

**CONSTRUCTION / ENERGY**

# CarboPur WF

## TWO-COMPONENT POLYURETHANE INJECTION RESIN

### DESCRIPTION

CarboPur WF is a fast reacting two-component injection resin, CFC free and halogen-free, for sealing and consolidation in dry and water-bearing strata and against water under pressure.

CarboPur WF, Component A is a mixture of various polyols and additives. CarboPur, Component B is a polyisocyanate.

### APPLICATION AND USE

- Consolidation in dry, wet and water-bearing strata
- Sealing against water under hydrostatic pressure from strata, dams or shaft walls, also against salt-water
- Repair of wet shafts, tunnels, channels and walls
- and many more special applications

Temperature range of application from 5 °C to 40 C.

### ADVANTAGES

- CarboPur WF is characterized by a very fast setting / immediate sealing effect
- Stabilising effect
- Used for wide-ranging injections
- Basis of the Minova sealing technology
- Compatible with CarboPur WFA and WT
- Groundwater hygiene tested
- In contact with a tunnel sealing band (EN 12 637-3) no significant changes can be detected
- CarboPur WF fulfils the fire examination according to DIN 4102-1 – Building material class B2 (normally inflammable)

### TECHNICAL DATA

The data below are laboratory data only. 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 <sup>3</sup>	1030 ± 30	1230 ± 30	DIN 12791-1
Colour	-	honey	dark brown	-
Flash point	°C	> 150	> 150	DIN 53213
Viscosity at 30 °C	mPa*s	180 ± 50	160 ± 50	ISO 3219
Viscosity at 25 °C	mPa*s	250 ± 50	200 ± 50	ISO 3219
Viscosity at 15 °C	mPa*s	550 ± 80	550 ± 100	ISO 3219

## REACTION DATA

Starting temperature	End of foaming / setting time	Foaming factor	Test Method
<b>without contact to water</b>			
15 °C	1 min 30 s ± 20 s	1.0	MCT PV 10-301
25 °C	45 s ± 15 s	1.0	MCT PV 10-301
30 °C	30 s ± 10 s	1.0	MCT PV 10-301

## REACTION DATA WITH CONTACT OF WATER

Starting temperature	Start of foaming	End of foaming / setting time	Foaming factor	Test Method
<b>with contact to water (1% relative to mix) (1 % relative to mix)</b>				
15°C	1 min 50 s ± 20 s	2 min 30 s ± 30 s	3 ± 0.5	MCT PV 10-301
25°C	1 min 10 s ± 15 s	1 min 40 s ± 20 s	3 ± 0.5	MCT PV 10-301
<b>with contact to water (2% relative to mix)</b>				
15°C	1 min 50 s ± 20 s	2 min 40 s ± 30 s	3 ± 0.5	MCT PV 10-301
25°C	1 min 20 s ± 20 s	1 min 50 s ± 20 s	3 ± 0.5	MCT PV 10-301

## MECHANICAL DATA

Parameter	Value	Standard	Reference
Adhesive strength (wet surface)	2.1 MPa after 15'	DMT-Method	1
Water permeability (unfoamed)	< 1x10 <sup>-12</sup> m/s	DIN 18130	2
Water permeability (foam factor 2)	3x10 <sup>-9</sup> m/s	DIN 18130	2
Tensile strength (unfoamed)	45 MPa	ISO 527	3
Elongation at break (unfoamed)	2.1 ± 0,5 %	ISO 527	3
Flexural strength (unfoamed)	90 ± 5 MPa	ISO 178	4
Flexural strain at flexural strength	4.8 ± 0,5 %	ISO 178	4
Dyn. E-Modulus (unfoamed)	3100 MPa	EN 14146	5
Static E-Modulus	2100 N/mm <sup>2</sup>	ISO 604	*
Shear force: (glued to wet surface with 0.1 to 0.5 MPa tension)	Cohesion: 1.9 MPa Shear angle: 65°		6
Shore hardness	D80 ± 5	ISO 7619-1	*
Compression strength	80 ± 10 MPa	ISO 604	*
Yield at break	10 ± 1,0 %	ISO 604	*

\* In house testing

## **APPLICATION METHOD**

The two components are pumped by a dual component pump at the volumetric ratio 1 : 1; they are mixed thoroughly in a static mixer unit prior to injection into 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 the mixture does not meet any more water, it hardens without foaming to form a pore-free material. Thus, a water-tight shell is foamed 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.

With strong outflow of water or in case of cold water we recommend use CarboPur WFA or WT. Those three resins can be combined with each other. For detailed instructions on use, consult the brochure 'Operating instructions on proper use of Minova injection resins'.

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).

The reaction time can be variable adjusted by the addition of the additives CarboAdd Fast and CarboAdd Thix.

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.

## **SAFETY INSTRUCTIONS AND LIMITATIONS**

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

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

## **PACKAGING AND TRANSPORTATION**

All forms of packaging comply with the dangerous good regulations for road, rail and domestic shipping.

The components can be delivered in 18/26/200/1000 l units.

Other packaging units are available on request.

## **STORAGE AND SHELF LIFE**

The product shelf life is 18 months from the date of production at a temperature between 10°C and 30°C.

The local legislation on storage needs to be considered.

## **DISPOSAL**

Follow local regulations.

## **APPROVALS AND CERTIFICATES**

1. Report on mechanical properties (adhesive shear, adhesive flexural strength, penetration capacity) (DMT MinTec, Essen, 1995)
2. Material test report on permeability of water (DMT, 2001)
3. Material test report on tensile strength (CTF, 2000)
4. Material test report on flexural strength (CTF, 2000)
5. Material test report on E-modulus (CTF, 2000)
6. Research of shear strength (DMT, MinTec, 1999)
7. Expertise on groundwater compatibility – DIBt data sheet (Hygiene-Institut, Gelsenkirchen, 2004)
8. Opinion about compatibility to tunnel sealing sheets (MPA Darmstadt, 2001)

9. Certificate according to KTW-guidelines (LADR GmbH, 2010)
10. Report LPI to the durability of PU WF P060109C
11. Report LPI to the durability of PU in sulfate laden water P060109C

## **DISCLAIMER**

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## **ADDITIONAL DOCUMENTATION**

- Operating instructions on proper use of Minova injection resins
- MSDS of CarboPur WF 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](http://www.minovaglobal.com/emea-cis)