REPORT	4590674
Title/Description:	MIGRATION REPORT
Date of issue::	28/05/2024
CUSTOMER	
Business name:	NORDITUBE Technologies SE
	LABAQUA, S.A.U.
Center responsible for the report:	Centro de Alicante C/ Dracma 16-18 PI Atalayas. 03114 Alicante
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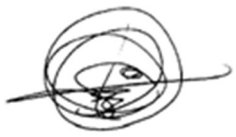		
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Technical director	**Head of Chromatography Department**	**Analyst**

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1. INTRODUCTION AND GENERAL INFORMATION

The company NORDITUBE Technologies SE. has required a migration study of a material used to be in contact with water for human consumption.

LABORATORY DATA:

LABAQUA S.A.

Adress:
C/ Dracma, 16-18
Polígono Industrial Las Atalayas
03114 – Alicante
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Phone: 965 10 60 70
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info@labaqua.com

CLIENT DATA:

NORDITUBE Technologies SE.

2. ELEMENTS OF STUDY DESCRIPTION

Material pieces: Industrial material.

Use: This material is intended for use in drinking water installations.

Trade name and batch: Uknown
Date of receipt at LABAQUA: 08/01/2024
Maker: NORDITUBE Technologies SE.

Samples remitted by: NORDITUBE Technologies SE.

Samples prepared by: NORDITUBE Technologies SE.

Assay pieces preparation: The sample consists of pieces of material with the following dimensions

Dimensions:
S = 1 dm2 each piece, 10 Total pieces
Volume: 2 L
Ratio S/V = **5.00 dm^{-1}**

Figure 1. Image of the test piece.

3. EXPERIMENTAL PROCEDURE

The present study is based on UNE-EN ISO 12873-1: 2014 Regulation: Influencia de los materiales sobre el agua destinada al consumo humano. Influencia de la migración. Parte 1: Método de ensayo de materiales de fabricación industrial que estén constituidos o contengan materiales orgánicos o vítreos (esmaltes vítreos o de porcelana).

When the migration water was obtained, the water sample was analyzed, indicated in the Annex I, in order to calculate the migration rate, 7985756-Blank, y 7985755-Sample.

According with this Regulation and with CEN/CENELEC regulations, all the European countries are required to reach the specifications indicated.

Table 1. General information about the migration test:

Parámetro	Datos
Total number of sheets	10 pieces
Final water volume	2 L
Disinfection process	Not appropriate for this test
Sample Surface.	1 dm2 each piece
Ratio S/V	5.00 dm-1
Water assay	Chlorinated water with an active chlorine (Cl2) content of 1ppm.
Water assay time and temperature.	Chlorinated water at 23.2 ± 2 ºC for 72 ± 1h
Test deviations	No deviations..
Incidents	No incidents
Static Contact	04/04/2024 11:00h – 05/04/2024 11:00h

Date and time of the start of the migration test	05/04/2024 11:00h
Date and time of completion of the migration trial	08/04/2024 11:30h

Reagents used

- Tap water from the laboratory.
- Chlorinated water with an active chlorine (Cl2) content of 1ppm
- Lab's material
- Stove (B-194) calibrated at 23ºC.

Migration steps

- Sampling, shipment and preservation. The sample was provided by the company NORDITUBE Technologies SE. No special preservation condition was required.

- Sample preparationo. The samples were already received cut and prepared by the client himself. Each sample consists of 10 test pieces.

- Pretreatment of test pieces. The pretreatment consists of an initial washing of the samples by flowing tap water at a speed between 1m/min and 3m/min for 60±5 minutes in an upward current.

- Static contact period. The pieces are completely immersed in 2 liters of test water for 1 period of 24 hours. In this case, no disinfection treatment was required.

- Migration assay. The test is carried out in 2 L of test water (Chlorinated water with an active Chlorine content of 1ppm) at 23±2 ºC. To carry out the migration test, samples of the liquid that had been in contact with the samples were taken 3 days after the start of the test at the indicated temperature. A blank sample was made in the same way. This report includes the results obtained for the first cycle of the sample.

- Analysis. The concentration of the compounds was determined using the internal procedures indicated in the analysis report.

4.Results.

Sample codification.

Table 2. Sample denomination.

Analysis date	Code	Sample name	Total migration period (hours)
08/04/2024	7985755	NORDILINE PE	72±1h
08/04/2024	7985756	NORDILINE PE. BLANCO	72±1h

Analytical results:

Below are the results of the migration test of the compounds that appear in the organic analysis and Screening report:

7985755 (NORDILINE PE)

Compound	Value	Units
1,2-Dichloroethane	< 0.5	µg/L
Perfluorohexane sulfonic acid (PFHxS)	< 0.005	µg/L
Perfluorononanoic acid (PFNA)	< 0.005	µg/L
Perfluorooctane sulfonic acid (PFOS)	< 0.010	µg/L
Perfluorooctanoic acid (PFOA)	< 0.005	µg/L

Acrylamide	< 0.05	µg/L
Aldrin	< 0.0200	µg/L
Aluminium	< 2	µg/L
Amonio	< 0.05	mg/L
Antimony	< 2	µg/L
Arsenic	< 2	µg/L
Barium	< 2	µg/L
Organic Compounds screening BS EN 15768	Informe adjunto	--
Benzene	< 0.5	µg/L
Benzo-(g,h,i)-perylene	< 0.0100	µg/L
Benzo-a-pyreno	< 0.0050	µg/L
Benzo-b-fluoranthene	< 0.0100	µg/L
Benzo-k- fluoranthene	< 0.0100	µg/L
Berilio	< 2	µg/L
Bicarbonates	< 4.0	mg/L
Bisphenol A	< 0.02	µg/L
Boron	**45**	**µg/L**
Bromates	< 10	µg/L
Cadmium	< 1	µg/L

Calcium	< 1.0	mg/L
Carbonates	< 2.0	mg/L
Total Organic Carbon	**1.9**	**mg/L**
Total cyanides	<5	µg/L
Chlorates	**0.496**	**mg/L**
Chlorites	< 0.100	mg/L
Residual Combined Chlorine	< 0.05	mg/L
Free Residual Chlorine	**0.31**	**mg/L**
Total Residual Chlorine	**0.35**	**mg/L**
Vinyl chloride	< 0.1	µg/L
Chlorides	**1.9**	**mg/L**
Cobalt	< 2	µg/L
Copper	< 2	µg/L
Color	< 1.0	mg/L Pt/Co
Conductivity at 20ºC	< 20	µS/cm
Chromium	< 2	µg/L
Dieldrin	< 0.0100	µg/L
Epichlorohydrin	< 0.1	µg/L
Fluorides	< 0.10	mg/L

Heptachlor	< 0.0100	µg/L
Epoxide Heptachlor	< 0.0100	µg/L
Iron	< 10	µg/L
Indene[1,2,3-c,d]pyrene	< 0.0100	µg/L
Manganese	< 2	µg/L
Mercury	< 0.20	µg/L
Niquel	< 2	µg/L
Nitrates	< 0.5	mg/L
Nitrites	< 0.05	mg/L
Odour at 23ºC	**1**	**Ind. de dil.**
Oxidability	**0.83**	**mg O_2/L**
pH	**7.1**	**U. pH.**
Silver	< 2	µg/L
Lead	< 2	µg/L
Taste at 23ºC	**1**	**Ind. de dil.**
Selenium	< 2	µg/L
Sodium	**1.8**	**mg/L**
Sulphates	< 1.0	mg/L
Sum of 4 perfluorinated	< 0.10	µg/L

Turbidity	< 0.20	UNF
Vanadium	< 2	µg/L
Zinc	< 2	µg/L

7985756(NORDILINE PE. BLANCO)

Analito	Valor	Unidades
1,2-Dichloroethane	< 0.5	µg/L
Perfluorohexane sulfonic acid (PFHxS)	< 0.005	µg/L
Perfluorononanoic acid (PFNA)	< 0.005	µg/L
Perfluorooctane sulfonic acid (PFOS)	< 0.010	µg/L
Perfluorooctanoic acid (PFOA)	< 0.005	µg/L
Acrylamide	< 0.05	µg/L
Aldrin	< 0.0200	µg/L
Aluminium	< 2	µg/L
Amonio	< 0.05	mg/L
Antimony	< 2	µg/L
Arsenic	< 2	µg/L

Barium	< 2	µg/L
Organic Compounds screening BS EN 15768	Informe adjunto	--
Benzene	< 0.5	µg/L
Benzo-(g,h,i)-perylene	< 0.0100	µg/L
Benzo-a-pyreno	< 0.0050	µg/L
Benzo-b-fluoranthene	< 0.0100	µg/L
Benzo-k- fluoranthene	< 0.0100	µg/L
Berilio	< 2	µg/L
Bicarbonates	< 4.0	mg/L
Bisphenol A	< 0.02	µg/L
Boron	**45**	**µg/L**
Bromates	< 10	µg/L
Cadmium	< 1	µg/L
Calcium	< 1.0	mg/L
Carbonates	< 2.0	mg/L
Total Organic Carbon	< 0.5	mg/L
Total cyanides	<5	µg/L
Chlorates	**0.506**	**mg/L**
Chlorites	< 0.100	mg/L

Residual Combined Chlorine	< 0.05	mg/L
Free Residual Chlorine	**0.84**	**mg/L**
Total Residual Chlorine	**0.88**	**mg/L**
Vinyl chloride	< 0.1	µg/L
Chlorides	**1.9**	**mg/L**
Cobalt	< 2	µg/L
Copper	< 2	µg/L
Color	< 1.0	mg/L Pt/Co
Conductivity at 20ºC	< 20	µS/cm
Chromium	< 2	µg/L
Dieldrin	< 0.0100	µg/L
Epichlorohydrin	< 0.1	µg/L
Fluorides	< 0.10	mg/L
Heptachlor	< 0.0100	µg/L
Epoxide Heptachlor	< 0.0100	µg/L
Iron	< 10	µg/L
Indene[1,2,3-c,d]pyrene	< 0.0100	µg/L
Manganese	< 2	µg/L
Mercury	< 0.20	µg/L

Niquel	< 2	µg/L
Nitrates	< 0.5	mg/L
Nitrites	< 0.05	mg/L
Odour at 23ºC	**1**	**Ind. de dil.**
Oxidability	< 0.20	mg O_2/L
pH	**7.5**	**U. pH.**
Silver	< 2	µg/L
Lead	< 2	µg/L
Taste at 23ºC	**1**	**Ind. de dil.**
Selenium	< 2	µg/L
Sodium	**1.8**	**mg/L**
Sulphates	< 1.0	mg/L
Sum of 4 perfluorinated	< 0.10	µg/L
Turbidity	< 0.20	UNF
Vanadium	< 2	µg/L
Zinc	< 2	µg/L

The migration rate (M) was calculated using the following equation:

$$M = c_n / (S / V \cdot t)\ [\text{mg dm}^{-2}\text{d}^{-1}]$$

Where:

M = Migration rate

c_n = The concentration obtained (expressed as mg/L and calculated with (cn = an – bn) where an is the concentration obtained in the migration and bn the concentration obtained in the blank).

t = Migration period (**3 days**)

S/V = rate surface / volume in dm^{-1} (**5.00dm^{-1}**).

Migration rate calculation:

Table 2.1. Results sample 7799387 at 23±1 ºC.

Compuesto	b_n^T	a_n^T	c_n^T	M_n^T
1,2-Dichloroethane	< 0.5 µg/L	< 0.5µg/L	< 0.5 µg/L	< 3.33 ×10^{-5} mg/dm^2 day
Perfluorohexane sulfonic acid (PFHxS)	< 0.005 µg/L	< 0.005 µg/L	< 0.005 µg/L	< 3.33 ×10^{-7} mg/dm^2 day
Perfluorononanoic acid (PFNA)	< 0.005 µg/L	< 0.005 µg/L	< 0.005 µg/L	< 3.33 ×10^{-7} mg/dm^2 day
Perfluorooctane sulfonic acid (PFOS)	< 0.010 µg/L	< 0.010 µg/L	< 0.010 µg/L	< 6.67 ×10^{-7} mg/dm^2 day
Perfluorooctanoic acid (PFOA)	< 0.005 µg/L	< 0.005 µg/L	< 0.005 µg/L	< 3.33 ×10^{-7} mg/dm^2 day
Acrylamide	< 0.05 µg/L	< 0.05 µg/L	< 0.05 µg/L	< 3.33 ×10^{-6} mg/dm^2 day

Aldrin	< 0.02 µg/L	< 0.02 µg/L	< 0.02µg/L	< 1.33 ×10^{-6} mg/dm^2 day
Aluminium	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33 ×10^{-4} mg/dm^2 day
Amonio	< 0.05 mg/L	< 0.05 mg/L	< 0.05 mg/L	< 3.33 ×10^{-2} mg/dm^2 day
Antimony	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33 ×10^{-4} mg/dm^2 day
Arsenic	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33 ×10^{-4} mg/dm^2 day
Barium	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33 ×10^{-4} mg/dm^2 day
Benzene	< 0.5 µg/L	< 0.5 µg/L	< 0.5 µg/L	< 3.33 ×10^{-5} mg/dm^2 day
Benzo-(g,h,i)-perylene	< 0.01 µg/L	< 0.01 µg/L	< 0.01µg/L	< 6.67 ×10^{-6} mg/dm^2 day
Benzo-a-pyreno	< 0.005 µg/L	< 0.005 µg/L	< 0.005 µg/L	<3.33 ×10^{-7} mg/dm^2 day
Benzo-b-fluoranthene	< 0.01 µg/L	< 0.01 µg/L	< 0.01µg/L	< 6.67 ×10^{-6} mg/dm^2 day
Benzo-k- fluoranthene	< 0.01 µg/L	< 0.01 µg/L	< 0.01µg/L	< 6.67 ×10^{-6} mg/dm^2 day
Berylium	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33 ×10^{-4} mg/dm^2 day

Bicarbonates	< 4.0 mg/L	< 4.0 mg/L	< 4.0 mg/L	< 0.27 mg/dm^2 day
Bisphenol A	< 0.02 µg/L	< 0.02 µg/L	< 0.02µg/L	< 1.33 ×10^{-6} mg/dm^2 day
Boron	45 µg/L	45 µg/L	< 10 µg/L	< 6.67 ×10^{-4} mg/dm^2 day
Bromates	< 10 µg/L	< 10 µg/L	< 10 µg/L	< 6.67 ×10^{-4} mg/dm^2 day
Cadmium	< 1 µg/L	< 1 µg/L	< 1 µg/L	< 6.67 ×10^{-5} mg/dm^2 day
Calcium	< 1 mg/L	< 1 mg/L	< 1 mg/L	< 6.67 ×10^{-2} mg/dm^2 day
Carbonate	< 2 mg/L	< 2 mg/L	< 2 mg/L	< 1.33 ×10^{-1} mg/dm^2 day
Total Organic Carbon	**< 0.5 mg/L**	**1.9 mg/L**	**1.9 mg/L**	**1.27 mg/dm^2 day**
Total cyanides	< 5 µg/L	< 5 µg/L	< 5 µg/L	< 3.33 ×10^{-4} mg/dm^2 day
Chlorates	0.506 mg/	0.496 mg/	< 0.100 mg/L	< 6.67 ×10^{-3} mg/dm^2 day
Chlorites	< 0.1mg/L	< 0.1mg/L	< 0.1mg/L	< 6.67 ×10^{-3} mg/dm^2 day
Vinyl chloride	< 0.1 µg/L	< 0.1 µg/L	< 0.1 µg/L	< 6.67 ×10^{-6} mg/dm^2 day

Chlorides	1.9 mg/L	1.9 mg/L	< 1.0 mg/L	< 6.67×10^{-2} mg/dm^2 day
Cobalt	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day
Copper	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day
Chromium	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day
Dieldrin	< 0.01 µg/L	< 0.01 µg/L	< 0.01µg/L	< 6.67×10^{-6} mg/dm^2 day
Epichlorohydrin	< 0.1 µg/L	< 0.1 µg/L	< 0.1 µg/L	< 6.67×10^{-6} mg/dm^2 day
Fluorides	< 0.10 mg/L	< 0.10 mg/L	< 0.10 mg/L	< 6.67×10^{-3} mg/dm^2 day
Heptachlor	< 0.01 µg/L	< 0.01 µg/L	< 0.01µg/L	< 6.67×10^{-6} mg/dm^2 day
Epoxide Heptachlor	< 0.01 µg/L	< 0.01 µg/L	< 0.01µg/L	< 6.67×10^{-6} mg/dm^2 day
Iron	< 10 µg/L	< 10 µg/L	< 10 µg/L	< 6.67×10^{-4} mg/dm^2 day
Indene[1,2,3-c,d]pyrene	< 0.01 µg/L	< 0.01 µg/L	< 0.01µg/L	< 6.67×10^{-6} mg/dm^2 day
Manganese	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day

Mercury	< 0.20 µg/L	< 0.20 µg/L	< 0.20 µg/L	< 1.33×10^{-5} mg/dm^2 day
Niquel	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day
Nitrates	< 0.5 mg/L	< 0.5 mg/L	< 0.5 mg/L	< 3.33×10^{-2} mg/dm^2 day
Nitrites	< 0.05 mg/L	< 0.05 mg/L	< 0.05 mg/L	< 3.33×10^{-3} mg/dm^2 day
Silver	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day
Lead	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day
Selenium	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day
Sodium	1.8 mg/L	1.8 mg/L	< 1.0 mg/L	< 6.67×10^{-2} mg/dm^2 day
Sulphates	< 1.0 mg/L	< 1.0 mg/L	< 1.0 mg/L	< 6.67×10^{-2} mg/dm^2 day
Sum of 4 perfluorinates	< 0.10 µg/L	< 0.10 µg/L	< 0.10 µg/L	< 6.67×10^{-6} mg/dm^2 day
Vanadium	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day
Zinc	< 2 µg/L	< 2 µg/L	< 2 µg/L	< 1.33×10^{-4} mg/dm^2 day

5. Conclusions

The parameters indicated in Table 2.1 have been analyzed in the water obtained after the migration period calculating its maximum migration rate.

- The material studied and coded as 7985755 (NORDILINE PE.) complies with section I of Annex IX of RD3/2023, because no compounds have been found outside the positive lists.
- **Total Organic Carbon** and **Oxidability** compounds do not exceed the maximum value established by RD3/2023.