**TECHNICAL SPECIFICATIONS**

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| **Parts** | **Sub items** | **IOM standard specification** |
| **1. Stationary X ray machine** | | |
| **Brand and Model of the x-ray Machine** | Brand/Model | **Vendor should specify the brand and model of the X ray machine** |
| **X-ray Machine Generator** | mA, | **650 or more** |
| KVP, | **40 - 150 kV** |
| Power (KW), | **50KW or more** |
| **Automatic exposure control** | **Present** |
| **X-ray tube** | **F**ocal spot size of the tube, | 0.6/1.2mm (dual) |
| Tube Material | Tungsten-Rhenium |
| Movability | Multirotating tube (capable to take decubitus view on the table), X-ray tube rotation: ± 180° |
| Heat capacity, cooling rate and thermal protection | 300KHU or more |
| **Tube stand** | Floor /ceiling amounted tube, | Strong; Horizontal travel range ~ 140 cm; Vertical travel range ~150 cm; Rotation of tube around vertical axis: ± 90°; Floor mounted preferred as it needs less space and no need for strong ceiling (Vendor should specify the type, whether it is floor or ceiling mounted) |
| **Bucky Chest** | Bucky ( Chest Bucky) | Highest vertical and rotation Bucky movement  Distance from chin rest to active area of Bucky allows to fully include the chest x-ray image and avoid cutting of the apices  Ergonomic, Strong Bucky stand, which can be well fixed on the floor, |
| **Table** | X-ray Table | Four-Way Float Top Table (Minimum Simple, two-way table with locking wheel, especially for small X ray rooms, and if the use is predominantly for chest X rays and requested by the mission). |
| **Grid** | Grid Included | Grid ratio, 8:1 or more (the higher is the better) |
| **Exposing switch (Console)** | Image exposing Console ( If separate from the operator’s work station) | Display automatic (Digital) with exposing button |
| **Collimator** | Automatic/Semiautomatic/manual, with light beam centering and timer | (Vendor should specify the type) Automatic better followed by semiautomatic and manual respectively |
| **Electricity source requirement** | Electricity requirement of the x-ray machine | Either Three Phase  Or  If only single phase electricity is available in the mission, the Single phase machine should be with DQE >80%) |
| **Room requirement** | Room size and shape needed, for stationary (Room size and x-ray arrangement should allow lateral decubitus view) | Vendor should specify the room size requirement of the X ray machine |
| **2. The Detector** | | |
| **The Detector specification** | Brand/model | Vendor should specify the brand and model of the detector |
| One/double detector, | preferred if double for both table and Bucky instead of moving the detector between the Bucky and table |
| Physical weight | Less than 5kg (smaller is better) |
| Physical size of detector | 17X17'', better than 14X17'' |
| Detector Material | Cesium Iodide ( CsI ), better than Gadolinium oxysulfide (Gadox) |
| Pixel number | More than or equal to 3000 x 3,000 (the higher the better) |
| Pixel size/ pitch | Less than or equal to 140 μm (the lower the better) |
| DQE (Detective quantum efficiency) | 65% or more for three phase machine and >80% for single phase machine |
| Analog to Digital (AD) Conversion | 12 bits or more |
| Image transfer method | Wired/wireless image transfer –or wireless through Wi-Fi router, the best specification and latest model of router |
| Digital image quality | The image quality will be checked and confirmed acceptable by IOM subject matter expert. |
| **Detector Battery** | Charging method | 1. direct electric charging preferred  2. if not, external battery charging with tethering option |
| If external battery charger, number of batteries | At least 3 batteries |
| If external battery charger, number of chest x-ray it can take after full charge of the battery | after full charging, can take 200 or more CXRs or lasts for 8 hours of operation |
| If direct electric charging, is detector integrated(internal)/ or movable (external) | If the machine has double detector for both chest and table Bucky separate, integrated fixed detector is better.  But if single detector, external (movable) detector is preferred, so that it can be moved between the chest Bucky and the table |
| **3. Computer (hardware & software)** | | |
| **Computer (hardware & software)** | Operating system | windows 10, preferably |
| Memory | 16GB or more |
| Processor | latest, i7 or above |
| Image storage | 1TB or higher (can store more than 3000 CXR images) |
| Image manipulating software | Specify brand name of software |
| DICOM compliance | DICOM 3 compatible & IHE compliant, with ability to network to PACS |
| Ports | Ports for USB, DVD/CD burning ability |
| Radiographer monitor size | minimum 17” |
| HIS/RIS | included and enabled |
| Other supports | Supports worklist modality, storage, printing and query and retrieve. |
| Biodata fields on the display | All biodata fields can be accessible on the display |
| **4. Other Items** | | |
| **Certification** | Registration by regulatory body | The machine is approved by authorized regulatory bodies and manufacturer is legally registered, and agent/vender is available in the country, |
| Certification document | Vendor can submit any of the following certification documents: 1. Preferably if WHO/SRA certification such as FDA or EU certification. 2. If not, Certification from the country where the X-ray machine will be installed +/- CE marking 3. If 1 and 2 are not available, Certification from the country of manufacture of the X ray machine and confirmation that the X-ray machine is allowed to be installed in the country where the x-ray machine will be installed. |
| **Accessories Included** | Lead aprons, skirts and gloves  (4 Aprons for Technicians, 3 Aprons for pregnancy, 3 normal Aprons for applicants ) | Vendor to specify the type and quantity of lead accessories which can be provided |
| Lateral cassette holder | Specify if Lateral cassette holder can be provided and included in the package (needed for taking lateral decubitus views) |
| Child Immobilizer | Specify if include in the package |
| Other accessories ( such as x-ray printer, CD burners and others) | Include in the optional list the offer for any other available accessories related to digital radiography services |
| **After sale service by the vende** | Availability of technical support locally | Vendor should confirm if technical support is available locally in the country where the X ray machine is going to be installed |
| The capacity of the technicians | The vendor should confirm the technicians available locally are able to fix any machine related issues |
| The easy availability of technical support | The vendor should confirm the technicians available locally are accessible in regular and emergency bases |
| Response time to critical failure ( The equipment stops working) | Uninterrupted support with response in few hours preferred, onsite or remote, |
| Response time to non critical failure (the equipment is still working) | within 3days |
| **Spare part availability** | Availability of spare parts in Stock | All spare parts are available locally |
| Time needed to get spare part, when not available in stock | The vendor should specify how long does it take to get spare parts if not available locally (within a week ) |
| **Warranty** | Duration of warranty | Preferably 2 years |
| The parts/actions included in the warranty | The warranty is comprehensive including the X ray machine tube, detector and other high vacuum items. (including changing new detector-if the detector fails) |
| The service and maintenance agreement included in the warranty | 24/7 on call for troubleshooting, and regular every 3months ( calibrations, software updates) |
| **Availability of Service and maintenance services after the warranty period** | Service maintenance and insurance coverage services is available after the warranty period | Vender to specify if they have service and maintenance service, which can be used after the warranty period, and provide the cost in the optional offer. |
| **Global reputability of the brand in the sector including the years of experience in the market and field-proven products** | Good/Bad/No experience | at least 25 years experience of the manufacturer of X ray machine with no known technical issues |
| **IOM experience on the machine** | Good/Bad/No experience | Vendor to specify if similar items have been provided to IOM offices or clinics.    Note that IOM internal experience in using the Machine in one of IOM health assessment clinics worldwide will be taken in to consideration. |
| **Image quality checks** | DICOM CXR images can be provided for image quality checking | The vender agrees to send at least 5 chest X ray DICOM (Not JPEG)images taken by the same machine brand and model installed at another institution has to be checked by a radiologist to ensure the acceptability of the image it produces. |
| **Users opinion** | The vender has installed the machine to other users, and can provide contact details to collect users’ opinion | Vendor to provide contact list of users from where the same brand and model of machine is installed to get users opinion  Vendor to provide 5 recommendation letters from centers where the same brand and model of machines are installed ( this will be done if IOM Doesn’t have direct experience in using the machine if the technical specification are met. ) |
| **Delivery time and place,** | Duration of time needed for delivering the machine and certainty, and the delivery is to the site where the machine will be installed, | Please provide delivery lead time |
| **Installation** | Included in the Package | The installation will be done onsite by the vendor as part of the package |
| **Users training** | Included in the package | Training will be given to the users by the vendor onsite, and users guideline will be provided, as part of the package |
| **Assisitng the process for getting license to operate x-ray from Gov. if needed** | Guide in completing the requirements, when needed | The vendor can assist to get approval for license to operate x-ray from Government where the X ray machine is going to be installed, if needed |
| **Cost per unit** | inclusive of all in the package (including tax/VAT) | Amount for each part and the whole package |
| **5. CD Burner** | | |
| **CD burner** | DICOM Compatibility | DICOM part 10 compliant and ability to network with PACS |
| Automation | Automatically retrieve patient studies from networked PACS |
| Label Creation | Create customized label with patient biodata information using the inbuilt printer. Printing using Inkjet or Thermal transfer technology |
| Speed | Capable to produce 60 CDs in an hour. Preferably separate bin for input and output of CDs |
| DICOM Viewer | Standard DICOM viewer included in the DICOM disc created |
| Disc Recorders | Single or Dual Disc Recorders. Can choose dual disc recorder if the volume is very high |
| Software | Easy and intuitive for the user to use |
| Media | CD or DVD |
| **6.X-Ray Printer** | | |
| **X-Ray Printer** | Does it include the x-ray printer | Vendor to specify if X ray printer price is included in the package. If not, please provide the unit price separately. |

## Approved By:

Dr. Saiful MD Quayyum

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