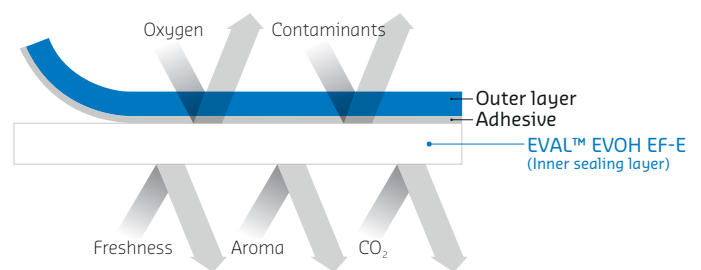
1mm of EVAL™ offers the same gas barrier protection as a 10 metre wall of LDPE.

Kuraray Co., Ltd. is the world leader in the production and development of EVOH (ethylene vinyl-alcohol copolymer) barrier plastic raw materials. It is available world wide under the trade name EVAL™, either in pellet form for multilayer processing, or as monolayer EVAL™ film for lamination.

EVAL™ is used as a barrier layer, combined with other materials to optimise both cost and performance. With 10,000 times the oxygen gas barrier properties of LDPE, very thin layers of EVAL™ are enough to bring superior gas and chemical barrier properties to the entire structure.



Typical multilayer structure with EVAL™ resin



Typical laminated barrier sealant structure with EVAL™ monolayer film

Properties of EVAL™

Optimised barrier

- High barrier against oxygen and other gases
- High barrier against chemicals and organic solvents
- High barrier against odour and other contaminants
- Preserves fat and vitamin content against oxidation

Safety in use and disposal

- Halogen-free chemistry
- BPA, stabiliser, plasticiser and anti-oxidant free
- Safe processing via conventional plastic processing technologies
- Safe incineration for energy recovery
- Recyclable in polyolefin streams

Versatility for optimal packaging design

- Transparent, an alternative to aluminium foil
- Resistant to flex-crack and pinhole formation
- Unbreakable, replacing glass
- Anti-scalping
- Resistant to heat, UV and radiation
- Excellent thermoformability
- Available as resins for coextrusion/coinjection, or as monolayer EVAL™ film for lamination

KURARISTER™, transparent high-barrier film

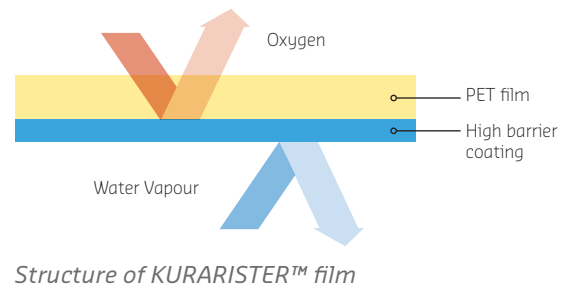
KURARISTER™

Kuraray has also developed KURARISTER™ technology - transparent high-barrier retortable films. Though not an EVAL™ EVOH product, these films for lamination use Kuraray's unique wet coating technology, and provide excellent oxygen and water vapour barrier before, during and after all standard sterilisation treatments.

KURARISTER™ is typically laminated to other films, and provides both gas and water vapour barrier to the entire packaging structure. Protection of quality and extended shelf life help reduce product waste.

Properties of KURARISTER™

- A 12µm PET film with a durable high-barrier coating
- Easily reverse printed without surface treatment for exceptional high quality graphics, or can be left transparent for product visibility.
- Resistant to flexing, elongation, crack and pin-hole formation
- Reliable barrier performance before, during and after standard sterilisation treatments.



EVAL™ and KURARISTER™ for medical and pharmaceutical applications

Examples of possible applications, replacing halogen chemistry plastics, aluminium foil, PAN and glass



EVAL™

EVAL™

EVAL™

EVAL™ and KURARISTER™

EVAL™ and KURARISTER™

Multilayer barrier structures with EVAL™ EVOH can take many forms:

- Barrier flexible film for pouch, SUP, protective overwrap, blister pack, sachet, transdermal patch packaging
- Barrier bottle for liquid nutrition, solid oral dose, oxygen sensitive liquids and injectables
- Barrier ampoules and individual doses
- Barrier dispensers of nasal spray, eye liquids
- Barrier IML (in-mould label)

Multilayer flexible barrier structures with KURARISTER™ offer high barrier with or without sterilisation:

- Barrier pouch
- Barrier SUP
- Barrier sachet
- Barrier lidding film
- Barrier overwrap
- Barrier IML (in-mould label)

www.evalevoh.com

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Nutraceuticals and infant formulas

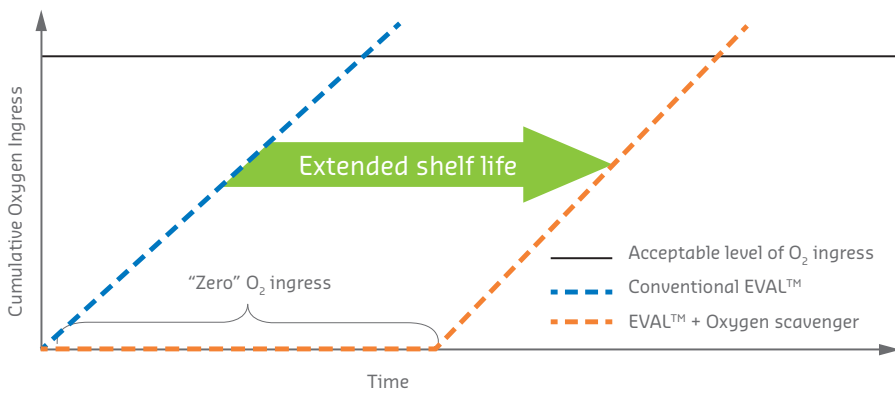
Flexible pouch, SUP, bottle, container

EVAL™ and KURARISTER™ barrier properties help extend shelf life and avoid waste. With reliable performance, shelf-stable packaging can be designed to safely limit the total amount of oxygen ingress. Quality is assured and shelf life is extended, notably by protecting fat and vitamin content against oxidation.

By simply adjusting the EVAL™ layer thickness, it is possible to design structures with extra margins of safety, notably for products stored and distributed in warm environments.



Additional safety for the most sensitive consumers



For the most oxygen-sensitive products, EVAL™ grades with oxygen scavenging capacity create a *negative* oxygen ingress. EVAL™ is already widely used world-wide to improve the safety, shelf life and process efficiency of packaging for baby food and other infant formulas.



Parenteral nutrition

Overwrap, flexible pouch, SUP, bottle

EVAL™'s largest use world-wide is for food packaging. Since 1972, EVAL™ has helped reduce food waste by blocking oxygen ingress and contaminants, extending shelf life and avoiding product waste.

Since very thin layers of EVAL™ provide the functional gas and contamination barrier to the entire structure, the result has been a reduction in packaging waste by reducing the weight and amount of packaging materials used.

EVAL™ provides the same function and benefits to parenteral nutrition solution packaging, in unbreakable, transparent and halogen-free structures.

KURARISTER™ lamination films widen Kuraray's barrier product portfolio, with additional water vapour barrier properties.



Solutions for transparent barrier sterilisation

Traditional EVOH used in thin transparent structures can be sensitive to the high temperatures and humidity of sterilisation processing. For this reason special grades of EVAL™ have been developed. Standard EVAL™ grades withstand sterilisation in thick structures, and pasteurisation under any conditions.

KURARISTER™ films are specially designed for transparent flexible structures that require sterilisation, providing both oxygen and water vapour barrier.



Oxygen sensitive fluid packaging

Ampoules, vials, overwrap, flexible pouches, SUP, dosers

As product formulas become more complex, they often become more volatile and sensitive to oxygen. EVAL™ provides a functional barrier in both directions: assuring formula integrity and quality while blocking the permeation of external gases and contaminants. Unbreakable all-plastic barrier structures with EVAL™ allow transparency and squeezability for safe and convenient use.



Ostomy, dialysis bags and biomanufacturing

In addition to O₂ and CO₂ gas barrier, EVAL™ provides an outstanding odour barrier, especially useful for ostomy applications.

EVAL's functional barrier works in both directions, protecting contents against contamination while keeping them from escaping into the environment. Flexible barrier structures provide an efficient disposable solution for biomanufacturing. When incinerated, the tiny but functional amounts of EVAL™ in the structure release only CO₂ and water vapour. No dioxin, no metal residue.

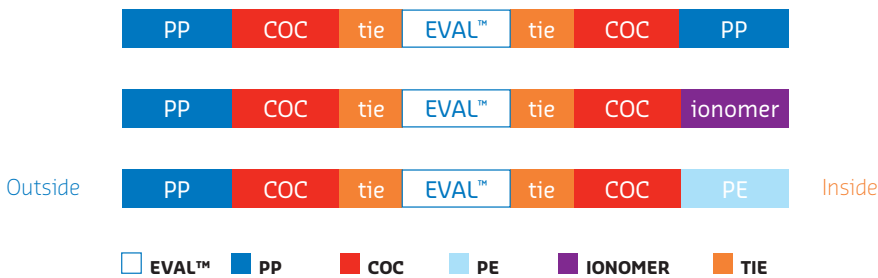


Solid oral dose and tablets

Blister pack, bottle, sachet, flexible pouch and SUP

Blister packs

Sophisticated and optimised multilayer structures can improve pharmaceutical packaging performance even while controlling cost. EVAL™ functional gas and contamination barrier can be combined with the water vapour barrier of cyclic olefin copolymers (COC). The result is a halogen-free blister pack with excellent barrier protection against oxygen, contamination and water vapour.



Bottle

EVAL™ functional barrier blocks oxygen ingress into unbreakable all-plastic bottles. Vitamins and other sensitive materials retain their properties longer, extending shelf life and avoiding waste.

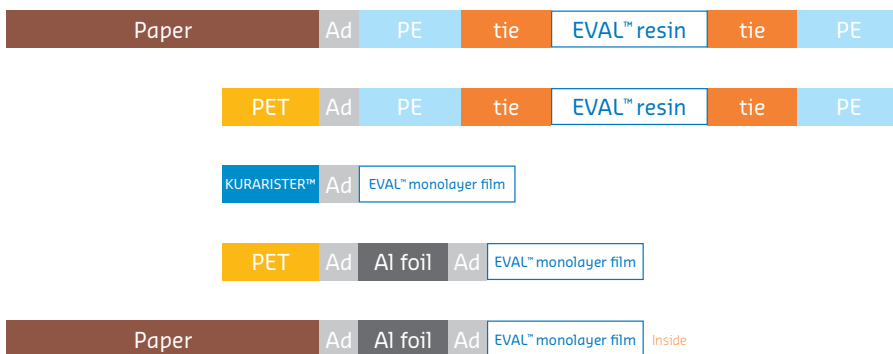
Barrier cap liners and state-of-the-art coinjecting cap closures with EVAL™ provide barrier against both oxygen and water vapour barrier. Multilayer barrier cap liners with EVAL™ can also be used.



Sachet, pouch, SUP, lidding film and transdermal patch

EVAL™ and KURARISTER™ offer a reliable alternative to Al foil, with excellent stress crack and pinhole resistance. Multilayer barrier films with EVAL™ can be laminated onto a variety of different substrates to provide sachets with functional barrier. KURARISTER™ films can be laminated to a sealing layer to provide both gas and water vapour barrier.

Specific grades of EVAL™ film can be laminated to a substrate, providing the sachet or pouch with both barrier properties and a sealable internal contact layer with excellent anti-scalping properties.



Veterinary products

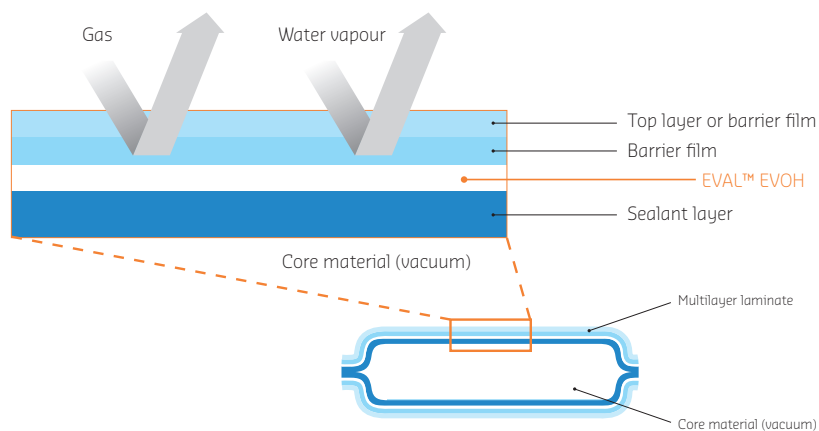
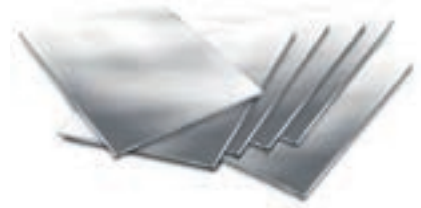
EVAL™ has excellent chemical resistance, offering a safe and transparent packaging choice for aggressive formulas used in veterinary treatments.



Efficient cooling systems with EVAL™ VIPs

Space-saving and efficient vacuum insulation liners

EVAL™ can provide the barrier function to high-spec Vacuum Insulation Panels (VIP), maintaining their vacuum and insulating efficiency. Medical transport containers lined with VIPs remain cooler longer, protecting valuable contents. VIP panels with EVAL™ are light weight, resist heat bridging and use much less space than traditional insulation, without compromising on performance.



Compliance Status




- All EVAL™ and KURARISTER™ grades are FDA and EU approved for food contact application (2002/72/EC, FDA 21CFR,...)
- DMF are available for most commercial grades and "Authorisation letter to make reference" can be obtained upon request.
- 2 years changes policy; longer "no changes" grades available.
- Composition information transfer for extractables and leachables studies (in timely manner) as there is no monograph in European Pharmacopeia.
- Additive-free grades: a Declaration of Absence of Chemicals can be provided. No heavy metals or animal origin.
- Support can be provided to obtain compliance with ISO EN 11607 that applies to all sterile barrier systems.
- USP Class VI Grades: several EVAL™ grades have been confirmed to meet the requirements of USP guidelines for class VI plastics -70°C.

Technical assistance for pharmaceutical packaging design



In addition to our central research laboratories in Kurashiki, Japan, Kuraray has a technical centre in Singapore and at the regional EVAL™ production sites in Houston, USA and Antwerp, Belgium. At each site we work together with packaging producers and the pharmaceutical industry, bringing our expertise in barrier technology and structure optimisation.



-  EVAL™ production site
-  EVAL™ Technical Centre
-  EVAL™ Kuraray sales office

EVAL™ the world's leading EVOH

Asia-Pacific

KURARAY CO., LTD. (Okayama, Japan)

Capacity: 10,000 tons/year

The world's first EVOH production facility

Americas

KURARAY AMERICA INC. (Houston, Texas, USA)

Capacity: 47,000 tons/year

The world's largest EVOH production facility

Europe, Africa, Middle East

EVAL EUROPE N.V. (Antwerp, Belgium)

Capacity: 35,000 tons/year

Europe's first and largest EVOH production facility

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www.kurarister.com

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The information, specifications, procedures, methods and recommendations herein are presented in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. No representation, guarantee or warranty is made as to the completeness of said information, specifications, procedures, methods and recommendations or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe patents of others or give desired results. Readers are cautioned to satisfy themselves as to the suitability of said information, specifications, procedures, methods and recommendations for the purpose intended prior to use.



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