



Italian National Agency for New Technologies,  
Energy and Sustainable Economic Development

## ANNEX A

### **TECHNICAL ATTACHMENT AND EVALUATION CRITERIA OF THE OFFER**


February 2020

A handwritten signature in black ink, appearing to be 'JB' or similar, on a light yellow background.

## Commitment for the provision of a X-ray Computed Tomography (CT) system

<b>Essential requirements of the equipment</b>	<p>The requested equipment must be able to perform computed axial tomography with at least 4 degrees of freedom. The essential requirements that the equipment must respect are in the list below:</p> <p><b>SOURCE:</b></p> <table> <tr> <td><b>Operating voltage</b></td><td><math>\geq 450\text{kV}</math></td></tr> <tr> <td><b>Beam current</b></td><td><math>\geq 1\text{ mA}</math></td></tr> <tr> <td><b>Power rating</b></td><td><math>\geq 450\text{W}</math></td></tr> <tr> <td><b>Minimum focal spot</b></td><td><math>\leq 400\text{ micron}</math></td></tr> </table> <p><b>2D DETECTOR</b></p> <table> <tr> <td><b>Active area</b></td><td><math>\geq 400 \times 400\text{ mm}</math></td></tr> <tr> <td><b>Active pixels</b></td><td><math>\geq 2000 \times 2000\text{ pixels}</math></td></tr> <tr> <td><b>Detector bit depth</b></td><td><math>\geq 16\text{ bits}</math></td></tr> </table> <p><b>LINEAR DIODE ARRAY</b></p> <table> <tr> <td><b>Number of diodes</b></td><td><math>\geq 1000\text{ pixels}</math></td></tr> <tr> <td><b>Distance between pixels</b></td><td><math>\leq 400\text{ micron}</math></td></tr> </table> <p><b>MANIPULATOR</b></p> <table> <tr> <td><b>Minimum axis displacements travel</b></td><td><math>\geq 400\text{mm (X); } 600\text{mm (Y); } 600\text{mm (Z)}</math></td></tr> <tr> <td><b>Turntable diameter</b></td><td><math>\geq 300\text{ mm}</math></td></tr> <tr> <td><b>Turntable maximum load</b></td><td><math>\geq 50\text{kg}</math></td></tr> <tr> <td><b>Largest sample size for Direct Radiography</b></td><td><math>\geq 600\text{mm (width); } 700\text{mm (height)}</math></td></tr> <tr> <td><b>Largest sample size for Computed Tomography</b></td><td><math>\geq 300\text{mm}</math></td></tr> </table> <p><b>CONTROL CONSOLE</b> Full control of X-ray tube and manipulator, real time radiography with multi display elaboration of parameters and image</p> <p><b>WORKSTATION FOR RECONSTRUCTION WITH MONITOR 4K</b>  <b>Processor:</b> 2x Intel Xeon Tetradeca-core (14) CPU <u>or higher</u>  <b>RAM:</b> <math>\geq 256\text{ GB}</math> <u>or higher</u>  <b>HDD:</b> <math>\geq 16\text{TB RAID 10 HDD (8TB usable)}</math> <u>or higher</u>  <b>SDD:</b> <math>\geq 1.6\text{TB RAID 0 SSD}</math> or higher  <b>VIDEO card:</b> 2 x Market leading Nvidia graphics card <u>or higher</u></p> <p><b>SOFTWARE FOR RECONSTRUCTION:</b> VGSTUDIO MAX 3.3 or updated release</p> <p><b>X-RAY CABINET</b>  The cabinet for X-Rays must be fully in compliance with the International Ionising Radiations Regulations (IRR99 protection, for a radiation dose rate not exceeding <math>1\mu\text{Sv / h (0,25mR / h)}</math>).  The Cabinet <u>must have a remote internal visual system</u> with at least a TVCC color system in the cabinet with external monitor.</p>	<b>Operating voltage</b>	$\geq 450\text{kV}$	<b>Beam current</b>	$\geq 1\text{ mA}$	<b>Power rating</b>	$\geq 450\text{W}$	<b>Minimum focal spot</b>	$\leq 400\text{ micron}$	<b>Active area</b>	$\geq 400 \times 400\text{ mm}$	<b>Active pixels</b>	$\geq 2000 \times 2000\text{ pixels}$	<b>Detector bit depth</b>	$\geq 16\text{ bits}$	<b>Number of diodes</b>	$\geq 1000\text{ pixels}$	<b>Distance between pixels</b>	$\leq 400\text{ micron}$	<b>Minimum axis displacements travel</b>	$\geq 400\text{mm (X); } 600\text{mm (Y); } 600\text{mm (Z)}$	<b>Turntable diameter</b>	$\geq 300\text{ mm}$	<b>Turntable maximum load</b>	$\geq 50\text{kg}$	<b>Largest sample size for Direct Radiography</b>	$\geq 600\text{mm (width); } 700\text{mm (height)}$	<b>Largest sample size for Computed Tomography</b>	$\geq 300\text{mm}$
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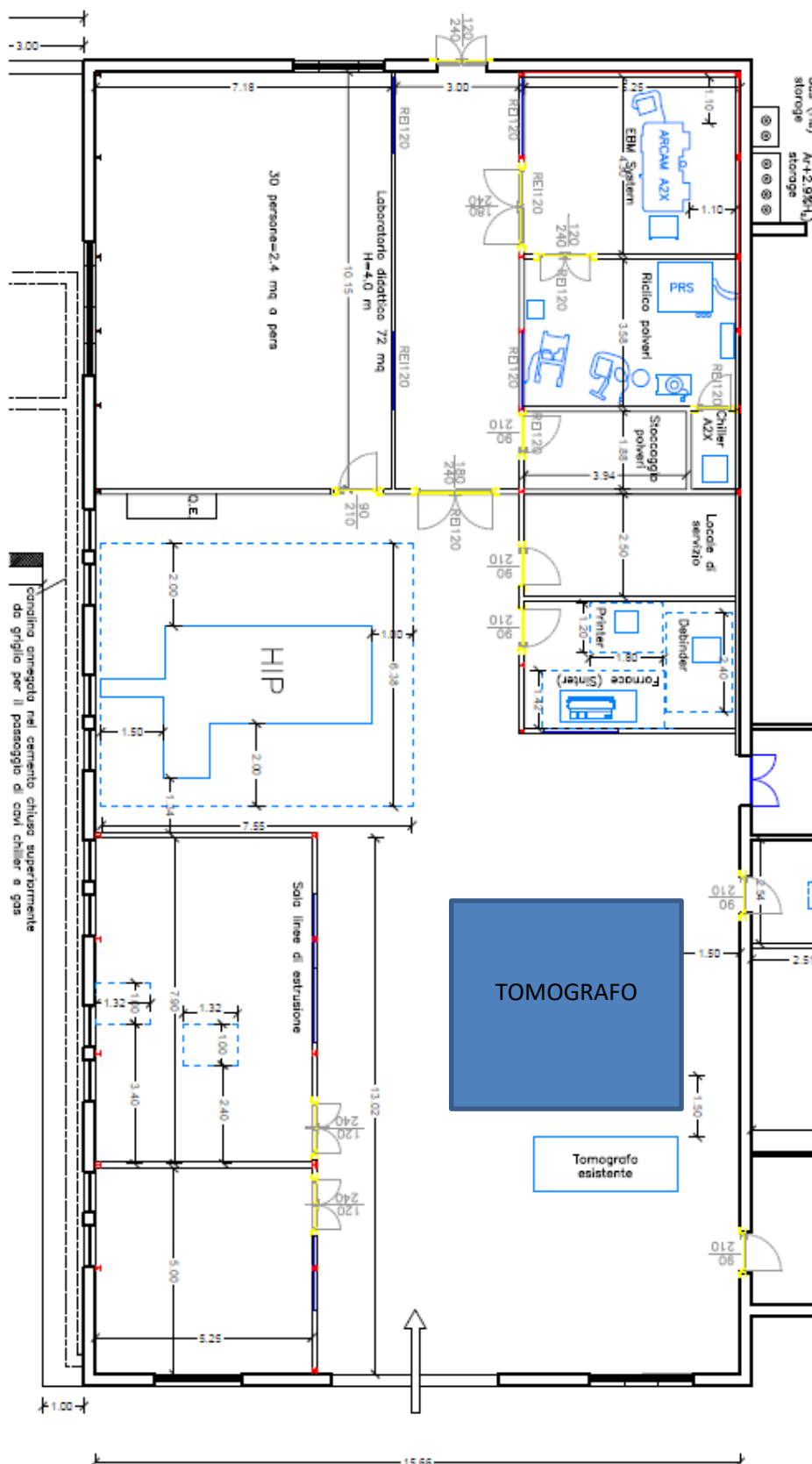
Check of qualification	<p><b><u>All the sent data must be deduced from brochures of standard products and real measures.</u></b></p> <p><b>Pay Attention!!!</b></p> <p><b><u>A test report on a steel sample having different thicknesses is requested, under penalty of exclusion. The report must show the results of tests using the standard ASTM E1025 penetrameters for each thickness, so that the quality of radiographic and tomographic images can be evaluated.</u></b></p> <ul style="list-style-type: none"> <li>- The standard sample must be a steel wedge with 4 steps (thickness of steps: 5-10-15-20 mm respectively), width and length of 10 mm and 40 mm respectively, and overlapping penetrameter with equivalent thickness having 3 through holes 2 T, T and 4 T.</li> <li>- The report must show the test parameters, images and images analysis with evaluation of the holes dimensions.</li> <li>- The attached document, in case of awarding, will be used as a criterion for comparison for the final test of the equipment.</li> </ul>
Essential accompanying furniture	<ul style="list-style-type: none"> <li>- <b>Cooling system:</b> the equipment must include as essential requisite the furniture and installation of a cooling system adequate to the continuum and stable operation of the tomography (7/7 - 24/24).</li> <li>- <b>Starter KIT:</b> eventual consumables (as a non-exhaustive list example: seals, filaments, high voltage consumables, etc.) in order to permit a correct operation for the first 1000 tomographic cycles.</li> <li>- <b>All what is necessary, even if not here explicit, for the installation, final test, correct operation and use of the equipment (as a non-exhaustive list example: pipes and connecting cables from the principal machine to ancillary; fluids that are essential for the installation (de-ionized water, additives, oils, etc.), eventual blocks for calibration and penetrameters).</b></li> </ul>
Training	<ul style="list-style-type: none"> <li>- A complete training on the procedures for the correct use of the equipment is requested, to be completed during final test and subsequent start phases.</li> <li>- The Course must be structured so that at the end of the training the staff members are fully able to operate with the equipment, modify the packages of standard parameters in order to go further with research on parameters optimization, and check new materials.</li> <li>- It is also requested that those who will be trained could in turn become trainers for other users.</li> </ul>
Warranty	<ul style="list-style-type: none"> <li>- <b>Full, 24 months</b> from the date of memorandum of correct installation.</li> </ul>



<b>Payments</b>	<p>Payments will be made no later than 30 days after receipt of the invoices issued, as follows:</p> <ul style="list-style-type: none"> <li>- <b>20%</b> of the contract value at the time of signing the contract; payment of the advance is subject to the provision of a bank or insurance guarantee for an amount equal to the advance, as established by art. 35 paragraph 18 of Legislative Decree no. 50/2016; the delivery time of the equipment starts from receipt of the advance payment;</li> <li>- <b>60%</b> of the contract value upon delivery of the complete equipment at the destination and assembly site (ENEA Casaccia Research Center, Rome), subject to verification of the integrity of the goods by the Process Manager;</li> <li>- <b>20%</b> of the contract value after installation and testing of the equipment and verification of conformity by the Procedure Manager</li> </ul>
<b>Conditions on the furniture</b>	<p><b>The equipment must be new from factory and not repaired.</b> It must be delivered and installed at ENEA CR CASACCIA (ROME), with concomitant check of the proper operation.</p>
<b>Delivery times</b>	<ul style="list-style-type: none"> <li>- Starting from the date of the order, the equipment must be delivered, installed and tested for its operation in ENEA CR CASACCIA, no later <b>than 5 (solar) months</b>.</li> <li>- <b>Attention!</b> The term for the delivery is mandatory and no extension for any reason will be conceded. In case of a delay in the delivery, with respect to the delivery time declared in the documents for the public bid and starting from the date of reception of the supply order, a penalty will be applied to the supplier, equal to the 1 ‰ (one over thousand) of the total cost of the equipment for each (solar) day of delay, to be calculated till the day of positive check/test of compliance of the supply.</li> </ul>
<b>Penalties</b>	<p>In the event of partial or total non-fulfillment of contractual obligations and / or delay in delivery, with respect to the delivery time declared by the supplier in the tender documents (starting from the date of payment of the contractual advance), a penalty is charged to the supplier, equal to <b>1 ‰ (one per thousand)</b> of the total supply amount for each day (SOLAR) of delay, to be calculated up to the day of positive testing / verification of conformity of the supply.</p> <p>Penalties for delays not due to the supplier's liability are excluded.</p> <p>The fixing of the penalties does not exclude the fair compensation for any other damage occurred, or the termination of the contract if the total amount of penalties exceeds the guarantee provided by the contractor.</p>

**Final placement in the laboratory - Layout**

- The equipment will be placed in a laboratory having a dedicated free space of 4 x 4 m and height of 5 m. The lab is equipped with a crane with 10 ton of payload and an entrance door of 3.8 x 3.8 m.



## EVALUATION CRITERIA OF THE ECONOMICALLY MOST BENEFIT OFFER

The evaluation of the offers and the awarding of the supply will take place at the discretion of a Selection Committee, specifically appointed by ENEA after the deadline for sending the offers, by assigning to each offer scores according to the evaluation criteria and the calculation methods described below.

### ➤ ECONOMIC OFFER: **maximum 20 points**

- 20 points assessed on the prices applied to the essential supply of the X-Ray Tomography system, including installation, testing and training.

The overall economic offer score of the operator "i" (POEi) will therefore be calculated as follows:

$$POEi = 20 \times PRmin / PRI$$

where:

- **POEi** = Economic Offer score of the operator "i"
- **PRmin** = minimum price offered
- **PRI** = price offered by the "i" operator

### ➤ TECHNICAL OFFER: **maximum 80 points** distributed as follows for the following parameters:

- Maximum Operating voltage in kV: PP(kV) = **15 Points**
- Maximum power in Watt: PP(W) = **5 Points**
- Detector Panel Dimensions in mm: PP(DP)= **10 Points**
- Detector Panel resolution number of pixels: PP(PX) = **10 Points**
- Focal spot in micron: PP(GF) = **10 Points**
- Number of motor Axes: PP(DG) = **10 Points**
- Working volume: PP(V) = **5 points**
- Maximum load on the rotating table: PP(ML)= **5 Points**
- Minimum delivery time expressed in months: PP(t) = **10 Point**

The formula applied for the individual parameters will be:

**For the parameter PP (x) where the best parameter is the maximum one:**

$$PP(x) i = PP(x) * P(x) i / P(x) iMax$$

Or

**For the parameter PP (x) where the best parameter is the minimum one:**

$$PP(x)_i = PP(x) * (1 - (P(x)_i - P(x)_{imin}) / P(x)_{imin})$$

Where "x" is the specific parameter (Maximum Operating voltage "KV"; Maximum power "W ....; t= delivery time)  
 "i" the specific operator

**PP(x)<sub>i</sub>**= score Parameter "x" of the Operator "i"

**P(x)<sub>i</sub>**= value of Parameter "x" of the offeror "i"

**P(x)<sub>iMax</sub>**= value of the parameter "x" higher than those offered

**P(x)<sub>imin</sub>**= value of the parameter "x" lower than those offered

The overall technical score for the bidder "i" will be:

$$PTTi = \sum PP(x)_i$$

Where **PTTi** is the Total Technical Score of the operator "i" obtained as a summation in "x" of the individual technical scores on the various parameters of the operator "i"

**TOTAL SCORE** of the operator "i" given by the sum of the Economic Score + the Technical Score will be:

$$POEi + PTTi$$