# Shaping the Future of Sustainable Wood Coatings with Bio Based and Microplastic Free Wax Additive Technologies

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# Definition of “Wax”

- A wax is a low melting organic material or compound which is solid at 40°C.
- Waxes have a sharp melting point. Only a few degrees above the melting point their melt viscosity reaches its minimum.
- Chemically waxes may be hydrocarbons, fatty alcohols, esters of fatty acids, etc.
- If several of these criteria are not met, material generally not classified as a wax.
- **Primarily defined by characteristic physical behaviour rather than chemical composition**



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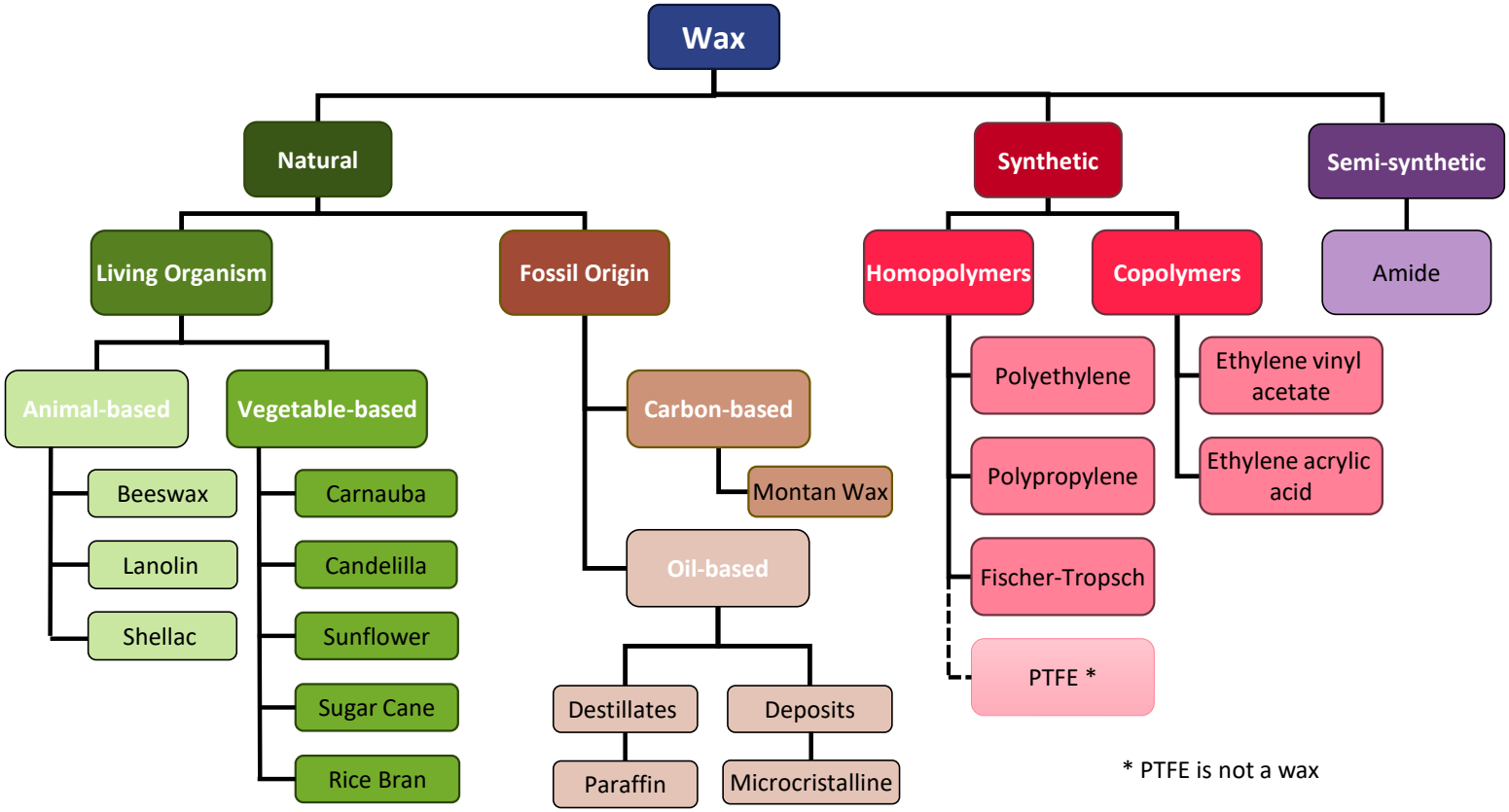
# Wax origin

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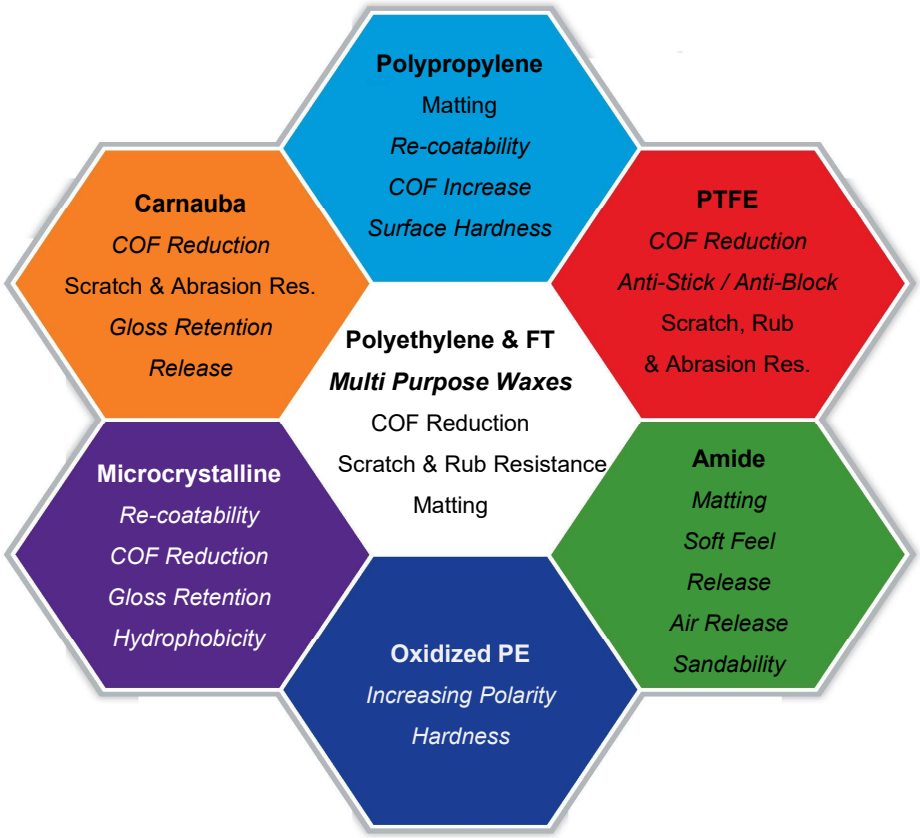
# Mechanism of Wax Performance

**For optimum performance, wax particles must typically reach the surface of the coating film before drying/curing is completed!**

**Parameters which affect migration of the wax particle to the surface:**

- Chemical & physical nature of the wax:
  polarity, particle size, density
- Chemical & physical nature of the coating system:
  polarity, density, viscosity etc. of coating constituents
- Curing conditions:
  open time, solvent evaporation, viscosity gradient
- Film thickness

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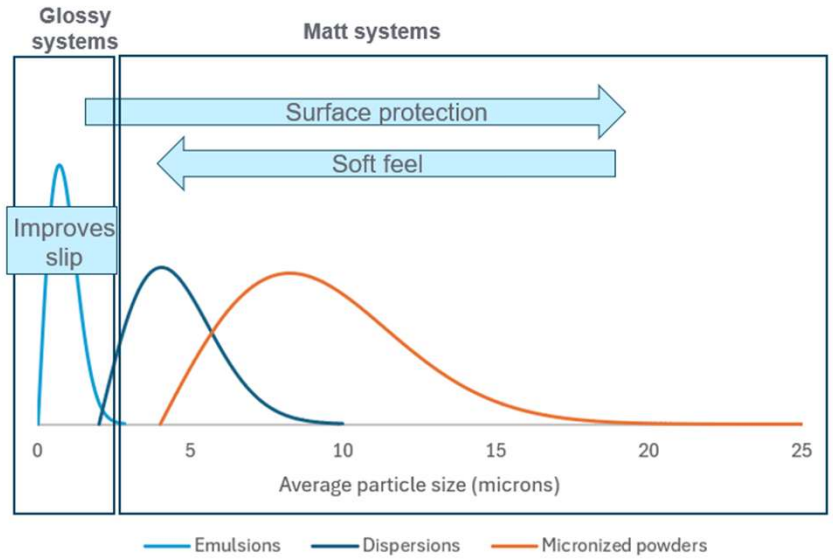
# Wax Additive Forms and Particle Size

| | **Micronized Wax** | **Wax Dispersion** | **Wax Emulsion** |
|---|---|---|---|
| Benefits | Larger Particle Size<br>Higher Melting Point<br>100% Active<br>Long shelf life | Easy to incorporate<br>Smaller Particle Size<br>Broader Wax Basis | Easiest incorporation<br>Submicron Particle Size<br>High Gloss & Clarity<br>Little separation over time |
| Drawbacks | Incorporation<br>Dust | Shorter shelf life<br>Separation over time<br>„Shipping Solvent“ | Emulsifier impact on coating<br>„Shipping Water“ |










Choosing the **right particle size and supply form** is essential to achieve an **optimum incorporation and application** process and a **proper performance** of the coating system.

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# Sustainable Wax Additives



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# Microdispersions

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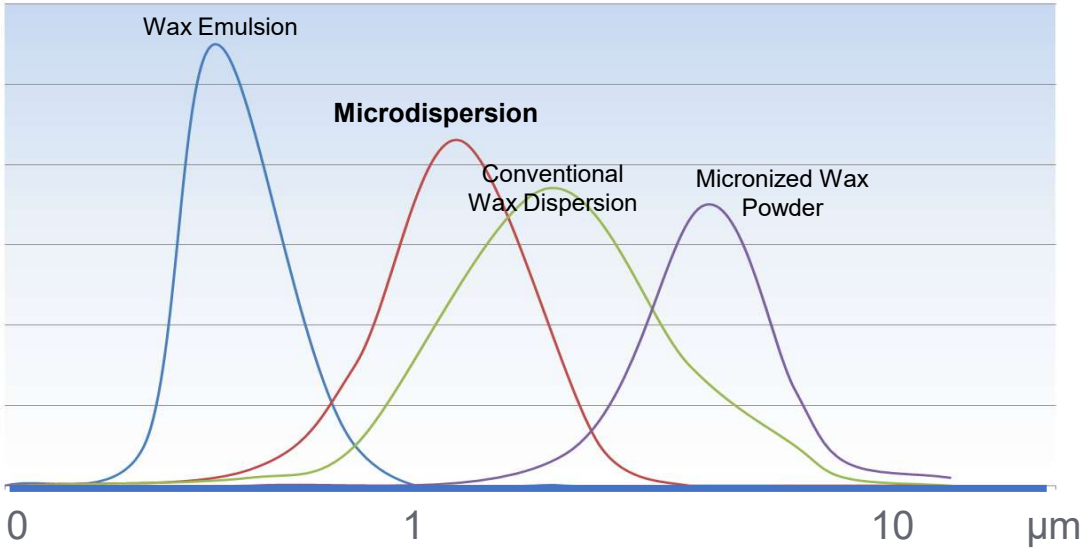
# Microdispersions – a new WB Wax Dispersion Technology

- Particle size in between wax dispersions and emulsions
- Higher solid content in the wax dispersion ➔ less water transport costs
- Incorporation close to self-dispersing ➔ less shear & energy needed
- Excellent stability of the wax in the coating ➔ pro-longed shelf life leading to less potential waste
- Allows for broader formulation capabilities ➔ excellent surface properties leading to longevity of coated surfaces

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# Microdispersion vs. Conventional WB Wax Dispersion

**Conventional wax dispersion in water**



**Microdispersion in water**



**Significantly improved dispersibility compared to conventional wax dispersions**

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# Microdispersions – Products

- Microdispersions combine the benefits of wax dispersions and emulsions
- First commercialized microdispersions:
  - **Lanco Glidd 6734** for glossy systems
  - **Lanco Glidd 6735** for matt systems
- Microdispersions based on sustainable waxes currently under development

Comparison vs. conventional wax emulsion and dispersion

| | | Wax Chemistry | Scratch & abrasion resistance | Anti-blocking | COF reduction/ Slip | Surface feel | Matting | Solid content (%) | Dv 50 |
|---|---|---|---|---|---|---|---|---|---|
| **Emulsion** | **Aquaslip 5071** | Ox. PE | ●◐○○○ | ●●○○○ | ●●●◐○ | ●●○○○ | ◐○○○○ | 37 | <1 |
| **Dispersion** | **Lanco Glidd 6148** | Polyolefin | ●●●●○ | ●●●●○ | ●●●●○ | ●●●○○ | ●●●●○ | 53 | < 9 |
| **Microdispersion** | **Lanco Glidd 6734** | PE | ●●◐○○ | ●●●○○ | ●●●●○ | ●●●○○ | ●○○○○ | 50 | <1 |
| **Microdispersion** | **Lanco Glidd 6735** | PE | ●●●●○ | ●●●●○ | ●●●●○ | ●●●●● | ●●●◐○ | 65 | <4 |

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# Microplastic Free Wax Additives

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# What are Microplastics?

The intentional use of synthetic polymer microparticles, resulting in releases to the environment, poses a **risk to the environment that is not adequately controlled**.

*Definition by REACH - restriction of synthetic polymer microparticles (Entry 78 of Annex XVII REACH, as introduced by Commission Regulation (EU) 2023/2055)*

Synthetic polymer microparticles are defined as particles

- containing **solid polymer**,
- where ≥ 1% w/w of particles have (i) all **dimensions ≤ 5mm**, or (ii) length of ≤ 15mm and length to diameter ratio of > 3

Polymers out of scope of the regulation:

- liquid polymers
- polymers that occur in nature that have not been chemically modified
- polymers which are soluble at > 2 g/l
- polymers that are (bio)degradable (as per definition stipulated in the regulation)
- non-carbon polymers
- polymers permanently incorporated into a solid matrix during intended end use (06/2028: only if duration >1year)


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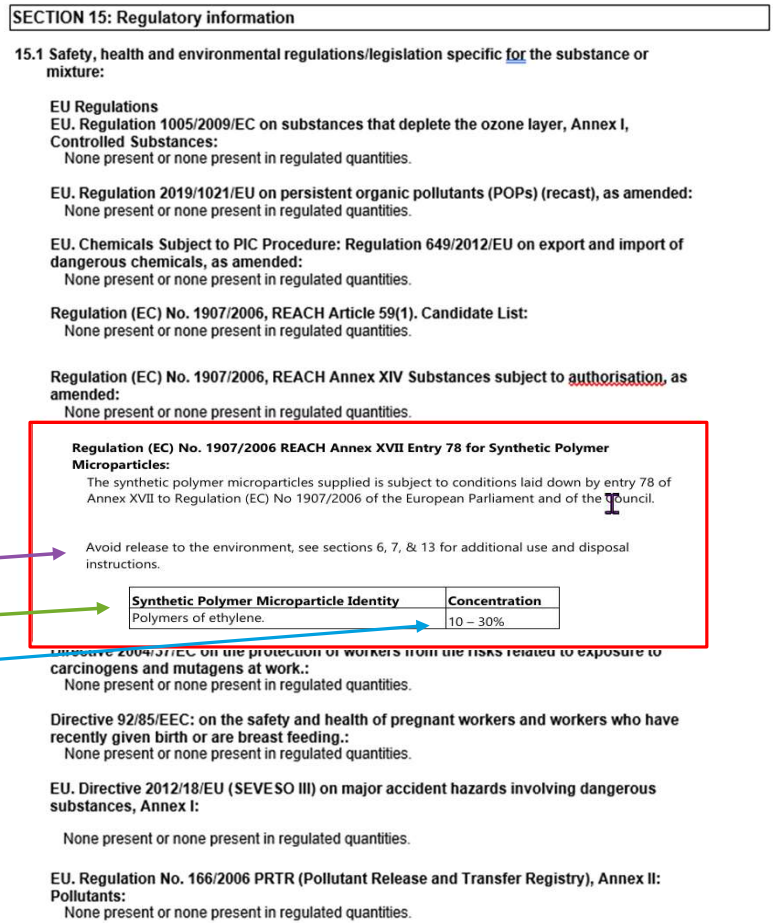
# Microplastic reporting on EU SDS (from October 2025)

Currently, number of derogations to the regulation allowing the sale and use of products which contain microplastics

➔ Materials used under derogation have specific reporting and labelling obligations under the terms of the regulation.

**Requirements listed in section 15**

- Use and disposal instructions
- Generic Polymer Identity
- Quantity/Concentration



**SECTION 15: Regulatory information**

**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:**

**EU Regulations**
**EU. Regulation 1005/2009/EC on substances that deplete the ozone layer, Annex I, Controlled Substances:**
None present or none present in regulated quantities.

**EU. Regulation 2019/1021/EU on persistent organic pollutants (POPs) (recast), as amended:**
None present or none present in regulated quantities.

**EU. Chemicals Subject to PIC Procedure: Regulation 649/2012/EU on export and import of dangerous chemicals, as amended:**
None present or none present in regulated quantities.

**Regulation (EC) No. 1907/2006, REACH Article 59(1). Candidate List:**
None present or none present in regulated quantities.

**Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended:**
None present or none present in regulated quantities.

**Regulation (EC) No. 1907/2006 REACH Annex XVII Entry 78 for Synthetic Polymer Microparticles:**
The synthetic polymer microparticles supplied is subject to conditions laid down by entry 78 of Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council.

Avoid release to the environment, see sections 6, 7, & 13 for additional use and disposal instructions.

| Synthetic Polymer Microparticle Identity | Concentration |
|---|---|
| Polymers of ethylene. | 10 – 30% |

**Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens and mutagens at work.:**
None present or none present in regulated quantities.

**Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breast feeding.:**
None present or none present in regulated quantities.

**EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, Annex I:**

None present or none present in regulated quantities.

**EU. Regulation No. 166/2006 PRTR (Pollutant Release and Transfer Registry), Annex II: Pollutants:**
None present or none present in regulated quantities.

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# What are microplastic-free waxes?

**Due to future regulatory constraints and general market trends, microplastic-free wax additives are becoming a mainstream option towards more sustainable coatings. As per the previous definition by ECHA:**

➔ **Bio-based** waxes (polymers that occur in nature that have not been chemically modified), e.g. Carnauba, Rice bran wax

➔ **Synthetic waxes that are not a polymer** (a polymer is a substance consisting of molecules characterized by the sequence of one or more types of monomer unit)


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# Microplastic-free without sacrificing the performance

At Lubrizol, we have developed several microplastic-free alternatives:

## ➢ For water-based wood coating formulations:

| | Chemistry | Scratch & mar resistance | COF reduction/ Slip | Matting efficiency | Soft feel | Dv 50 | Melting point (°C) | Remarks |
|---|---|---|---|---|---|---|---|---|
| **Lanco TFW 1765 NC** | Hydrophilic PTFE-mod. PE | ●●●●◐ | ●●●●● | ●●◐○○ | ●●●●◐ | < 7.5 | 105 | High performance |
| **Lanco 2510 SF** | Inorganically mod. Wax Compound | ●●●●○ | ●●●●○ | ●●◐○○ | ●●●○○ | < 7.5 | 105 | High performance PTFE-free and microplastic-free |
| **Lanco 2520 SF** | Inorganically mod. Wax Compound | ●●●●○ | ●●●●◐ | ●●◐○○ | ●●●○○ | < 6 | 105 | High performance PTFE-free and microplastic-free |

## ➢ For solvent-based wood coating formulations:

| | Chemistry | Scratch & mar resistance | COF reduction/ Slip | Matting efficiency | Soft feel | Dv 50 | Melting point (°C) | Remarks |
|---|---|---|---|---|---|---|---|---|
| **Lanco PP 1362 D** | Mod. PP | ●●●●○ | ●●●●○ | ●●●◐○ | ●●●●◐ | < 9 | 140 | Good all-rounder |
| **Lanco 1588 LF** | Polyolefin | ●●●●○ | ●●●◐○ | ●●●○○ | ●●●◐○ | < 9 | 105 | Good all-rounder and microplastic-free |
| **Lanco 1400 SF** | Mod. Polyolefin | ●●●○○ | ●●●●○ | ●●○○○ | ●●●●◐ | < 6 | 140 | Good transparency, feel and microplastic-free |
| **Lanco TF 1778 C** | PTFE-mod. PE | ●●●●◐ | ●●●●● | ●●○○○ | ●●●●◐ | < 6 | 102 | High performance |
| **Lanco 1510 SF** | Mod. Polyolefin | ●●●◐○ | ●●●●○ | ●●○○○ | ●●●●◐ | < 7 | 106 | High performance PTFE free and microplastic-free |

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# Bio-based wax additives

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# Why choosing bio-based waxes?

- Plant-based or animal origin of the wax: **bio-availability** of the raw materials
- Reducing the **environmental impact** of wood coatings
- Reducing the **consumption of fossil resources** without sacrificing the performance
- Achieving **Ecolabel** or other environmentally friendly certifications
- Becoming **naturally microplastic-free**




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# Bio-based without sacrificing the performance

At Lubrizol, we have developed several bio-based waxes:

✓ **For water-based wood coating formulations:**

| | Chemistry | Scratch & mar resistance | COF reduction/ Slip | Matting efficiency | Soft feel | Dv 50 | Melting point (°C) | Remarks |
|---|---|---|---|---|---|---|---|---|
| **Lanco 1561 LF** | Ox. PE | ●●●●○ | ●●●●○ | ●●●○○ | ●●●●○ | < 9 | 104 | Good transparency and stability |
| **Lanco 8020 SF** | Renewable Polymer | ●●●○○ | ●●●○○ | ●●○○○ | ●●●●● | < 8 | 260 | Great soft feel and dispersibility, bio & naturally microplastic-free |
| **Aquaslip 5071** | Ox. PE | ●◐○○○ | ●●●◐○ | ◐○○○○ | ●●○○○ | <1 | 125 | Good all-rounder for glossy systems |
| **Aquaslip 912** | Carnauba | ●○○○○ | ●●●●● | ○○○○○ | ●○○○○ | <1 | 82 | Slip and gloss retention, bio & naturally microplastic-free |

✓ **For solvent-based wood coating formulations:**

| | Chemistry | Scratch & mar resistance | COF reduction/ Slip | Matting efficiency | Soft feel | Dv 50 | Melting point (°C) | Remarks |
|---|---|---|---|---|---|---|---|---|
| **Lanco 1588 LF** | Polyolefin | ●●●●○ | ●●●◐○ | ●●●○○ | ●●●◐○ | < 9 | 105 | Good all rounder |
| **Lanco A1602** | Amide | ●◐○○○ | ●●●◐○ | ●●●●○ | ●●●●○ | < 7 | 142 | Great softfeel, improves sandability, bio & microplastic-free |
| **Lanco 1955 SF** | Carnauba | ●●●○○ | ●●●●○ | ●●○○○ | ●●●◐○ | < 7 | 82 | Great slip, bio and naturally microplastic-free |

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# Ongoing sustainable developments

Innovation driven by performance, regulatory, cost, competition and market demands:

- Water-based product expansion
- Bio-based microdispersions
- PTFE- and Microplastic-free technologies
- Renewable raw materials diversification in waxes
- Improve performance & Reduce additive dosage



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