

EINAR® PLANT-BASED, FOOD-GRADE POLYMER ADDITIVES

Anti-fog additives for polypropylene films



PRODUCT NAME

Einar® 618 and Einar® 601

Einar® 422, Einar® 423 and Einar® 406

APPLICATION

Cold fog protection in PP films

Hot fog protection in PP films

Palsgaard®

The plant-based, food-grade anti-fog solutions for polypropylene films

The excellent properties of PP film, such as stiffness, transparency and barrier properties, are creating a steadily growing demand for PP film in food packaging applications and as a result, efficient anti-fog solutions for both cast and BOPP film are becoming a top priority.

With our **Einar®** anti-fog additives specially formulated for PP films you can overcome concerns over food safety and add a renewable component to your PP films and even improve their anti-fog performance without affecting costs.

KEY FEATURES

- ✓ Internal anti-fog additives for additive masterbatches based on polypropylene
- ✓ Custom-designed blends of fatty acid esters of glycerol and polyglycerol made from vegetable oils
- ✓ Highly effective replacement for conventional anti-fog chemistries such as glycerol monooleate or sorbitan esters
- ✓ High heat resistance and low volatility
- ✓ No adverse effects on mechanical, optical, and barrier properties
- ✓ Worldwide approval for food-contact applications

KEY BENEFITS

- ✓ Prevent fogging from chilled and hot packaged food and maintain transparency during storage
- ✓ Efficacy in a broad range of PP types
- ✓ Efficient performance with low loading levels in both cold- and hot fog applications
- ✓ Help to reduce food waste as products will stay fresh for longer and continue to appeal to consumers
- ✓ No worries in food-contact applications
- ✓ Consultancy and technical evaluations available from our applications team

Einar® 422, Einar® 423 and Einar® 406 for PP hot fog applications

Einar® 422 is our tried and true hot fog solution for PP featuring a consistent and long term performance. It is an excellent choice especially for random PP anti-fog application for packing of hot foods on display or microwaved ready meals.

Einar® 423 is a new hot fog development where the focus is long term and consistent anti-fog performance and with a quicker onset. Recommended for PP anti-fog application for packing of hot foods on display or microwaved ready meals in both random PP and BOPP.

Einar® 406 is also a new development for hot fog applications especially in random PP, where requirements are immediate onset and consistent anti-fog performance throughout the period of time for packaged foods in storage at elevated temperatures.

The recommended loading level of our **Einar®** anti-fog additives when incorporated in a random copolymer PP film layer is 0.5 - 1.0%, and when incorporated in a random copolymer PP layer and loading levels for homopolymer PP film are 1.0 - 2.0%.

Einar® 422 product details

Physical/chemical properties:	blend of fatty acid esters monoglycerides, min. 45% acid value, max. 3.0 mg KOH/g melting point, approx. 56°C colour off-white form at 25°C solid
Storage conditions:	Should be stored in a cool and dry place in tightly closed packaging
Packaging:	25 kg multiply paperbag with an inner PE bag
Product form:	Einar® 422 comes in pellets
Total shelf-life:	Min. 24 months

Einar® 423 product details

Physical/chemical properties:	blend of fatty acid esters acid value, max. 3.0 mg KOH/g saponification value 165-185 mg KOH/g melting point, approx. 54°C colour off-white form at 25°C solid
Storage conditions:	Should be stored in a cool and dry place in tightly closed packaging
Packaging:	25 kg multiply paperbag with an inner PE bag
Product form:	Einar® 423 comes in pellets
Total shelf-life:	Min. 24 months

Einar® 406 product details

Physical/chemical properties:	blend of fatty acid esters acid value, max. 6 mg KOH/g Iodine value 19-25 mg KOH/g melting point, approx. 67°C colour off-white form at 25°C solid
Storage conditions:	Should be stored in a cool and dry place in tightly closed packaging
Packaging:	25 kg multiply paperbag with an inner PE bag
Product form:	Einar® 406 comes in paste form
Total shelf-life:	Min. 24 months

HOT FOG TEST OF 1.5% EINAR® 422

Measured in 30µm R-PP

1 min	A	A	A	A	A	A	A
5 min	B	B	A	A	A	A	A
15 min	E	D	C	C	B	B	B
60 min	E	E	D	D	C	C	C
180 min	E	E	E	D	D	D	C
	1 day	7 days	1 month	3 months	6 months	1 year	1.5 year

Days after film manufacture

HOT FOG TEST OF 0.5% EINAR® 423

Measured in 30 my R-PP

1 min	A	A	A	A	A
5 min	C	C	C	C	C
20 min	E	E	E	E	E
60 min	E	E	E	E	E
180 min	E	E	E	E	E
	1 day	7 days	2 weeks	1 month	6 months

Days after film manufacture

HOT FOG TEST OF 1,0% EINAR® 406

Measured in 30 my R-PP

1 min	D	D	D	D	D
3 min	E	E	E	D	C
10 min	E	E	E	E	E
60 min	E	E	E	E	E
180 min	E	E	E	E	E
	1 day	7 days	2 weeks	1 month	6 months

Days after film manufacture

Excellent	E
Acceptable	D
Better	C
Poor	B
Very poor	A

Guidelines for use

Einar® 601 and Einar® 618 should be incorporated into the polymer matrix via a master batch. The physical form of the additives requires that liquid dosing is used in order to meter the additive adequately.

Einar® 422, Einar® 423 and Einar® 406 can be incorporated into the polymer matrix via a masterbatch or by direct addition in the extrusion process.



Einar® 618 and Einar® 601
for PP cold fog applications

Einar® 618 and Einar® 601 will provide good anti-fog performance in PP film and is primarily suited for cold fog applications but will also have good short term properties in a hot fog use. Both products work well in both cast and BOPP film and will be a fast acting anti-fog, producing clear and transparent film for an extended period of time.

The recommended loading level of Einar® 618 and Einar® 601 is 1.0 - 1.5% when incorporated in a random copolymer PP layer and loading level for homopolymer PP film is 1.5 - 2.0%.

Einar® 618 product details

Physical/chemical properties:	polyglycerol ester	
	free fatty acids, max.	4%
	total fatty acid ester	
	content, min.	90%
	melting point, approx.	30°C
	colour	off-white
	form at 25°C	paste
Storage conditions:	Should be stored in a cool and dry place in tightly closed packaging	
Packaging:	180 kg/396.8 lb net in steel drum	
Product form:	Einar® 618 comes in paste form	
Total shelf-life:	Min. 18 months	

Einar® 601 product details

Physical/chemical properties:	polyglycerol ester	
	free fatty acids, max.	3%
	saponification value	160-185 mg KOH/g
	melting point approx.	50°C
	colour	off-white
	form at 25°C	paste
Storage conditions:	Should be stored in a cool and dry place in tightly closed packaging	
Packaging:	180 kg/396.8 lb net in steel drum	
Product form:	Einar® 601 comes in paste form	
Total shelf-life:	Min. 24 months	

COLD FOG TEST OF 1.5% EINAR® 618

Measured in 30µm R-PP

1 min	A	A	A	A	D	D	E
15 min	A	C	C	C	C	D	D
60 min	A	E	E	E	D	D	E
120 min	A	E	E	E	D	D	E
300 min	B	E	E	E	D	D	E
	1 day	3 days	7 days	2 weeks	2 months	3 months	16 months
Days after film manufacture							

COLD FOG TEST OF 1.5% EINAR® 601

Measured in 30µm R-PP

1 min	C	D	D	D	E	E	D
15 min	C	D	D	D	E	E	D
60 min	C	D	D	D	E	E	D
120 min	C	D	D	D	E	E	D
300 min	C	D	D	D	E	E	D
	1 day	3 days	7 days	1 month	2 months	3 months	6 months
Days after film manufacture							

Excellent	E
Acceptable	D
Better	C
Poor	B
Very poor	A

Plant-based, food-grade solutions for the polymer industry

Health and Safety

Einar® polymer additives are safe to use, identified as non-toxic and not expected to cause irritation to the skin, eyes or lungs. They are made from renewable, plant-based material under hygienic conditions. SDS is available on request.

Legal status and other regulatory information

Einar® 618, Einar® 601, Einar® 422, Einar® 423 and Einar® 406

- Food contact compliance for EU, USA, Mercosur, China
Detailed information available on request