

CONSTRUCTION

CarboCryl Hv

HYDROPHILIC 3-COMPONENT METHACRYLATE GEL

CE identification according DIN EN 1504-5

Classification: U(S2) W(1) (1/2/3) (5/40)

CarboCryl Hv / CarboCryl Plus

DESCRIPTION

CarboCryl Hv is a sealing hydrophilic, cross-linked 3-component methacrylate gel.

CarboCryl Hv, A1, is an aqueous methacrylate solution. CarboCryl Hv, A2, is an accelerator based on amines. The hardener CarboCryl Hv, B2, a peroxide salt, is a solid, which is soluble in water.

CarboCryl Hv does not contain acryl amide nor its derivatives.

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



APPLICATION AND USE

- Crack injection in concrete repair in combination with CarboCryl Plus
- Brick work injection, e. g. as an effective horizontal barrier
- Curtain injection
- Stabilisation of sandy soil
- Pressing of injection hoses in combination with CarboCryl Plus

Applicable at temperatures from 5 °C to 40 °C (building component temperature).

ADVANTAGES

- Excellent penetration capacity due to water like viscosity
- Adjustable curing speed
- High elasticity
- Resistance vs. most organic, or inorganic chemical liquids
- Approved for the use as a large-scale sealing in drinking water

TECHNICAL DATA

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

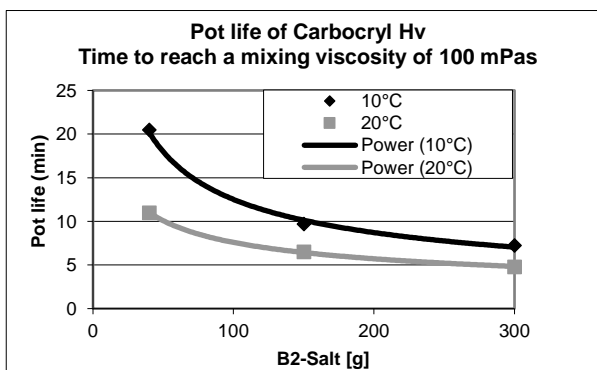
MATERIAL DATA

Parameter	Unit	CarboCryl Hv Comp A1	CarboCryl Hv Comp A2	CarboCryl Hv Comp B2	Standard
Density at 25 °C	kg/m ³	1055 ± 10	935 ± 10	ca. 1100	DIN 12791
Colour	-	colourless	transparent	white	
Melting point	°C	-15	-	-	
Flash point	°C	-	> 170	-	
pH-value	-	6 ± 1	10,2 ± 0,5	-	DIN 19268
Viscosity at 25 °C	mPa*s	5 ± 0,3	1,5 ± 0,5	solid	ISO 3219

REACTION DATA

Specific Mixing ratio A : B	1 / 1 p. b. vol.
Blend A1 : A2 // water : B2 (p. b. w.)	20 + 1 // 20 + p. b. w. B2
Mixing viscosity	< 5 mPa*s

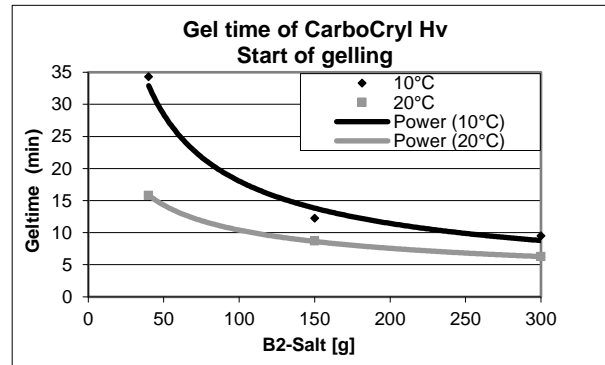
POT LIFE



B2-Salt [g]	Pot life at 20 °C [min : s]	Pot life at 10 °C [min : s]
300	04:50	07:15
150	06:30	09:40
40	11:00	20:30

Real variation of values about 10 %

GEL TIME



B2-Salt [g]	Gel time at 20 °C [min : s]	Gel time at 10 °C [min : s]
300	06:15	09:30
150	08:40	12:15
40	15:50	34:20

Real variation of values about 10 %

MECHANICAL DATA

Tear-off strength from various surfaces⁶
(curing time 2 hrs. at 20 °C / 50% rel. hum.)

Surface	Measured Values	Unit
Concrete, dry	110/60/100	kPa
Concrete, damp	20/40/20	kPa
Concrete, coated with bitumen	30/30	kPa
Brick, damp	40/20/70	kPa

APPLICATION METHOD

1. Preparation of the solutions

Prior to injection, 5 per cent of the accelerator (component A2) will be mixed with component A1 (resin). In a second vessel, the same volume of water (component B1) will be mixed with the hardener (component B2). Thus, the standard formulation comprises 20 kg comp. A1, as delivered, 1 kg comp. A2 and 300 g comp. B2 dissolved in 20 l water. In special cases, e. g. at low ambient temperature, the share of B2-component can be increased up to 1000 g; a higher concentration is not allowed (deterioration of the mechanical properties). For crack and/or masonry injections, an amount of 150 g per batch (20 kg A1 component) is recommended. No metal

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

The with A2 component activated A1 component can be used within 12 hours (depending on temperature). Afterwards the use of the activated component is no longer recommended, as the properties of the cured gel deteriorate. The pot-life will get shorter with elongated standing. A post-activation with A2 component results in a deterioration of the mechanical properties; the gel body becomes brittle then.

The ready-to-use B component is stable for 5 hours (depending on temperature).

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 grout is capable of penetrating minute cracks as well as silty soil. 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. Final Product

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

CarboCryl Hv 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, caustic brine and fuel.^{8,16}

CarboCryl Hv is approved for the use as a large-scale sealing in drinking water according to the German regulations for plastics in drinking water (KTW).² When injected into sand, the content in total organic carbon (TOC) reaches 70 mg/l at maximum and falls below the threshold of insignificance of 20 mg/l only nine hours 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).¹⁰

As to corrosion resistance, no wear by corrosion can be detected after 7 weeks on a standard reinforcing steel encapsulated in gel.³

CarboCryl Hv is not degraded by bacteria or fungi, which occur e. g. in soil.¹

4. Advice

In areas, where water pressure is to be expected > 0.5 bar (e.g. cracks), CarboCryl Hv can be modified with CarboCryl Plus (not for curtain injection).

The addition of CarboCryl Plus results in acrylategels with reduced water content i. e higher solids content. So adhesion, elasticity and shrinking can be improved by modification with CarboCryl Plus. Recommendations for the processing of CarboCryl Plus can be found in the respective technical data sheet of CarboCryl Plus.

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

SAFETY INSTRUCTIONS AND LIMITATIONS

Observe the usual precautionary measures for handling chemicals, see Material Safety Data Sheet CarboCryl Hv.

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 (1kg)
- Component B2 (hardener) 1 l (300g)

STORAGE AND SHELF LIFE

At least six months from date of delivery 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 taken into consideration.

DISPOSAL

Follow local regulations.

APPROVALS AND CERTIFICATES

1. DIBt: General approval of construction regulation Z-101.29-5 DIBt (2014)
2. Expertise on sterility (KTW-Gutachten, Dr. Kramer, 1998)
3. Investigation on the corrosion resistance of reinforcing steel encapsulated in acrylic gel CarboCryl Hv (MFPA Leipzig, 1999)
4. Investigation on the compatibility of joint ribbon against CarboCryl Hv (MFPA Leipzig, 1999)
5. Expertise on compability with drinking water (KTW-Gutachten, Dr. Kramer, 1999)
6. Investigation on thermal conductivity and moisture vapour transmission of masonry treated with CarboCryl Hv (MFPA Leipzig, 2000)
7. Report on adhesive strength and adhesion (MFPA Leipzig, 2001)
8. Report on resistance against various liquids (MFPA Leipzig, 2001)
9. Application-specified investigations for crack injection (MFPA Leipzig, 2001)
10. Durability test of CarboCryl Hv (MFPA Leipzig, 2002)
11. Investigations on groundwater compatibility of CarboCryl Hv (MFPA Leipzig, 2003)
12. P5.1/09-144 Studies to assess the impact of CarboCryl Hv on groundwater, using the column experiment with reversed flow direction (MFPA Leipzig, 2007)
13. P5.1/09-145 Studies to assess the impact of CarboCryl Hv on groundwater, using the column experiment with reversed flow

direction - additional analysis - (MFPA Leipzig, 2007)

14. Application as grout for sealing of reinforced concrete structural elements (Engineering office Raubach, 2009)
15. Behaviour of CarboCryl Hv after 10 years water storage change and removal in soil (MFPA Leipzig, 2009)
16. Qualifying examination according to standards and regulations of the DB AG (MFPA Leipzig, 2009)
17. Declaration of performance (2017)
18. CE identification according to DIN EN 1504-5, classification: U (S2) W (1) (1/2/3) (5/40)
19. Examination of watertightness of CarboCryl Hv / CarboCryl Plus according to DIN EN 14068 at a water pressure of 7 bar (MFPA Leipzig, 2011)
20. Certificate of the watertightness of injected cracks under cyclical expansion (MFPA Leipzig, 2011)
21. Studies of the resistance of injection material against fluids aggressive to concrete (MFPA Leipzig, 2011)
22. Examination of CarboCryl Hv / CarboCryl Plus to obtain a general approval as injection material for injection of cracks in reinforced concrete components (MFPA Leipzig, 2013)
23. Contact behaviour of injection resins on acrylate basis and anhydrite rock (MFPA Leipzig, 2014)
24. Elution behaviour of CarboCryl Hv (MFPA Leipzig, 2014)
25. Behaviour of CarboCryl Hv after 16 years water storage change and removal in soil (MFPA Leipzig, 2015)

Test according to EN 1504-5: U(S2) W(1) (1/2/3) (5/40)	Details
Water tightness	S2
Viscosity	≤ 60 mPa*s, filling degree > 95
Corrosion behaviour	Verifiable no corrosive effect
Changing of volume and mass by air drying and water bearing	Air drying: approx. -15 % Water bearing: approx. +20 %
Sensitivity compared to water	Passed
Sensitivity compared to Wet-dry-cycles	Passed
Compatibility with concrete	Passed
Disposal of hazardous materials	Correlation with EN 1504-5, 5.4

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MCT-100101/CarboCryl Hv_E32 , February 2019

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