Protection and Rehabilitation of Sewerage Structures

Sewage treatment plants, process basins and sewers

EXPERTISE
SEWAGE WATER & UNDERGROUND SEWER

MC
BE SURE. BUILD SURE.

Effective Protection for Concrete in Sewerage Technology

Pure, clean water is vital. Looking around, water might seem to be in plentiful supply. Yet, throughout the world, water consumption is on the rise – for food and personal hygiene, in agriculture and for the manufacture of industrial products and everyday essentials.

This makes it all the more important for us to manage water responsibly, assisted by modern sewage treatment plants and sewerage networks, operated with great dedication by our water suppliers and wastewater disposal companies.

Special building materials from MC-Bauchemie have been used in sewerage structures for decades, helping concrete stand the test of time and providing durable protection for components exposed to harsh environments. So, whether it is for industrial or municipal wastewater, mechanical or chemical resistance, a new build or rehabilitation – BE SURE. BUILD SURE.

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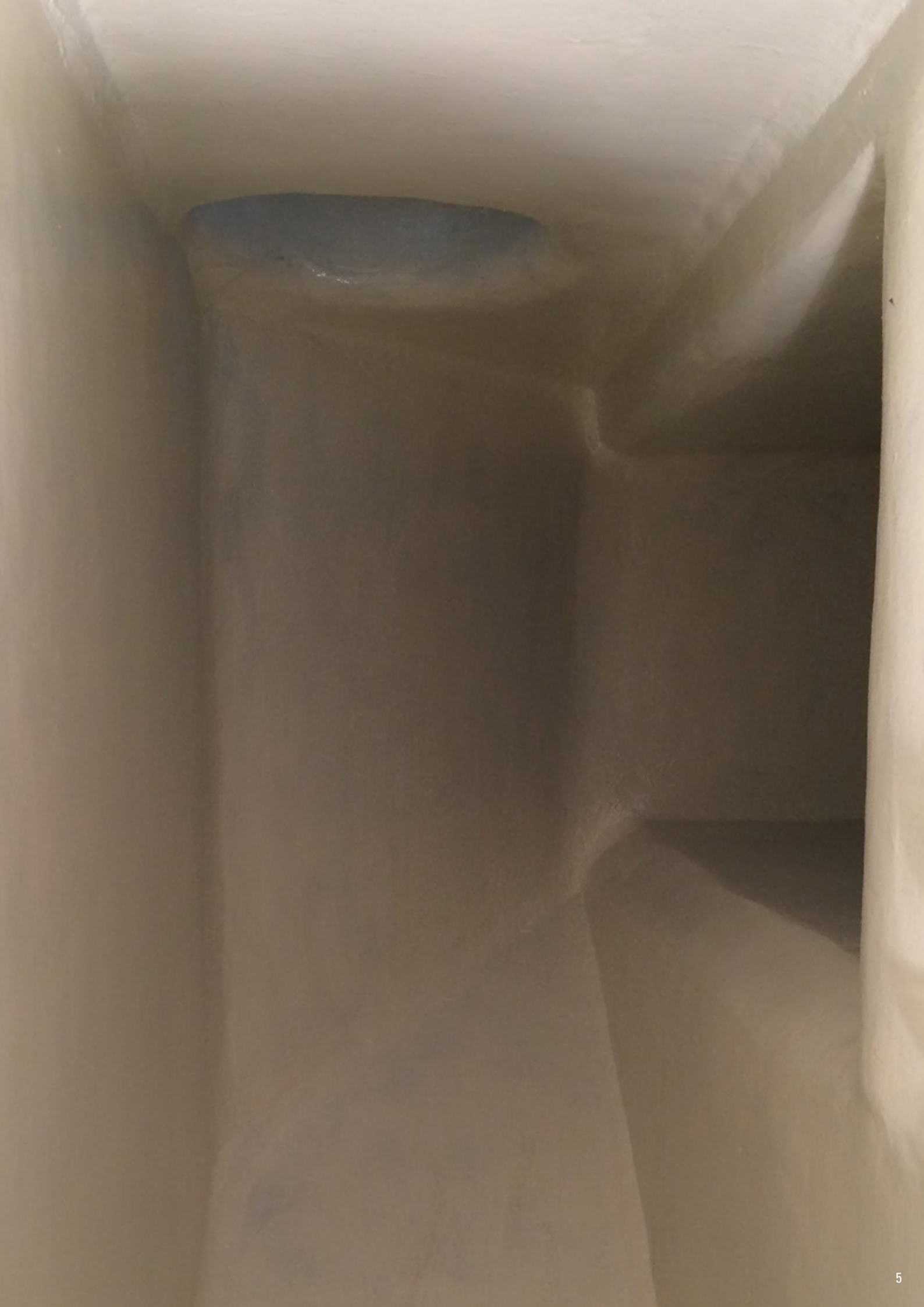
Long-Term Protection for Concrete in Sewerage Technology

When designing new sewerage structures made of reinforced concrete, designers are guided by the conditions that concrete parts will be exposed to during operation. These basics of concrete construction are laid down in various European and national standards, including in EN 1992-1-1, EN 206 and in Germany's DIN 1045.

The same principle applies to rehabilitation. Should components in a sewage treatment plant or in underground sewage structures suffer damage, cautious owners will have the actual condition analysed by a specialist before taking further action. Proven inspection and testing procedures have been established in order to provide highly accurate results in this domain.

By comparing the actual condition of the structure with the one of new structures built on state of the art, specialist planners are able to determine what needs to be repaired. The European standard EN 1504 provides clear guidance in this regard. By selecting principles and methods corresponding to the degree of damage sustained by the components, a specific repair plan can be drafted. This plan has to match the owner's expectations in relation to product quality and required service life.

Experience shows that construction components used in sewerage technology can be exposed to significant mechanical and chemical attack. Mechanical stressing arises from the flowing sewage and is intensified by undissolved sewage constituents. Chemical effects are of particular concern in closed systems such as digestion tanks or pumping and storage basins found in the underground sewerage network. Biogenic sulphuric acid corrosion is likely to occur in these areas, necessitating effective protection for all exposed component surfaces.



Technical Rules and Product Performance

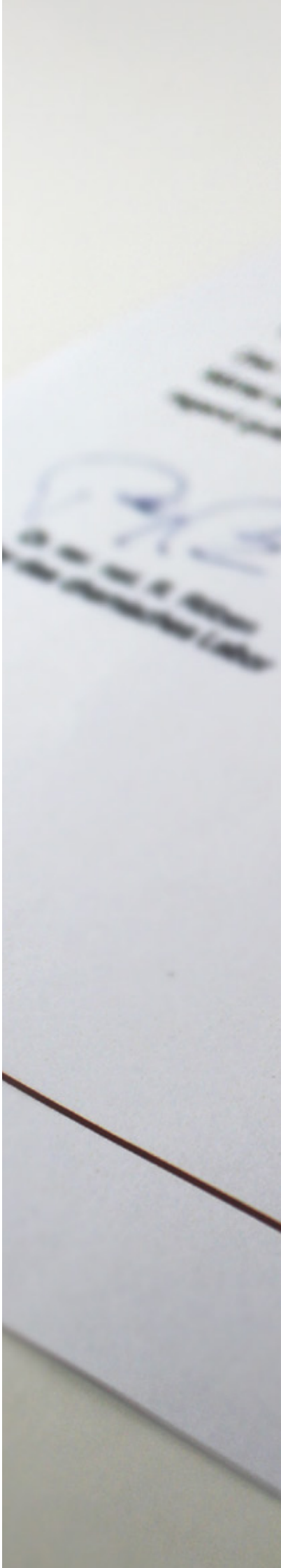
When it comes to selecting products for protecting and rehabilitating reinforced concrete – including the mortar and coatings used in sewerage facilities – the European EN 1504 series of standards take precedence. However, some countries have other rules at their disposal, that supplement product standards. Germany, for instance, applies additional regulations which cover the construction, testing and repair of sewerage systems. In addition to European and national standards, example give the DIN 19573, these also include the guidelines and advisory leaflets issued by the German Association for Water, Wastewater and Waste (DWA).

However, rules and regulations are just one of a number of important aspects. In addition to professional planning and quality-conscious construction, the consideration of product standards represents no more than a minimum requirement – one which MC systems for sewerage applications not only meet but often far exceed.

Some 25 years ago, mineralogists from MC-Bauchemie realised that porosity, which is affected by the mortar formulation, is key to ensuring mechanically resistant, long-lasting mineral protection systems for component surfaces. The associated product technology was systematically developed to create market-leading systems such as **MC-RIM PROTECT** for sewage treatment plants and **ombran MHP-SP 3000** for the sewerage network. These product lines are illustrative of MC's innovative approach to problem-solving beyond the bounds of established standard specifications.

The current market standard for covered / closed structures such as digestion towers with their exposure to chemical and bacterial attack is **MC-PowerPro HCR**, a high-performance coating with integrated DPM technology. The hybrid silicate **ombran FT** is specifically designed for installation in sewer separation systems; using the automated MRT (Manhole Rehabilitation Technology) process, it is applied more quickly and with higher quality than conventional products.

Such solutions do not only conform to standards, they go beyond established rules and regulations, significantly reducing the construction time and ensuring safe application together with exceptionally long-lasting protection.

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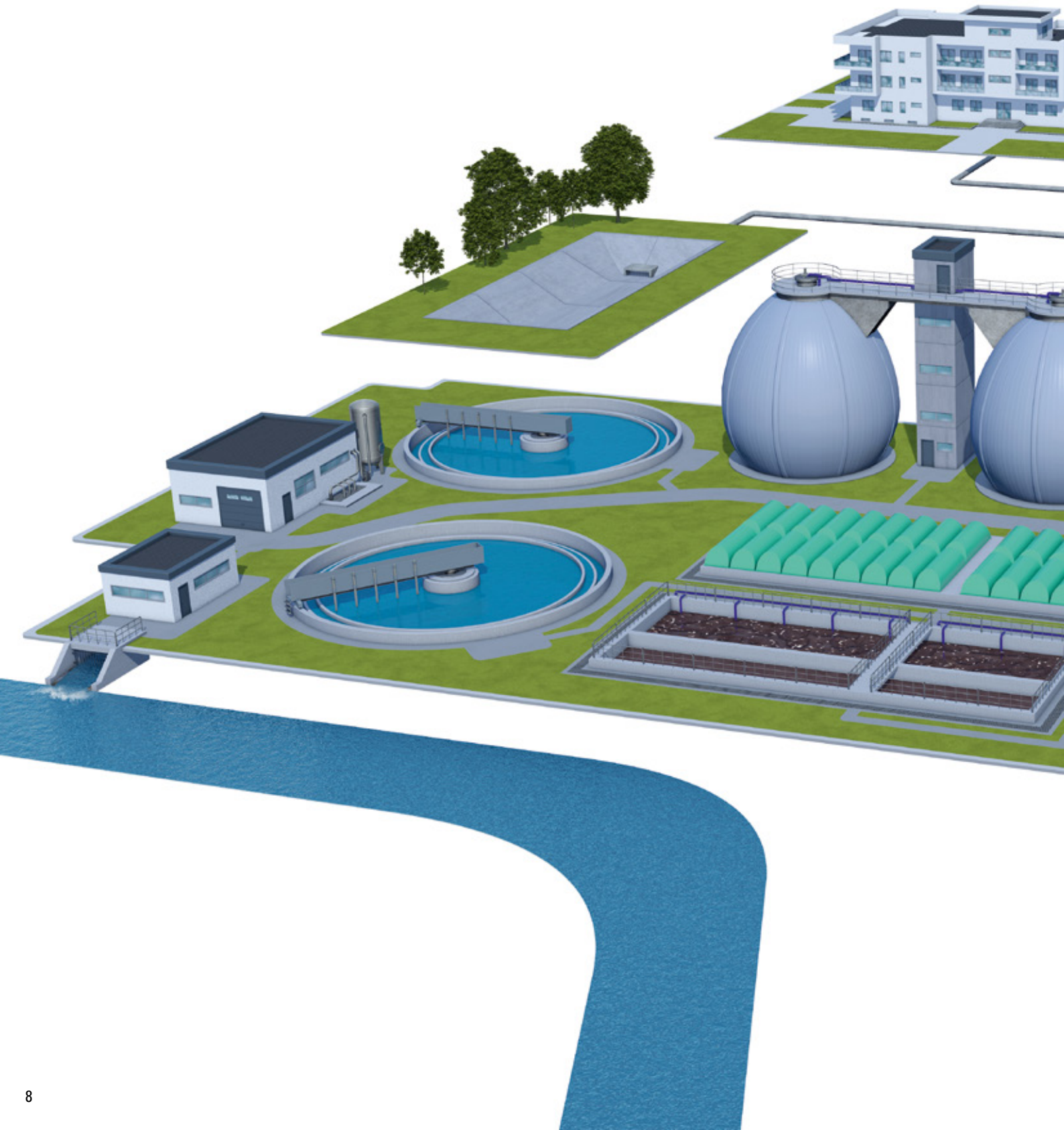
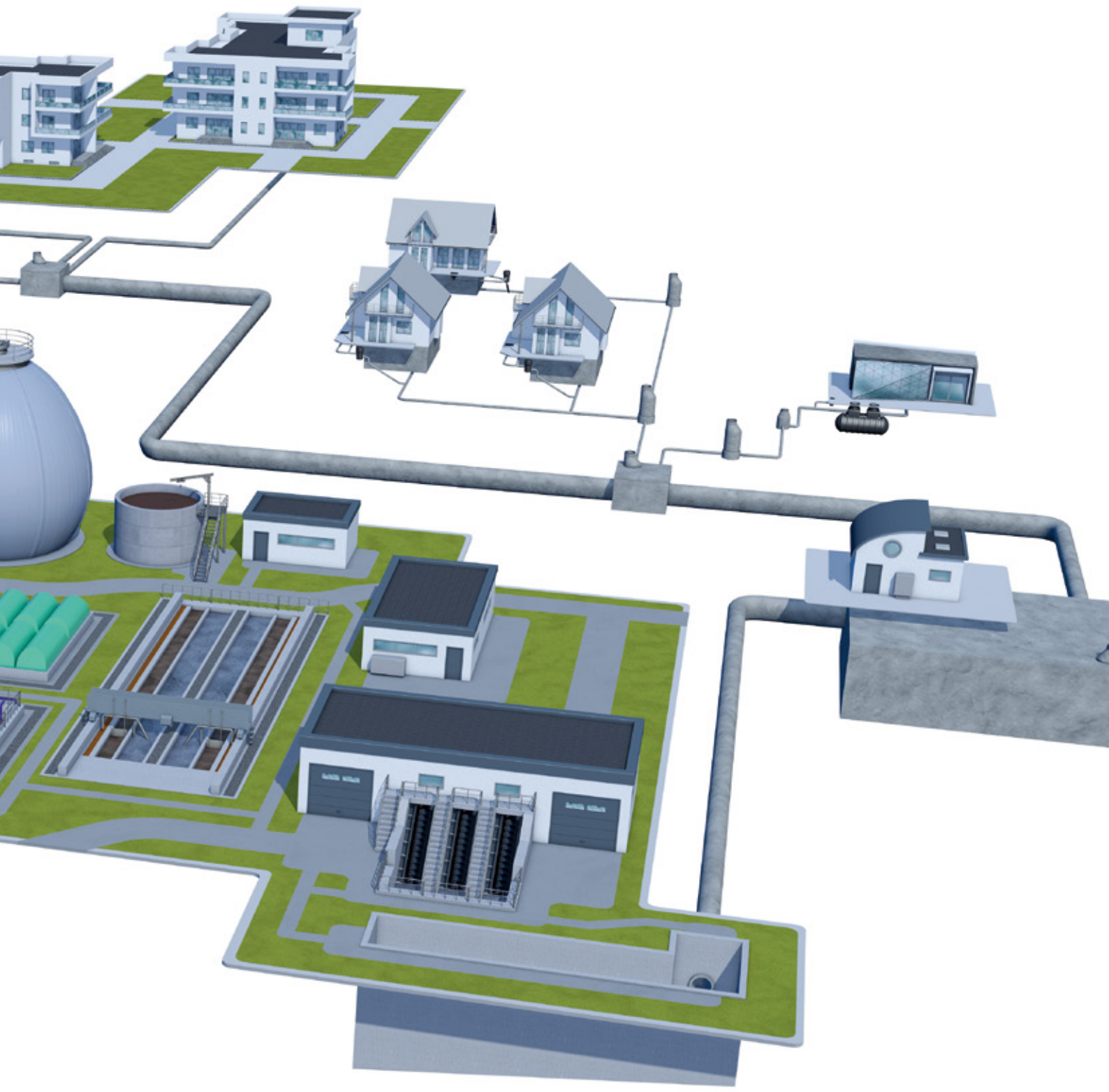
Structures in Sewage Treatment Plants and Underground Sewers





Sewage Treatment Plants, Open and Closed Structures

1. Repairing and reprofiling concrete with highly sulphate-resistant speciality mortar

- **Nafufill BC** – highly sulphate-resistant cement-bound bonding coat. For use as a system with Nafufill KM 250 HS and MC-RIM PROTECT-H. Certified in accordance with EN 1504-3.
- **Nafufill KM 250 HS** – fibre-reinforced, highly sulphate-resistant, PCC concrete replacement for reprofiling and increasing the concrete cover, for trowel and wet spray application. Certified as R4 in accordance with EN 1504-3.
- **Nafufill GTS-HS** – highly sulphate-resistant SPCC concrete replacement for reprofiling and increasing the concrete cover. Can be applied by dry spraying. Certified as R4 in accordance with EN 1504-3.

2. Mineral based surface protection

- **MC-RIM PROTECT** – fibre-reinforced, highly sulphate-resistant, cement-bound high-performance coating for use on vertical surfaces in open basins in sewerage structures. For trowel, wet spray and dry spray application. Chloride-proof with effective resistance in the range pH 3.35 to pH 14. Suitable for exposure classes XD1-3, XS1-3, XC1-4, XM1, XA1-3, XF1+3, XWW1-3 and XWW4 and moisture classes WO, WF, and WA. Certified as R4 in accordance with EN 1504-3 and as a surface protection system in accordance with EN 1504-2.
- **MC-RIM PROTECT-H** – highly sulphate-resistant, cement-bound, abrasion-resistant coating for horizontal and slightly inclined surfaces. Suitable for exposure classes XD1-3, XS1-3, XC1-4, XA1-3, XF1-4, XM1 and XWW1-3 and moisture classes WO, WF, and WA. For application by trowel or using a screed pump unit, certified as CT-C60 in accordance with EN 13813. Use Nafufill BC as bonding coat.
- **MC-RIM PROTECT-ST** – fibre-reinforced, sulphate-resistant, cement-bound coating for use on vertical surfaces in open basins in sewerage structures. For trowel and wet spray application. Chloride-proof with effective resistance in the range pH 4 to pH 14. Suitable for exposure classes XD1-3, XS1-3, XC1-4, XA1-3, XF1+3 and XWW1-3. Certified as R4 in accordance with EN 1504-3.
- **MC-RIM PROTECT-MR** – fibre-reinforced, highly sulphate-resistant, cement-bound, highly abrasion-resistant coating for surfaces subjected to high levels of mechanical abrasion. For trowel and wet or dry spray application. Suitable for exposure classes XD1-3, XS1-3, XC1-4, XM1-2, XA1-3, XF1+3 and XWW1-3. Certified as R4 in accordance with EN 1504-3.
- **MC-RIM PROTECT-C** – ready-to-use, water-based, film-forming curing agent, barrier-coefficient >90%.
- **Nafufill EC 6** – three-component ECC fine filler for vertical and overhead surfaces for subsequent coating with synthetic resin coatings, certified in accordance with EN 1504-3.

3. Synthetic-resin-based surface protection

- **MC-PowerPro HCR** – two-component, duroelastic speciality coating for surfaces exposed to chemical attack in sewerage structures. to be used in combination with MC-PowerPro HCRprimer. Highly resistant to biogenic acids and highly abrasion-resistant. System tested in accordance with the DIBt test principles for JGS coatings. Certified to EN 1504-2.

Sewer and Manhole Structures

1. Reprofiling and coating with highly sulphate-resistant speciality mortars

- **ombran MHP rapid** – highly wear-resistant mortar for channel/open sewer rehabilitation, very quickly resistant to re-exposure to water.
- **ombran MHP 15** – highly wear-resistant mortar for trowel application, quickly resistant to re-exposure to water.
- **ombran MHP** – universal mortar for trowel application.
- **ombran MHP-SP** – mortar for wet spray and spinning application using the compact conveying method.
- **ombran MHP-SP 3000** – mortar suitable for spinning or spraying providing optimised chemical resistance.

2. Surface protection coating for severe chemical attack

Coating with special resins based on hybrid-silicate technology

- **ombran CPS** – synthetic coating for manholes, pump sumps / stations and storage basins with very high resistance against biogenic sulphuric acid.
- **ombran FT** – conductive synthetic coating for oil / grease and light liquid separators.

Hand lay-up lamination with styrene-free organic-mineral resin

- **ombran SC** – Hand-laid laminate coating for small to medium-sized surfaces in sewer structures, used in combination with ECR glass fibre mats.

3. Manhole coating with special automated technology (MRT)

- **MRT Blaster HP Unit** – for removing concrete and old coatings.
- **MRT Blasting Unit** – for substrate preparation.
- **MRT Spinning Unit** – for applying the speciality mineral mortars **ombran MHP-SP** and **ombran MHP-SP 3000**.
- **HS Coating Head** – for spinning application of the highly chemically-resistant hybrid-silicate resin **ombran FT**.
- **MRT Control Unit** – for automatic control of the entire repair process.

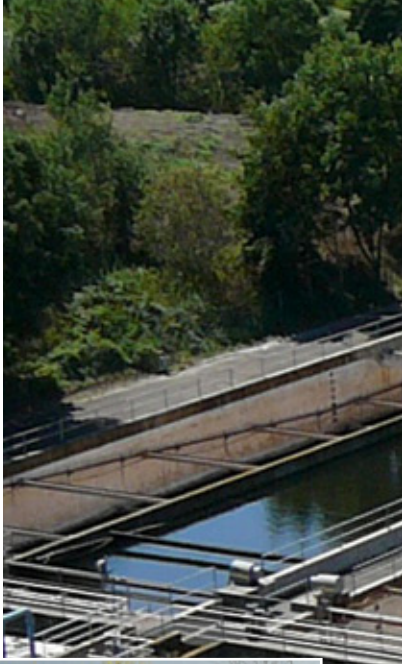
4. Speciality no-dig rehabilitation techniques

- **Konudur Homeliner with epoxy resins**
  Konudur 160 PL-XL, 170 TR and 102 – creation of a self-supporting pipe-in-pipe system for no-dig rehabilitation of entire drains of sewers in inaccessible areas (CIPP liner).
- **Konudur LM-Liner with silicate resins**
  Konudur 250 OM-PL – local sealing and stabilisation of defects in inaccessible drains of sewers (patch lining).
- **Konudur Robopress 07** – for use with ProKasro 2K system – PU resin for rapid embedding and sealing of lateral connections in inaccessible sewers using robotic technology.
- **Konudur Robopox 10 / 10 fast / 20 / 20 fast / 26** – epoxy resin for embedding lateral connections and filling work by robotic in inaccessible sewers.

5. Rapid sealing

- **ombran W** – rapid-curing expansion-type plugging mortar for stopping local water infiltration.
- **ombran IW** – superfast-curing mortar for stopping laminar water infiltration.
- **MC-Fastpack Injekt LE** – fast-curing, two-component expanding resin for permanent sealing by injection.
- **Konudur Flexfit / Konudur Flexfit CS** – reactive resin filler for the flexible bonding of on-site curing pipe liners to manholes and accessible sewage constructions.

Rehabilitation and Protection of Wall and Floor Surfaces Using High-Performance Mineral Coatings

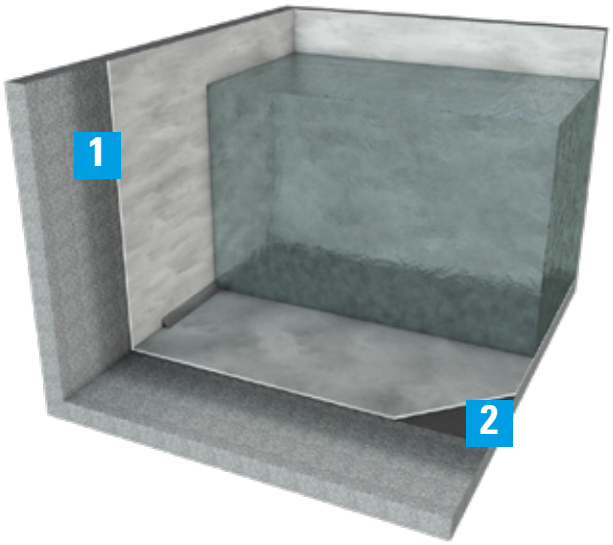


Reinforced concrete is the most frequently used material for structures such as sand traps, grease traps, screening plants, primary clarifiers, aeration tanks or secondary clarifiers. Due to continuous, intensive use, the wall and floor surfaces are subjected to a multiplicity of physical and chemical attacks. Over the long term, these can damage the supporting structure and, in the worst-case scenario, result in complete failure of the construction.

When it comes to the repair of open basins, many experienced operators opt for mineral coatings such as **MC-RIM PROTECT**, **MC-RIM PROTECT-ST** or **MC-RIM PROTECT-H**. These are easy to use, open to diffusion and perfectly compatible with reinforced concrete. As they can be quickly applied, downtimes are kept to a minimum, meaning that basins can be rapidly returned to service.

With their low porosity and high resistance to media found in sewage, **MC-RIM PROTECT**, **MC-RIM PROTECT-ST** and **MC-RIM PROTECT-H** are the perfect match for the stringent requirements of sewage treatment plants. They also boast verified resistance for exposure classes XA3 and XWW3.

All three high-performance coatings can be applied manually or via wet spray technology. They are quickly and easily smoothed, enabling specialist applicators to achieve high levels of productivity. **MC-RIM PROTECT**, **MC-RIM PROTECT-ST** and **MC-RIM PROTECT-H** cure with level, impervious surfaces which will withstand renewed attacks over protracted periods.



System composition:

[1] Wall:
MC-RIM PROTECT or MC-RIM PROTECT ST –
fibre-reinforced surface coating

[2] Floor:
Nafufill BC – bonding coat
MC-RIM PROTECT-H – cement-based surface coating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Highly Resistant Coatings for Structures Subjected to High Mechanical Stressing

In the inlet channel, the coarse and fine screen system, the sand trap, screw draw works and on the scraper trackway, reinforced concrete is subjected to extreme mechanical abrasion. This leads to significant concrete wear, which can in turn reduce the performance of these system components and increase energy consumption.

The solution for such applications comes in the form of **MC-RIM PROTECT-MR**. A high-performance mineral coating, that can be accurately applied and is highly wear-resistant. In addition it boasts exceptionally of low porosity, is fibre-reinforced and has excellent chemical resistance against substances typically found in sewage, as evidenced by its verified suitability for exposure classes XA3 and XWW3.

MC-RIM PROTECT-MR is applied manually or via wet spray technology and can be levelled and smoothed with ease.

MC-RIM PROTECT-MR is ideal for use on wall surfaces and scraper trackways that are subjected to high mechanical stressing, as well as for the accurate lining of spiral pump hutch while the screw is in operation – the perfect installation process for restoring maximum efficiency with minimum effort and energy.

For thicker layers, **MC-RIM PROTECT-H** is the ideal solution, having been specially designed for the requirements of scraper trackways.

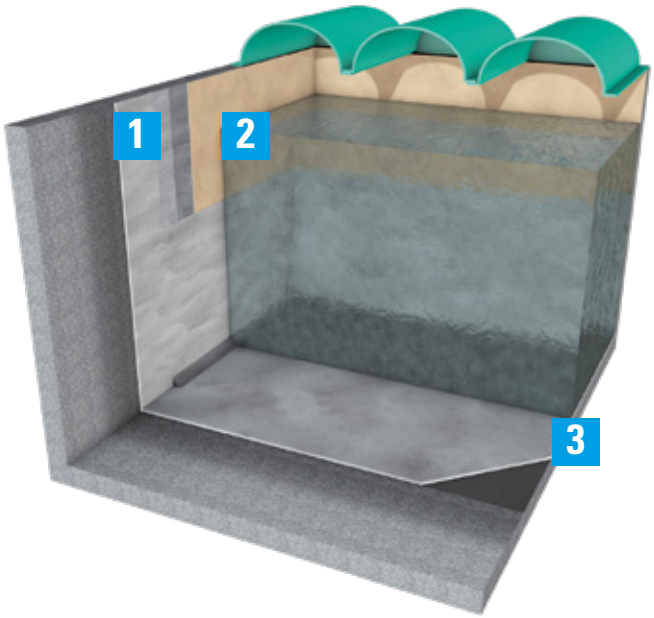
Long-Term Surface Protection for Areas with Wet and Dry Cycles and Gas Zones Subject to Biogenic Sulfuric Acid Corrosion

Reinforced concrete is exposed to significant chemical attack in the gas zones of covered structures, such as aeration basins, sludge thickeners, digestion tanks and towers. Created as a result of bacterial decay processes, the gases that arise in such apparatus contain gaseous hydrogen sulphide (H_2S). This escapes into the gas compartment and is oxidised by bacteria on the component surfaces to form sulphurous acid (H_2SO_3) and sulphuric acid (H_2SO_4).

This leads to disastrous consequences for the concrete, as these acids reach low pH values of 0 – 2 in the concentrations present. Even on high-quality concrete, these acids chemically attack the cement stone and, over the long term, destroy the concrete structure. The characteristic damage first becomes apparent in zones with fluctuating water levels, where textures similar to exposed aggregate concrete appear. If no action is taken, it continues unabated, necessitating extensive repair work.

MC-PowerPro HCR is a two-component resin coating applied using a roller or an airless spray for protection against biogenic sulphuric acid corrosion.

MC-PowerPro HCR is acid-resistant down to a pH of 0 and covers cracks with a maximum width of 0.25 mm. Together with **MC-RIM PROTECT** or **MC-RIM PROTECT-ST**, it forms a long-lasting protection system for reinforced concrete in closed structures within sewage treatment plants.



System composition for wall surfaces:

[1] Surface coating/levelling with MC-RIM PROTECT or MC-RIM PROTECT-ST

[2] Coating in air-exposed area (gas zone) on top of MC-RIM PROTECT or MC-RIM PROTECT-ST using MC-PowerPro HCRprimer and MC-PowerPro HCR (two coats)

System composition for floor surfaces:

[3] MC-RIM PROTECT-H surface coating together with Nafufill-BC (bonding coat)

Service Lifetime of Over 30 Years Verified by Experts

Protecting concrete structures is particularly important in sewerage facilities because the substances in sewage and process flows attack the concrete and can have a negative effect on the load-bearing capacity of the structure over the long term. To prevent this, protective measures have been in use for many years.

Until now, proof of the durability of these methods was either non-existent or, at best, vague. So, when owners posed the perfectly understandable question of how long an investment would last, no-one could give them an answer.

This is not the case with the speciality mineral coatings of the **MC-RIM product range**. Several independent testing institutes and experts have confirmed that these have a service **lifetime of at least 30 years**.

In order to arrive at this conclusion, specialists tested several structures in three sewage treatment plants. These tests included a rainwater overflow basin, an aeration tank, and a sludge thickener. The tests were designed to determine the current condition of the mortar coatings using a variety of characteristics typical of concrete and mortar and to conclude at a value for the expected remaining useful life.

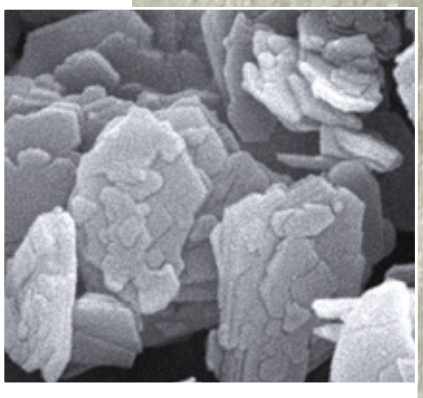
The reports confirm that **MC-RIM** protects the reinforced concrete effectively over many years. The coatings exhibit only minor signs of wear, underlining their impressive quality and value.

Adhesion tensile test of the **MC-RIM** mortar coating

Core extraction during the long-term study of the **MC-RIM system**

Mineral Based Reprofiling and Coating Systems Providing Exceptionally Fast Application

Speciality coating materials are essential for repairing structures in the sewerage network. They need to provide easy application, allow a rapid return to service and be resistant to the aggressive and diverse conditions inherent in sewage treatment and transport. This is exactly what is offered by the mineral based mortars in the ombran MHP range, which are based on high-performance cements. For many years, they have proven their outstanding compatibility in sewerage applications where sulphuric acid attack is not a factor.



Microscopic view: densified mortar matrix using DySC® technology

Concrete and masonry substrates in need of rehabilitation often exhibit significant unevenness, pry-out failures, or low concrete cover, meaning that reprofiling must first be carried out. The dual-performance systems of the **ombran MHP** range save a considerable amount of time during application. In addition to the actual mineral coating, reprofiling work can also be performed using the same mortar system. Coupled with the fact that the ombran mortars are ready for exposure to water after just a short period of time, this significantly simplifies and speeds up progress on site, keeping costly water retention time to a minimum.

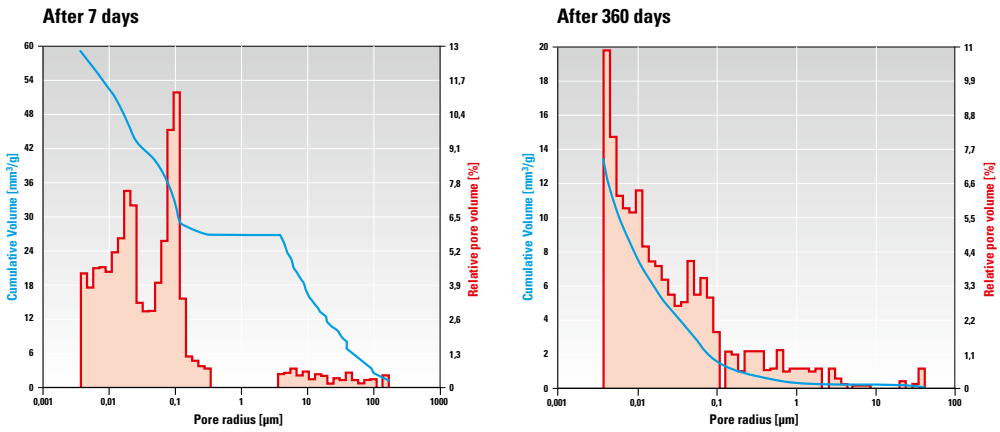
Resistance to mechanical, biological and, above all, chemical attack is crucial for the long-term success of a coating solution. Choosing the right ingredients, such as tricalcium aluminate-free (C_3A-free) cements, to create highly sulphate-resistant, special coatings, is essential for cement-based mortar systems in sewerage systems.

Minimal porosity and the best possible pore size distribution in the mortar matrix are key to maximising the chemical resistance of cement-based systems. In addition to an optimised w/c ratio, our patented DySC® technology (Dynamic SynCrystallisation) ensures that the mortar matrix of the **ombran MHP** range becomes more compact and consolidated, even after normal hydration has ceased. This eliminates active water-bearing pores, ensuring powerful, long-lasting protection for the sewerage structures.

Cement-bound materials are porous!

The characteristic values determined are the total porosity and the pore size distribution using mercury pressure porosimetry. The measurements include compaction/air pores (x > 50 µm), capillary pores (50 µm > x > 0.05 µm) and gel pores (x < 0.05 µm). While mass transport is not possible in the gel pore range, compaction/air pores and capillary pores make cement-bound building materials permeable to contaminants. The following applies: The greater the proportion of compaction/air pores and capillary pores, the lower the chemical resistance and hydrolysis resistance of the system.

The DySC® technology of the ombran MHP system effectively reduces these pore types as the coating ages, resulting in minimized overall porosity and an optimized pore radius distribution.



Changes over time in the pore radius distribution of the ombran MHP-SP

High-Performance Coatings for Sewerage Structures and Separator Systems

Sewerage facilities are exposed to chemical attack, not only as a result of the discharge of sewage containing high concentrations of aggressive chemicals. Exacerbating factors are long dwell times, slow sewage flow rates and specific conditions relating to sewer pressure pipes (up and downstream transfer manholes).

Hence biogenic sulphuric acid corrosion is especially likely to be found on structures such as storage basins, pump stations, or large storage sewers, while separators are also vulnerable to attack by fatty acids. Normal sewage mains are, however, also affected.

This can result in damage to concrete, render old coatings unfit for purpose or cause joints to fail, potentially endanger the stability of affected structures and causing contaminants to seep into the surrounding soil (due to exfiltration, for example). In the case of industrial sewerage structures, this sometimes gives rise to costly production downtimes. To repair and prevent damage to these facilities, speciality coating and lining systems are required with a level of chemical resistance that goes far beyond that of the usual, cement-bound materials.

The hybrid-silicate coatings **ombran CPS** and **ombran FT** are three-component coating systems that are impervious to contaminants and have strong water vapour diffusion capabilities, meaning damage caused by osmosis is avoided. When cured, these hybrid-silicate coatings become viscoplastic with high mechanical resistance.

In addition, ombran offers a comprehensive portfolio of specialty coatings: from the silicate resin-based hand lay-up **ombran SC** to the flexible PU system for dynamically loaded shaft neck coatings, **ombran flex**, and the liner connecting system **Konudur Flexfit CS**.

MRT – Manhole Coating with Special Automated Technology

Repairing manhole structures presents a particular challenge. Although the majority of manholes with an inside diameter of 1,000 mm are accessible, adequate substrate preparation and subsequent coating are often difficult to achieve due to depth and spatial constraints.

However, help is at hand in the form of the unique **Manhole Rehabilitation Technology (MRT)**. This facilitates high-quality and reproducible substrate preparation using high-pressure water-granulate / ultra high-pressure water blasting.

Even the vertical inner surfaces of the manhole can be coated automatically: the high-performance mortar from the **ombran MHP** range is evenly applied to the manhole walls by a rotating head as the spinning unit. The resulting coating is optimally compacted and completely reproducible.

Occupational safety requirements are strictly observed during both the substrate preparation and the coating phase. The rehabilitation process is monitored from outside the manhole. These kinds of automated and recurring processes significantly boost the productivity of specialist application companies by up to 40 % during manhole rehabilitation.

In addition to the tried-and-tested **ombran MHP-SP** – especially designed for spray and spinning application – the new **ombran MHP-SP 3000** is on hand. This material offers even greater chemical resistance and meets the highest requirements for coating mortars in accordance with DIN 19573. The **ombran FT** speciality coating is resistant to biogenic sulphuric acid corrosion and can also be applied quickly, evenly, and economically using **MRT technology**.

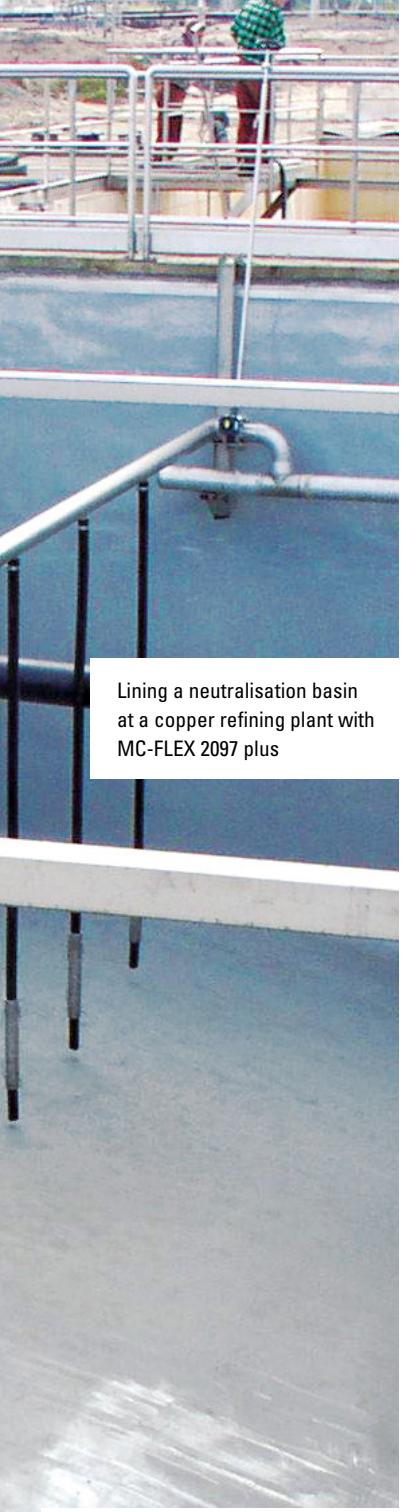
Special Solutions for No-Dig Rehabilitation

Underground sewerage is, by its very nature, fairly inaccessible, with sewers and pipes often running through areas where open trenches are not an option. Obvious examples include traffic junctions and public spaces, while private property or industrial plants and buildings can also stand in the way of supposed simple repair or renovation measures. This is where no-dig rehabilitation methods come into play. These can be divided into two categories: localised repairs and complete renovations.

Crucial for reliable renovation of inaccessible sewers using **CIPP liner systems** (cured-in-place lining) is the quality of the carrier materials and reaction resins used. In offering styrene-free speciality resins that are highly temperature and chemical resistant, MC enables reliable and long-lasting repairs, even in these hard-to-reach areas.

Depending on the damage encountered, complete renovation of the pipeline may not always be necessary. Localised damages can be selectively repaired using the **patch liner method**. This focuses on sealing and stabilising the damaged area. If there is severe infiltration, a **patch liner** may also be needed as preparation for entire renovation using the **CIPP liner method**. Especially formulated and adapted to suit seasonal fluctuations in processing temperatures, organo-mineral resins optimise progress on site and offer impressive longevity.

For localised repair of inaccessible sewer lines, robotic systems can also be used alongside the **patch liner method**. With the aid of **robot technology**, damaged areas can be repaired with either ombran mineral or reaction resin based systems. With this type of rehabilitation, application of the grouting materials must meet high standards and be appropriately matched to the various robot technique available. The developers of ombran have worked closely with machine manufacturers from all fields to ensure optimal results.



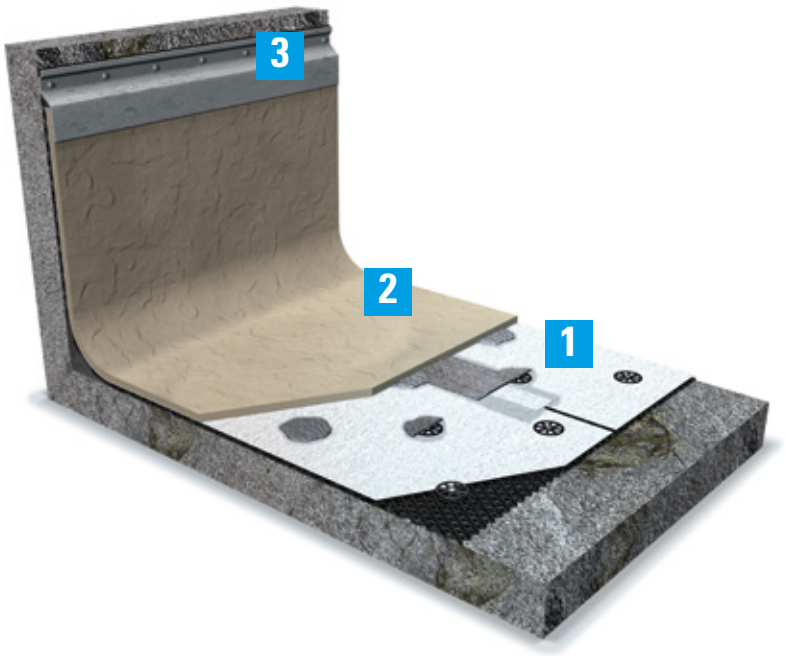
Lining a neutralisation basin at a copper refining plant with MC-FLEX 2097 plus

Lining of Industrial and Commercial Process Basins Against Chemical Attack

High mechanical stressing and aggressive fluids are a common cause of damage to industrial sewerage structures. Thanks to their resistance properties, functional characteristics and durability, coating and lining systems from the MC-FLEX range represent an economical solution in a broad range of applications. The two-component, viscoplastic reaction resins come in two versions that are effectively aligned to different application techniques.

MC-FLEX *plus* has been especially developed for industrial plants where chemically aggressive liquids and sludge are handled or stored. Applications range from the lining of neutralisation basins to protecting thickener and basin structures for sewage and sludge treatment.

Making severely damaged or contaminated substrates ready for coating was once a complex process. Now extensive substrate rehabilitation can often be skipped thanks to the **MC-FLEX *plus*** system. As "tank-in-tank" liner, **MC-FLEX *plus*** is an industry-tested alternative to conventional coatings. **MC-FLEX *plus*** can absorb motion between adjacent anchor points, largely eliminating the need for special joint constructions. The successful use of the system in industrial facilities for sewage treatment and in neutralisation basins around the world is testament to its excellent performance.



Example system composition using MC-FLEX *plus*:

[1] Geokomposite MC-FLEX base

[2] MC-FLEX 2097 sealing layer

[3] Retention rail with ventilation

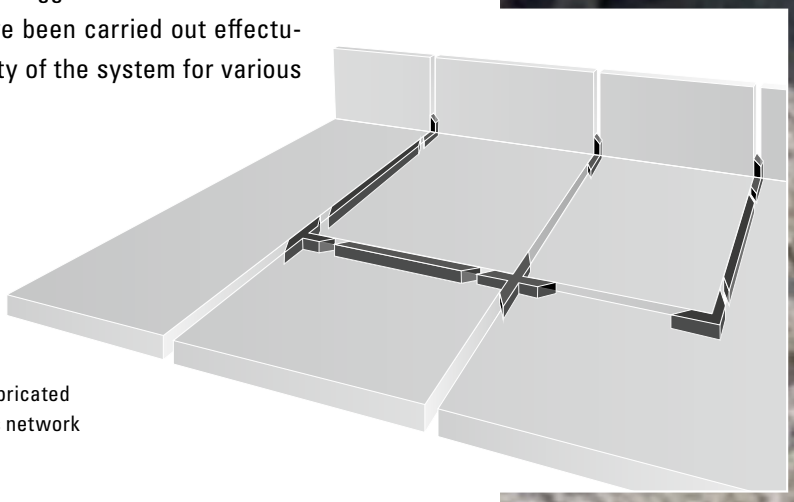
Flexible Sealants and Joint Profiles for Any Application

Joints in sewerage facilities are normally sealed with flexible PU sealants. Innovative joint profiles offer extra reliability and greater durability for the higher exposure classes found in closed sections, yielding lower maintenance costs and shorter inspection times.

Flexible PU sealants such as **Mycoflex 450** or the one-component **MC-FLEX PU 22 Construct** have performed well in open treatment basins for decades. Provided they are professionally installed, they resist water pressure and flow, as well as typical chemical attacks and micro-organisms. This high durability is impressively confirmed by a study conducted by an external testing institute, which found that the material retained its elasticity even after long-term immersion in municipal wastewater.

Consisting of factory-made mouldings of a polymer foam, the **Mycoflex Resyst** joint system complements the range of sealants offered by MC-Bauchemie. The moulded profiles are pressed into the joint and bonded to its flanks. Matching corner and elbow pieces facilitate transition to vertical components and connect joint intersections. The profiles can be supplied for all common joint widths and can be fitted in horizontal and vertical arrangements.

Mycoflex Resyst has been put through its paces in numerous tests designed to verify its resistance to a wide variety of media. It has also been granted the approval for facilities used to store, fill, and handle substances classed as hazardous to water, by German Institute for Structural Engineering (DIBt). Furthermore tests to demonstrate its resistance to aggressive substances in liquid/semi-liquid manure and silage effluent have been carried out effectually. These extensive tests highlight the suitability of the system for various applications in sewerage structures.



Durably bonded, the **Mycoflex Resyst** system of factory-fabricated profiles and specialty mouldings serve to seal a structure's network of joints.

The Right Injection Material for Every Sewerage Requirement

Sewerage structures are in direct contact with subsoil and ground water, making it essential that they are leak-proof to prevent untreated sewage from contaminating the environment. Yet tight and otherwise leak-proof structures are not just an environmental necessity, they are also crucial for long-term stability. This is why repair methods for sewerage facilities include injection-based applications for cracks and cavities, subsoil stabilisation, and the exterior waterproofing of components in contact with the ground.

In many cases, cracks and cavities in reinforced concrete and masonry need to be filled. The innovative polyurethane resin **MC-Injekt 2300 flow** with Water Boost Effect is used for this purpose. This injection resin, which has a very long workability, becomes fast reactive on contact with water. This allows cracks and voids to be sealed efficiently, safely, permanently and in an environmentally friendly manner.

MC-Montan Injekt TR-X has been specially formulated for the retrofitting of waterproofing on the external surfaces of building components. This acrylate gel complies with German regulations on the protection of soil and groundwater. As a particularly low-viscosity injection resin, it seals even the finest-grained structures to make them completely impermeable to water, thereby preventing infiltration in the long term. It also offers excellent chemical resistance.

Coarse-grained loose rock is efficiently sealed with **MC-Injekt PowerSeal G** expansion resin, which is also environmentally compatible in its make-up and activity.

If the subsoil close to the structure has become unstable, the **MC-Montan Injekt System F** offers solutions that provide a waterproof seal, expand, and simultaneously stabilise the ground.

Small-scale waterproofing issues, particularly those involving a strong flow of water, can also be resolved in a matter of seconds using the **MC-Fastpack Power-Tool** compressed-air-powered cartridge dispenser and the highly reactive **MC-Fastpack Injekt LE**.

Service the Smart Way

Rehabilitation projects in sewerage systems and sewage treatment plants are complex and pose a variety of challenges. From design right through to monitoring results, we will support you with individually tailored expert support and practical solutions.

Customised product solutions are required to deliver successful repair and protection for concrete structures used in the transport and treatment of sewage. Right from the planning stage, make sure you benefit from our decades of experience in projects in the municipal and industrial sewerage sector. We will be there for you from day one, offering condition assessment, site analysis, and assistance in the selection of a suitable repair system through to closely coordinated support throughout the complete rehabilitation process.

As well as providing advice for specialist planners, operators, and owners of sewerage facilities, we are firm believers in the benefit of high-value-adding training for professional application companies. We hold regular, individual instruction events to make sure our partners are confident in the use of our products, all aligned to ensuring thorough and durable repair of your structures.

We also offer numerous in-depth information and advanced training events for all kinds of outside personnel involved in the rehabilitation of sewerage structures. We promote knowledge-sharing with industry players in a variety of formats and report on general developments and new trends relating to the sewerage sector. By working with us, you also can benefit from this pooling of expertise and the cutting-edge knowledge it brings, enabling you to incorporate fresh ideas into your day-to-day work. Our integral approach is aligned to delivering optimum results for every single one of your projects.

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Protection and Rehabilitation of Sewerage Structures

- Sewage Treatment Plants
- Sewerage Systems
- Industrial Wastewater Treatment
- Separator Systems

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