

FUCHS Special Applications

SOK

Concrete release agents
for the construction industry



MOVING YOUR WORLD

LUBRICANTS.
TECHNOLOGY.
PEOPLE.



FUCHS LUBRICANTS GERMANY

We do not just develop lubricants. We develop intelligent solutions for highly complex challenges.

To this end, we have pooled our expertise and experience from a wide range of application areas: FUCHS SCHMIERSTOFFE and FUCHS LUBRITECH became FUCHS LUBRICANTS GERMANY. Our goal: to keep our customers' world in motion. Efficient, sustainable, reliable. Today and tomorrow.

What can we move for you?

FUCHS LUBRICANTS GERMANY

Facts and figures

Company: FUCHS LUBRICANTS GERMANY GmbH,
a company of the FUCHS Group

Locations: Based in Mannheim, with sites in
Bremen, Dohna, Hamburg, Kaiserslautern, Kiel and Wedel;
approx. 1,400 employees

Product range: A full range of more than 3,000 products
for all application areas

Certifications i. a.: ISO 9001, IATF 16949, ISO 14001,
ISO 45001, ISO 50001, ISO 21469, HALAL, KOSHER
(detailed certifications at www.fuchs.com/de/en)

CO₂ neutral production*

Since 1931, we have been pursuing the same goal: to keep the world moving. With innovative and technological lubricant solutions that have a sustainable impact on the future. Unconditional reliability is our top priority, it is the foundation of our company and basis for everything that defines us.

Reliability is both a driver and a demand. And it's a promise to all our customers in the fields of automotive suppliers and OEMs, mechanical engineering, metal processing, mining and exploration, aerospace, energy, construction and transport, agriculture and forestry, as well as the paper, steel, metal, cement, forging and food industries, but also qualified lubricant dealers, car dealerships and workshops.

Long-term experience, high development strength and the fulfillment of far-reaching standards are the basis for the special quality of our world-leading product brands. We deliver solutions that are simply more efficient and therefore more sustainable. We always think in holistic solutions. For the development of individual solutions, we enter into an intensive customer dialog with you. This is the way we live up to our claim of moving your world.

MOVING YOUR WORLD

*Partially also based on compensation

CONCRETE RELEASE AGENTS WITH AN OPTIMUM EFFECT

High-quality concrete release agents are indispensable where the quality of a concrete surface is concerned. Based on our decades of experience, we have developed our high-performance SOK products in close cooperation with our customers. Today, these concrete release agents are utilised successfully around the world in precast plants as well as in structural and civil engineering.

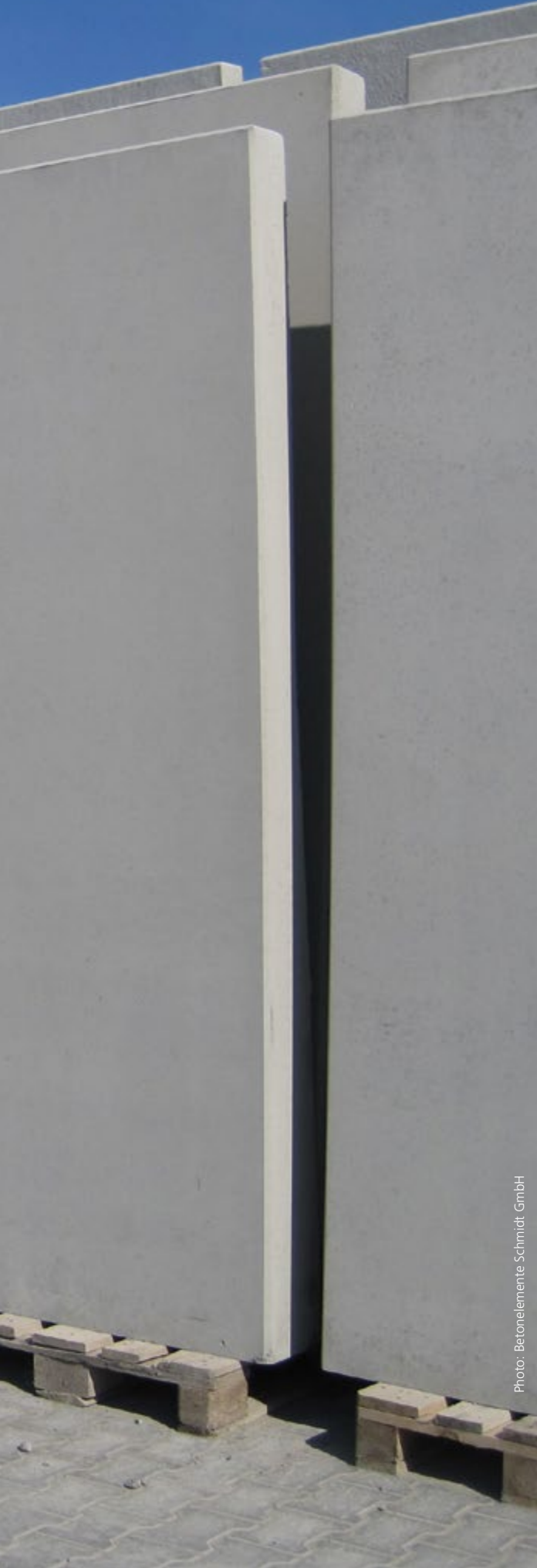


Photo: Betonelemente Schmidt GmbH

Our concrete release agents reliably fulfil all the requirements for modern concrete release agents, such as:

- Easy separation of concrete and formwork
- Concrete surfaces without pores and shrink holes
- Light-colored concrete surfaces without discoloration
- Clean formwork
- Protection of the formwork and easy cleaning
- Temporary protection against corrosion on steel formwork
- Hygienic safety for the user
- Harmlessness for the environment
- Universal applicability
- Cost effectiveness
- Sustainability

The fact that we can provide eco-friendly, alternative water-based products, e.g. our SOK AQUA range, as concrete release agents for almost all applications clearly displays and proves that quality, efficiency and environmental awareness can be reconciled.

Our product range is also constantly evolving through our close cooperation with those people who utilise our products. Continuous dialogue with our customers is important to us. This close cooperation, coupled with our years of experience in the field of release agents, ensures that we can continue to provide ongoing product optimisation for you. In case of sufficient quantities, we will develop concrete release agents for your specific applications and requirements. Please contact us!

The composition of concrete release agents

Concrete release agents consist of a base fluid in which the required additives are dissolved. This base fluid can be mineral oil with and without de-aromatised white spirit, ester/vegetable oil or, in the case of emulsions, water. Fatty acids and/or esters are usually used as separating substances. The fatty acids react chemically with the cations of the "concrete water" to produce metal soaps, which form the "predetermined breaking point" between concrete and formwork following the hardening of the

concrete. The often utilised esters are saponified to form fatty acids and alcohol by the highly alkaline concrete (pH value 12.9).

The fatty acids react, as described, with the cations in the "concrete water". The alcohol is built into the cement matrix. Furthermore the concrete release agents contain additives for the minimisation of pores and shrink holes as well as a temporary corrosion protection for steel formwork.

The concrete release agents (SOK) are divided into the following three main groups with regard to their raw material basis:

Product	Group 1 Mineral oil basis, partly with solvents	Group 2 Emulsions	Group 3 Ester-oil release agent
Carrier substance	Mineral oils/partly with solvents (approx. 80 to 95%)	Water (approx. 65 to 85%)	Vegetable oils, ester oils (approx. 95 to 99%)
Chemically separating substance	Fatty acids and esters (approx. 2 to 15%)	Fatty acids and esters	Vegetable oils, esters (approx. 95 to 99%)
Additives for minimising pores and shrink holes	yes	yes	yes
Corrosion protection additives	yes	yes	yes
Other additives	-	Emulsifying agents	-

Mineral oil based release agents

Inexpensive release agents, whose technical effectiveness does not usually correspond to the performance of the products used in precast plants, are used for normal requirements in structural and civil engineering. Mineral oil based release agents with solvents are often used in precast plants. The technical requirements in this segment are very high. Corrosion quite often occurs on the steel formwork particularly in the production of ceilings and walls. FUCHS LUBRICANTS GERMANY has developed special concrete release agents with increased corrosion protection.

Emulsion based release agents

For reasons of health and safety at work and environmental hygiene, water-based products are increasingly used in precast concrete plants. FUCHS LUBRICANTS GERMANY successfully brought emulsions onto the market years ago under the name SOK AQUA. Work is continuing intensively and sustainably to further extend and push the range of emulsions. It goes without saying that the majority of the concrete release agents from the FUCHS LUBRICANTS GERMANY SOK range are easily biologically degradable in accordance with the OECD tests and correspond at the most to the German water pollution class 1 (WGK).

Ester or vegetable oil based release agents

Sustainable release agents based on ester or vegetable oil are not only suitable for applications in drinking water protection areas, but can also be used in many other areas.



Photo: Mederer

Instructions for the use and storage of concrete release agents

Application of concrete release agents

Concrete release agents can be used on all common formwork, e.g. steel formwork, plastic-coated wooden formwork, etc. The concrete release agents can be used for horizontal and vertical production processes. The upper limit of the temperature range of the release agents reaches a formwork temperature of about 130 °C, depending on the type. The performance of a release agent depends on the formwork temperature, the process technology and the concrete composition. When applying our ready-to-use concrete release agents, care must be taken that they are always applied thinly and evenly. The formation of drops and puddles on the formwork is to be avoided in every case. If necessary the formwork can be drawn off, for example with a rubber lip, or wiped with a clean cloth or mop.

Following the application of emulsions from the SOK AQUA range, they "break" after a short time. This means that the colour of the release agent film changes from white to light yellow. The film is then oily. Concreting can take place on the emulsion once it has broken. The time required for this is 5 to 15 minutes, depending on the



temperature. With regard to the yield when spraying, the emulsions from FUCHS LUBRICANTS GERMANY behave similarly to solvent-based release agents. In other words, the emulsions are very economical in use.

The release agents are applied using manual spraying devices or stationary spraying systems. In the case of manual spraying devices, consumption values of up to 60 m²/l are possible when using our concrete release agents. Consumption values of up to about 100 m²/l can be achieved in optimally adjusted stationary spraying systems. The important factor is to maintain a spraying pressure of 4 to 6 bar. A proper spray pattern will usually not be generated at a lower pressure.

The selection of suitable spray nozzles is another critical factor for a good spray pattern. In the case of manual spraying devices, for example, the stainless steel nozzle fittings type TPU800067-SS from Spraying Systems Co. have proven themselves with our products in practice.

In the case of stationary spraying systems, nozzles with smaller diameters should always be chosen in accordance

with the process conditions. In order to achieve optimum results with our release agents in terms of quality and consumption, it is very important for the spraying systems to be "correctly adjusted".

If mineral-oil based products not requiring labelling in accordance with the CLP Regulation are utilised, then a higher spraying pressure of approx. 6 to 12 bar is necessary. We recommend nozzles such as the models TPU SS 1,100,067, 1,100,033 SS or SS 800,067 from Spraying Systems Co.

Our expert field representatives will be pleased to advise you on the choice of suitable release agents, pumps and nozzles for the optimization of stationary spraying systems.

Storage

Concrete release agents must always be stored in closed containers under cover and protected from frost and direct sunlight. The release agent containers are to be secured with a collection pan.



Fields of application of concrete release agents

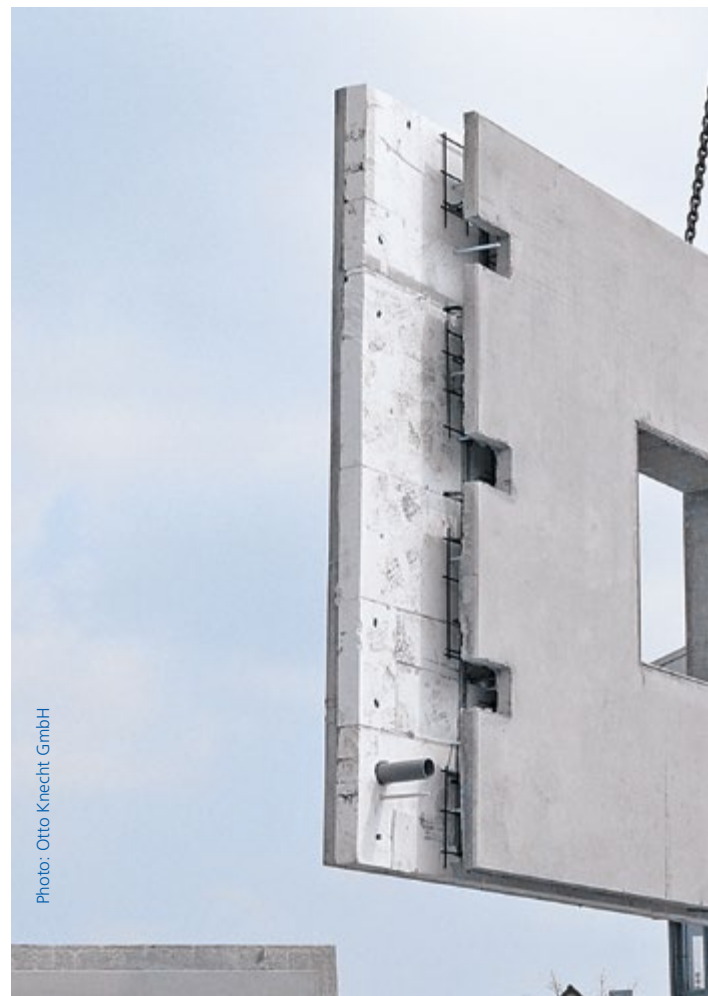
Application areas for concrete release agents based on mineral oil (with and without solvent)

Concrete release agents based on mineral oils with and without solvents are still widely used in precast plants and in structural and civil engineering. These products are universally applicable. Precast plants often utilise solvent-based products for standard formwork to fulfil the high demands on the quality of concrete surfaces (up to exposed concrete class "SB4") and cleanliness of the formwork. The products containing mineral oil are often also used as immediate demolding release agents. According to the dangerous and hazardous substances regulations, solvent-based products must be labelled.

Your benefits at a glance:

- Application temperature up to 130°C
- Reduce pore and shrink holes formation to a large extent
- Provide clean and homogeneous concrete surfaces
- Contain an effective corrosion protection
- Do not impair the adhesion of plaster, adhesives and paint
- Suitable for use in horizontal and vertical areas

Solvent-based concrete release agents are often utilised in precast plants on all common formwork such as steel





formwork, coated wooden boards, plastic formwork, etc. Some of these products can be utilised at formwork temperatures of up to 130°C. These products can also occasionally be found in structural engineering when exposed concrete is required.

FUCHS LUBRICANTS GERMANY has created a number of proven release agents which offer very high corrosion protection for steel formwork.

Inexpensive products based on spindle oil are utilised in structural and civil engineering for normal applications. The products, which are formulated for structural and civil engineering, exceed the technical requirements in those areas.

Application areas for concrete release agents based on ester oil

Products based on ester oil, which also include vegetable oils, are becoming more and more important for environmental reasons and are increasingly used for the production of precast concrete elements. These products can currently be found in various areas of application, such as ceiling and wall production, the use of spun concrete or for immediate demolding.

FUCHS LUBRICANTS GERMANY has developed SOK ECO 107, SOK ECO 911 and SOK HU ECO for requirements of this kind.



Some of our concrete release agents have also been awarded the EU Ecolabel, which is a well-known label for the use of eco-friendly products, especially with environmental authorities and in the context of environmental audits.

Emulsion-based concrete release agents

Emulsions which are utilised as concrete release agents are the latest product generation. The emulsions can be used in precast plants on all standard formwork such as steel formwork, plastic-coated wooden formwork etc. Compared with solvent-based concrete release agents, emulsions have distinct advantages thanks to their handling and application. Emulsions from the SOK AQUA range are non-flammable and virtually odourless during spraying. The effects of the SOK AQUA products in terms of concrete technology correspond in most cases to the concrete release agents containing solvents. The user therefore obtains flawless exposed concrete surfaces that are free of pores, shrink holes and stains. The concrete surfaces are bright and smooth. Furthermore, the formwork can be easily cleaned without too much effort.

FUCHS LUBRICANTS GERMANY has successfully managed to integrate a demonstrably increased corrosion protection in some products, for example, SOK AQUA KS for utilisation on corrodible steel formwork.

Your benefits at a glance

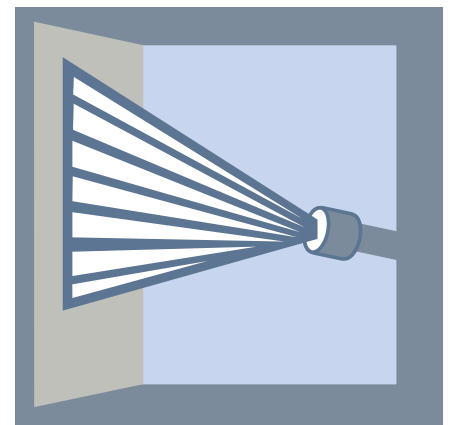
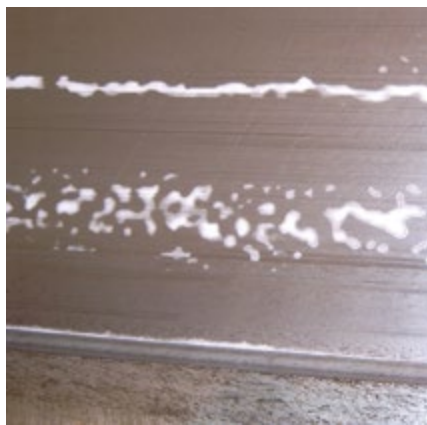
- Application temperature up to 70 °C (formwork temperature)
- Largely prevent pore formation
- Provide clean and uniform surfaces
- Contain very effective corrosion protection for steel formwork
- Do not impair the adhesion of plaster, adhesives or paint
- Suitable for use in horizontal and vertical areas
- Non-flammable
- Almost odourless in the applicatio
- Easily biodegradability

Application areas for emulsions

Emulsions can be utilised for horizontal and vertical production processes in precast part production. The temperature application range of the emulsion release agents is generally between room temperature and 70°C for the temperature of the formwork. The performance, as well as the maximum application temperature for an emulsion, depends on the process engineering and the concrete composition. Special, rain-resistant emulsion types are necessary for the structural and civil engineering sector. They have also been developed by FUCHS LUBRICANTS GERMANY, e.g. in the product SOK AQUA E.

Storage of emulsions

Emulsions must generally be stored under cover, protected from frost and direct sunlight. The products from FUCHS LUBRICANTS GERMANY are designed so that they will still be liquid at -5°C. However, if an emulsion freezes accidentally in winter, then it is ready to be used again after thawing and stirring.



The composition of emulsions

An emulsion is a mixture of finely distributed water and oil. The oil hereby forms very small droplets that "float" in the aqueous phase. For the production process and for the prevention of phase separation, the emulsions also include special tensides, referred to as emulsifiers. In addition to the emulsifiers, the release agents also contain additional components such as corrosion protection additives and stabilisers. An "oil-in-water emulsion" ("O/W" emulsion) is the usual choice for concrete release agents. The O/W emulsions are comparable to solvent-based concrete release agents due to their low viscosity and can be very finely applied to the formwork.

Functional principle of emulsions

If the "milk-coloured" emulsion is sprayed onto the formwork, then the emulsion will "break" after a short time. This means that the intended separation to the oil and water phase occurs. In this process, the oil phase with the active ingredients forms as a film on the formwork. The water from the emulsion floats on the oil layer and evaporates as defined. At this point in time, the oil phase remaining on the formwork has a clear appearance. The breaking of the emulsion is highly dependent on the temperature. The lower the ambient temperature, the longer the process takes. The concrete can be poured into the formwork after the breaking of the emulsion.

Benefits of emulsions in terms of safety


Compared to solvent-based release agents, SOK AQUA products are subject to significantly lower demands for handling and storage when complying with regulations. Since the products of the SOK AQUA range do not present any appreciable risk to the employees, the containers may be stored in the production hall. Concrete release agent containers are to be secured with a collecting pan. Most FUCHS emulsions are easily biodegradable according to OECD 301 C.

Product and application overview of our concrete release agents*

Concrete release agents for precast plants on the basis of aqueous emulsions

Product	Preferred application	Comment
SOK AQUA 55 ES	Garages, L-stones, beams, ceilings and walls	Mineral oil-free emulsion especially for use with high hydration heat development or heated formwork
SOK AQUA G PLUS	Large pipes, concrete sleepers, manholes, ceilings, walls	Provides for particularly good concrete surfaces
SOK AQUA HF	Beams, trusses, ceilings and walls	Emulsion containing mineral oil especially for use with high hydration heat development
SOK AQUA KS	Ceilings, walls, concrete sleepers	Emulsion with enhanced corrosion protection for steel formwork
SOK AQUA TB 1	Tubbings, filigree concrete slabs	Mineral oil and solvent-free release agent for very good concrete surfaces
SOK AQUA Z	L-stones, beams	Very well suited for self-compacting concrete
SOK AQUA Z PLUS	Precast slabs with in-situ topping, solid slabs and walls	Mineral oil-free emulsion with strong separating effect

Concrete release agents for precast plants

Product	Preferred application	Comment
SOK ULTRA	Vertical productions, e.g. beams, trusses etc.	Usable up to a formwork temperature of 130 °C
SOK 128	Beams, trusses, TT-slabs, SCC	Universal release agent for precast plants
SO 912	Beams, ceilings, walls	Higher release effect than SOK 128
SOK BTM UP/4	Ceilings, walls, beams, trusses, SCC	Almost odourless during application; especially suitable for pigmented concrete
SOK ECO 107 	Ceilings, walls, beams	Mineral oil and solvent-free release agent; EU Ecolabel certified
SOK ECO 911	Concrete sleepers, spun concrete, walls	Based on native raw materials
SOK STG	Considerably heated garage formwork	Odourless during application; no labelling

Concrete release agents for precast plants with enhanced corrosion protection

Product	Preferred application	Comment
SOK U/K 105	Ceilings, walls	Release agent with very good corrosion protection for steel formwork
SOK U/K 115	Ceilings, walls	Trouble-shooter for solving acute rust problems with very strong corrosion protection
SOK 2/K 105	Ceilings, walls	Slightly better release effect and more oily than SOK U/K105


Concrete release agent for block manufacturing

Product	Preferred application	Comment
SOK AQUA 100	Paving, curbs and paving slabs	Individually and flexibly mixable emulsion concentrate based on renewable raw materials; suitable for all applications in stone production
SOK AQUA CB	Curbs and paving slabs	Ready-to-use emulsion with high separating strength

Concrete release agents for immediate demolding

Product	Preferred application	Comment
SOK BTM HU 2	Slatted floors, gardening and landscaping	Usable up to a water/cement ratio of < 0.41
SOK BTM HU 3	Concrete sleepers, slatted floors, gardening and landscaping	Universally usable immediate demolding release agent
SOK HU2-E	Gardening and landscaping, concrete sleepers, slatted floors	Almost odourless during application
SOK HU ECO	Cable ducts, concrete sleepers, slatted floors	Mineral oil and solvent-free release agent based on esters; no labelling

Concrete release agents for structural and civil engineering

Product	Preferred application	Comment
SOK AQUA 100	Cast-in-place ceilings, walls and columns	Efficient emulsion concentrate based on renewable raw materials
SOK ECO 911	Cast-in-place ceilings, walls and columns	Low viscosity release agent based on native raw materials
SOK BTM E	Cast-in-place ceilings, walls and columns	Universal release agent
SOK AQUA E	Cast-in-place ceilings, walls and columns	Special emulsion for the construction of buildings; rain-resistant
SOK PERFEKT	Cast-in-place ceilings, walls and columns	High-quality release agent for the construction of buildings
SOK ECO 107 	Cast-in-place ceilings, walls and columns	Mineral oil and solvent-free release agent; EU Ecolabel certified
SOK 128	Cast-in-place ceilings, walls and columns	For the production of exposed concrete and SCC
SOK 72 S	Bridges, exposed concrete with board structure	Special release agent for unplanned wooden formwork

Release agents for special applications

Product	Preferred application	Comment
SOK MULTITRENN	Release agent for polystyrene foam in wall and ceiling production and for special applications	Blue-coloured release agent based on ester oil; no labelling
SOK WAX 1	For geometrically complex formwork (e.g. chamfer strips, undercuts)	Pasty formwork wax based on mineral oil
SOK WAX ECO	For geometrically complex formwork	Pasty formwork wax; free of mineral oil and solvent
SOK MT	Pipe production	Release agent for bottom pallets
SOK GM	Smoothing aid for fresh concrete surfaces	Also suitable for SCC, ECC and UHPC; reduces crack formation and efflorescence

* This is only an extract from our release agent portfolio and general recommendations for use. We are happy to advise you on finding the release agent that is best suited for your application.

Every release agent application needs experienced advice

Every use of release agents should be preceded by comprehensive advice on the respective application. Only in this way can the desired result be achieved. Our experienced engineers will not only give advice on the application, but will also be pleased to inform you about our complete range of products.



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