

SEALING OF DRUM LIDS



So that “closed” also means tight

Perfect seals for drum lids to prevent leakage and contamination

Cylindrical lidded drums made of blackplate, tinplate or steel or of plastic are the global standard for filling, storing and transporting many types of products. As industrial storage aids and transport containers, they literally keep production and distribution rolling.

The metal lidded drums, for example, consist of the typical reinforced beadings at even intervals, making them easier to roll. They are rarely closed using a threaded lid, but most often by a metal lid and clamping ring sealed with polyurethane foam. The filling volume ranges from 25 liters of the smaller metal drums called pails or hobboks all the way up to 220 liters.

Due to the wide range of internal coatings, most goods can be packed and transported in steel drums. They are mainly used for the storage of solid, paste-like or powder materials.

The cylindrical-bellied plastic drums, in typical blue with a black plastic lid, are often used as containers for the food, cosmetics or chemical industries and have a low tare weight without sacrificing stability, robustness and safety. They are usually made of high-quality polyethylene plastic HDPE (high-density polyethylene), which is particularly dense, break-resistant and durable. Moreover, HDPE is tasteless and odorless, making it excellent for food storage.

Due to the combination of the sealing material and the closing mechanism, most of these steel and plastic drums meet the requirements for the UN approval based on drop tests, pressure and stacking. FERMAPOR K31 polyurethane foam gaskets from Henkel provide the perfect seal against leakage and contamination. Drums may also be required to have a UN hazardous goods approval, depending on their intended use. In any case, they must be able to withstand large pressure and, of course, be leak-proof.

Are you looking for a complete system solution for sealing your drum lids?

We provide a perfectly adapted sealing solution for metal or plastic drum lids consisting of sealing foam, dosing system and process automation all from a single source. Our solution offers fully automatic material application and ensures high-precision dosing that is controlled by contour robots.

Do you need an automation system that adapts to your production requirements?

The modular design of our mixing and dosing systems and their peripheral interfaces allows them to be used flexibly and efficiently with excellent integration into your existing production concepts. In addition, our dosing systems are very easy and intuitive to operate and allow for continuous process monitoring.

We work with the world's leading packaging manufacturers, who rely on our expertise. We are looking forward to meeting your requirements.



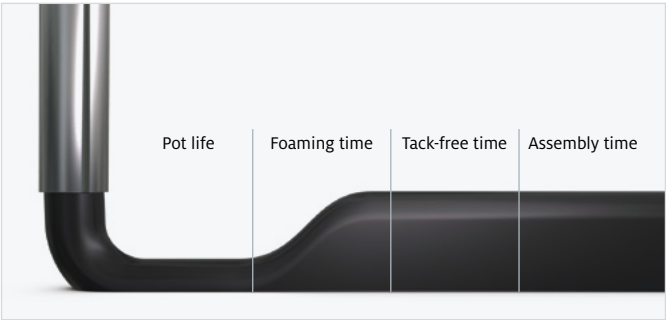
Customized sealing foams

for maximum packaging safety of metal drum lids

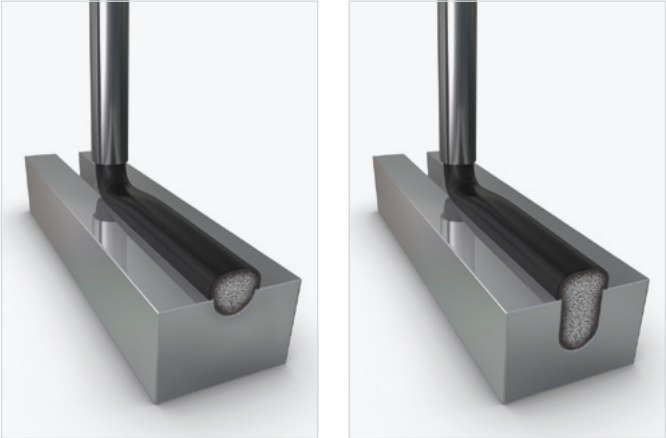
With its Sonderhoff brand, Henkel has acquired many years of experience in the manufacture of 2-component sealing systems and the accompanying mixing and dosing machines. We are recognized as experts when it comes to applying material using Formed-In-Place-Foam-Gasket (FIPFG) technology to seal lidded containers.

The requirements for lidded drums made of blackplate, tinplate and steel are as varied as their contents. For sealing the drum lids, we offer FERMAPOR K31 polyurethane sealing foams, which provide perfect protection against leakage or contamination of packaged goods as part of the overall design of the container. The drums are therefore leak-proof in accordance with UN approval, even in the event of drops, impacts or vibrations.

Provided that the container design is suitable for the transport of hazardous goods, the special formulations of FERMAPOR K31 polyurethane sealing foams also meet the sealing requirements of the UN hazardous goods approval.



The different reaction phases of the sealing foam in the chronological sequence



Metal drums	for industrial products	for food products
FERMAPOR K31-	A-6501-4-N	A-6505-1-N-FD
	B-5	B-28-FD
Mixing ratio	4.4 : 1	3.05 : 1
Pot life	60 sec.	35 sec.
Tack-free time	7 min.	8 min.
Viscosity of the A component	1,250 mPas	6,200 mPas
Density	0.42 g/cm³	0.28 g/cm³
Hardness (Shore 00)	67	80
Temperature resistance	from -40 to +80 °C	from -40 to +80 °C
Pretreatment	Plasma or Primer	Plasma or Primer



Cross-section of a polyurethane foam bead in groove uncompressed



Cross-section of a polyurethane foam bead in the groove and compressed to approx. 50 %

The FERMAPOR K31 two-component polyurethane sealing foams can be adjusted for different degrees of hardness and, with optimized formulation, offer excellent adhesion to internally painted drum lids and lug covers made of tinplate, blackplate and steel (some of which require pretreatment).

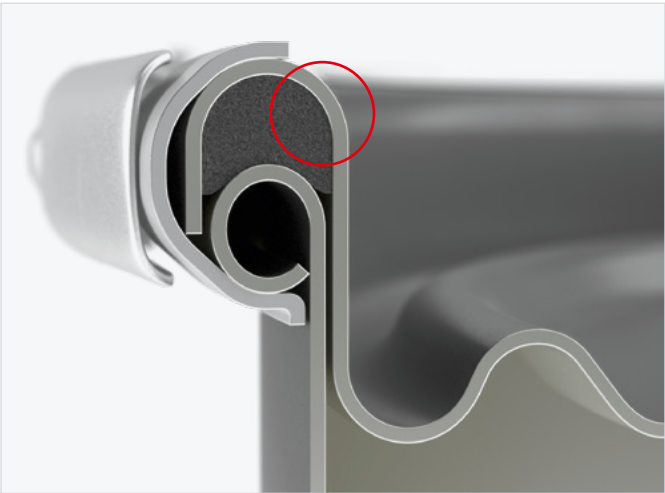
Our reference material FERMAPOR K31-A-6501-4-N / K31-B-5 is used for sealing the lids of metal drums for industrial products such as paints, varnishes, construction materials and aggregates. Pretreatment with plasma or primer is usually carried out for even better adhesion.

FERMAPOR K31-A-6505-1-N-FD / K31-B-28-FD meets the requirements of a lid gasket for the packaging of foodstuffs in metal drums. This formula has been tested for safe use in direct contact with liquid, alcoholic, fatty and dry foodstuffs in accordance with the European standard EU 10/2011 and the German LFGB (according to §§30 and 31 para. 1 of the German Food and Feed Act).



Metal drum with PU foam gasket in the lid and clamping ring, for frequent opening and re-closing thanks to a foam gasket with a consistent sealing performance

When the drum lid is closed, the elastic cell structure of the gasket is compressed and the housing is sealed. The excellent resetting ability of the foam gasket allows repeated opening and re-closing of the drum lid without any loss of sealing performance.



Compressed polyurethane foam gasket in the groove of the lid

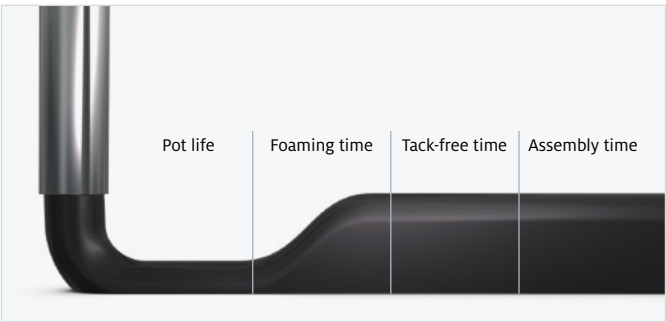
Customized sealing foams

for maximum packaging safety of plastic drum lids

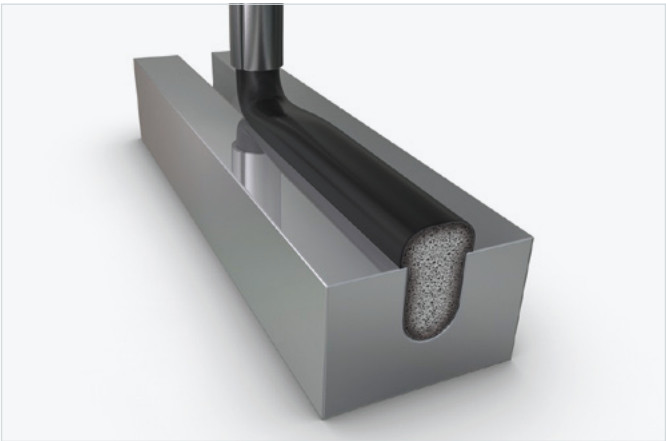
FERMAPOR K31-A-6505-1-N-FD / K31-B-28-FD polyurethane foam with FDA compliance, in accordance with Title 21 of the U.S. Code of Federal Regulation (21 CFR § 174.5), is used to provide a seamless final lid seal for plastic food drums with a capacity of two liters or more.

This polyurethane foam gasket is suitable for use in direct contact with aqueous, acidic, alcoholic, fatty and dry raw food products. This also applies to cold or hot filled or pasteurized milk as well as dairy products. Here, the correct ratio between the contact area of the gasket surface and the filling volume must be maintained.

The FDA-compliant foam gasket is characterized by the excellent migration behavior of the gasket materials used in the formula. The expert opinions of independent testing institutes certify that the values determined for overall migration of the gasket materials are below the limit value of EU Regulation No. 10/2011 of 10 mg/dm². The smell and taste, as well as the appearance and consistency of the food filled in plastic drums, do not change.



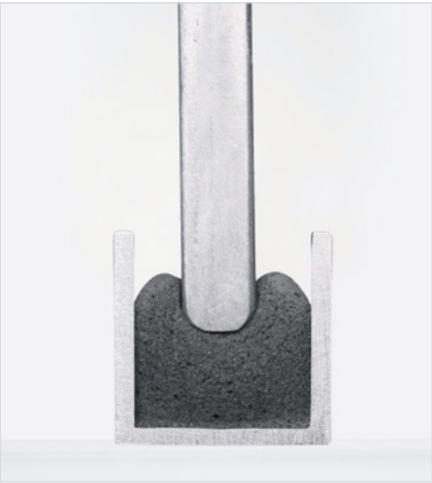
The different reaction phases of the sealing foam in the chronological sequence



Plastic drums	for industrial products	for food products
FERMAPOR K31-	A-9843-8-VP2	A-6505-1-N-FD
	B-5	B-28-FD
Mixing ratio	4.5 : 1	3.05 : 1
Pot life	46 sec.	35 sec.
Tack-free time	9 min.	8 min.
Viscosity of the A component	9,000 mPas	6,200 mPas
Density	0.29 g/cm³	0.28 g/cm³
Hardness (Shore 00)	67	80
Temperature resistance	from -40 to +80 °C	from -40 to +80 °C
Pretreatment (optional)	Plasma, Corona, Flame or Primer	Plasma, Corona, Flame or Primer



Cross-section of a polyurethane foam bead in groove uncompressed



Cross-section of a polyurethane foam bead in the groove and compressed to approx. 50 %

The tear strength and elongation at break of the FDA-compliant foam gasket have been improved through consistent development of the mechanical properties. Even in the event of drops, impacts and vibrations, the lids of the plastic drums sealed with foam gaskets suitable for foodstuffs remain leak-proof.

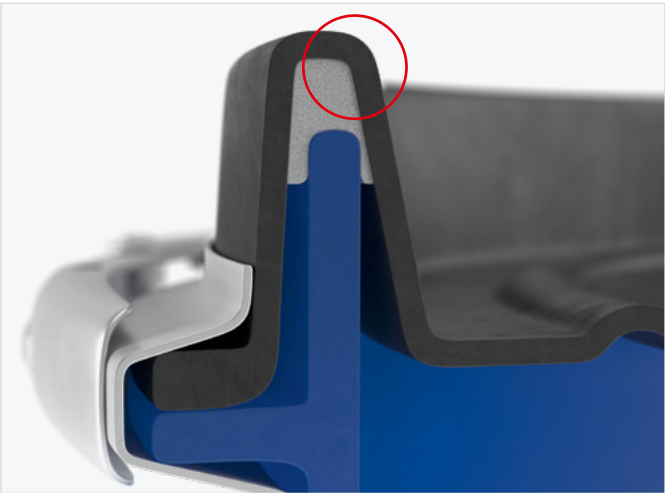
Our reference material FERMAPOR K31-A-9843-8-VP2 / K31-B-5 is used for sealing the lids of plastic drums for industrial products such as paints, varnishes, construction materials and aggregates.

We can also adapt our sealing foams to meet your specific technical requirements. Sonderhoff sealing foams can be customized, for example, in terms of reactivity, hardness, viscosity, color and other chemical and physical properties.



Plastic drum with a sealed lid and clamping ring, designed for frequent opening and re-closing thanks to a foam gasket with a continuous sealing effect

The foam gasket in the groove of the lid is compressed when the drums are closed and almost completely recovers when they are reopened. If the barrel is closed again the excellent foam resetting ability ensures that the sealing properties and low water absorption of the lid gasket are maintained over the long term while providing optimum adhesion to plastic.



Polyurethane foam gasket in the plastic lid groove, compresses and seals when closing.

Flexible and fully automatic – fully in line with your requirements

Customer-specific mixing and dosing systems
for accurate and efficient dosing processes

As a process expert, we offer economical and efficient solutions for the customized automation and integration of our mixing and dosing systems into your production processes.

The reference configuration shown here is used for the fully automatic and contour-accurate application of 2-component sealing foams into the groove of the lids of metal or plastic drums. It consists of the DM 502 mixing and dosing system with a 3-axis linear robot and a conveyor belt system for feeding parts and clocking out. The drum lids are fed to the dosing station at the cycle rate specified for your production, where they pass under the 3-axis linear robot.

At the centering station, the lid is positioned on the belt in such a way that the mixing head controlled by the linear robot can move along the lid groove with contour accuracy and apply the precisely dosed discharge quantity into the groove.

Alternatively, the sealing foam can also be dispensed into the groove by rotating the lid. The discharge quantity is fed into the groove of the lid via the mixing head in relation to the rotational speed.

With the high volumes and short cycle times of drum lid production, our dosing machines with FIPFG technology enable the efficient and precise application of material. The highly dynamic LR-HD or, alternatively, the highly efficient LR-HE plus 3-axis linear robot ensures precise contour guidance of the MK 825 PRO precision mixing head over the contour of the lid.

Both application variants apply the sealing foam into the lid groove with high dosing and repetition accuracy. The coupling point of the foam gasket closes seamlessly and is therefore almost invisible. After expanding by several times the specified material volume, a soft foam gasket with the desired foam hardness is produced and cures at room temperature.



Optional:
Automatic **ELEVATOR** drum refilling
station for the **A component** with
pneumatic lift and agitator



Optional:
Automatic **SUPPLY TAB** drum refilling
station for low-viscosity products,
e.g. isocyanate (**B component**)

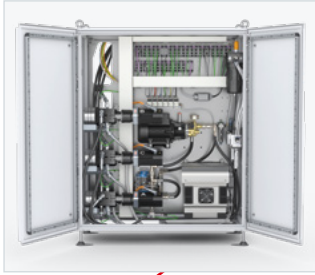
Separately installed **material pressure tanks** (24 l or 44 l, single-walled or double-walled) with minimum fill-level sensors, on a grating platform with adjustable leveling feet and drip tray



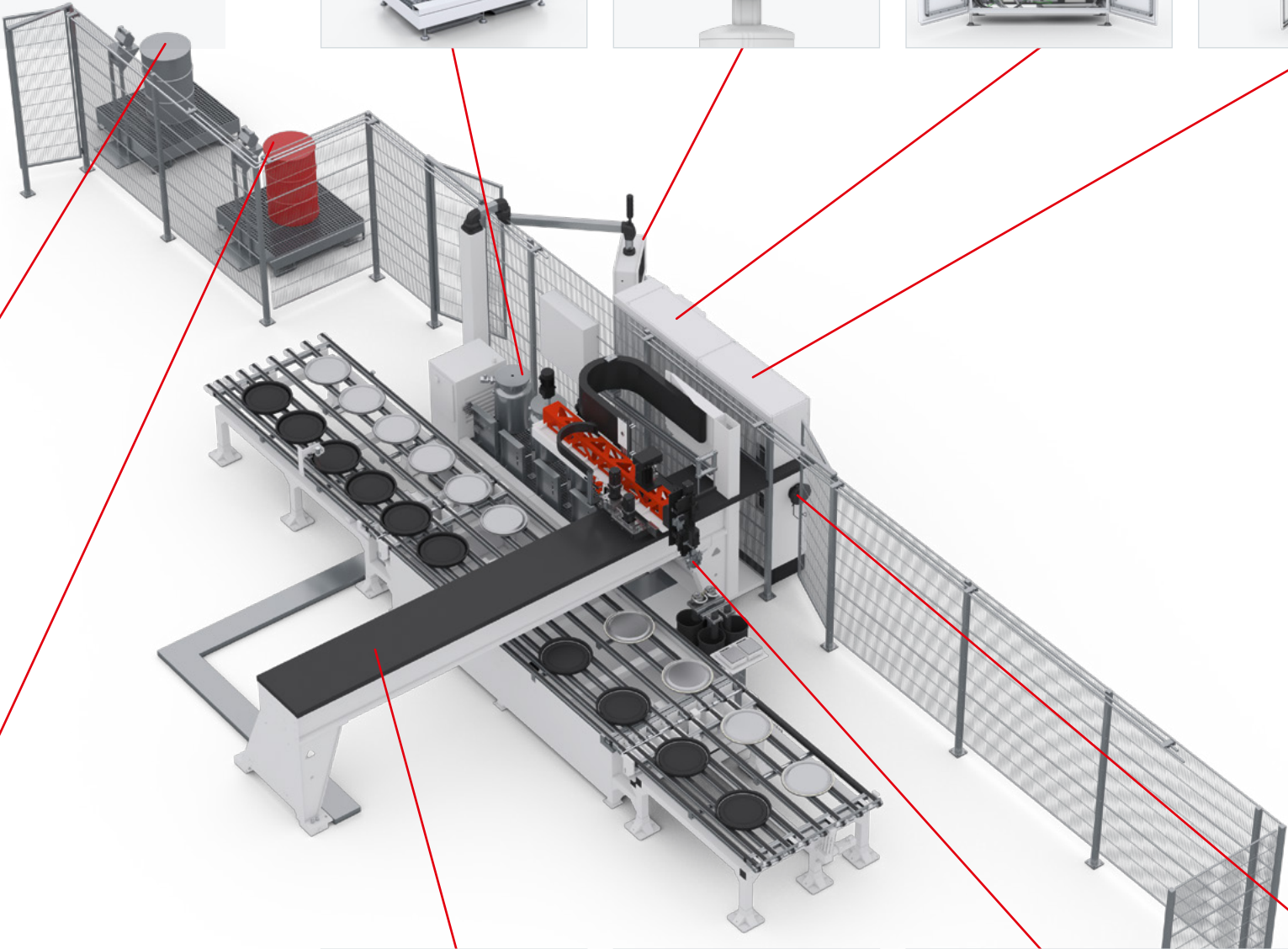
Optionally available: **CONTROL 2 touchscreen operating panel** (21.5") for operating the dosing system



The **dosing machine cabinet** contains the components of the dosing periphery, e.g. the dosing pumps.



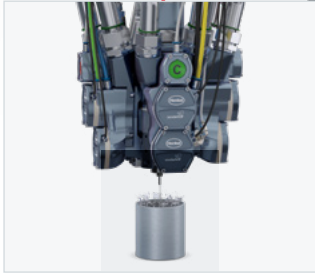
The control electronics, safety engineering and industrial PC are installed in the **switch cabinet**.



Highly dynamic **LR-HD 3-axis linear robot** for precise guidance of mixing heads for the application of polymer reaction materials. The rack-and-pinion drive with high stiffness and acceleration enables dynamic application speeds.



Optional: Highly efficient **LR-HE plus 3-axis linear robot** for precise guidance of mixing heads for the application of polymer reaction materials. The Omega toothed-belt drive enables high application speeds for components with medium and large radii.



Precision mixing head MK 825 PRO with high-pressure water rinsing



The multi-function **MP 2 mobile panel** (10.1" WXGA TFT) enables convenient operation of the dosing system.



Advantages of our mixing and dosing machines

- › Combination of processes (bonding, foaming, caulking, potting)
- › High flexibility of the dosing system
- › Simple, intuitive operation
- › Automatic material preparation incl. handling
- › High dosing and repeat accuracy
- › Short machine downtimes and cycle times
- › Fine-cell foam structure due to dynamic mixing
- › Reproducible foam quality
- › Ecological high-pressure water rinsing
- › Easy maintenance

This is why you should use the FIPFG technology in your production process



Advantages of the Formed-In-Place Foam Gasket Technology

- › Sealing standard in many industrial sectors
- › Highly accurate material application controlled by contour robots
- › Processing and full curing at room temperature
- › Perfect coordination of the material system and dosing system
- › Suitable for 2D and complex 3D part geometries
- › More efficient use of materials compared to punched seals
- › Cheaper compared to 2-C injection molding, as there are no tooling costs
- › High degree of future viability, due to suitability for use in a wide variety of industries & applications



Advantages of our FIPFG foam gaskets

- › More cost-effective than compact systems due to lower foam density
- › Seamless seal / hardly visible coupling point
- › Compensation of component tolerances
- › Good resilience
- › Multiple compression and release processes possible
- › Broad range of properties / wide variety of recipes
- › Individually adaptable recipes
- › Good form fit to the component contour
- › Resistant to moisture, dust, temperature & media
- › Flame-retardant according to UL 94
- › IP classes up to IP 68 or NEMA 4 to 6 and NEMA 12
- › Special PU foam with low VOC emissions
- › Very fast reacting PU foam (Fast-Cure)

Perfectly coordinated solutions of material, machine and contract manufacturing

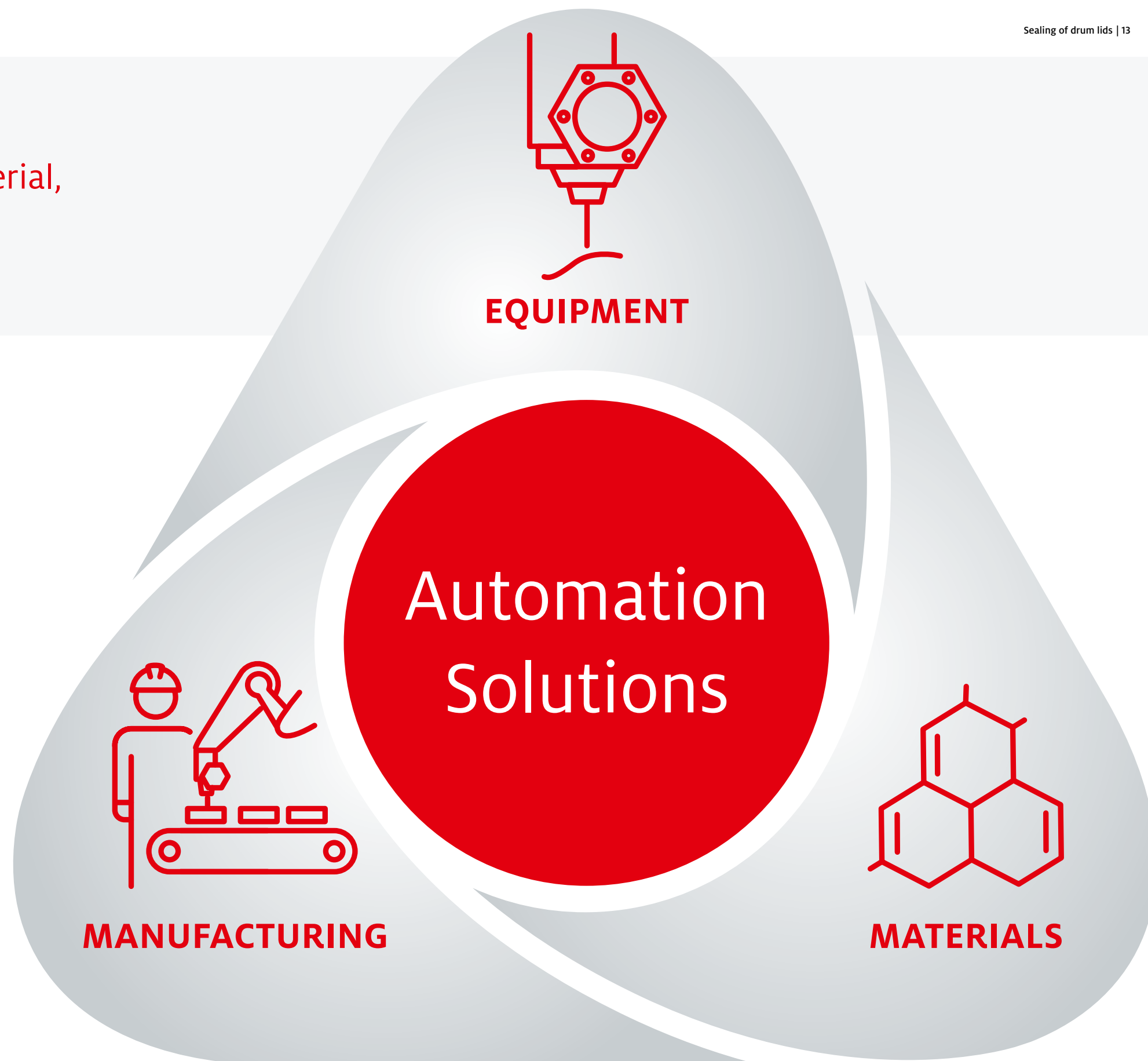
With its Sonderhoff brand, Henkel has not only acquired many years of experience in the manufacture of tailor-made two-component sealing systems and mixing and dosing machines, but also as a process expert for application-specific material application using the FIPFG (Formed-In-Place-Foam-Gasket) technology.

With the Sonderhoff portfolio, we offer all the advantages of a system provider from a single source and the solutions to meet your technical and commercial challenges.

With the dosing technology that is tailored to our sealing foams, we ensure efficient production processes in accordance with the requirements of fully automated series production.

If you would like to take advantage of all the benefits of the FIPFG technology for your production in a flexible, fast, uncomplicated manner and without having to make your own acquisition investments, we can provide expert sealing for your components at one of our contract manufacturing sites worldwide. There, the spectrum ranges from the sampling of prototypes and small batch series to production scale manufacturing.

The choice is yours! You can either decide in favor of our all-inclusive package, consisting of material, machine and contract manufacturing, supported by application advice, sampling and training or you can choose the individual solutions that suit you best. We combine our products and services from a single source in such a way that you receive the optimum solution for your requirements profile.



Flexibility & Precision

Customer-specific solutions – worldwide and for many industries

The Henkel specialists for the Sonderhoff portfolio
are available globally

Every year, more than 300 million seals are manufactured in more than 50 countries using products from Henkel’s Sonderhoff portfolio. At our Centers of Expertise and Regional Hubs, our specialists offer application engineering advice, e.g. selecting a suitable material system and sampling of your components, as well as project management for dosing systems and automation. You will receive training from us on how to use the FIPFG technology and we will support you with the selection of spare parts and a regular service offering. Furthermore, we will be pleased to take over parts of your production for you – from small to large series – at our subcontracting locations.

Sales staff at all other Henkel locations worldwide will also be happy to answer any questions and provide you with further information on our sealing, bonding, and potting solutions. We look forward to hearing from you.

- KOŁO, POLAND
External Subcontracting Location
- DÜSSELDORF, GERMANY
Center of Expertise
- ELGIN, ILLINOIS, USA
Regional Hub
- RICHMOND (KANSAS CITY), USA
Regional Hub
- DORNBIRN, AUSTRIA
Center of Expertise
- BARCELONA, SPAIN
External Subcontracting Location
- OGGIONO, ITALY
Regional Hub
- INCHEON, KOREA
External Subcontracting Location
- SHANGHAI, CHINA
Regional Hub
- PUNE, INDIA
Regional Hub
- PUNE, INDIA
External Subcontracting Location
- SÃO PAULO, BRAZIL
External Subcontracting Location

Global presence



Henkel Corporation

One Henkel Way
Rocky Hill, CT 06067
United States
Tel.: +1 860 571 5100
Fax: +1 860 571 5465

www.henkel-northamerica.com

www.henkel-adhesives.com

www.sonderhoff.us

Get in contact with us



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