

Compliance Sheet—Micro Focus Radiography System

- Offers without Compliance sheet will not be considered.
- Mere copy and pasting of specification in Compliance sheet shall not be done.
- Party has to provide page and paragraph number of product brochure against each complied specification. In case it is not possible, party has to provide sufficient clarifications.

Manufacturer’s Name with complete Address	
Supplier’s Name with complete Address	
Name and model number of proposed Equipment	

	Compliance/Clarifications
1 Scope of Supply:	
1.1 The scope of supply includes the Supply, Installation, Commissioning and Demonstration of a Micro-Focus Radiography System for the intended functions on a turnkey basis and the supply of all relevant technical Documentation.	
1.2 The scope also includes on-site training of VSSC ¹ personnel after I&C ² (minimum 2 days) on the complete functioning and day-to-day maintenance of the total x-ray system.	
2 Technical Specification:	
The Proposed Micro Focus X-ray system consists, preferably of the following main sub-systems:	
2.1 X-Ray Tube	

¹VSSC—Vikram Sarabhai Space Centre

²I&C—Installation and Commissioning

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2.2 High Voltage x-ray Generator	
2.3 High Tension power Cable, Cooling and Vacuum System	
2.4 Control cabinet	
2.5 X-ray Tube manipulator	
2.6 Standard Accessories and essential consumables	
3 X-Ray Tube Specifications:	
3.1 Type: Open reflective type with minimum dynamic voltage range of 20 to 225 kV. Provided with serviceable beam chamber, integrated cooling system, vacuum generator and vacuum Sensor and laser (Class-1 type) assisted focusing device.	
3.2 Tube Current: Tube current should be adjustable between 0-3 mA (or more)	
3.3 Power rating: Maximum power rating of the tube should be ≤350Watt	
3.4 Target Material: Tungsten.	
3.5 Focal Spot Size: Dynamic focal ranging from ≤6 μm to 100 μm	
3.6 Power Supply: compatible with Indian electrical supply conditions (220 volts ±5% & 50 Hertz ±1%)	
3.7 Leakage Radiation: ≤1mGy per hour measured at maximum kVp and corresponding mA at a distance of 1m from the focus of the tube (documentary evidence or specific compliance should to be provided along with the offer).	
3.8 Beam Angle: 30 degrees or better.	

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3.9 Maximum defect detectability $\leq 10 \mu\text{m}$ (documentary evidence to be provided along with the offer)	
3.10 Penetration Thickness: $\geq 10 \text{ mm}$ (steel) with radiographic quality as per ASTM E94 /ASTM E 2698.	
3.11 Weight: $\leq 50 \text{ kg}$ (for tube).	
3.12 The tube should be provided standard collimators and filters.	
3.13 The offered system should be pre-calibrated, tested, qualified, and ready to use after commissioning. FAT ³ report shall be submitted along with the item.	
3.14 The tube should work in a environment of 5 to 40°C and with a relative humidity of 80 % (max-non condensing)	
4 High Voltage X-Ray Generator:	
4.1 Voltage Range: 20 to 225 kV (continuously adjustable in 1 kV increments).	
4.2 Electrical Protection Features: Over-voltage and over-current protection must be provided.	
5 High Tension power Cable, Cooling and Vacuum System:	
5.1 High Tension Power Cable: <ul style="list-style-type: none"> 5.1.1 Cable length between Power module to power supply: ≥ 20 meters. 5.1.2 Cable length between Power module to control console: ≥ 20 meters. 5.1.3 High-tension cable with R30 connectors (preferred) from HV generator to X-ray tube: ≥ 5 meters. 	

³FAT—Factory Acceptance Test

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<p>5.1.4 Other necessary cables and tubing (vacuum pump, cooling kit, door switch, etc.) must be of suitable length to be provided.</p>	
<p>5.2 Cooling and Vacuum System:</p> <p>5.2.1 Cooling: Integrated cooling system for the generator and X-ray tube.</p> <p>5.2.2 Vacuum: A vacuum system for evacuating and secondary high –vacuum pumping</p> <p>5.2.3 Necessary hoses with rough and high-vacuum gauges should also be provided.</p>	
<p>Note:</p> <ol style="list-style-type: none"> 1. The length of cables and tubing (including High tension, power cables, cables to the control unit, cooler, vacuum pump, etc.) given are indicative only. 2. <u>They should be of exact length sufficient enough to ensure connections with minimum excess length for which party has to make a visit to the facility at VSSC prior to the submission of offer, if required.</u> 3. <u>There should not be any buffering/tangling of cables/tubes with overhanging inside the X-ray room permitted at any cost.</u> 	
<p>6 Control cabinet:</p>	
<p>6.1 Equipped with keys/knobs for setting the kV, mA and exposure time.</p>	
<p>6.2 Control of roughing pump, integrated cooler, power supply and focusing optics.</p>	
<p>6.3 Separate Indicators (preferably LED) for X-Ray stand by and running</p>	
<p>6.4 Provisions for repetition of the exposure with preset parameters.</p>	
<p>6.5 Safety Features:</p>	
<p>6.5.1 Emergency stop button and warning lamp, door interlocks.</p>	

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6.5.2 Safety protection for X-ray tube in case of vacuum drop or surge.	
6.5.3 PLC & Safety circuitry.	
7 X-Ray Tube Manipulator:	
7.1 Movement: The manipulator (movable) must allow smooth, jerk free manual movement of the X-ray tube in the vertical axis (from 300 mm to 1200 mm from floor level).	
7.2 Orientation: The tube should be capable of focusing in both horizontal and vertical directions, as well as at intermediate inclined position in between.	
8 Standard Accessories and essential consumables:	
8.1 The system should include all standard accessories such as filters, collimators, and a focusing optics control system.	
8.2 Essential consumable like filament, lubricant for the vacuum system (in required quantity) shall also to be supplied during the warranty period of 2 years.	

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9 Compliance and Certifications:	
9.1 Operation Instruction Manual: A detailed operation instruction manual (hard copy in English) with all electronic circuit diagrams and block diagrams must be provided.	

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9.2 Regulatory Approvals:	
9.2.1 Documentary evidence or specific compliance for Regulatory clearance from the Radiation Safety Authority of the country of origin or the IAEA ⁴ must be attached with the offer.	
9.2.2 Type approval from BARC ⁵ /AERB ⁶ must be submitted within 1 month after placement of the PO ⁷ .	
9.3 Environmental and Safety Compliance: The system must meet international standards for operational compliance, environmental protection, radiation safety, and electromagnetic compatibility & all other electrical safety features for entire system shall also be ensured. Documentary evidence must be submitted (either in the catalogue/Brochure or compliance in the compliance sheet) as proof of compliance along with the offer.	
9.4 Leakage Radiation: A certificate for the Stray radiation measured for the supplied tube from the radiation protection agency of the country of origin/ICRP ⁸ should be attached along with the supply	
9.5 System Qualification Criteria (to be demonstrated at the time of I & C): The penetration capability of ≥10 mm in steel, ensuring to meets radiographic quality as per ASTM E94/ ASTM E 2698).	
9.6 Radiography quality with a density range of 1.8 to 2.8 and defect sensitivity and contrast with respect to 1-1T (or equivalent) with Agfa D4 or	

⁴ IAEA-International Atomic Energy Agency

⁵BARC-Bhabha Atomic Research centre

⁶AERB-Atomic Energy Regulatory Board

⁷ PO—Purchase Order

⁸ICRP-International Commission on Radiological Protection

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equivalent film/ DFPD ⁹ (of 100µm pixel pitch) under standard processing/digital imaging parameters.	
9.7 The maximum detectability of ≤10µm to be demonstrated using JIMA ¹⁰ RT RC-2 resolution (Thickness of penetration, FOD ¹¹ , magnification, Film/ Detector combination required to achieve the maximum detectability to be stated in the offer)	
9.8 A suitable JIMA Image Quality Indicator shall also be quoted along with the equipment.	
10 General Specifications (Terms & Conditions)	
10.1 The offer should be submitted in two parts.	
10.1.1 Part-1: Technical bid containing details of the system meeting all technical specifications with all brochures/catalogues/technical data sheets. The items/accessories included along with X-ray system in the standard supply to be clearly indicated in the offer. The masked price bid with cost of the standard supply, other essential & optional accessories with split up cost, AMC cost and price list of probable spares required for the AMC period should also be attached.	
10.1.2 Part 2: Price bid offer of the system with split up cost for all the items mentioned in the part-1	
10.2 VEC¹² The offered system should be the latest, standard model having brochure/catalogue with model number from a reputed manufacturer. The party has to mention the year of manufacturing	

⁹DFPD- Digital Flat Panel Detector

¹⁰ JIMA-Japan Imaging and Measurement Association

¹¹FOD-Film to Object Distance

¹²VEC-Vendor Eligibility Criteria

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<p>along with model number of the system. Technical Brochure/Catalogue containing the full Technical specification of the system should be attached (in English) along with the offer.</p>	
<p>10.3 VEC: The party shall be an OEM¹³ or an authorized sales agent and service dealer of the OEM (The latest original authorization certificate from the OEM should be attached if the party is a sales agent/dealer). Assembled/integrated systems are not acceptable.</p>	
<p>10.4 VEC: The party should have after-sales service facility in India with service personnel trained and certified by the principal in troubleshooting/maintenance/calibration and software update of the system.</p>	
<p>10.5 Installation and Training: The supplier must perform the installation and commissioning of the system and provide two days of exclusive training on the complete functioning and day-to-day maintenance and minor trouble shooting of the X-ray system at VSSC.</p>	
<p>10.6 Performance Certification: A list of existing customers in India (with addresses) to whom the same or similar systems supplied within last five years and working in satisfactory condition are to be provided. The Party has to coordinate a visit of the VSSC Team to any one of these customers as per our choice, if required during the technical offer evaluation. If there is no customer in India, the details of customers to whom the same or similar systems are supplied by the dealer/OEM within the last five years, with an original performance evaluation certificate from any two customers are to be supplied along with the offer.</p>	
<p>10.7 After Sales and service support: The party has to give an undertaking to ensure the availability of spare and services for at least the next 10 years from the date of installation of the system. <u>There should be commitment also from the part of OEM for assured support on real-time basis, in case of breakdown/urgency, if any, if the Indian agent/Service provider fails to act (A letter of</u></p>	

¹³OEM-Original Equipment Manufacturerer

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<p><u>commitment from the OEM is to be attached along with the offer).</u></p>	
<p>10.8 Warranty: The system supplied should be provided with a two-year warranty from the date of installation & commissioning and thereafter under a Non-comprehensive annual maintenance contract for five years for which a separate order will be made at the expiry of warranty.</p>	
<p>10.9 AMC¹⁴: The Party has to quote separately for the AMC [2 PM¹⁵ visits and one BM¹⁶visit (if required at free of cost) per year] with a price list of probable spares to be procured during the AMC period. <u>The cost of AMC shall also be accounted for arriving at the L1 offer during bid evaluation.</u></p> <p>10.10 The party has to quote for additional visits if more than one breakdown maintenance visit becomes necessary in a year during AMC period.</p>	
<p>10.11 Scope of work in Warranty and AMC Period:</p> <p>10.11.1 Checking and ensuring proper functioning of equipment.</p> <p>10.11.2 Conduct 2 PM visits and any number of BM visits (if required at free of cost) every year during the warranty period and 2 PM and 1 BM (if required at free of cost) visits during the AMC period.</p>	
<p>10.12 Breakdown (if any) of the system both in warranty and AMC period has to be attended to within two consecutive working days on receipt of information from VSSC and periodic maintenance visit in due course on mutual agreement.</p>	
<p>10.13 During maintenance, replacement of parts if any, which are not available with VSSC has to be supplied by the party with prior approval from VSSC. Payment for the same shall be released separately on the certification of the successful functioning of the system after the replacement of the</p>	

¹⁴AMC-Annual Maintenance Contract

¹⁵PM-Preventive Maintenance

¹⁶BM-Break-down Maintenance

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<p>spare by VSSC and against the production of documentary evidence by the party.</p>	
<p>10.14 Party has to quote for all the specified concomitant accessories which are considered essential for commissioning and utilization of the machine, even if not specified.</p>	
<p>10.15 The party has to supply the certificates of warranty, calibration, conformities for electrical safety & environmental protection, operating instruction manual and operational compliance along with the system.</p>	
<p>10.16 Installation prerequisites to be arranged by VSSC like Isoline transformer, UPS, Special earthing, etc., if any required to be clearly indicated in the offer.</p>	
<p>10.17 Party also have to submit the FAT report and certificate of stray/leakage radiation measurement for the radiation protection agency of the country of origin or IAEA along with the supply.</p>	
<p>10.18 Apart from items mentioned under the Technical Specification above, party may quote any other additional concomitant or optional Accessories (if any) essential to extract the full rated performance of the system with proper justification.</p>	
<p>10.19 The party has to provide a compliance sheet along with the quote, explaining detailed compliance against each serial number of the specification list. Offer without the compliance matrix shall not be considered for evaluation. Stating just "Yes" or "Complied" against each serial number of the specification sheet without proper explanation may cause the rejection of the offer without any further intimation from VSSC.</p>	
<p>10.20 Documents to be supplied along with the offer:</p>	

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10.20.1	<p>Part-1: Technical bid, Brochures/catalogues/ Technical data sheets(in English), Compliance sheet of the specification, Certificate from OEM (in case of Dealer/Indian agent), Certificate for commitment from the OEM for spare and service support for fault free operation (at for 10 years), List of existing customers in India/ List customers outside India with original performance evaluation certificate from any two customers, Price masked Price bid containing the standard supply, concomitant and optional accessories with break up, AMC quote (Price masked, including the cost of additional BM visits, if any), Price list of spares for the AMC period (Price masked)</p>	
10.20.2	<p>Part-2: Price bid (with the price of all items filled as per the above)</p>	
10.21	<p>Documents to be supplied after Placement of PO: Type Approval from AERB/BARC</p>	
10.22	<p>Documents to be supplied along with the item: Operating instruction manual (Hard Copy in English), Certificate of warranty, Certificate of stray/leakage radiation, Certificate of operational compliance, Certificate of conformities for electrical safety & environmental protection, Calibration certificate from the OEM, Details of FAT, certificate of I&C (at the time of I&C).</p>	

