



## System Solutions for Concrete Goods

EXPERTISE  
CONCRETE GOODS

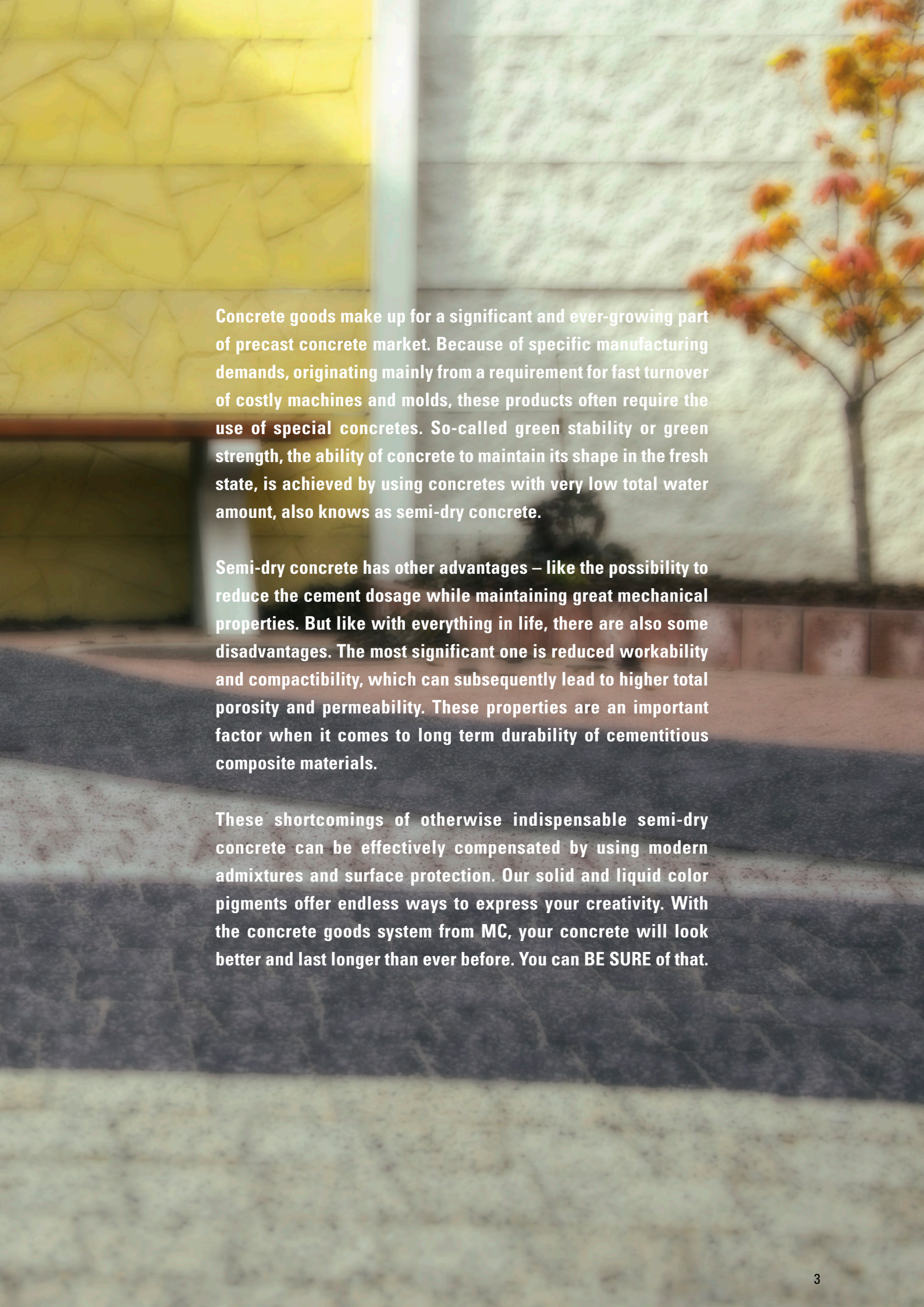




# MC concrete goods system is here.

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Concrete goods make up for a significant and ever-growing part of precast concrete market. Because of specific manufacturing demands, originating mainly from a requirement for fast turnover of costly machines and molds, these products often require the use of special concretes. So-called green stability or green strength, the ability of concrete to maintain its shape in the fresh state, is achieved by using concretes with very low total water amount, also known as semi-dry concrete.

Semi-dry concrete has other advantages – like the possibility to reduce the cement dosage while maintaining great mechanical properties. But like with everything in life, there are also some disadvantages. The most significant one is reduced workability and compactibility, which can subsequently lead to higher total porosity and permeability. These properties are an important factor when it comes to long term durability of cementitious composite materials.

These shortcomings of otherwise indispensable semi-dry concrete can be effectively compensated by using modern admixtures and surface protection. Our solid and liquid color pigments offer endless ways to express your creativity. With the concrete goods system from MC, your concrete will look better and last longer than ever before. You can BE SURE of that.





## Four factors that influence compactibility of semi-dry concrete

1. Additional water improves workability and compactibility, but can increase capillary porosity and reduce mechanical properties.
2. Additional cement can result in increased workability and compactibility, but also material costs and carbon footprint.
3. Longer compaction with higher energy can lead to more compact concrete, but it also means increased power consumption and slower production.
4. Compaction aid admixtures are developed specifically to bring all the benefits of enhanced compactibility with no drawbacks. They are often the most economical solution for uninterrupted production with constant quality.

## Two main ways to improve compactibility of semi-dry concrete

1. Reduction of friction between particles in the system by lowering their surface attractive forces.
2. Introduction of very fine air bubbles that act as tiny ball-bearings and allow better particles movement of in the system.

MC-Bauchemie offers a selection of products of both kinds as well as their combination in our Murasan BWA and Murasan Hydrotech portfolios.



## Murasan BWA and Murasan Hydrotech Each block perfectly compacted. Every time.

In order to achieve the optimal turnover of molds and machines, concrete goods are generally produced from so-called semi-dry concrete. Its low total water content brings important benefits, but at the same time some disadvantages.

The advantages include improved green strength, the ability of concrete to hold its shape in fresh state, as well as the possibility to reduce the amount of cement in the recipe while still achieving good mechanical properties. This significantly improves the environmental and economical aspect of concrete goods production. Hand in hand with said benefits goes one obvious drawback. The workability and compactibility of semi-dry concrete is noticeably reduced. When not properly compacted, both mechanical properties and durability of hardened concrete can be impaired.

### Our compaction admixtures bring a variety of benefits

- **Improved mechanical properties** as a result of more densely packed microstructure with less porosity.
- **Higher hydration degree** with selected products that allow adding more water with no effect on green strength. Higher cement hydration degree results in stronger concrete and more efficient production.
- **Enhanced visual aesthetics** thanks to more defined shapes and smoother surface, which results in brighter, more dynamic concrete colors.
- **Reduced risk of efflorescence** as a result of reduced water exchange between concrete and surrounding environment. However, an additional water-repellent admixture is highly recommended for maximum protection.
- **Faster and more reliable production** due to shorter production cycles and less equipment wear. Improved internal cohesion of compacted fresh concrete lowers the risk of defects.



## Murasan BWA and Murasan Hydrotech **Efflorescence and frost protection.** **Lasting and reliable.**

Water is generally considered to be one of the main culprits of concrete corrosion. It either directly or indirectly participates in processes which can lead to loss of mechanical properties as well as visual degradation. With concrete goods, this problem is amplified by characteristically higher permeability.

Regular concrete is considered to be fairly hydrophilic material. When the surface contact angle for water is  $90^\circ$  or lower, water wets the pores and capillaries and spontaneously fills them. With the right protection admixture the surface contact angle can be increased significantly. This forces the water droplets to assume more spherical shape which are not able to penetrate the concrete without the help of external pressure.

Protection (i. e. water repellent and hydrophobic) admixtures should not be mistaken for the waterproofing ones. Waterproofing admixtures are able to completely fill bigger pores and cavities, making it more difficult for water to penetrate deeper into the concrete. Internal protection admixtures however, thanks to their tiny molecules, are able to reach pores and capillaries by several orders of magnitude smaller. This means that unless exposed to pressurized water, protection admixtures offer greater water resistance.

Improved frost resistance and reduced exposure to waterborne corrosive substances such as chlorides and sulphates results in extended long term structural robustness. At the same time, the susceptibility to efflorescence and growth of algae, moss and small plants are reduced substantially. All considered, protection admixtures can prolong the lifetime of concrete goods while keeping them looking good, preventing all common water-related visual defects.



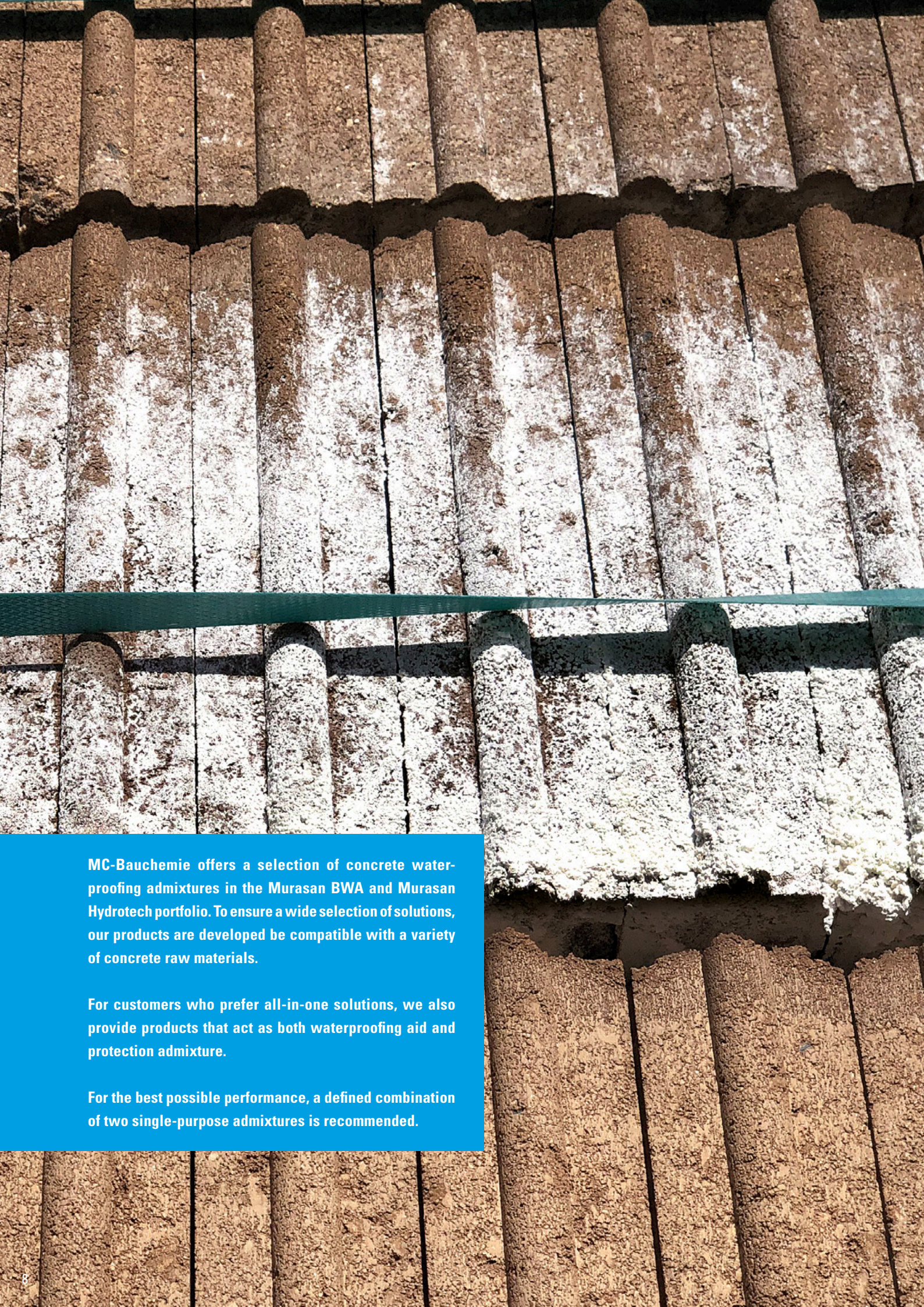
*Without waterproofing admixture*





*With waterproofing admixture*





MC-Bauchemie offers a selection of concrete waterproofing admixtures in the Murasan BWA and Murasan Hydrotech portfolio. To ensure a wide selection of solutions, our products are developed to be compatible with a variety of concrete raw materials.

For customers who prefer all-in-one solutions, we also provide products that act as both waterproofing aid and protection admixture.

For the best possible performance, a defined combination of two single-purpose admixtures is recommended.





There are several ways in which liquid water contributes to concrete degradation. By degradation, we don't only mean the loss of strength and disintegration, but also purely visual phenomena reducing the aesthetical value of concrete.

#### **Mechanical degradation**

When water freezes, its volume increases by approximately 9%. If this expansion happens inside concrete's porous system the crystallization pressure can reach up to tens of megapascals, far exceeding the tensile strength of concrete, leading to cracking, spalling and eventually complete disintegration.

#### **Chemical degradation**

There are 3 main types of water-related chemical degradation:

- **Leaching waters** with low content of ions, especially calcium and magnesium. These waters slowly dissolve the cement stone, lowering mechanical properties and causing secondary efflorescence.
- **Acidic waters** that create easily soluble compounds with cement hydration products. These are then washed away, leaving behind nothing but incoherent aggregate grains.
- **Waters containing soluble chlorides and sulfides.** These can react with cement stone and form insoluble products with increased volume. This leads to a development of cracks and even total disintegration of concrete.

#### **Visual degradation**

One of the most common issues of concrete goods is efflorescence. It is caused by calcium hydroxide and water-soluble salts migrating towards the surface. The water then evaporates, leaving behind white deposits.

These negative occurrences are driven mainly by the exchange of water between concrete and the environment. Our concrete goods waterproofing admixture are specially engineered to prevent water from entering concrete's inner capillary system. No water, no problem.



## Murasan Color products from MC **Away with the grey. Pick a color.**

Coloring your concrete with pigments increases its aesthetic value and makes it stand out in the sea of grey. In addition to a wide range of black, brown, red and yellow we also offer green, blue and white pigments.

All powder pigments, slurries and granulates are compliant with the EN 12878 standard. That means they are produced using inorganic raw materials such as iron oxides, chromium oxide, cobalt oxide and carbon black. This guarantees that our pigments have good resistance against high pH environments (e.g. cement stone) as well as harsh weather conditions like UV radiation, high humidity and extreme temperatures.

We offers a complete assistance with selecting the right pigment for any application conditions as well as delivery and installation of necessary dosing equipment.

**To ensure the best possible color intensity and minimal fading over time, it is important to follow several principles:**

- **Flawless concrete processing**, especially low water-to-cement ratio, good compaction and thorough curing.
- **Internal protection admixtures** reduce the risk of efflorescence and water-related damages that prematurely degrade the concrete.
- **Surface protection** offers even higher degree of protection and can improve the aesthetics thanks to color-intensifying components.





## MC-Bauchemie offers all three types of concrete pigments in the Murasan Color product range.

Powdered pigments Murasan Color P will not break the bank, liquid pigments Murasan Color L allow for clean and precise mixing and granulate pigments Murasan Color G combine the benefits of both. The right type of pigment and its color tone depends entirely on the concrete recipe, production conditions and desired visual characteristics.

### Powder

- + Cost efficient
- + Best availability
- + Long shelf life
- + No extra water
- Extremely fine and dusty
- Harder to mix
- Mess in the production
- Less accurate dosing
- Not flowable

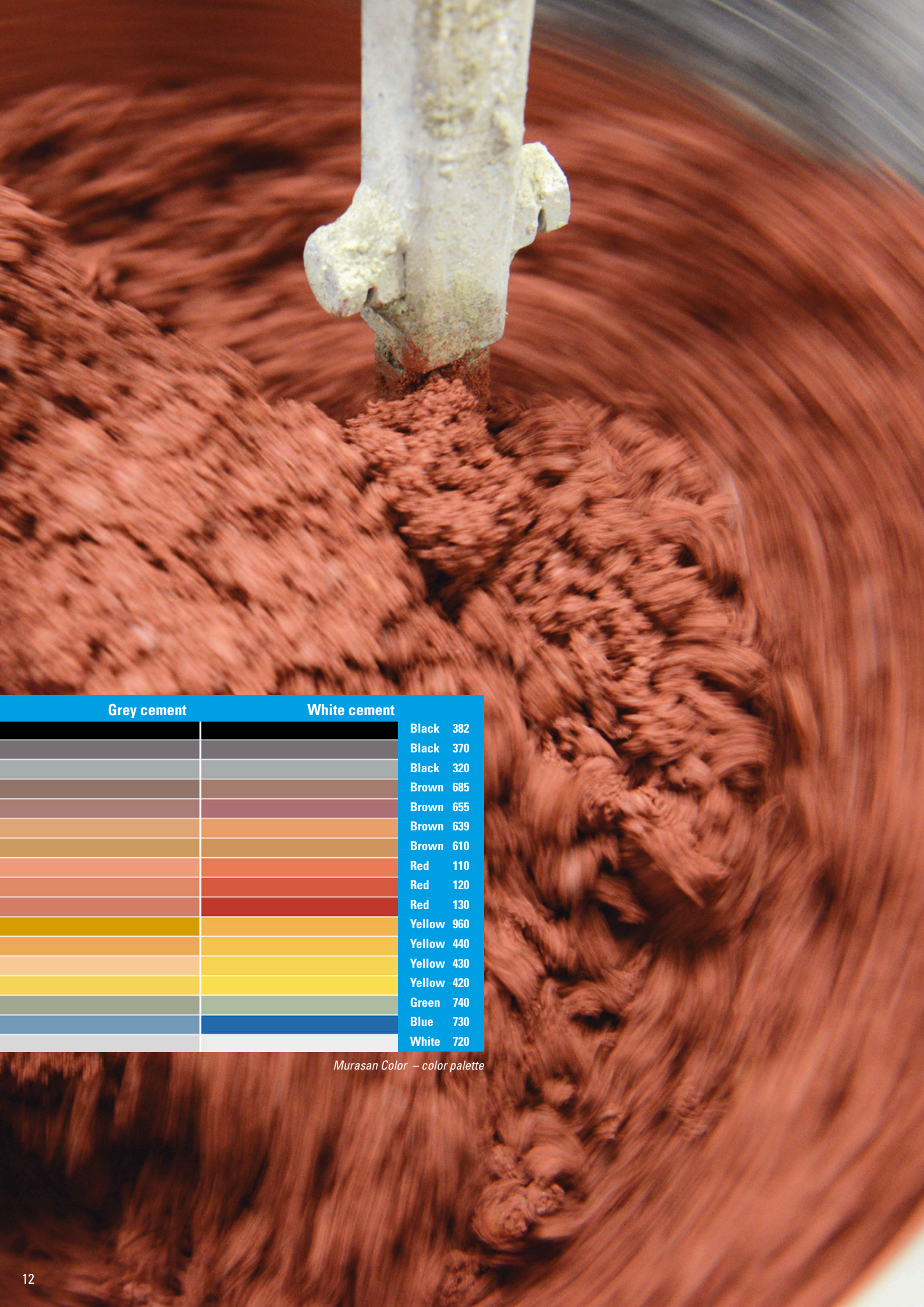
### Liquid

- + Better color control
- + No dusting
- + Wider range of colors
- + Easier handling
- + Accurate dosing
- + Shorter mixing time
- Limited shelf life
- Sedimentation over time
- Can freeze in winter

### Granulate

- + No dusting
- + Flowable
- + Easy handling
- + Accurate dosing
- + No extra water
- + Long shelf life
- Limited range of colors





Grey cement	White cement		
		Black	382
		Black	370
		Black	320
		Brown	685
		Brown	655
		Brown	639
		Brown	610
		Red	110
		Red	120
		Red	130
		Yellow	960
		Yellow	440
		Yellow	430
		Yellow	420
		Green	740
		Blue	730
		White	720

*Murasan Color – color palette*



## There are several factors that have more or less impactful effect on the final color of pigmented concrete.

**Pigment dosage** has a significant influence on the resulting color shade and intensity. Our recommended dosages are 1-5% for solid and 2-8% for liquid pigments. Dosing above these limits does not yield proportional color improvement.

**Powder additives** such as fly ash, ground granulated blast-furnace slag or microsilica affects the shade of the binder matrix and slightly change the color of pigmented concrete.

**Excess mixing water** evaporates from the concrete and results in additional capillaries and pores. The porosity of concrete surface changes the way light interacts and reflects off of it. In general, higher porosity results in reduced color intensity.

**Cement** comes in many different types and colors. The shade and intensity of cement color directly affects the color of pigmented concrete. The best colors are typically achieved with white cement.

**Aggregate** often contains impurities that can have slight effect on color shade of cement stone. The actual aggregate color can also contribute to the final appearance of pigmented concrete.

**Curing** is sometimes disregarded, but good and careful compaction and thorough curing will result in better concrete surface with less porosity, which then leads to more intensive and uniform colors.



## Murasan Surface products from MC **Maximum surface protection. For a long time.**

**Even at the best possible degree of compaction, concrete goods are known for their relatively higher open porosity.**

Preventing the penetration of damaging substances into the concrete is the most effective way of preventing premature aging. When it comes to concrete degradation, water is most often the main culprit. Using a suitable surface protection significantly hampers or even completely prevents water from entering the concrete.

**The damages preventable by surface protection can be split into two groups:**

- **Damages negatively affecting structural integrity of concrete** such as cracking and spalling caused by crystallization pressure of ice and salts, gradual erosion caused by abrasive particles and mechanical wear caused by pedestrians and vehicles.
- **Damages causing visual deterioration** such as contamination caused by food and drinks, oil, petrol and other staining substances, discoloration caused by crystallization of water-soluble minerals on the surface (efflorescence) and growth of simple organisms like algae, moss and small plants.

While the second group has little to none effect on the functionality of concrete goods, all mentioned issues can lead to costly and time-consuming warranty claims and are preventable with a proper surface protection system.











## The Murasan Surface range

From invisible hydrophobic impregnations through water-blocking coatings to high-end UV-hardened surface protection system, Murasan Surface range from MC-Bauchemie offers a selection of solutions for all your needs.

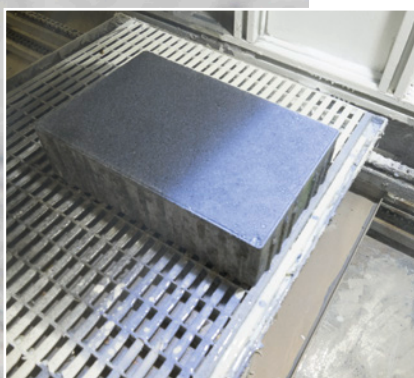
Murasan Surface products bring the best possible degree of protection when combined with suitable compaction aid and internal waterproofing admixtures from Murasan BWA and Murasan Hydrotech range. Film-forming Murasan Surface products contain a color enhancing component that improves and deepens the tone of your colored concrete.



One of the most important characteristics of surface protection products are their recommended application conditions. Some products can only be applied on hardened concrete (dry side), while others are applicable immediately after production (wet side). Film-forming products create a visible coating on the surface while non-film-forming ones do not alter the natural concrete aesthetics.

#### Dry side

Some products, for example **Murasan Surface 600**, can only be applied on completely cured and hardened concrete. This is called the **dry side** of production. At this stage, concrete goods are generally ready to be packaged. To avoid delays, it is necessary to make use of additional production line equipment such as near infrared (NIR) and ultraviolet (UV) lamps.

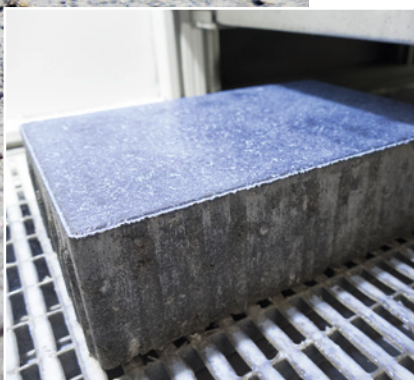


#### Wet side

The majority of our surface protection products are also applicable on the **wet side** of the production. The material then gradually sets together with the concrete in the curing chamber, therefore no additional equipment is necessary.

#### Film-forming

**Film-forming** products can be further divided depending on the layer thickness. An example of **slightly-film-forming** material would be **Murasan Surface 500 Lite**. On the opposite side of the spectrum is then our two component, UV-hardened system **Murasan Surface 700**. In addition to extending the surface durability, our film-forming materials will intensify the color of any pigmented concrete. For white concrete we offer special versions with enhanced translucency.



#### Non-film-forming

Generally speaking thicker coating layer means better protection but also glossier and less natural looking concrete surface. A **non-film-forming impregnation** such as **Murasan Surface 610** provides significantly higher degree of protection against liquid water (compared to untreated concrete) with no visual change of the surface.



For the most uniform layer thickness and consistent performance with optimal utilization of material we highly recommend application of our surface protection products by spraying. Application by rolling, brushing or dipping is also possible but should be consulted first.



## Equipment and machinery from BM **Have the right tools for the job. Get it done.**

Great admixtures, surface coatings and color pigments are just one part of our concrete goods system. In order to fully utilize the benefits of our products, we partnered with company  **BM-Anlagebau & Dosiertechnik GmbH**, which will assist our customers with designing and building the perfect production line. Four groups of production equipment are available:

### **Dosing systems**

Precise dosing of solid and liquid products. Volumetric or gravimetric, mobile or stationary, automatic or manual, every dosing system can be customized for particular needs and conditions of each production line.

### **Spraying systems**

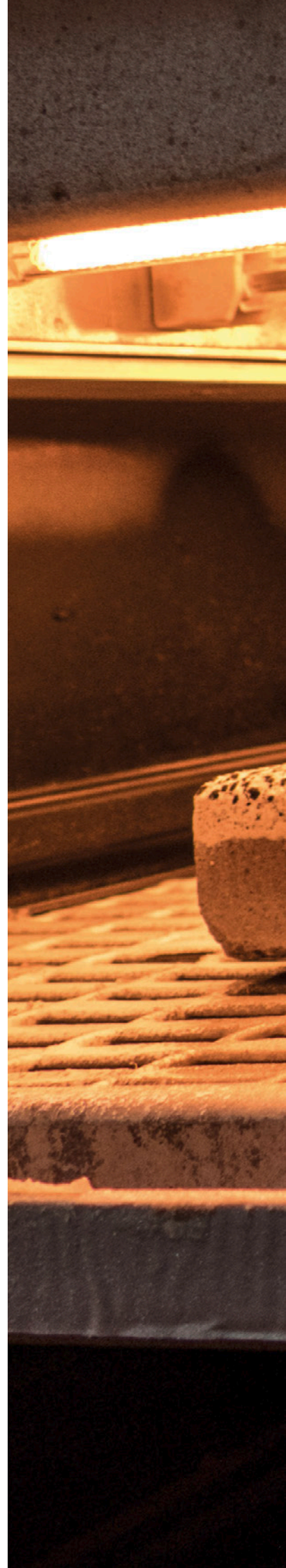
Efficient and accurate application of surface coatings and impregnations. The equipment is custom designed and expertly built using state-of-the-art components. All parameters can be precisely set for a completely automated production.

### **NIR drying equipment**

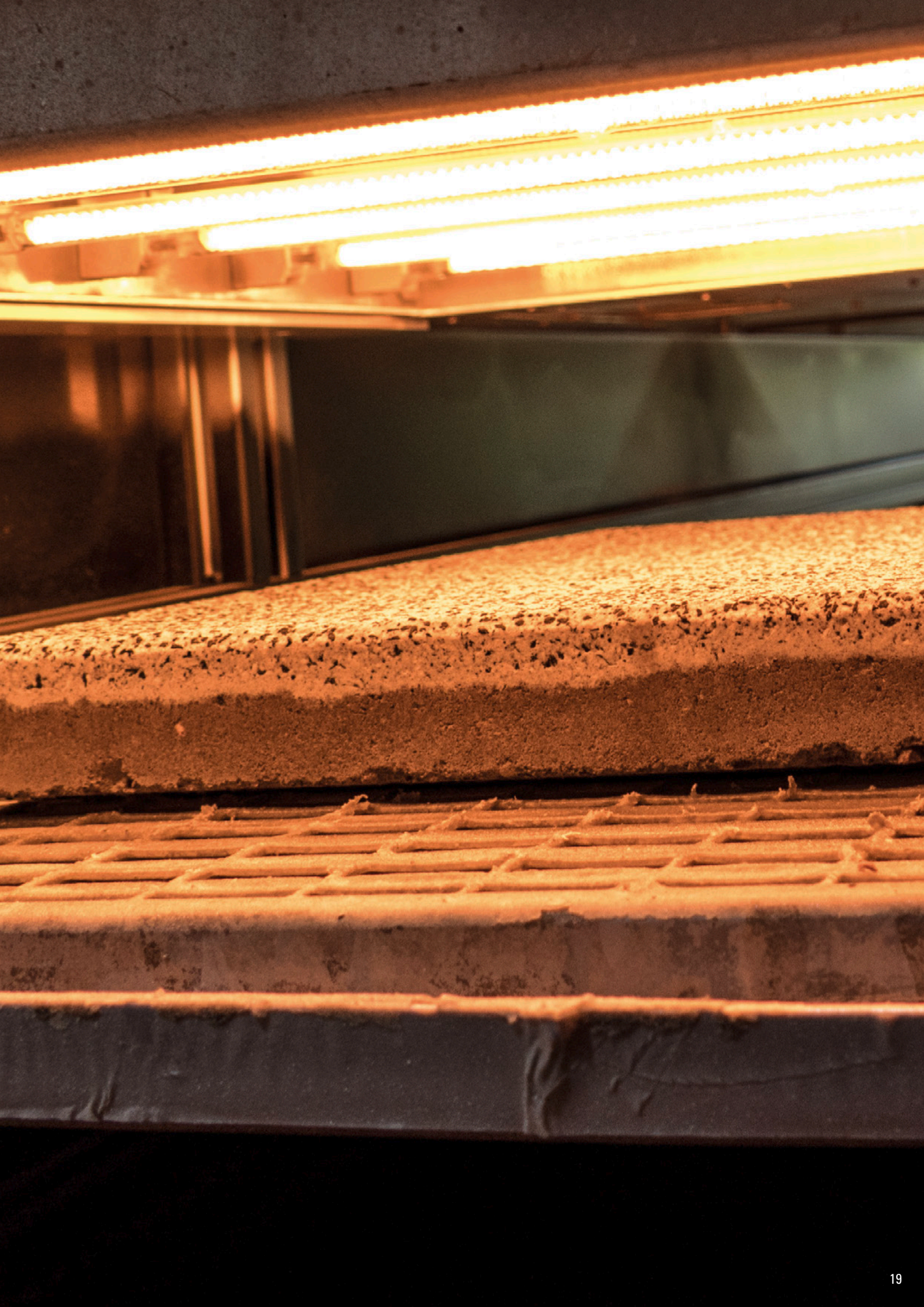
Great for accelerated drying and curing of surface protection. When applied on the dry side of production, there is often not enough time for the surface protection products to properly dry and set before stacking and packaging. In order to optimize the production flow, a near-infrared radiator is the most efficient solution.

### **UV curing equipment**

Necessary for hardening of our high-end Murasan Surface 700 System. The ultraviolet lamp used works in a spectrum that quickly initiates the polymerization but does not produce any harmful ozone. The whole hardening process takes place in a closed chamber with integrated ventilators for temperature control.









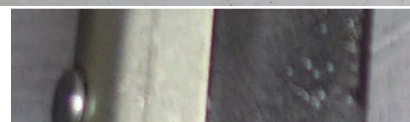
## Ortolan products from MC Get perfect surface. Every time.

With decades of comprehensive experience, Ortolan release agents from MC-Bauchemie are the best solution for a clean and reliable separation between the form and concrete.

Using Ortolan not only ensures that the surface will look great, but also protects and preserves expensive steel equipment. This is especially the case for the products with optional enhanced corrosion protection. Even though our release agents come in a variety of viscosities, from low viscosity mineral oils to paste-like waxes – they are all easy-to-use and meet the highest occupation and environmental hygiene demands.

There are five main product lines in our Ortolan portfolio, each offering a unique combination of features:

- **Ortolan Basic** are robust products for the most conventional use cases. The main focus of Basic is good separation between concrete and formwork.
- **Ortolan Classic** are our release agent all-rounders. They can be used in a broad spectrum of applications, offering good separation performance and high focus on surface quality.
- **Ortolan Extra** meets the highest requirements for concrete surface aesthetics. Products are available in a range of viscosities stretching from mineral oil emulsions to thick wax pastes. Enhanced corrosion protection is optional.
- **Ortolan Premium** are our top-of-the-line release agents. They are produced from high performance, low viscosity mineral oils, offering superb separation and highest possible surface quality. Included corrosion inhibitors protect and preserve steel forms.
- **Ortolan Bio** are aqueous release agents based on renewable plant oils. Thanks to that, they offer an unparalleled environmental and user friendliness without sacrificing separation performance, high quality surface aesthetics and enhanced steel corrosion protection.









## Supplementary products and support **Everything in one package. Be sure.**

The essence of MC experience is not only getting the most fitting, highest quality products, but also the right kind of support at any time. Whether that means supplementary products and tools, a quick Q&A over the phone, full-on technical support or all of that combined, we at MC-Bauchemie pride ourselves on our customer-oriented philosophy.

When designing our solution system for concrete goods, we made sure to offer more than just a long list of products. Each product was mindfully developed and handpicked for the system with a clear sense of purpose. Our international network of laboratories, R&D scientists, experienced application technicians and qualified local employees ensures responsive and professional support.

Whether you are interesting in a singular product or our complete concrete goods system, we will assist you with finding the right solution for every step of the way. This includes identification of the right admixtures, pigments and surface protection to achieve the desired concrete properties, optimization of concrete recipes and installation of complementary dosing, spraying and curing equipment.

Our partners can BE SURE to receive the most optimal solution every time, anytime.





Our supplementary products help our customers keep their production facilities in top-notch condition.

- **Donnitil Rust Ex** is our ready-to-use rust removing agent for both concrete and equipment with characteristically short reaction time.
- **Donnitil Oil Ex** ready-to-use oil remover for concrete. It quickly releases grease stains from the surface and can be easily washed with water.
- **Donnitil 3X** water-soluble powder that readily removes efflorescence and cement stains from mineral surfaces.
- **Donnitil BGR 81** especially potent ready-to-use agent for removing hydraulic binder residues from tools and equipment.





## System solutions for concrete goods

- Compaction admixtures
- Waterproofing admixtures
- Color pigments
- Surface protection
- Machinery
- Release agents
- Other products and support

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BE SURE. BUILD SURE.

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