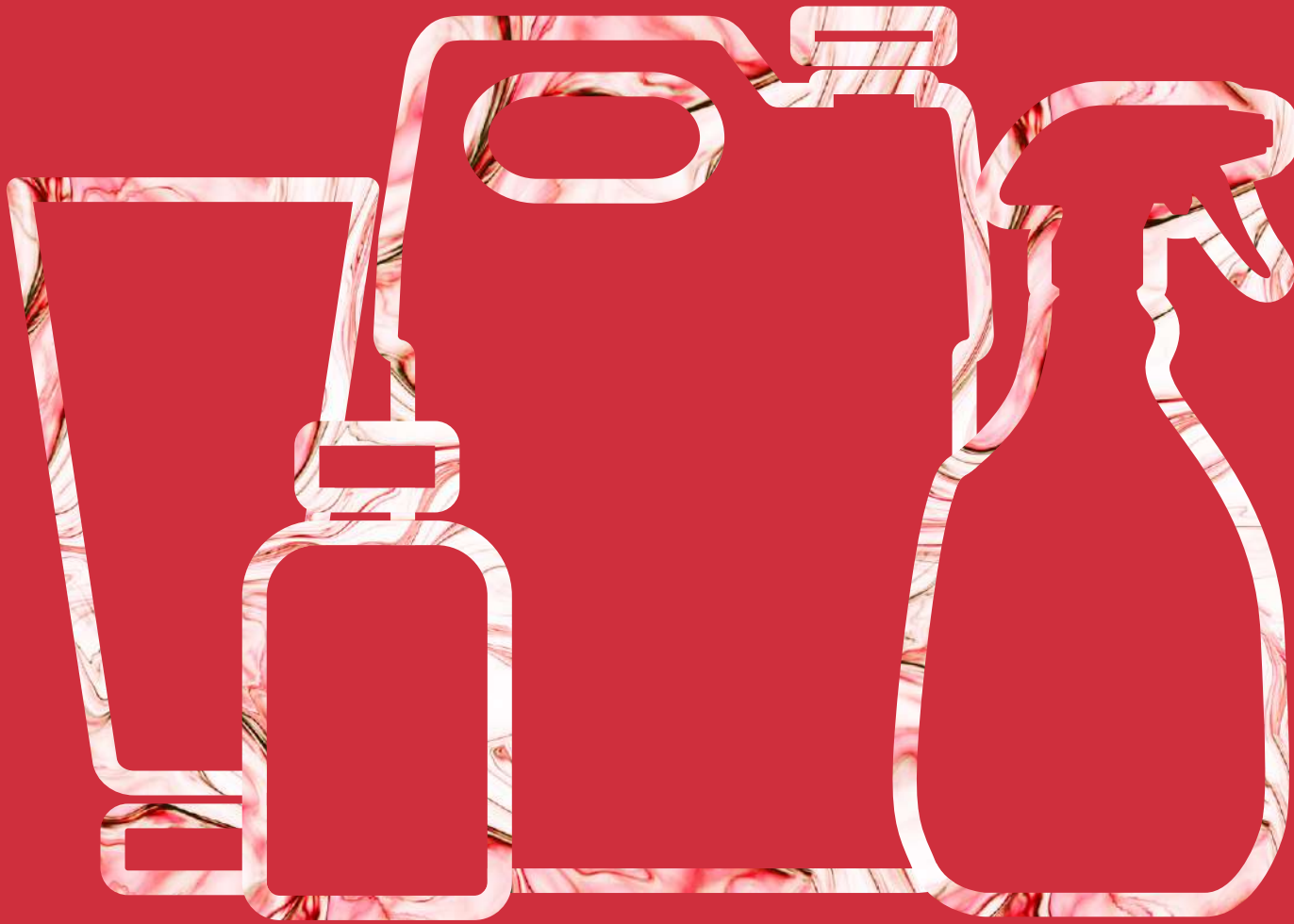


Barrier Packaging

Protect your products with peace of mind




Enkase
TM



Barrier packaging technology

Better shelf life. Better quality. Better world.

The world's priorities continue to shift towards environmentalism. And attitudes toward plastics must shift along with them. Continued reliance on plastic packaging must not come at the expense of our planet. With this in mind, we offer our time-tested solution: Enkase.

Enkase is a unique barrier technology that transforms conventional plastics into high performance packaging. Enkase creates a permanent barrier that can be applied to polyolefin packaging regardless of shape, size or design.

Whether your product formulation is water-based or organic, Enkase protects its integrity by reducing ingredient loss, increasing shelf life and maintaining quality. It also helps ensure compliance with packaging regulations, safeguarding health and the environment.

Fully recyclable, Enkase technology has the lowest carbon footprint of any barrier packaging, making it the most environmentally responsible choice. Enkase is the only barrier technology available worldwide that gives you total economic and environmental peace of mind.



Features and benefits

Enkase modifies the surfaces of monolayer polyolefin (HDPE, PP, etc.) containers to provide barrier protection in every direction against permeation. It ensures the quality, flexibility, safety and compliance of your products.

Quality

- Preserves contents so they don't change over time
- Increases shelf life
- Reduces leachables from plastics packaging
- Prevents container paneling and label flagging

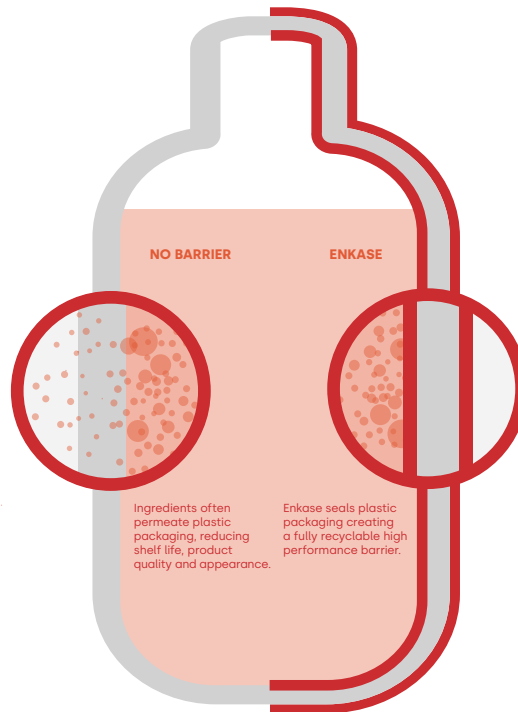
Safety and compliance

- Ensures contents don't permeate through container walls
- Reduces risk of impact on human health and the environment
- Helps compliance with complex packaging regulations

Infinite flexibility/more design freedom

- Enables packaging design independent of barrier layer
- Can be applied to any package size or shape
- Enhances package durability to extend life of end product
- Suitable for caps, sprayers, etc.
- Long-term cost savings
- Light-weighting: can support reduced use of plastic and lower costs

Protect your products, profits and planet.
Enkase it.



Transforming plastics for a better barrier

Enkase offers three levels of barrier performance—L3, L5 and L9— to meet or exceed global packaging standards.

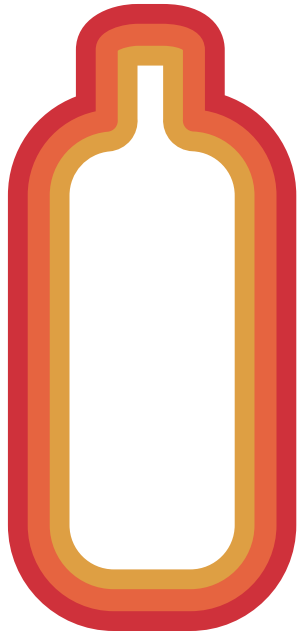
Many factors contribute to the design of barrier packaging, including:

- **Formulation ingredients:** most formulations are a mix of active ingredients, emulsifiers, solvents, flavors and fragrances.
- **Shelf life requirements:** products with higher shelf life expectations require greater barrier protection.
- **Packaging shape:** packages designed with a higher surface area often lose more content through permeation, because of the greater contact area between the contents and the package. In such cases, it's advisable to use a higher level of Enkase.
- **Packaging material:** While Enkase works for all polyolefins, material choice can impact performance.
- **Regulatory requirements:** regulations and product stewardship goals can vary significantly. For example, while USDOT regulations permit up to 2% weight loss for compliance, many OEMs and manufacturers require much better performance. Such expectations impact the choice of the Enkase level for your application.



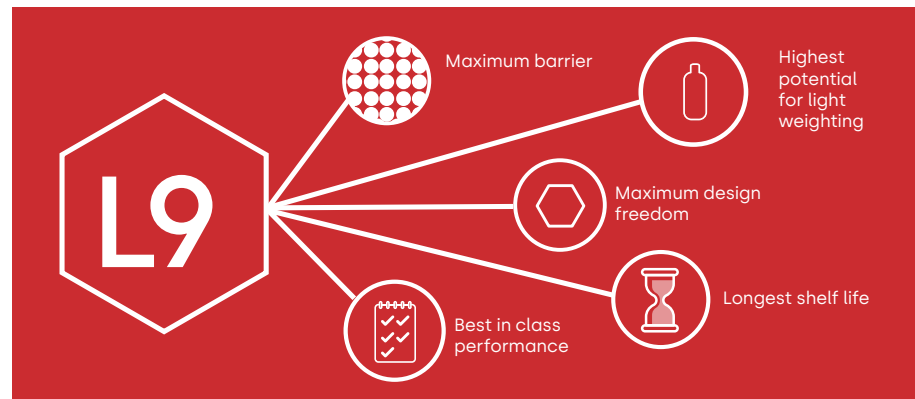
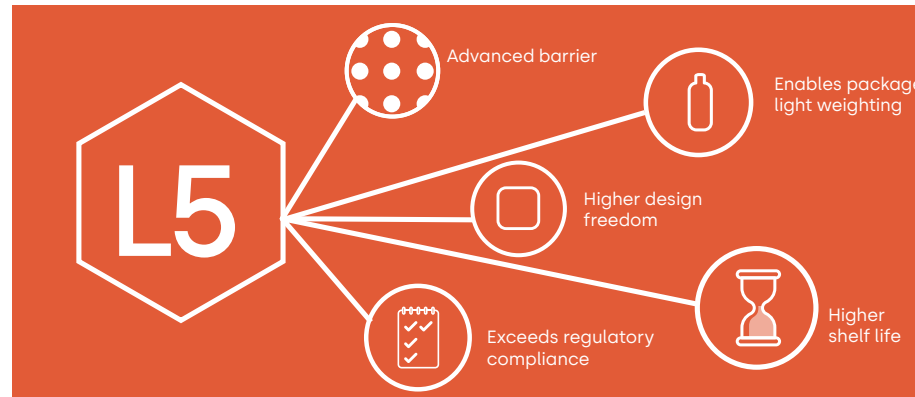
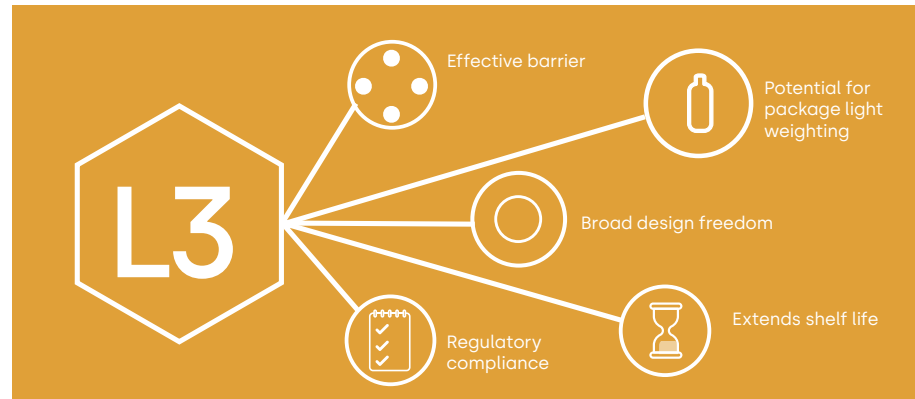
L3 L5 L9





Enkase offers three levels of barrier performance – **L3**, **L5** and **L9**, to meet or exceed global packaging standards. Depending on the formulation components, higher Enkase levels lead to longer storage life, reduced container weight and higher performance for higher more challenging components and formulations in industries such as essential oils, organics and flavors and fragrances.

We will collaborate with you to provide level recommendations and samples for your specific packaging needs.



Example Chemistries

- Aromatics
- Pine oils
- Mineral oils
- Flavors
- Essential oils
- Fragrances
- Benzhaldehyde
- Citrus oils
- Petroleum distillates
- APIs
- Xylene
- Toluene
- D-limonene
- Lanolin



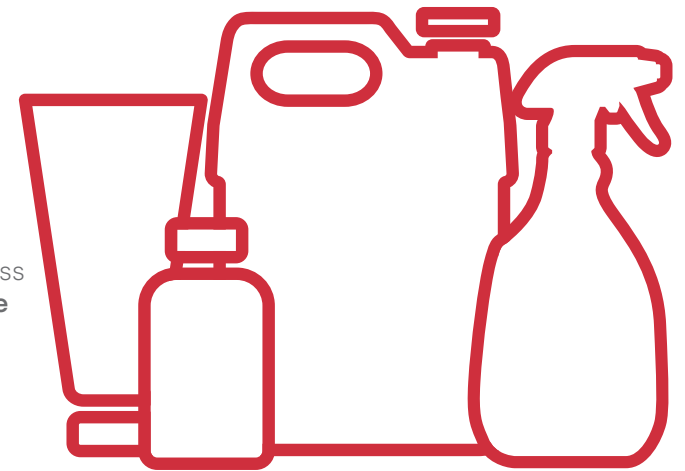
Enkase - the standard in recyclable barrier packaging

Enkase is a high performance barrier, regardless of your package design or size, and ensures quality and compliance. Whether it's a **1ml or 1000+ liter container**, Enkase is the most versatile barrier packaging solution. It is also commercially used on caps, nozzles and many other package assemblies.

Enkase is the most adaptable barrier packaging option, especially when compared to alternatives such as multilayer or PET. Enkase has the **least environmental impact** of all barrier packaging technologies as proven by life cycle assessments. Enkase offers the ability to lightweight plastic packaging and is **fully recyclable** with existing recycle streams. In addition, Enkase enables complete freedom for container shape and design, which can often be limited by alternate barrier constructions.

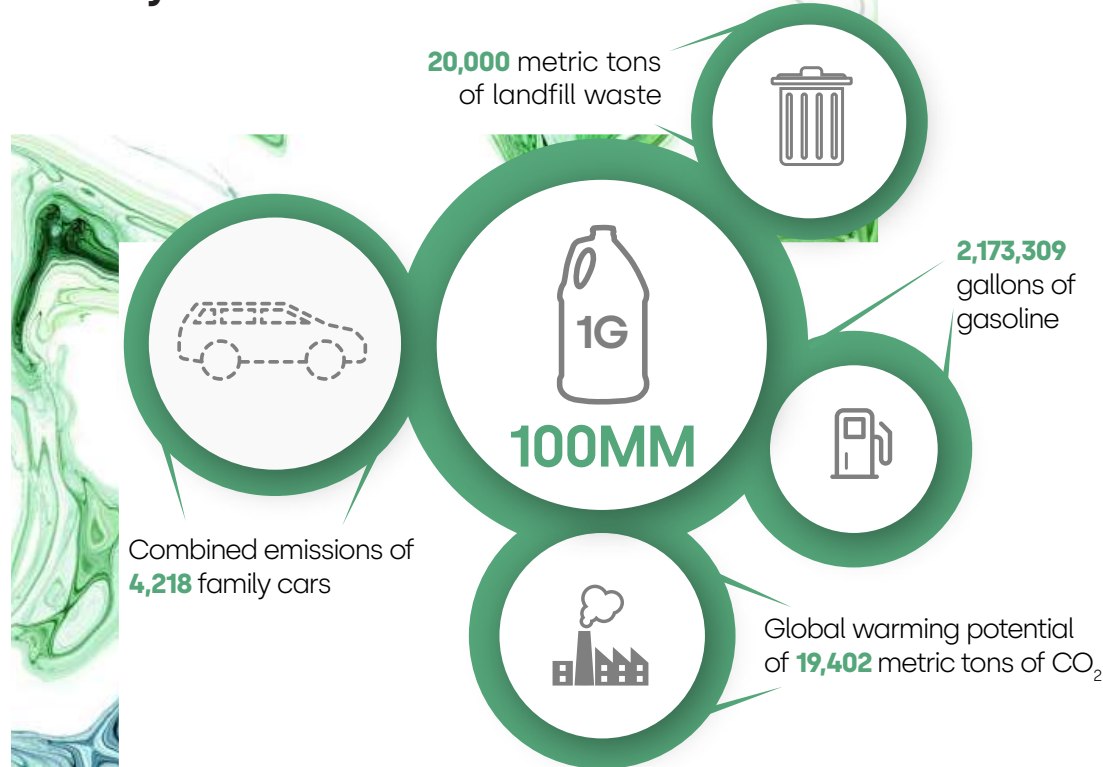
Enkase works best on polyolefins such as polyethylene, polypropylene and copolymers. Enkase is even being used with traditional multilayer equipment to produce the highest **post-consumer recycle content** plastic packaging – exceeding 80% post use content. Enkase can also treat packaging with monolayer PCR content, while imparting excellent barrier performance.

The Enkase manufacturing process includes 100% quality verification of all production, for peace of mind. Our flexible manufacturing process is efficient for short run **custom jobs to very large production volumes**, while maintaining best in class performance.



Recycling and sustainability

Switching to Enkase/HDPE from multilayer will offset:



By simply switching your packaging to Enkase/HDPE, you will offset significant global warming potential and enable the circular economy.

Enkase barrier packaging technology has been and continues to be recycled successfully by some of the largest consumers of recycled resin. We are focused on improving the impact that plastics have on the planet. That is why we are proud to offer the lowest environmental footprint and global warming impact of any barrier packaging technology.

Enkase barrier packaging is completely recyclable in existing HDPE collection streams. Our sustainable manufacturing process generates **zero** process emissions, **zero** process waste and **zero** water waste.

In our mission to develop technologies that improve the sustainability of our customers' products, we support the United Nations Sustainable Development goals promoting sustainable industrialization, production, consumption and partnerships on a global scale.

We don't just make things. We make things better for the world.



RecyClass is the recycling platform established by Plastics Recyclers Europe



Industries and applications

From health and beauty, to crop protection, to flavors and fragrances, Enkase can be used for products in a wide range of markets and applications.

Whether it's a 1ml bottle or a 1,000+ liter container, Enkase offers the best-in-class, fully recyclable packaging option.

Consumer Goods

Autocare
Lawn & Garden
Food & Beverage
Flavors & Fragrances
Health & Beauty
Home Care

Industrial Products

Adhesives & Sealants
Coatings
Crop Protection
Flavors & Fragrance
Industrial Chemicals
I&I Cleaning

Healthcare

Animal Health
Medical Diagnostics
Pharmaceuticals
Cold Chain

Transportation

Engine Additives
Fuels & Oils
Lubricants & Greases



Barrier Packaging

Technologies overview



A leading provider of polymer materials science solutions, globally.

With operations in the Americas, Australia and Europe, we believe in the science of better: innovating safer, more environmentally-friendly technologies that enable more sustainable products and packaging. Our barrier packaging and surface technologies, ingredients and other solutions transform your offerings from a commodity to a specialized solution.

If you do good things in plastic, **we make good better.**
To protect your products—and give you peace of mind.



Barrier Packaging



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