



Luwax[®] and Poligen[®] Application Guide

Polyethylene based waxes, polymers and emulsions

Polyethylene homopolymers

Luwax® polyethylene homopolymers are synthetic waxes of very high purity, as expressed by the absence of acid groups, saponifiable matter and metal residues. They are very hydrophobic polymers of strongly branched nature, with varying degrees of hardness, melting points and melt viscosities.

Polyethylene homopolymers are typically used as processing aids in high temperature processes, e.g. as lubricant, dispersant, mold release agent, or to control melt viscosity. In solid form they are used to modify optical, mechanical and tactile properties of films and surfaces.

Luwax® ethylene based homopolymers

Polyethylene homopolymers

	Luwax® A Types	Luwax® AH 3 Powder	Luwax® AH 6 Types	Luwax® AL 3 Powder	Luwax® AM 3 Powder
Physical Forms	Powder, granules	Powder	Powder, granules	Powder	Powder
Characterization	soft, highly branched	hard, low viscosity	hard, high viscosity	soft, low viscosity	matting
Melting Point [°C]	101 - 109	110 - 118	108 - 116	102 - 108	104 - 108
Recrystallization Point [°C]	92 - 98	100 - 104	100 - 105	92 - 100	92 - 100
Dropping Point [°C]	107 - 114	112 - 120	110 - 120	101 - 112	101 - 112
Hardness [N/mm²]	10 - 25	23 - 35	25 - 35	10 - 20	approx. 20
Acid no. [mg KOH/g]	0	0	0	0	0
Saponif. no. [mg KOH/g]	0	0	0	0	0
Viscosity, 120 °C [mPas]	600 - 1200	105 - 205	700 - 1300	105 - 205	105 - 205
Typical applications	PVC processing (lubricant) Masterbatch (dispersant) Mold release agents Coatings & printing inks Polishes	Coatings & printing inks Hot melt adhesives Polishes	PVC processing (lubricant) Coatings & printing inks Hot melt adhesives Polishes	PVC processing (lubricant) Masterbatch (dispersant) Hot melt adhesives Polishes	Coatings

Micronized polyethylene homopolymers

Luwax® *micronized* polyethylene homopolymers are produced by means of a proprietary process that results in spherical particles of various particle sizes. The spherical nature of these micronized waxes facilitates easy and fast homogenization, especially compared to irregular shaped particles obtained through milling and grinding processes.

Luwax® micronized polyethylene homopolymers are made from hard waxes and are typically used to modify optical, mechanical and tactile properties of coated or printed surfaces. In high temperature processes they tend to melt faster than powder or granular grades, thus they can be used where fast action as lubricant or dispersant is required.

Luwax® ethylene based homopolymers

Micronized polyethylene homopolymers

	Luwax® AF 29 Micropowder	Luwax® AF 30 Micropowder	Luwax® AF 31 Micropowder	Luwax® AF 32 Micropowder
Physical Forms	Micronized, spherical particles	Micronized, spherical particles	Micronized, spherical particles	Micronized, spherical particles
Characterization	hard, low viscosity	hard, low viscosity	hard, low viscosity	hard, low viscosity
Melting Point [°C]	110 - 118	110 - 118	110 - 118	110 - 118
Recrystallization Point [°C]	100 - 105	100 - 105	100 - 105	100 - 105
Dropping Point [°C]	112 - 120	112 - 120	112 - 120	112 - 120
Hardness [N/mm²]	23 - 40	23 - 40	23 - 40	23 - 40
Acid no. [mg KOH/g]	0	0	0	0
Saponif. no. [mg KOH/g]	0	0	0	0
Average particle size [µm]	≤ 7.5	≤ 8.5	≤ 10	≤ 12
Viscosity, 120 °C [mPas]	105 - 205	105 - 205	105 - 205	105 - 205
Typical applications	Coatings & printing inks	Coatings & printing inks	Coatings & printing inks	Coatings & printing inks Masterbatch (dispersant)

Oxidized polyethylene homopolymers

Luwax® *oxidized* polyethylene homopolymers exhibit a higher polarity than unmodified polyethylene waxes. They are still highly hydrophobic polymers, yet the polar groups introduced by oxidation allow for easy emulsification in aqueous systems and facilitates some polar interactions in the final application.

Luwax® oxidized polyethylene homopolymers are typically used to prepare wax emulsions which are used in various industries to modify properties of surfaces and fibers. Additionally they are used as lubricants in the PVC industry.

Luwax® functionalized hydrophobic polymers

Oxidized polyethylene homopolymers

	Luwax® OA Pastille	Luwax® OA 2 Types	Luwax® OA 3 Powder	Luwax® OA 5 Types	Luwax® OA 6
Physical Forms	Pastilles	Powder, pastilles	Powder	Powder, pastilles	Powder
Characterization	soft, low melting point	soft	hard	soft, for food contact	hard, for food contact
Melting Point [°C]	94 - 104	103 - 112	126 - 133	103 - 112	126 - 133
Recrystallization Point [°C]	88 - 94	94 - 100	115 - 119	95 - 101	114 - 119
Dropping Point [°C]	101 - 107	107 - 113	128 - 135	107 - 113	128 - 135
Hardness [N/mm²]	8 - 18	20 - 30	60 - 70	22 - 32	56 - 66
Acid no. [mg KOH/g]	19 - 25	19 - 25	20 - 24	15 - 19	17.5 - 19
Saponif. no. [mg KOH/g]	20 - 40	20 - 40	24 - 30	20 - 30	20 - 30
Viscosity, 120 °C [mPas]	165 - 415	170 - 360	4500 (140 °C)*	230 - 370	6500 (140 °C)*
Typical applications	Hard surface care Textile finishing Construction (release) Water repellency	PVC processing (lubricant) Construction (release) Water repellency	Hard surface care Textile finishing	PVC processing (lubricant) Fruit coating Water repellency	Hard surface care Textile finishing

*: Viscosity in mm²/s (DIN 51562)

Polyethylene copolymers

Luwax[®] polyethylene *copolymers* are functionalized hydrophobic polymers. The utilized comonomers introduce functional groups into the polyethylene chains, like esters in Luwax[®] EVA Types, carboxylic acids in Luwax[®] EAS 5 Granules, or ethers in Luwax[®] V Flakes. This way a choice of different polarities, functions and chemical interactions is provided.

The thixotropic effect Luwax[®] EVA 1 Granules is utilized in solvent born metallic coatings. Luwax[®] EVA 3 Types are dispersion agents for polar pigments in masterbatches. Luwax[®] EAS 5 Granules, emulsifiable without emulsifier, forms strong films on metal, glass and other surfaces. Luwax[®] V Flakes is especially suitable for wax finishings for leather.

Luwax[®] functionalized hydrophobic polymers

Polyethylene copolymers (powders & granules)				Polyvinylether
	Luwax [®] EVA 1 Granules	Luwax [®] EVA 3 Types	Luwax [®] EAS 5 Granules	Luwax [®] V Flakes
Physical Forms	Granules	Powder, granules	Granules	Flakes
Characterization	vinylacetate comonomer 9.5% - 11.5%	vinylacetate comonomer 13% - 15%	carboxylic acid comonomer 25% - 29%	Vinylether
Melting Point [°C]	84 - 92	92 - 97	75 - 85	47 - 51
Recrystallization Point [°C]	74 - 86	80 - 88	40 - 52	approx. 40
Dropping Point [°C]	93 - 100	98 - 104	n/a	49 - 53
Hardness [N/mm²]	5 - 12	9 - 15	7 - 14	28 - 32
Acid no. [mg KOH/g]	0	0	160 - 180	0
Saponif. no. [mg KOH/g]	0	0	approx. 170	0
Viscosity, 120 °C [mPas]	1125 - 1625	900 - 1200	MFI: 8 - 12 g/10 min (160 °C/325g)	approx. 180
Typical applications	Coatings	Masterbatch (dispersant) Hot melt adhesives	Hot melt adhesives Surface hydrophobation Surface protection Water repellency (paper/wood)	Leather finishing Polishes (stone floors) Mold release

Poligen® aqueous emulsions (I)

Poligen® aqueous emulsions based on *oxidized* polyethylene waxes provide the properties of oxidized waxes via an easy to use liquid form. They are especially useful in water based systems and find use as part of coating and printing formulations as well as in home care and I&I. Depending on the application needs, softer and harder wax variant are available, with and without food contact approvals.

Poligen® MW 2, a montan wax based emulsion, is mainly used in hard surface cleaning and polishing applications due to its good buffability, but also finds use as mold release agent.

Poligen® aqueous emulsions of hydrophobic polymers

Oxidized polyethylene homopolymers

	Poligen® WE 1	Poligen® WE 6	Poligen® WE 7	Montan Wax Poligen® MW 2
Characterization	hard	hard, for food contact	soft	buffability
Solid content [%]	34 - 35	33 - 36	38 - 41	38 - 42
Viscosity [ISO cup, 4 mm]	20 - 36	20 - 60	40 - 100*	approx. 25
pH value	9 - 10	7.5 - 9.5	8.5 - 9.5	4.0 - 6.0 (10% in water)
Transmission (LT)	approx. 75	approx. 65	65 - 95	
Typical applications	Hard surface care Coatings & printing inks Water repellency (paper/wood)	Hard surface care Coatings & printing inks Water repellency (paper/wood)	Hard surface care Coatings & printing inks Water repellency (paper/wood)	Hard surface care Polishes

*: ISO cup, 5 mm

Poligen® aqueous emulsions (II)

Poligen® copolymer based aqueous emulsions contain different grades of carboxylic acid containing hydrophobic polymers. They are free of surfactants and emulsifiers and convey the specific film forming and surface modifying properties of such copolymers, as often needed in coating, sealing, lamination and adhesive applications.

Poligen® aqueous emulsions of hydrophobic polymers

Polyethylene copolymers

	Poligen® WE 3	Poligen® WE 4	Poligen® CE 12	Poligen® CE 18
Characterization	comonomer: carboxylic acid	comonomer: carboxylic acid	comonomer: carboxylic acid	comonomer: carboxylic acid
Solid content [%]	24 - 26	20 - 22	24 - 26	20 - 24
Viscosity [ISO cup, 4 mm]	< 85*	25 - 170	< 85*	< 30
pH value	8.5 - 9.5	8.5 - 9.5	8.5 - 9.5	8.5 - 9.5
Transmission (LT) [%]	approx. 90	approx. 95	approx. 70	approx. 90
Typical applications	Coatings adhesives/sealing/laminating Surface hydrophobation Surface protection Water repellency (paper/wood)	Coatings adhesives/sealing/laminating Surface hydrophobation Surface protection Water repellency (paper/wood)	Coatings adhesives/sealing/laminating Surface hydrophobation Surface protection Water repellency (paper/wood)	Coatings adhesives/sealing/laminating Surface hydrophobation Surface protection Water repellency (paper/wood)

*: ISO cup, 5 mm

Test Methods:

Melting Point	DSC (DIN 51007)	Viscosity (wax melts)	BASF method, RotoVisco, 120 °C
Recrystallization Point	DSC (DIN 51007)	MFI* (wax melts)	DIN EN ISO 1133
Dropping Point	DIN ISO 2176	Viscosity (emulsions)	DIN EN ISO 2431, ISO cup, 4 mm (5 mm where indicated)
Hardness	Ball hardness, 23 °C (Fischer, DIN EN ISO 6507-1)	pH value	DIN 19268, 23 °C
Acid Number	DIN EN ISO 2114	Transmission	BASF method
Saponification Number	DIN EN ISO 3681	Solid Content	DIN EN ISO 3251
Average Particle Size	Coulter Counter	*: Melt Flow Index	

DISCLAIMER

This document, or any answers or information provided herein by BASF, does not constitute a legally binding obligation of BASF. While the descriptions, designs, data and information contained herein are presented in good faith and believed to be accurate, they are provided for your guidance only. Because many factors may affect processing or application/use, we recommend that you make tests to determine the suitability of a product for your particular purpose prior to use. It does not relieve our customers of the obligation to perform a full inspection of the products upon delivery or any other obligation. The claims and supporting data provided in this publication have not been evaluated for compliance with any jurisdiction's regulatory requirements and the results reported may not be generally true under other conditions or in other matrices. Users must evaluate what claims and information are appropriate and comply with a jurisdiction's regulatory requirements. **NO WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE REGARDING PRODUCTS DESCRIBED OR DESIGNS, DATA OR INFORMATION SET FORTH, OR THAT THE PRODUCTS, DESIGNS, DATA, OR INFORMATION MAY BE USED WITHOUT INFRINGING THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS. IN NO CASE SHALL THE DESCRIPTIONS, INFORMATION, DATA, OR DESIGNS PROVIDED BE CONSIDERED A PART OF OUR TERM AND CONDITIONS OF SALE.**

Safety

We know of no ill effects that could have resulted from using our products for the purpose for which they are intended and from processing them in accordance with current practice. According to the experience we have gained up to now and other information available at our disposal, our products do not exert any harmful effects on health, provided that they are used properly, due attention is given to the precautions necessary for handling chemicals, and the information and advice given in our safety data sheet are observed.

Labelling

Details about the classification and labelling of our products and further advice on safe handling are contained in the current safety data sheets.



We create chemistry