

Service description for the provision of the delivery:

Delivery and commissioning of a μ CT

Reference number:
02404/6050/2/6

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Cost center::	61816050
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1 General

1.1 Brief Introduction to TU Clausthal

Regionally rooted, globally recognized - that's the Technical University of Clausthal. The education at our traditional university is highly valued by national and international companies. Young people enjoy studying in Clausthal in a different way, namely in a personal atmosphere and with practical teaching conditions.

Research and teaching are conducted in Clausthal in the fields of energy and raw materials, natural and material sciences, economics, mathematics, computer science, mechanical engineering, and process engineering.

Our principle is the close collaboration of natural, engineering, and economic sciences within an application-oriented research ecosystem. This is organized in five innovative research centers: the Research Center for Energy Storage Technologies, the Clausthal Center for Materials Science, the Simulation Science Center, the CUTEC Clausthal Environmental Technology Research Center, and the Drilling Simulator Celle - TU Clausthal.

With around 3,000 students and around 1,100 employees, the TU Clausthal is one of the most important economic factors in the West Harz.

1.2 Subject of the Tender (Summary)

The subject of the tender is the delivery, assembly, installation, and commissioning of a micro-computed tomography (μ CT) device, as well as the training in the operation of the device.

Project Background and Project Description:

The μ CT will become part of our Cognitive Materials Infrastructure (CoMa-I).

Our vision is to enable materials to think. To achieve this, we want to create an infrastructure that enables us to develop such materials in the lab and make them technically usable. An example of our vision would be a high-strength material that can be manufactured like corals using distributed, biomimetic, miniaturized, and additive processes, and that functions like bone, adapting to external influences, constantly monitoring itself, and continuously renewing itself.

Currently, there are no such technical materials that exhibit intelligence or that can independently adapt, monitor, and renew themselves as well as generally serve as independent, active functional components in structures and components while also being circular, meaning they produce no waste and unwanted by-products. Biological tissues and systems, such as bones and corals, however, impressively show that this can be realized.

The infrastructure supported here is intended to help make such materials technically usable. Our research is motivated by the megatrends of climate change &

green transition, aging societies, and digitalization, along with the challenges that accompany them. Sustainable, cognitive materials are a key technology to address the challenges arising from these transformations, allowing the infrastructure to seamlessly integrate into TU Clausthal with its focus on the digitally informed circular economy.

1.3 Information on the Contracting Authority

The contracting authority and contracting partner is the Technical University of Clausthal (TUC), represented by the President.

Technische Universität Clausthal
Adolph-Roemer-Str. 2a,
DE-38678 Clausthal-Zellerfeld

The executive body is the Clausthal University of Technology,
represented by the

Clausthal University of Technology
Institute of Materials Science and Engineering
Digitalisation in Material Science and Engineering

1.4 Performance Location

The performance will take place at the Institute for Materials Science and Engineering.

Delivery address:

Clausthal University of Technology
Institute of Materials Science and Engineering
Agricolastraße 6 (C24)
Room: Institute of Materials Science and Engineering, Labor A
38678 Clausthal-Zellerfeld, Germany

1.5 Performance Deadline

The delivery of the μ CT is to be carried out as soon as possible.

1.5 Contact Points

Communication may only be carried out electronically via the portal "<https://www.dtv.de>".

1.6 Terms of the Procurement Procedure

Publication	From	To	Time
Date of dispatch of the notice	07.07.2026		
Latest date to hand in questions for clarification		17.07.2026	
Answering questions for clarification received in good time		22.07.2026	15:00 Uhr MEZ
Offer deadline	07.07.2026	07.08.2026	11:00 Uhr MEZ
Opening of offers		07.08.2026	11:00 Uhr MEZ
Award/binding period		15.09.2026	

2 General Terms and Conditions of the Tender and Contract

2.1 Tender Documents / Further Information

The tender documents will be made available for download on the "German Procurement Portal" website. Bidders can register for free. It is the bidder's responsibility to inform themselves about the current status of the procurement procedure and to request any missing documents if necessary.

The bidder who wishes to submit an offer is obliged to regularly retrieve information on changes or clarifications of the tender documents from the website:

"<https://www.dtv.de>"

Clarification questions are to be submitted in writing via the portal and will only be answered via the portal. An offer will only be considered if the bidder has taken into account all published information in their offer. Technical disruptions in accessing the portal are to be reported to the contracting authority immediately by email via the above-mentioned contact person, so that everything necessary can be arranged. A complete update of the tender documents by supplementing the performance description will not be carried out.

Each offer is to be submitted in electronic form exclusively on the platform "<http://www.dtv.de>" by **07.08.2026, 11:00 am CET** in German or English language.

2.2 Tender Specifications

Each bidder may only submit **one** main offer. Side offers for demonstration models and used equipment in mint condition are permitted.

Important Note:

The offer must be submitted in the same order as the tender documents (1-10) as a PDF:

- 1) Formless letter of the bidder with date and signature
- 2) Invitation to submit an offer (EU tender)
- 3) Offer (VgV)
- 4) Bidder's conditions for the award of services (EU-wide)
- 5) Additional contract conditions of the State of Lower Saxony
- 6) Own statements
 - i) At the request of the bidder - can be submitted voluntarily the "Uniform European Declaration of Intent (EEE)". The declaration of intent can be created under the following link and attached to the offer by the bidder: <https://uea.publicprocurement.be/gdpr>
 - ii) Should the bidder not submit the "Uniform European Declaration of Intent (EEE)", the bidder is to fill in the attached form "Declaration for non-qualified companies in the following procedure". Companies that are prequalified are to submit a corresponding proof/access, so that the contracting authority can view the stored documents.
 - iii) Statement on § 4 para. 1 NTVerG
- 7) Performance description
- 8) Evaluation schema
- 9) Further own statements with date, signature, and company seal
- 10) Other

2.3 Language

The bidder is to create their offer, including all annexes and supporting documents, in German or English. The correspondence with the contracting authority is to be conducted in German or English. The contract and negotiation language are German or English. In the event of any discrepancies, the German version shall prevail.

2.4 Prices

All prices are to be stated in Euro.

2.5 Terms of delivery

The delivery is to be carried out free of charge and insured **(DPU) in accordance with the Incoterms 2020 and, in the case of imports from outside the European Union, in accordance with DDU (delivered duty unpaid / delivered duty unpaid)** to the installation site (see 1.4 Performance Location). The costs for this are to be calculated in the offer price.

In the case of deliveries from a third country, the Technical University of Clausthal is to pay the taxes itself and to separate them.

2.6 Delivery/Distribution/Compensation for Delay

The delivery date is to be entered by the contractor.

Delivery Date:	Signature/Company Seal
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If the agreed-upon latest delivery date is not met, the contractor is to pay the contracting authority a lump sum for compensation for delay of 0.5% of the contract value per completed calendar week.

The lump sum for compensation for delay is limited to 10 weeks. After this period, the contracting authority is entitled to reject the performance. If the contracting authority exercises its right of withdrawal, the payments made and their interest as well as the lump sum for compensation for delay for 10 weeks are due immediately.

If the delay is not due to the contractor's fault, the above provisions do not apply.

In addition to the above provisions, the contracting authority has no further rights or claims in the event of delay, unless the contractor acts intentionally.

2.7 Payment Conditions

After proper delivery or performance and acceptance, the contractor is to submit an invoice, on the basis of which the payment is to be made by the Technical University of Clausthal within a period of 14 days.

If advance payments are desired, they are only to be made against presentation of a valid bank guarantee.

2.8 Additional Contract Conditions

The additional contract conditions of the State of Lower Saxony apply. The bidder's general terms and conditions do not apply and may not be stated.

We explicitly point out that, in accordance with § 57 VgV para. 1 no. 3, no changes or additions to the contract documents are to be made. This is the case, for example, if the bidder's own general terms and conditions are attached and lead to exclusion from further procedure.

2.9 Place of Jurisdiction

The place of jurisdiction is Clausthal-Zellerfeld.

3 Performance Details / Technical Requirements

3.1 Performance Description / Tasks

Brief description of the device to be procured:

Analytical μ CT for advanced computed tomography analyses.

Working area:

Institute for Materials Science and Engineering. The device will be used to analyse biologic tissues, metals, polymers, as well as glass and ceramics.

Installation site:

The device will be located in the CoMa-I facility of the institute under the supervision of a dedicated technician.

Example for evaluation:

"During the determination of the economically most advantageous offer, the following criteria will be applied.

With the letter A, exclusion criteria are marked. The non-fulfillment of an exclusion criterion marked with A leads to exclusion of the offer (KO criterion). With the letter B, evaluation criteria are marked. The criteria marked with B are the ones within the evaluation scale with points to be evaluated and receive a weighting. If listed, points are to be awarded for each evaluation criterion, which are to be entered into the final point score with the specified weighting factor.

The field "Bidder details" is to be completed in full. If fields "yes/no" are included, the offer is to be marked with the corresponding entry. Furthermore, the individual price is to be stated wherever required.

Price statements are to be made in net terms (without VAT).

All fields are to be completed in full.

	Description	Bidder details	Explanation	Criterion
A	Module A – Safety and dimensions			
A1	Full-protection device. Please provide evidence or approval	() yes () no	Operation only possible, if no harmful radiation leaves the instrument housing	A
A2	Power connections compatible with German 230 V / 400 V outlets	() yes () no	Instrument can be installed with standard parts.	A
A3	Overall device height lower than 190 cm	() yes () no	Instrument fits through our doors	A
A4	Overall device depth lower than 120 cm	() yes () no	Instrument fits through our doors. If installation can be modular inside the room, this can be ticked	A
A5	Overall device length lower than 210 cm	() yes () no	Instrument fits through our doors. If installation can be modular inside the room, this can be ticked	A
A6	Maximum diameter of field of view 0 mm (0 p) 100 mm (20 p) Other point results are calculated linearly.	Diameter <hr/> mm	Specifying sample diameter	B
A7	Maximum height of field of view 0 mm (0 p) 100 mm (20 p) Other point results are calculated linearly.	Height <hr/> mm	Specifying sample diameter	B
A8	Maximum diameter of field of view with rasterised scanning 100 mm (0 p) 200 mm (10 p) Other point results are calculated linearly.	Diameter <hr/> mm	That is, capability to image specimens larger diameter than field of view.	B

A9	<p>Maximum height of field of view with rasterised scanning</p> <p>100 mm (0 p) 200 mm (10 p)</p> <p>Other point results are calculated linearly.</p>	<p>Height</p> <hr/> <p>mm</p>	<p>That is, capability to image specimens larger height than field of view.</p>	B
A10	<p>Rasterised scanning to increase resolution and/or extend the measurement range.</p> <p>Partial volumes shall be automatically acquired and combined into one overall volume.</p>	<p><input type="checkbox"/> metrologically determined positions (10 points)</p> <p><input type="checkbox"/> image based stitching (5 points)</p> <p><input type="checkbox"/> no (0 points)</p>	<p>Note, using metrologically determined positions of the instrument axes is deemed better than image-based stitching alone as the latter is readily available in external software solutions</p>	B
A11	<p>Temperature compensation for all coordinate axes, relevant instrument components, the device, and the workpiece volume. A material-specific coefficient of thermal expansion should be configurable for the specimen material. An additional temperature sensor at the measurement volume should be available for workpiece-volume compensation.</p>	<p><input type="checkbox"/> yes (10 points)</p> <p><input type="checkbox"/> no (0 points)</p>	<p>Temperature compensation supports reliable dimensional measurement under practical operating conditions. The requirement is based on compensation of the device and workpiece volume using the material expansion coefficient and the temperature measured at the measurement volume.</p>	B
A12	<p>Certified algorithms (Gauss and Chebyshev) for calculation of coordinate-measuring geometry elements. Certifying institute should be Physikalisch-Technische Bundesanstalt or an international equivalent.</p>	<p><input type="checkbox"/> yes (10 points)</p> <p><input type="checkbox"/> no (0 points)</p> <p>Certificate / evidence</p> <hr/>	<p>Supports traceable dimensional evaluation in the same area as the requested length measurement error specification.</p>	B
A13	<p>Certification of manufacturer calibration for the CT-based metrology specification (Deutsche Akkreditierungsstelle (DAkkS) or international equivalent).</p>	<p><input type="checkbox"/> yes (10 points)</p> <p><input type="checkbox"/> no (0 points)</p> <p>Calibration scope / certificate</p> <hr/>	<p>Optional evidence for traceability of the specified length measurement error.</p>	B

B	Module B – X-ray source			
B1	<p>Maximum operating voltage.</p> <p>110 kV (10 p) 160 kV (20 p)</p> <p>Other point results are calculated linearly.</p>	<p>Voltage</p> <hr/> <p>kV</p> <p>@ Current</p> <hr/> <p>mA</p>	<p>High intensity for measurements of dense materials.</p>	B
B2	<p>Minimum operating voltage.</p> <p>60 kV (10 p) 30 kV (20 p)</p> <p>Other point results are calculated linearly.</p>	<p>Voltage</p> <hr/> <p>kV</p> <p>@ Current</p> <hr/> <p>mA</p>	<p>Low intensity for measurements of soft materials.</p>	B
B2.a	<p>Range of operation voltage</p> <p>The largest interval receives the full score of 10 points, the smallest receives 0 points. Other values are calculated linearly.</p>	<p>Delta of Voltage</p> <hr/> <p>kV</p> <p>Delta of @ Current</p> <hr/> <p>mA</p>	<p>Note, we try to understand the interval between minimum (B1) and maximum (B2). Maximum is considered an asset.</p>	B

B3	<p>Open x-ray source design or, if a closed source is the only option, rotating/moveable targets.</p> <p>In open designs, wear parts such as filament and target should be replaceable.</p> <p>Compactness is deemed beneficial for longevity. If for example high-voltage generator, vacuum pump, and tube head form one compact unit without external high-voltage cables and other adjustments to minimise risk of early failure is considered most advantageous.</p>	<p>() Open, compact X-ray source (20 points)</p> <p>() Open X-ray source (10 points)</p> <p>() Closed vacuum tube (0 points)</p>	<p>Open x-ray source designs like, e.g. in SEM are considered advantageous over closed, vacuum tubes. For example, open x-ray source designs typically enable target exchange.</p> <p>However, there are closed source designs that enable to rotate or move the target so that burn-out is avoided at the target spot. If this can be shown and evidence can be presented that simple filament exchange is possible, this is also acceptable and would receive 10 points. If compactness can then be shown, full 20 points would be possible. In the end, we ask you to show that there is no difference to an open, compact source design.</p>	B
B4	Target	<p>() Transmission target (30 Points)</p> <p>() Reflection Target (0 Points)</p>	Transmission target typically enables higher resolution	B
B5	<p>Minimum X-ray spot size of the tube</p> <p>10 µm (0 p) 1 µm (30 p)</p> <p>Other point results are calculated linearly.</p>	<p>x-ray Spot size</p> <hr/> <p>µm</p>	That is, the true resolution of the device.	B
B6	<p>Long-term stability of the X-ray source at high resolution. Spot size ≤ 4 µm at appropriate tube power over at least 24 h continuous operation, or equivalent documented operating</p>	<p>Operating voltage</p> <hr/> <p>kV</p> <p>Spot size</p>	Evidence of source stability is requested for long tomographic measurements and reproducible high-resolution scans.	B

	<p>point. The operating voltage used for the evidence shall be stated.</p> <p>Most stable system receives 20 points, least stable system receives 0 points. Other values are calculated linearly.</p>	<hr/> <p style="text-align: center;">μm</p> <p style="text-align: center;">@ tube power</p> <hr/> <p style="text-align: center;">W</p> <p style="text-align: center;">over duration</p> <hr/> <p style="text-align: center;">h</p>		
B7	<p>Automatic target/source monitoring and automatic readjustment to maintain stable and maximum available source performance without manual operator intervention.</p>	<p>() yes (10 points) () no (0 points)</p> <p>Description of monitoring/readjustment is required</p>	<p>Supports stable source performance and reduces operator intervention during regular operation.</p>	B
B9	<p>Guaranteed filament lifetime of at least 750 h.</p> <p><750 h (0 p) ≥750 h (10 p)</p> <p>Guaranteed lifetime shall be stated.</p>	<p style="text-align: center;">Guaranteed lifetime</p> <hr/> <p style="text-align: center;">h</p> <hr/>	<p>Long filament lifetime reduces operating interruptions and ownership costs.</p>	B

C				
Module C – Detector				
C1	<p>Detector technology</p> <p>Flat-panel (e.g. amorphous-silicon TFT or CCD) CMOS or sCMOS</p>	<p>() Flat panel (0 points) () CMOS (20 points) () sCMOS (30 points)</p>	<p>CMOS detectors are typically faster, have better SNR, and are more dose efficient. However, scientific CMOS (sCMOS) detectors offer additional benefits</p>	B
C2	<p>Reconstructable feature size over a full 3D tomogram.</p> <p>10 μm (0 points) 1 μm (30 points)</p> <p>The volume structural resolution should be verified by tomography of a sphere or similar 3D object. For example, with 1 mm diameter positioned directly in front of the X-ray source.</p>	<p>Smallest detectable feature size</p> <hr/> <p>μm</p> <p>Characteristic length (e.g. sphere diameter)</p> <hr/> <p>μm</p> <p>Object position in scan</p> <hr/> <p>μm</p>	<p>True resolving power is typically worse than voxel size and should be measured with a suitable edge or wire phantoms in 3D and reported in object space in alignment with the spot size (B5).</p> <p>True volume structural resolution is typically worse than voxel size and should be demonstrated in object space using the tomographed object. The edge transition of the object may be evaluated from multiple intensity profiles, for example using the FWHM of the derivative of the signal profile.</p> <p>See also C2.1 for evidence provision.</p>	B
C2.1	<p>Evidence for volume structural resolution. Please image a sphere, spherical reference object, or other 3D reference object for evidence.</p> <p>For example, a sphere with 1 mm diameter positioned directly in front of the X-ray source. The signal profile of the edge transition shall be determined from multiple</p>	<p>Measured FWHM</p> <hr/> <p>μm</p> <p>Characteristic length (e.g. sphere diameter)</p> <hr/> <p>μm</p>	<p>Evidence for the effective volume structural resolution in object space, based on the edge transition of a tomographed sphere.</p> <p>Provision of the tomography data set and an evaluation report is mandatory</p>	B

	<p>intensity profiles; the full width at half maximum (FWHM) of the derivative of the signal profile shall be evaluated. Volume structural resolution $\leq 4 \mu\text{m}$</p> <p>(20 points).</p>	<p>Object position in scan</p> <hr/> <p>μm</p>		
C2.2	<p>Permissible length measurement error for CT-based metrology.</p> <p>Maximal Permissible Error (MPE): $(4.5 + L/75)$ micrometer or better.</p> <p>MPE SD: $(3.5 + L/100)$ micrometer or better (L in mm).</p> <p>The length measurement error should be verified using an appropriate 3D standard such as for example a multi-sphere standard in alignment with ISO 10360 and VDI/VDE 2617-13.</p> <p>Smallest MPE receives 30 points, least stable system receives 0 points. Other values are calculated linearly.</p>	<p>MPE</p> <hr/> <p>μm</p> <p>MPE Standard deviation</p> <hr/> <p>μm</p>	<p>Comparable and traceable acceptance criteria for dimensional measurements and metrological use of the system. The included MKDN multi-sphere distance standard shall be used for verification of the length measurement error.</p>	B
C4	<p>Minimum voxel size</p> <p>10 μm (0 points) 1 μm (10 points)</p> <p>Other point results are calculated linearly.</p>	<p>Voxel size</p> <hr/> <p>μm</p>	<p>We are aware that this depends on mathematical reconstruction. However, in alignment with C4 and B5, we are interested to learn about minimum practical voxel size</p>	B

C5	3D Standard included in package. This can be for example a multi-sphere distance standard for verification of length measurement errors according to VDI/VDE 2617-13.	<input type="checkbox"/> yes <input type="checkbox"/> no	We wish to be able to regularly test resolution power and source stability.	A
C6	Filter changer for physical filter materials as well as filter materials	<input type="checkbox"/> yes (20 points) <input type="checkbox"/> no (0 points)	Clip in or automatically usable filters. Expected filter materials are at least copper and aluminium (or equivalent) as well as combinations thereof	B
C7	Capability to develop und use own filters	<input type="checkbox"/> yes (10 points) <input type="checkbox"/> no (0 points)		B

D	Module D – Measurement Options			
D1	Capability of image averaging during reconstruction	<input type="checkbox"/> yes (5 Point) <input type="checkbox"/> no (0 Points)	That is, capability to improve signal to noise and reduce artefacts be capturing several images at the same angular position	B
D2	Capability of helical scanning in addition to standard circumferential scanning	<input type="checkbox"/> yes (10 Point) <input type="checkbox"/> no (0 Points)	That is, capability to scan similar to clinical CT.	B
D3	Phase-contrast scanning	<input type="checkbox"/> yes (10 Point) <input type="checkbox"/> no (0 Point)	Paganin phase-contrast imaging would be beneficial. We are aware that soft- and hardware-based solutions exist. The point value here reflects that we find this interesting but do not consider it a dealbreaker if this is not available.	B
D4	Ring artefact reduction	<input type="checkbox"/> yes (5 Point) <input type="checkbox"/> no (0 Points)	Capability to improve signal to noise and reduce artefacts.	B

D5	Beam hardening artefact reduction	<input type="checkbox"/> yes (5 Point) <input type="checkbox"/> no (0 Points)	Capability to improve signal to noise and reduce artefacts.	B
D6	Cone-beam artefact correction for CT data.	<input type="checkbox"/> yes (5 points) <input type="checkbox"/> no (0 points) Description of method needed	Correction of cone-beam related artefacts shall be available for tomographic data.	B
D7	Drift correction during tomography, e.g. for small specimen movements, thermal effects, or focal spot drift.	<input type="checkbox"/> yes (5 points) <input type="checkbox"/> no (0 points) Description of method needed	Drift correction supports stable and reproducible reconstruction during longer measurements.	B
D8	Artefact correction for mono-material and multi-material specimens.	<input type="checkbox"/> yes (5 points) <input type="checkbox"/> no (0 points) Description of method needed	Correction methods shall be applicable to conventional CT data and, where applicable, laminography data.	B
D9	Multi-spectral CT (MSPCT) correction methods for reduction of material-dependent artefacts.	<input type="checkbox"/> yes (10 points) <input type="checkbox"/> no (0 points) Description of MSPCT method needed	Separate evaluation of MSPCT capability enables assessment of advanced correction approaches for multi-material specimens.	B
D10	Region-of-interest CT (ROI-CT) for freely selectable sub-areas of specimens, axial and radial to the rotation axis. ROI sub-volumes shall remain in a common specimen coordinate system; fusion with volumes measured at other magnifications is desirable.	<input type="checkbox"/> yes (15 points) <input type="checkbox"/> no (0 points)	Capability to inspect local areas at higher resolution while keeping exact spatial relation to the complete specimen.	B
D11	Eccentric tomography outside the centre of the rotation axis.	<input type="checkbox"/> yes (10 points) <input type="checkbox"/> no (0 points)	Capability to scan larger or off-centre regions while preserving tomographic evaluation options.	B

E				
Module E – Sample Stage				
E1	Capability to mount and use bespoke sample holders and stages, e.g. a wet-cell to scan objects immersed in liquids	<input type="checkbox"/> yes <input type="checkbox"/> no	We must be able to integrate bespoke devices and sample holders	A
E2	Maximum sample weight on sample stage 0 g (0 Points) 5 000 g (20 Points)	Max. sample weight <hr/> g	Option to scan bulky and heavy samples as well as to mount and use bespoke sample holders and stages. At the same time the error	B
E3	Motorised x, y, z positioning for positioning sample within field of view	<input type="checkbox"/> yes (10 points) <input type="checkbox"/> no (0 points)	Sample positioning control for sample positioning and efficient scanning.	B
E4	Integrated camera for in-operando observation of sample and stage. Alternatively, a glass window is also acceptable.	<input type="checkbox"/> yes (5 points) <input type="checkbox"/> no (0 points)	We look for a webcam-type camera to be able to check on samples and stages once scanning chamber is closed. As this can be achieved by a simple glass window, both alternatives are acceptable.	B
E5	Option to add a motorised automated sample changer with software integration at a later stage. The changing process shall use the instrument's own axes to automatically load and measure identical or different specimens from a palette located inside the instrument.	<input type="checkbox"/> yes (20 points) <input type="checkbox"/> no (0 points)	If possible, provide modular price in offer, so that we could include it if head room is available or at a later stage. The price is for informational purposes only and should not be included in the offer price. Control of the changing process should be performed via the instrument control software. No additional software should be required to control the sample changer.	B
F				
Module F – Software				
F1	Control software – Image acquisition and device operation	<input type="checkbox"/> yes <input type="checkbox"/> no	Software to control device and display instrument status.	A

F2	Computer to run and control the instrument, reconstruction, and analysis software.	<input type="checkbox"/> yes <input type="checkbox"/> no		A
F3	Reconstruction software – Image reconstruction	<input type="checkbox"/> yes <input type="checkbox"/> no	Software to reconstruct acquired projection images.	A
F4	Evaluation software – Image analyses	<input type="checkbox"/> Metrology (20 points) <input type="checkbox"/> Image analyses (10 points) <input type="checkbox"/> no (0 points)	Software to analyse reconstructed images. Capabilities comparable to Dragonfly or ImageJ are considered as “classic” Image analyses. Additional software capability so that the machine can act as metrological device goes beyond this and addresses industrial needs for measurement.	B
F5	Reconstructed volume data shall be exportable as RAW or TIFF-stack in 16 bit and 32 bit data depth.	<input type="checkbox"/> 16 bit and 32 bit export (10 points) <input type="checkbox"/> 16 bit export only (5 points) <input type="checkbox"/> no export (0 points)	Shareable 16 bit and 32 bit volume data are important for further analysis in other software packages.	B
F6	Capability to (automatically) generate reproducible measurement protocols	<input type="checkbox"/> yes (10 points) <input type="checkbox"/> no (0 points)	Capability to use standard measurement protocols that can be repeated as for example in a quality assurance. Variables could be pore analyses, connectivity measurements, dimensional analyses (shape and position) for target and actual dimension.	B
F7	Measurement sequences can be interactively taught, saved, and run fully automatically from device control and image acquisition through to the result report.	<input type="checkbox"/> yes (10 points) <input type="checkbox"/> no (0 points)	This adapts automatic protocol generation to the complete workflow requested in the specification.	B

G	Module G – Support, installation, periphery, and consumables			
G1	Commissioning and installation in the foreseen laboratory.	<input type="checkbox"/> yes <input type="checkbox"/> no	Device must be commissioned and installed.	A
G2	Training of three technicians on site	<input type="checkbox"/> yes <input type="checkbox"/> no	Training of three technicians has to be included	A
G3	Continuous online support by technician or similar	<input type="checkbox"/> yes (10 points) <input type="checkbox"/> no (0 points)	We are not looking for a 24/7 hotline but a productive contact in case of problems is desirable.	B
G4	Assisted application support, e.g. through videocall	<input type="checkbox"/> yes (10 points) <input type="checkbox"/> no (0 points)	We are not looking for a remote technician but assistance in case of special testing requirements is desirable.	B
G5	<p>Low ownership costs</p> <p>Costs for warranty:</p> <p>20 points = lowest price 10 points = all prices inbetween 0 point = highest Price</p> <p>Replacement of X-ray tubes / targets</p>	<p>Please estimate for 5 years. A calculation is requested which is to be attached as the basis for the calculation</p> <p>This information is required for the evaluation of the offer.</p> <p>This information is not to be included in the tender price.</p> <hr/> <p>Maintenance costs per maintenance operation</p> <hr/> <p>Replacement costs per X-ray tube</p>	<p>We are aware that maintenance is needed. However, we look for robust devices that incur reasonable and ideally low regular ownership costs. For example, we would like to minimise maintenance costs for the tube.</p> <p>Please calculate with 750 h beam time per year</p>	B
G6	24-month warranty	<input type="checkbox"/> yes (20 points) <input type="checkbox"/> no (0 points)		B

G7	Possibility and capability to refurbish and overhaul device.	<input type="checkbox"/> yes (20 points) <input type="checkbox"/> no (0 points) <hr/> Evidence for capability	Bearing longevity and efficient usage in mind, we consider the possibility to overhaul and renew the device as crucially important. Provide evidence about this capability. This evidence can be individual cases where this has been done.	B
G8	Minimum operator maintenance shall be required for the X-ray source during regular manufacturer maintenance. Maintenance costs must be detailed (see G5). If regular maintenance costs are laid off against a mutually beneficial cooperation agreement (including services by the device users) is considered advantageous.	<input type="checkbox"/> yes to cooperation with cost lay-off (20 points) <input type="checkbox"/> yes (10 points) <input type="checkbox"/> no to cooperation with cost lay-off (0 points)	Regular manufacturer maintenance shall cover necessary source maintenance without operator intervention.	B
G9	Readiness and capability for scientific or technical cooperation related to micro-CT applications. The specific content of a cooperation shall be agreed separately. A possible cooperation topic is the development of phase-contrast methods or ultra-low dosage imaging routines for micro-CT systems.	<input type="checkbox"/> yes <input type="checkbox"/> no	The possibility to cooperate after award is a prerequisite; the cooperation topics themselves are intentionally not specified in this tender matrix. As an example, cooperation may address the development of phase-contrast imaging for micro-CT systems.	A
G10	Acceptance evidence upon installation has to be provided as factory pre-acceptance at the manufacturer and confirmed after installation and commissioning at the site of use.	<input type="checkbox"/> yes <input type="checkbox"/> no	This targets an acceptance plan where we require tangible acceptance structures for verifying the agreed system specification before and after installation.	A

G11	Capability investigation on five workpieces provided by the institute. This should, include 25 repeated measurements without exchange where applicable.	<input type="checkbox"/> yes <input type="checkbox"/> no	The capability investigation shall verify defined properties on an agreed workpiece and may be checked against a cooperative reference measurement. Five benchmark workpieces will be provided	A
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3.2 Evaluation scheme

Lfd. Nr.	Criteria	Rating
1	<p>Price (weighting: 40 %)</p> <p>The price is included as a criterion in the decisive weighting of the overall offer.</p> <p>The lowest-priced offer receives the full score of 10 points. An offer whose total price is twice as high as the lowest offer price receives no points. Tenders whose price is between the lowest tender price and double the lowest tender price receive a linear score.</p>	Tender amount (final price including VAT)
2	<p>Scope of the performance (weighting: 40 %)</p> <p>The sum of the points achieved for the B criteria.</p>	
3	<p>Sustainability (weighting: 20 %)</p> <p>The take-back, recycling and avoidance of packaging materials is awarded 1 point. Companies that do not take back and recycle packaging do not receive any points.</p> <p>Companies that use reusable containers for transportation of the items of this tender receive 1 point. Companies that do not use them do not receive any points.</p>	<p>A take-back of packaging / recycling is offered . <input type="checkbox"/> yes <input type="checkbox"/> no</p> <p>Re-usable containers are used for transportation. <input type="checkbox"/> yes <input type="checkbox"/> no</p>

3.3 Further Declarations

1. Possible Exclusion Criteria

a) Exclusion criteria under further laws; Compliance with further legal provisions

There are no exclusion criteria under § 21 of the Act to Combat Tax Evasion and Illegal Employment (SchwarzArbG), § 21 of the Employee Assignment Act (AEntG), § 19 of the Minimum Wage Act (MiLoG), § 98c of the Residence Act, and § 22 of the Supply Chain Due Diligence Act (LkSG).

2. As a public contracting authority, we are obliged to consider the interests of small and medium-sized enterprises in the award of contracts under § 97 GWB. Therefore, we need the following information for statistical purposes:

My/our company is a small and medium-sized enterprise (SME).

My/our company is not a small and medium-sized enterprise (SME).

3. Declaration in accordance with Annex to the BMWK Circular Letter of 14.04.2022 (Russia Sanctions)

(Please tick if applicable)

The following declaration is made by me/us in a binding manner (possibly also on behalf of the applicants/offerors mentioned below):

1. The applicant/bidder does not belong to the persons or companies mentioned in Article 5 k) (1) of Regulation (EU) No 833/2014 as amended by Article 1 (23) of Regulation (EU) 2022/576 of the Council of 08 April 2022 on restrictive measures in view of the actions of Russia undermining or threatening the territorial integrity, sovereignty and independence of Ukraine, by virtue of: a. Russian citizenship of the applicant/bidder or establishment of the applicant/bidder in Russia, b. Participation of a natural person or company, to which one of the criteria under letter a applies, in the applicant/bidder by holding more than 50% of the shares, c. Acting on behalf of or on the instructions of persons or companies, to which the criteria under letters a and/or b apply.

A. The companies involved as subcontractors, suppliers or companies whose capacities are used in connection with the provision of the suitability proof, which account for more than 10% of the contract value, do not belong to the persons or companies mentioned in the regulation with a connection to Russia.

B. It is confirmed and ensured that no companies involved as subcontractors, suppliers or companies whose capacities are used in connection with the provision of the

suitability proof, which account for more than 10% of the contract value, will be used during the contract period.

Article 5 k) of Regulation (EU) No 833/2014 as amended by Article 1 (23) of Regulation (EU) 2022/576 of the Council of 08 April 2022 reads as follows:

(1) It is prohibited to award public contracts or concessions, which fall within the scope of the directives on public procurement and under Articles 10 (1), (3), (6) (a to e), (8) to (10) and Articles 11 to 14 of Directive 2014/23/EU, to the following persons, organisations or entities:

a) Russian citizens or natural or legal persons, organisations or entities established in Russia,

b) Legal persons, organisations or entities, whose shares are held by more than 50% directly or indirectly by one of the persons or entities mentioned under letter a,

c) Natural or legal persons, organisations or entities, which act on behalf of or on the instructions of one of the persons or entities mentioned under letters a and/or b, also those, which account for more than 10% of the contract value, subcontractors, suppliers or companies, whose capacities are used in the sense of the directives on public procurement.

(2) The competent authorities may authorise the award or continuation of contracts, which are intended for:

a) the operation, maintenance, decommissioning, disposal of radioactive waste, supply with and reprocessing of nuclear fuel, and the continuation of the planning, construction and acceptance tests for the commissioning of civil nuclear facilities and their safety, as well as the delivery of raw materials for the production of medical radioisotopes and similar medical applications,

b) international cooperation in the field of space programmes,

c) the provision of essential goods or services, which are exclusively or only in sufficient quantities available from the persons mentioned under paragraph 1,

d) the activity of diplomatic and consular representations of the Union and the Member States in Russia, including delegations, embassies and missions, or international organisations in Russia, which enjoy immunity under international law,

e) the purchase, import or transportation of gas and oil, including refined petroleum products, as well as titanium, aluminium, copper, nickel, palladium and iron ore from or through Russia into the Union, or

f) the purchase, import or transportation of coal and other solid fossil fuels listed in Annex XXII until 10 August 2022.

(3) The relevant Member State shall inform the other Member States and the Commission of each authorisation granted under this Article within two weeks of its grant.

(4) The prohibitions under paragraph 1 shall not apply to the performance — until 10 October 2022 — of contracts which were concluded before 09 April 2022.

Place, Date	Signature / company stamp
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