



TENDER SPECIFICATIONS

Part 2 - Technical Specifications

Supply of a laser 3D profilometer to be used for analysis of nuclear material

Procurement procedure N°	JRC/KRU/2017/G.III.8/0112/OC
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European Commission – JRC Karlsruhe

Postal address: P.O. Box 2340, 76125 Karlsruhe (Germany)

Delivery address: Hermann-von-Helmholtz-Platz 1, Building 811
76344 Eggenstein-Leopoldshafen (Germany)

1. THE JRC KARLSRUHE

The JRC Karlsruhe was founded in 1963 as the Institute for Transuranium Elements (ITU). It is located on the Campus Nord of the "Karlsruhe Institute of Technology" (KIT) and is part of the Joint Research Centre (JRC) of the European Commission.

Within the nuclear work program of the JRC, the JRC Karlsruhe site is dedicated to the nuclear safety and security (Directorate Nuclear Safety and Security) and is funded by the EURATOM research and training programs. Nowadays, the JRC is one of the leading research institutes in nuclear science and a unique provider of nuclear measurement technology. Its task is to provide the scientific basis for the protection of the European citizen from the risks associated with the handling and storage of highly radioactive materials. The legal basis for this is the Euratom Treaty.

Within the framework of the Euratom Treaty, the task of the European Commission is to establish the highest and binding safety standards and ensure their application, including the highest security for interim storage and final disposal of nuclear waste. Furthermore, from the outset, ensuring the strictly peaceful use of European nuclear power plants and nuclear fuel was a major element of the Euratom Community. This work will be further developed in close cooperation with the Directorate-General for Energy (DG ENER), the nuclear power authorities of the Member States and the International Atomic Energy Agency. As a European research centre, the JRC Karlsruhe supports all 28 member states, regardless of national or commercial interests, and is in the clear interest of all EU Member States.

The specific tasks of the JRC Karlsruhe have adapted themselves to the new social challenges: the mission of the JRC is to support all phases of the European Commission's policy cycle with independent, evidence-based scientific and technical research; Thus acting as an internal scientific service of the Commission.

More information at <https://ec.europa.eu/jrc/en>.

2. SCOPE OF THE CONTRACT

The JRC Karlsruhe plans the purchase of a laser 3D profilometer to modernize its equipment, replacing old and no more functional contact profilometers and enlarging the analytical capabilities complementing surface topology analysis with the information provided by other techniques, for example Scanning Electron Microscopy (SEM), Scanning Electrochemical Microscopy (SECM) and Atomic Force Microscopy (AFM).

The 3D profilometer will contribute to several research areas of the JRC-Karlsruhe, in particular:

- the characterization of surface corrosion phenomena for the stability of spent nuclear fuel,
- the determination of mechanical and thermodynamical properties of uranium dioxide and other fuel materials,
- the identification of topological finger prints of nuclear fuel for forensic purposes.

The main materials to be studied are both fresh and irradiated fuels for current (UO₂, MOX) and future nuclear reactors, various matrices for high level waste disposal and structural nuclear materials. This investment is essential for the continued successful implementation of JRC work programmes on nuclear fuel safety, waste management and nuclear decommissioning. Its unique capabilities will enhance JRC reputation and will be a centre stage facility for open access programmes in the support of Member State organisations.

3. ELEMENTS TO BE INCLUDED IN THE OFFER

The offer shall be established in accordance with the following technical specifications and shall include all the administrative and technical requirements described in this document. Failure to comply, the offer will not be taken into consideration.

The bidder is requested to provide details of the manufacturer, type and technical properties of the brands on offer.

The minimum technical requirements are to be fulfilled by the offered equipment; otherwise the tender will not be taken into consideration and declared non-admissible. The quotation and other technical documentation provided by the bidder serve the purpose of assessing the tender. Other information provided by the bidder, going beyond the minimum requirements, serve the purpose of information only and are not taken into account in assessment of the quotation.

3.1. Delivery period

The contractor shall deliver and perform the start-up of the equipment to the JRC Karlsruhe within **9 (nine)** months after the contract signature date.

3.2. Transport and Installation

The supplies shall be delivered under Incoterms DDP¹. The contractor shall be responsible for the packaging, shipping and necessary transport insurances in order to deliver the equipment to the JRC Karlsruhe, to the following address:

European Commission – JRC Karlsruhe
Hermann-von-Helmholtz-Platz 1, Building 811
76344 Eggenstein-Leopoldshafen (Germany)

To the attention: Mr Antonio Bulgheroni.

The installation and set-up of the instrument shall be done by skilled staff assigned by the contractor. The contractor is fully responsible that his staff is able to obtain the security clearance and entry permits required by the authorities to enter the JRC Karlsruhe premises. Support in the clearance process will be provided by the JRC Karlsruhe; for this purpose, the staff carrying out the installation shall duly fill-in a registration form at least 15 days before their arrival.

The technicians performing the on-site installation and training shall be in possession of a valid radiological protection pass, in compliance with Art. 15 of the German Ionising Radiation Protection Regulation (StrlSchV)².

3.3. Terms of payment

Terms of payment are specified in the contract and are based on the following schedule:

¹ Incoterms 2010 of the International Chamber of Commerce: DDP = Delivered Duty Paid = the contractor has to bear all costs and risks involved in delivering goods to destination.

² Council Directive 90/641/EURATOM about the operational protection of outside workers exposed to the risk of ionising radiation during their activities in controlled areas, and Council Directive 96/29/EURATOM laying down basic safety standards for the health protection of the general public and workers against dangers of ionising radiation.

- 80 % upon delivery and installation of the equipment at JRC Karlsruhe premises and provisional technical acceptance (see §3.5);
- 20 % upon issuance of the final technical acceptance (see §3.6)

3.4. Factory acceptance

Not requested.

3.5. Site acceptance

The Commission shall release a **provisional** technical acceptance after delivery and successful installation of the equipment at JRC Karlsruhe site following a first performance test of the instrument.

The signature by both parties of the provisional technical acceptance is subject to the outcome of tests aimed at assessing the equipment performances. All the functions of the instruments and its peripherals will be tested using non-radioactive samples. Calibrated standards will be used for the determination of the vertical resolution and measurement stability. If additional options will be purchased, their functionalities will be tested under the same conditions.

Testing shall be performed at JRC Karlsruhe's premises by contractor's skilled staff. The contractor is fully responsible that his staff is able to obtain the security clearance and entry permits required by the authorities. JRC Karlsruhe will provide help in the administrative process. Therefore JRC Karlsruhe must be informed of the names of the staff that will carry out the installation and training at least 15 days before their arrival at the premises.

Any residual defects will have to be corrected by the contractor before the provisional technical acceptance is released.

3.6. Final technical acceptance

The Commission shall release a **final** technical acceptance of the equipment following a general operation of the instrument not later than **3 (three)** months after the release of the provisional technical acceptance.

For the final technical acceptance to be issued, the instrument must have operated according to specifications during the **3 (three)** month-period.

Final technical acceptance is subject to the outcome of tests aimed at assessing that the equipment performances (vertical resolution, image quality and reproducibility) conform to the technical specifications.

The related technical report will be signed both by the Commission and by the contractor and will determine the date of commencement of the warranty period.

3.7. Training

The contractor shall provide adequate on-site training to enable proper operation and maintenance of the equipment by JRC staff. Following delivery and commissioning of the instrument at JRC Karlsruhe, a training period for at least **4 (four)** days for **3 (three)** operators in English and/or German shall be given. The training shall take place with the commissioned instrument on dates agreed by both parties.

3.8. Documentation

A complete set of technical files over the electronic schemes and mechanical design, operational manuals, maintenance manuals and software documentation in English shall be provided at the time of the installation.

3.9. Warranty

A minimum warranty period of 2 years shall be granted. Warranty begins **on the date of the final technical acceptance** of the equipment by JRC Karlsruhe as described in §3.6. During the warranty period, the contractor is responsible for the proper functioning of the instrument and parts covered by the warranty.

The warranty covers both software and hardware. During the warranty period software updates shall be provided free of charge. For minor technical or operational problems with the equipment, telephone/e-mail support has to be provided.

The warranty shall comprise:

- Preventive maintenance: as preventive maintenance is understood any periodic intervention on the equipment to ensure its proper function and calibration. It shall take place at least once a year at the JRC Karlsruhe site during its working hours by contractor's technicians. The maintenance shall include the control of the instrument performance and the replacement of deteriorated parts (either electronic or mechanical). This preventive maintenance shall include labour, spare parts, travel and subsistence expenses.

The parts supplied must be fully compatible with the instruments and the correct performance and appropriate operation must be further guaranteed.

After each preventive maintenance visit, a relevant maintenance report shall be issued by the contractor.

- Corrective maintenance: as corrective maintenance is understood any intervention made in case of improper performance or breakdown of the equipment, to be performed at the JRC Karlsruhe during working hours. When a need arises for corrective maintenance, actions to resolve the issues can be carried out by JRC Karlsruhe staff following instructions given by the contractor. If it is not possible to resolve the issue within 3 working days, an on-site corrective maintenance has to be provided by the contractor upon request (phone call confirmed by e-mail). The time limit for on-site intervention shall be within 4 working days from the request. This corrective maintenance shall include repair labour, spare parts, travel and subsistence expenses.

The replacement of any parts will be done after agreement with the JRC technician in charge of the equipment who will be present during the corrective interventions.

The parts supplied must be fully compatible with the instruments and the correct performance and appropriate operation must be further guaranteed.

After each corrective maintenance visit, a relevant maintenance report shall be issued by the contractor.

Hardware covered by the warranty and which has been radioactively contaminated will not be taken back by the contractor.

The technicians performing the on-site maintenance interventions shall be in possession of a valid radiological protection pass, in compliance with Art. 15 of the German Ionising Radiation Protection Regulation (StrlSchV).³

3.10. Directives and norms to be followed

European norms and regulations are to be followed. Voltages to be used are to be on the European 230 Volt Standard. CE marking is to be placed on the equipment. A product's compliance with EU legislation is to be supplied and it shall detail the norms that have been followed in the construction of the equipment.

All safety regulations must be covered and all necessary safety devices must be included in the offer.

Technical norms are generally referred to in the following technical specification. Equivalent norms to EN, DIN, CE, ISO etc. are also accepted. The bidder is responsible for proving the equivalence.

4. MAINTENANCE CONTRACT

Not requested after the warranty period.

However, the tenderer shall provide a price list of the most common spare parts, valid for the period of validity of the warranty.

5. TECHNICAL SPECIFICATIONS

The bidder is requested to provide details of the manufacturer, type and technical properties of the brands on offer, where applicable, to give information on the quality of products.

The minimum technical requirements are to be fulfilled by the bidder; otherwise the quotation is declared to be invalid. The data to be completed by the bidder serve the purpose of assessing the quotation.

All details provided by the bidder in addition to the minimum requirements only provide information and are not taken into account in assessment of the quotations.

See Annex 1 -Technical appendix.

³ Council Directive 90/641/EURATOM about the operational protection of outside workers exposed to the risk of ionising radiation during their activities in controlled areas, and Council Directive 96/29/EURATOM laying down basic safety standards for the health protection of the general public and workers against dangers of ionising radiation.

ANNEX 1: TECHNICAL APPENDIX

General specification	
<p>In view of a possible inclusion of this instrument inside a glovebox, the following aspects must be fulfilled:</p> <ul style="list-style-type: none"> • Possibility to separate the measuring unit from the dedicated controller electronics to minimize the amount of instrumentation that has to be installed inside the glove box and to simplify its maintenance. • All cables between the measuring unit and the control electronics readout have to be 10 meters in length. The cables are to be fitted with vacuum tight feedthroughs (supplied by JRC-Karlsruhe) to bridge the wall of the glove box. • The footprint of the measuring unit should not exceed the following dimensions: 50 cm x 30 cm x 50cm. Maximum allowed weight is 30 kg. <p>Inclusion in a glove box involves the use of thick PVC gloves and limited leeway for manipulation of specimens or other activities such as instrument maintenance and repair. Such environment requires an ergonomically simplified design for specimen mounting and maintenance or repair operations. Therefore a suitable design for unchallenging operation of the system within a glovebox environment (or a custom adaptation of the original design) is required.</p> <p>After selection of the successful tenderer, JRC Karlsruhe may require, at no additional costs, custom adaptation of the selected system design. Custom adaptation may be required after completion of the commissioning tests where objective difficulties for sample mounting or maintenance and repair in a glovebox environment became apparent.</p>	
Optical specifications / Measuring	
Light source	Laser
Detector	16-bit photomultiplier
Field of view	500 µm x 500 µm at a single x,y position
Note	Fully automatic and stepless laser intensity setting
Optical specifications / Imaging	
Imaging detector	High definition colour detector
Magnification	> 1000x
Focus	Automatic with the possibility to apply manual corrections.

Detector resolution	> 2048 x 1536 pixels
Height measurement	
Z-resolution	< 1 nm
Repeatability	< 20 nm
Width measurement	
Display resolution	< 5 nm
Repeatability	< 100 nm
Motorized and Software Controlled Stage	
XY stage range	> 20 mm in both directions
Maximum sample height	> 10 cm
Fixing	Possibility to fix samples on the stage through sample holders provided by JRC-Karlsruhe
Stitching	Automatic image reconstruction up to 10 mm x 10 mm
Calibration	
<ul style="list-style-type: none"> A depth calibration standard conform to ISO 5436 	
Software features	
<ul style="list-style-type: none"> Automatic stitching of adjacent pictures Automatic calculation of surface roughness and waviness Automatic calculation of sample volumes Reporting tool 	
Options (to be quoted separately)	
<ul style="list-style-type: none"> Stage 360° compucentric rotation Stage tilt range from -15° to 60° Automatic pattern recognition 	