

Plastic Additives

Your key components for reliable performance
in the automotive industry



We create chemistry

// Adding value to plastics

The choice of the best plastic additives is a crucial factor for success in plastic applications. It calls for a reliable partner who not only offers a wide product portfolio but can also provide innovative solutions that can fulfill today's and tomorrow's requirements.

Long-standing expertise and a toolbox approach make BASF the best partner for innovative and customized solutions. New developments and continuous improvement of its portfolio as well as close cooperation with its customers enables BASF Plastic Additives to drive sustainability and reliability in all kinds of plastic applications.

Plastics are valuable materials that offer safe, durable, and cost-efficient solutions. In many cases the use of plastics can be more sustainable than the use of other materials. BASF Plastic Additives offers products that can help to mitigate negative impacts on the environment and also by extending and closing the loop in the circular economy of plastics.

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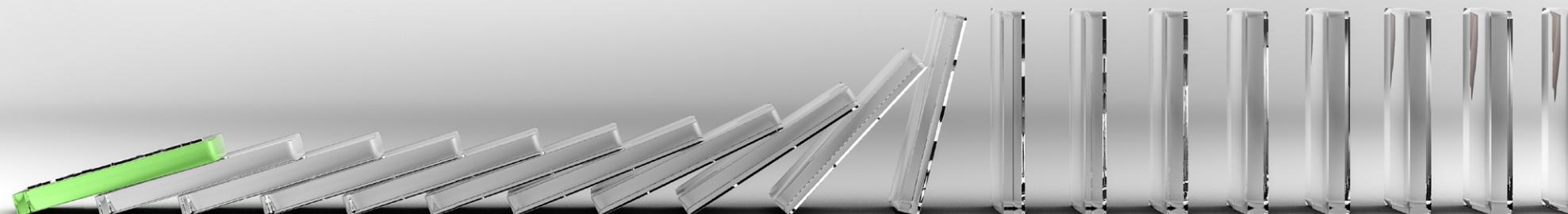
Additives, the enablers for plastic

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Automotive & Future Mobility





/ Additives, the enablers for plastic

Plastics are an essential resource in a multitude of applications where they provide outstanding performance in light weighting, ease of use, and functionality. Offering high durability where needed, reliable quality, and safety, they play a vital role in raising living and hygiene standards as well as improving the resource and energy balance.

Public opinion usually associates plastic with single-use products, which might be a reason why plastics have a rather poor image, but plastics are used in many essential applications in various industries. Plastic additives are enablers that can actually contribute to more sustainability when incorporated in the value chain of present and future industries.

Plastics offer features and benefits that other materials do not, and in many cases the alternatives do not have a better sustainability profile. Therefore, the main challenges facing the plastics industry today are to improve sustainability along the entire value chain and to reduce or even eliminate plastic waste in the process.

BASF Plastic Additives supports that process by supplying solutions that contribute to longer product lifetimes, safe and reliable use, as well as resource and energy efficiency. Those properties allow to integrate plastics in a more sustainable way in modern value chains.

Adequately stabilized plastics enable a **very efficient** use of resources, especially during the use phase. At the end of their life, plastics are still very valuable **resources that can be transformed** into new feedstock or into energy.

BASF Plastic Additives help to:

Improve the sustainability profile

of plastic products by ...

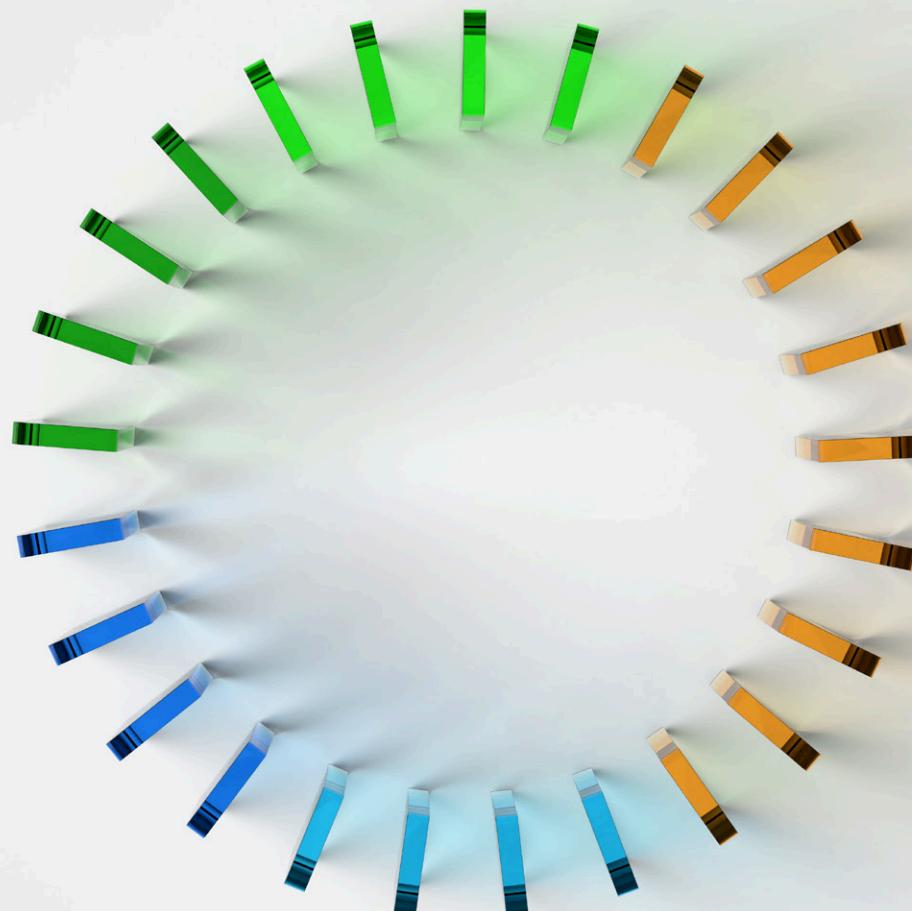
... extending product lifetimes with solutions that increase durability, and improve resistance to thermal, UV and chemical exposure.

... enabling better processing and performance of recycled plastics with the IrgaCycle® toolbox.

Provide cost-efficient solutions on a global scale by ...

... enabling applications where plastics last longer and require less maintenance than other materials.

... reducing the volume of raw materials and energy needed.



Ensure the safety and reliability of plastics by ...

... reducing exposure to undesirable by-products and residues with high-quality and extensively tested products.

... enhancing the safety of applications which require fail-safe stability and flame retardancy.

... ensuring that BASF's customers can fulfill and meet regional requirements.



/ VALERAS® creating new VALue for plastics in an ERA of Sustainability

Join us on this journey. Take a look at our customer stories, featured products, and exceptional services to make sustainable plastics a reality.

Plastics fulfill essential tasks in modern industries, which is why they play a substantial role in the shift towards a more sustainable future. With society and customers becoming increasingly aware of the importance of a holistic view of the value chain and cradle-to-grave approaches, plastics can be seen for what they really are: valuable materials that, with the help of additives, become enablers of more sustainability for many industries.

BASF Plastic Additives aims to promote this sustainability and support its customers with high value plastic additives and solutions to meet market needs. Together we can make plastics lighter, stronger, more durable and safer. It is why BASF Plastic Additives has brought its most sustainable products, innovative solutions, regulatory support, and longtime experience under one brand: VALERAS®. The VALERAS® portfolio includes BASF plastics additives that offer significant sustainability benefits for the plastics industry in many categories including improved durability, energy savings, or by reducing emissions.

Beyond that, BASF promotes the acceleration to a circular economy by developing new and innovative solutions to extend and close the loop. Ensuring that the required properties of plastics are maintained over a longer product lifecycle helps to keep them in the loop and thereby save valuable resources. Innovative products such as IrgaCycle® enable recycling of plastics and by enhancing the quality of the resulting material to help close the loop.

BASF also provides support when it comes to compliance with regulatory requirements. RegXcellence® for plastic additives is part of the VALERAS® portfolio and offers targeted access to comprehensive global regulatory support for BASF customers.

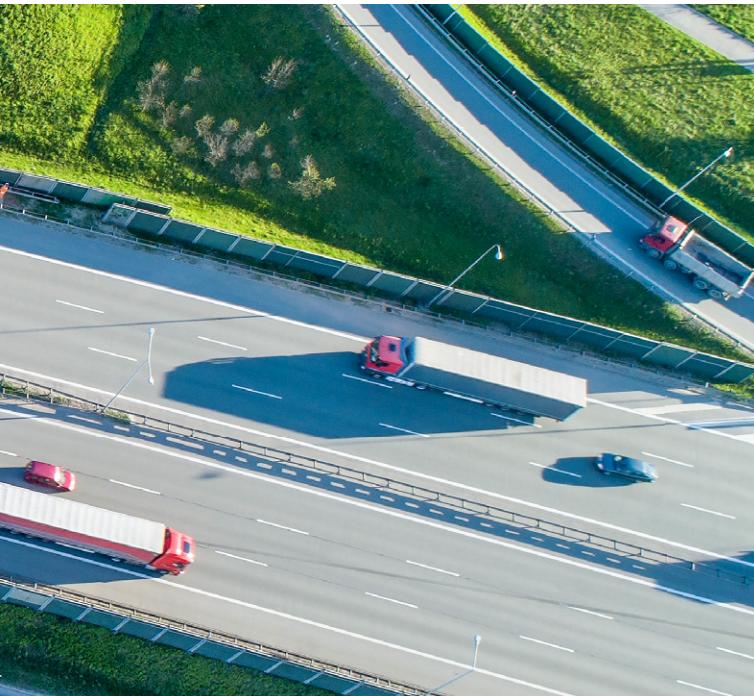
VALERAS® by BASF Plastic Additives
enables customers to achieve their
sustainability goals.





/ Plastic additives for the automotive industry

Electrified, sustainable, circular and shared – the design of tomorrow's car is complex and demands technical expertise. Packed with features for safety, entertainment, comfort, and environmental friendliness, modern automobiles have evolved to high-tech homes on wheels. Plastics play an important role in this transformation and plastic additives enable and enhance many of the required properties.



Health and safety, emissions reduction, circular economy, connectivity, and autonomous driving push the change towards a more sustainable automotive industry. To achieve that aim, vehicle manufacturers are constantly looking for new ways of driving innovation forward and rethinking their approach to building state-of-the-art cars. Advanced cars today contain a large part of plastics by overall vehicle volume, but only 12% of the entire vehicle by weight – which makes cars light in weight and augments fuel economy. Plastic additives play a decisive role in enabling these exciting developments in mobility, leading to safer, more efficient vehicles.

Plastic additives are accelerating the ride

BASF is committed to helping customers on their sustainable journey with smart additive solutions that contribute to making plastics more efficient. Our additives ensure smooth and stable processing, as well as excellent durability of plastic parts even under the most demanding use conditions. Furthermore, they also extend the performance profile of plastics with special effects such as flame retardancy and scratch- and dust resistance, thus ensuring safety and long-lasting aesthetics.





VALERAS®

Creating value for plastics used in the automotive industry

The automotive industry is currently undergoing a huge change driven by electrification, legislation, and commitment to the reduction of carbon footprint. In addition, awareness of the potential risks from emissions of unwanted substances is growing. To ensure the highest standards, BASF Plastic Additives offers sustainable solutions that enable the same performance in plastics at reduced concentration with future-proof substances.

Additionally, the demand for plastics with increased recyclate content for interior, exterior and under-the-hood applications is rising. BASF Plastic Additives provides solutions that improve the quality of recyclates and restore the performance of used plastics. This enables recyclers to increase the share of recycled plastics in their products without drawbacks on performance. Furthermore, it allows the use of recycled plastics for an increasingly broader range of applications in the automotive industry and thereby contributes to circularity and CO₂ footprint reduction in vehicle production.



How BASF Plastic Additives **add value to your products**

■ Lightweight

Lightweight constructions continue to lead projects in automotive. Plastic components in cars not only contribute to the safety of cars, they also help improve fuel economy, reduce costs and lighten their environmental footprint. Lightweight plastics also help balance the additional weight needed for electrified and automated driving, such as batteries, sensors and electronic control systems.

■ Durability

Light and thermal resistance, as well as anti-dust effects and scratch resistance are permanent features that are essential for enabling longer service life of car components. The cars of the future will further push the targets towards durability, with a greater focus on performance and aesthetics for new and second-hand cars.

■ Eco

Sustainability and eco-friendliness are no longer a matter of choice in the automotive industry. More natural and sustainable materials incorporated in cars, combined with an eco-design of the parts to ease the dismantling of end-of-life vehicles, reuse of the materials for increasing circularity in production processes, and keeping ahead of the changing legislative landscape have become top priorities for the automotive industry.

In alignment with the CASE framework, BASF sees connectivity, autonomy, shared mobility and electrification as driving forces for future mobility, supplemented by sustainability requirements.

The next-generation car will be at least partially autonomous, capable of making decisions on its own as it is equipped with all the necessary electronic systems and sensors. Thus, infotainment options, interior design elements, and comfort features will gain further in importance.

Furthermore, car ownership may become less important in the future, especially for those who do not drive regularly or live in urban areas. Instead, car sharing and ride sharing services will become the new standard for many people – and along with it, cost savings and reduced carbon footprint. It is estimated that one in ten vehicles will be a shared car by 2030. This will lead to an extended need for vehicle interior surfaces with greater durability and wear resistance. With people sharing vehicles, keeping the vehicles clean becomes critical. Car manufacturers will have to rely increasingly on highly durable plastic materials for interiors.

An increasing number of car manufacturers are using mechanically recycled thermoplastics to produce various car parts – from rocker panels, fabric covers, trims, headrests, and acoustic insulation, suspension components, filters, cables to engine components. Furthermore, the chemical recycling process is developing and will help the automotive industry to comply with evolving legal requirements and OEM sustainability goals.

BASF's newly launched IrgaCycle® portfolio of additives for improving the quality of mechanically recycled thermoplastics is intended to support the automotive industry in the transition



to a circular economy. Electrified cars and other pioneering technologies will go hand in hand with plastic materials that enhance safety, durability and sustainability at the same time. With its outstanding plastic additives solutions, BASF plays an integral part in this exciting evolution. Plastics and plastic composites accompany us into the future of mobility.

The next generation of cars will be part of a sustainable and efficient lifestyle.

Case Study

Going longer distances with Chimassorb® 2020

The automotive industry is undergoing a revolution and BASF can help it meet its sustainability goals.

Excellent airflow

HVAC units are responsible for the constant circulation of air in the car. This is why it is important that the plastics used for HVAC systems don't emit any volatiles that could be harmful to health or emit unpleasant odors in the vehicle interior even at high temperatures. In addition, HVAC systems need to offer excellent heat resistance to ensure proper function throughout the service life of the car. BASF carried out tests in which the heat resistance of under-the-hood plastic parts and the fogging emission of the used plastic materials were examined in detail. The tests compared conventional plastic parts and plastic parts stabilized with Chimassorb® 2020 and exposed them to the same accelerated aging conditions. The use of Chimassorb® 2020 maximized the time to embrittlement to 65 days. Furthermore, Chimassorb® 2020 shows significantly lower emissions in the fogging test compared to standard low molecular weight HALS stabilizers and even reduces fogging of the neat TPO resin.



These observations lead to the following conclusions:

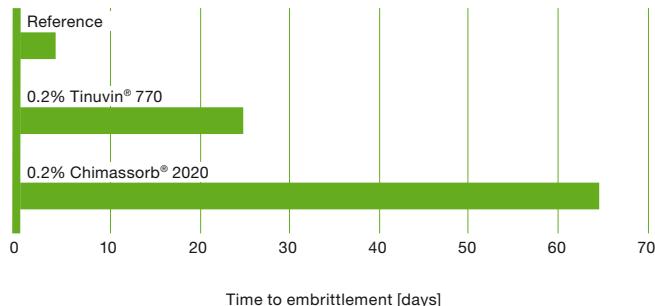
Applying Chimassorb® 2020 increases the long-term thermal stability and thus the longevity of the plastics used in vehicle manufacturing. It also ensures meeting the requirements on emissions from plastics, such as VDA 270 (odor), VDA 275 (formaldehyde), VDA 278 (VOC & FOG) and DIN 75201/SAE J 1756 (fogging), thus offering customers a safe and pleasant driving experience.

Chimassorb® 2020 is BASF's response to:

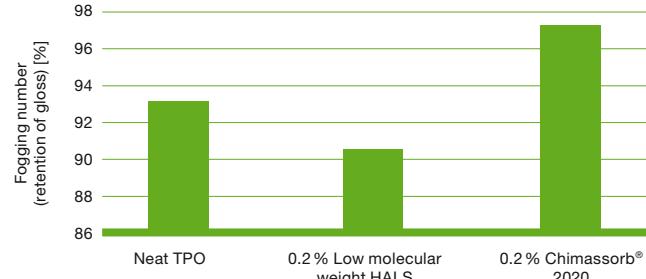
- Emission and odor reduction
- Heat stability

Chimassorb® 2020 at 150°C

TPO + 20 % talc + 0.75 % carbon black + 0.5 % TiO2

**Fogging test SAE J 1756**

Black TPO, 14 % talc



Heating in fog test chamber 6 hours at 110°C, chill plate at 38°C

Durable design features
and reliable safety combined for
**long-lasting interior
and enjoyable driving.**

Recommended additives for the automotive industry

BENEFIT	Interior TPO	Exterior TPO	UTH PP	PC headlamp & glazing	Interior and exterior styrenics*	Polyol	PUR foams	TPU
Process stabilization		Irganox® B 215 Irganox® B 900			Irganox® B 900	Irganox® 1076 Irgastab® PUR 70	Irgastab® PUR 70	Irgafos® 126 Irganox® 1010
Thermal resistance	Chimassorb® 2020 Irganox® B225 Tinuvin® 111		Chimassorb® 2020 Irganox® PS 802 Tinuvin® 111					
Light stabilization	Chimassorb® 944 Chimassorb® 2020 Tinuvin® 111 Tinuvin® 120 Tinuvin® XT 855 Uvinul® 4050	Chimassorb® 944 Chimassorb® 2020 Tinuvin® 111 Tinuvin® 120 Tinuvin® 770 Tinuvin® XT 850 Tinuvin® XT 855		Tinuvin® 360 Tinuvin® 1600 Uvinul® 3030	Tinuvin® 770 Tinuvin® P Uvinul® 3035 Uvinul® 3035 Uvinul® 4050		Tinuvin® B 75	Tinuvin® 213 Tinuvin® 622 Tinuvin® PUR 866

* ASA and its blends



/ Terminology

ABS	Acrylonitrile Butadienestyrene	PET	Polyethylene Terephthalate
EBA	Ethylene Butyl Acrylate	PMMA	Polymethylmethacrylate
EVA	Ethylene-Vinyl Acetate	PO	Polyolefin
HDPE	High-Density Polyethylene	POM	Polyoxymethylene
HIPS	High-Impact Polystyrene	PP	Polypropylene
LDPE	Low-Density Polyethylene	PS	Polystyrene
LLDPE	Linear Low-Density Polyethylene	PS	Process Stabilizer
LS	Light Stabilizer	PU	Polyurethane
LTTS	Long-Term Thermal Stabilizer	PVB	Polyvinylbutyral
PA	Polyamide	PVC	Polyvinyl Chloride
PBT	Polybutylene Terephthalate	TPO	Thermoplastic Polyolefin
PC	Polycarbonate	TPU	Thermoplastic Polyurethane
PE	Polyethylene	UVA	UV Absorber
PES	Polyester		



/ Global Headquarters and Asia Pacific

BASF South East Asia Pte Ltd
Plastic Additives
128 Beach Road
Guoco Midtown #18-01
Singapore 189773
Phone: +65 6337 0330

/ South America

BASF S.A.
Plastic Additives
Sede Administrativa
Av. das Nações Unidas
14.171, Morumbi
04794-000 São Paulo, SP
Brasil
Phone: +55 11 2039-3359

/ Europe

BASF Lampertheim GmbH
Plastic Additives
Chemiestrasse 22
68623 Lampertheim
Germany
Phone: +49 621 60-0

/ E-mail

plastic-additives@basf.com

For more information on BASF Plastic Additives, please contact your account manager or visit

www.plasticadditives.bASF.com

/ North America

BASF Corporation
Plastic Additives
Energy Tower IV
11750 Katy Freeway
Houston, TX 77079
USA
Phone: +1 800 431 2360



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