

Flexible Polymers _ Compounding



LUCOBIT resins and their use in compounding applications.

_ General

Of all the tens of thousands plastics available worldwide that are used by the plastic converter industry most undergo compounding in order to meet product requirements. It is estimated that over 65 wt-% of the 200 million tons consumed worldwide are compounded. Compounding is a very large and important market.

The thousands of different additives and other ingredients used in the compounds improve the plastics performance

during processing and / or meet the many different product requirements, including cost restraints. The composition of the compound is dictated by the requirements of the converter's application. Among the very many different additives are pigments, dyes, fillers, UV stabilizers, coupling agents and others.

The following table shows the LUCOBIT products and its main properties fit for use in compounding applications:

Impact modifier Carrier for colour masterbatches Roofing compounds Highly filled & HFFR compounds				
Product	Material	Colour	Shore A	MFR ¹⁾ 190 °C / 2.16 kg
Lucofin® 1400HN	EBA (16 % BA)	natural	90	1.4
Lucofin® 1400HN Powder	EBA (16 % BA)	natural	90	1.4
Lucofin® 1400MN	EBA (17 % BA)	natural	88	7
Lucofin® 1400MN Powder	EBA (17 % BA)	natural	90	1.4
Lucofin® 1492	MAh grafted EBA (17 % BA)	natural	92	5
Lucofin® 1492 Powder	MAh grafted EBA (17 % BA)	natural	92	5
Lucofin® 1494	MAh grafted EBA (17 % BA)	natural	92	7
Lucofin® 1494H	MAh grafted EBA (16 % BA)	natural	90	1.8
Lucofin® 1400SL	EBA (16 % BA) slip agent (0.2 %)	natural	90	1.4
Lucopren® EP 1500H-90 ¹⁾	PP EPM	natural	90	0.6
Lucopren® EP 1500M-90 ¹⁾	PP EPM	natural	88	8

¹⁾ average ²⁾ MFR 230°C / 2.16 kg

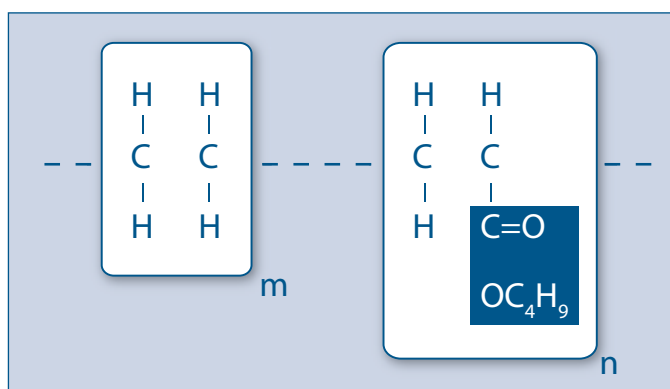


_ LUCOBIT products

LUCOBIT products are the right choice for your compound. They finetune highly filled and HFFR compounds, colour as well as additive masterbatches, roofing and impact modified compounds. LUCOBIT products impart:

- High filler loadings, such as ATH (Aluminium trihydrate) or chalk
- Extrusion melt temperature up to 300°C and therefore increased production output
- Food approval certificates
- Flexibilization and impact modification to otherwise brittle plastics (PA, PA / ABS, PBT, PET)

The majority of LUCOBIT products is based on ethylene butyl acrylate copolymer (EBA). The repeat unit of EBA copolymers is shown in the figure. This structure explains many of its unique properties as explained on the next page.

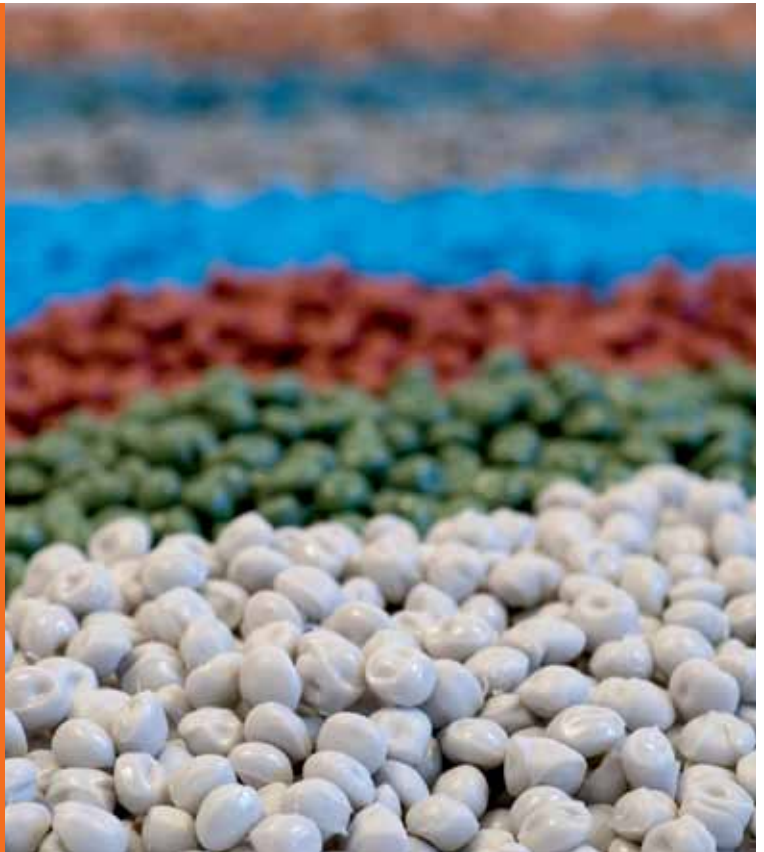


Our Brands

Lucofin®

Lucopren®

Products – that makes you successful.

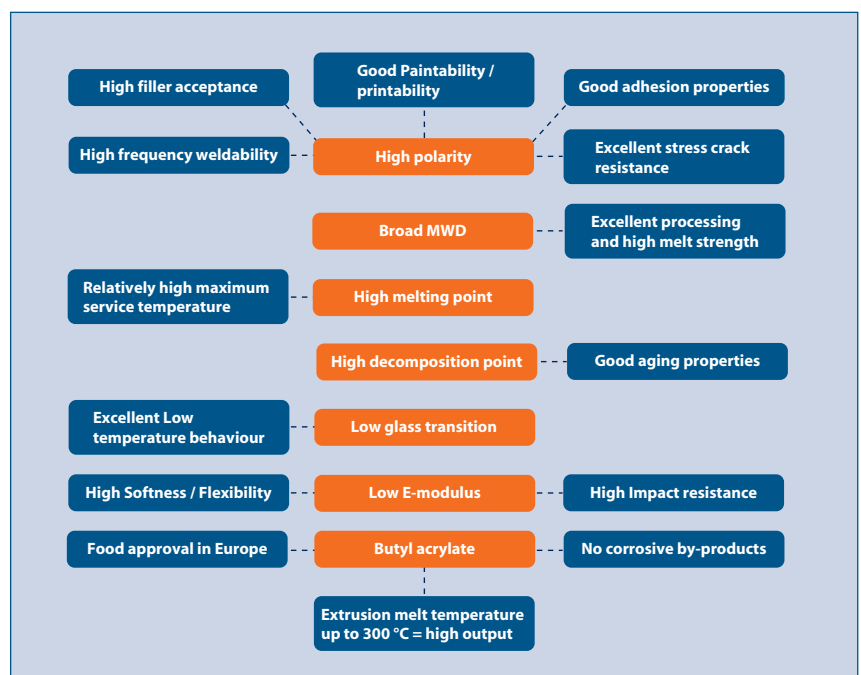


– Advantages of LUCOBIT products compared to plastomers and EVA

The speciality plastics based on flexible polyolefins which are marketed and sold by LUCOBIT AG under the trade names Lucofin® types are doubtless products that you have long known to be quality materials. Particularly with a view to our grafted and non-grafted EBA grades, our distribution partners repeatedly tell us that there is a certain information gap as far as cost-effectiveness is concerned. What may at first glance appear to be more expensive compared with other polymer systems does in fact almost always, on closer inspection, prove to be the cheapest solution overall and in the long term.

It is essential here not to interpret the performance of a product solely in terms of the price per unit of quantity. You only obtain an objective result if you examine all technical aspects. In terms of our EBA grades competing on both a commercial and technical basis with EVA, plastomers, but also EBA products from other manufacturers, the Lucofin® materials are proving time and time again to be the optimum solution for an increasingly large number of our customers' end applications.

A sustainable assessment must take account not just of the simple formula of „dosage x price“ but also the value attached to the technical advantages afforded from the use of Lucofin® EBA. The following table illustrates the key properties – as marked in orange – and the resulting advantages – as marked in blue – of Lucofin® 1400HN and 1400MN. If all of these factors impacting on cost effectiveness are assessed in an objective and unbiased way, it is ultimately apparent that Lucofin® EBA materials usually constitute the better solution.





Case Study.

Customer

Globally oriented masterbatch company.

Previous situation

LDPE based masterbatch with combined pigment and stabilizer concentration of 40 %.

Solution now

Lucofin® 1400MN based masterbatch with combined pigment and stabilizer concentration of 60 %.

Benefits to the customer

- Productivity increase of 30 % due to higher concentration of pigments and stabilizers
- Improved processing with 10 % less scrap during the masterbatch compounding
- Better match of masterbatch resin with mother compound resin resulting in lower brittleness temperature of final extrudate (waterproofing membrane)

Impact modification of polyamides with Lucofin® 1492 – possibly in blend with Lucofin® 1400HN / MN.



Commercial polyamides such as PA-6 and PA-66 are generally regarded as tough and ductile materials since they exhibit high tensile elongation to break and high drop weight impact strengths. They become even tougher after equilibration with ambient humidity, due to the plasticization effect of the absorbed water.

However, under conditions of low humidities and / or low temperatures due to the lack of plasticizing water and under conditions of stress concentration such as in the presence of sharp notches or cracks, polyamides exhibit brittle failure. This property, commonly evaluated as notched Izod or Charpy impact tests, indicates that unmodified polyamides exhibit relatively low energies for crack propagation.

The impact performance of polyamides can be improved by compounding in modifying elastomeric components, such as Lucofin® 1492 and Lucofin® 1400MN.

Lucofin® 1492 is a Maleic anhydride (MAH) grafted variation of Lucofin® 1400MN. Due to the innovative reactive extrusion technology the extremely polar MAH in Lucofin® 1492 is more active than in comparable competition grades and compatibilizes readily with all kinds of polyamides. Commercial impact modified polyamides typically contain 5 % to

25 % of Lucofin® 1492 to maximize the toughening efficiency while retaining a high level of tensile strength and heat deflection temperature. Unreinforced PA as well as glass fiber reinforced PA can be impact modified likewise.

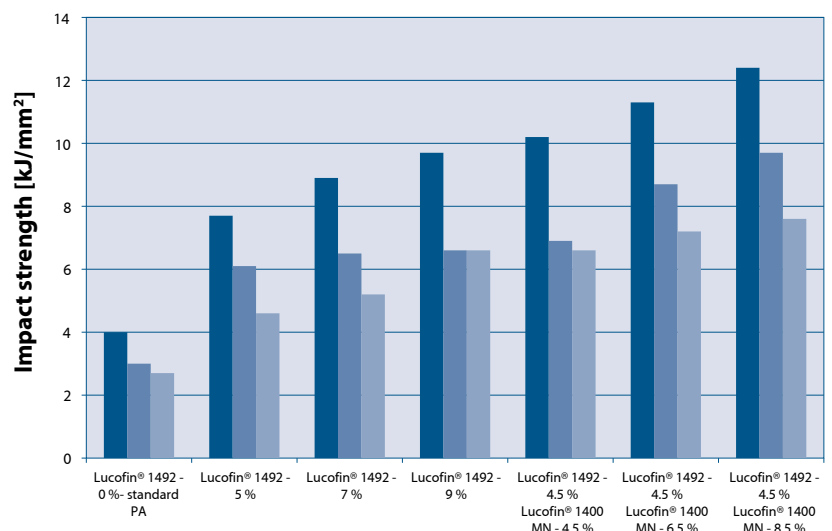
Lucofin® 1492 impact modified PA blends indeed offer a unique combination of high notched Izod impact and drop weight impact strengths, coupled with a good balance of modulus, tensile strength, heat, solvent and abrasion resistance characteristics. These properties are suitable for many engineering and metal replacement applications.

In case of cost driven applications the proportion of Lucofin® 1492 in a PA formulation may be partly substituted by Lucofin® 1400HN or Lucofin® 1400MN without sacrificing too much impact modification. This procedure is possible because of the polar nature of the non grafted Lucofin® 1400HN / Lucofin® 1400MN.

Below table clearly shows that by compounding standard PA grades with increasing amount of Lucofin® 1492 an increasing impact strength can be observed which often is the goal. If cost reduction is desired partial replacement of Lucofin® 1492 by Lucofin® 1400MN is possible without losing too much technical advantage.

Charpy notch impact strength at various temperatures of non filled PA 6 injection moulded samples compounded with various amounts of Lucofin® 1492 and Lucofin® 1400MN according to STN EN ISO 179

■ Charpy notch impact strength 23 °C
■ Charpy notch impact strength -20 °C
■ Charpy notch impact strength -30 °C



Solutions in flexible polyolefins.

— Competence and diversity

LUCOBIT AG develops, produces and sells top quality materials for the plastics processing industry. Our focal area of business is in high-quality speciality plastics based on flexible polyolefins which are used in waterproofing, asphalt and in numerous other segments of flexible polymers. LUCOBIT products are supplied to compounding companies all over the world.

Competence, experience and the specialist knowledge from 40 years of product history are the reasons behind LUCOBIT AG's success as a first class point of reference on the national and international markets. As a flexible and group-independent company, we are present and active in all significant plastics markets around the world – supported by a far-reaching sales networks which offers our customers a direct contact partner wherever they need one. Wherever they can be found, LUCOBIT AG products and services stand for consistently high quality standards, top rate workability and diverse opportunities for use.

— Thinking and acting

Constant innovation and the willingness to venture into new terrain – this approach is an integral part of the way we think and act. In this way, we not only secure our own future, but also that of our customers. The LUCOBIT materials research is also always using the latest knowledge and methods to further optimize our products. The responsible use of our natural resources is of equal importance to us. Development and production of lasting products and a distinctive environmental awareness are deeply rooted within our company. An ecological approach is top priority for us.

The compliance with international standards is a matter of course. LUCOBIT AG is ISO-certified according to the standards DIN EN 9001 (quality management) and DIN EN 14001 (environment management).

— Services and solutions

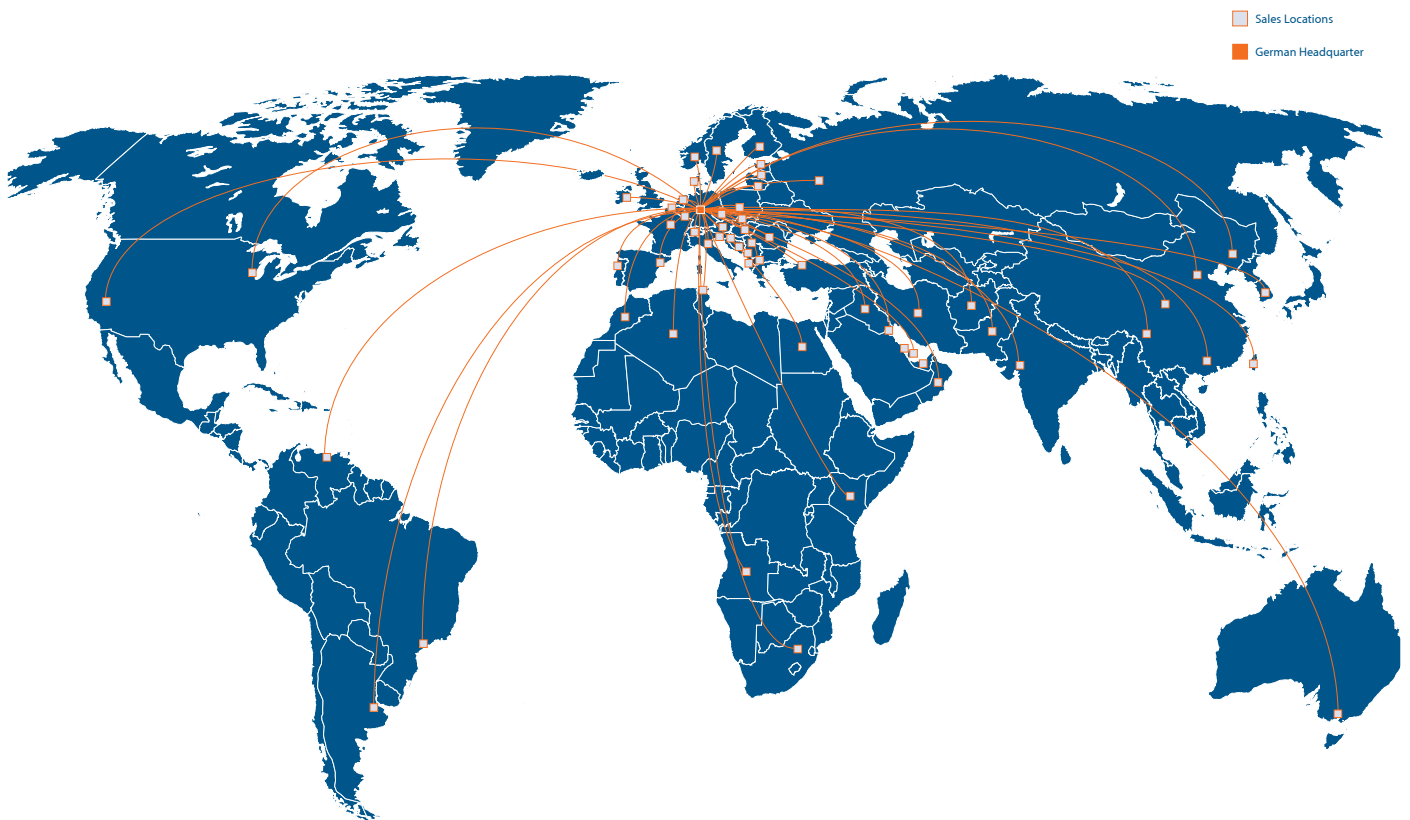
The focal point of our daily work is the task to satisfy our customers and to offer them tailor-made solutions which suit their specific requirements. Customer-oriented service therefore has top priority at LUCOBIT AG. This is reflected in our business processes and organisational structures. Short decision-making processes and reaction times are as much a part of this as binding agreements and the targeted

implementation of agreed arrangements. High qualification demands on our employees are a guarantee for the observation of these principles. Our work is characterised by our reliability, readiness for action and flexibility.

Uncompromising quality and first class services are our trademarks. We offer our customers comprehensive consultancy services and support ranging from product development and the calibration of specialty plastics for their specific production facilities to the optimisation of production processes and concepts for transport and logistics. Your task is our challenge. Together with you, we want to use perspectives in markets of the future and help these grow.



Locations.



Note

The information provided in this document is based on our product tests and present technical knowledge. It does not release purchasers from the responsibility of carrying out their receiving inspections. Neither does it imply any binding assurance of suitability of our products for a particular purpose. As LUCOBIT cannot anticipate or control the many different conditions under which this product may be processed and used this information does not relieve processors from their own tests and investigations. Any proprietary rights as well as existing legislation shall be observed.



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