**ANNEX NO. 4 OF DOCUMENTATION OF THE PROCUREMENT PROCEDURE**

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**SPECIFICATION OF THE PUBLIC CONTRACT SUBJECT for thermal analyzer**

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

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| **Technical specification**­­ **­– Thermal analzer** | | |
| **Designation of the delivery (min. brand and type)** | |  |
| **Individual technical parameters of the performance** | | **Data about the offered performance** |
| 1 | **Thermal analyzer** which enables simultaneous measurement of differential scanning calorimetry (DSC)/differential thermal analysis (DTA) and thermogravimetry (TG). |  |
| 2 | **Temperature range:** from room temperature up to 1600 °C or wider with one furnace made of graphite heating element, which must be equipped at least with 4 port connections at the top and at the bottom for future modularity. | ***and will enter the actual values*** |
| 3 | **Programmable heating rate**  Adjustable at least in the range from 0.01 °C/min  to 99.99 °C/min in steps 0.01 °C/min. | ***and will enter the actual values*** |
| 4 | **Construction**  The instrument must have a vertical hang-down design with balance above the furnace. |  |
| 5 | **Balance:**  At least two ranges:  balance resolution in small range +/- 5 mg ≤ 0.6 ng  TGA baseline drift ≤ 40 g  Baseline drift precision ≤ 3 g  Max. loading capacity at least 30 g | ***and will enter the actual values*** |
| 6 | **Large Sample & Crucible Capacity**  The balance must allow direct placement of the sample onto the suspension with minimum dimensions of 14 mm × 20 mm, and must allow using TGA crucibles with a volume of up to 2500 µl. | ***and will enter the actual values*** |
| 7 | **Measurement in gas flow or in vacuum**  The system must be vacuum tight and provide the necessary equipment (vacuum pumps, connections, gauges) to achieve a minimum vacuum level  (< 1 mbar) and a forced vacuum level (< 5.10-2 mbar). |  |
| 8 | **Programmable gas flow controllers**  The system must include a flow management for carrier gas with a mass flow controller (MFC) covering at least the range of 4–200 ml/min, capable of connecting up to three different gases; and for auxiliary gas with an MFC in the range of  0,3–16 ml/min. The mixing of carrier and auxiliary gases must be software-controlled and adjustable within a ratio range of 1:99 to 50:50. | ***and will enter the actual values*** |
| 9 | **Exchangeable DSC and DTA rods**  The system must be equipped with at least one TG-DSC sensor operating from ambient temperature up to a minimum of 1500 °C. | ***and will enter the actual values*** |
| 10 | **Chiller**  Chiller with cooling power of at least 1700 W at 20oC must be included. | ***and will enter the actual value*** |
| 11 | **Alumina and Pt-Rh crucibles for DSC/DTA**  At least 10 alumina crucibles and one platinum-rhodium crucible for DSC/DTA must be included. | ***and will enter the actual value*** |
| 12 | **Temperature upgrade**  The instrument must be upgradeable minimal to a 1750 °C and 2400°C without requiring a furnace replacement. |  |
| 13 | **Evolved Gas Analysis (EGA)**  The system must support future integration with EGA techniques (MS, GC-MS, FT-IR), including a heated interface capable of reaching up to 300 °C. |  |
| 14 | **Corrosive gas compatibility**  The instrument must allow for a future upgrade to operate in corrosive gas environments by incorporating a special protective quartz tube, protected DTA rods, and protected furnace thermocouples, without requiring a furnace replacement. |  |
| 15 | **Thermomechanical analysis (TMA)**  The system must provide the option for future upgrade to TMA functionality within the same instrument. |  |
| 16 | **Personal computer and software**  PC for operation and control of the thermal analyzer and software for programming and conducting of experiments and data acquisition and software for analysis of measured data must be included. |  |

Instructions for the participants:

*The participant fills in the data in the “Data about the offered performance” column, indicating for each item whether the performance offered by him meets the relevant request of the contracting authority (“****YES****”) or does not (“****NO****”).*