

Hygiene-Institut des Ruhrgebiets

Institut für Umwelthygiene und Umweltmedizin
Direktor: Prof. Dr. rer. nat. L. Dunemann

Hygiene-Institut · Postfach 101255 · 45812 Gelsenkirchen



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Unser Zeichen: C 846/02/st
Ansprechpartner: Herr Dr. Schössner

Gelsenkirchen, 22.04.2002

TEST CERTIFICATE

Use of the 2-K-EP-impregnating resin
Konudur 160 BRAWO I
for laminates and polyester needle felt hoses
reconstruction of sewers
- waterhygienic assessment -

(Redraft dated 12.09.1997, Dir.Tgb.-Nr.: C 1304/97/sn)

- English version of our test certificate, dated 27.03.2002, Ref.: C 805/02/st -

Applicant: MC-Bauchemie Müller GmbH & Co. KG
Am Kruppwald 6-8
D-46238 Bottrop

Test material: Konudur 160 BRAWO I

Receipt of the sample: 09.05.1995

Test pieces: test pieces, measuring:
4 cm x 4 cm x 16 cm

Test period: 22.05.1995 – 01.06.1995
(experimental)

Application: sealing and reconstruction of sewers

Formulation: 2-component-system / epoxid-resin-based

This test certificate consists of 3 pages and 1 annex.

Durch die DAP Deutsches Akkreditierungssystem Prüfwesen
GmbH akkreditiertes Prüflaboratorium
Die Akkreditierung gilt für die in der Urkunde
aufgeführten Prüfverfahren.

Deutscher Akkreditierungsrat

DAR
DAP-PL-2548.00

Träger des Hygiene-Instituts:
Verein zur Bekämpfung der Volkskrankheiten
im Ruhrkohlengebiet e.V., Gelsenkirchen

Scope:

Concrete waste water pipes in sewage systems are often damaged by sewage aggressive to concrete so strongly, that a reconstruction is required. The 2-components-EP-impregnating-resin **Konudur 160 BRAWO I** for laminates and polyester needle felt hoses is intended to be used for reconstruction of sewers. Bringing in **Konudur 160 BRAWO I** into the sewers to be restored, a contact of the material (rips and holes in the pipe wall) with the ground water can't be excluded. The material therefore was checked and assessed from the water hygienic point of view.

Test method:

Prisms with a dimension of 4 cm x 4 cm x 16 cm reached the examination. The tests to the water behaviour of **Konudur 160 BRAWO I** were carried out following the method published by the Working Group "Trinkwasserbelange" (Drinking Water Concerns) of the Plastics Commission of the German Federal Health Authorities ("Assessment of plastics and other non-metallic materials from the hygienic point of view in the scope of the Law for Foodstuffs and Requirements for the Drinking Water Area", Bundesgesundheitsblatt, Vol. 20, 1977, page 124 ff.).

The test results are listed in the attached table.

Test results:

An influence of the quality of the test water such as colour, odour, turbidity and tendency to foam formation is not ascertainable by the standardized surface (cm²) to volume (ml) ratio for large gaskets of 1:50.

The concentration of organic compounds, analyzed by the parameter "total organic carbon" (TOC), in the relevant 3rd test period (7.-9. day) was <0,1 mg/l in the test water (see annex). Therefore a surface area value can be calculated from $M = <1 \text{ mg/m}^2 \text{ per day}$ (for 1 m² and 1 day). The established limiting value for gaskets in the drinking water area is considerably higher (limit value for small gaskets $M = 125 \text{ mg/m}^2 \text{ per day}$). As a comparison the limit value for the TOC-migration of pipes in the drinking water area is $M = 2,5 \text{ mg/m}^2 \text{ per day}$ (in the 3rd migration period). Phenols and aromatic amines are not included in the recipe according to the manufacturer's indications.

The examination of the toxicity of the test water with dehydrogenase activity by 2,3,5-Triphenyltetrazoliumchlorid (TTC) didn't yield any indication of toxic compounds in the test water (Deutsche Einheitsverfahren zur Wasser-, Abwasser- und Schlammuntersuchung, System-Nr. L3).

Assessment:

On the grounds of the test results there are no reservation of the water hygienic point of view about the use of the 2-components, EP-impregnating resin **Konudur 160 BRAWO I** for laminate and polyester needle felt hoses to the sealing and reconstruction of sewer.

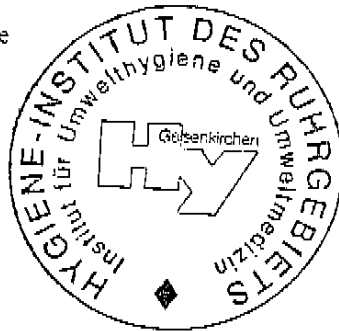
Toxic influences on the surrounding water don't proceed from the examined material. By the use of the material no considerable influence of the surrounding ground water has to be expected. Statements about the technical suitability and durability are not made.

Corresponding quality is presupposed by examining material and product for the validity of the test certificate with regard to composition and processing.

This test certificate shall not be reproduced except in full without the written approval of the Hygiene-Institut.

The Director of the Institute
on behalf of


(Dipl.-Chem. Koch))
-Dept. Waterchemistry-



1 annex

HYGIENE-INSTITUT DES RUHRGEBIETS, GELSENKIRCHEN
 Institut für Umwelthygiene und Umweltmedizin

annex
 Ref.: C 846/02/st

Waterquality of the 2-component-EP-impregnating resin Konudur 160 BRAWO I

Applicant: MC-Bauchemie, Bottrop

Measuring of test pieces: 4 cm x 4 cm x 16 cm

Surface area of test pieces: 865 cm²

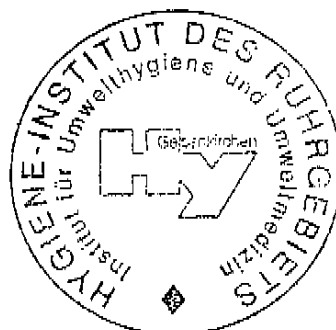
Volume of test water: 2950 ml

Migration time: three periods à 3 days (72 hours)

test period test water of:	1.-3. day 26.05.95	4.-6. day 29.05.95	7.-9. day 01.06.95	untreated test-water (entmin. water)
colour	colourless	colourless	colourless	colourless
turbidity	clear	clear	clear	clear
odour *	without	without	without	without
threshold odor number [20°C] *	1	1	1	1
tendency to foam formation *	none	none	none	none
surface area value TOC mg/m ² x d	0,6	0,6	0,2	-

* For the determination of odour, threshold odour number and tendency to foam formation a surface (cm²) / volume (ml) ratio of 1:50 (standard for small gaskets) was adjusted by dilution with odourless water.

Gelsenkirchen, 22.04.2002



(Dipl. Chem. Koch)

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Unser Zeichen: C 847/02/st
Ansprechpartner: Herr Dr. Schössner

Gelsenkirchen, 22.04.2002

TEST CERTIFICATE

Use of the 2-K-EP-impregnating resin
Konudur 160 BRAWO III
for laminates and polyester needle felt hoses
reconstruction of sewers
- waterhygienic assessment -

(Redraft dated 12.09.1997, Dir.Tgb.-Nr.: C 1304/97/sn)

- English version of our test certificate, dated 27.03.2002, Ref.: C 806/02/st -

Applicant: MC-Bauchemie Müller GmbH & Co. KG
Am Kruppwald 6-8
D-46238 Bottrop

Test material: Konudur 160 BRAWO III

Receipt of the sample: 09.05.1995

Test pieces: test pieces, measuring:
4 cm x 4 cm x 16 cm

Test period: 22.05.1995 – 01.06.1995
(experimental)

Application: sealing and reconstruction of sewers

Formulation: 2-component-system / epoxid-resin-based

This test certificate consists of 3 pages and 1 annex.

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Träger des Hygiene-Instituts:
Verein zur Bekämpfung der Volkskrankheiten
im Ruhrkohlengebiet e.V., Gelsenkirchen

Scope:

Concrete waste water pipes in sewage systems are often damaged by sewage aggressive to concrete so strongly, that a reconstruction is required. The 2-components-EP-impregnating-resin **Konudur 160 BRAWO III** for laminates and polyester needle felt hoses is intended to be used for reconstruction of sewers. Bringing in **Konudur 160 BRAWO III** into the sewers to be restored, a contact of the material (rips and holes in the pipe wall) with the ground water can't be excluded. The material therefore was checked and assessed from the water hygienic point of view.

Test method:

Prisms with a dimension of 4 cm x 4 cm x 16 cm reached the examination. The tests to the water behaviour of **Konudur 160 BRAWO III** were carried out following the method published by the Working Group "Trinkwasserbelange" (Drinking Water Concerns) of the Plastics Commission of the German Federal Health Authorities ("Assessment of plastics and other non-metallic materials from the hygienic point of view in the scope of the Law for Foodstuffs and Requirements for the Drinking Water Area", Bundesgesundheitsblatt, Vol. 20, 1977, page 124 ff.).

The test results are listed in the attached table.

Test results:

An influence of the quality of the test water such as colour, odour, turbidity and tendency to foam formation is not ascertainable by the standardized surface (cm²) to volume (ml) ratio for large gaskets of 1:50.

The concentration of organic compounds, analyzed by the parameter "total organic carbon" (TOC), in the relevant 3rd test period (7.-9. day) was <0,1 mg/l in the test water (see annex). Therefore a surface area value can be calculated from $M = <1 \text{ mg/m}^2 \text{ per day}$ (for 1 m² and 1 day). The established limiting value for gaskets in the drinking water area is considerably higher (limit value for small gaskets $M = 125 \text{ mg/m}^2 \text{ per day}$). As a comparison the limit value for the TOC-migration of pipes in the drinking water area is $M = 2,5 \text{ mg/m}^2 \text{ per day}$ (in the 3rd migration period). Phenols and aromatic amines are not included in the recipe according to the manufacturer's indications.

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Assessment:

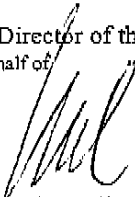
On the grounds of the test results there are no reservation of the water hygienic point of view about the use of the 2-components, EP-impregnating resin **Konudur 160 BRAWO III** for laminate and polyester needle felt hoses to the sealing and reconstruction of sewer.

Toxic influences on the surrounding water don't proceed from the examined material. By the use of the material no considerable influence of the surrounding ground water has to be expected. Statements about the technical suitability and durability are not made.

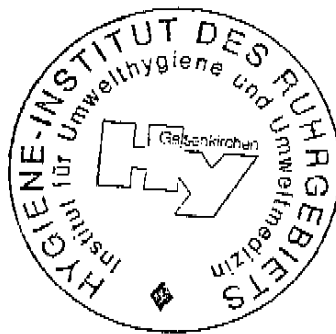
Corresponding quality is presupposed by examining material and product for the validity of the test certificate with regard to composition and processing.

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The Director of the Institute
on behalf of



(Dipl.-Chem. Koch)
-Dept. Waterchemistry-



1 annex

Waterquality of the 2-component-EP-impregnating resin Konudur 160 BRAWO III

Applicant: MC-Bauchemie, Bottrop

Measuring of test pieces: 4 cm x 4 cm x 16 cm

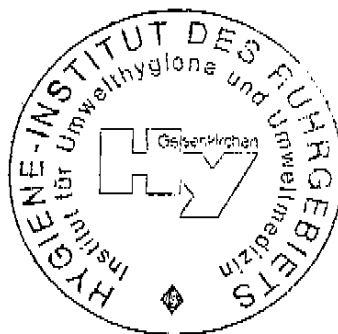
Surface area of test pieces: 865 cm²

Volume of test water: 2950 ml

Migration time: three periods à 3 days (72 hours)

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odour *	without	without	without	without
threshold odor number [20°C] *	1	1	1	1
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Gelsenkirchen, 22.04.2002

(Dipl.-Chem. Koch)