Polymer Additives

Additive specialties and high performance concentrates

AkzoNobel

AkzoNobel creates everyday essentials to make people's lives more liveable and inspiring

As a leading global paints and coatings company and a major producer of specialty chemicals, we supply essential ingredients, essential protection and essential color to industries and consumers worldwide. We have approximately 45,000 people in around 80 countries and are dedicated to energizing cities and communities while creating a protected, colorful world where life is improved by what we do.

We supply customers around the world with ingredients for the manufacture of life's essentials. Specialty chemicals are used in paints, detergents, foods, plastics, cosmetics, construction, pulp and paper, pharmaceuticals, electronics and agriculture for example. Our products can be used in a variety of ways. For example, as basic building blocks of manufactured products, in the processing of raw materials, as intermediates used to produce finished goods, or they may be used to enhance the functionality and durability of manufactured products. You'll find us in the food you eat, the buildings you live and work in, the vehicles and roads you use to move around, as well as everyday items such as paper products and your children's toys.

We produce everyday essentials for the global polymer and electronic industries. Our product portfolio includes organic peroxides, metal alkyls, organometallic specialties and polymer additives, which are essential ingredients for the thermoplastic, composite and rubber industries.

We have a long history in polymer additives, starting with the world's first commercial production of fatty amines in 1949. Since then we have added many new additives to our product portfolio, with the growth of plastics in everyday life.

Today, we are one of the world's top producers with a broad range of polymer additives.

AkzoNobel is consistently ranked as one of the Chemicals industry leaders on the Dow Jones Sustainability World Indexes (DJSI), showing that we take our obligations seriously - to the planet, to our customers and to our own people. We believe the only way to grow is by developing sustainable, innovative solutions that benefit our customers and we're constantly looking for ways to reduce our impact on the environment.

We're committed to Responsible Care®.
Product Stewardship and REACH.

Sustainability is at the heart of everything we do

We are committed to making all our products, services and partnerships as sustainable as possible. It's one of the company's strategic reputation builders, as well as being one of our core principles.

Sustainability is critical for the future success of our company, our society and our planet. Planet Possible is how we explain our sustainability strategy on an economic, environmental and social level. It is our commitment to doing more with less: creating more value from fewer resources. It is about developing a more sustainable business and increasing our resource efficiency across the entire value chain.

Planet Possible™

We engage our employees, suppliers and customers on sustainability and form partnerships to drive the agenda. By working closely with these key stakeholders, we can ensure that our value chain is sustainable and delivers business benefits for all. We can help make life more livable, healthy and inspiring.

Our researchers are based in dedicated customer-focused business teams. They perform research, product and process development and technical support in order to translate market needs into new products. They understand the needs of our customers and are committed to their success.

Our range of polymer additives

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Your global partner

Our manufacturing sites and distribution centers are found all around the globe, including joint ventures in Japan and China.

Our global distribution network allows us to deliver our products to you anywhere in the world. That's how we ensure security of supply and easy access to quality products wherever you are.

All our sites are ISO 9001 and ISO 14001 certified to ensure the highest product quality and strict compliance with environmental regulations. We continually invest in manufacturing techniques, high quality standards, safety, innovation, active technical support and a reliable supply chain.

Delivering innovative solutions

As a company of innovation it is our ambition to discover new dimensions in polymer additives. Using synergies with AkzoNobel's polymer and surface chemistry strengths we have developed significant knowledge in this field.

This, coupled with our thorough understanding of polymer production and processing is the basis for the development of new, innovative polymer additives.

One of our focus areas is the antifog market. We are working to develop a new generation of antifog additives, both for the agricultural market in need of long lasting products and the food packaging market that lacks antifog additives for polypropylene films.

One of our latest products introduced in the market is Kayabrid, a polypropylene based compatibilizer for the composite market that enhances the mechanical properties of the final product at lower addition levels.

Not to forget our tailor-made antistatic and slip additive high concentrates and superconductive carbon blacks. These unique and easy to use products offer savings in operational costs and time.

At AkzoNobel, customer focus is our core value: we listen to our customers and use our expertise and innovation to come up with unique product solutions. Like in case of Armostat 2000 CEP: an innovative non-dusting physical form of our Armostat 2000 which is solving cake and storage issues at our customers.

Behind every innovation there is a dedicated team of researchers that master science to deliver innovative solutions. They perform research, product and process development and provide technical support in order to translate market needs into new products.

Much of our success is due to our philosophy of creating close partnerships with our customers. Sharing our rich experience in polymer additives is one of the most important and valuable resources we offer.

Antistatic Additives

Armostat®

Armostat is the world's number one brand in antistatic additives.
Our full range of products, including high performance concentrates, offer a solution to problems related to the build-up of electric charges on plastic material.

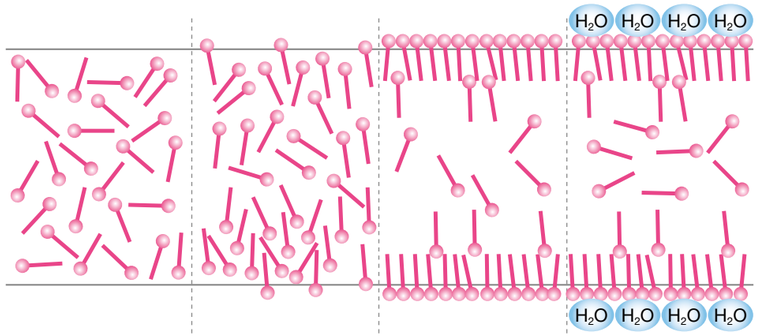
Once added to the polymer during the extrusion process, our antistatic additives migrate to the surface giving the required effect.

Dust attraction upon storage of plastic materials is a well-known phenomenon. Doing your shopping in a supermarket or household store, which article would you choose? The bright and shiny bottle -probably containing antistatic additives- or the dusty one?

However, the need for antistatic additives does not stop with aesthetic aspects. In many industrial applications antistatic properties are needed to prevent electric discharge during filling or loading of plastic packaging, which can initiate fires or dust explosions. During processing they prevent fouling, packaging film defects caused by sparks and improve release of injection or blow molded articles.

Dosing liquid or paste-form antistatic additives can be a problem. That's why we offer high performance concentrates. They reduce cleaning time of dosing systems and minimize waste while giving all the advantages of our antistatic additives.

Fast antistatic action, long lasting antistatic properties, solid or liquid products, or cost efficient, easy to dose high concentrate solutions; whatever your requirements, we offer the product to match.



Phase 1
Homogeneous distribution of antistatic agent during the extrusion process

Phase 2
Antistatic agent begins to migrate to the surface after extrusion

Phase 3
Hours or days later antistatic agent covers the surface

Phase 4
Moisture pick up from the surrounding air, giving the desired antistatic properties

Product name	Description	Application	Physical form	Origin raw material	Polymer	Typical dosage (%)	Packaging
Ethoxylated amines Long term antistatic action							
Armostat 300	Tallow based	General purpose	Paste	Animal	PE, PP	0.1-0.2	180 kg steel drum
Armostat 700	Oleic based	Liquid alternative for Armostat 300	Liquid	Animal	PE, PP	0.1-0.2	180 kg steel drum
Armostat 400	Coconut based	Vegetable and liquid alternative for Armostat 300	Liquid	Vegetable	PE, PP PS	0.1-0.2 1.0-3.0	180 kg steel drum
Armostat 1800	Stearic based	Vegetable alternative for Armostat 600	Solid	Vegetable	BOPP, PP	0.1-0.2	180 kg steel drum
Amine-free specialities Fast and long term antistatic action							
Armostat 2002	Lauric based	Easy to dose alternative of Armostat 2000	Pellets	Vegetable	PE, PP	0.1-0.3	20 kg PE bag in cardboard box

Image courtesy of Oerlemans Plastics BV

High Performance Concentrates

Armostat®, Nourymix®

Dosing of liquid or paste-form additives requiring special melting, pumping and injection equipment can be a challenge. Our high performance concentrates go beyond standard polymer additives. That's what we call Additives®.

We offer unique high performance concentrates of our polymer additives as easy to use, cost effective solutions. High performance concentrates are free-flowing granules containing up to 80% active additive on a polymer carrier.

Easy to use
High performance concentrates are non-caking. They can easily be dosed using conventional feeders without any additional investment.

Cost effective
High performance concentrates are cost effective since the cost per kilogram of active ingredient is generally lower. They also increase production flexibility as they require less storage space and handling in your plant. All you need is a base polymer grade and AkzoNobel's high performance concentrates.

High performance concentrates are based on our high quality Armostat® and Nourymix® range of polymer additives. Their high loading level guarantees that you have less foreign polymer in your final application and less impact on the physical properties of your end product.

Eco-premium
High performance concentrates help you reduce your carbon footprint:
- Reduced compounding energy required
- Lower CO_2 emissions
- Less packaging (less waste)
- Improved transport and warehousing

Our range of high performance concentrates includes:

- Armostat® antistatic additives
- Nourymix® slip and antiblock additives

Antistatic High Performance Concentrates

Product name	Recommended use	Physical form	Origin of raw material	Active content (%)	Packaging
PE					
Armostat 300-XE50	Long lasting general purpose antistatic action for LDPE and LLDPE	Free-flowing granules	Animal	50	25 kg PE bag in cardboard box
Armostat 300-XE75	Long lasting general purpose antistatic action for HDPE	Free-flowing granules	Animal	75	25 kg PE bag in cardboard box
Armostat 2000 CEP-AE80	Fast and long lasting antistatic action for LDPE	Free-flowing pellets*	Vegetable	80	25 kg PE bag in cardboard box
PP					
Armostat 300-XP80	Long lasting general purpose antistatic action for PP	Free-flowing granules	Animal	80	25 kg PE bag in cardboard box
Armostat 400-XP75	Long lasting general purpose antistatic action for PP	Free-flowing granules	Vegetable	75	25 kg PE bag in cardboard box
Armostat 600-XP75	Long lasting general purpose antistatic action for BOPP	Free-flowing granules	Animal	75	25 kg PE bag in cardboard box
Armostat 1800-XP75	Long lasting general purpose antistatic action for BOPP	Free-flowing granules	Vegetable	75	25 kg PE bag in cardboard box
Armostat 2000 CEP-AP80	Fast and long lasting antistatic action for PP	Free-flowing pellets*	Vegetable	80	25 kg PE bag in cardboard box
Other polymers					
Armostat 400-XS50	Long lasting general purpose antistatic action for PS and ABS	Free-flowing granules	Vegetable	50	25 kg PE bag in cardboard box
Armostat 400-XN50	Long lasting general purpose antistatic action for SAN	Free-flowing granules	Vegetable	50	20 kg PE bag in cardboard box

* Closed End Pellets (CEP), Armostat 2000 encapsulated in a polymeric film

Superconductive carbon blacks

Ketjenblack®

AkzoNobel has a leading position in the electro-conductive carbon black market. Our Ketjenblack superconductive carbon blacks offer the highest electrical conductivity at the lowest concentration in the industry.

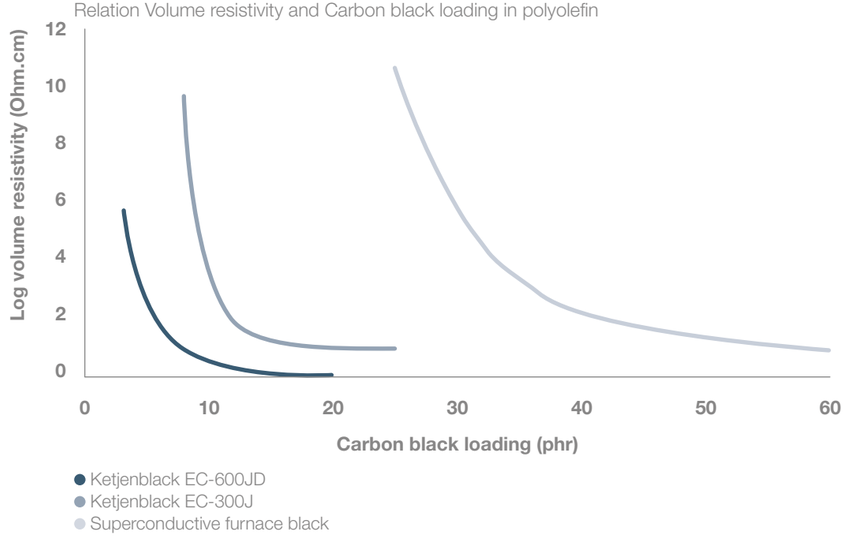
Our supercondtive carbon blacks provide your products with excellent antistatic or electroconductive properties in order to attain the highest level of safety in their end use.

Our high purity superconductive blacks are used in a wide range of applications. These include protective packaging for electronics, safety shoes, fuel tanks and hoses, conductive flooring, medium and high voltage cables, and electrostatic paintable plastics including automotive parts. Ketjenblack also finds use in non-polymer applications such as batteries, fuel cells and conductive coatings.

Due to the unique morphology of Ketjenblack, substantially lower amounts are needed to obtain the desired properties when compared to conventional conductive carbon blacks. As a result the mechanical properties of the final compound are preserved. Ketjenblack EC-600JD is recognized in the industry as a unique product giving the highest electroconductivity at the lowest addition levels.

We also produce tailor-made superconductive carbon black formulations. Regardless of concentration or medium, please contact us with your specific needs.

Relation Volume resistivity and Carbon black loading in polyolefin



Product name	Description	Application	Physical form	Polymer	Typical dosage (%)	Total BET surface area (m^2/g)	Packaging
Ketjenblack EC-300J	Superconductive black with very high purity	Making polymers conductive with minimum impact on mechanical properties	Soft pellets	All polymers Resins, coatings and inks	8-10	800	10 kg PE bag, 180 kg big bag
Ketjenblack EC-600JD	Top end super-conductive black with very high purity	Provides the same conductive properties as Ketjenblack EC-300J with half of the dosage	Soft pellets	All polymers Batteries and fuel cells	4-5	1400	8 kg PE bag, 140 kg big bag
Ketjenblack EC-600JD Powder	Ketjenblack EC-600JD in very fine powder form	Batteries and fuel cells	Very fine powder	All polymers Batteries and fuel cells	4-5	1400	4 kg PE bag

High performance concentrates

Product name	Recommended use	Physical form	Active content (%)	Packaging
Coatings and resins				
Ketjenblack EC-330 JMA	Easy to disperse formulation of Ketjenblack 300 in methacrylate monomer for resin systems	Non-dusting powder	30	35 kg drum

Flame Retardant Additives

Perkadox®

Perkadox 30 and Perkadox BC-FF act as flame retardant synergists in combination with brominated flame retardants. They allow for the use of significantly lower amounts of flame retardant synergists like antimony trioxide, while maintaining the same level of flame retardancy. Due to their relatively high thermal stability, they are particularly suitable for use in polystyrene, especially expandable polystyrene.

Flame retardant synergists

Product name	Description	Application	Physical form	Melting point (°C)	Polymer	Typical dosage (%)	Packaging
Perkadox BC-FF	Organic peroxide	Synergist for PS	Crystals	40	PS	0.5-2	25 (5x5) kg PE bag in cardboard box
Perkadox 30	C-C initiator	Synergist when higher processing temperatures are required	Flakes	90-110	PP, PS	0.25-1	20 kg PE bag in cardboard box

Processing Aid

Armowax® W-440

Armowax W-440 is the best dispersion and processing aid for highly filled polymer compounds available. This hyper-dispersant gives the perfect balance between internal and external lubrication.

When making highly filled polymer compounds, dispersion of the fillers is a challenge. In many cases standard processing aids do not perform well enough to get a proper dispersion. In those situations Armowax W-440 brings the perfect solution.

The unique characteristics of Armowax W-440 are based on a combination of hydrophilic and hydrophobic groups present in the double-comb polymeric structure. The good compatibility of Armowax W-440 with polymer and fillers, combined with low-melting point, improves the flow properties of compounds during processing while enhancing optimal dispersion.

Armowax W-440 ensures optimal dispersion of AkzoNobel's Ketjenblack and other superconductive carbon blacks, glassfibers or calcium carbonate. If a standard dispersion aid does not give you the performance you need, Armowax W-440 is the product of choice.

Product name	Description	Application	Physical form	Origin raw material	Polymer	Typical dosage (%)	Packaging
Armowax W-440	Polymeric ester of long chain alcohol	Specialty processing aid for highly filled polymer compounds	Pastilles	Synthetic	Polyolefins, engineering plastics	0.5-2.0	20 kg PE bag in cardboard box

Advantages of Armowax W-440

During compounding
- improved dispersion of fillers
- broader processing window
- reduced melt viscosity of compounds
- increased melt strength of highly filled compounds

During end use
- improved surface gloss
- increased impact strength
- reduced additive concentrations needed
- increased elongation at break

During molding
- improved flow properties
- improved mold release behavior
- reduced contamination
- reduced equipment wear

Polymer Modification Peroxides

Perkadox®, Trigonox®

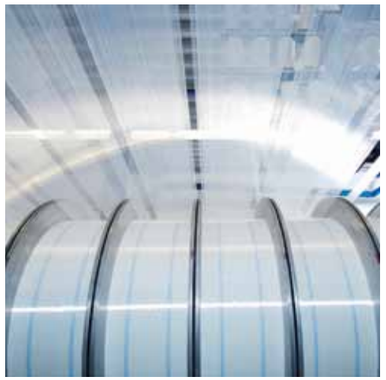


Image courtesy of Jürgens Maschinenbau GmbH & Co. KG

AkzoNobel is the world leader in initiators used in the production of thermoplastics polymers such as polyvinyl chloride (PVC), low density polyethylene (LDPE), acrylics and styrenics. Our organic peroxides are also used to modify polypropylene via reactive extrusion.

Polypropylene is preferably produced in large campaigns which limits the amount of available grades. AkzoNobel's Trigonox and Perkadox range of peroxides allows for the modification of the molecular weight distribution of PP to your specific needs resulting in Controlled Rheology PP (CR-PP) and High Melt Strength PP (HMS-PP).

CR-PP is suitable for high speed processes that require less die swell and an increased MFI like spun bond and melt blown fiber production as well as extrusion coating.

One of our latest products introduced to the market is Trigonox 301. When compared to other organic peroxides used for CR-PP, Trigonox 301 is clearly one of the most cost-effective and safe of those approved for use in food contact applications. It creates fewer volatile decomposition products which are undesirable from an odor and taste point of view.

HMS-PP is suitable for processes that require both an increased melt strength and die swell like PP foaming, thermoforming and blow molding.

AkzoNobel offers Trigonox 101 and Trigonox 301 in an 'easy to handle' version on PP.

Product name	Feature	Physical form	Max. storage temp (°C)	Half-life 0.1 h (°C)	SADT (°C)	Typical dosage (%)	Packaging
Trigonox 101	General purpose peroxide for polymer modification. Production of CR-PP and polymer grafting, for example MA-g-polyolefins	liquid	40*	156	80	0.01-0.25	25 kg HDPE can
Trigonox 101-20PP	Easy to use version of 20% Trigonox 101 on PP. Recommended for use in production of CR-PP and polymer grafting.	beads	30	156	70	0.05-1.25	15/20 kg box
Trigonox 301	Specialty peroxide for polymer modification. High performance alternative for Trigonox 101. Generates less volatiles, improving safety and organoleptic profile of the modified polymer. BfR and food contact approved (EU, and as rheology modifier for FDA). Safer in transport compared to Trigonox 101.	liquid	40*	170	110	0.01-0.25	25 kg HDPE can
Perkadox 24L	Specialty peroxide for polymer modification. Production of HMS-PP from PP powder.	powder	20	84	40	0.5-2.0	25 kg box

* Minimum storage temperature 10°C for both Trigonox 101 and Trigonox 301
** Net weight depends on region

Contact us

For product inquiry and ordering information, please contact your AkzoNobel account manager or regional AkzoNobel sales office.

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Additional information
Product Data Sheets (PDS) and Material Safety Data Sheets (MSDS) are available at polymerchemistry.akzonobel.com
On request we also provide specific publications on the use and the safe handling and storage of our products.

Image on page 14 courtesy of Jürgens Maschinenbau GmbH & Co. KG

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AkzoNobel creates everyday essentials to make people's lives more liveable and inspiring. As a leading global paints and coatings company and a major producer of specialty chemicals, we supply essential ingredients, essential protection and essential color to industries and consumers worldwide. Backed by a pioneering heritage, our innovative products and sustainable technologies are designed to meet the growing demands of our fast-changing planet, while making life easier. Headquartered in Amsterdam, the Netherlands, we have approximately 45,000 people in around 80 countries, while our portfolio includes well-known brands such as Dulux, Sikkens, International, Interpon and Eka. Consistently ranked as a leader in sustainability, we are dedicated to energizing cities and communities while creating a protected, colorful world where life is improved by what we do.