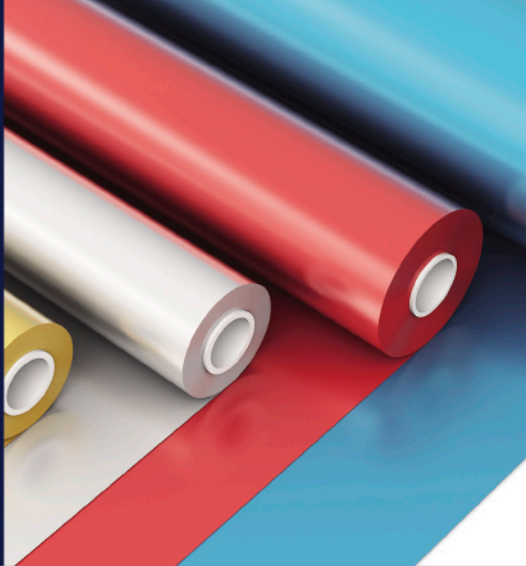


We provide the world's best products

INNOSLIP SERIES



PATHWEL™ HAS
PROGRESS IN YOUR LIFE

DECADES OF EXPERIENCE

We are a leading manufacturer of polymer additives, with a focus on amides produced from renewable vegetable-based sources. Our amides are used as slip and Anti-Block agents in polymers and have applications spanning multiple products and industries.

At Pathwel, we understand the important role that chemicals play in our everyday lives. Therefore, we maintain close relationships with our customers to best understand their needs. We are proud of our dedication to working intimately with our customers and delivering solutions to their problems. Our philosophy is that our customers' success is our success. Pathwel constantly strives to improve products and remain dedicated to customers so that they can confidently rely on us for their polymer additive needs.

PATHWEL™
PROGRESS IN YOUR LIFE

**WILL BE YOUR
BEST FUTURE PARTNER**



ABOUT PATHWEL

Pathwel is a leading producer of polymer additives, with a focus on slip and Anti-Block agents. These products facilitate the production and processing of polymers and enhance the quality and performance of end products we use in our everyday lives.

Our journey began in 1974, and with over four decades of experience in the oleochemical derivative industry, Pathwel is one of the industry pioneers. Currently, we operate a newly commissioned state-of-the-art production facility and serve customers worldwide. We understand the importance of supply stability for our customers. So we built our plant to be in compliance with the highest environmental and strictest safety standards. Furthermore, our site is ISO 9001 and ISO 14001 certified to ensure product quality and regulatory compliance.

Using our advanced in-house technology and research capabilities. Our team is proud to be working seamlessly to bring the highest quality products to our customers.



Opening Ceremony of Daejin Fine Chemical Co., Ltd. Amide Plant (1991)

DECADES OF EXPERIENCE UNDER OUR BELT

Our history began in 1974 when we started as Daejin Corporation, a pioneering distributor of fatty acid amides in Korea to meet the needs of Korea's budding petrochemical industry. In order to better meet the demands of our customers and to deliver top quality products, we invested in production technology and became a manufacturer of amides. Our first manufacturing plant was built in 1991, in Gyeongju, Korea.

Innovation
for customer satisfaction



Collaboration
and cooperation for trust



Responsibility
to society and company



1974

Established Daejin Corporation as an exclusive agent / distributor of fatty acid amide in Korea

1989

Established Daejin Fine Chemical Co., Ltd. as a producer of fatty acid amide

1991

Completed construction of fatty acid amide plant in Gyeongju, Korea

1998

Divested the plant to Akzo Nobel N.V. (2014 Akzo Nobel N.V. Divested the plant to PMC biogenix)

2001

Renamed company from Daejin Fine Chemical Co., Ltd. to DY Holdings Co., Ltd.

2014

Jan. Established Pathwel Co., Ltd. to produce fatty acid amide

2016

Mar. Completed construction of new fatty acid amide plant in Jincheon, Korea
Sep. Obtained
ISO 9001:2015 (updated Sep.2020)
ISO 14001:2015 (updated Sep.2020)

2017

Oct. Obtained Jhospa (Erucamide & Oleamide)

2018

Nov. Obtained EU Reach (Erucamide & Oleamide)

2019

Jul. Obtained K-Halal (Updated Jul.2022)

2021

Dec. Obtained K-Reach (Erucamide & Oleamide)

2022

Jul. Obtained WHC-Halal

Polymers tend to exhibit high friction and mutual adhesion. Such properties causes problems as polymers adhere to other polymers, processing machines and other surfaces during manufacturing, secondary processing and final use by end-users.

INNOSLIP SERIES Slip & Anti-Block Agents

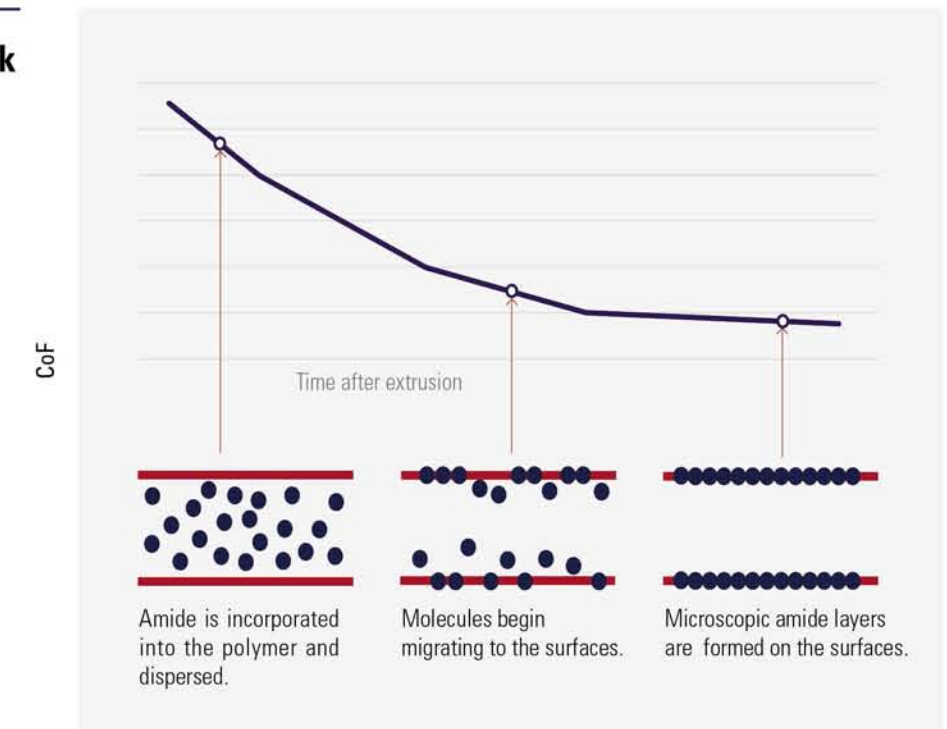
INNOSLIP additives are incorporated directly into the polymer during the extrusion process. They work by migrating to the surface as the polymer cools forming a solid lubricating layer at the surface. This acts to lower the friction or adhesion between contacting polymer surfaces and the polymer and other materials.

Our INNOSLIP line offers various grades of primary amide that can be used as slip agent, Anti-Block agent, antitacking agent and molding agent. All INNOSLIP products are high in purity to ensure superior performance. They are solely derived from renewable plant-based raw materials and are free from any animal products and genetically modified organisms. Our amides are also non-toxic and non-hazardous. Therefore, they are safe for a wide range of industrial applications, including the common use in food contact materials such as food wrappers, films, produce bags, bottle caps, and food containers.

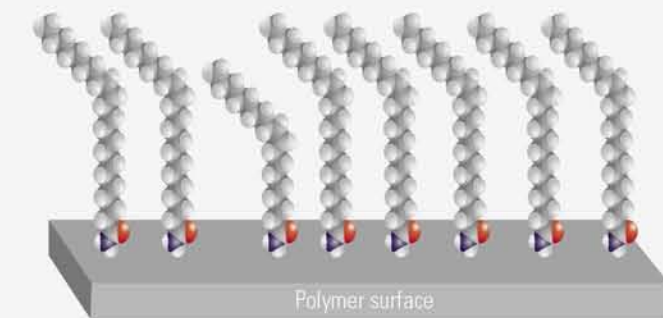
In polyolefins Erucamide (or Oleamide) migrates quickly, covers the surface, has a planar layer like structure on the polymer surface. Behenamide (or Stearamide) migrates slowly, does not cover the surface so well and appears to have a more crystalline 3 dimensional structure.

The double bond in Erucamide (or Oleamide) results in poorer oxidative stability than with Behenamide (or Stearamide). Mono-unsaturates always have small quantities of poly-unsaturates which are more unstable.

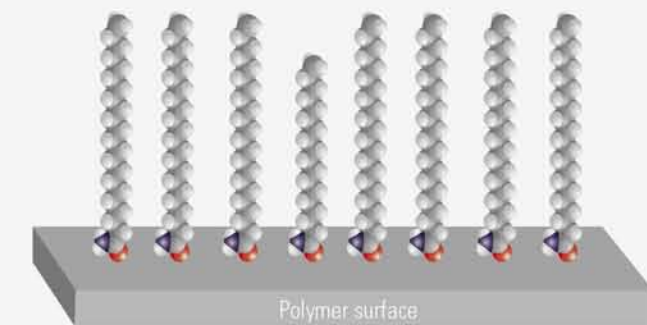
How Amides Work



Slip / Blocking Performance Required



Mono-unsaturated amide

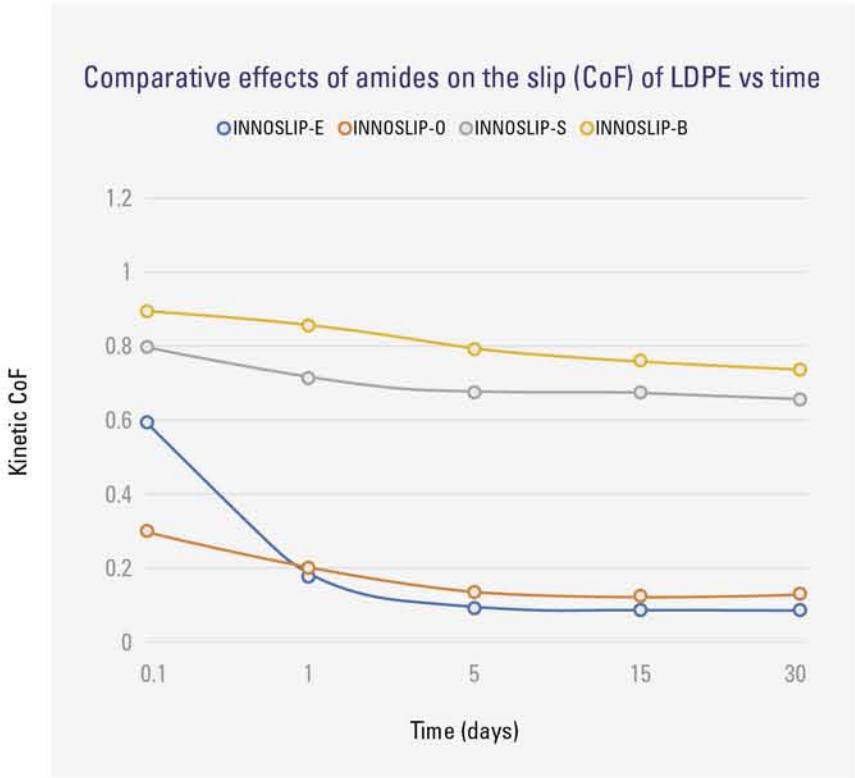


Saturated amide



CoF of Saturated and Unsaturated Amides

• 500 ppm in LDPE film after 14 days, amide of varying carbon chain length



• Comparative effects of INNOSLIP range on coefficient of friction in LDPE



Product Range

High Slip / Secondary Anti-Block

Trade name	Description	Physical form at 25°C	Raw material origin	Key effects & Recommended uses
INNOSLIP-E	Erucamide	Bead / Microbead / Powder	Vegetable	Slip / Release in polyolefins and many other polymers.
INNOSLIP-ER	Erucamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-EH	Erucamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-EL	Erucamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-O	Oleamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-OV	Oleamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-ORX	Oleamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-UL	Oleamide	Bead / Microbead / Powder	Vegetable	

Low Slip & Good Anti-Block

Trade name	Description	Physical form at 25°C	Raw material origin	Key effects & Recommended uses
INNOSLIP-S	Stearamide	Bead / Microbead / Powder	Vegetable	Anti-Block in polyolefins, also mold release.
INNOSLIP-S5	Stearamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-S6	Stearamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-S7	Stearamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-S9	Stearamide	Bead / Microbead / Powder	Vegetable	
INNOSLIP-B	Behenamide	Bead / Microbead / Powder	Vegetable	

Product Physical Forms

Pathwel products are available in up to three physical forms.



Beads

Size : 1-1.5mm

Good general purpose form suitable for the majority of feeders



Microbeads

Size : 0.3-0.4mm (300-400µm)

Recommended for dry mixing with other granulates



Fine powder

Size : 0.01-0.1mm (10-100µm)

Recommended for dispersion into liquids or other fine powders

Industry Applications



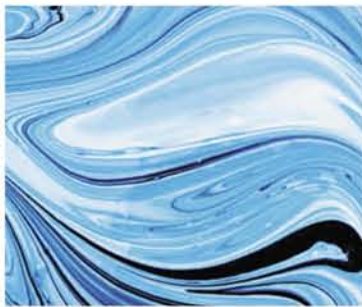
Polyolefin Film

Used commonly in PE and PP films, amides give slip and Anti-Block properties without compromising clarity. Applications include our everyday food packaging and plastic bags, as well as agricultural films.



Masterbatch & Compound

When amides are not directly incorporated into polyolefin resins, or if an additional dosage is required, they can be added as components of masterbatches and compounds to suit the needs of the end user.



Paint, Ink & Dye

In paint, ink and dye, amides can serve as pigment dispersing aids and also as thixotropic agents to increase product viscosity.



Molding

In both injection and rotational molding processes. Amides can serve as a mold release agent. They also improve the product surface finishing and add a scuff resistant property, thus reducing wastage and product defect.



Lubricant

Our slip agents, namely oleamide, can be used in lubrication oils and greases to enhance their friction reducing performance. They can also be used to control viscosity.



Rubber

Not only do amides serve as internal lubricants that facilitate rubber processing, they also serve as dispersing aids for pigments (e.g. carbon black). They are also used as a release agent in rubber molding operations.

INNOSLIP-E Series

INNOSLIP-E Series offers grades of erucamide, an unsaturated primary amide produced from erucic acid derived from vegetable oil. INNOSLIP-E Series is used as a slip and Anti-Block agent in polyolefin resin production as well as in processing to enhance the quality of end products, all without materially altering the properties of the polymer itself. It is characterized by its low volatility, good heat stability and slow migration.

<Chemical Name>

Erucamide ; (Z)-13-Docosenamide

<Property / Recommended Use>

Slip and Anti-Block Property

INNOSLIP-E series functions as a high performing slip agent and good Anti-Block agent in polyolefin resins, in particular polyethylene and polypropylene for film applications, by migrating to the surface to form a thin layer of external lubrication that adds the slip property.

Reduce Friction

INNOSLIP-E series reduces problems arising from the inherent tendency of polymers to cause friction and adhere to other surfaces. The addition of slip property aids not only in the initial resin production but also processing of the resins by the end users (e.g. facilitates mold release during injection molding process and reduces coefficient of friction in films).

Slow Migration

INNOSLIP-E Series migrates slower than oleamide does because of its larger molecular structure. Such property is necessary for making PE and PP films that need printing, sealing or other surface treatments immediately after extrusion; the slow migration allows time for the surface treatments before forming a layer on the surface.

High Processing Temperature

INNOSLIP-E series has low volatility and high heat stability, making it suitable for use in PE and PP films which are processed under high temperature.

High Slip & Secondary Anti-Block

Trade name	INNOSLIP-E	INNOSLIP-ER	INNOSLIP-EH	INNOSLIP-EL
Description	Erucamide	Erucamide	Erucamide	Erucamide
Physical form at 25°C	Bead / Microbead / Powder	Bead / Microbead / Powder	Bead / Microbead / Powder	Bead / Microbead / Powder
Raw material origin	Vegetable	Vegetable	Vegetable	Vegetable
Amide Purity(%)	min. 98.5%	min. 98.5%	min. 99.0%	min. 95%
Iodine Value(g I ₂ /100g)	74-79	75-80	75-80	70-90
Melting Point(°C)	80-84	79-83	79-83	70-86
Color(Gardner)	max. 2.0	max. 2.0	max. 2.0	max. 2.0
Acid Value(mg KOH/g)	max. 0.5	max. 0.5	max. 0.2	max. 1.5
Moisture(%)	max. 0.5	max. 0.5	max. 0.1	max. 0.5
Key effects & Recommended uses	*High Slip / Secondary Anti-Block *Slip / release in Polyolefin and many other polymers *INNOSLIP-EH is high purity grade *INNOSLIP-EL is technical grade			

INNOSLIP-O Series

INNOSLIP-O Series is an unsaturated primary amide produced from oleic acid derived from vegetable oil. INNOSLIP-O Series offers different grades of oleamide to be used as a slip agent in polyolefin resin production as well as in processing to enhance the quality of end products, all without materially altering the properties of the polymer itself. INNOSLIP-O Series is characterized by its rapid migration to the surface, also known as “fast blooming”.

<Chemical Name>

Oleamide ; Amides, C18 (unsaturated) ; (Z)-9-Octadecenamide

<Property / Recommended Use>

Slip Property

INNOSLIP-O Series functions as a slip agent in polyolefin resins by migrating to the surface to form a thin layer of external lubrication.

Reduce Friction

Polyolefin has the inherent tendency to cause friction and adhere to other surfaces during production and processing. INNOSLIP-O reduces problems arising from such property during initial resin production and processing of the resins by the end users (e.g. reduces coefficient of friction in films).

Rapid Migration

INNOSLIP-O Series is recommended for applications that require quick development of slip property because its light molecular structure allows it to migrate faster or bloom faster to the surface than erucamide does.

Fast Slip & Secondary Anti-Block				
Trade name	INNOSLIP-O	INNOSLIP-OV	INNOSLIP-ORX	INNOSLIP-UL
Description	Oleamide	Oleamide	Oleamide	Oleamide
Physical form at 25°C	Bead / Microbead / Powder	Bead / Microbead / Powder	Bead / Microbead / Powder	Bead / Microbead / Powder
Raw material origin	Vegetable	Vegetable	Vegetable	Vegetable
Amide Purity(%)	min. 98.5%	min. 98.5%	min. 98.5%	min. 98.5%
Iodine Value(g I ₂ /100g)	81-87	85-95	81-87	81-87
Melting Point(°C)	72-76	70-74	70-76	70-76
Color(Gardner)	max. 2.0	max. 2.0	max. 2.0	max. 2.0
Acid Value(mg KOH/g)	max. 0.5	max. 0.5	max. 0.5	max. 0.5
Moisture(%)	max. 0.5	max. 0.5	max. 0.5	max. 0.5
Key effects & Recommended uses	*Fast Slip / Secondary Anti-Block *Slip / release in polyolefins and many other polymers *INNOSLIP-UL is low H.C content Oleamide			

INNOSLIP-S Series

INNOSLIP-S Series is a saturated primary amide produced from stearic acid derived from vegetable oil. INNOSLIP-S Series offers grades of stearamide that are used as an Anti-Blocking agent in polyolefin resin production as well as in processing to enhance the quality of end products, all without materially altering the properties of the polymer itself. INNOSLIP-S Series is characterized by its outstanding Anti-Blocking property.

<Chemical Name>

Stearamide ; Octadecanamide ; Amides, C16-C18 (even numbered)

<Property / Recommended Use>

Anti-Block

INNOSLIP-S has a limited slip property but is an excellent Anti-Blocking agent that migrates to the surface to form a non-sticking layer. Especially in film applications, it can prevent two layers of PP or PE films from adhering to each other, while maintaining high film clarity

Combined Usage

Given its limited slip property, INNOSLIP-S Series is often used with erucamide or oleamide to achieve both slip and Anti-Block performance.

Other Applications

INNOSLIP-S Series can also be used as a cell size regulator in PE foam production and mold release agent in injecting molding.

Low Slip & Good Anti-Block					
Trade name	INNOSLIP-S	INNOSLIP-S5	INNOSLIP-S6	INNOSLIP-S7	INNOSLIP-S9
Description	Stearamide	Stearamide	Stearamide	Stearamide	Stearamide
Physical form at 25°C	Bead / Microbead / Powder	Bead / Microbead / Powder	Bead / Microbead / Powder	Bead / Microbead / Powder	Bead / Microbead / Powder
Raw material origin	Vegetable	Vegetable	Vegetable	Vegetable	Vegetable
Amide Purity(%)	min. 98.5%	min. 98.5%	min. 98.5%	min. 98.5%	min. 98.5%
Iodine Value(g I ₂ /100g)	max. 1.0	max. 1.0	max. 1.0	max. 1.0	max. 1.0
Melting Point(°C)	96-103	97-104	97-104	99-105	100-110
Color(Gardner)	max. 2.0	max. 2.0	max. 2.0	max. 2.0	max. 2.0
Acid Value(mg KOH/g)	max. 0.5	max. 0.5	max. 0.5	max. 0.5	max. 0.5
Moisture(%)	max. 0.5	max. 0.5	max. 0.5	max. 0.5	max. 0.5
Key effects & Recommended uses	*Low Slip / Good Anti-Block *Anti-Block in polyolefins, also mold release				

INNOSLIP-B Series

INNOSLIP-B is behenamide, a saturated primary amide produced from behenic acid derived from vegetable oil. INNOSLIP-B is used as an Anti-Blocking agent in the production of polyolefin resins and in processing to improve the quality of the final product. all without materially altering the properties of the polymer itself. Behenamide is characterized by its outstanding Anti-Blocking and heat stability property.

<Chemical Name>
Behenamide ; Docosanamide

<Property / Recommended Use>

Anti-Block
INNOSLIP-B serves as an excellent and high performing Anti-Blocking agent for both polyethylene and polypropylene films. It can be also used with cellophane and polystyrene. However, INNOSLIP-S Series has limited slip properties.

Improved Film Clarity
INNOSLIP-B improves film clarity and it can also be used together with other inorganic Anti-Block agents for added performance.

Cap & Closure
INNOSLIP-B is suitable for usage in caps and closures, including food containers as its property reduces the force required to twist off the cap and closure. Furthermore, INNOSLIP-B does not affect the odor profile of the polymer used, making it suitable for use in food contact packaging.

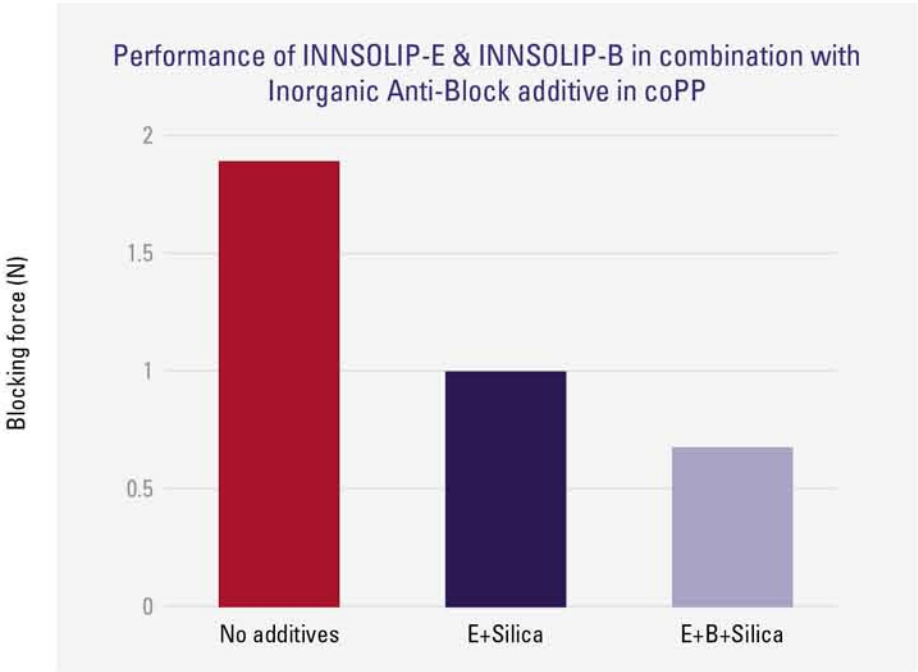
Heat Stability
INNOSLIP-B has superior heat stability, allowing it to with stand up to 270°C of processing temperature.

Low slip & Excellent Anti-Block	
Trade name	INNOSLIP-B
Description	Behenamide
Physical form at 25°C	Bead / Microbead / Powder
Raw material origin	Vegetable
Amide Purity(%)	min. 98.5%
Iodine Value(g I ₂ /100g)	max. 2.0
Melting Point(°C)	105-115
Color(Gardner)	max. 2.0
Acid Value(mg KOH/g)	max. 0.5
Moisture(%)	max. 0.5
Key effects & Recommended uses	*Low Slip / Excellent Anti-Block

INNOSLIP-B Series

Most INNOSLIP additives will improve blocking when used in combination with inorganic materials. INNOSLIP-B is the most effective, migrating to form a continuous non-sticking layer. This allows lower levels of inorganic Anti-Blocking agent to be used, resulting in improved clarity. INNOSLIP-B can be used in combination with INNOSLIP-E, without increasing the total amide level, to give combined slip and Anti-Block performance.

INNOSLIP-B can be used in combination with INNOSLIP-E, without increasing the total amide level, to give combined slip and Anti-Block performance .



PATHWEL™

PROGRESS IN YOUR LIFE



Global Network

Regulatory Information

United States

All INNOSLIP products are listed on the FDA Code of Federal Regulation Title 21 as substances approved for various food contact applications.

European Union

All INNOSLIP products are in compliance with EC Regulation 10 / 2011 on plastic materials and articles intended to come into contact with food. Select products have been REACH registered.

Japan

We are a member of the Japanese Hygienic Olefin and Styrene Association (JHOSPA) and certificates are available upon request.

Halal

Our products are not produced with any raw materials derived from animal-based sources. Our plant is also Halal certified.

SVHC

Our products and their components are not on the list of Substances of Very High Concern (SVHC) under the EU REACH regulation.

RoHS

Our products and their components do not contain any of the ten restricted hazardous substances on the Restriction of Hazardous Substance directive of the EU.

ISO

We are ISO 9001 and 14001 certified.

Certificate



www.pathwel.co.kr



Progress in your life

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