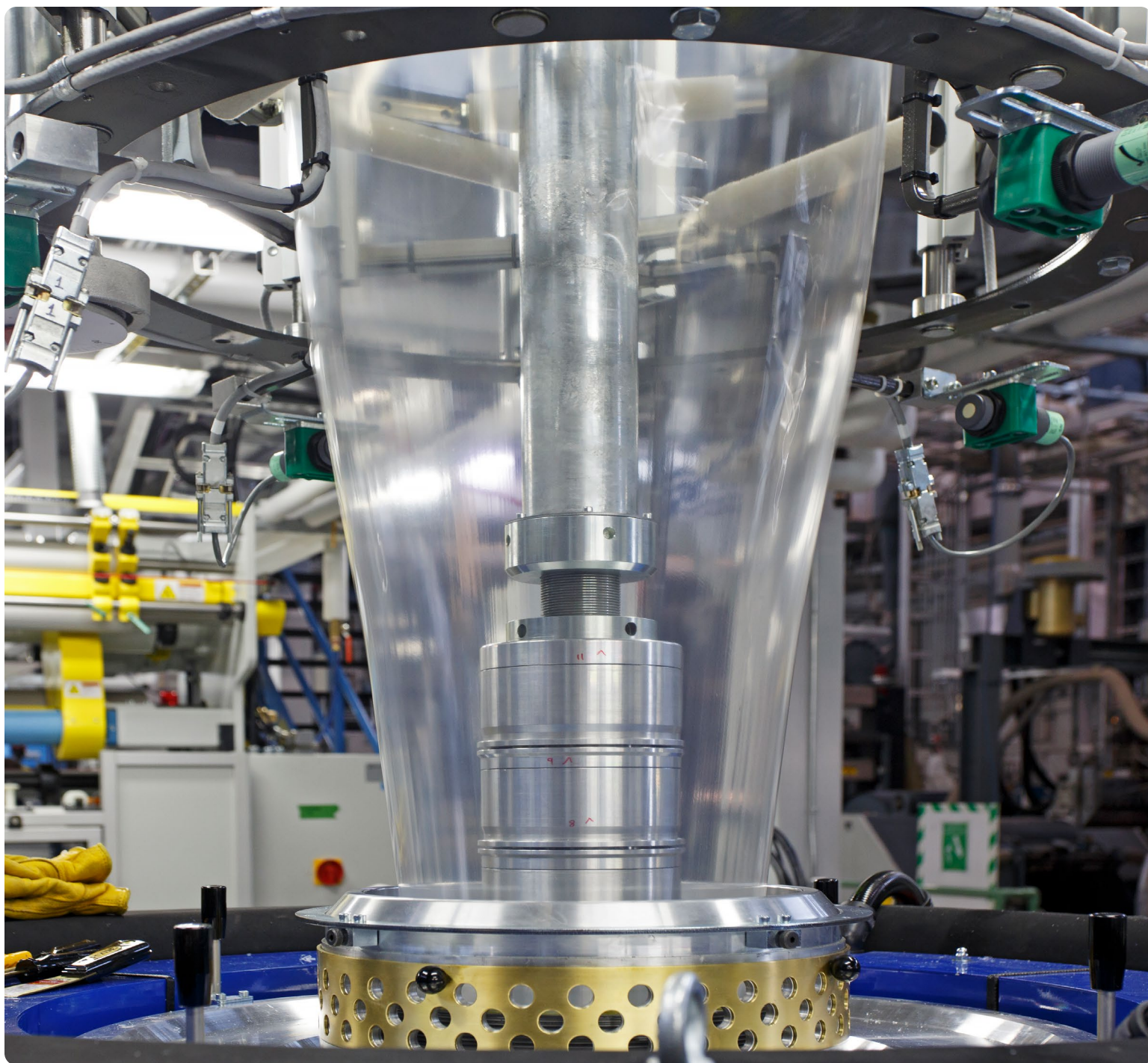


Processing for Performance:

Maximizing Barrier by Optimizing Process Conditions



➤ BACKGROUND

Barrier HDPE resins are widely used in food packaging to enhance shelf life because they provide a high-performing barrier against moisture. Barrier performance also enables converters to reduce non-PE materials, supporting recyclability.

To meet these needs, resin manufacturers continue to innovate polymer architectures to improve intrinsic barrier properties, while additive suppliers introduce technologies to further enhance performance. Converters also have an important lever in processing conditions. Parameters such as frost line height, blow up ratio, drawdown ratio, and process stability influence molecular orientation and crystalline structure, ultimately affecting barrier performance.

This case study evaluates how changes in key processing conditions impact the WVTR of HDPE-based barrier films and identifies opportunities to optimize barrier performance.



➤ CHALLENGES



Maintaining Barrier Performance Under Variable Processing Conditions

As packaging structures grow more complex and shelf life demands rise, converters need improved WVTR performance to protect packaged goods. However, higher barrier levels are often limited by processing conditions such as drawdown ratio and frost line height, which restrict the performance of conventional materials.



Delivering Consistent Product Performance Under Different Processing Conditions

Film converters operate multiple lines with varying die sizes and frost line heights. These differences in processing can significantly affect film structure, orientation, and barrier performance, making it difficult to meet performance expectations across equipment and sites.



Advancing Monomaterial Designs Without Compromising Performance

As sustainability demands grow across packaging, brand owners and converters must shift from multi-material to monomaterial designs to enhance recyclability, while also focusing on downgauging and structural efficiency. However, simpler structures can compromise barrier performance, strength, and package integrity, while cost pressures often limit the ability to add complexity. Balancing sustainability, performance, and cost efficiency remains a significant challenge.

➤ SOLUTION

With leading barrier performance, SURPASS® HPs167-AB and HPx267-AB barrier resins offer a compelling solution to enable monomaterial packaging solutions.

Consistent Barrier Protection Across Processing Times

- Both SURPASS® HPs167 and HPx267 resins: With process times between 2.5 - 7.0 sec, WVTR stays consistent around 0.1-0.15 g.mil/100 in²/day
- Delivers consistent barrier performance across sites, lines and production rates

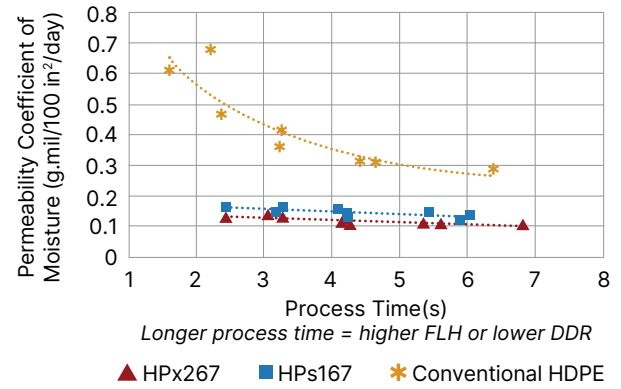
Consistent WVTR and Greater FLH Flexibility

- WVTR remains robust to different Frost line height (FLH) at 0.11 - 0.12 g/mil/100in²/day
- Provides process flexibility

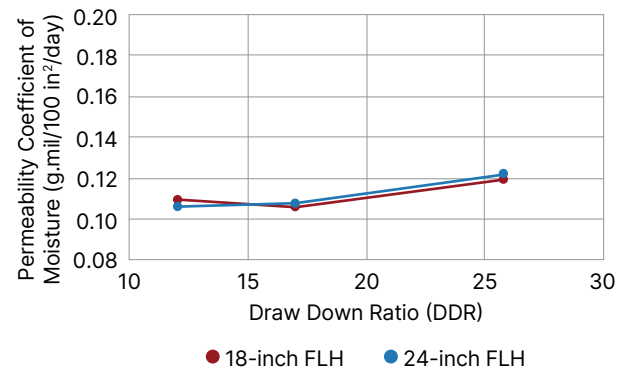
High-Barrier HDPE Enables Recyclable, Cost-Efficient Design

High-barrier HDPE layers replace multi-material films, enabling monomaterial structures. This improves recyclability while reducing conversion and material costs. It also enables downgauging without compromising barrier performance, allowing brands to maintain functionality while enhancing economic efficiency.

WVTR Performance of HDPE Films



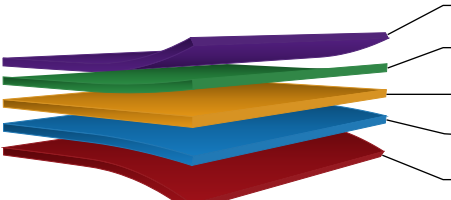
WVTR of HPx267



High-barrier resin solutions enable cost-effective designs while supporting recycle-ready all-PE barrier structures, helping balance performance, sustainability, and efficiency.

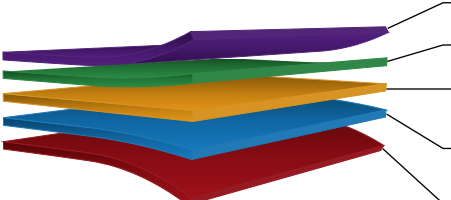
Case 1: Cost-Effective Moisture Barrier Structure

Eliminate metallized PET with HPx267-AB resin, reducing layers and cost (reducing complexity improves cost efficiency).

	Layer %	Material	Purpose
		PET (12 micron)	Print web
		Adhesive (1.5 gsm)	Adhesion
	25%	C4-LLDPE: PF-0118	Bulk layer
	50%	SURPASS HDPE: HPs167-AB and HPx267-AB resin	Moisture barrier
	25%	VPsK914 or FP120	Sealant

Case 2: All-PE Barrier Structure (Recycle Ready)

Utilize an oriented PE print web to achieve a monomaterial structure.

	Layer %	Material	Purpose
		MDO-HD or BOPE-HD (20 micron)	Print web
		Adhesive (1.5 gsm)	Adhesion
	20%	MDPE: TF-Y534-IP	Thermal stability, clarity, and strength
	60%	SURPASS HDPE: HPs167-AB or HPx267-AB resin	Stiffness, thermal stability, moisture barrier
	20%	QPsK905 or VPsK914	Sealant

SUMMARY

Advanced barrier SURPASS HPs167-AB and SURPASS HPx267-AB resin grades offer a reliable, future-ready alternative to conventional HDPE materials. They deliver consistent moisture protection, even across varying processing conditions, while maintaining long-term performance. HPx267-AB also improves processing consistency, helping reduce variability during manufacturing.

By enabling simpler, polyethylene-based structures, these resins support recyclability, reduce costs, and advance circularity goals—without sacrificing performance.



www.borougeinternational.com

SURPASS® is a registered trademark of NOVA Chemicals Corporation in Canada and of NOVA Chemicals (International) S.A. elsewhere; authorized use/utilisation autorisée.

On March 30, 2026, NOVA Chemicals Corporation was acquired by Borouge Group International AG. NOVA Chemicals Corporation and its parents/affiliates/subsidiaries are referred to as herein as Borouge International. The information contained herein is, to our knowledge, accurate and reliable as of the date of publication.

Borouge International extends no warranties and makes no representations as to the accuracy or completeness of the information contained herein, (in particular for any data and calculations made by third parties that are not verified by Borouge International) and assume no responsibility regarding the consequences of its use or for any errors. It is the customer's responsibility to inspect and test our products in order to satisfy themselves as to the suitability of the products for the customer's particular purpose. The customer is also responsible for the appropriate, safe, and legal use, processing, and handling of our products. Nothing herein shall constitute any warranty (express or implied, of merchantability, fitness for a particular purpose, compliance with performance indicators, conformity to samples or models, non-infringement, or otherwise), nor is protection from any law or patent to be inferred. The information contained herein relates exclusively to our products when not used in conjunction with any third-party materials. Where products supplied by Borouge International are used in conjunction with third-party materials, it is the responsibility of the customer to obtain all necessary information relating to the third-party materials and ensure that Borouge International products, when used together with these materials, are suitable for the customer's particular purpose. No liability can be accepted in respect of the use of Borouge International products in conjunction with third-party materials.