

# **PETER GREVEN – Competence in plastics**



PETER   
**GREVEN**

Partner der Industrie

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*The Peter Greven Company has been producing and developing metallic soaps, lubricants and special stabilizers for both the plastics industry and stabilizer manufacturers for many years. Our philosophy as a company of the oleochemical industry is to deliver high-quality additives to our customers.*



## 1. PVC

PVC is now used in a wide number of areas, from standard technical products to special medical applications. This development would never have been possible without the use of appropriate stabilizers which protect PVC from decomposition when exposed to heat or light. Probably the most important class of the stabilizers are metallic soaps. Metallic soaps not only have excellent stabilizing properties, they are also good lubricants.

### Metallic soaps

#### **LIGA CALCIUMSTEARAT 600**

This stearate is characterized by its slightly alkaline nature and low electrolyte content. These features provide remarkably better stabilization in comparison to neutral stearates. Calcium stearate is widely used in the manufacture of non-toxic stabilizers, in many cases in conjunction with zinc stearate. It is dosed in quantities of between 0.2 and 0.6 phr. Calcium stearate is approved by the BfR (i.e. Bundesinstitut für Risikobewertung or Federal Institut for Risk Assessment). It is used mainly for the manufacturing of foils in the production of profiles, tubes and cables.

#### **LIGA CALCIUMSTEARAT 600 G**

Low-dust version of LIGA CALCIUMSTEARAT 600 that offers good dosing and handling properties.

#### **LIGA ZINKSTEARAT 101/6**

LIGA ZINKSTEARAT 101/6 is especially suitable for use as a stabilizer for PVC in connection with calcium or barium stearate. It has good colour properties and high initial stability. This product offers high free-flowing abilities and can be dosed easily. Zinc stearate is approved for use in the manufacture of food contact materials, made of PVC, in accordance with the recommendations of the BfR.

#### **LIGA ZINKSTEARAT 104 G**

Low-dust version of LIGA ZINKSTEARAT 101/6. Due to the uniform grain-structure LIGA ZINKSTEARAT 104 G shows good free-flowing and dosing properties.

#### **LIGA BARIUMSTEARAT**

Barium stearate in combination with zinc stearate is used as a stabiliser of plasticized PVC.

#### **LIGA MAGNESIUMSTEARAT techn.**

Magnesium stearate can also be used in non-toxic stabilizers as a partial replacement for calcium stearate. It is approved for use by the BfR. It has slightly better solubility in PVC compared to calcium stearate.

#### **LIGA CALCIUMLAURAT LIGA ZINKLAURAT LIGA BARIUMLAURAT**

Calcium, barium and zinc are also offered as laurates. Compared to stearates, these compounds provide much better stabilization due to their higher metal content. Their high solubility in PVC means they are less likely to plate out, which is particularly advantageous in the case of barium laurate.

#### **LIGASTAB ZN 108**

Zinc salts of short-chain fatty acids. Good stabilization properties as the metal content is higher compared to the laurates. The floating properties are less distinctive than of laurates and stearates.

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## Lubricants

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Lubricants are just as indispensable as additives in the manufacture of PVC as stabilizers. Lubricants are usually based on straight-chain hydrocarbons with different functional groups. The properties for technical applications vary depending on the ratio between the two components. A distinction is made between internal and external lubrication. Internal lubricants are clearly polar and reduce the friction between the individual PVC chains. This results in a reduction in the viscosity of the melted PVC, fine transparency

and a low tendency to plate out. External lubricants reduce the friction between the plastics (polymers) and the tool surface. This improves the quality of the surface of the plastics. However, this usually leads to an increase in the melting time. By nature, the materials are more prone to the plate out effect.

It should also be noted that most lubricants cannot be definitively assigned to either one of these groups – many of them fall somewhere in between.

### **LIGALUB SH**

Lubricant with external lubrication properties based on special carbonic acids. LIGALUB SH is a free flowing powder, which reduces stickiness. It is suitable for use with both unplasticized and plasticized PVC. LIGALUB SH is also appropriate for transparent applications. BfR approved.

### **LIGALUB 10 GE**

Liquid, internal lubricant based on a glycerine partial ester. This product is suitable for all forms of processing and is very soluble in PVC. It improves the surface lustre and dispersibility of pigments. BfR approved.

### **LIGALUB 11 GE**

Partial ester of glycerine, mainly used as an internal lubricant for extrusion of unplasticized PVC. BfR approved.

### **LIGALUB GT**

LIGALUB GT is an external lubricant for application in PVC processing. It improves the flow-characteristics of the mass.

### **LIGALUB 36 FE**

Universal, free-flowing sprayed lubricant. This neutral ester wax is readily soluble, improves viscosity and reduces the stickiness of PVC. BfR approved.

### **LIGALUB FAE**

Internal sprayed lubricant based on a di-carbonic acid ester. This product is extremely soluble in PVC and is especially suitable for manufacturing complex injection-moulding parts or profiles made of unplasticized PVC. LIGALUB FAE has no adverse effects on melting.

### **LIGALUB 45 ITD**

LIGALUB 45 ITD is an internal lubricant for easy processing of plasticized and unplasticized PVC. It is suitable for transparent applications and improves the surface properties. The distribution of pigments is improved due to its dispersing effect. LIGALUB 45 ITD is compatible with nearly all stabilizing systems.

### **LIGALUB 80 MEG**

Lubricant with internal and external lubrication properties for the processing of unplasticized PVC. Compared to LIGALUB 36 FE, the internal lubrication effect is pronounced. Good compatibility with other external lubricants and suitable with most of the stabilizing systems.

### **LIGALUB 55 PE**

is a highly compatible inner lubricant for the processing of unplasticized PVC like foils and bottles. It has synergetic properties besides the alkaline leadsulfate-stabilizers and calcium-zinc-stabilizers.

### **LIGALUB 70 KE**

This high molecular complex ester is an external lubricant with high separating properties, mainly for the production of unplasticized PVC-calender-foils. Due to its high compatibility this product is suitable for transparent application. Other thermoplastic plastics like PU and polyamide can be demoulded by LIGALUB 70 KE at higher temperatures. This allows more efficient production.

### **LIGALUB 71 KE**

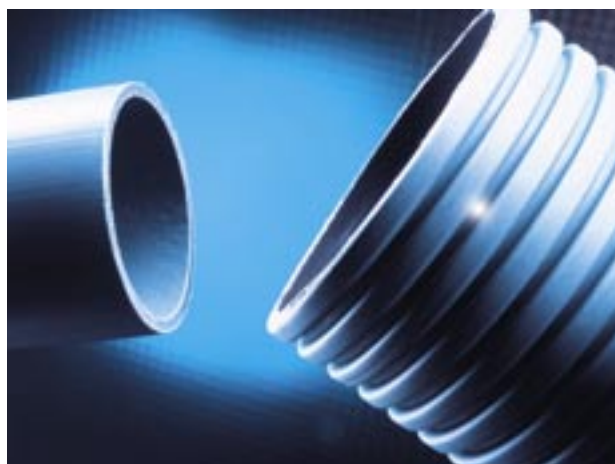
is an external lubricant with separating properties. It is suitable for the application in plasticized and unplasticized PVC and pastes. Despite its high separating properties this ester shows a good compatibility.

### **LIGALUB 74 KE**

is an external lubricant for the processing of unplasticized PVC. It shows high separating properties and reduces the stickiness of the PVC mass. It exhibits only limited compatibility with plasticized PVC.

## 2. Polyolefines

Compared to PVC, polyolefines are easy-to-work plastics with naturally favourable working properties and good thermal stability in the absence of oxygen. The additives mainly used to stabilize this plastics are antioxidants. However, most catalysts contain chloride, and there is a risk of hydrochloric acid formation during processing which can affect the performance and easily corrode working tools. To prevent this, 0.05 to 0.2% calcium or zinc stearate is added to the formulations. Calcium stearate has proved especially beneficial in this regard due to its higher affinity to chloride.



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### Metallic soaps

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#### **LIGA CALCIUMSTEARAT 800**

Neutral calcium stearate for use in PE/PP, for neutralization of catalysts containing chloride. These free flowing powders feature a low content of heavy metals, especially iron. This prevents the graying of plastics containing DLTDP. The dosage is usually between 0.05 and 0.2%. Calcium stearate is BfR approved for the production of food contact materials.

#### **LIGA CALCIUMSTEARAT 350**

Very fine-particled calcium stearate with a low iron content. This product is particularly useful in the manufacture of fibres. In addition, LIGA CALCIUMSTEARAT 350 also exhibits high thermal stability.

#### **LIGA CALCIUMSTEARAT CPR-2-V**

Precipitated calcium stearate of vegetable origin with extremely fine particle size. This product is also available in kosher and halal grades.

#### **LIGA CALCIUMSTEARAT CPR-5-V**

Precipitated calcium stearate of a vegetable fatty acid with high transparency and extremely high heat stability.

#### **LIGA ZINKSTEARAT 101 CG**

Very fine neutral precipitated zinc stearate with a low heavy metal content for use in polyolefines, especially for fibre production. LIGA ZINKSTEARAT 101 CG also features high heat stability and high transparency.

#### **LIGA ZINKSTEARAT 101/6**

Produced by direct conversion, free-flowing zinc stearate with a low heavy metal content. This product has high colour stability.

#### **LIGA ZINKSTEARAT ZPR-2-V**

Precipitated Zinc stearate based on vegetable stearic fatty acids. This product is also available in kosher and halal grades.

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### Lubricants

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In most cases, polyolefines can be processed without the use of additional lubricants since the stearates used confer a lubricating effect. However, the use of lubricants has proved worthwhile in some applications.

#### **LIGALUB 11 GE** **LIGALUB 11 GE/90**

Lubricant and antistatic additive based on a glycerine partial ester. Mainly used in the manufacture of foils and injection-moulding. It is dosed in quantities of between 0.1 and 0.5%.



## 3. Thermosetting Plastics

Metallic soaps and oleochemical additives serve as release agents. Stearates are mainly used as release agents for the subsequent moulding process. Zinc stearate, especially, has shown to perform very well due to its low moisture content and low melting point.

### **LIGA ZINKSTEARAT 101 CG**

This product is a precipitated stearate with a very low particle size. Its high primary fineness gives very good distribution in initial processing which leads to considerably improved release properties during the final moulding compared to the 'directly converted' stearates. The dosage is approx. 1 %.

### **LIGA ZINKSTEARAT 101/6**

Produced by direct conversion, free-flowing zinc stearate with a low heavy metal content. This product has high colour stability.

### **LIGALUB SH**

Release agent for the manufacture of SMC and BMC. Use of this product is beneficial for applications requiring subsequent treatment of the surface of the material. It has a very good release effect even at the high filler amount of some formulations.

### **LIGA CALCIUMSTEARAT 800**

This free flowing stearate has proved itself as a very effective solution for difficult release problems. This is due amongst other properties to favourable melting point and melt viscosity of calcium stearate.

## 4. Polystyrenes

Polystyrene has a comparatively high thermal stability and can be processed mainly without stabilizers. However it loses this property upon copolymerisation, requiring the use of antioxidants. The use of oleochemical additives is usually limited to lubricants and separating agents, which must be added to the plastics in bigger quantities to ensure optimum workability. The effects of lubricants here are very similar to those in PVC, especially with some copolymers such as ABS.

### **LIGA ZINKSTEARAT 101/6**

LIGA ZINKSTEARAT 101/6 is mainly used as a lubricant in polystyrene and ABS. This product meets the stringent demands for purity and solubility.

### **LIGA ZINKSTEARAT 104 G**

Low-dust version of LIGA ZINKSTEARAT 101/6. Due to the uniform grain-structure LIGA ZINKSTEARAT 104 G shows good free-flowing and dosing properties.

### **LIGA ZINKSTEARAT ZPR-2-V**

This stearate is suitable for use in many of the same applications as LIGA ZINKSTEARAT 101/6. However, it is derived from a vegetable fatty acid and is also available as kosher and halal grades.

**LIGA MAGNESIUMSTEARAT techn.** Magnesium stearate has both internal and external lubricating and good separating properties. It is mainly used in the manufacture of injection moulding items. It is dosed in quantities of 0.2 to 0.8%.

### **LIGALUB 50 PE**

This pentaerythritol ester is used as a separating and antiblocking agent. This product improves surface lustre with a very minimal effect on heat resistance. Dosed quantities of 0.5% result in a significant reduction in the sticking temperature.

### **LIGALUB 11 GE LIGALUB 11 GE/90**

Saturated partial ester of glycerine. When used as an internal lubricant, this product effects a clear reduction in the Vicat softening temperature.

### **LIGALUB GT**

The product is suitable as a release agent and external lubricant for EPS.

## 5. Further applications

Various stearates, LIGA CALCIUMSTEARAT 800, LIGA ZINKSTEARAT 101/6, LIGA MAGNESIUMSTEARAT techn. or LIGA ALUMINIUMSTEARAT D2 and TR are used in polyamides, polycarbonates and acrylic resins. Which additive is the right one depends on the processing conditions and its solubility in the respective plastic. In general, free flowing properties and workability of the components are improved. LIGA ALUMINIUMSTEARAT TR is particularly suitable for transparent applications in acrylic glass.

LIGA ALUMINIUMSTEARAT D2 is suitable for colour stabilization during melt-extrusion of polyester fibres. LIGA CALCIUMSTEARAT 800, LIGA ZINKSTEARAT 101/6, LIGA MAGNESIUMSTEARAT techn. or LIGA ALUMINIUMSTEARAT D2 are added to hot-melt adhesive formulations during pulverization and improve the lubricating and separating properties as well as free flowing ability of the initial products. LIGA NATRIUMSTEARAT and LIGA KALIUMSTEARAT have proved useful as effective emulsifiers for emulsion polymerization.



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