

# Technical specifications

Size	project-specific	
Thickness	30 - 100 mm	
Special sizes	on request	
Tolerance	project-specific based on mock up	DIN 18202, DIN 18203, EN 13369
Concrete quality	C35/45	
Material	fibreC 3D	
Exposure class	XC3/XF3/XD3	DIN EN 206-1, ÖNORM B 4710
Reinforcement	project-specific (carbon, plastic, steel or fiber reinforcement)	
Building material class	A1 - non-combustible	DIN EN 13501-1
UV-light resistance	UV-resistant colour pigments	DIN 12878
Surface quality formwork side	exposed concrete class SB 3; other class only by project-specific agreement or by reference sample / mock up	DBV-Merkblatt Sichtbeton (08/2008) FDB-Merkblatt Nr. 1 (06/2015) VDZ-Merkblatt H8 (01/2009)
Surface finish formwork side	smoothed, sanded/polished, sandblasted, bush hammered, acid etch, washed	
Surface finish rear side	sanded, sandblasted, bush hammered, smoothed	
Colours	project-specific, various colours available	
Assembling and weather protection	hydrophobic coating optional	
Fastening	exposed, concealed	
Joint width	project-specific, min. 15 mm	

## Colours

### Combination with concrete skin panels

cast offers a wide range of design options for facades. The selection of different colours and surfaces offers a wide range of designs to meet individual expectations. Special colours (RAL - equivalent) can also be produced on request. The combination of extruded concrete skin panels and cast elements in the same colour is possible and provides an economical solution for the entire building envelope. The different production techniques should be respected when colour matching.

### Natural colours

cast 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.

### Colour and UV resistance

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 elements 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 as material defects. The technical characteristics of the panel are not affected by these.

### Colour differences in production batches

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.

# Material characteristics

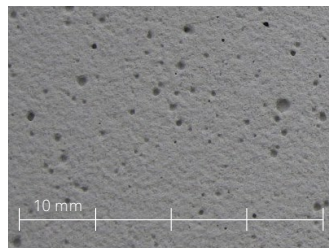
## Vivid signs of a natural building material

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 cast. 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 cast. Colour and texture variations are a feature of our natural product.

Mottling



Pores



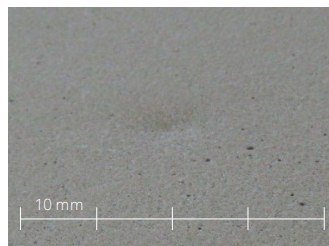
## Concrete lives

As the panels are not chemically treated or painted, small defects, dents, tension lines, efflorescences or flaws and textures may be visible (data sheet on exposed concrete, DBV-Merkblatt „Sichtbeton“, Version August 2004).

Blowhole/dent



Depression



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 & stable

cast 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. cast is part of a natural cycle. Influencing variables for possible colour changes are temperature variations and differences in air humidity.

Colour variation



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 discoloration, 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.

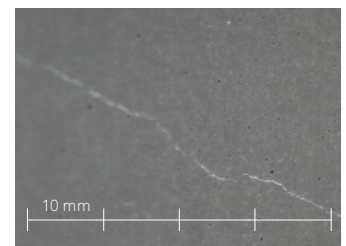
## Hydrophobic coating

As a basic protection against environmental influences, cast comes with a transparent hydrophobic impregnation. The opaque hydrophobic coating emphasises the naturalness of the material. The gloss level of the hydrophobic impregnation has a visual influence on the surface appearance. The hydrophobic coating is permeable and therefore breathable. If the cladding panel is applied vertically, it provides solid basic protection against weathering, dust and dirt but not against scratching, pressurised liquids, oil, acids, strong alkaline substances, etc. The hydrophobic coating may be reapplied to achieve increased protection of the panels and to prevent extreme environmental conditions and wear and tear through intensive cleaning.

## Note

The surface characteristics described apply to the visible side of the cladding panel. cast 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.

Tension line



Visual changes like micro-cracks (tension lines) do not affect the technical characteristics of cast. The static functions, the longterm stability and fire resistance are not affected.

## Overall impression

The optical overall impression of a building or an element can only be assessed at an adequate range and usual conditions of light. The following inspection ranges have proved oneself in practice:

*Building:* The adequate range corresponds to the distance that allows the viewer to realize the building with all its significant elements. The main design criteria must be recognizable.

*Elements:* The adequate range corresponds to the usual viewing distance of the user. The visual inspection should be carried out at a distance of min. 5 meters.

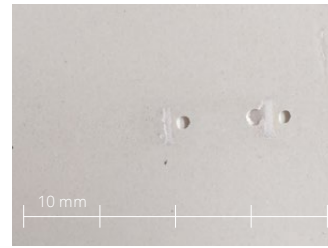
The result should be a harmonious overall impression. Accidental structural irregularities are characteristic for the technology of exposed concrete and should be taken into consideration for the assessment of the overall impression. Deviations, such as differences in colour shade of adjacent formwork or shuttering sections or irregular pore distribution within a surface must not be so large to appear disturbing to an objective viewer.

## Single criteria

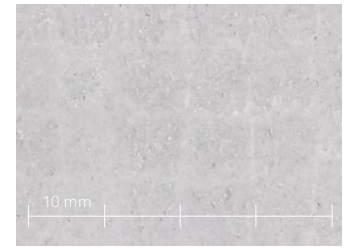
At the assessment of fair-faced concrete surfaces the overall impression from an usual distance is authoritative. Single criteria are only controlled if the overall impression of the view surfaces does not fulfil the requirements. Tolerated discrepancies in the appearance of the fair-faced concrete surface are: small structural differences for prepared concrete surfaces; colour differences between adjacent layers; clouds, marbling, and small colour variations; cluster of pores; spacer and reinforcement which become apparent; dark stripes and little bleeding at formwork joints; anchor holes; dragged water effects in a small number and size; - single lime flags and blooming; discolourations on the bottom sides of horizontal elements as a result of rust deposits on the formwork; edge breaking at the design with sharp edges; small crippling.

Requirements that cannot be implemented with certainty for reasons of production methods are: completely uniform colouring of all visible surfaces | completely uniform pore structure (pore size and distribution), visible surfaces without pores | in-situ concrete components without efflorescence

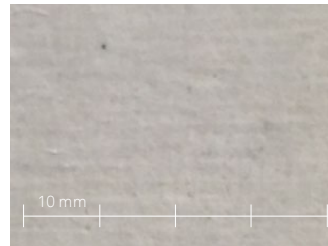
Apparent spacers



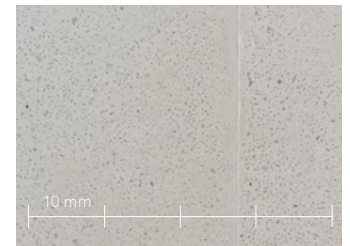
Apparent reinforcement



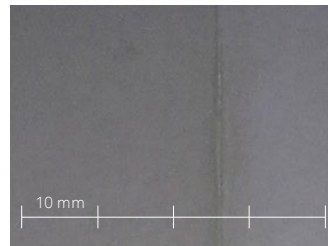
Apparent formwork shell



Formwork joints



Discolouration of edges / corners



## References

Fachvereinigung Deutscher Betonfertigteilbau e.V.:

FDB-Merkblatt Nr. 1 [Code of practice No 1 about fair-faced concrete surfaces (surface appearance) of precast elements made of concrete and reinforced concrete]; Bonn 06/2005; [www.fdb-fertigteiltbau.de](http://www.fdb-fertigteiltbau.de)

Deutscher Beton- und Bautechnik-Verein E.V.:

DBV-Merkblatt „Sichtbeton“; Berlin August 2008; [www.betonverein.de](http://www.betonverein.de)

Verein Deutscher Zementwerke e.V.:

VDZ-Merkblatt H 8: Sichtbeton – Techniken der Flächengestaltung 1.09/7; Düsseldorf 2009; [www.beton.org](http://www.beton.org)