

SOK

Concrete release agents for the construction industry



LUBRICANTS.
TECHNOLOGY.
PEOPLE.



LUBRITECH
Special Application Lubricants

LUBRICANTS. TECHNOLOGY. PEOPLE.

FUCHS LUBRITECH – Special Application Lubricants

Within the FUCHS Group, we at FUCHS LUBRITECH are the experts for highly specialised applications. We develop, produce and distribute the world's leading branded products of our own. Our employees are committed to solving your challenges. We are there, with you and for you.



LUBRITECH

Special Application Lubricants

Facts and figures

Company: FUCHS LUBRITECH GmbH, part of the FUCHS Group, based in Kaiserslautern, Germany

LUBRITECH: the Special Application Lubricants Division of the FUCHS Group

Product range: LUBRITECH GROUP offers a full range of more than 1,000 special products, including food grade lubricants, adhesive lubricants, lubricating fluids and greases, pastes, solid film lubricants, concrete release agents, aerosols and metal-forming lubricants

Certifications: ISO 9001: 2008, ISO 21469, Halal, Kosher

FUCHS has developed, produced, and sold lubricants and related specialties for more than 80 years – for virtually all applications and sectors. With over 100,000 customers and 50 companies worldwide, the FUCHS Group is the world's leading independent lubricant supplier.

Within the FUCHS Group, **FUCHS LUBRITECH** is the expert for Special Application Lubricants. A team of more than 500 specialists around the world work to meet your needs. However demanding the application, we offer a specialised solution. Service is a crucial and fundamental component of our offering. Our experts offer on-site technical consultation to assure performance, efficiency and process reliability.

FUCHS LUBRITECH special lubricants stand for the highest performance and sustainability, safety and reliability as well as efficiency and cost savings. They represent a promise: **technology that pays back.**



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 product range with the brand name SOK. They are now utilised successfully around the world in precast plants as well as in structural and civil engineering.

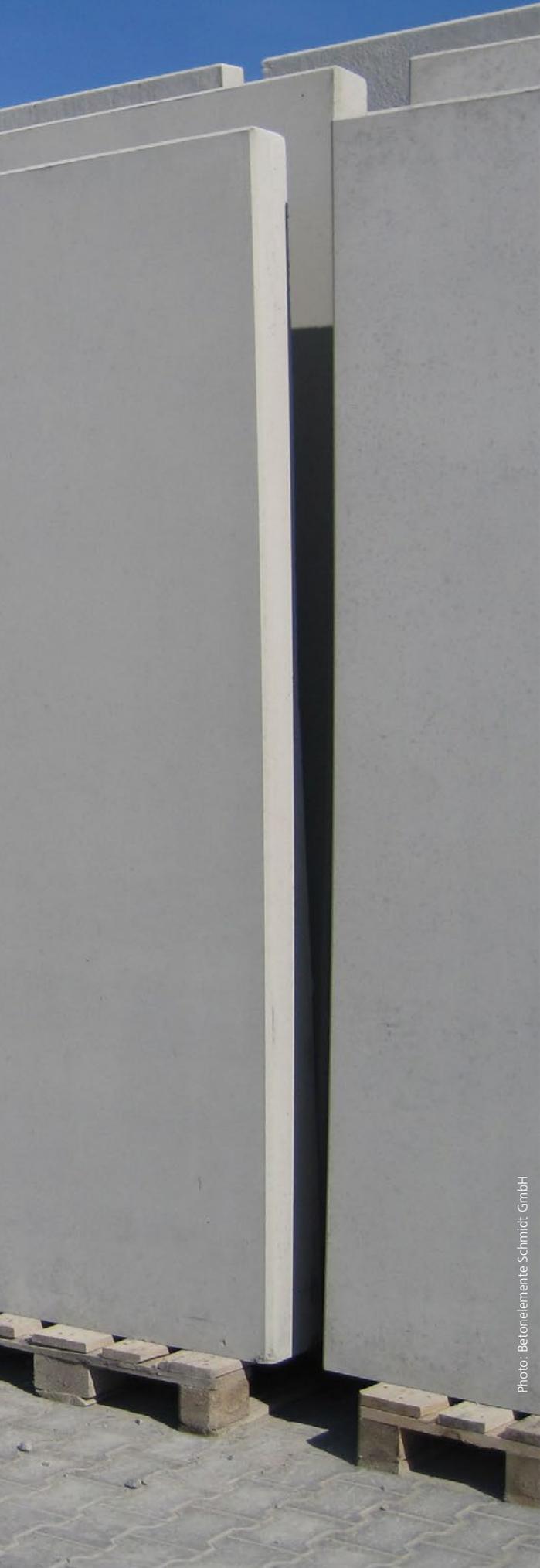


Photo: Betonelemente Schmidt GmbH

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

- Easy separation of concrete and form
- Concrete surfaces without pores and shrinkage cavities
- Light-coloured concrete surfaces without discolouration
- Clean forms
- Protection of the form and easy cleaning
- Temporary protection against corrosion on steel forms
- 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 form 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 shrinkage cavities as well as a temporary corrosion protection for steel forms.

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 also solvents (approx. 80 to 95%)	Water (approx. 65 to 85%)	Vegetable oils, ester oils (approx. 95 to 99%)
Separating substance	Fatty acids and esters (approx. 2 to 15%)	Fatty acids, esters and partly also hydrocarbons	Vegetable oils, esters (approx. 95 to 99%)
Additives for minimising pores and shrinkage cavities	yes	yes	yes
Rust 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. Precast plants often utilise release agents based on mineral oil - sometimes mixed with solvents. The technical requirements in this segment are very high. Corrosion quite often occurs on the steel form, particularly in the production of ceilings and walls. FUCHS LUBRITECH 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 stationary production plants. FUCHS LUBRITECH 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 LUBRITECH 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

Biogenic release agents on an ester or vegetable oil basis are normally used for special applications, such as on bottom pallets in pipe manufacturing and in drinking water protection areas. Due to their high viscosity these products are usable only to a limited extent in winter.



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 forms, e.g. steel forms, plastic-coated wooden forms, 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 form temperature of about 130 °C, depending on the type. The performance of a release agent depends on the form 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 form is to be avoided in every case. If necessary the form 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 LUBRITECH 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/litre are possible when using our concrete release agents. Consumption values of up to about 100 m²/litre can be achieved in optimally adjusted stationary spraying systems. The important factor is to maintain a spraying pressure exceeding 4 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 SS800067 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 – as a free service from FUCHS LUBRITECH – will be pleased to advise you on the choice of suitable release agents, pumps and nozzles for the optimisation of stationary spraying systems.

Storage

Concrete release agents must always be stored in closed containers under cover and protected from frost and direct sunlight. In accordance with the German Water Resources Act (WHG) the release agent containers are to be secured with a collection pan.

CLP Regulation:

Since June 2015 mixtures of components must be classified in accordance with the new Hazardous substances legislation (GHS/CLP). Products based on hydrocarbons (mineral oil) are, when not already covered by another reason, free from the CLP labelling regulation when they have a viscosity of > 20.5 cSt @ 40°C.



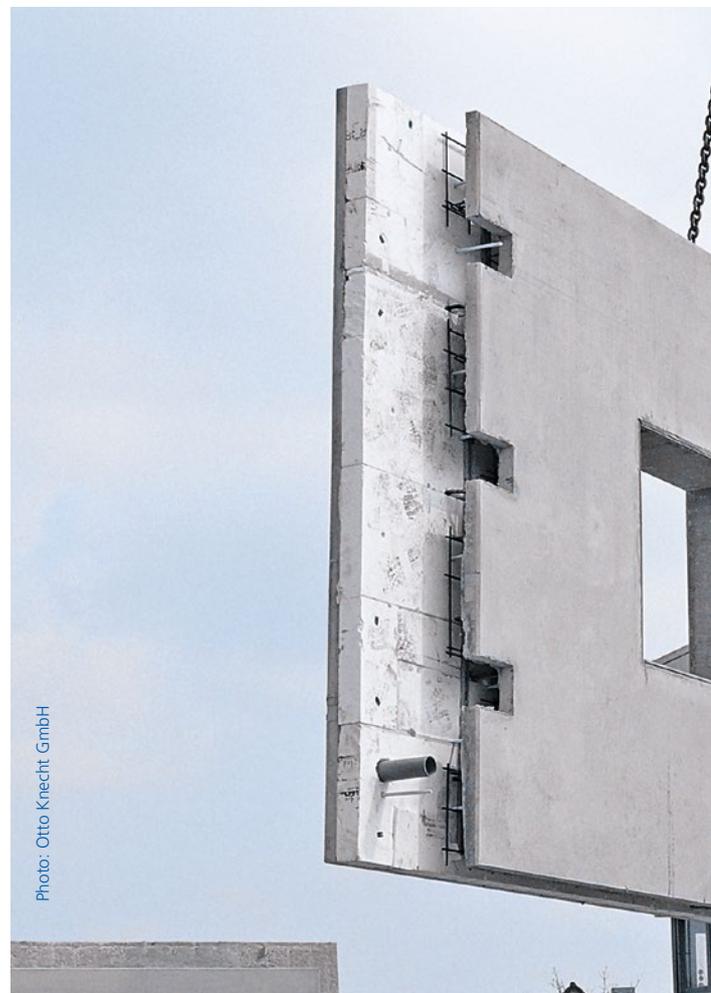
Concrete release agents based on hydrocarbons and ester oils

Application areas for concrete release agents based on hydrocarbons

Concrete release agents based on hydrocarbons, which also include products based on mineral oil or solvents, are still widely used in precast plants and in structural and civil engineering. These products are universally applicable. Release agents based on ester oils are usually required for special applications. Precast plants often utilise solvent-based products for standard forms to fulfil the high demands on the quality of concrete surfaces (up to exposed concrete class "SB4") and cleanliness of the forms. The products which contain hydrocarbons are also used for direct release from forms. According to the dangerous and hazardous substances regulations, these solvent-based products must be labelled.

An overview of the benefits of the products based on hydrocarbons:

- Application temperature up to 130°C
- Reduce pore and shrinkage cavity 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 forms such as steel forms, coated wooden boards, plastic forms, etc. Some of these products can be utilised at form temperatures of up to 130°C. These products can also occasionally be found in structural engineering when exposed concrete is required.

FUCHS LUBRITECH has created a number of proven release agents which offer very high corrosion protection for steel forms.

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 oils, which also include vegetable oils, are less common due to their higher viscosity. These products are mainly found in pipe manufacturing and mixer protection.

The ester-based low-viscosity products are increasingly used for environmental reasons in the production of lightweight precast houses. Likewise, SOK BTM N 105 is utilised in the field of general precast element production.

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 forms such as steel forms, plastic-coated wooden forms, 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, shrinkage cavities and stains. The concrete surfaces are bright and smooth. Furthermore, the forms can be easily cleaned without too much effort.

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

Your benefits at a glance

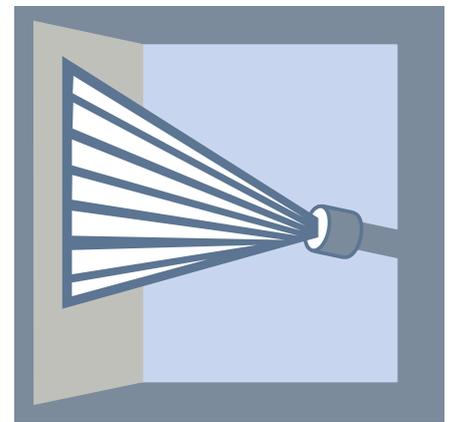
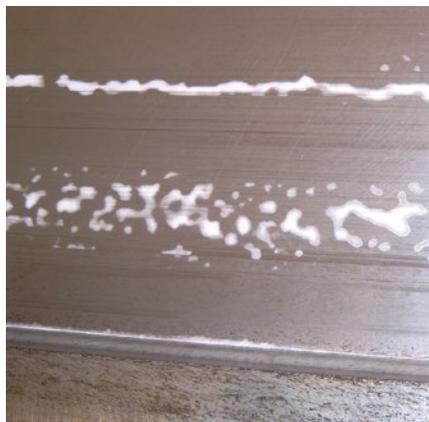
- Application temperature up to 70 °C (form temperature)
- Largely prevent pore formation
- Provide clean and uniform surfaces
- Contain very effective corrosion protection for steel forms
- Do not impair the adhesion of plaster, adhesives or paint
- Suitable for use in horizontal and vertical areas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

Functional principle of emulsions

If the "milk-coloured" emulsion is sprayed onto the form, 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 form. 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 form 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 form 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. The German Water Resources Act (WHG) determines that the containers, as for every other concrete release agent, must be provided with a collection pan. The emulsions from FUCHS LUBRITECH are rapidly biodegradable in accordance with OECD Test 301.

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	Ceilings, walls, trusses	Universal release agent
SOK AQUA CB	Paving block production	"Board oil" for the base plates
SOK AQUA G	Ceilings, walls, concrete sleepers	Release agent for the production of precast elements
SOK AQUA G PLUS	Large pipes, block production, concrete sleepers, manholes, ceilings, walls	Specially designed for the production of precast elements with a good concrete surface finish
SOK AQUA KS	Ceilings, walls, beams, trusses, garages, concrete sleepers	Emulsion of the latest generation with enhanced corrosion protection for steel forms. Produces very good concrete surfaces
SOK AQUA KS PLUS	Ceilings, walls, TT ceilings	Offers very strong corrosion protection
SOK AQUA M	Ceilings, walls, beams, trusses	Easy to re-apply; concrete surfaces free of blemishes
SOK AQUA Z	L-blocks, garages, beams, walls	Very well suited to self-compacting concrete (SCC) Contains no mineral oil.
SOK AQUA Z PLUS	Precast slabs with in-situ topping, solid slabs and walls	Emulsion with increased release effect Contains no mineral oil.

Concrete release agents for precast plants

Product	Preferred application	Comment
SOK 128	Ceilings, walls, beams, trusses, garages, SCC etc.	Universal release agent for precast plants
SOK 912	Ceilings, walls, beams	Higher release effect than SOK 128
SOK BTM FT8	Ceilings, walls, beams, trusses etc.	Release agent for the manufacture of precast elements
SOK BTM UP-4	Ceilings, walls, beams, trusses, garages, SCC etc.	Almost odourless during application
SOK STG	Considerably heated garage forms	Odourless during application. The product already fulfils the strict CLP criteria today.
SOK ULTRA	Vertical productions, e.g. beams, trusses etc.	Usable up to a form temperature of 130 °C.
SOK BTM N105	Floors, walls, beams, etc.	Release agent for the manufacture of precast elements SOK BTM N105 is free of solvents and mineral oil.

Concrete release agents for precast plants with enhanced corrosion protection

Product	Preferred application	Comment
SOK U/K 105	Ceilings, walls	Release agent with enhanced corrosion protection
SOK U/K 115	Ceilings, walls	Release agent with very effective corrosion protection
SOK 2/K 105	Ceilings, walls	Slightly better release effect and more oily than SOK U/K105

Concrete release agents for direct release from forms

Product	Preferred application	Comment
SOK BTM HU-2	Slatted floors, gardening and landscaping, etc.	Usable up to a water/cement ratio of < 0.41
SOK BTM HU-3	Slatted floors, gardening and landscaping, concrete sleepers etc.	Universally usable product for direct release from forms
SOK BTM HU2-E	Gardening and landscaping, concrete sleepers, slatted floors	Almost odourless during application
SOK HU-2 GHS	Concrete sleepers	The product requires no labelling in accordance with the CLP directive.

Concrete release agents for structural and civil engineering

Product	Preferred application	Comment
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
SOK PERFEKT	Cast-in-place ceilings, walls and columns	High-quality release agent for the construction of buildings
SOK 128	Cast-in-place ceilings, walls and columns	For the production of exposed concrete and SCC
SOK 912	Cast-in-place ceilings and columns	For the production of exposed concrete
SOK 725	Bridges, exposed concrete with board structure	Special release agent for the unplanned wooden form

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 requirements according to CLP
SOK WAX 1	Pasty form wax	For geometrically complex forms
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.

Innovative lubricants need Experienced application engineers

Every lubricant change should be preceded by expert consultation on the application in question. Only then the best lubricant system can be selected. Experienced LUBRITECH engineers will be glad to advise on products for the application in question and also on our full range of lubricants.



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