

## CONSTRUCTION

# CarboCryl Sv

## HYDROPHILIC THREE-COMPONENT ACRYLATE GEL

*CE - marking CarboCryl Sv according to DIN EN 1504-5*

## DESCRIPTION

CarboCryl Sv is a fast sealing hydrophilic three-component acrylate gel.

CarboCryl Sv, A1, is an aqueous acrylate solution. CarboCryl Sv, A2, is an accelerator based on amines. The hardener CarboCryl Sv, B2, a peroxide salt, is a solid, which is soluble in water. CarboCryl does not contain acrylamide.

After mixing, the hardener triggers the polymerisation of the methacrylate yielding an elastic gel.



## APPLICATION AND USE

- Sealing of water even under high pressure
- Grout curtains in soil
- Repair of dilatation joints (in combination with CarboCryl Plus)

Applicable at temperatures from 5 °C to 30 °C (40 °F to 90 °F)

## ADVANTAGES

- Excellent penetration capacity due to water like viscosity
- Adjustable curing speed
- High elasticity
- Chemical resistance vs. most organic, or inorganic liquids
- Does not contain acrylamide nor its derivatives

## TECHNICAL DATA

The data below are laboratory data. They may vary in practice by thermal exchange between resin and concrete, moisture, and other factors.

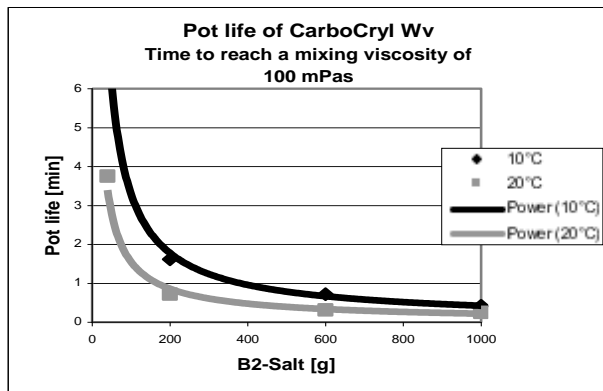
## MATERIAL DATA

Parameter	Unit	Component A1	Component A2	Component B2
Density at 25 °C	kg/m <sup>3</sup>	1230 ± 10	935 ± 10	ca. 1115
Colour	-	colorless	colorless	white
pH-value	-	7.7 ± 0.5	10.2 ± 0.5	
Viscosity at 25 °C	mPa*s	50 ± 20	2 ± 1	solid

## REACTION DATA

Parameter	Details
Specific Mixing ratio A : B	1 / 1 p. b. vol.
Blend A1 : A2 // water : B2 (p. b. w.)	20 + 0.5 // 17 + p. b. w. B2 (cf. plot)
Mixing viscosity	< 10 mPa*s

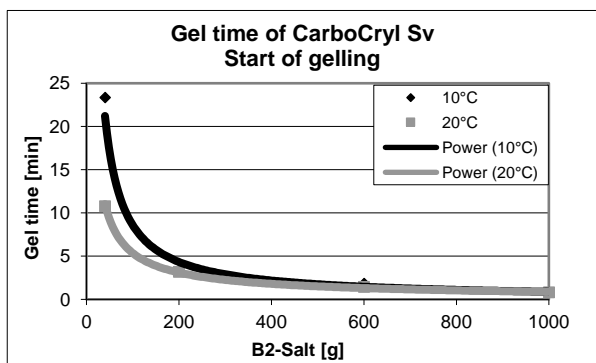
### POT LIFE



B2-Salt [g]	Pot life at 20 °C [min : s]	Pot life at 10 °C [min : s]
1000	00:15	00:25
600	00:19	00:43
200	00:43	01:37
40	03:45	07:45

Real variation of values about 10 %

### GEL TIME



B2-Salt [g]	Geltime at 20 °C [min : s]	Geltime at 10 °C [min : s]
1000	00:48	00:50
600	01:25	01:50
200	03:10	03:20
40	10:45	23:20

Real variation of values about 10 %

### MECHANICAL DATA

Tear-off strength from various surfaces<sup>3</sup>  
(curing time 3 hrs. at 20 °C / 50 % rel. hum.)

Surface	Measured Values	Unit	Standard
Concrete, dry	33/29/32	kPa	DIN 1 048
Concrete, damp	28/41/37	kPa	DIN 1 048
Concrete, coated with bitumen	4/4/5	kPa	DIN 1 048
Brick, damp	8/4/6	kPa	DIN 1 048

### PROPERTIES AFTER CURING

Parameter	Details	Standard
Consistency	Soft-elastic	
Color	white	
Elongation at break	ca. 1000 %	DIN EN ISO 527-3
Water absorption	ca. 100 %	DIN EN ISO 62

### APPLICATION METHOD

#### 1. Preparation of the solutions

Prior to injection, 2.5 % of the accelerator (component A2) is mixed with component A1 (resin). In a second vessel, the same volume of water (component B1) is mixed with the hardener (component B2). By changing the hardener content (B2) the gelling time can be adjusted. Thus, a formulation comprises 20 kg comp. A1, as delivered, 0.5 kg comp. A2 and between 40 g and 600 g comp. B2 dissolved in 17 l water. For special application as e.g. temporary sealing, the product can be used with a maximum B2-portion of 1000 g rel. to 20 kg A1-component. For safety reasons, a dosage of more than 1000 g B2 salt relative to 20 kg A1-component must not be exceeded.

<b>Application soil penetration</b>	recommended dosage: 40 g B2 component rel. to 20 kg A1 component
<b>Application dilatation joint (with CarboCryl Plus)</b>	recommended dosage: 200 g B2 component rel. to 20 kg A1 component

The freshly prepared solutions are serviceable approximately 4 hours. No metal stirrers should

be used for mixing and homogenisation of the product, but only plastic or wood paddles.

2. Processing of the solutions

For injection we recommend to use a self-priming two-component injection pump in stainless steel, with a specific mixing ratio 1 : 1. The solutions are conveyed separately via high pressure hoses to a compression head and injected into soil or masonry via a feed pipe and a packer, which has been fixed before in a drill hole. After injection of the acrylate, flush out the compression head with water.

The radius of injection is defined by the gel time, in the first place. In case that on a site both CarboCryl and polyurethane have to be injected, first the higher viscous polyurethane shall be used, than the lower viscous CarboCryl gel.

Within the processing time all equipment can be cleaned with water. Partially and completely cured material can only be removed mechanically.

3. Processing temperature

Processing temperature	5 – 40 °C	part temperature
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The temperature range is consistent with our recommendation. In principle, the product reacts even at very low temperatures (according to experience up to about -15 ° C) or significantly higher temperatures than 40 ° C. However, here other problems can be observed which are not caused by the product properties: the failure of the pump technology in frosty conditions by freezing the air lines or the presence of ice in the structural elements which has to be sealed. Very high temperatures lead to very short reaction times. So complete filling of the injection area is prevented. There is also the risk that the activated A-component cures at very high temperatures without the addition of the B component, which can lead to blockage of the injection pump.

4. Final Product

CarboCryl Sv can take up and give off water reversibly, depending on the environment.

CarboCryl Sv meets the requirements of DS 835.9201 of Deutsche Bahn AG (German railway) regarding flexion, change of mass and volume as well as deformation after storage in water, deformation after dynamic load, tightness and resistance against fluids aggressive to concrete, brine and fuel.<sup>4,6</sup>

CarboCryl Sv does not get brittle even at temperatures of -30 °C.

CarboCryl Sv is approved for the use as a large-surface-seal in drinking water according to the German regulations for plastics in drinking water (KTW).<sup>1</sup>

When injected into sand, the content in total organic carbon reaches 129 mg/l at maximum and sinks below the threshold of significance of 20 mg/l 20hrs after the injection (test set up according to “Evaluation of the effect of building products on soil and groundwater“ of the German Institute for Construction Technology (DIBt), 2001).<sup>9</sup>

As to the corrosion resistance, no wear by corrosion can be detected after 7 weeks encapsulating a standard reinforcing steel with gel.<sup>7</sup>

CarboCryl Sv is not degraded by bacteria or fungi, which occur e. g. in soil.<sup>2</sup>

**SAFETY INSTRUCTIONS AND LIMITATIONS**

Observe the general safety regulations when handling chemicals, see MSDS.

In case of repeated injections attention must be paid that before the following injection a curing time of 10 min is kept. Otherwise, the gel being formed may be destroyed mechanically.

In sections, where ventilation is to be expected (e. g. dilatation joints), CarboCryl Sv can be modified with CarboCryl Plus. The addition of CarboCryl Plus results in gels with reduced water content i. e. higher solids content. So adhesion, elasticity and shrinking can be improved. Recommendations for the processing of CarboCryl Plus can be found in the respective technical data sheet.

**PACKAGING AND TRANSPORTATION**

All forms of packing are approved to the danger goods regulation road, railway, domestic shipping.

The components are delivered in following units:

- Component A1 (methacrylate) 25 l (20kg)
- Component A2 (accelerator) 1 l (0,5 kg)
- Component B2 (hardener) 1 l (300g or 1000g)

Other packaging units are available on request.

**STORAGE AND SHELF LIFE**

At least six months from date of delivery or twelve months from date of production when stored in a dry place between 10 °C and 30 °C. Do not expose to sunlight or prolonged contact to iron. When this time is exceeded, we recommend having the material checked by Minova for compliance with specification. The local legislation on storage has to be observed.

**DISPOSAL**

Follow local regulations.

**APPROVALS AND CERTIFICATES**

1. Expertise on compatibility with drinking water (“KTW-Gutachten”, Dr. Kramer, 1999)
2. Investigations on sterility (Dr. Kramer, 1998)
3. Report on adhesive strength and adhesion (MFPA Leipzig, 2001)
4. Report on resistance against various liquids (MFPA Leipzig, 2001)
5. Investigation of compatibility of joint tapes (waterstop) against CarboCryl Sv (MFPA Leipzig, 1999)
6. Qualifying examination after the injection gel policy 804.61.02 of DB AG of CarboCryl Sv or CarboCryl Sv/CarboCryl Plus (MFPA Leipzig, 2010)
7. Investigations on the corrosion resistance of reinforcing steel embedded in CarboCryl Sv (MFPA Leipzig, 2000)
8. Investigations on groundwater compatibility of CarboCryl Sv (MFPA Leipzig, 2002)

Test according to EN 1504-5: U(S2) W(1) (1/2/3) (5/40)	Details
Water tightness	S2
Viscosity	≤ 60 mPa*s
Corrosion behavior	It is assumed that no corrosive effects are present
Volume and mass change by air drying and water storage	Air drying: approx. -15 % Water storage: approx. +40 %
Sensitivity to water	passed
Sensitivity to wet-dry cycles	passed
Compatibility with concrete	passed
Release of dangerous substances	NPD

\*NPD - No Performance Determined

**DISCLAIMER**

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