

to make ideas work



| wax additives

for better materials
and optimized
processing



VOELPKER® WAX ADDITIVES:

- General advantages
- Remarks on Epoxy applications

Dr. Lutz Matthies

Outline

1. Introduction: Company presentation VOELPKER
2. Overview: VOELPKER[®] wax additives series for plastic applications
3. WARADUR[®] wax additives: Typical effects at a glance
4. Basic notes on WARADUR[®] wax additives in EMC
 - 4.1 Epoxy Moulding Compounds
 - 4.2 Advantages of WARADUR[®] wax additives with respect to EMC
5. WARADUR[®] wax additives: Typical structural elements and effects
 - 5.1 WARADUR[®] wax additives: External and internal lubrication
 - 5.2 WARADUR[®] wax additives: External and internal lubrication
 - 5.3 WARADUR[®] wax additives: Dispersion of pigments and fillers
6. WARADUR[®] wax additives: Colour stability

1. Introduction: Company presentation VOELPKER



Made in Germany – since 1900

- Founding of the company 1900
- Focusing on montan wax production and processing
- From 1970, a joint production process
> **montan waxes + tanning agents**
- Decades of wax expertise was the key to developing numerous **special wax blends**
- A family company since 2004

2. VOELPKER® wax additives series for plastic applications

VOELPKER | plastic series

Improve your plastic production – VOELPKER Plastic Series

The use of products from the VOELPKER® Plastic Series allows the user to create compounds with significantly better characteristic value profiles, which would otherwise not have been

possible in the absence of our wax additives. The unique multifunctionality of WARADUR® + CEVO®* additives allows the resolution of different problems: it ensures improved surface quality, increased flow properties and a reduction of friction peaks.

VOELPKER | plastic recycling series

Wax additives for recyclates processing – VOELPKER Plastic Recycling Series

The products of the VOELPKER® Plastic Recycling Series are adapted to the processing conditions of recyclates. These conditions are dependent on the base polymer involved. The unique

multifunctionality of montan waxes on the one hand and the synergies of other additives such as stabilisers and lubricants on the other hand can be used to produce compounds with property profiles that are very close to those of new products.

3. WARADUR® wax additives: Typical effects at a glance

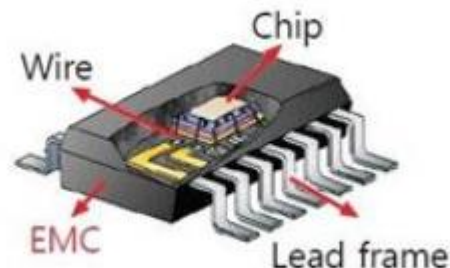
- External and internal lubrication: improved flow and mould release properties. Conventional lubricants are external or internal in type
- Due to their unique molecular structure, WARADUR® wax additives provide **both effects** simultaneously
- No plate out / blooming out or exudation; the surfaces can be further processed
- Improved dispersion of pigments / fillers
- Wide applicability
- Good thermal / colour stability

4. Basic notes on WARADUR[®] wax additives in EMC



4.1 Epoxy Moulding Compounds

- Epoxy Mould(ing) Compounds (EMC) are thermosetting plastics with very good mechanical, electrical insulation and temperature resistance properties. They are used extensively in the semiconductor, electronics and automotive industries to replace more expensive ceramics, metals and other plastics.
- Epoxy Mold Compounds (EMC) are formulations of thermosetting solid epoxy polymers, additives, and silica-based fillers.



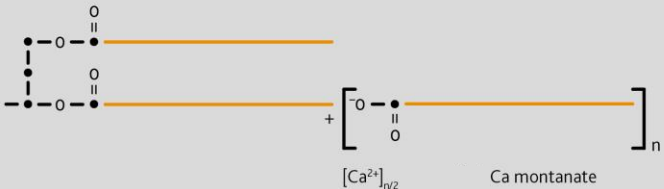


4.2 Advantages of WARADUR[®] wax additives with respect to EMC

- Good compatibility
- Good release effect and flow promotion
- Distribution of fillers
- Low moisture affinity
- No negative effects on adhesion
- Temperature stability, low volatility
- Glas transition temperature (T_g) control

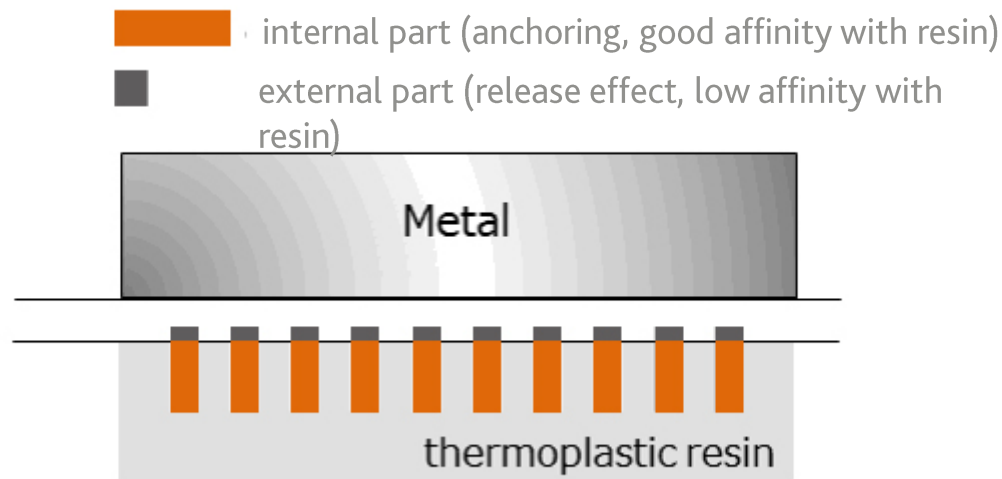
5. WARADUR® wax additives: Typical structural elements and effects

- Saponification and oxidation to a light yellow raffinate (mainly wax acids with chain lengths of C 28-32)
- Subsequent esterification leads to partially synthetic montan wax

Name	Chemical nature	Structural characteristics
WARADUR® S	Montanic acids (linear, saturated), mainly	
WARADUR® E	Ethylene glycol esters of montanic acids	
WARADUR® OP	Butylene glycol esters of montanic acids; calcium montanate	

5.1 WARADUR[®] wax additives: External *and* internal lubrication

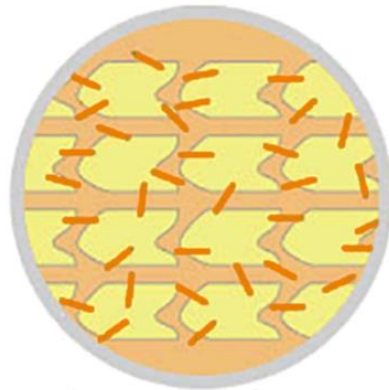
- Conventional lubricants are external or internal in type
- Due to their unique molecular structure, WARADUR[®] wax additives provide both effects simultaneously



5.2 WARADUR[®] wax additives: External *and* internal lubrication

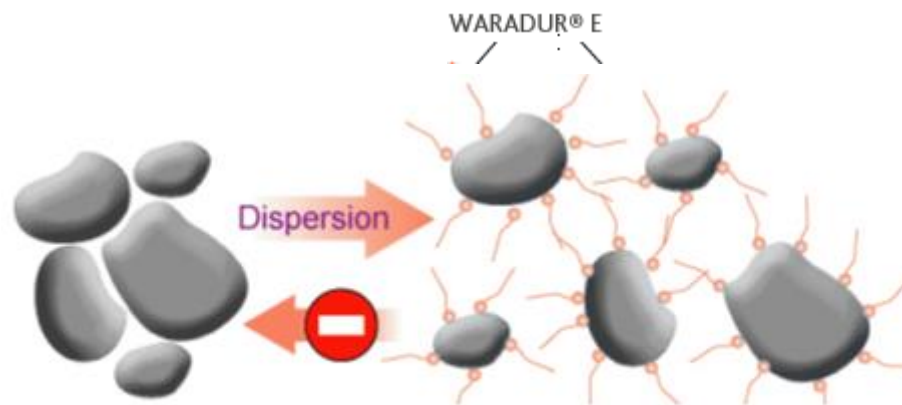
- Conventional lubricants are external or internal in type
- Due to their unique molecular structure, WARADUR[®] wax additives provide both effects simultaneously

 internal (flow improving, viscosity lowering, good affinity with resin)



5.3 WARADUR[®] wax additives: Dispersion of pigments and fillers

- Breakdown of the undesired agglomerates
- Even pigment / filler distribution
- Higher colour yield
- Better mechanical stability



6. WARADUR[®] wax additives: Colour stability



| wax additives

for better materials
and optimized
processing



Thank you for your attention.

Völpker Spezialprodukte GmbH
Fabrikstraße 1
39393 Völpke
Germany

Phone: +49 39402 962-0

E-Mail: application@voelpker.com

URL: www.voelpker.com