



VISCOWAX®

High quality polyethylene waxes
by Innospec Leuna, made in Germany

VISCOWAX® PRODUCTS

The two different groups of polyethylene waxes
with increasing viscosities

Innospec Leuna runs a high pressure polymerisation plant as well as a wax oxidation plant at the vast Leuna chemical site in Germany. The extensive Innospec Leuna wax portfolio is well known under the brand VISCOWAX®.

The following wax categories are produced:

- Polyethylene waxes (PE-waxes)
- Ethylene vinyl acetate copolymer waxes (EVA-waxes)
- Oxidized PE-waxes
- Oxidized EVA-waxes

PE-waxes

With its high pressure polymerisation reactor Innospec Leuna is able to produce a wide range of molecular weights, as indicated by the different values of melt viscosity. Furthermore the polymer structure can be adjusted to obtain either hard waxes with higher melting points and higher densities or softer waxes with lower melting points and lower densities. The structure determines also the degree of crystallinity.

Polyethylene waxes		
High hardness High crystallinity High melting point	Viscosity at 140°C [mm²/s]	Lower hardness Lower crystallinity Lower melting point
VISCOWAX® 111 Dmp: 108-113°C	50 - 80	
VISCOWAX® 112 Dmp: 110-115°C	100 - 200	VISCOWAX® 122 Dmp: 106-112°C
VISCOWAX® 113 Dmp: 111-116°C	200 - 300	VISCOWAX® 123 Dmp: 107-112°C
VISCOWAX® 114 Dmp: 112-117°C	300 - 400	VISCOWAX® 124 Dmp: 110-115°C
VISCOWAX® 115 Dmp: 112-117°C	400 - 500	
VISCOWAX® 116 Dmp: 114-120°C	600 - 800	VISCOWAX® 126 Dmp: 107-113°C

Product	Viscosity @ 140°C [mm²/s]	Drop point [°C]	Penetration [0.1 mm]
VISCOWAX® 111	65	111	≤ 2
VISCOWAX® 112	150	112	≤ 1
VISCOWAX® 122	150	109	≤ 5
VISCOWAX® 113	250	113	≤ 1
VISCOWAX® 123	250	109	≤ 4
VISCOWAX® 114	350	115	≤ 1
VISCOWAX® 124	350	112	≤ 2
VISCOWAX® 115	450	115	≤ 1
VISCOWAX® 116	700	117	< 1
VISCOWAX® 126	700	110	≤ 2

Oxidized PE-waxes

By catalyst-free oxidation of PE-waxes a number of polar, oxidized PE-waxes are accessible.

Three different acid value ranges are covered. Others can be custom-made.

Product	Viscosity @ 140°C [mm²/s]	Drop point [°C]	Penetration [0.1 mm]	Acid value [mg KOH/g]
VISCOWAX® 253	200	109	≤ 2	16
VISCOWAX® 252	200	106	≤ 3	16
VISCOWAX® 272	170	108	≤ 3	22
VISCOWAX® 271	170	104	≤ 4	22
VISCOWAX® 262	150	107	≤ 4	27
VISCOWAX® 261	150	104	≤ 5	27

EVA-waxes

Depending on their vinylacetate content and other characteristics, EVA waxes offer a number of interesting properties.

Product	Viscosity @ 140°C [mm²/s]	Drop point [°C]	Penetration [0.1 mm]	Vac-content [%]
VISCOWAX® 331	65	99	≤ 12	11
VISCOWAX® 334	400	99	≤ 7	11
VISCOWAX® 343	400	95	≤ 12	14
VISCOWAX® 353	600	93	≤ 12	17

Oxidized EVA-wax

Oxidized EVA-wax is a rare specialty and is based on VISCOWAX® 334. In the same way as with the oxidized PE-waxes, functional groups are added to the molecules. As a result of this modification the wax is able to be used in water borne emulsions maintaining the specific properties of an EVA, like flexibility and adhesion.

Product	Viscosity @ 140°C [mm²/s]	Drop point [°C]	Penetration [0.1 mm]	Acid value [mg KOH/g]
VISCOWAX® 453	200	95	≤ 10	16

PROPERTIES AND FUNCTIONS

Waxes from the broad VISCOWAX® portfolio are commonly used as additives in a wide range of applications to produce very different effects, mainly to improve processability and product properties. The requirements for the properties of the waxes are different depending on which function they perform in the final product.

Valuable properties of polyethylene waxes:

- Melting temperatures
- Structure, crystallinity, melting heat
- Crystallization temperature and heat
- Melt viscosity
- Polarity, reactivity
- Chemical inertness
- Hardness
- Gloss
- Dispersability
- Emulsifiability
- Adhesion
- Hydrophobic properties
- Thermostability
- Film forming

Methods of characterization:

Properties	Analysis	Unit	Method	Analogous methods
Thermal properties	Congeaing point/ Set point	°C	DGF M III 4a,	DIN 51 556, ISO 2207, ASTM D 938-60
	Drop melting point	°C	DGF M III 3 (Mettler)	DIN 51 801
	DSC	-		DIN 53 765
Rheology	Kinematic viscosity (Ubbelohde)	mm ² /s	DGF M III 8	DIN 51 562
	Dynamic viscosity	mPas	DGF M III 8	ISO 3219
Hardness	Needle penetration	0.1 mm	DGF M III 9b	DIN 51 579
Colour	Yellowness index	-	Dr. Lange	ASTM E313
Density		g/cm ³	ISO 1183, C	
Acid value	Titrimetric	mg KOH/g	DGF M IV 2	ISO 3682
Saponification value	Titrimetric	mg KOH/g	DGF M IV 2	ISO 3681
Vinyl acetate content	Titrimetric, FTIR	%	Internal method	

Important functions of PE-waxes

LUBRICATING EFFECTS

Because of their low viscosity at temperatures slightly above the melting point the polyethylene waxes have a lubricating effect in plastics processing.

WETTING AND DISPERSING EFFECT

Based on its low viscosity as a melt VISCOWAX® is able to wet the pigments or additives easily. Dispersing work is therefore reduced which results in higher dispersion quality.

SURFACE MODIFYING EFFECTS

- Hydrophobing
- Sealing
- Smoothness
- Gloss
- Matting
- Slip, anti-blocking
- Scratch-, abrasion-, mar-resistance

VISCOSITY ADJUSTMENT

Increasing viscosity for paraffin blends,
decreasing viscosity in plastics based compounds.

RETENTION EFFECT / RHEOLOGY EFFECT

Polyethylene waxes are able to incorporate lower molecular organic substances, like oils or solvents, in their polymeric structure forming pastes.

RELEASE / PARTING EFFECTS

Except for the EVA-waxes, all VISCOWAX® grades can form inert, non-sticky films on several surfaces. In sticky materials PE-waxes can reduce the stickiness and be helpfully in de-moulding.

Important functions of EVA-waxes

ADHESIVENESS EFFECT

EVA-waxes are in opposite to PE-waxes rather sticky and can improve the stickiness of adhesive materials.

COMPATIBILIZER EFFECT

EVA-waxes consist of polar and non-polar segments. Therefore they have better compatibility with more polar plastics or additives and may be used as compatibilizer in formulations with ingredients of different polarity.

WETTING AND DISPERSING EFFECT

EVA-waxes show a very good wetting and dispersion performance for heavy to disperse polar pigments / additives.

FLEXIBILITY

Whereas PE-waxes are relatively brittle the EVA-waxes are more flexible.

VISCOWAX® applications

Plastics processing	Lubricants for plastics and PVC processing Masterbatches Rubber
Coatings	Printing inks Paints, lacquers and varnishes Paper coating Corrosion protection
Compounds	Candles Hotmelts Insulating and cable compounds
Emulsions	Textile and leather processing Fruit coating
Polishes	Floor polish Shoe polish Car polish
Release agents	Plastics industry Aluminium die cast

Status under food legislation

Most of the VISCOWAX® grades have been licensed for the manufacture of materials and articles intended to come into contact with food according to the respective FDA-rules and EU-regulations. Please find further details in the individual product data sheets.

Form of delivery, packaging and storage

VISCOWAX® is shipped palletised as dust-free powder in PE and Paper sacks of 25kg each. Shipment in big bags of different sizes is possible upon request.

The product shall be stored in its original packaging at room temperature in a dry place. It must not be stored together with amines. Avoid direct sun radiation and water contact.

Safety

VISCOWAX® has not been classified as hazardous materials in accordance with the Regulation (EC) No. 1272/2008 (CLP/GHS) and therefore it does not require marking. It is insoluble in water and has no harmful effect on fish and bacteria. Disposal of the product is to be carried out in accordance with the local regulations.

Please refer to the Safety Material Data Sheet for further safety-relevant information.

The facts stated and the recommendations made are based on our own research and/or the research of others, and are believed to be accurate. No guarantee of their accuracy is made, however, and unless otherwise expressly provided by law or in written contract, the materials are sold without warranties, expressed or implied, in particular without guarantee as to suitability for particular purpose. Innospec assumes no responsibility for injury or damage to users or third parties. Recipient agrees to assume all risk and liability whether used singly or in combination with other materials.

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