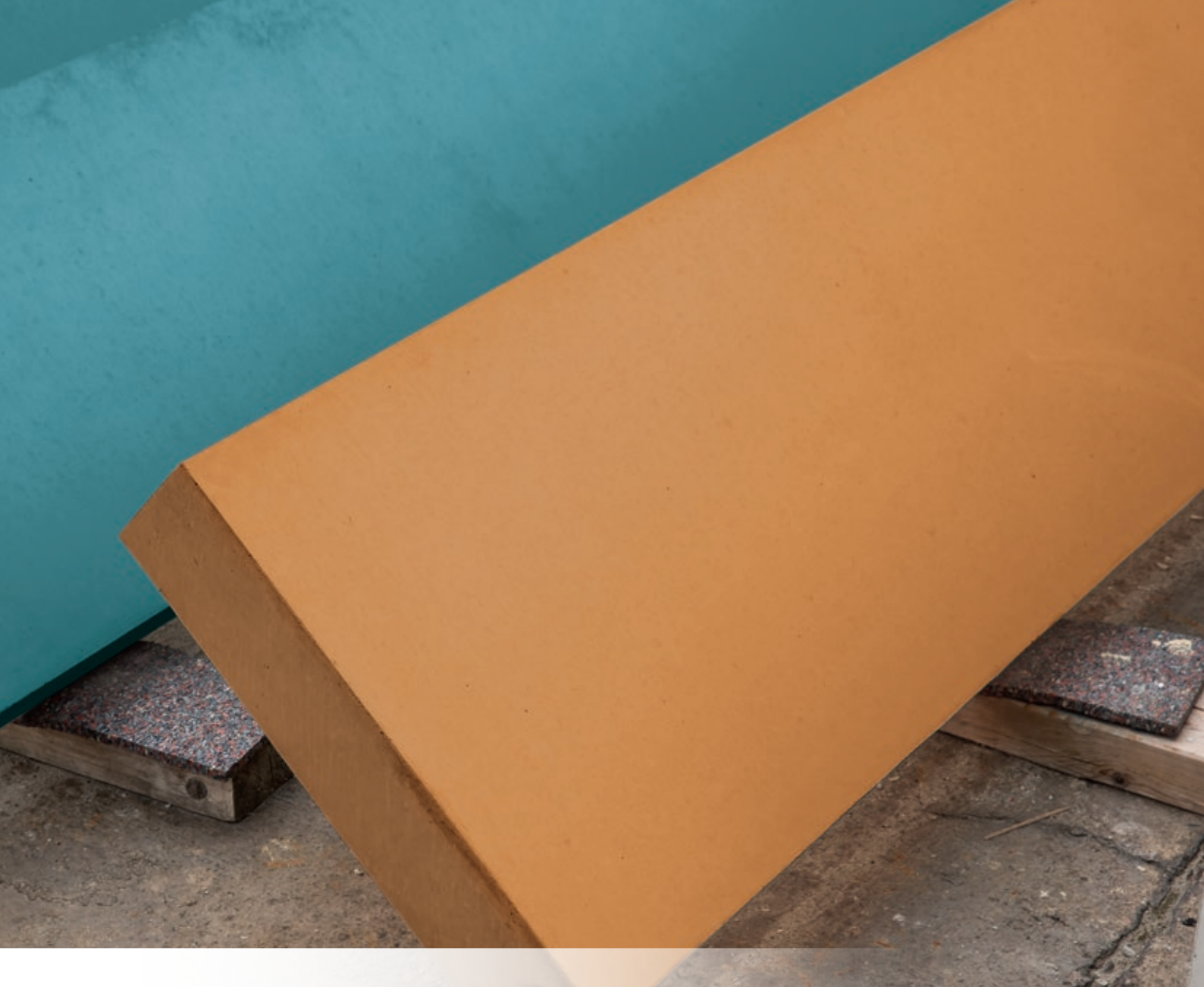


Colouring Concrete

in ready-mixed concrete, concrete product and precast concrete manufacturing facilities

EXPERTISE
ADMIXTURES & ADDITIVES

MC
BE SURE. BUILD SURE.

Aesthetic Appeal for Soft Concretes

MC-Color: The system solution for colouring fair-faced concretes

The appearance of fair-faced concrete has long moved on from the standard grey of old. The design possibilities and advantages of coloured exposed concrete surfaces are being increasingly utilised by architects and developers for a wide range of construction projects. Coloured architecture without coloured coatings? Good looks and cost-efficiency are no longer a contradiction in terms.

MC-Color

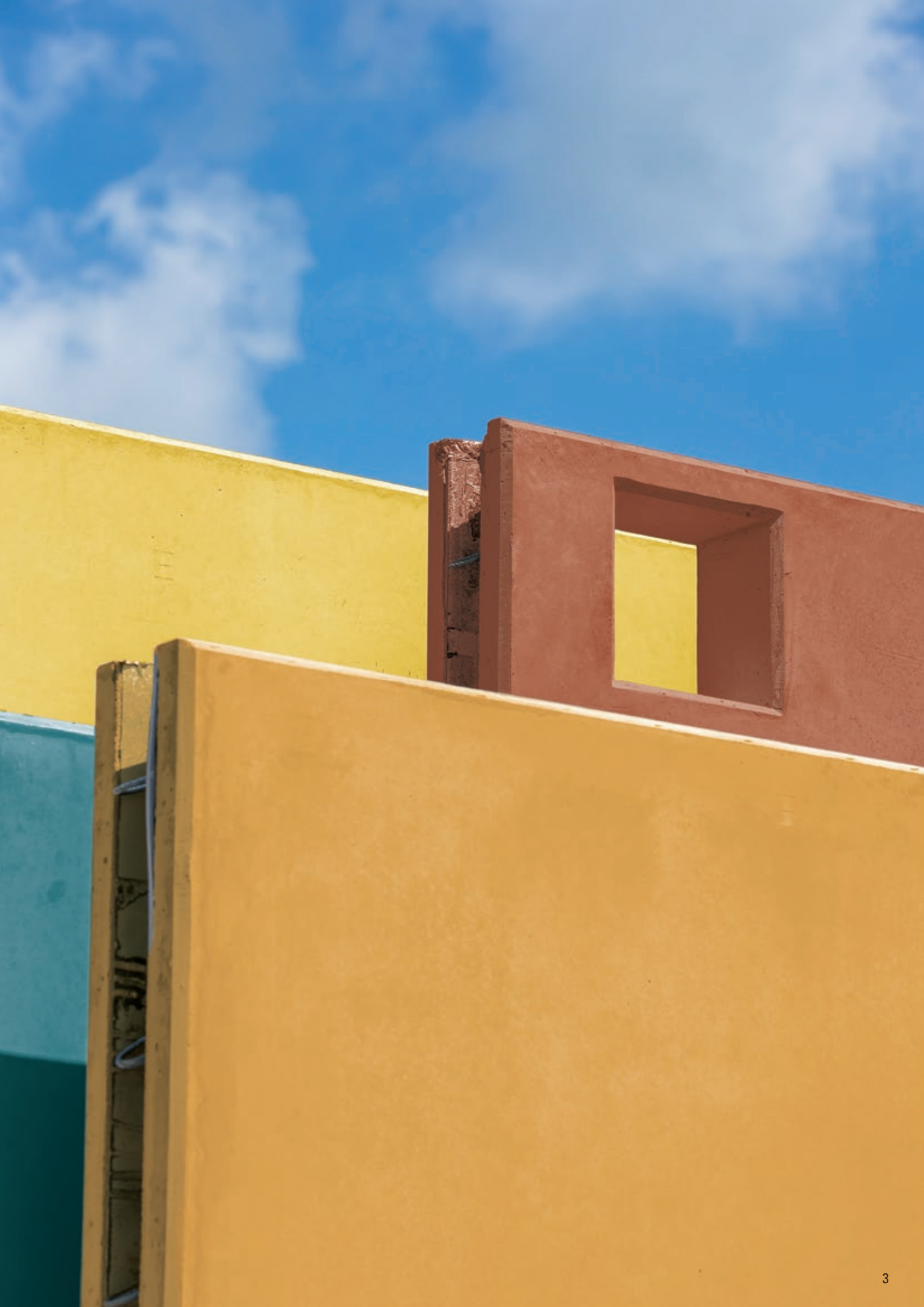
For the colouring of ready-mixed concretes and pre-cast concrete components, MC-Color offers a range of liquid colours (slurries) designed to ensure durable visual allure. The suspensions are based on coloured pigments, water and additives. The pigments become fully dispersed during the production process, enabling them to fully develop their colour intensity and ensuring a homogeneous shade.

Mobile dosing technology for flexible deployment

Liquid colours require an appropriate dosing/metering system for the manufacturing process. However, as coloured concrete does not usually form part of the standard portfolio of ready-mixers or precasters, MC is able to provide these manufacturers with a mobile dosing system on a hire basis to meet their project-related requirements. With this equipment, coloured ready-mixed concretes and pre-cast concrete components can be manufactured cost-efficiently without the need to convert manufacturer-specific weigh systems.

Surface protection with long-lasting aesthetic appeal

Efflorescence is more visually apparent on coloured fair-faced concrete surfaces than on grey surfaces. However, the surface-protection product range MC-PROTECT offers especially coordinated system solutions that minimise its occurrence. These mass hydrophobation and film-forming or non-film-forming impregnation products cut the water absorption capacity of the concrete, thus considerably reducing the occurrence of efflorescence.



Technical Concrete Services

Standard and individual colours with systematic service backup

In addition to the MC-Color standard colours, MC also offers colour customisation on the basis of samples such as broken edges, concrete blocks and natural stone or charts pertaining to standardised colour systems such as RAL. Through the combination of different colour pigments and mixing ratios, we are able to achieve a virtually unlimited spectrum of shades.

Matching your individual concrete formulation

As there are a large number of factors that influence the appearance of colour in concrete, the required shade for both standard and individual applications is always selected with the help of our colour laboratory. In order to achieve the required tone, we test the liquid colour at various dosages in combination with the customer's concrete formulation. This takes into account the effect exerted by manufacturer-specific additives and cements on colour appearance while also enabling dosages to be optimally predefined.

Preparation of binding samples

Coloured sample blocks are prepared from the selected colours and presented to the developers/architects. After the colour has been selected, we recommend that a test area be prepared in order to check the colour tone under practical conditions. This then serves as a reference for all participants in relation to the subsequent project work. Our applications engineering service is available to support clients during the entire test phase.

Influencing factors

Regional raw materials, the type and method of colorant addition, and the processing and application details all have an effect on the appearance of the coloured concrete. Thus, a colour definition taking into account manufacturer-specific production conditions is the only way to gain the required degree of certainty when striving for accurate mixing and dosing.

Cement type: The natural colour of the binder is a major aspect affecting concrete coloration. Essentially, the appearance of the coloured result is purer, brighter, more intensive and more luminescent when using a white cement. By comparison, standard commercial Portland cement attenuates the colour intensity and is likely to produce a darker shade. This effect is more apparent in the case of bright, brilliant colours such as yellow, green and blue than it is in the case of muted colours such as dark red, black or dark brown tones.

Aggregates: When producing concrete, the aggregate is normally completely coated by the coloured cement paste. Nevertheless, coloured aggregates can penetrate through the paste and thus influence the tone of the concrete, shifting the shade more toward its own natural colour. As in the case of the binder, this influence is greater in the case of light, bright concrete colours such as white, yellow, green or blue than in the case of darker shades.

w/c ratio: The higher the water/cement ratio, the brighter is the colour of the concrete. Variations in the water/cement ratio cause a change in the colour shade. Consequently, it is essential that water balance be kept as constant as possible during the production of a series of batches required to exhibit the same colour.

Dosage: The colour intensity of the concrete initially rises with a higher dosage of colorant. Depending on the pigment and the required colour intensity, we recommend a dosage of 4 – 8 mass-% of the binder content when using liquid colours. Once the dosage increases to 9 – 11 mass-% of liquid colour related to the binder content, the saturation point of the concrete has normally been reached and the colour intensity thereafter remains constant even if the dosages are further increased.

Infeed: To ensure the optimum colour intensity, we recommend that the liquid colours be fed using a compulsory mixer.

Placement/application: The type of formwork and release agent, and also the compaction, curing and weather conditions likewise influence the colour that the concrete ultimately shows. In order to ensure that the shade corresponds to the original specification, it is essential that preliminary trials be carried out including the preparation of test areas in accordance with the real conditions that will actually prevail during the project work.

Protection Against Efflorescence

Mass hydrophobation and impregnation

MC's coordinated surface protection system MC-PROTECT offers reliable prophylactic protection against the occurrence of efflorescence. It consists of a mass hydrophobation treatment for the fresh concrete, and film-forming or non-film-forming impregnation treatments that are then applied to the hardening mass.

Cause and effect

Efflorescence – also known as lime bloom – occurs as a result of the dissociation of calcium hydroxide from the cement during the hydration process. The calcium hydroxide dissolved the makeup water or introduced by external water in the form of rain or trapped moisture is separated and eventually makes its way to the concrete surface. Here it reacts with the carbon dioxide in the ambient air to create insoluble calcium carbonate, which appears as a calcium (lime) deposit on the concrete.

Effective solutions with MC-PROTECT

Surface protection in the form of a mass hydrophobation treatment offers an effective solution to counter the occurrence of efflorescence. With MC-PROTECT HCS and MC-PROTECT HWA, MC has developed two mass hydrophobation treatments especially for ready-mixed concretes and pre-cast concrete components. They hydrophobise the cement matrix, thereby inhibiting capillary suction. This reduces or – ideally – may even completely eliminate the process of calcium transport to the concrete surface. The two products differ in terms of their raw material base and the resultant time at which they begin to take effect:

MC-PROTECT HCS

Based on fatty acid derivatives, this product develops its hydrophobic effect right at the start, i.e. during the mixing process.

MC-PROTECT HWA

Based on silicon compounds, this product hydrophobises the concrete matrix after a time delay. As a property, this is indispensable where the chosen system requires the application of an additional impregnation treatment on the hardening concrete. If the concrete were to become hydrophobic during the impregnation process, the additional impregnation agent would no longer be able to penetrate the capillaries. Application of such additional film-forming or non-film-forming impregnation products provides additional protection for the concrete.

MC-Color Standard Colours

6 % liquid colour in grey cement


MC-Color **Red 110**


MC-Color **Red 120**


MC-Color **Red 130**

MC-Color **Yellow 420**

MC-Color **Yellow 430**


MC-Color **Yellow 440**


MC-Color **Yellow 960**


MC-Color **Brown 610**


MC-Color **Brown 639**


MC-Color **Brown 655**


MC-Color **Brown 686**


MC-Color **Black 320**


MC-Color **Black 370**


MC-Color **Black 830**

MC-Color **Titaniumwhite 720**


MC-Color **Green 740**


MC-Color **Blue 730**

6 % liquid colour in white cement


MC-Color **Red 110**


MC-Color **Red 120**


MC-Color **Red 130**

MC-Color **Yellow 420**

MC-Color **Yellow 430**


MC-Color **Yellow 440**


MC-Color **Yellow 960**


MC-Color **Brown 610**


MC-Color **Brown 639**


MC-Color **Brown 655**


MC-Color **Brown 686**


MC-Color **Black 320**


MC-Color **Black 370**


MC-Color **Black 830**

MC-Color **Titaniumwhite 720**


MC-Color **Green 740**


MC-Color **Blue 730**

Note: The colours indicated here are provided for guidance purposes only. The colour intensity in the concrete depends on many factors such as the composition of the initial input materials used and the water content of the concrete. Before using a liquid colour, therefore, it is essential that trials be carried out in order to enable the colour and dosage amount to be properly defined.

Colouring of Concrete

in ready-mix, concrete product and precast concrete manufacturing facilities

- Liquid colours, dosing technology and hydrophobation
- Concrete colouring service
- Mobile colour dosing facilities

MC-Bauchemie Müller GmbH & Co. KG
Concrete Industry
Am Kruppwald 1-8
46238 Bottrop, Germany

Phone: +49 2041 101-50
Fax: +49 2041 101-588

CI@mc-bauchemie.com
www.mc-bauchemie.com

BE SURE. BUILD SURE.

Contact details

akut 180910 EN