

Recommended Preparation

- Fill the vessel equipped with overhead mixer with unheated water.
- Turn on the mixer so that the surface of the water moves vigorously. The top blade should be submerged to half the height of the water.
- A defoamer can be added at this point, prior to any polyvinyl alcohol addition.
- Add the polyvinyl alcohol to room temperature water with added agitation.
- Elevate the solution temperature to 85-90°C.
- Upon reaching cook temperature, hold at temperature for 30 minutes to allow polymer to fully dissolve.
- A biocide is not necessary for storage solution of Ultiloc 5003 over 24 hours.

*Adding 10-20% IPA or Ethanol aid in coating low surface energy substrates and reduce foaming during preparation

Need a solution sample immediately? Pre-made solution is available.

Property	Value
Total Solid Content	10 - 15%
Viscosity (20 °C)	50-315 cPs



Customer Commitment

Selvol Ultiloc copolymers have undergone thorough analysis to validate their characteristics and benefits. Sekisui Specialty Chemicals has a wide array of testing equipment and methodologies available to qualify application feasibility, assist in formulation, and suggest adjustments. Our knowledgeable specialists are ready and excited to support our customers in creating tomorrow's popular products.

Sekisui Specialty Chemicals

A new frontier, a new lifestyle.

Sekisui Specialty Chemicals is part of the Sekisui Chemical Group, a multibillion dollar global company that delivers a wide range of products and services to enrich people's lives. Sekisui has been striving to 'produce a better world with creative technologies' since its formation in 1947. The company is comprised of core businesses and technologies in housing, social infrastructure, and chemical solutions. Selvol Ultiloc copolymers are the latest example of the depth and breadth of Sekisui Chemical Group's innovative contributions to these key business fields.



Selvol Ultiloc 5003 for Enhanced Barrier in Flexible Packaging

Key Characteristics

- ✓ Improved Gas Barrier
- ✓ Primary Amine Functionality
- ✓ Enhanced Reactivity
- ✓ Excellent Adhesion to Plastic, Glass, Metals, and Wood
- ✓ Cationic at Neutral and Acidic pH
- ✓ Excellent Film Former
- ✓ Environmentally Friendly, Low VOC, Non-Toxic, and Recyclable
- ✓ Potential Reduced Laminate Structure
- ✓ High Surface Energy

Ultiloc 5003 can achieve a combination of these features simultaneously



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COPOLYMERS THAT EXPAND ON THE
FUNCTIONALITY OF THE INDUSTRY TRUSTED
SELVOL POLYVINYL ALCOHOL PRODUCTS

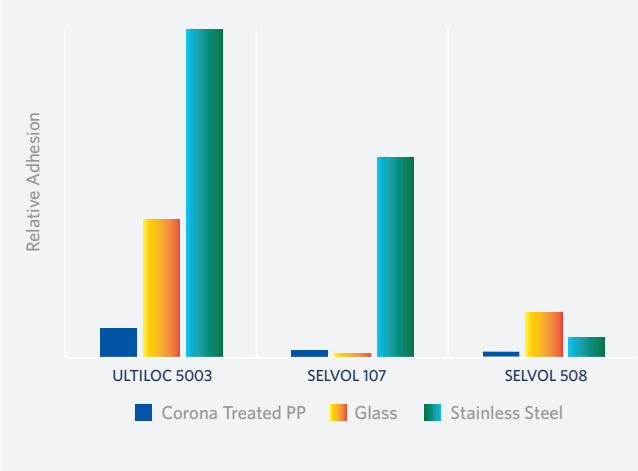


A Multifunctional Barrier Coating: Selvol Ultiloc 5003

The market for flexible packaging continues to expand with an increased focus on sustainability and the circular economy. Ultiloc offers a unique solution to formulators seeking environmentally friendly flexible packaging. Ultiloc 5003 provides exceptional gas barrier properties at low to moderate levels of humidity, as well as improved adhesion to a variety of substrates, as illustrated in Figure 1. This particular characteristic can simplify processing and potentially reduce costs by eliminating the need for tie-layers in multilayered structures. For these reasons, Ultiloc 5003 is a viable replacement for PVdC and EVOH in barrier packaging applications. Benefits include:

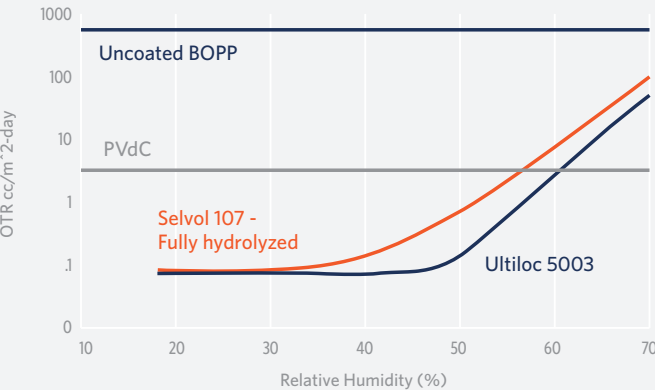
- Improved adhesion to wide variety of substrates, including difficult/low energy surfaces
- Effective additive for improving adhesion characteristics in tie layers
- Higher reactivity – leading to improved crosslinking or post reactions
- Lower temperature solubility and quicker dissolution process

FIGURE 1:
90° Peel Test Comparison



The current market drivers are increasing the need for sustainably sourced, recyclable, lightweight packaging

FIGURE 2:
OTR of Ultiloc 5003 Versus Standard PVOH on BOPP and PVdC*



*Coat weight: 4 gsm

Use in Mono-Materials

The flexible packaging market is shifting towards environmentally friendly, mono materials due to mounting regulatory pressure, larger climate concerns, and general cost efficiency. In addition to use in traditional multilayer structures, Ultiloc 5003 can also be used in mono-material structures for improved recyclability and streamlined production. The barrier properties and excellent adhesion make Ultiloc 5003 the perfect fit in PP or PE mono-material structures. As shown in Figure 2, the oxygen barrier of a polypropylene mono-material structure is significantly improved compared to conventional PVOH, achieving higher barrier properties at up to 65% relative humidity.

Whether using Ultiloc 5003 in a multilayered or mono-material film structure, the end result is an eco-friendly, cost-effective approach to flexible packaging design.

Ultiloc 5003 in Ultra High Barrier Applications

Ultiloc 5003 can serve as an integral part of an ultra high barrier film structure, including mono-materials, for the replacement of aluminum foil. This is because the high surface energy of Ultiloc 5003 makes it an excellent adhesion layer for vapor metallization. Refer to Table 1 for Ultiloc 5003's performance compared to standard grades of Selvol on OPP.

TABLE 1:
Metalized Tape Peel Comparison on OPP*

Primer Coating	Tape Peel Test	Oxygen Barrier at 75% RH cc/m²·day
None	X	XX
Selvol 107	X	✓
Ultiloc 5003	✓	✓

*Coat weight: 4 gsm

Selvol Ultiloc in Biopolymer Films

Pre-made Ultiloc liquid solutions can be used to coat biopolymer films such as PLA to enhance oxygen barrier properties. As shown in Table 2 below, a PLA film coated with a Selvol Ultiloc solution exhibits excellent oxygen barrier properties.

Contact your Sekisui representative to find out more about specifications and availability.

TABLE 2:
OTR Comparison of Selvol Ultiloc Solution on PLA*

Substrate	OTR at 0% RH, cc/m²·day	OTR at 50% RH, cc/m²·day
Uncoated PLA	>250	>250
PLA Coated with Selvol Ultiloc Solution	<0.2	<1.0

*Coat weight: 4 gsm



Viscosity of 5003 as a Coating

For the optimal barrier layer in flexible packaging products, Sekisui recommends 10-15% by weight Ultiloc 5003 solutions.

FIGURE 3:
U5003 Viscosity Versus Temperature

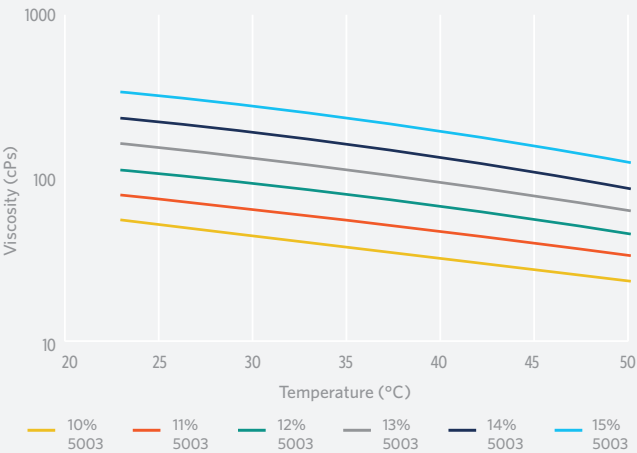


TABLE 3:
Commercial Specification

Test	Specification	Method
Viscosity ^(a) (cps)	5.0 - 10.0	Brookfield
Ash ^(b) Wt %	3.0 Max.	ISE
Volatile Wt %	5.0 Max.	Drying
pH ^(c)	9.0 - 12.0	Potentiometry

(a) Of a 4% aqueous solution at 20°C (b) Expressed as Sodium Oxide (c) Of a 4% aqueous solution

