

**concrete skin**  
Characteristics  
05/2016



# Technical specifications

<b>Sizes</b>	2.5 x 1.2 m, 3.1 x 1.2 m and 3.6 x 1.2 m	
Special sizes	on request	
Dimensional variation length (3.6 m)	± 3 mm	EN 12467
Dimensional variation width (1.2 m)	± 2 mm	EN 12467
Diagonal difference < 1.5 m   > 1.5 m	± 3.5 mm   ± 4 mm	DIN 18202
Diagonal difference > 2.5 m   > 3.6 m	± 5 mm   ± 6 mm	DIN 18202
<b>Thickness</b>	13 mm (10 mm on request)	
Thickness tolerance	± 1.3 mm	EN 12467
Edge straightness (Level 1)	± 0.1 %	EN 12467
Perpendicularity (Level 1)	± 2 mm/m	EN 12467
<b>Physical characteristics</b>		
Tolerances facing > 0.6   > 1.2   > 3.6 m	± 2 mm   ± 4 mm   ± 8 mm	DIN 18202
Swelling	0.384 mm/m	
Shrinkage	0.737 mm/m	
Bulk density	2.0 - 2.42 kg/dm <sup>3</sup>	EN 12467
Bending tensile strength	> 18 N/mm <sup>2</sup> (MOR*)	EN 12467, Class 4
E-modulus for deformation calculation	approx. 10,000 N/mm <sup>2</sup>	
E-modulus for restraint calculation	approx. 30,000 N/mm <sup>2</sup>	
Dead load / mass per unit area (13 mm)	26 - 31.5 kg/m <sup>2</sup>	
Thermal expansion coefficient	10*10 <sup>-6</sup> (-6) 1/°k	DIN 51045
Building material class (panel   system)	A1 - incombustible   A2-s1,d0 - incombustible	DIN 4102   EN 13501-1
Temperature stability	according to humidity up to 350°C	
Specific heat capacity	approx. 1,000 Joule / (kg*K)	
Thermal conductivity	lambda: approx. 2.0 W / (m*K)	
Moisture expansion	0.05 %	EN 12467
<b>Weather resistance</b>		
Water impermeability	given	EN 12467
Heat-rain-alternate test	given	EN 12467
Frost resistance	given	EN 12467
Frost-defrost-alternate test	given	EN 12467
UV-light resistance	UV-light resistant colour pigments	DIN 12878
Hot water resistance	given	EN 12467
Wet storage resistance	given	EN 12467
<b>Fastening</b>		
Fastening visible	Rivets	
Fastening invisible	Adhesive, Undercut anchor	
Substructure	Aluminum, steel	
Joint width	min. 8 mm	
<b>Reinforcement</b>	With alkali-resistant glassfibres (AR glass), technical approved	
<b>Edge formation</b>	Cut edges are unfinished and sharp-edged with a coarseness of about 1 mm on the visible face. Glassfibres may emerge at the edges.	
<b>Colours**</b>	Through coloured panels; 12 standard colours; special colours on request.	
<b>Surfaces**</b>	MA matt: brushed / smooth surface, natural blushing effect (excl. formparts) FL ferro light: sandblasted at lower pressure, surface is finer than FE (excl. formparts) FE ferro: sandblasted at higher pressure, surface is rougher	
<b>Assembling and weather protection</b>	Hydrophobicity	

\* MOR: Modulus of Rupture; Design values deviate from MOR in accordance with national rules and regulations. National approvals, rules and regulations apply to the calculation of the rated resistance.

\*\*Because concrete is a natural product, each glassfibre reinforced concrete panel is regarded as a single piece. Differences in colour, structure and texture are characteristic. Efflorescences or small, visible pores are not defects. The light resistance varies depending on the colour. Differences in the surface appearance, which do not affect the fitness for purpose of the panels, are permitted. EN 12467 / Data sheet Exposed concrete 02/2004 [Publisher:BDZ/DBV]

The technical description of product characteristics should not be interpreted as a contractual commitment on the part of the manufacturers. Despite careful inspection, no liability can be accepted for the correctness, completeness and topicality of the document. This is particularly true for typographical errors or subsequent changes to technical specifications.

# Colours and surfaces

## 12 standard colours - 3 surfaces

concrete skin offers a wide range of design options for facades. The selection of ten different colours in each of three surfaces offers a wide range of designs to meet individual expectations. Special colours (RAL - equivalent) can also be produced on request. The three surface finishes (sand blasted, finely sandblasted or brushed) open up a wide spectrum of optical and tactile effects. The combination of different surfaces in the same colour creates a particularly vivid design.

## Natural colours

concrete skin has a distinct advantage over other colour-treated materials - namely the consistent colouring of the whole panel. The mixture of the desired colour is created before the actual production process. The colour becomes part of the product by being added in the blending of the raw materials. Other products are in some cases only superficially treated and coloured, resulting in significant quality differences.

concrete skin is coloured by ferric oxide colours and natural additions and subsequently brushed or sandblasted. The natural, authentic colours of concrete skin fit well in landscapes and blend with nature and the environment.

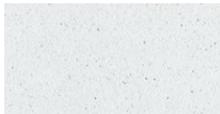
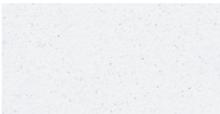
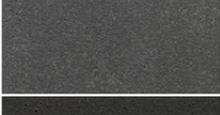
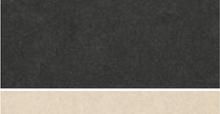
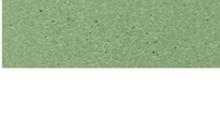
## Colour fastness and UV stability

Liquid colours for colouring cement-bonded building materials comply with the DIN EN 12878. The pigments used in the liquid colours are light-, UV- and weather-resistant and not soluble in water, alkalis or diluted acids. Factors such as natural fluctuations in raw materials used, panel and air moisture, dirt and light sources must be taken into consideration. The appearance of the panels may even become brighter due to dehydration. Changes caused by age, weather or environment specific influences are natural processes that cannot be influenced from a production point of view and are therefore not considered material defects. The technical characteristics of the panel are not affected by these.

## Colour differences

Glassfibre reinforced concrete is a natural material. The characteristics of the raw materials such as the colour of cement can lead to variations in colour within a panel, between individual panels or between different production batches. To avoid any discrepancies, we recommend ordering the total amount instead of part orders, and ordering spare panels with the first delivery.

Due to technical reasons printed colours may differ from the original shade.

	FE ferro	FL ferro light	MA matt
polar white			
off-white			
ivory			
silvergry			
chrome			
anthracite			
liquide black			
sahara			
sandstone			
terra			
terraccotta			
green			

## FE ferro

Sandblasted: blasted at higher pressure, surface is rougher



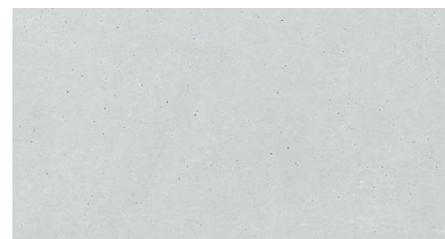
## FL ferro light

Sandblasted: blasted at lower pressure, surface is finer than ferro



## MA matt

Brushed, smooth surface, mottled appearance, natural blushing effect



# Characteristics

## Vivid signs of a natural building material

Concrete is a natural product and Rieder sees it as such, with all its vital signs and characteristics. Living surfaces with the interplay of colour shades and light cloud effects, rather than dead and clinical surfaces are characteristic of concrete skin. Even in the colouring of the concrete matrix, the focus is placed on meeting the ecological requirements of modern design. This is why the production involves natural raw materials to ensure the authenticity of all products. The demand for low porosity, homogeneous colour and strictly uniform smooth surfaces is not part of our sustainable philosophy. We consciously avoid chemical treatment and artificial materials to preserve the authenticity of the „green“ product concrete skin. Colour and texture variations are a feature of our natural product.

## Concrete lives.

As the panels are not chemically treated or painted, small defects, dents, tension lines, efflorescences or flaws and textures may be visible (Data sheet exposed concrete 02/2004 [Publ.:BDZ/DBV]).

When cement sets, it separates calcium hydroxide. This dissolves in water and can migrate to the concrete surface. When the water evaporates, the calcium hydroxide is returned to the surface and is converted to calcium carbonate (lime). If this natural process is intensified by unfavourable conditions, it leads to deposition of calcium carbonate, which is visible as a white efflorescence. Efflorescences are a natural feature of all cement-bonded composite materials.

## Part of nature - resistant and stable

concrete skin is not an artificially created material that exists cut off from the natural cycle of the environment. As adaptable and extraordinary the concrete skin is, it is just as authentic. Influencing variables for possible colour changes are temperature variations and differences in air humidity.

Concrete is hygroscopic. It absorbs moisture and gives it off again. The large format of the panels means that moist spots may dry at different speeds. Visible colour changes may occur between individual panels and within a panel. The visible characteristics of concrete are intensified on matt panel surfaces.

A typical feature of highly-compressed, high-quality concrete surfaces is so-called blue- and green discolouration, which can occur in particular in bright colours or fresh panels. They can be attributed to a natural hardening and drying process of organic substances. Tests

and experiences have shown that this blue colouring on the cladding may disappear under the influence of UV radiation and light. This occurs based on the climatic and environmental influences. Heat, insolation and dryness can in particular accelerate the process.

In addition to the basic protection of the hydrophobising, the glass-fibre reinforced concrete panel can be provided with a polyurethane protection. Depending on the thickness of this layer, which wears over time with the cleaning of the panels, protection against graffiti or other effects of dirt may be provided. The natural look and surface feel of glassfibre reinforced concrete is impaired by this coating.

## Note:

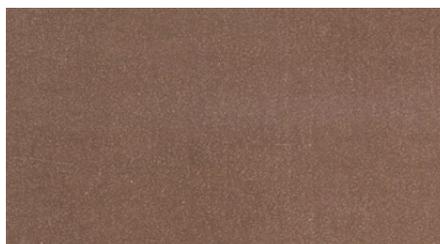
The surface characteristics described apply to the visible side of the cladding panel. concrete skin sample panels can never reflect all of the above characteristics. In large-scale cladding applications, optical phenomena occur that cannot be detected on small sample panels.

Visual changes like tension lines do not affect the technical characteristics of concrete skin. The static functions and the long-term stability are not affected.

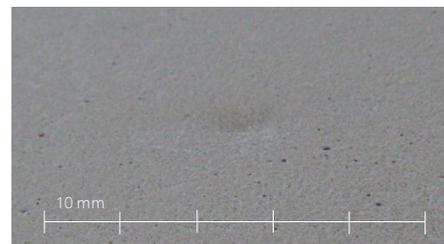
Blowhole/dent



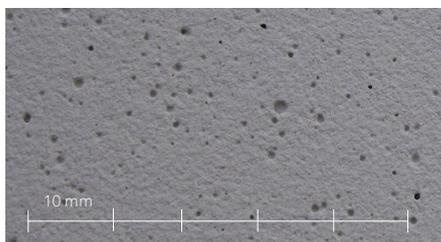
Mottling



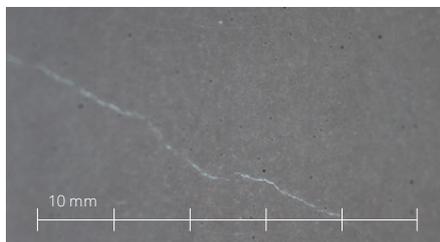
Depression



Pores



Tension Line



Colour variation

