EPAL
Grupo Águas de Portugal
Direção de Laboratórios

CONSTRUCTION MATERIALS IN CONTACT WITH WATER INTENDED FOR HUMAN CONSUMPTION

REPORT OF TESTS ON THE INFLUENCE OF MATERIALS ON THE QUALITY OF WATER INTENDED FOR HUMAN CONSUMPTION

WELSPUN PIPE BFSC

VERSION 3
THIS VERSION CANCELS AND REPLACES THE VERSION OF APRIL 2ND 2025
REPORT NO.: 04/2025
INTERNAL CODIFICATION OF TESTS NO.: MAT/03/25
JUNE 11, 2025

CLIENT:
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1. TEST LABORATORY

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2. CLIENT

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Contact: Raúl Bartolomé • **Tel:** +34 667 478 506 • **email:** jraul_bartolome@welspun.com

3. MATERIAL TO BE TESTED

Producer name	WELSPUN CORP.
Production date*	-
Batch*	-
Trade name / Designation*	WELSPUN BFSC
Material type*	Cementitious
General composition*	Blast Furnace Slag Cement Mortar
Shape	Samples
Dimmensions (mm):	
Lenght	91 and 45
Width	91 and 45
Height/Thickness	7
Proposed use*	Water suplly system
Color	Grey
Opacity	Opaque

Date of reception	February 04, 2025
Conditions of reception	Cardboard box

* Information provided by the customer

4. TEST METHODS

The test standards/methods applied to determine the analytical parameters tested were:

- **NP EN 14944-1:2023** – Influence of cementitious products on water intended for human consumption – Test methods – Part 1: Influence of factory made cementitious products on organoleptic parameters (Temperatura 23ºC)

- **EN 14944-3:2023** – Influence of cementitious products on water intended for human consumption – Test methods – Part 3: Migration of substances from factory-made cementitious products (Temperatura 23ºC)

- **Método de ensaio ME 57 (Versão 9 de 08/06/2022)** – Análise semi-quantitativa de compostos orgânicos não específicos por cromatografia gasosa associada à espectrometria de massa. Método de ensaio elaborado com base na norma **EN 15768:2015** – *Influence of materials on water intended for human consumption; GC-MS identification of water leachable organic substances* (Temperatura 23ºC).

5. PROCEDURE

Only the surface that is practically exposed to water for human consumption is placed in contact with the test water.

5.1. SAMPLE PRE CONDITIONING

The material is subjected to a preconditioning procedure where the material is immersed with preconditioning water for five consecutive periods, three of 24 hours, one of 72 hours and a final period of 24 hours, at (23 ± 2) °C.

5.2. MIGRATION

There are 3 consecutive migration periods, with the first one starting immediately after preconditioning. Each migration period lasts for 72 hours at (23 ± 2) °C.

The material is immersed with chlorine-free test water and test water with a free chlorine content of (1.0 ± 0.2) mg. L-1 (see 6.2).

For each migration period, a blank test (non-chlorine and chlorine) is carried out, where the test water is kept under the same conditions as the test, in the absence of the material. Simple tests were carried out for the chemical and physicochemical parameters (blank test and sample test).

At the end of each migration period, the migration waters are removed and sent for analysis to the various parameters.

The migration tests were carried out with non-chlorinated test water and chlorinated test water, a simple test.

6. MIGRATION TESTS

6.1. TEST SCHEDULE

Start date: February 11, 2025

Date of conclusion: February 27, 2025

Table 1 – Test schedule

Test	Begin		End	
	Day	Hour	Day	Hour
Pre treatment	2025-02-11	10h30m	2025-02-12	10h30m
	2025-02-12	10h30m	2025-02-13	10h30m
	2025-02-13	10h30m	2025-02-14	10h30m
	2025-02-14	10h30m	2025-02-17	10h30m
	2025-02-17	10h30m	2025-02-18	10h30m
1st migration	2025-02-18	10h30m	2025-02-21	10h30m
2nd migration	2025-02-21	10h30m	2025-02-24	10h30m
3rd migration	2025-02-24	10h30m	2025-02-27	10h30m

6.2. TEST SCHEDULE – Remaining tests

Start date: May 06, 2025

Date of conclusion: May 22, 2025

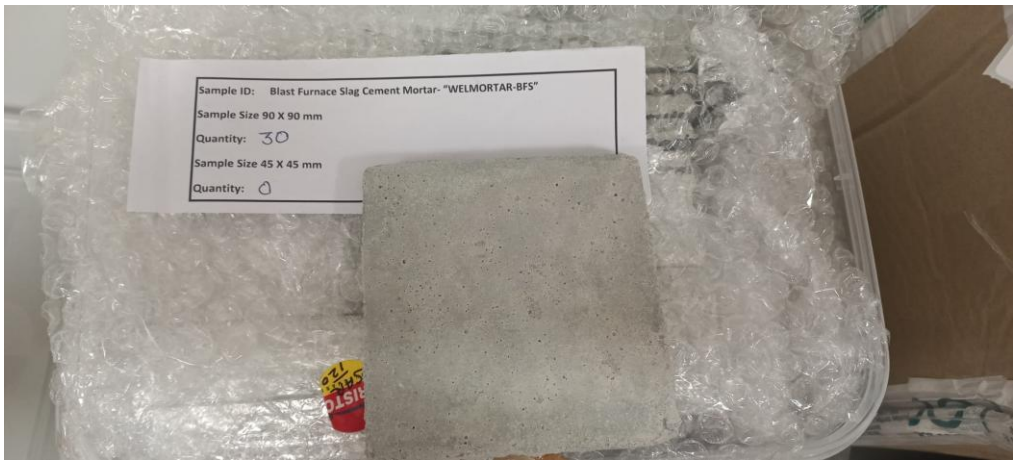
Table 2 – Test schedule

Test	Begin		End	
	Day	Hour	Day	Hour
Pre treatment	2025-05-06	10h30m	2025-05-07	10h30m
	2025-05-07	10h30m	2025-05-08	10h30m
	2025-05-08	10h30m	2025-05-09	10h30m
	2025-05-09	10h30m	2025-05-12	10h30m
	2025-05-12	10h30m	2025-05-13	10h30m
1st migration	2025-05-13	10h30m	2025-05-16	10h30m
2nd migration	2025-05-16	10h30m	2025-05-19	10h30m
3rd migration	2025-05-19	10h30m	2025-05-22	10h30m

6.3. TEST CONDITIONS

Preparation of material for testing:

The preparation of the samples was the responsibility of the Customer, and they were delivered by the Customer to the Laboratory in their final form. It was not necessary to carry out any type of preparation of the specimens in the Laboratory.

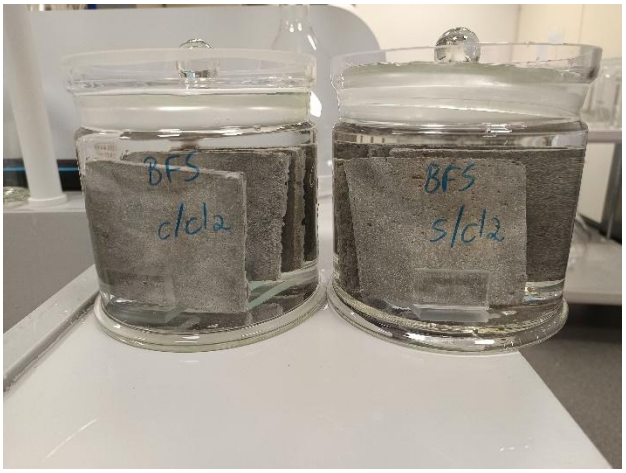


6.3.1. CHEMICAL PARAMETERS (ICP-OES METALS AND GC-MS)

Dimmensions (mm):	
Lenght	91
Width	91
Height/Thickness	7
Surface area of the material in contact with water (dm^2)	8
Ratio S/V (dm^{-1})	5,0

Table 3 – Test conditions for chemical parameters (simple test with non-chlorinated test water and chlorinated test water)

Conditions		Chemical parameters Test with non-chlorinated water	Chemical parameters Test with chlorinated water
General	Nº of samples	7	7
	Water volume (L)	1,5	1,5
	Temperature (ºC)	23 ± 2	23 ± 2
Pre treatment	Water	Preconditioning water	Preconditioning water
	Disinfection	No	No
Migration	Water	Test water	Test water
	Disinfection	No	Yes (1 $mg.L^{-1}$ Cl_2)

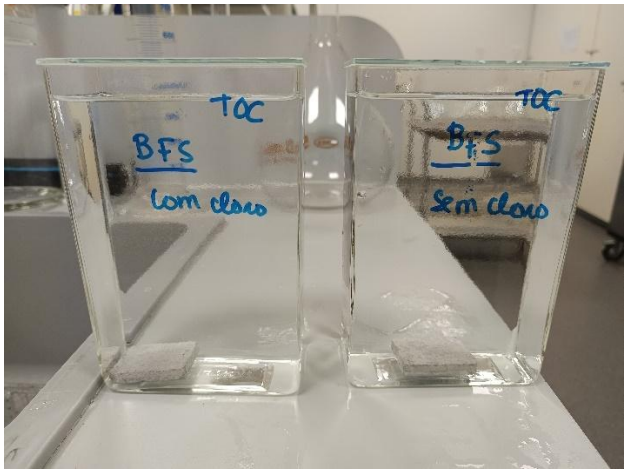


6.3.2 TOC PARAMETER

Dimmensions (mm):	
Lenght	45
Width	45
Height/Thickness	7
Surface area of the material in contact with water (dm^2)	0,33
Ratio S/V (dm^{-1})	0,51

Table 4 – Test conditions for TOC parameter (simple test with non-chlorinated test water and chlorinated test water)

Conditions		TOC Test with non-chlorinated water	TOC Test with chlorinated water
General	Nº of samples	1	1
	Water volume (L)	0,7	0,7
	Temperature (ºC)	23 ± 2	23 ± 2
Pre treatment	Water	Preconditioning water	Preconditioning water
	Disinfection	No	No
Migration	Water	Test water	Test water
	Disinfection	No	Yes (1 $mg.L^{-1}$ Cl_2)



6.3.3 CHEMICAL PARAMETERS (Remaining parameters)

Dimmensions (mm):	
Lenght	91
Width	91
Height/Thickness	7
Surface area of the material in contact with water (dm^2)	11
Ratio S/V (dm^{-1})	5,0

Table 5 – Test conditions for chemical parameters (simple test with non-chlorinated test water and chlorinated test water)

Conditions		Chemical parameters Test with non-chlorinated water	Chemical parameters Test with chlorinated water
General	Nº of samples	10	10
	Water volume (L)	2,2	2,2
	Temperature (ºC)	23 ± 2	23 ± 2
Pre treatment	Water	Preconditioning water	Preconditioning water
	Disinfection	No	No
Migration	Water	Test water	Test water
	Disinfection	No	Yes (1 $mg.L^{-1}$ Cl_2)

6.3.4 ORGANOLEPTIC PARAMETERS

Dimmensions (mm):	
Lenght	45
Width	45
Height/Thickness	7
Surface area of the material in contact with water (dm^2)	0,33
Ratio S/V (dm^{-1})	0,51

Table 6 – Test conditions for Organoleptic parameters (simple test with non-chlorinated test water and chlorinated test water)

Conditions		Organoleptic parameters Test with non-chlorinated water	Organoleptic parameters Test with chlorinated water
General	Nº of samples	1	1
	Water volume (L)	0,7	0,7
	Temperature (ºC)	23 ± 2	23 ± 2
Pre treatment	Water	Preconditioning water	Preconditioning water
	Disinfection	No	No
Migration	Water	Test water	Test water
	Disinfection	No	Yes (1 $mg.L^{-1}$ Cl_2)

7.RESULTS

Table 7 – Results of TOC – Simple test carried out with non-chlorinated test water and chlorinated test water
(All analytical parameters are accredited)

Parameters	Methods	Results 1st migration				Results 2nd migration				Results 3rd migration			
		*25003596 Blank without chlorine	*25003598 Blank with chlorine	*25003597 Sample without chlorine	*25003599 Sample with chlorine	*25003600 Blank without chlorine	*25003602 Blank with chlorine	*25003601 Sample without chlorine	*25003603 Sample with chlorine	*25003604 Blank without chlorine	*25003606 Blank with chlorine	*25003605 Sample without chlorine	*25003607 Sample with chlorine
TOC (mg/L C)	EN 1484:1997	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
Sample reception date	-	21.02.2025	21.02.2025	21.02.2025	21.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	27.02.2025	27.02.2025	27.02.2025	27.02.2025
Test start date	-	24.02.2025	24.02.2025	24.02.2025	24.02.2025	25.02.2025	25.02.2025	25.02.2025	25.02.2025	27.02.2025	27.02.2025	27.02.2025	27.02.2025
Test end date	-	24.02.2025	24.02.2025	24.02.2025	24.02.2025	25.02.2025	25.02.2025	25.02.2025	25.02.2025	27.02.2025	27.02.2025	27.02.2025	27.02.2025

* LABWAY-LIMS samples designation

Table 8 – Results of METALS – Simple test carried out with non-chlorinated test water and chlorinated test water
(All analytical parameters are accredited)

Parameters	Methods	Results 1st migration				Results 2nd migration				Results 3rd migration			
		*25003584 Blank without chlorine	*25003586 Blank with chlorine	*25003585 Sample without chlorine	*25003587 Sample with chlorine	*25003588 Blank without chlorine	*25003590 Blank with chlorine	*25003589 Sample without chlorine	*25003591 Sample with chlorine	*25003592 Blank without chlorine	*25003594 Blank with chlorine	*25003593 Sample without chlorine	*25003595 Sample with chlorine
Boron (mg/L B)	ME 147 s/ digestão (2024/03/25)	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Aluminium (µg/L Al)	ME 147 s/ digestão (2024/03/25)	<20.0	<20.0	25.0 ± 3.3	20.9 ± 2.7	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	20.5 ± 2.7	22.0 ± 2.9
Barium (µg/L Ba)	ME 147 s/ digestão (2024/03/25)	<5.00	<5.00	10.8 ± 1.2	11.5 ± 1.3	<5.00	<5.00	11.7 ± 1.3	12.1 ± 1.3	<5.00	<5.00	10.0 ± 1.1	9.3 ± 1.0
Calcium (mg/L Ca)	ME 147 s/ digestão (2024/03/25)	39.2 ± 3.5	39.1 ± 3.5	21.7 ± 2.0	31.0 ± 2.8	39.7 ± 3.6	39.6 ± 3.6	30.9 ± 2.8	38.9 ± 3.5	38.6 ± 3.5	38.4 ± 3.5	29.4 ± 2.7	28.2 ± 2.5
Iron (µg/L Fe)	ME 147 s/ digestão (2024/03/25)	<20.0	<20.0	21.4 ± 2.8	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Magnesium (mg/L Mg)	ME 147 s/ digestão (2024/03/25)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Manganese (µg/L Mn)	ME 147 s/ digestão (2024/03/25)	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00

Parameters	Methods	Results 1st migration				Results 2nd migration				Results 3rd migration			
		*25003584 Blank without chlorine	*25003586 Blank with chlorine	*25003585 Sample without chlorine	*25003587 Sample with chlorine	*25003588 Blank without chlorine	*25003590 Blank with chlorine	*25003589 Sample without chlorine	*25003591 Sample with chlorine	*25003592 Blank without chlorine	*25003594 Blank with chlorine	*25003593 Sample without chlorine	*25003595 Sample with chlorine
Zinc (µg/L Zn)	ME 147 s/ digestão (2024/03/25)	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Sample reception date	-	21.02.2025	21.02.2025	21.02.2025	21.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	27.02.2025	27.02.2025	27.02.2025	27.02.2025
Test start date	-	21.02.2025	21.02.2025	21.02.2025	21.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	28.02.2025	28.02.2025	28.02.2025	28.02.2025
Test end date	-	24.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	28.02.2025	28.02.2025	28.02.2025	28.02.2025

* LABWAY-LIMS samples designation

Table 9 – Results of Organic Chemical Parameters – Simple test carried out with non-chlorinated test water and chlorinated test water
(All analytical parameters are accredited)

Parameters	Methods	Results 1st migration				Results 2nd migration				Results 3rd migration			
		*25003584	*25003586	*25003585	*25003587	*25003588	*25003590	*25003589	*25003591	*25003592	*25003594	*25003593	*25003595
		Blank without chlorine	**Blank with chlorine**	**Sample without chlorine**	**Sample with chlorine**	**Blank without chlorine**	**Blank with chlorine**	**Sample without chlorine**	**Sample with chlorine**	**Blank without chlorine**	**Blank with chlorine**	**Sample without chlorine**	**Sample with chlorine**
Organic Compounds GC-MS (µg/L)	ME 57 (2022/06/08) Valores estimados	Detetable (see table 10)	Detetable (see table 10)	No detetable	Detetable (see table 10)	No detetable	No detetable	No detetable	No detetable	No detetable	No detetable	No detetable	No detetable
Sample reception date	-	21.02.2025	21.02.2025	21.02.2025	21.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	27.02.2025	27.02.2025	27.02.2025	27.02.2025
Test start date	-	21.02.2025	21.02.2025	21.02.2025	21.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	27.02.2025	27.02.2025	27.02.2025	27.02.2025
Test end date	-	21.02.2025	21.02.2025	21.02.2025	21.02.2025	24.02.2025	24.02.2025	24.02.2025	24.02.2025	27.02.2025	27.02.2025	27.02.2025	27.02.2025

* LABWAY-LIMS samples designation

Table 10 – Results of Organic Compounds GC-MS

Compound	IDENTIFICATION					SEMI QUANTIFICATION	
	CAS number	Retention time (min)	Relative Retention time (min)	Confidence level *	More intense ions	Internal quantification standard	Blank and sample concentration Without chlorine / With chlorine ($\mu g.L^{-1}$)
d5-chlorobenzene	**3114-55-4**	**17.03**	**0.539**	**Positive**	**117 / 82 / 119 / 54**	d5-chlorobenzene	
Chlorobenzene	108-90-7	17.12	0.542	Positive	112/ 77 / 114 / 51	d5-chlorobenzene	Blank without chlorine 1st migration – 2.3 Blank with chlorine 1st migration – 2.3 Sample with chlorine 1st migration – 2.4
2-ethyl-1-hexanol	104-76-7	25.15	0.796	Positive	57 / 41 / 43 / 55	d5-chlorobenzene	Sample with chlorine 1st migration – 2.5

* Confidence level – Tentative – means that the identification of the compound is carried out based on the comparison of the mass spectrum of the compound with a library of mass spectra. Positive – means that the identification of the compound is carried out based on the comparison of the mass spectrum of the compound with a library of mass spectra and identification with a pure standard. Unidentified – means that identification of the compound cannot be performed based on comparison of the mass spectrum of the compound with a library of mass spectra

Table 11 – Results of organoleptic parameters (Color, Turbidity, Odor and Flavour) according to the units of Decree-Law 69/2023
(All analytical parameters are accredited)

Parameters	Methods	Results 1st migration				Results 2nd migration				Results 3rd migration			
		*25009105 Blank without chlorine	*25009107 Blank with chlorine	*25009106 Sample without chlorine	*25009108 Sample with chlorine	*25009109 Blank without chlorine	*25009111 Blank with chlorine	*25009110 Sample without chlorine	*25009112 Sample with chlorine	*25009113 Blank without chlorine	*25009115 Blank with chlorine	*25009114 Sample without chlorine	*25009116 Sample with chlorine
Color (mg/L Pt-Co)	ISO 7887 (2011) Método C	<2	<2	<2	2	<2	<2	<2	<2	<2	<2	<2	<2
Turbidity [1] (UNT)	ISO 7027-1 (2016)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.36 ± 0.04	<0.30
Odor[2] at 25ºC (Fator dil.)	ME 42 (2015/07/29)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Flavour[2] at 25ºC (Fator dil.)	ME 42 (2015/07/29)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sample reception date	-	16.05.2025	16.05.2025	16.05.2025	16.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	22.05.2025	22.05.2025	22.05.2025	22.05.2025
Test start date	-	19.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	22.05.2025	22.05.2025	22.05.2025	22.05.2025
Test end date	-	19.05.2025	19.05.2025	19.05.2025	19.05.2025	21.05.2025	21.05.2025	21.05.2025	21.05.2025	23.05.2025	23.05.2025	23.05.2025	23.05.2025

NOTE 1: UNT turbidity units are equivalent to FNU turbidity units.
* LABWAY-LIMS samples designation

NOTE 2: The determinations of Odor and Flavour follow the EN 1622: 2006 standard, complete paired test method with 5 evaluators/panelists.

Table 12 – Results of organoleptic parameters (Color, Odor and Flavour) according to the units NP EN 14944-1:2023
(All analytical parameters are accredited)

Parameters	Methods	Results 1st migration				Results 2nd migration				Results 3rd migration			
		*25009105 Blank without chlorine	*25009107 Blank with chlorine	*25009106 Sample without chlorine	*25009108 Sample with chlorine	*25009109 Blank without chlorine	*25009111 Blank with chlorine	*25009110 Sample without chlorine	*25009112 Sample with chlorine	*25009113 Blank without chlorine	*25009115 Blank with chlorine	*25009114 Sample without chlorine	*25009116 Sample with chlorine
Color (m^{-1})	ISO 7887 (2011)	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Odor[2] at 25ºC (TON)	EN 1622 (2006)	1	1	1	1	1	1	1	1	1	1	1	1
Flavour[2] at 25ºC (TFN)	EN 1622 (2006)	1	1	1	1	1	1	1	1	1	1	1	1
Sample reception date	-	16.05.2025	16.05.2025	16.05.2025	16.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	22.05.2025	22.05.2025	22.05.2025	22.05.2025
Test start date	-	19.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	22.05.2025	22.05.2025	22.05.2025	22.05.2025
Test end date	-	19.05.2025	19.05.2025	19.05.2025	19.05.2025	21.05.2025	21.05.2025	21.05.2025	21.05.2025	23.05.2025	23.05.2025	23.05.2025	23.05.2025

* LABWAY-LIMS samples designation
NOTE 2: The determinations of Odor and Flavour follow the EN 1622: 2006 standard, complete paired test method with 5 evaluators/panelists.

Table 13 – Results of Inorganic parameters – Simple test carried out with non-chlorinated test water and chlorinated test water
(All analytical parameters are accredited)

Parameters	Methods	Results 1st migration				Results 2nd migration				Results 3rd migration			
		*25009093 Blank without chlorine	*25009095 Blank with chlorine	*25009094 Sample without chlorine	*25009096 Sample with chlorine	*25009097 Blank without chlorine	*25009099 Blank with chlorine	*25009098 Sample without chlorine	*25009100 Sample with chlorine	*25009101 Blank without chlorine	*25009103 Blank with chlorine	*25009102 Sample without chlorine	*25009104 Sample with chlorine
pH (E.Sörensen)	ME 37 (2021/04/29)	7.46 ± 0.20	7.42 ± 0.20	8.81 ± 0.20	8.62 ± 0.20	7.41 ± 0.20	7.48 ± 0.20	8.51 ± 0.20	8.40 ± 0.20	7.31 ± 0.20	7.48 ± 0.20	8.45 ± 0.20	8.57± 0.20
pH determination temperature (ºC)	Temp. pH test performance	21.9	21.9	21.9	21.8	22.1	22.0	22.2	21.9	21.9	22.0	22.0	22.0
Conductivity (µS/cm 20°C)	SMEWW 2510-B (24.ª Edição)	381 ± 19	366 ± 18	291 ± 15	306 ± 15	369 ± 18	360 ± 18	311 ± 16	341 ± 17	365 ± 18	372 ± 19	327 ± 16	287 ± 14
Alkalinity (mg/L $CaCO_3$)	SMEWW 2510-B (24.ª Edição)	99 ± 13	94 ± 12	50.6 ± 6.6	60.1 ± 7.8	93 ± 12	92 ± 12	63.5 ± 8.3	79 ± 10	93 ± 12	93 ± 12	74.0 ± 9.6	64.8 ± 8.4
Antimony (µg/L Sb)	ME 142 (2025/03/28)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic (µg/L As)	ME 142 (2025/03/28)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium	ME 142 (2025/03/28)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Parameters	Methods	Results 1st migration				Results 2nd migration				Results 3rd migration			
		*25009093 Blank without chlorine	*25009095 Blank with chlorine	*25009094 Sample without chlorine	*25009096 Sample with chlorine	*25009097 Blank without chlorine	*25009099 Blank with chlorine	*25009098 Sample without chlorine	*25009100 Sample with chlorine	*25009101 Blank without chlorine	*25009103 Blank with chlorine	*25009102 Sample without chlorine	*25009104 Sample with chlorine
(µg/L Cd)													
Plumb (µg/L Pb)	ME 142 (2025/03/28)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt (µg/L Co)	ME 142 (2025/03/28)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cupper (µg/L Cu)	ME 142 (2025/03/28)	<1.00	<1.00	1.19 ± 0.24	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Chromium (µg/L Cr)	ME 142 (2025/03/28)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Lithium (µg/L Li)	ME 142 (2025/03/28)	<1.00	1.14 ± 0.23	6.0 ± 1.2	5.2 ± 1.0	<1.00	<1.00	5.2 ± 1.0	3.98 ± 0.80	<1.00	<1.00	4.60 ± 0.92	4.75 ± 0.95
Nickel (µg/L Ni)	ME 142 (2025/03/28)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	2.35 ± 0.47	<1.00
Selenium (µg/L Se)	ME 142 (2025/03/28)	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Mercury (µg/L Hg)	ME 35 (2023/12/15)	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Sample reception date	-	16.05.2025	16.05.2025	16.05.2025	16.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	22.05.2025	22.05.2025	22.05.2025	22.05.2025

Parameters	Methods	Results 1st migration				Results 2nd migration				Results 3rd migration			
		*25009093 Blank without chlorine	*25009095 Blank with chlorine	*25009094 Sample without chlorine	*25009096 Sample with chlorine	*25009097 Blank without chlorine	*25009099 Blank with chlorine	*25009098 Sample without chlorine	*25009100 Sample with chlorine	*25009101 Blank without chlorine	*25009103 Blank with chlorine	*25009102 Sample without chlorine	*25009104 Sample with chlorine
Test start date	-	16.05.2025	16.05.2025	16.05.2025	16.05.2025	19.05.2025	19.05.2025	19.05.2025	19.05.2025	22.05.2025	22.05.2025	22.05.2025	22.05.2025
Test end date	-	06.06.2025	06.06.2025	06.06.2025	06.06.2025	03.06.2025	03.06.2025	03.06.2025	03.06.2025	03.06.2025	03.06.2025	03.06.2025	03.06.2025

* LABWAY-LIMS samples designation

Table 14 – Results of MIGRATION RATES

	1st migration sample – without chlorine 1st migration sample – with chlorine	2nd migration sample – without chlorine 2nd migration sample – with chlorine	3rd migration sample – without chlorine 3rd migration sample – with chlorine
Aluminium	M_1 without chlorine = 1.7 µg.dm^{-2} d^{-1} M_1 with chlorine = 1.4 µg.dm^{-2} d^{-1}	-	M_3 without chlorine = 1.4 µg.dm^{-2} d^{-1} M_3 with chlorine = 1.5 µg.dm^{-2} d^{-1}
Barium	M_1 without chlorine = 0.72 µg.dm^{-2} d^{-1} M_1 with chlorine = 0.77 µg.dm^{-2} d^{-1}	M_2 without chlorine = 0.78 µg.dm^{-2} d^{-1} M_2 with chlorine = 0.81 µg.dm^{-2} d^{-1}	M_3 without chlorine = 0.67 µg.dm^{-2} d^{-1} M_3 with chlorine = 0.62 µg.dm^{-2} d^{-1}
Cupper	M_1 without chlorine = 0.08 µg.dm^{-2} d^{-1} -	-	-
Lithium	M_1 without chlorine = 0.40 µg.dm^{-2} d^{-1} M_1 with chlorine = 0.35 µg.dm^{-2} d^{-1}	M_2 without chlorine = 0.35 µg.dm^{-2} d^{-1} M_2 with chlorine = 0.27 µg.dm^{-2} d^{-1}	M_3 without chlorine = 0.31 µg.dm^{-2} d^{-1} M_3 with chlorine = 0.32 µg.dm^{-2} d^{-1}
Nickel	-	-	M_3 without chlorine = 0.16 µg.dm^{-2} d^{-1}
2-ethyl-1-hexanol	M_1 with chlorine = 0.17 µg.dm^{-2} d^{-1}	-	-

Table 15 – Results of Concentration in tap water C_{tap} and MAXIMUM TOLERABLE CONCENTRATION, MTC_{tap}

	3rd MIGRATION SAMPLE		
Parameters	**Concentration in tap water (C_{tap})**	**Maximum tolerable concentration (MTC_{tap})**	**Reference value**
Aluminium	C_{tap} = 14 µg/L without chlorine C_{tap} = 15 µg/L with chlorine (Conversion factor = 10)	MTC_{tap} = 30 µg/L	Annex V Implementing Decision (EU) 2024/367 of 23 January 2024

Barium	C_{tap} = 6.7 µg/L without chlorine C_{tap} = 6.2 µg/L with chlorine (Conversion factor = 10)	MTC_{tap} = 50 µg/L	Annex V Implementing Decision (EU) 2024/367 of 23 January 2024
Lithium	C_{tap} = 3.1 µg/L without chlorine C_{tap} = 3.2 µg/L with chlorine (Conversion factor = 10)	MTC_{tap} = 30 µg/L	Annex V Implementing Decision (EU) 2024/367 of 23 January 2024
Nickel	C_{tap} = 1.6 µg/L without chlorine (Conversion factor = 10)	MTC_{tap} = 2.0 µg/L	Annex V Implementing Decision (EU) 2024/367 of 23 January 2024

8. APPRECIATION OF RESULTS

THE OPINION OR OPINION EXPRESSED IN THIS REPORT ARE NOT INCLUDED IN THE SCOPE OF ACCREDITATION

To assess the results, the limits established in Decree - Law No. 69/2023, of August 21, referring to water intended for human consumption, Commission Regulation No. 10/2011 of January 14, 2011 were taken as a reference. concerning plastic materials and objects intended to come into contact with food, the positive list 4MS combined list of monomers, other starting substances, additives, PPAs and APs for products coming into contact with drinking water, the list of substances of the Synoptic document – Provisional list of monomers and additives notified to the European Commission as substances which may be used in the manufacture of plastics or coatings intended to come into contact with foodstuffs, the Guidelines for drinking water quality (4th edition) of the World Health Organization and the USEPA Guidelines and COMMISSION IMPLEMENTING DECISION (EU) 2024/368 of 23 January 2024 laying down rules for implementing Directive (EU) 2020/2184 of the European Parliament and of the Council with regard to testing and acceptance procedures and methods of the final materials used in products that come into contact with water intended for human consumption and COMMISSION IMPLEMENTING DECISION (EU) 2024/367 of 23 January 2024 laying down implementing rules for Directive (EU) 2020/2184 of the European Parliament and of the Council as regards the establishment of European positive lists of starting substances , compositions and constituents whose use is authorized for the manufacture of materials or products that come into contact with water intended for human consumption.

8.1 INORGANIC CHEMICAL PARAMETERS

With regard to inorganic chemical parameters, the material meet the requirements of Decree-Law No. 69/2023, referring to water intended for human consumption, and the requirements defined in COMMISSION IMPLEMENTING DECISION (EU) 2024/368 of 23 January 2024 laying down rules for implementing Directive (EU) 2020/2184 of the European Parliament and of the Council with regard to testing and acceptance procedures and methods of the final materials used in products that come into contact with water intended for human consumption and COMMISSION IMPLEMENTING DECISION (EU) 2024/367 of 23 January 2024 laying down implementing rules for Directive (EU) 2020/2184 of the European Parliament and of the Council

as regards the establishment of European positive lists of starting substances , compositions and constituents whose use is authorized for the manufacture of materials or products that come into contact with water intended for human consumption.

The estimated concentration for consumer tap water (Ctap), taking as a reference the value obtained in the final extract after 9 days, for **Aluminium** was 14 μg/L and 15 μg/L for the test without chlorine and for the test with chlorine, respectively. (Using conversion factor of 10).
The MTCap value for Aluminium is 30 μg/L, in accordance with the Annexes of COMMISSION IMPLEMENTING DECISION (EU) 2024/367 of 23 January 2024.
Comparing the estimated concentration for water in the consumer's tap with the maximum tolerable concentration (MTCap), it is verified whether the requirements are met.

The estimated concentration for consumer tap water (Ctap), taking as a reference the value obtained in the final extract after 9 days, for **Barium** was 6.7 μg/L and 6.2 μg/L for the test without chlorine and for the test with chlorine, respectively. (Using conversion factor of 10).
The MTCap value for Barium is 50 μg/L, in accordance with the Annexes of COMMISSION IMPLEMENTING DECISION (EU) 2024/367 of 23 January 2024.
Comparing the estimated concentration for water in the consumer's tap with the maximum tolerable concentration (MTCap), it is verified whether the requirements are met.

The estimated concentration for consumer tap water (Ctap), taking as a reference the value obtained in the final extract after 9 days, for **Lithium** was 3.1 μg/L and 3.2 μg/L for the test without chlorine and for the test with chlorine, respectively. (Using conversion factor of 10).
The MTCap value for Lithium is 30 μg/L, in accordance with the Annexes of COMMISSION IMPLEMENTING DECISION (EU) 2024/367 of 23 January 2024.
Comparing the estimated concentration for water in the consumer's tap with the maximum tolerable concentration (MTCap), it is verified whether the requirements are met.

The estimated concentration for consumer tap water (Ctap), taking as a reference the value obtained in the final extract after 9 days, for **Nickel** was 1.6 μg/L for the test without chlorine. (Using conversion factor of 10).
The MTCap value for Nickel is 2.0 μg/L, in accordance with the Annexes of COMMISSION IMPLEMENTING DECISION (EU) 2024/367 of 23 January 2024.

Comparing the estimated concentration for water in the consumer's tap with the maximum tolerable concentration (MTCap), it is verified whether the requirements are met.

8.2 ORGANIC CHEMICAL PARAMETERS

No presence was detected in samples from material migration tests, at the end of the third migration, with concentrations above 2 µg.L-1, a value above which all compounds must be reported, as indicated in the proposed standard EN 15768:2015 The GC-MS identification of water leachable organic substances from materials in contact with water intended for human consumption.

9 FINAL APPRECIATION

THE OPINION OR OPINION EXPRESSED IN THIS REPORT ARE NOT INCLUDED IN THE SCOPE OF ACCREDITATION

Based on the tests carried out, THIS MATERIAL MEETS THE CRITERIA DEFINED IN THE COMMISSION IMPLEMENTING DECISION (EU) 2024/367 January 23, 2024 laying down rules for implementing Directive (EU) 2020/2184 of the European Parliament and of the Council with regard to the establishment of European positive lists of starting substances, compositions and constituents whose use is authorized for the manufacture of materials and DEFINED IN THE COMMISSION IMPLEMENTING DECISION (EU) 2024/368 January 23, 2024 laying down rules for implementing Directive (EU) 2020/2184 of the European Parliament and of the Council with regard to testing procedures and methods and acceptance of the final materials used in products that come into contact with water intended for human consumption.

In accordance with article 34 of Decree-Law 69/2023 – Minimum hygiene requirements applicable to materials that come into contact with water intended for human consumption – it is stated that materials intended for use in new installations or, in the case of repair or reconstruction work on existing installations for the collection, treatment, storage and adduction or distribution into the public network and the building network of water intended for human consumption and which come into contact with that water:

a) a) They do not directly or indirectly compromise the protection of human health, as provided for in this decree-law;
b) b) Do not negatively affect the color, odor or flavor of the water;
c) c) They do not favor microbial growth;
d) d) They do not release contaminants into the water at levels higher than those necessary taking into account the intended purpose of the material.

Based on the results presented in this report, the **WELSPUN PIPE BFSC** is approved for use in contact with water intended for human consumption, in the EPAL supply system.

Approval of the material only concerns the assessment of the influence of materials on the quality of water for human consumption with regard to physical-chemical, chemical and organoleptic changes, in accordance with current European migration testing standards. Approval is not related to the physical characteristics of the materials.

Lisbon, June 11 2025

EPAL-Empresa Portuguesa das Águas Livres, S.A. Direção de Laboratórios O Diretor	Responsável de Área do Laboratório de Química Orgânica	Técnica Responsável pelos Ensaios a Materiais
RUI MIGUEL MENEZES DAS NEVES CARNEIRO Digitally signed by RUI MIGUEL MENEZES DAS NEVES CARNEIRO Date: 2025.06.12 12:43:00 +01'00'	Assinado por : **VÍTOR MANUEL DO VALE CARDOSO** Num. de Identificação: 06995231 Data: 2025.06.11 14:52:24+01'00' CHAVE MÓVEL	Assinado por: Ana Isabel Roque dos Santos Penetra Identificação: BI11722322 Data: 2025-06-11 às 14:38:05
(Rui Neves Carneiro)	(Vitor Vale Cardoso)	(Ana Penetra)