



Labtech s.r.o., Hygienic Laboratory

Authorized Laboratory for examination of the health safety of products that come in to contact with drinking water and for water treatment

(regulation of Czech Health Ministry No. 409/2005)
Pod Nemocnicí 683, Klatovy, Czech Republic

ASSESSEMENT OF PRODUCTS IN CONTACT WITH DRINKING WATER

MC-Injekt PowerSeal F- expanding one-component resin

Client:

MC-BAUCHEMIE s.r.o.,

Průmyslová zóna Sever, Skandinávská 990, 267 53 Žebrák

Producer:

MC-Bauchemie Müller GmbH & Co. KG, Am Kruppwald 1-8, 46238 Bottrop

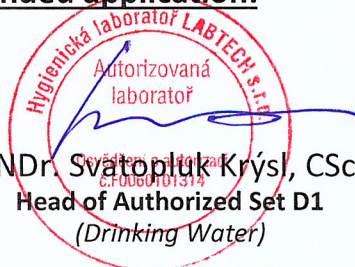
The product intended for contact with drinking water must, according to § 3 paragraph 2 of Decree 409/2005 Coll., comply the requirements of the leaching tests. Water pollution in this type of product must not exceed the hygienic limit of the monitored indicators of drinking water quality given by the Decree of the Ministry of Health No. 252/2004 Coll. and the requirements of Decree 409/2005 Coll.

Based on the performed leaching tests - see protocol PSV 11/21a - it can be stated that:

the product under test condition complies with the requirements of the authorised examination for products intended to come into contact with drinking water given by Decree No 409/2005 Coll., On hygiene requirements for products in contact with drinking water and for water treatment according to the use as intended application.

Klatovy, 15th January 2023

RNDr. Svatopluk Krýsl, CSc.
Head of Authorized Set D1
(Drinking Water)





LABTECH s.r.o., Test Laboratory Brno
Authorised Hygienic Laboratory
According to the Law of Czech Republic No. 258/2000
Accredited Testing Laboratory No. 1147
Pod Nemocnicí 683, 339 01 Klatovy



The protocol on authorised examination - PSV 11/21a

According to the requirements of Law of Czech Republic No. 258/2000
About protection of public health

Client :

Sample No.: 19089-19097
Order: 10.7.2021

MC-Bauchemie s.r.o.
Průmyslová zóna Sever
Skandinávská 990
267 53 Žebrák

| | | |
|--|---|-------------------------------------|
| Purpose of examination: | Evaluation of Hygienic properties of the sample according to the Regulation of Ministry of Health of Czech Republic No. 409/2005 for product used in contact with drinking water as amended and the Law of Czech Republic No. 258/2000 about protection of the public health, as amended. | |
| Product name: | MC-Injekt PowerSeal F - expanding one-component resin | |
| Producer: | MC-Bauchemie Müller GmbH & Co. KG, Am Kruppwald 1-8, 46238 Bottrop | |
| Sample description: | Reactive resins on diphenylmethane diisocyanate base, containing isomeres and homologues | |
| Practical used | For filling cracks, voids and interstices in concrete | |
| Sampling method used | The sample was supplied to the laboratory by the client. The sample was delivered in protective package. The laboratory is not responsible for mistake caused by the wrong way of sampling. | |
| Amount of delivered sample: | 1 kg | |
| Test beginning: | 1.8.2021 | Tests termination: 31.8.2021 |
| Justification of scope of the analyses and sample preparation procedure | Scope of analyses was performed according to the decree No. 409/2005 Coll. Ministry of Health on hygiene requirements for products coming into contact with drinking water, Annex No.1. | |
| Condition of sample preparation | According to Decree No. 409/2005 Coll., Annex No. 1 Leaching test, paragraph 15, an epoxy resin product intended for contact with drinking water must meet the requirements for the content of organic and inorganic parameters related to their composition. In the case of polyurethane resin, which is formed by the reaction of diphenylmethane diisocyanate with water, soluble organic substances are expected by-product, which can be included in the parameter total organic carbon and primary aromatic amines. The samples had to be prepared in the shape of a cylinder with using a suitable mold (PET bottle), which was then easily removed before testing. The solidification of the layer was performed in contact with moisture, which was achieved by wetting the inner surface of the bottle. After curing of the resin, its testing was performed: The tested samples were immersed in tap water for 24 hours at 23 ± 2 °C. After this static treatment of water, they were rinsed with tap water under a constant flow of $5 \text{ cm}^3 / \text{s}$ for 60 min. and then rinsed with test water for 2 min. | |

Work procedure for leaching:

The test was performed in accordance with Annex No. 1 to the Decree, points 9 and 10. Parallel leaching were performed immediately after previous sample treatment (see Sample preparation before leaching) by immersing the samples in test water (according to Annex No. 1, point 3b) - chlorine-free water with a conductivity <2 mS.m⁻¹ prepared by reverse osmosis and subsequent final treatment with an anion-cation exchange bed and filtration with activated carbon (AquaOsmotic type 03). The leaching ratios were as follows:

ratio of the external area of the tested samples : 350 cm² to the volume of the leaching liquid 350 cm³, ie. 1: 1 (cm².cm⁻³)

Table I. Testing methods used:

| Analyte | No. | Test Method | Unit | Uncertainty (%) |
|------------------------|-----|--|---------|-----------------|
| Color | 1 | SPE 07A:ČSN EN ISO 7887 | mg/l Pt | 15 |
| Smell | 2 | SEN 01:TNV 757340,ČSN EN 1622 | TON | |
| pH | 3 | ECH 01A:ČSN ISO 10523 | | 0,05 |
| COD Mn | 4 | VOL 04:ČSN EN ISO 8467 | mg/l | 8 |
| TOC | 5 | SPE 24A:ČSN EN 1484 | mg/l | 16 |
| Cadmium | 6 | ICP 03A:ČSN EN ISO 17294 | mg/l | 10 |
| Lead | 7 | ICP 03A:ČSN EN ISO 17294 | mg/l | 20 |
| Chromium | 8 | ICP 03A:ČSN EN ISO 17294-2 (1) | mg/l | 20 |
| Nickel | 9 | ICP 03A:ČSN EN ISO 17294-2 (1) | mg/l | 15 |
| Lead | 10 | ICP 03A:ČSN EN ISO 17294-2 (1) | mg/l | 15 |
| Primary aromatic amine | 11 | SPE 33: ČSN EN 13110-1,SZÚ AHEM 32, str. 27, 197 | mg/l | 20 |

Table II. Results of the first leachate (after 72 hours stagnation)

| Evaluated parameter | unit | K _{1A} | K _{1B} | K _{1,0} |
|---|---------|-----------------|-----------------|------------------|
| Color | mg/l Pt | 1,89 | <1,00 | <1,00 |
| pH | | 6,91 | 7,03 | 6,88 |
| COD Mn | mS/m | 6,02 | 5,98 | <0,20 |
| TOC | mg/l | 7,59 | 6,22 | 0,39 |
| Cadmium | mg/l | 0,0024 | 0,0038 | <0,0001 |
| Cobalt | mg/l | <0,001 | <0,001 | <0,001 |
| Chromium | mg/l | <0,001 | <0,001 | <0,001 |
| Copper | mg/l | <0,005 | <0,005 | <0,005 |
| Nickel | mg/l | 0,0022 | <0,001 | <0,001 |
| Lead | mg/l | <0,001 | <0,001 | <0,001 |
| Primary aromatic amine* | mg/l | <0,010 | <0,010 | <0,010 |
| K _{1A,B} concentration of evaluated parameter after 72 hours stagnation (two consecutive leachate) | | | | |
| K _{1,0} – concentration of control tests after 72 hours, | | | | |
| *mg anilinehydrochloride/l | | | | |

Table II. Results of the second leachate (after 72 hours stagnation)

| Evaluated parameter | unit | K _{2,A} | K _{2,B} | K _{2,0} |
|-------------------------|---------|------------------|------------------|------------------|
| Color | mg/l Pt | 1,35 | 1,05 | <1,00 |
| pH | | 6,69 | 6,45 | 6,19 |
| COD Mn | mS/m | 3,70 | 2,75 | <0,20 |
| TOC | mg/l | 6,40 | 4,64 | 1,07 |
| Cadmium | mg/l | 0,000195 | 0,00025 | <0,0001 |
| Cobalt | mg/l | <0,001 | <0,001 | <0,001 |
| Chromium | mg/l | <0,001 | <0,001 | <0,001 |
| Copper | mg/l | <0,005 | <0,005 | <0,005 |
| Nickel | mg/l | <0,001 | <0,001 | <0,001 |
| Lead | mg/l | <0,001 | <0,001 | <0,001 |
| Primary aromatic amine* | mg/l | <0,010 | <0,010 | <0,010 |

K_{2,A,B} concentration of evaluated parameter after 72 hours stagnation (two consecutive leachate)
K_{2,0} – concentration of control tests after 72 hours,
*mg anilinehydrochloride/l

Table IV. Results of the third leachate (after 72 hours stagnation)

| Evaluated parameter | unit | K _{3,A} | K _{3,B} | K _{3,0} |
|-------------------------|---------|------------------|------------------|------------------|
| Color | mg/l Pt | <1,00 | <1,00 | <1,00 |
| pH | | 6,99 | 6,77 | 6,75 |
| COD Mn | mS/m | 2,71 | 1,98 | <0,20 |
| TOC | mg/l | 2,21 | 2,79 | 0,35 |
| Cadmium | mg/l | 0,00134 | 0,00086 | <0,0001 |
| Cobalt | mg/l | <0,001 | <0,001 | <0,001 |
| Chromium | mg/l | <0,001 | <0,001 | <0,001 |
| Copper | mg/l | <0,005 | <0,005 | <0,005 |
| Nickel | mg/l | <0,001 | <0,001 | <0,001 |
| Lead | mg/l | <0,001 | <0,001 | <0,001 |
| Primary aromatic amine* | mg/l | <0,005 | <0,005 | <0,005 |
| Smell | TON | 1 | 1 | 0 |

K_{3,A,B} concentration of evaluated parameter after 72 hours stagnation (two consecutive leachate)
K_{3,0} – concentration of control tests after 72 hours,
*mg anilinehydrochloride/l

Table V. Evaluation of results of the third leachate

| Evaluated parameter | $K_{3,72,(1:1)}$ (mg.dm ⁻³) | $M_{72,3}^{23}$ (mg.dm ⁻² .24 h ⁻¹) | Concentration limit* |
|-------------------------|--|---|----------------------|
| Color | <1,00 | 0,33 | 20 |
| pH | 6,88 | x | 6,5-9,5 |
| COD Mn | 2,35 | 0,78 | 3,0 |
| TOC | 2,15 | 0,72 | 5,0 |
| Cadmium | 0,0011 | 0,00036 | 0,005 |
| Cobalt | <0,001 | 0,00033 | 0,02** |
| Chromium | <0,001 | 0,00033 | 0,05 |
| Copper | <0,005 | 0,00033 | 1.0 |
| Nickel | <0,001 | 0,00033 | 0,02 |
| Lead | <0,001 | 0,00033 | 0,01 |
| Primary aromatic amine* | <0,005 | 0,0016 | 0,03* |
| Smell | 1 | x | 2 |

$K_{3,72}$ is the mean value of the concentration of the test substance in the leachate after subtracting the value of the control sample in mg/l, over a period of 72 hours, expressed as the arithmetic mean of a pair of test samples at S/V ratio of 1: 1.
 $M_{72,3}^{23}$ migration number in mg.dm⁻².24 h⁻¹ migration number for the migrated component expressed as the arithmetic mean of the pair of tested samples
Limit - the relevant hygienic limit based on the cited decrees:
without index... corresponds to the limit value specified in Decree No. 252/2004 Coll. (Drinking water)
*... corresponds to the limit value specified in Decree No. 409/2005 Coll. (§6)
** .. corresponds to the limit value of Decree 10/2011, Regulation of the European Parliament and of the Council (EU), on plastic materials and articles intended to come into contact with food
The symbol < indicates the limit of quantification of the method used

Information for the customer:

The contracting authority submitted for testing a sample **MC-Injekt PowerSeal F** - one-component resin, It is a one-component liquid containing diphenylmethane diisocyanate (MDI). The active substance (MDI) reacts with the moisture present in the environment and forms a foamed polyurethane resin, which serves to seal cracks or cavities. According to the client's data, the product can be used to stop leaks in the walls and bottoms of reservoirs, or on other building structures, that may be part of the hygienic zone of drinking water source protection, etc.

Samples in the form of rollers with an outer surface of 350 cm² were prepared for testing in the laboratory (the inner surface of the rollers, which are absorbent, was not considered). After curing and subsequent leaching, extracts in the demineralised water were performed according to Annex No. 1 to Decree No. 409/2005 Coll. "Leaching test".

The evaluation of the leaching test was performed according to the cited decree: the submitted samples can be included to the category of requirements for products coming into contact with water, whose contact area does not exceed 100 cm² or its area to area ratio of all other products (materials) in the reservoir is less than 1: 1000. These products may reach the concentration of the highest hygienic limit of the monitored drinking water indicators, set in Decree No. 252/2004 Coll. For this reason, the limit values taken from the cited decree were used to evaluate the results of the monitored parameters in the third extract.

The results obtained on the basis of the analysis of aqueous extracts are given in tab. II., III., IV. The calculated migration numbers are given in tab. V. together with the results of the third extract. The parameters that could prove the imperfect properties of the product due to the possible migration of organic substances (organic carbon - TOC, primary aromatic amines) were monitored as very

important. Metals such as cadmium, lead, chromium, nickel, cobalt and copper were studied as important inorganic components. The extract was simultaneously tested for odor as an organoleptic parameter. As can be seen from Table V., the values found for all monitored parameters in the third extract did not exceed the limit values valid for drinking water, as stated in Decree No. 252/2004 Coll.

Expert opinions and interpretations:

A comparison of the achieved results with the hygienic limits shows that the product **MC-Injekt PowerSeal F** one-component resin with foaming properties, manufactured by MC-Bauchemie (Müller GmbH & Co. KG, Am Kruppwald 1-8, 46238 Bottrop,) **has not exceeded the limit values given by the decree of the Ministry of Health No. 409/2005** as amended for products whose area in contact with drinking water does not exceed 100 cm² or the ratio of its area to the area of all other products (materials) is less than 1: 1000.

Report elaborated by: RNDr. Svatopluk Krýsl, CSc.

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RNDr. Svatopluk Krýsl, CSc.
Head of Authorized Set D1
(Drinking Water)