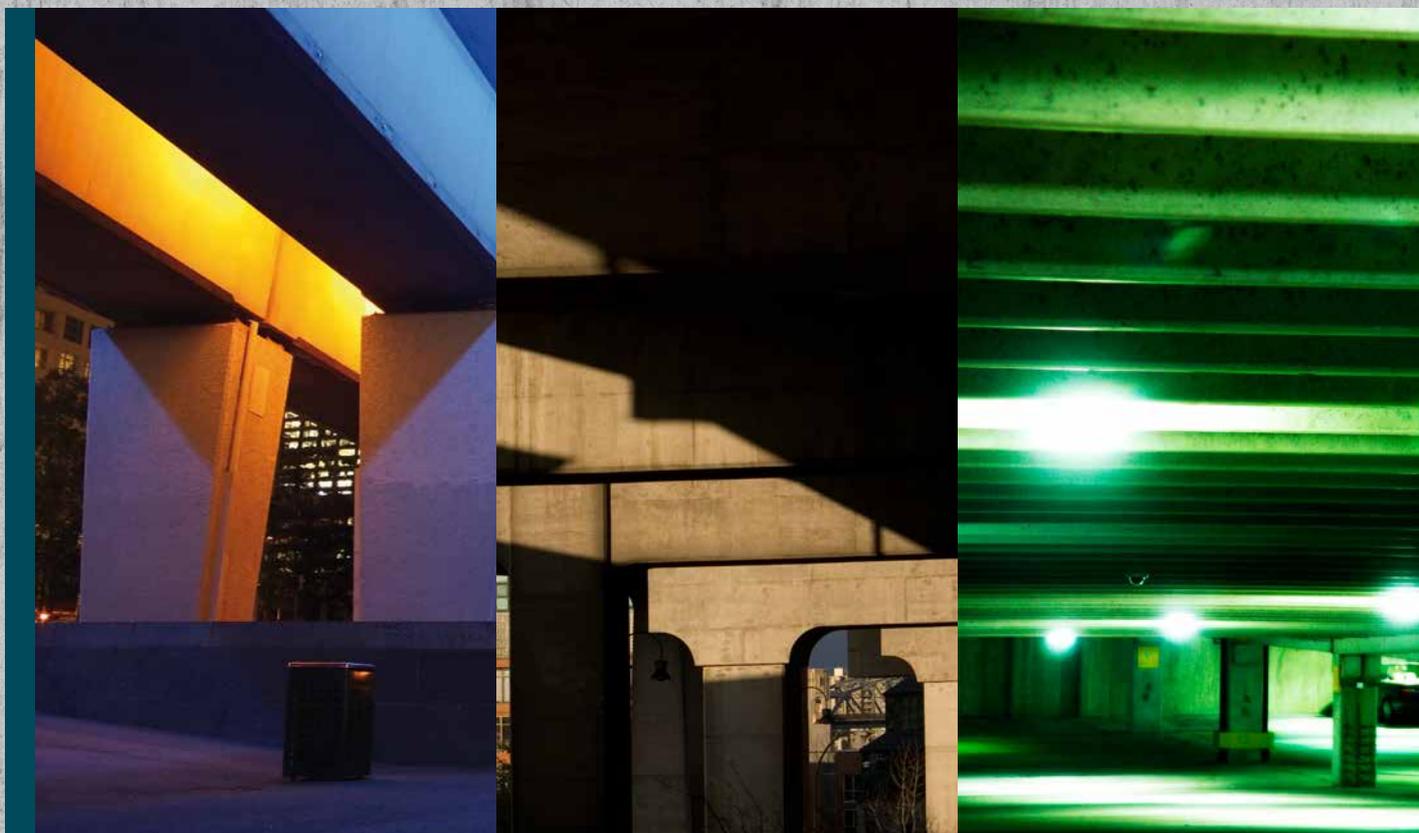


**CAS COMPOSITE-ANODE-SYSTEM
TECHNICAL DATA SHEETS
CAST³⁺ AND CAP 60**



CAS

COMPOSITE - ANODE - SYSTEMS GMBH

CAST³⁺ COMPOSITE PAINT

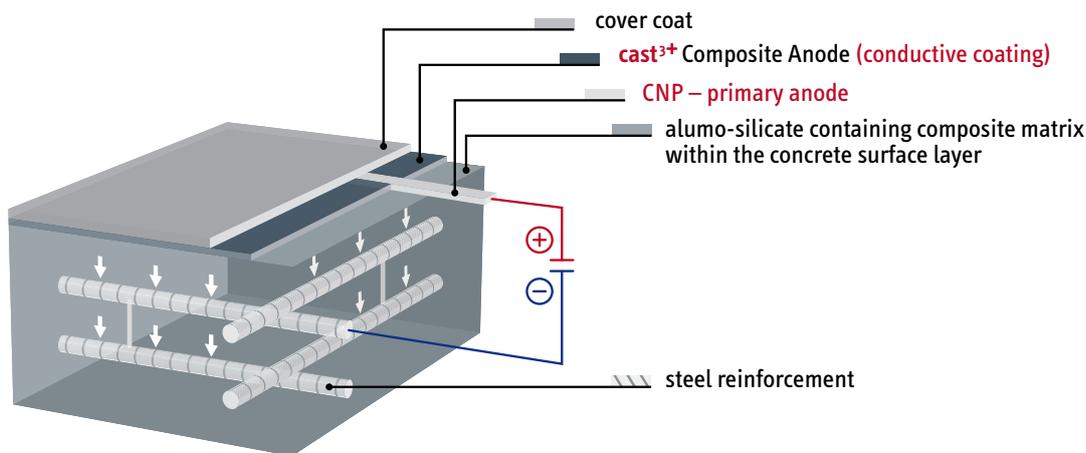
PRODUCT DESCRIPTION

The CAST³⁺ Composite-Anode-System consists of the electrically conductive CAST³⁺ composite anode forming a durable composite matrix with the concrete subsurface. The CAST³⁺ composite anode system is formed by applying the CAST³⁺ composite paint on the concrete surface.

The CAST³⁺ composite paint is a two component aqueous alkaline (pH 12,7) alumo-silicate/polymer composite paint for the active cathodic corrosion protection of reinforcing steel in concrete. The alumo-silicate component impregnates the surface layer of the concrete cover (2–5 mm) and hardens, depending on temperature, within 7–21 days within the conductive paint and within the pore structure of the concrete overlay forming the proprietary micro capillary matrix that assures high adhesion to the concrete at current loads up to 35 mA/m². The polymer component, a pure polyacrylate, assures high weathering resistance and in combination with the alumo-silicate component, high adhesion (2–4 MPa) and high durability. The CAST³⁺ composite paint is the 3d generation of the composite paint systems exhibiting high durability, high weathering resistance (UV-resistance, frost resistance, frost thaw salt resistance*) and compatibility with most of acrylic, PU and epoxy based paint and coating systems.

The CAST³⁺ composite paint is preferentially applied on with the CAP 60 primer impregnated concrete subsurfaces.

The cast³⁺ Composite Anode System



*frost thaw salt resistant only of the concrete base is frost thaw salt resistant

FIELDS OF APPLICATIONS

Cathodic protection of steel reinforced concrete members and structures that are endangered or damaged by the corrosion of the steel reinforcement induced by the ingress of de-icing salts, by exposure to sea water and/or by the carbonation of the concrete overlay.

- _ Bridges: bridge decks, columns, beams, supporting walls, abutments
- _ Parking garages: parking decks, pavements, columns, walls, sockets
- _ Apartment buildings: facades, balconies, columns, beams
- _ Tunnels: columns in street galleries, portals
- _ Pools: walls, concrete basin underside,
- _ Storage tanks for salty water, e.g. waste water, sea water
- _ Seaside Concrete Structures: jetties, decks, columns
- _ Concrete structures erected with salt contaminated concrete

ADVANTAGES

- _ No intrusion into the structure of the concrete member
- _ High durability, solidification of the concrete surface, strong adhesion to the concrete surface and high current loads (up to 35 mA/m²) due to the formation of an inorganic alumo-silicate composite matrix between the conductive coating and the concrete overlay
- _ High resistance against weathering
- _ High adhesion strength due to the formation of the composite matrix
- _ High durability in wet environments
- _ High chemical resistance against weak acids and alkalis (pH 4–pH 14)
- _ High electrolytic conductivity due to the microcapillarity of the composite matrix
- _ High electrical conductivity due the high performance electrically conductive fillers
- _ Simple and easy application
- _ Compatible with any water-vapor permeable and alkali-resistant polymer coating
- _ High sustainability (no or minimum concrete refuse, no fresh concrete required, minimum energy required for the preparation of the concrete surface.

MATERIAL DATA

Colour	Anthracite	component A
Colour	transparent	component B
Packaging	20 litre polypropylene pails à 20 kg net	component A
	0,25 litre polypropylene flasks à 0,31 kg net	component B

STORAGE AND SHELF LIFE

Component A: Stored in the original packaging in dry conditions, this product will keep for at least one (1) years.

Component B: Stored in the original packaging in dry conditions, this product will keep one (1) year, discard if a white precipitate is observed

PHYSICAL DATA

Density	1,20 kg/l	component A
Density	1,45 kg/l	component B
Solids Volume	ca. 48%	in component A
Mixing ratio	A:B	55 : 1
Pot life	approximately one (1) hour (20 °C)	

DRYING AND SOLIDIFYING BEHAVIOUR

temperature	relative humidity	dry after	rainproof after	overcoatable after
+ 10 °C	75%	12 h	24 h	21 d
+ 20 °C	75%	8 h	12 h	7 d
+ 23 °C	50%	6 h	8 h	7 d

Formation of the composite matrix: 1–3 weeks after application of the CAST³⁺ composite paint

Adhesive tensile strength after 3 days	1,5–3 MPa
Adhesive tensile strength after 28 days	2–4 MPa
Adhesive tensile strength after 1 Mio. Coulomb:	> 90% of the 28 day adhesive tensile strength

Water Absorption Coefficient W ₂₀ on a concrete subsurface, W ₂₀	0,04 kg/m ² .h ^{0,5} *
	0,43 kg/m ² .h ^{0,5} *

Water vapour diffusion resistance, μ_{H_2O}	1.120*
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Electric resistance after formation of the composite matrix	0,6–1,0 Ohm.cm
Sheet resistance after formation of the composite matrix	15–35 Ohm/square
Standard current densities	3–10 mA/m ²
Maximum Current Density	35 mA/m ²
Standard Voltage	1,5–5,0 V

_ Average current densities > 20 mA/m² shall only be applied at concrete temperatures > 0°C and if the tensile adhesion strength is > 2,5 Mpa 14 days after application.

_ The maximum current densities depend on the chloride content, the degree of saturation of the concrete and from the roughness of the concrete surface. If average current densities of > 15 mA/m² are expected then the technical service of CAS Composite Anode Systems shall be consulted.

_ Minimum service time (illustrated by references)	15 years
Expected Service Time	> 20 years

*Determined for the CAS-T+ paint

APPLICATION INSTRUCTIONS

CONCRETE SURFACE PREPARATION

The concrete surface has to be free of loose or sandy parts. Surface contamination's have to be thoroughly removed, especially oil, fats, wax. The pull-off strength of the concrete should be $> 1 \text{ Mpa}$, preferentially $> 1,5 \text{ MPa}$. Optimum adhesion of the coating will be obtained by preparing the concrete surface with sandblasting, water jetting, steel-ball blasting or grinding. If current densities of 10 mA/m^2 are expected then the medium roughness according to DIN 4760 should be $\geq 0,3 \text{ mm}$, preferentially $\geq 0,5 \text{ mm}$. The temperature of the concrete surface has to be above 8°C and the relative humidity of the ambient air should allow drying of the composite paint within 6–8 hours – this is usually achieved if $10^\circ\text{C} < T < 25^\circ\text{C}$, $75\% < \text{rh.} < 85\%$. Reprofiled surfaces shall be hardened for at least 3 days and cleaned with a rotating steel brush before applying the CAST³⁺ composite paint.

REMARKS

For an optimum performance (adhesion, electrical and electrolytic conductivity and durability) of the CAST³⁺ composite paint, especially at high protection current densities, optimum conditions for the formation of the microcapillary composite matrix have to be assured and maintained. Albeit the strengthening of the concrete surface induced by the formation of the composite matrix, the pull-off strength of the concrete surface should be at least $1,0 \text{ MPa}$, preferentially higher than $1,5 \text{ MPa}$. CAST³⁺ composite paint shall be applied to slightly prewetted concrete surfaces. Free or dissolved calcium hydroxide may interfere with the formation of the composite matrix. For the composite anode system design specifications (primary anode installation, cover coats, etc.) please consult the TDS "CAST³⁺ Composite Anode System for the Active Corrosion Protection of Steel in Concrete" available at the webpage or as hard copy from CAS Composite Anode Systems GmbH.

MIXING OF COMPONENTS

After homogenizing component A with an mechanical stirrer, CAST³⁺/B hardener is added while stirring (high speed), then mixing is continued for about 2 min at low speed (air should not be mixed in while stirring). The mixed material shall be transferred to another container to prevent mixing errors and to control the homogeneous mixing of the conductive pigment (graphite) into the paint.

MIXING RATIO

Component A : Component B = 55 : 1

APPLICATION

The CAST³⁺ composite paint may be applied like a conventional paint either with rollers (short hair) or with airless spray technique.

▷ Application with Paint Rollers

The CAST³⁺ composite paint is applied, undiluted, in minimum two layers. The application shall be rich but not wet. Not more than 450g/m^2 shall be applied per layer to prevent formation of surface micro-cracking. Subsequent coatings shall be applied on dry paint, preferentially on the next day but not later

than 24 hours after application of the previous layer. Formation of micro cracks in the surface indicates a too thick coat. It is strongly recommended to apply the CAST³⁺ composite paint on a concrete surface that has been impregnated with the CAP 60 primer.

▷ Application with the Airless Spray Guns

With the airless spray guns, 600 – 800 g/m² CAST³⁺ composite paint may be applied in a single operation. About up to 1000 m²/day may be applied with one airless spray gun.

CONSUMPTION

paint per application:	250 - 400 g/m ²
total consumption:	850 ± 150 g/m ²
wet film thickness:	350 - 500 µm
dry film thickness:	250 - 350 µm

PROCESSING CONDITIONS/LIMITS

concrete substrate temperature	min. 8°C/max. 35°C
air temperature	min. 8°C/max. 35°C
relative humidity	≤ 80%

CLEANING ADVICES

Not hardened material may be washed off with water, shortly after hardening with hot water. Dried and hardened material may only be removed mechanically.

SAFETY ADVICE'S

Safety and disposal instructions in the MSDS (material safety data sheets) and on the container labels have to be observed and followed. The MSDS for the component A (CAST³⁺/A) is also valid for the CAST³⁺ composite paint (component A mixed with component B).

The CAST³⁺ composite paint is designed and especially suited for the CAS-Composite Anode System for the cathodic corrosion protection of reinforcing steel in concrete. The purpose of this product data sheet is the description of the properties and applications of the CAST³⁺ composite paint.

The described properties and reported values may vary depending on the solicitude and processing on which we do not have any direct influence. Our warranty is therefore limited to the quality of the delivered product. The product data sheet does not contain a complete manual of use and application. Our advice and consultancy is required for the use of CAST³⁺ composite paint in connection with the CAS-Composite Anode System or in connection with any cathodic protection system for reinforcing steel in concrete. The information above is believed to be accurate and represents the best information currently available to us.

The CAST³⁺ composite paint and the CAST³⁺ composite anode system are protected by patents.

CAP 60 PRIMER

PRODUCT DESCRIPTION

The CAP 60 primer is a two component aqueous alkaline (pH 13,2) alumo-silicate/polymer composite primer for the solidification and for the enhancement of the ionic conductivity of concrete surfaces. The CAP 60 primer is especially designed for the CAST³⁺ composite paint, enhancing adhesion to the concrete surface and promoting ion transport across the concrete overlay..

MATERIAL DATA

Color	milky - emulsion	component A
Color	colorless, transparent	component B
Packaging	10 litre polypropylene containers à 10 kg net component A 0,25 litre polypropylene flasks à 0,31 kg net component B	

STORAGE AND HANDLING

Component A:	unopened containers may be stored for at least 12 month if stored properly, under dry and cool conditions, free from freezing
Component B:	unopened containers may be stored for at least 6 month if stored properly, under dry and cool conditions, free from freezing, discard if a white precipitate is observed

PHYSICAL DATA

Specific weight	1,08 kg/l	CAP 60
Specific weight solids	1,45 kg/l	CAST ³⁺ /B (hardener)
mixing ratio of components A:B	6 wt. % per weight	
pot time	30 : 1	
	approx. 2 hours (20 °C)	

APPLICATION INSTRUCTIONS

CONCRETE SURFACE PREPARATION

The concrete surface has to be free of loose or sandy parts. Surface contamination's have to be thoroughly removed, especially oil, fats, wax. The concrete surface may be dry to damp but not wet. The concrete overlay hast to be sufficiently absorbent to allow the CAP 60 primer to permeate at least 0,5 cm into the surface layer. The temperature on the concrete surface shall be at least 8°C.

REMARKS

An optimal development of the micro capillary composite matrix is a prerequisite for an optimal functionality (adhesion, electrolytic conductivity).

—— MIXING

Thoroughly mix component A with a mechanic stirrer. Keep vigorously stirring while adding component B, continue stirring at low speed for at least 2 minutes, without entraining air.

—— MIXING RATIO

Component A: Component B = 30 : 11

—— APPLICATION

The CAP 60 primer is applied to clean concrete surfaces (sand-blasted, water-jettied) preferentially by a brush, roller or with a hydraulic sprayer. The application shall be done in such a way that the surface is well soaked with the primer. Usually about 200–300 g are applied per m². The CAP 60 primer hardens within 8 hours at 15 °C to 25 °C, within 24 hours at temperatures at about 10° C, to such a degree that the CAST³⁺ composite paint may be applied. The CAST³⁺ composite paint shall not be applied later than 48 hours after the application of the CAP 60 primer.

—— MATERIALS CONSUMPTION

Paint per application: 200–300 g/m²

—— PROCESSING CONDITIONS/LIMITS

concrete substrate temperature	min. 8°C/max. 35°C
air temperature	min. 8°C/max. 35°C

—— CLEANING ADVICES

Spilled material may be washed off with water

—— SAFETY ADVICES

Safety and disposal instructions in the MSDS (material safety data sheets) and on the container labels have to be observed and followed. The MSDS for the component is also valid for the CAP 60 primer (component A mixed with component B).

The CAP 60 primer is designed and especially suited for the CAS-Composite Anode System for the cathodic corrosion protection of reinforcing steel in concrete. The purpose of this product data sheet is the description of the properties and applications of the CAP 60 primer. The described properties and reported values may vary depending on the solicitude and processing on which we do not have any direct influence. Our warranty is therefore limited to the quality of the delivered product. The product data sheet does not contain a complete manual of use and application. Our advice and consultancy is required for the use CAP 60 primer in connection with the CAS-Composite Anode System or in connection with any cathodic protection system for reinforcing steel in concrete. The information above is believed to be accurate and represents the best information currently available to us. The CAST³⁺ composite anode system is protected by patents.