

WORLDWIDE INNOVATION

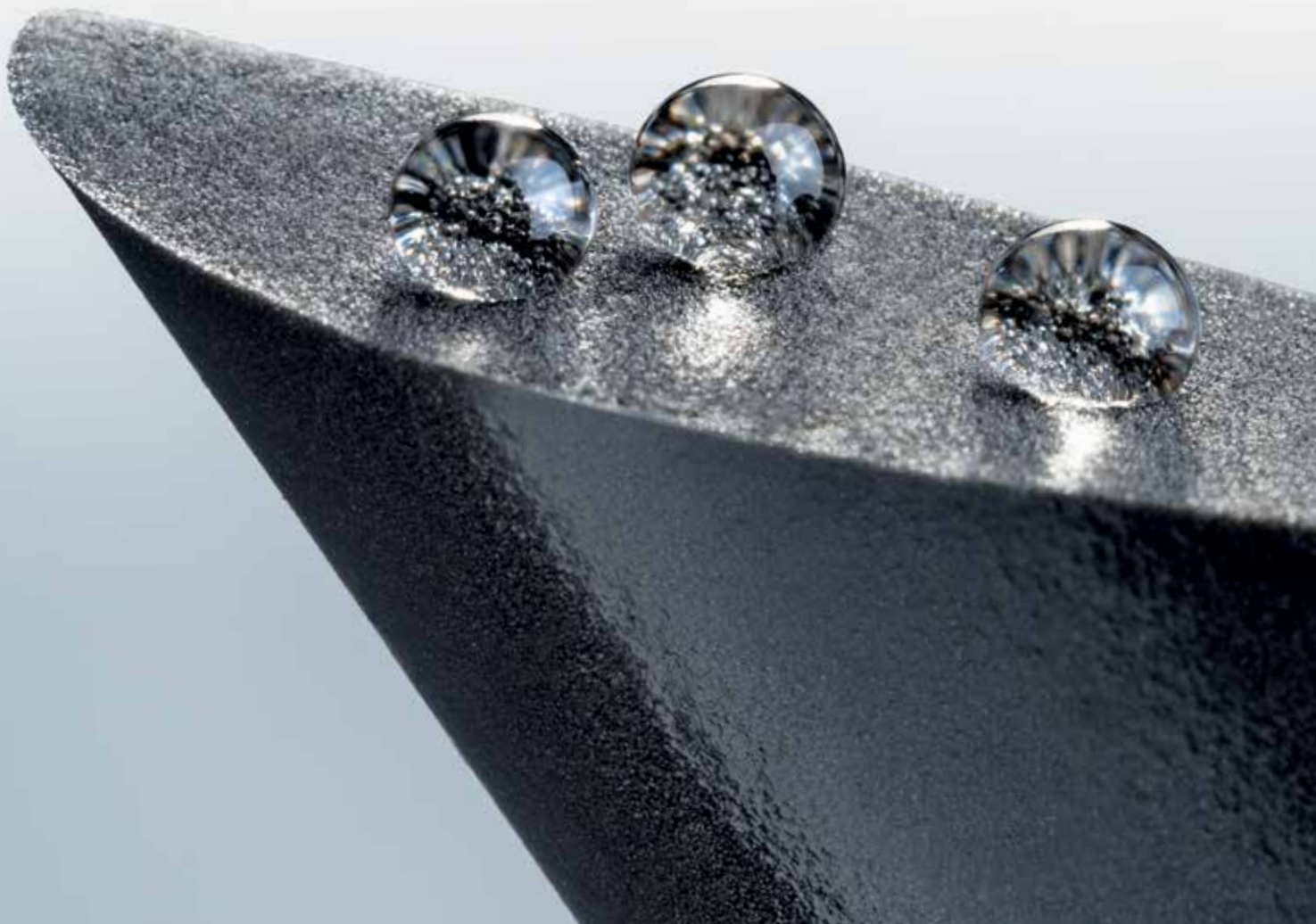
FIP CC Technology

The 2C polyurethane foam sealing with very low water absorption



AUTOMATED SEALING SOLUTIONS

**FIP CC Technology:
closed-cell foam sealings
on a polyurethane basis**

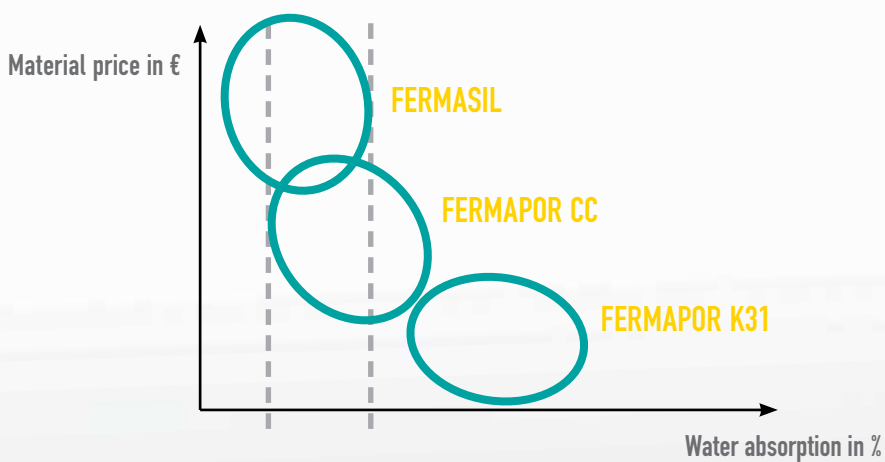


Formed In-Place Closed-Cell Technology

Very low water absorption at attractive material costs

The new FIP CC technology (Formed-In-Place Closed-Cell) combines the high water resistance of the silicone world with the attractive material costs of the polyurethane world.

Is FERMAPOR CC thus the better silicone? That depends on the application. Silicone remains unsurpassed in its temperature resistance. But if the temperature range of -40° to $+80^{\circ}\text{C}$ is adequate and the decisive factor is the absorption of water, then FERMAPOR CC is a very attractively priced alternative. We will be happy to provide you with samplings for comparison with other closed-cell liquid sealing systems.



All Sonderhoff material systems can be adapted to the particular requirements of the specific application. Thus the prices and water absorption vary according to the formulation.

FERMAPOR CC fills the gap between high-priced, closed-cell material systems and inexpensive, mixed-cell systems.

The FERMAPOR CC material system and the advanced FIPFG process offer a technology which, due to its increased cost-effectiveness, opens up new fields of application for automated sealing foams.



FERMAPOR CC

The material system on a proven polyurethane basis

FERMAPOR CC material systems are addition cross-linking, 2-component systems for the manufacture of soft polyurethane foams. The main elements of the A component are polyfunctional alcohols, the polyols. The B component consists of the aromatic MDI isocyanate and its derivatives. When component A is mixed with component B, a chemical reaction starts that, together with Sonderhoff Engineering's newly developed FIP CC process, leads to the formation of a predominantly closed-cell polyurethane soft foam.

Usual processing conditions – typical polyurethane

As soon as the foam has completely hardened, it can be used for applications with high sealing and quality requirements. The operating temperature range lies between -40° to $+80^{\circ}\text{C}$, and in the short term, even up to $+160^{\circ}\text{C}$ dependent on the test conditions, and is tested under real conditions appropriate to the application. The exact hardening time is dependent on external factors such as temperature, humidity, and sealing dimension and it is also evaluated specifically for the sealed part.



The FIP CC material system

Low water absorption even for damaged surfaces

FERMAPOR CC with its smooth, slightly shiny surface gives an optically high-quality appearance. Its foam structure has very fine cells, is impermeable and extremely uniform. Even if the surface should become damaged during application, practical trials and laboratory tests have shown that there is only a marginal change in water absorption.

Proven and new benefits – typical polyurethane

- **Predominantly closed-cell, therefore very low water absorption**
- **Ice water-resistant at water temperatures up to 1°C**
- No oven or humidity necessary for curing
- Very robust, mounting-proof sealing surface
- Low water absorption even after damage to the sealing surface (e.g. cracks)
- Cost-effective polyurethane alternative to 1-component and silicone applications
- Formulation can be customized like mixed-cell 2-component PU
- Thixotropic and half-thixotropic formulations available
- Shrinking no longer occurs
- Meets the standards REACH, EC Regulation 1907/2006, RoHS

Diversity of formulations – typical polyurethane

Because FERMAPOR CC is formulated on a polyurethane basis, the know-how based on over 1,000 Sonderhoff polyurethane formulations is available for the variations of FERMAPOR CC. Sonderhoff Chemicals' extensive experience in developing customer-specific material systems is also completely used for this new material system. Feel free to contact us; we will be pleased to develop the suitable material solution for your requirement.

PROCESSING INFORMATION

FERMAPOR CC systems are processed with 2-component, medium-pressure mixing and dosing machines. The recommended processing temperature is +23°C +/- 5°C. Generally, FERMAPOR CC components have a shelf-life of at least 6 months at storage temperatures from +10°C up to +40°C.

PHYSICAL AND CHEMICAL PROPERTIES

Property	FERMAPOR CC
Appearance	black, other colors on request
Hardness	from 40 to 70 shore 00
Compression resistance (25% compression)	> 20 kPa
Bulk density	from 0.30 g/cm ³ to 0.50 g/cm ³
Temperature resistance	from -40°C up to +80°C (short term up to +160°C)
Tensile strength	from 150 kPa to 500 kPa
Elongation at fracture	100% to 150%
Resilience (compression set)	>95% dependent on the test conditions
Water absorption (gravimetric)	<10% (material formulation with hydrophobic additives) at room temperature and ice water (1°C)

DM 402 CC

Worldwide innovation in mixing and dosing technology



The dosing technology of the new DM 402 CC mixing and dosing machine creates a foam sealing directly after the dosage with an almost fully reacted dimension – a huge benefit for process-oriented quality control. The application process itself is based on the known FIPFG (Formed-In-Place-Foam-Gasket) procedure, which is a production standard in many branches.

Familiar FIPFG benefits and proven peripherals for high process safety

The DM 402 is anchored in the proven installation layout of Sonderhoff Engineering and works precisely and reliably. A traversing range that can be individually dimensioned depending on the robot type and a standard output rate of 0.5 to 2.0 g/sec. enable the technology changeover to be made possible spontaneously and economically for many applications!

- Gentle, dynamic mixing of the material components in the mixing head
- The highly rigid linear robot offers highest positioning and repeating accuracy
- Central control system for additional peripherals/automation is possible with the open peripheral interfaces
- Remote maintenance via a modem or TCP/IP

Innovative and economical through the CC process

The innovation lies in the mixing head and material processing. The new foam process makes recirculation of material unnecessary. This simplifies changing material and accelerates process adaptations. So-called “shrinkages” of the foam sealing can no longer occur. Furthermore, no oven is needed, but it can be incorporated if it is desired to additionally accelerate the process until the component is installed. The usual air loading no longer takes place in the storage containers, which enormously shortens the setup time. The surface of the CC foam seal is smoother and more resistant than the conventional PU foam seals, and the cells in the foam structure are also significantly finer.

The FIP CC Technology

For the application of closed-cell 2C polyurethane foam sealings

CONTROL CONCEPT

- Self-explaining operator guide with interactive menu-based programming using soft keys, touch buttons and function keys; multifunctional Mobile Panel with integrated 6.5" touchscreen
- Modular "IPC" control fitted in the electrical switch cabinet with Power-Link
- EMERGENCY STOP deactivation with the proven "Sonderhoff-SAFETY" concept, real-time bus system
- Recipe management, programmable pot-life monitoring, dosing quantity preselection, automatic rinsing

MATERIAL PROCESSING

- Mixing ratio: from 1 : 2 to 1 : 4
 - Output quantity: from 0.5 to 2.0 g/s (*)
 - Material handling: tap line
- (*) depending on viscosity and mixing ratio / other application rates on request

PRECISION GEAR PUMPS

- Component A: 1.2 ccm/rpm (typical for output quantity 0.5 - 2 g/s and mixing ratio 1 : 4)
- Component B: 0.3 ccm/rpm (typical for output quantity 0.5 - 2 g/s and mixing ratio 1 : 4)
- Rotation speed: Pumps: 1 - 250 rpm/min.
- Speed-controlled servo gear motor with speed display and adjustment through the display

MIXING HEAD

- MK 125 with high-pressure water or component rinsing
- 2 components
- Integrated tempering application
- Mixing head: 1 - 6,000 rpm/min.

MATERIAL PREPARATION

- Pressure container with capacitive minimum fill-level sensors and shut-off valve, with compressed air fittings and compressed air reducer valves for controlling the container pressure
- Safety pressure valve, TÜV type-approved
- Novel material preparation for fast process adjustment and optimized foam results
- Direct adjustment of foaming degree possible
- Self-diagnosis of relevant wear components by the control system

PNEUMATIC

- Pneumatic system with filter-pressure reducer, maintenance unit including pressure monitoring and valve connection plate to control the pneumatic loads

OPTIONAL HANDLING SYSTEM

- Linear robot HD or HE plus
- Six axis robot



We supply worldwide to more than 50 countries and our customers produce annually more than 300,000,000 seals with our products.

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