

CONSTRUCTION / ENERGY

CarboPur WFA

TWO-COMPONENT POLYURETHANE INJECTION RESIN

DESCRIPTION

CarboPur WFA is an extremely fast reacting two-component injection resin used for sealing and stabilizing in dry and water bearing strata. CarboPur WFA is CFC-free and halogen-free.

CarboPur WFA, Component A is a mixture of various polyols and additives which reacts with the B-component to form a tough/hard polyurethane resin. CarboPur. Component B is a polyisocyanate.



APPLICATION AND USE

CarboPur WFA is compatible with concrete and steel. This resin is designed for sealing and consolidation in water-bearing strata and for:

- Consolidation in dry, wet and water-bearing strata
- Sealing against strong water ingress (also seawater)
- Sealing against water under pressure e.g. from strata, dams or shaft walls
- Stabilisation and sealing work in tunnels
- Repair of old shafts and tunnels
- Stabilisation of crown abutments in tunnelling
- Sealing of anchoring of sheet pilings etc. in ground water

Applicable at temperatures between -25 °C and +30 °C, recommended for sealing water at low temperatures.

ADVANTAGES

- Very fast setting and immediate sealing effect
- Stabilising effect
- For wide-ranging injections
- Basis of the Minova sealing technology
- Compatible with CarboPur WF and WT
- Groundwater hygiene tested
- CarboPur WFA fulfils the fire examination according to DIN 4102-1 – Building material class B2 (normally inflammable)

TECHNICAL DATA

The data below are laboratory data. They may vary in practice due to thermal exchange between resin and strata, surface properties of the stone, humidity, pressure, and other factors.

MATERIAL DATA

Parameter	Unit	Comp A	Comp B	Standard
Density at 25 °C	kg/m ³	1010 ±30	1230 ±30	DIN 12791-1
Colour	-	honey	dark brown	-
Flash point	°C	> 150	> 150	DIN 53213
Viscosity at 25°C	mPa*s	200 ±50	200 ±50	ISO 3219
Viscosity at 15°C	mPa*s	430 ±100	550 ±100	ISO 3219
Viscosity at 10°C	mPa*s	640 ±150	920 ±150	ISO 3219
Surface tension (20 °C)	mN/m	36	48	EN 4210

REACTION DATA

Starting temperature	End of foaming / setting time	Foaming factor	Test Method
without contact to water			
10 °C	45 s ±5 s	1.0 - 1.3	MCT PV 10-301
15 °C	35 s ±5 s	1.0 - 1.3	MCT PV 10-301
25 °C	20 s ±5 s	1.0 - 1.3	MCT PV 10-301

REACTION DATA WITH CONTACT OF WATER

Starting temperature	Start of foaming	End of foaming / setting time	Foaming factor	Test Method
with contact to water (1% relative to mix)				
10°C	50 s ± 10 s	1 min 20 s ± 20 s	3-8	MCT PV 10-301
15°C	40 s ± 10 s	1 min ± 20 s	3-8	MCT PV 10-301
with contact to water (2% relative to mix)				
10°C	55 s ± 10 s	1 min 25 s ± 20 s	3-15	MCT PV 10-301
15°C	40 s ± 10 s	1 min 10 s ± 20 s	3-15	MCT PV 10-301

MECHANICAL DATA

Parameter	Value	Standard	Reference
Compression strength (unfoamed)	80 ± 10 MPa	ISO 604	*
Upsetting at break	10 ± 1.0 %	ISO 604	*
Compression strength (foam factor 1.7)	20 ± 5 MPa	ISO 604	*
Compression strength (foam factor 2.1)	14 ± 4 MPa	ISO 604	*
Upsetting at break	10 ± 1.0 %	ISO 604	*
Tensile strength (unfoamed)	50 ± 10 MPa	ISO 527	*
Elongation at break (unfoamed)	2.3 ± 0.5 %	ISO 527	*
Adhesive strength (dry surface, 30 °C, 80 % rel. h.)	> 6,5 MPa after 1 h	DMT-Method	2
dyn. E-Modulus (unfoamed)	~ 2500 MPa	EN 14146	*
dyn. E-Modulus (foam factor 3)	~ 200 MPa	EN 14146	*
Creep (2 MPa load, 40 d; unfoamed)	0.10%	DIN 4093	5
Creep (2 MPa load, 40 d; foam factor 1.7)	0.20%	DIN 4093	5
Creep (2 MPa load, 40 d; foam factor 2.1)	0.30%	DIN 4093	5
Shore Hardness	D 78 ± 5	ISO 7619-1	*
Fire class	B2	DIN 4102-1	4

*in house testing

CarboPur WFA can take a continuous load of 2 MPa at a foaming factor of 2.1 with the deformation increase in seven days being less than 0.02 %.

APPLICATION METHOD

The two components are pumped by a dual component pump at the volumetric ratio of 1 : 1, they are mixed thoroughly in a static mixer unit prior to injection into the strata via a packer installed in a previously drilled borehole.

In contact with water, the resin foams up. The following reaction mix displaces then the preceding one. Since this mixture does not meet any more water it hardens without foaming to form a pore-free material. Thus, a water-tight shell is formed which, in turn, is surrounded by a zone consolidated by foamed-up polyurethane. This means that only one application cycle with one material is necessary for arriving at permanent sealing and consolidation.

The mixed resin penetrates the structure to be sealed. The major part of water in there is displaced due to the hydrophobicity and the viscosity of the resin. Traces of water make the resin foam.

According to its contact with water, the resin foams up more or less. Thus, the mechanical properties vary a lot. The cured resin is resistant against many acids, alkali and salt brines as well as organic solvents (if in doubt consult your nearest Minova representative)

It needs to be assured that the product temperature is between 15°-30°C before processing and during application

When the material is warmed up, local overheating, e. g. at the container wall, must be avoided by any means.

SAFETY INSTRUCTIONS AND LIMITATIONS

Observe the usual precautionary measures for handling chemicals, see MSDS of CarboPur WFA component A and CarboPur component B.

If the product is strong cooled down (< 0 °C) or at short notice lower temperatures (< -10 °C), it should be warmed up before application to the recommended processing temperature.

PACKAGING AND TRANSPORTATION

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

The components can be delivered in 20/26/200/1000 l units.

Other packaging units are available on request. Details are shown in the offer.

STORAGE AND SHELF LIFE

At least 6 months from date of delivery respectively 18 months after production when stored in a dry place between 10°C and 30°C. When this time is exceeded, we recommend having the material checked by Minova for compliance with specification.

The local legislation on storage needs to be considered.

DISPOSAL

Follow local regulations.

APPROVALS AND CERTIFICATES

1. **DIBt:** German approval as curtain injection Z-101.29-41 (DIBt, 2019)
2. Test report on adhesive strength (DMT MinTec Essen, 1999)
3. Compatibility with building material (GHS Kassel)
4. Report on the fire properties (CSIR, Pretoria, RSA)
5. Test report on long term compressive strength (Erdbaulabor Essen)
6. Test report on retardation and creep (Erdbaulabor Essen)
7. Expertise on compatibility with groundwater according to DIBt regulation (Hygiene-Institut, Gelsenkirchen, 2018)
8. Registration number KR07-160 (Product register, Sweden 2008)
9. Certificate according to KTW-guidelines (LADR GmbH, 2010)

10. Report LPI to the durability of PU on the basis of CarboPur WF P060109C
11. Report LPI to the durability of PU in sulfate laden water on the basis of CarboPur WF P060109C

DISCLAIMER

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ADDITIONAL DOCUMENTATION

- Operating instructions on proper use of Minova injection resins
- MSDS of CarboPur WFA component A and CarboPur component B

CUSTOMER SERVICE

For additional support options available at your area, contact our local offices.

www.minovaglobal.com/emea-cis