



INSTITUT PRO TESTOVÁNÍ A CERTIFIKACI, a. s.

třída Tomáše Bati 299, Louky, 763 02 Zlín, Czech Republic
TESTING LABORATORY - TESTING DIVISION

Issues

ATTEST No. 472108616

on sample:

Pipes Gerodur RC protect® and GEROfit®

client:

Gerodur MPM Kunststoffverarbeitung GmbH & Co. KG
Andreas-Schubert-Strasse 6, 01844 Neustadt in Sachsen, Germany
Company ID. No.: DE140641615

Values obtained and the assessment of the technical parameters:

Evaluated technical parameters of the leaching tests (see pages 2 - 8) **meet hygienic requirements** of the article 3 paragraph 2 of the Decree of the Czech Health Ministry No. 409/2005 Coll. *Hygienic requirements for articles intended to come into contact with water and for the water treatment* for articles intended into **the direct long time contact** with drinking water.

Evaluated sample does not negatively influence the sensorial properties of the drinking water.

This Attest was issued on the basis of following document: Test report No. 472108616, issued by Institut pro testování a certifikaci, a.s. Zlín, on November 2, 2015.

Issued on: November 02, 2015

Valid till: November 30, 2018



Dipl. Ing. Jiří Samsonek, Ph.D.
Head of the testing laboratory

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ATTEST

No. 472108616

Sample: Pipe Gerodur RC protect®

Evaluation of heavy metals in matter.

Parameter	Unit	Result of measurement ¹⁾	Uncertainty
Pb - lead	mg/kg	< 10	-
Cd - cadmium	mg/kg	< 10	-
Ba - barium	mg/kg	< 25	-
Se - selenium	mg/kg	< 10	-
Hg - mercury	mg/kg	< 10	-
Sb - antimony	mg/kg	< 10	-
As - arsenic	mg/kg	< 10	-
Cr - chromium	mg/kg	< 10	-
Ni - nickel	mg/kg	< 25	-
V - vanadium	mg/kg	< 10	-
Sn - tin	mg/kg	< 10	-
Cu - copper	mg/kg	< 10	-
Fe - ferrum	mg/kg	< 10	-
Mn - manganese	mg/kg	< 25	-
Zn - zinc	mg/kg	< 10	-

Notes to the table:

¹⁾ symbol „<“ means less than limit of detection of the analytical method

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ATTEST

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Sample: Pipe Gerodur RC protect®

Evaluation of the 1st leachate into the testing water after 72 hours.

Parameter	Unit	Parallel leachate		K _{72;1} ¹⁾	Uncertainty ²⁾	K _{0;1} ³⁾
		8616/1-A	8616/1-B			
TOC ⁴⁾	mg/l	< 0,20	< 0,20	< 0,20	-	0,17
CHSK _{Mn} ⁵⁾	mg/l	0,19	0,16	0,18	0,04	-
Colour	mgPt/l	< 5	< 5	< 5	-	< 5
Pb	µg/l	< 1,0	< 1,0	< 1,0	-	< 1,0
Cd	µg/l	< 0,2	< 0,2	< 0,2	-	< 0,2
Ni	µg/l	< 2,0	< 2,0	< 2,0	-	< 2,0
V	µg/l	< 0,5	< 0,5	< 0,5	-	< 0,5
Ba	mg/l	< 0,01	< 0,01	< 0,01	-	< 0,01
pH	-	5,88	5,91	5,90	0,36	5,60
Phenols	mg/l	< 0,005	< 0,005	< 0,005	-	< 0,005
PAU ⁶⁾	µg/l	< 0,001	< 0,001	< 0,001	-	< 0,001

Evaluation of the 2nd leachate into the testing water after 72 hours.

Parameter	Unit	Parallel leachate		K _{72;1} ¹⁾	Uncertainty ²⁾	K _{0;1} ³⁾
		8616/1-A	8616/1-B			
TOC ⁴⁾	mg/l	< 0,20	< 0,20	< 0,20	-	0,15
CHSK _{Mn} ⁵⁾	mg/l	< 0,10	< 0,10	< 0,10	-	-
Colour	mgPt/l	< 5	< 5	< 5	-	< 5
Pb	µg/l	< 1,0	< 1,0	< 1,0	-	< 1,0
Cd	µg/l	< 0,2	< 0,2	< 0,2	-	< 0,2
Ni	µg/l	< 2,0	< 2,0	< 2,0	-	< 2,0
V	µg/l	< 0,5	< 0,5	< 0,5	-	< 0,5
Ba	mg/l	< 0,01	< 0,01	< 0,01	-	< 0,01
pH	-	5,78	5,75	5,77	0,35	5,61
Phenols	mg/l	< 0,005	< 0,005	< 0,005	-	< 0,005
PAU ⁶⁾	µg/l	< 0,001	< 0,001	< 0,001	-	< 0,001

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ATTEST

No. 472108616

Sample: Pipe Gerodur RC protect®

Evaluation of the 3rd leachate into the testing water after 72 hours.

Parameter	Unit	Parallel leachate		K _{72,1} ¹⁾	Uncertainty ²⁾	K _{0,1} ³⁾
		8616/1-A	8616/1-B			
TOC ⁴⁾	mg/l	< 0,20	< 0,20	< 0,20	-	0,18
CHSK _{Mn} ⁵⁾	mg/l	< 0,10	< 0,10	< 0,10	-	-
Colour	mgPt/l	< 5	< 5	< 5	-	< 5
Odour	TON ⁸⁾	1	1	1	-	1
Flavour	TFN ⁸⁾	1	1	1	-	1
Pb	µg/l	< 1,0	< 1,0	< 1,0	-	< 1,0
Cd	µg/l	< 0,2	< 0,2	< 0,2	-	< 0,2
Ni	µg/l	< 2,0	< 2,0	< 2,0	-	< 2,0
V	µg/l	< 0,5	< 0,5	< 0,5	-	< 0,5
Ba	mg/l	< 0,01	< 0,01	< 0,01	-	< 0,01
pH	-	5,63	5,61	5,62	0,34	5,62
Phenols	mg/l	< 0,005	< 0,005	< 0,005	-	< 0,005
PAU ⁶⁾	µg/l	< 0,001	< 0,001	< 0,001	-	< 0,001
1-hexene ⁷⁾	mg/l	< 0,5	< 0,5	< 0,5	-	< 0,5

Notes to the tables:

- ¹⁾ K_{72,n} is the concentration of the analyte after 72 hours of leaching, expressed as an average value from two tested samples of parallel leachates after the subtraction of the blank value, the blank value are not subtracted in case of: odour, flavour and pH
 - ²⁾ the reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%
 - ³⁾ K_{0,n} is the concentration of the analyte after 72 hours of leaching in the blank, expressed as an average value from two tested parallels leachates
 - ⁴⁾ TOC = total organic carbon
 - ⁵⁾ CHSK_{Mn} = permanganate index method
 - ⁶⁾ PAU = polycyclic aromatic hydrocarbons, sum of benzo(b)fluorantene, benzo(k)fluorantene, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene
 - ⁷⁾ 1-hexene, CAS No. 592-41-6, Ref. No. 18820
 - ⁸⁾ TFN = threshold flavour number
TON = threshold odour number
- symbol „<“ means less than limit of detection of the analytical method

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ATTEST

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Sample: Pipe Gerodur RC protect®

Summary results of evaluation 1st – 3rd leachate into the testing water at 23 °C.

Parameter	Unit	K _{72;1} ¹⁾	K _{72;2} ¹⁾	K _{72;3} ¹⁾
TOC ²⁾	mg/l	< 0,20	< 0,20	< 0,20
CHSK _{Mn} ³⁾	mg/l	0,18	< 0,10	< 0,10
Colour	mgPt/l	< 5	< 5	< 5
Odour	TON ⁶⁾	-	-	1
Flavour	TFN ⁶⁾	-	-	1
Pb	µg/l	< 1,0	< 1,0	< 1,0
Cd	µg/l	< 0,2	< 0,2	< 0,2
Ni	µg/l	< 2,0	< 2,0	< 2,0
V	µg/l	< 0,5	< 0,5	< 0,5
Ba	mg/l	< 0,01	< 0,01	< 0,01
pH	-	5,90	5,77	5,62
Phenols	mg/l	< 0,005	< 0,005	< 0,005
PAU ⁴⁾	µg/l	< 0,001	< 0,001	< 0,001
1-hexene ⁵⁾	mg/l	-	-	< 0,5

Notes to the table:

- ¹⁾ K_{72;n} is the concentration of the analyte after 72 hours of leaching, expressed as an average value from the dual samples of parallel leachates after the subtraction of the blank value, the blank value are not subtracted in case of: odour, flavour and pH
 - ²⁾ TOC = total organic carbon
 - ³⁾ CHSK_{Mn} = permanganate index method
 - ⁴⁾ PAU = polycyclic aromatic hydrocarbons, sum of benzo(b)fluorantene, benzo(k)fluorantene, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene
 - ⁵⁾ 1-hexene, CAS No. 592-41-6, Ref. No. 18820
 - ⁶⁾ TFN = threshold flavour number
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ATTEST

No. 472108616

Sample: Pipe Gerodur RC protect®

Calculation of the migration numbers for 3rd leachate. Test water 23°C.

Migration number for parametr	Unit	M ₂₄ , 3 rd leachate
TOC ³⁾	mg.dm ⁻² .d ⁻¹	< 0,0067
CHSK _{Mn} ⁵⁾	mg.dm ⁻² .d ⁻¹	< 0,0034
Pb	µg.dm ⁻² .d ⁻¹	< 0,034
Cd	µg.dm ⁻² .d ⁻¹	< 0,0067
Ni	µg.dm ⁻² .d ⁻¹	< 0,067
V	µg.dm ⁻² .d ⁻¹	< 0,017
Ba	mg.dm ⁻² .d ⁻¹	< 0,00034
Phenols	mg.dm ⁻² .d ⁻¹	< 0,00017
PAU ⁷⁾	µg.dm ⁻² .d ⁻¹	< 0,000034
1-hexene	mg.dm ⁻² .d ⁻¹	< 0,017

Notes to the table:

M₂₄ = migration number for migrated analyte in concentrations per decimetre square per 24 hours, expressed as average from the dual tested samples, symbol „<” means less than limit of detection of the analytical method

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No. 472108616

Sample: Pipe Gerodur RC protect®

Calculation of the modified concentration for 3rd leachate. Test water 23°C.

Parameter	Unit	K _{72,3} ¹⁾	C _{72,3} ²⁾	Limit ³⁾
Colour	mgPt/l	< 5	-	max. 20
Odour	TON ⁸⁾	1	-	max. 2
Flavour	TFN ⁸⁾	1	-	acceptable (max. 2)
pH	-	5,62	-	-
TOC ⁴⁾	mg/l	-	< 0,2	max. 1,0
CHSK _{Mn} ⁵⁾	mg/l	-	< 0,06	max. 0,90
Pb	µg/l	-	< 0,6	max. 1,0
Cd	µg/l	-	< 0,2	max. 0,5
Ni	µg/l	-	< 1,1	max. 2,0
V	µg/l	-	< 0,3	max. 5,0 ⁹⁾
Ba	mg/l	-	< 0,006	max. 0,070 ⁹⁾
Phenols	mg/l	-	< 0,003	max. 0,005 ⁹⁾
PAU ⁶⁾	µg/l	-	< 0,0006	max. 0,010
1-hexene ⁷⁾	mg/l	-	< 0,3	max. 3,0 ¹⁰⁾

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ATTEST

No. 472108616

Sample: Pipe Gerodur RC protect®

Notes to the table:

- 1) $K_{72,n}$ is the concentration of the analyte after 72 hours of leaching, expressed as an average value from the dual samples of parallel leachates after the subtraction of the blank value, the blank value are not subtracted in case of: odour, flavour and pH, symbol „<“ means less than limit of detection of the analytical method
- 2) $C_{72,3}$ is the modified concentration of migrated components for 3st leachate, for conversion factor $F = 5$, geometric factor $F_g = 10$ and operating factor $F_o = 0,5$, symbol „<“ means less than limit of detection of the analytical method
- 3) 10% of the hygienic limit for drinking water according to the Decree of the Czech Health Ministry No. 252/2004 Coll., as amended, annex 1, for TOC is the limit value 20 % of the hygienic limit, for $CHSK_{Mn}$ is the limit value 30 % of the hygienic limit, for the sensorial properties is hygienic limit of the above mentioned Decree, limits have to relation to parameter values of the third leachate $K_{72,3}$
- 4) TOC = total organic carbon
- 5) $CHSK_{Mn}$ = permanganate index method
- 6) PAU = polycyclic aromatic hydrocarbons, sum of benzo(b)fluorantene, benzo(k)fluorantene, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene
- 7) 1-hexene, CAS No. 592-41-6, Ref. No. 18820
- 8) TFN = threshold flavour number
TON = threshold odour number
- 9) 10% of the hygienic limit for drinking water according to the Decree of the Czech Health Ministry No. 409/2005 Sb., as amended, limits are valid for parameter values of the third leachate $K_{72,3}$
- 10) specific migration limit according to Decree of Health Ministry No. 38/2001 Coll., as amended and according to Commission Regulation (EU) No 10/2011

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Sample identification:

The client supplied for the testing the sample – see table No. I

Table I: Sample description and identification

ITC's identification number	Sample identification by client	Description of submitted sample
472108616/1	pipe Gerodur RC protect® (coextruded pipe, inside black and outside blue and/or black with blue stripes), material of inside black layer is Eltex TUB 121 N 6000	cuts of pipe, 40 x 3,7 mm, inside black and outside blue, labelled Gerodur RC protect®

Together with the sample the following document was supplied:

- Declaration of compliance for the product Eltex Superstress TUB 121 N 6000 with Commission Regulation (EU) No. 10/2011, Regulation (EC) No. 1935/2004 of the European Parliament and of the Council and Resolution AP(89) I, issued by company INEOS Olefins & Polymers Europe, on March 11, 2015 and August 5, 2015 - including the information about the substances limited by their specific migration limits;
- statement of the company Gerodur MPM Kunststoffverarbeitung GmbH & Co. KG Germany, that pipes Gerodur RC protect® (coextruded pipe, inside black and outside blue and/or black with blue stripes) and GEROfit® (inside black and outside with blue additional layer) have the same inside black layer from material Eltex TUB 121 N 6000, dated on August 5, 2015.

Sampling method used:

The sample was supplied by the client. The laboratory is not responsible for mistakes caused by the wrong way of sampling.

Work request:

Evaluation of selected hygienic parameters of the sample according to the Decree of the Czech Health Ministry No. 409/2005 Coll. – "Hygienic requirements for articles intended to come into contact with water and for the water treatment in accordance with the law No. 258/2000 Coll. on Public Health Protection as amended.

Opinions and interpretations:

Evaluation of fulfilling of the requirements of the Decree of the Czech Health Ministry No. 409/2005 Coll. for articles intended into direct long time contact with drinking water:

- In the supplied sample heavy metals content was determined by XRF spectroscopy. All critical elements were under limit of detection of the used analytical method - see table on the page 2 of this attest
- According to the article 10 of the Decree of the Czech Health Ministry No. 409/2005 Coll. for the manufacturing of plastics and products made from plastics intended into contact with drinking water, the products shall only be made of the monomers and other initial substances and additives included in the list of monomers and other initial substances listed in the supplements to Decree of the Czech Health Ministry No. 38/2001 Coll. as amended and only up to the limit quantities laid down by that legislation.

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Testing Laboratory – D2

ATTEST No. 472108616

The client supplied the document confirming compliance with the requirements of legislation (see page 9 of this attest – point Sample identification), including the information about the substances limited by their specific migration limits. Migration of components from plastic materials and products shall not exceed specific migration limits (SML) or other restrictions included in the list of substances. The test results of the specific migration of 1-hexene, CAS No. 592-41-6, Ref. No. 18820 and barium in the 3rd leachate meet the required limit values according to the Decree of the Czech Health Ministry No. 409/2005 Coll. – see tables on the pages 5 and 7.

- The supplied sample is intended into the contact with drinking water. The article intended into the direct long time contact with the drinking water shall meet requirements of the article 3 paragraph 2 of the Decree of the Czech Health Ministry No. 409/2005 Coll.

10 % of the hygienic limit set for the drinking water by to the Decree of the Czech Health Ministry No. 252/2004 Coll. (for TOC is the limit value 20 % of the hygienic limit, for the sensorial properties is the limit value the hygienic limit) shall be met. Three subsequent 72-hours leachates into the testing water (deionised water of temperature 23 °C) according to the conditions from Annex No. 1 of the Decree of the Czech Health Ministry No. 409/2005 Coll. were prepared from the supplied samples. The test results for parallel leachates, the average values subtracted by the blank values and blank values are listed in the tables on pages 3 – 6 of this attest. Summary results of evaluation 1st – 3rd leachate into the testing water at 23 °C and calculation of the modified concentration for 3rd leachate together with limit values are listed in the table on the page 7 of this attest.

The tested parameters from the third leachate **meet the requirements of the article 3 paragraph 2 of the Decree of the Czech Health Ministry No. 409/2005 Coll. on the products intended into the direct long time contact with drinking water.**

The supplied sample **doesn't negatively influence the sensorial properties of the water.**

Evaluated by:

MUDr. Beata Frydrychová, on November 2, 2015.

Conclusion:

The comparison of the obtained values of the samples with the requirements of the Decree of the Czech Health Ministry No. 409/2005 Coll. and the evaluation of the conformity with this regulation are listed on the page 1 of this Attest.

Dipl. Ing. Věra Vilímková
Head of the laboratory of analytical chemistry and microbiology

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