**ANNEX NO. 3 OF DOCUMENTATION OF THE PROCUREMENT PROCEDURE**

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**SPECIFICATION OF THE PUBLIC CONTRACT SUBJECT**

A testing station for complex testing of Proton Exchange Membrane water electrolysers (PEM-WE) and Anion Exchange Membrane water electrolysers (AEM-WE). The station must allow detailed control, diagnostics, and analysis of electrolytic cells operating with distilled water or alkaline solutions.

The testing station must include a potentiostat with an impedance analyser for measuring electrical properties and setting electrical conditions on the tested objects. Additionally, it must have a programmable power supply for controlling the electrolysers, as well as pumps and other devices necessary for testing the operation of electrolysers, such as setting and controlling temperatures, pressures, and flow rates of working gases or liquids.

The subject of the public contract shall meet the following requirements for technical parameters and equipment:

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| **Technical specification**­­ **­– Testing station for testing of water electrolysers** | | |
| **Designation of the delivery (min. brand and type)** | |  |
| **Individual technical parameters of the performance** | | **Data about the offered performance** |
| **Multi-range potentiostat** | | |
| 1 | The potentiostat must be software-integrated into the system's control software. |  |
| 2 | At least 3 current ranges, covering ±100 mA to ±20 A | ***and will enter the actual value*** |
| 3 | Voltage range: at least ±5 V | ***and will enter the actual value*** |
| 4 | Current accuracy: at least 1% of the current range | ***and will enter the actual value*** |
| 5 | Voltage resolution better than 1 mV | ***and will enter the actual value*** |
| 6 | Total potentiostat power: at least 100 W | ***and will enter the actual value*** |
| **Programmable Power Supply** | | |
| 7 | Must allow automatic switching (without manual physical switching) between the programmable power supply and the potentiostat |  |
| 8 | Maximum current: at least 100 A | ***and will enter the actual value*** |
| 9 | Voltage range: at least ±5 V | ***and will enter the actual value*** |
| 10 | Power supply capacity: at least 500 W | ***and will enter the actual value*** |
| 11 | Must be software-controlled through the test station system |  |
| **Impedance Analyzer** | | |
| 12 | Must enable impedance measurement in potentiostatic mode across the entire operational range of the electrolyser (up to 100 A). |  |
| 13 | Impedance measurement range: min. 1 mHz to 10 kHz |  |
| 14 | Frequency accuracy: better than 0.01% | ***and will enter the actual value*** |
| 15 | Amplitude accuracy: better than 1% | ***and will enter the actual value*** |
| 16 | Amplitude range: min. 10 mV to 2.5 V. |  |
| **Required Impedance Measurement Modes** | | |
| 17 | EIS (Electrochemical Impedance Spectroscopy) |  |
| 18 | HFR (High Frequency Resistance) in real-time |  |
| 19 | Additional Measurement Modes:  “Half-cell” measurements for parts of the test cell (using additional voltage inputs in the system) – at least one input. |  |
| **Handling of Operating Electrolyte and Gases** | | |
| 20 | Electrolyte conduits in the device must be stainless steel for compatibility with deionized water and alkaline electrolytes |  |
| 21 | The system must include at least two electrolyte reservoirs, with heating capabilities and temperature settings up to 95 °C | ***and will enter the actual value*** |
| 22 | The system must control (measure and heat) the temperature of the tested electrolyser up to 120 °C if required | ***and will enter the actual value*** |
| 23 | Pumps for supplying electrolyser media must be software-controlled, with adjustable flow rates ranging from 50 to 600 ml/min |  |
| 24 | Water reservoirs must automatically refill from an external (pressurized) source as needed |  |
| 25 | The conductivity of deionized water in the reservoirs must be monitored in real-time via sensors |  |
| 26 | Operational gas pressures must be controlled via integrated backpressure regulation in the min. range of 0 to 2 bar at the electrolyser outlet |  |
| 27 | The system must include at least six temperature sensor inputs and six universal analog inputs (0–5 V) for recording signals from various operational device components. |  |
| 28 | Single-use or recirculating operation of supply water (with required deionization filtration and reservoir heating) |  |
| 29 | Condensers (dehumidifiers) for vapor with reservoirs for condensed vapors in both the anode and cathode branches |  |
| 30 | Independent automatic control of purging gases in two channels (H2 and O2 channels) adjustable via system software (flow rate, start, stop) in the range of up to 500 ml/min | ***and will enter the actual value*** |
| **Additional requirements** | | |
| 31 | Operation:  The system must be designed for unattended operation, without requiring manual intervention during experiments |  |
| 32 | Safety:   * The system must include sensors for detecting hydrogen in the oxygen branch and oxygen in the hydrogen branch. * The system must allow various types of safety alarms or automatic shutdown (e.g., in case of increased temperature or voltage/current outside set limits). |  |
| 33 | Software:   * The system must have fully integrated software for overall system control, experiment setup, analysis of the tested electrolyser, display of measured data and results, and safety alarm settings. Additionally, it must include software for impedance evaluation (analysis, modeling equivalent circuits). |  |
| 34 | Dimmensions: Compact bench-top |  |