

TEST REPORT PER/13731-25

1. Identification

Applicant	: AR4 Comercio e Servicios LTDA
Applicant's address	: Av. Senador Vergueiro, 2123 - Sala 1205, Centro, São Bernardo do Campo – SP CEP 09750-001
Product	: AR4 Plus Test
ID	: AR4 Plus Test Colorimetric Kit (Erio T)
Presentation	: Sealed packaging
Sample Quantity	: Seven (07) units
Tests carried out by	: Intertek Testing Services Perú
S.A. Reception date	: 07 November 2025
Date of analysis	: November 10 to 22, 2025
Test Method	: Water Quality Evaluation by Conductivity and Colorimetría

2. Objective

Evaluate the behavior of the AR4 Plus Test product, colorimetrically and conductively, with pure water type 1 in accordance with the ISO 3696 standard; by observing the color change and evaluating conductivity by comparing it with the AR4 Plus Test reference scale indicated in the colorimetric kit.

3. Technical basis provided by the applicant:

The ISO 22241-1:2019 standard (NOx reduction agent — AUS 32 / AdBlue) requires the use of pure water for the preparation of the reducing agent and sets strict quality requirements for the final product; The test methods and control criteria are developed in parts 2 and 3 of the standard.

This evaluation combines the measurement of electrical conductivity at 25 °C with the Erio-T colorimetric test at pH 10 detailed below:

- Blue color: pure water (sin $\text{Ca}^{2+}/\text{Mg}^{2+}$).
- Red color: contaminated water (presence of $\text{Ca}^{2+}/\text{Mg}^{2+}$).

Proposed evaluation criteria

Conductivity ($\mu\text{S}/\text{cm}$)	Sales Added ($\text{CaCl}_2 + \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$) Iones generadas $\text{Ca}^{+2} + \text{Mg}^{+2}$ (mg/L)	Criteria	Interpretation
≤ 0.1	–	Approved – Water grade 1	Cumple, ISO 22241-1 / ISO 3696 (Grade 1)
$< 5^*$	1.47	Approved - Water grade 3	Complies with ISO 22241-1 / ISO 3696 (Grade 3)
$\approx 20^*$	10	Failed - Indication of slight contamination (Presence of mineral salts)	Non-ISO 22241-1 compliant / Non-ISO 3696 (grade 3) compliant
$\approx 50^*$	25	Failed - contaminated water (Presence of mineral salts)	Non-ISO 22241-1 compliant / Non-ISO 3696 (grade 3) compliant

* Information provided by the applicant

Sample Preparation:

Sample 1 (White): Water grade 1 according to ISO 3696 ($<0.01 \text{ mS}/\text{m} = 0.1 \mu\text{S}/\text{cm}$).

Sample 2: sample prepared from sample 1 and between 1.47 mg/L of Ca^{2+} salts and Mg^{2+} were added in order to achieve an approximate conductivity value of 5 $\mu\text{S}/\text{cm}$.

Sample 3: sample 1 and 10 mg/L of Ca^{2+} and Mg^{2+} salts were added in order to achieve an approximate conductivity value of 20 $\mu\text{S}/\text{cm}$.

Sample 4: sample 1 and 25 mg/L of Ca^{2+} and Mg^{2+} salts were added in order to achieve an approximate conductivity value of 50 $\mu\text{S}/\text{cm}$.

4. Procedure provided by the applicant:

1. Measure the electrical conductivity of the sample at a temperature of 25°C .
2. In a test tube, add 5 mL of the sample and 2 drops of pH 10 buffer solution.
3. Add 1 drop of the Erio-T indicator and observe the color:
Blue: absence of calcium/magnesium ions (pure water).
Red-wine: presence of hardness (contaminated water).
4. Record the observed color and conductivity value.
5. Repeat this process for each of the four samples.

5. Results Obtained

Sample analyzed	Reference conductivity at 25°C	Measurement conductivity at 25 °C	Observed Color (Erio-T)	Classification and Interpretation
Sample 1	≤ 0.1	0.055 $\mu\text{S}/\text{cm}$	Blue	Pure Water; meets ISO 22241-1 standard for water type Grade 1
Sample 2	< 5	4.973 $\mu\text{S}/\text{cm}$	Intense Blue	Water with an indication of ions; meets ISO 22241-1 standard for Water Type Grade 3
Sample 3	≈ 20	20.09 $\mu\text{S}/\text{cm}$	Red	It does not comply; Appreciable presence of $\text{Ca}^{2+}/\text{Mg}^{2+}$, water not suitable for automotive urea, does not comply with the ISO standard 22241-1
Sample 4	≈ 50	50.28 $\mu\text{S}/\text{cm}$	Intense Red	It does not comply; High hardness; water not suitable for automotive urea, does not comply with ISO 22241-1

6. Conclusion:

Samples 1 and 2 meet the water purity requirements set out in ISO 22241-1:2019 and ISO 3696:1987 depending on the grade you apply.

According to the parameters evaluated (conductivity and colorimetric), the test allows to verify whether the water is qualitatively within the standard for the preparation of automotive urea (AUS 32).

7. Photographic record (evidence)

Conductivity Measurement:

Sample 1: Conductividad $\leq 0,1 \mu\text{S/cm}$	Sample 2: Conductividad $< 5 \mu\text{S/cm}$
 A Sartorius conductivity meter with a black face and yellow accents. The screen displays '0.055 µS/cm c' and '19.11.25'. A QR code is visible on the left side of the screen.	 A Metrohm 914 pH/Conductometer with a blue and white body. The screen displays '4.973 µS/cm' and '22.2 °C'. A label 'intertek ICB 2880' is attached to the side.
Sample 3: Conductividad $\approx 20 \mu\text{S/}$	Sample 4: Conductividad $\approx 50 \mu\text{S/cm}$
 A Metrohm 914 pH/Conductometer with a blue and white body. The screen displays '20.09 µS/cm' and '22.2 °C'. A label 'intertek ICB 2880' is attached to the side.	 A Metrohm 914 pH/Conductometer with a blue and white body. The screen displays '50.28 µS/cm' and '22.0 °C'. A label 'intertek ICB 2880' is attached to the side.

ErioT Assay (Color observed)



8. Technical references

- ISO 22241-1:2019 — Diesel engines — NO_x (automotive urea) reducing agent — Part 1: Quality requirements.
- ISO 3696: 1987 – Water for analytical Laboratory use – specification and test methods
- APHA 2340 C — Determination of total hardness with EDTA and Eriochrome Black T.
- ABNT NBR 12621:1992 — Water — Determination of total hardness.

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