
Technical Information

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® = Registered trademark of
BASF Aktiengesellschaft

Luwax[®] A Granules Luwax[®] A Powder

Low-density ethylene homopolymer wax

For printing inks, PVC manufacturing, cable fillers, wax dispersions,
coating waxes, polishes, masterbatches and coatings

Chemical nature

Low-density polyethylene wax

Properties

	Test methods		
	DIN	ASTM	
Melting point (DSC)	51007	D-3418	101–109 °C
Dropping point (Ubbelohde)	51801	D-3954	107–114 °C
Melt viscosity (120 °C)	51562	D-2162	950–1550 mm ² /s
Density (23 °C)	53479	D-792	0.910–0.930 g/cm ³
Molar mass			approx. 7000 g/mol

The above information is correct at the time of going to press. It does not necessarily form part of the product specification.

A detailed product specification is available from your local BASF representative.

Storage

Luwax[®] A Powder/Granules has an unlimited shelf life in its original packaging, provided it is stored correctly in a dry place. The packaging needs to be inspected occasionally to ensure that it is still intact.

Solubility

Luwax[®] A Powder/Granules is insoluble in water at room temperature and is insoluble or only very sparingly soluble in all the usual organic solvents. It is soluble at elevated temperatures in aliphatic, aromatic and chlorinated hydrocarbons and most other solvents that are not too polar.

The following table shows the temperature at which Luwax[®] A Powder/Granules forms a clear 10% solution in selected solvents. There is also a "cloud point" at which the wax begins to recrystallize on cooling.

Solvent	Clear point (°C)	Cloud point (°C)
(all figures are approximations)		
white mineral spirits	77	72
xylene	72	64
toluene	68	65
turpentine oil	73	67
spindle oil	84	78
perchloroethylene	67	61
Shellsol A	72	66
butyl acetate	110	105

These 10% solutions cool to form pastes with varying degrees of firmness.

Miscibility

Luwax[®] A Powder/Granules can be blended with many other types of waxes, resins and polymers simply by melting and stirring them together.

The compatibility of Luwax[®] A Powder/Granules with the substances listed below was determined by melting them and mixing them together in the ratios 9:1 and 1:9.

With only one exception, a homogeneous mixture was formed in solid and liquid form in all cases.

	9:1	1:9
Block paraffin wax	+	+
Candelilla wax	+	+
Carnauba wax	+	+
Crude montan wax	+	+
Ethylene/vinylacetate copolymer (e. g. Luwax [®] EVA 1)	+	+
Fischer-Tropsch-wax	+	+
Hard and soft microcrystalline wax	+	+
Hydrocarbon resin	+	+
Luwax [®] E Powder/Flakes	+	+
Luwax [®] LG Flakes	+	+
Oxidized polyethylene wax (e. g. Luwax [®] OA Pastilles and Luwax [®] OA 2 Pastilles/Powder)	+	+
Luwax [®] OP Powder/Flakes	+	-
Luwax [®] V Flakes	+	+
Polyethylene (Lupolen [®])	+	+
Polyisobutylene (Oppanol [®] B grades)	+	+
Rosin and its derivatives	+	+

+ = Forms a homogeneous mixture

- = Does not form a homogeneous mixture

Applications

General properties and possible uses

Properties	Applications/possible uses
Hardness, toughness	<ul style="list-style-type: none"> – polishes with hard-wearing films – rub-resistant printing inks
Good solvent binding	<ul style="list-style-type: none"> – firm, fine, fatty and thermally stable pastes for solvent-based polishes – thickener for mineral oils and Vaseline
Good buffability	<ul style="list-style-type: none"> – polishes which form high-gloss films, e. g. floor polish, shoe polish, car polish
Forms finely divided pastes	<ul style="list-style-type: none"> – printing inks – shoe polishes – corrosion-resistant wax coatings, impregnating agents and mould-release agents
Good lubricating and separating effect	<ul style="list-style-type: none"> – processing aid for natural and synthetic rubber – external lubricant for PVC processing – mould-release agent
Dispersibility	<ul style="list-style-type: none"> – pigment masterbatches for colouring polymers – wax crayons and mechanical self-copying paper
Compatibility	<ul style="list-style-type: none"> – wax coatings, laminating adhesives and hot-melt adhesives
High strength	<ul style="list-style-type: none"> – candles
Electrical insulating effect	<ul style="list-style-type: none"> – filling and insulating compounds for electrical components and circuits
Hydrophobic	<ul style="list-style-type: none"> – Temporary anti-corrosion coatings for motor vehicles and machine parts – leather polishes and car polishes – impregnating agent and water repellent for the front of buildings, prefabricated joinery etc. – PVC processing – coating of granular fertilizers
Good resistance to ageing and UV-light	<ul style="list-style-type: none"> – latex, rubber

Printing inks

Luwax® A Powder/Granules improve the printing properties of offset printing inks. They improve the rub resistance and scratch resistance and have an effect on the surface smoothness of the finished prints.

For use in offset printing inks, 20–30 % Luwax® A Powder/Granules are dissolved in mineral oil at 110–130 °C by stirring. Upon cooling, fine crystal-line pastes are formed. The wax can also be dissolved and dispersed in a similar way in varnishes containing no mineral oil.

Masterbatches

Luwax® A Powder are used as dispersants in the manufacture of masterbatches for colouring polyethylene, polypropylene, PVC and polystyrene. The strong pigment dispersion effect, the good mixing properties and the relatively low melt viscosity guarantee quick and homogeneous distribution of the pigments in these polymers without damaging their mechanical properties.

PVC

As a hydrocarbon wax, Luwax® A Powder is only slightly soluble in PVC and therefore acts as an external lubricant for plasticised and unplasticised PVC. It prevents the PVC melt from sticking and burning on to the hot metal surfaces of the processing machinery. The production cycle becomes more even and the surface properties of the PVC products, such as their gloss, smoothness and water repellency, are improved. The amount added is usually between 0.1 and 0.6 phr (parts per hundred resin). Luwax® A Powder is frequently combined with external/internal lubricants (e. g. montanic ester waxes such as Luwax® E Powder or Luwax® OP Powder) or with internal lubricants.

Luwax[®] A Powder is also being used increasingly in the extrusion of pipes and profiles because it produces a more even, smoother and glossier surface than paraffins and microwaxes. It increases, especially, the non-stick effect and water repellency.

Luwax[®] A Powder is also used as an external lubricant in stabiliser-lubricant compounds for extrusion.

Polyurethane foams

Dispersions of Luwax[®] A Powder, with or without other waxes, in aliphatic and aromatic hydrocarbons are very good mould release agents for the manufacture of polyurethane foams.

Other plastics

With regard to thermoplastics and thermoset moulding compounds, the addition of 0.5–2 % Luwax[®] A Powder increases the output and mould release effect in the injection moulding process.

In impact-modified polystyrene, 0.5–3 phr Luwax[®] A Powder improve scratch resistance without impairing the mechanical and thermal properties.

Rubber

Luwax[®] A Powder acts as an auxiliary in the production of natural rubber and synthetic elastomers. It

- prevents inherent tack (especially in the case of chlorinated elastomers),
- improves the rheological properties of rubber compounds during injection moulding and calendaring,
- make the surface of the rubber smoother and more water-repellent,
- reduces the shrinkage of rubber mixes and of vulcanised products,
- reduces the frosting effect (chalking of highly filled compounds) and
- increases the ozone protection effect, as an antioxidant.

Depending on the intended application, up to 6 phr may be used without changing the properties of vulcanizates. Luwax[®] A Powder is added right at the start of the mixing process because this helps to disperse fillers and pigments.

Polishes

Luwax[®] A Powder/Granules form smooth fine crystalline pastes with good oiling properties, which retain their consistency at high temperatures. The exudation of solvents is reduced to a minimum. These properties can, for example, be transferred to upgrade the properties of paraffin wax.

Luwax[®] A Powder/Granules are thus an important balancing component for the manufacture of pastes and creams for floor polish, shoe polish, car wax, furniture wax and ski wax, which usually contain paraffin wax, microcrystalline waxes and montanic ester waxes dissolved in mineral spirits.

To manufacture the wax pastes, the components are blended together at 119–130 °C. The pre-heated solvent is then added; at this stage, a clear solution must be produced. The mixture is cooled down, with simultaneous stirring, until clouding clearly starts to occur (pouring temperature) and is poured out into tins or plastic tubes.

Better-compounded pastes are obtained if the warm solvent is added in such a way that a cloudy dispersion is produced which is then heated up until there is a small amount of residual cloudiness and then cooled down again to the pouring temperature.

Very finely divided liquid wax dispersions can also be produced with Luwax[®] A Powder/Granules, by lowering the wax concentrations or in the presence of substances which have a liquefying effect on wax gels, such as Luwax[®] V Flakes or magnesium stearate. Upon drying, they form very dense, buffable wax films which are easy to polish and they are therefore suitable as an additive for liquid floor polishes or for other applications in which the formation of wax films is required (e.g. car waxes and furniture polishes). In the manufacture of fine and low-viscosity wax dispersions with Luwax[®] A Powder/Granules it is important to cool down the clear solution of the waxes in the solvent as quickly as possible whilst stirring vigorously (water cooling). A further improvement in the fineness of the particles is provided by subsequent brief homogenisation with a high-speed stirrer (e.g. Ultra-Turrax).

Sudan dyes or dye base pulping can be used to colour solved-based wax preparations.

Starting formulations for the production of floor polishes and shoe polishes are given in the following tables.

	Solid floor polishes for tins		Liquid floor polishes, wax dispersions	
(All figures in % w/w)				
Formulation No.	1	2	3	4
Solid content in %	25	25	12	12
Luwax® A Powder/Granules	6.0	4.0	2.0	2.5
Luwax® OP Powder/Flakes	–	2.5	–	–
Hard microcrystalline wax (melting point approx. 85 °C)	2.0	2.0	1.5	2.5
Soft microcrystalline wax (melting point approx. 72 °C)	2.0	1.5	2.0	2.0
Paraffin wax (melting point 52–54 °C)	15.0	15.0	6.5	4.5
Luwax® V Flakes	–	–	–	0.5
White spirit	75.0	75.0	88.0	88.0
Pouring temperature in °C	57	57		

	Shoe polishes packed in tins	
(All figures in % w/w)		
Formulation No.	1	2
Solid content in %	25	25
Luwax® A Powder/Granules	4.0	7.0
Luwax® OP Powder/Flakes	4.0	2.0
Hard microcrystalline wax (melting point approx. 85 °C)	4.0	–
Soft microcrystalline wax (melting point approx. 72 °C)	1.0	2.0
Paraffin wax (melting point 52–54 °C)	12.0	14.0
Turpentine oil	–	15.0
White spirit	75.0	60.0
Pouring temperature in °C	57	57

Metal industry

Upon drying, liquid dispersions of Luwax® A Powder/Granules, either alone or together with other waxes, in aliphatic or aromatic hydrocarbons (see section on “Polishes”) form very dense, buffable films on surfaces; these films are impervious to air, corrosive gases, water, salt solutions, acids, alkalis, coolant and other aggressive substances. These films are therefore very good for protecting metal surfaces from corrosion, e.g. during transportation by sea or during storage of new tools, machinery and motors, to preserve the coated surface of new motor vehicles, refrigerators, washing-machines etc., and for car underbody protection.

Because of the high dropping point of Luwax® A Powder/Granules, these anticorrosion films can even be used at working temperatures of up to 90 °C, depending on the composition of the wax blends. The wax films can be removed easily and completely with cold cleaning agents based on organic solvents (aliphatic hydrocarbons) and surfactants. Steam-jet cleaning also works very well.

Formulations 3–4 for liquid floor polishes (on page 6) can be recommended for the production of fine wax dispersions with Luwax® A Powder/Granules. A balancing of film properties, like for example buffability, toughness, adhesion and anti-corrosion effect, can be achieved by means of additives such as mineral oils, silicone oils, resins, bitumen and corrosion inhibitors.

Construction industry

Liquid dispersions of Luwax® A Powder/Granules, together with paraffins and microcrystalline waxes, are good stripping agents for stripping exposed concrete, especially where there are textured relief surfaces.

At the same time, these dispersions are good impregnating agents and water repellents for concrete-covered walls which are particularly exposed to an industrial or sea atmosphere. They can be coloured with light-resistant and weather-resistant inorganic or organic pigments and thus function as a masonry paint at the same time.

Hot-melt coatings with Luwax® A Powder/Granules, which can also be blended with other waxes, act as separating films on bitumen boards and sheeting to prevent them from sticking when they are piled up or rolled up.

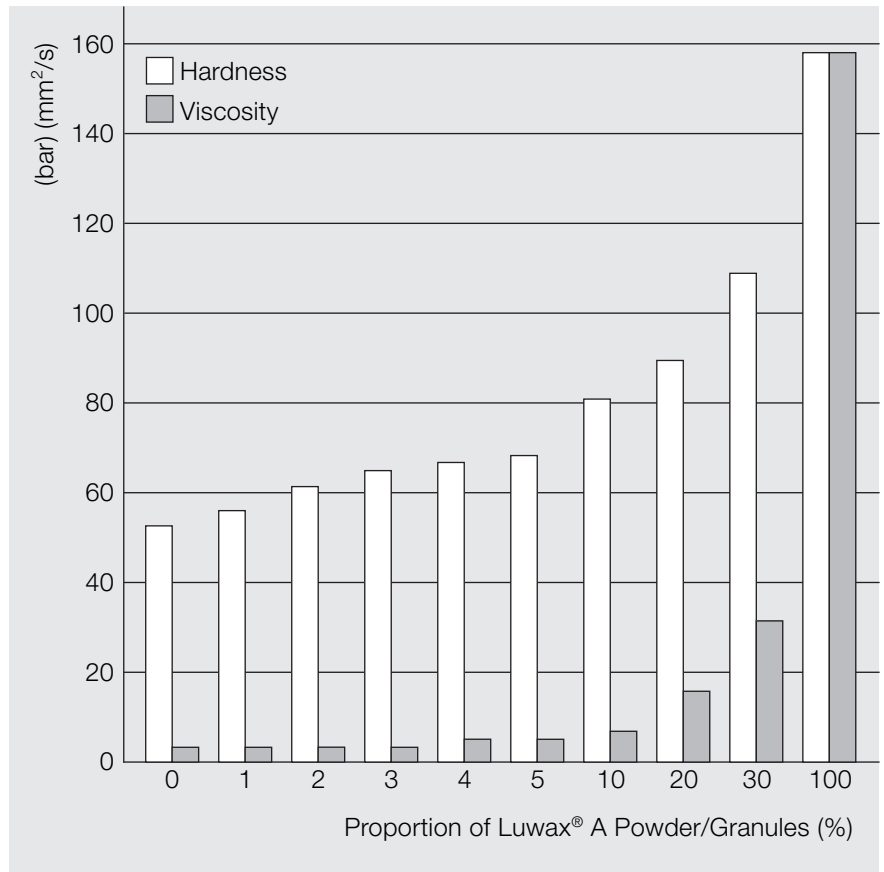
Mineral oil industry

Because of their solvent binding (retention) property, Luwax® A Powder/Granules can also be used to thicken lubricating oils or to give soft mineral fats and Vaseline a more solid consistency. The quantities which need to be added are generally below 5 %.

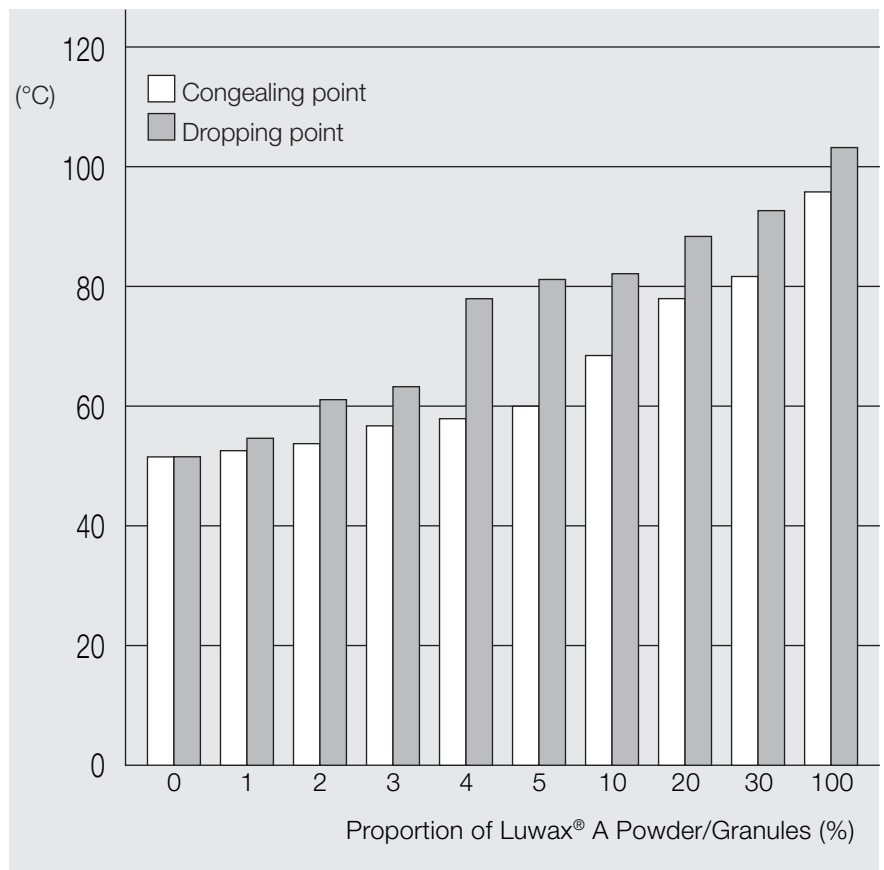
Paper & packaging industry

Even small additions of Luwax® A Powder/Granules to paraffins and microcrystalline waxes increase their hardness, abrasion resistance, toughness, blocking point and melting point. Water vapour and grease permeability are reduced. Luwax® A Powder/Granules are therefore suitable as a balancing component in coating and laminating waxes for all types of waxed paper, for food packaging, e. g. frozen food packaging, and in hot-melt adhesives. These coating waxes consist of paraffins, microcrystalline waxes and ethylene vinyl acetate copolymers. Hydrocarbon resins are added to produce sealing properties ("hot tack"). True hot-melt adhesives have a high resin content. Luwax® A Powder/Granules are compatible with all these substances and can therefore easily be mixed in with the melt. The addition of Luwax® A Powder/Granules also has the effect that low-viscosity melts of coating waxes are less easily absorbed by the paper, so the area which can be covered with a given quantity is increased.

The charts below show the strong effect which small amounts of Luwax® A Powder/Granules have on the properties of paraffin (e. g. with melting point 52/54 °C).



Modifying the properties of paraffin wax with Luwax® A Powder/Granules



Modifying the properties of paraffin wax with Luwax® A Powder/Granules

Office supplies industry

For mechanical self-copying papers, Luwax® A Powder/Granules can be used as a component on the receiving page to optimise hardness, rub resistance and transfer properties.

Luwax® A Powder/Granules constitute an essential ingredient in non-staining wax crayons based on the following formulation:

Wax crayons

(All figures in % w/w)

37 Luwax® A Powder/Granules
28 Soft microcrystalline wax (Ozokerit)
10 Paraffin wax (melting point 50/52 °C)
15 Kaolin
4 Titanium dioxide
5–6 pigment

Luwax® A Powder/Granules improve hardness and thereby the writing properties of wax crayons. For extrusion, it is better to increase their content at the expense of the soft waxes.

Candle industry

The heat resistance and breaking strength of typical candle blends, consisting of 60–80 % paraffin wax (melting point 52/54 °C) and 20–40 % stearin, can be improved by the addition of 0.3–1 % Luwax® A Powder/Granules. A dip-coating compound for the outside of the candle with a shine and good mechanical strength may, for example, consist of 97 % paraffin wax (melting point 52/54 °C), 3 % Luwax® A Powder/Granules and approx. 0.2 % Sudan dye.

Electrical industry

Because of their good dielectric and mechanical properties Luwax® A Powder/Granules can also be used in combination with paraffins to make filling and insulating compounds for electrical components and circuits. The following table shows some typical values:

Dielectric properties of Luwax® A Powder/Granules

Dielectric constant	
DIN 53483	
23 °C, 10 ³ –10 ⁶ Hertz	2.2–2.3
Dielectric loss factor	
DIN 53483	
23 °C, 10 ³ –10 ⁶ Hertz	tan = 0.0005
Resistivity	
DIN 53482	
25 °C	10 ¹⁶ Ohm · cm

Food-contact legislation

Luwax® A Powder/Granules is listed in European Resolution AP (96)5 dated 02. 10. 1996.

Luwax® A Powder/Granules is mentioned in Section E No. 3 of Resolution XXV of BfR on “Hard paraffins, microcrystalline waxes and blends of these with waxes, resins and polymers” (version dated 01.06.1998).

Luwax® A Powder/Granules is included in Resolution IX of BfR on “Pigments for colouring plastics and other polymers for essential consumer goods” dated 01. 06. 94.

Luwax® A Powder/Granules meets the requirements of FDA regulation 21 CFR 177.1520 “Olefin polymers”.

The composition meets the requirements of FDA regulation 21 CFR 176.170 (b) “Components of paper and paperboard in contact with aqueous and fatty foods”.

The composition meets the requirements of FDA regulation 21 CFR 175.300 “Resinous and polymeric coatings”.

The composition meets the requirements of FDA regulation 21 CFR 172.615 “Chewing gum base”.

Safety

We know of no ill effects that could have resulted from using Luwax[®] A Powder/Granules for the purpose for which they are intended and from processing them in accordance with current practice.

According to the experience we have gained over many years and other information at our disposal, Luwax[®] A Powder/Granules do not exert any harmful effects on health, provided that they are used properly, due attention is given to the health and safety precautions necessary for handling chemicals, and the information and advice given in our safety data sheets are observed.

Handling

Provide respiratory protection, eye protection and protection against electrostatic charging when transferring large quantities of powder without suction equipment.

It is advisable to sweep up any spillage immediately to avoid the risk of slipping.

Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

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