

Medical Imaging

C-Arm

No.	Item Specifications
1	1 Description of Function
1.1	This equipment is used in orthopaedic fractures for imaging of bone pathology or fractures on display monitor during operation/ reduction of fractures.
2	Operational Requirements For continuous fluoroscopy, image storage and retrieval The system offered shall be a general fluoroscopy/radiology system, it should be a non-digital; non-DICOM compatible type.
3	System Configuration
3.1	X-ray C-Arm Mobile with complete accessories
4	Technical Specifications
4.1	X-Ray Generator
	Microprocessor based, high frequency inverter generator
	Generator Output: not less than 2kW at 100kV
	Fluoroscopic/ Radiographic KV range
	Lower limit shall not exceed 40 KV
	Higher limit shall not be less than 120 KV
	Fluoroscopic mA range
	Lower limit shall be ~0.1 mA
	Upper limit shall be ~9 mA
4.2	X-Ray Tube
	Rotating anode type
	Single focal spot, shall not be more than 0.6 mm
	Nominal voltage: 110 kV
	Anode heat storage capacity not less than 300 KHU
	Inherent filtration should be at least 3 mm Al eq
4.3	Collimator
	Operator controlled automatic collimation
4.4	C-Arm
	· Focus - I.I. Distance shall be at least 100 cm
	· Depth shall be ~ 75cm
	· Horizontal travel at least 200mm
	· Vertical travel at least 450 mm
	· Orbital movement shall be ~125°
	· Swivel range shall be ~12°
	· Rotation about horizontal axis shall be more than +/-180°
4.5	Image Intensifier
	· At least 23 cm input screen with direct coupling with camera
	· Shall be at least 52 lp/ cm
	· Noise reduction, scattered light trap for high contrast dynamics
	· CCD camera technology with ABC and AGC control
4.6	TV Monitor
	· 2 units LCD monitor side by side for live and reference image
	· Shall be at least 43 cm with automatic brightness control
4.7	Image rotation
	· Shall be at least 625 scanning lines at 50 Hz
	· Trolley for 2 display screens and with the alphanumeric keyboard included
	· High resolution and anti glare
4.8	Imaging Modes
	· Fluoroscopy mode shall have the following facilities:

	· Continuous fluoroscopy with last image hold
	· Last image hold with at least two frames image memory
	· Continuous fluoroscopy with image acquisition rate: about 20 frame/second.
	· Hard disk with image storage capacity of at least 30000 images
	· RAM Memory of 256 images
	· Mosaic display of 16 images
	· Zoom (x 2)
	· Measures: at least distances, angles
	· Come with CD/DVD/RW drive
4.9	Video printer for B/W thermal printing on paper, size 20 x 25 cm, resolutions about 300 dpi; The video printer can be placed on the monitor trolley
4.1	Indicate here other features and software functions included in this offer
5	System Configuration Accessories, spares and consumables
5.1	Video printer for B/W thermal printing 01 no.
5.2	Sterilizable textile cover and clips, for the X-ray tube and the Cassette holder for 24 x 30 cm
5.3	All standard accessories/consumables/parts required for the proper operation of the above item shall be included in the offer.
6	Operating Environment
6.1	The product offered shall be designed to be stored and to operate normally under Power Supply, Climate, Temperature, Humidity, etc. for Sudan.
6.2	Should work on 220-240V/ 50 Hz AC Single phase fitted with appropriate plugs and sockets.
7	Standards and Safety Requirements
	The unit offered shall be certified to meeting the relevant requirements of TUV, CE mark (MDD), FDA and/or any equivalent quality and safety standards.
	Certificates showing the compliance of this unit offered with any relevant quality and safety standards MUST be submitted with this TSF.
8	User Training
8.1	On site operational training till the familiarity of the system and satisfaction of end user shall be provided.
9	Warranty
9.1	Comprehensive warranty for 2 years.
10	Maintenance Service During Warranty Period
10.1	Preventive & Corrective Maintenance:
	During the warranty period supplier must ensure planned preventive maintenance (PPM) at least 3 nos. in a year along with corrective/breakdown maintenance whenever required.
11	Installation, Inspections and Commissioning
11.1	Supplier must accomplish proper installation and commissioning of the equipment on site.
11.2	Inspections to verify the compliance of the offered equipment as per the specifications
12	Documentation
12.1	User (Operating) manual in English
12.2	Service (Technical / Maintenance) manual in English
12.3	List of important spare parts and accessories with their part numbers and costing.
12.4	Certificate of calibration and inspection from factory.
12.5	Log book with instruction for daily, weekly, monthly and quarterly maintenance checklist.

Conventional X-Ray

No.	Item Specifications
1	Description of Function
1.1	A general purpose X-ray machine for routine X-ray examinations at healthcare facilities.
2	Operational Requirements
2.1	It shall be suitable to be used for adult and paediatric patients in general Radiography examination.
3	System Configuration

3.1	X-ray Generator,1 unit
3.2	X-Ray tube & tube support system, 1 unit
3.3	Radiographic patient table, fixed height1 unit
3.4	Floor mounted bucky stand, 1 unit
4 Technical Specifications	
I X-ray Generator:	
	Bidder shall indicate brand and model information here and provide technical data document for X-ray generator offered
4.1	Microprocessor based, high frequency inverter generator, the generator shall have at least 50kHz.
4.2	Generator Output: not less than 50 kW (500mA at 100kV)
4.3	Radiographic voltage: 40 kV to 150kV, in 1kV step.
4.4	Radiographic current: 10 to 500mA
4.5	Exposure time: 0.001sec (1msec) - 10sec
4.6	Anatomical Programmable Radiographic mode shall be available.
4.7	Manual & automatic exposure control and automatic brightness control shall be available.
4.8	Shall come with overload protection device.
4.9	Power supply: 3 phase, 380 - 415V 50/60Hz
II X-Ray Tube:	
4.10	X-ray tube rotating: +/-120°.
4.11	Large focus not more than 1.2 mm.
4.12	Small focus not more than 0.6 mm.
4.13	Maximum tube voltage 150 KV. Maximum tube output shall match with the generator output of not less than 50 KW.
4.14	Filtration: min 2.5mm Al equivalent.
4.15	Cooling method passive or forced air and/or oil cooling.
4.16	Anode rotating speed: More than 3000 rpm.
4.17	Anode heat capacity shall not be less than 300 KHU.
III Radiography Patient Table:	
4.18	Radiography table shall be fixed height, 4-way floating top type with foot switch control.
4.19	Come with grid and cassette tray, with grid ratio: not less than 10:1. Grid line number: 40 line/cm. Focus distance: 115cm.
4.20	Cassette size: accept all sizes from cassette 5" x 7" cm to 14" x 17" type.
4.21	Radiography table shall be fixed height of about 60cm.
4.22	Table top to film distance: approx. 6cm.
4.23	Table top transverse movement : approx. ±14cm.
4.24	Table longitudinal movement : approx. ± 29cm.
4.25	Table top dimension: approx. 2000 mm x 800 mm.
4.26	Shall come with a three-field AEC.
4.27	Table movement arrested by electromagnetic brakes.
IV Floor Mounted Bucky Stand:	
4.28	Vertical travel: from 460-1700mm or in the range.
4.29	Moving Grid with Grid ratio not less than 10:1. Grid line number: 40 lines/cm.
4.30	Shall come with Automatic Exposure Control for vertical bucky exposures.
4.31	Cassette size: accept all sizes from 5"x7" to 14"x17".
4.32	Movement arrested by electromagnetic brakes.
V Floor Mounted Tube Stand:	
4.33	Longitudinal travel: approx. 1750mm.
4.34	Vertical travel: from 630 -1850mm or in the range.
4.35	Movement arrested by electromagnetic brakes.
4.36	Rotation of tube arm around vertical axis: 1800; lockable at 00 to +/- 900.
VI Collimator:	
4.37	Manually adjustable.
4.38	Manually selectable filters.

4.39	Light localizer with timer controlled light.
4.40	Built-in light switch should be provided.
4.41	Turning angle should be min +/- 45 degree.
4.42	Halogen lamp.
VII Control Console:	
4.43	Digital Display.
4.44	Minimum 3 Point Exposure Technique.
4.45	Status display, error display.
4.46	Shall have area dose product determination and display.
4.47	Shall come with radiography remote control in control room.
5 Accessories, Spare Parts and Consumables	
5.1	Accessories:
	☐ Lead apron, light weight with Lead equivalence 2mm- 02 nos.
5.2	All standard accessories, consumables and parts required to operate the equipment, including all standard tools and cleaning and lubrication materials, to be included in the offer.
6 Operating Environment	
6.1	The product offered shall be designed to be stored and to operate normally under Power Supply, Climate, Temperature, Humidity, etc. for Sudan.
6.2	Power supply: 380-415VAC 3 phase 50Hz fitted with appropriate plug for X-ray generator fitted with appropriate plug for other units. The power cable must be at least 3 metres in length.
7 Standards & Safety Requirements	
7.1	Must submit ISO 13485:2003/AC: 2007 AND
7.2	CE (93/42 EEC Directives) or USFDA approved product certificate.
7.3	Shall meet:
	☐ IEC 60601-1-3 - Part 1: General Requirements for safety - Collateral Standard: General Requirements for Radiation Protection in Diagnostic X-Ray Equipment.
	☐ IEC 60601-2-7 - Part 2-7: Particular Requirements for the Safety of High-Voltage Generators of Diagnostic X-Ray Generators.
8 User Training	
8.1	The Supplier shall conduct user training for this equipment to enable operators to use the equipment properly. The training shall include the use of all operational functions of the equipment, as well as routine checks and maintenance expected by users.
9 Warranty	
9.1	Comprehensive warranty for 2 years from acceptance.
10 Maintenance Service During Warranty Period	
10.1	During warranty period supplier must ensure preventive maintenance & corrective/breakdown maintenance whenever required.
11 Installation and Commissioning	
11.1	The bidder must arrange for the equipment to be installed by certified or qualified personnel; any prerequisites for installation to be communicated to the purchaser in advance, in detail.
12 Documentation	
12.1	User (Operating) manual in English.
12.2	Service (Technical / Maintenance) manual in English.
12.3	List of important spare parts and accessories with their part numbers and costing.
12.4	Certificate of calibration and inspection from factory.

Lead apron

No.	Item Specifications
	Technical Specifications
	Flexible lead rubber in tear resistant plastic cover
	Sleeveless, half-length at back
	Fastening with crossed elastic straps with Velcro end

0.5 lead thickness for small, medium and large sizes
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Echo Ultrasound

No.	Item Specifications
1	Description of Function
1.1	Colour Doppler Echocardiography System is required to study the anatomical abnormalities and blood flow in the heart and associated vessels.
2	Operational Requirements
2.1	☑ Latest generation Electronic Phased array Colour Doppler system with minimum 512 electronic independent channels.
	☑ System must be DICOM ready and capable of being interfaced with HIS/RIS/PACS.
	☑ Must be upgradable to next generation system on site.
	☑ Frequency compounding or better technology for better resolution and penetration.
3	System Configuration
3.1	Colour Doppler System with all application packages, quad loop for serial studies with high frame rate review. Harmonic imaging capability in all modes. (Tissue, Contrast, Anglo) Integrated Stress Echo Package, Digital Storage and Retrieval – 01no.
	☑ 1-3 MHz Adult Cardiac probe Electronics Phased Array probe- 01 ea.
	☑ 3-11 MHz Electronics Phased Array Probe for Vascular applications- 01 ea.
	☑ Multi-plane TEE Probe: 4-8 MHz for Adult as well as Paediatric echocardiography.
	☑ 5-10 MHz Electronic phased array probe for Paediatric cardiology.
	☑ Colour Printer -01no.
	☑ B/W Video Thermal Printer -01no.
4	Technical Specifications
4.1	Latest generation Electronic Phased array colour Doppler system with Minimum 512 Electronic independent channels.
4.2	256 gray shades for sharp contrast resolutions
4.3	Multi-dimensional Beam former for generating two images simultaneously-one at low end of bandwidth and one at high end-then selectively retrieves and mixes the components together for finely textured 2-D or B mode image with superior contrast resolution
4.4	Adult Cardiac and Vascular Probes to be supplied which must be latest generation wide band transducers without frequency selection for higher sensitivity of response over a broader frequency range of operation. All probes to be phased array.
	Probes for paediatric application and Trans oesophageal Echo for future requirement.
4.5	Harmonic Imaging: System must have following modes in harmonic with separate setting for:
	☑ Tissue Harmonic.
	☑ Contrast Harmonic - both triggered and real time
	☑ Harmonic Angio.
	☑ Quantification of harmonics imaging
4.6	Harmonic imaging capability in Adult Cardiac, Paediatric Cardiac and linear Probe.
4.7	Gain control in two dimensions for additional level of flexibility to image quality control.
4.8	Real time high frequency 2D for higher resolution and low frequency Doppler for higher sensitivity in all probes
4.9	Frame rate must be 300 FPS or more.
4.1	Steerable PW/CW in all Phased Array probes.
4.11	High definition acoustic zoom for enlarging sections of 2D and colour flow images with more acoustic information for greater clarity and detail while maintaining an optimal frame rate.
4.12	Modes - 4D, M-Mode, Steerable PW/CW Doppler, Colour Doppler, and High Definition colour flow with capability of automatically picking up colour flow as a function of focal depth
4.13	Monitor must be 15" or more, high resolution colour monitor.
	Tilt and Swivel monitor must be able to view in all angles and all light conditions.
4.14	Colour Flow Imaging for:

	☐ Increased lateral & spatial resolution.
	☐ Detection of even subtle areas of turbulence, displaying a more physiological blood flow appearance without loss of frame rate.
	☐ Colour flow with capability of automatically picking up colour flow as a function of focal depth
4.15	Tissue Colorization (B-colour) for improved contrast resolution
4.16	Application software for Adult, Paediatric, Foetal and Peripheral Vascular and Trans oesophageal applications. (All application packages must be built into the system).
4.17	Cine loop memory- more than 120MB of memory.
	☐ High Frame rate review for better clarity of playback images study in slow motion.
	☐ Quad loop with memory for pre and post image comparison of any procedure.
	☐ Memory: 256 frames or more in quad loop. M Mode & Doppler Scroll Memory-40 seconds or more.
	☐ Frame grabber facility for post analysis.
4.18	Various maps for pre and post processing.
4.19	ECG triggers facility.
4.2	User defined system and application pre-sets for multi-user department.
4.21	Minimum 4.8 GB optical disc drive for image storage and retrieval. (standard with system)
4.22	Dedicated integrated dynamic stress echo package for flexible user defined protocols with stacked sub loops facility and contrast stress protocol.
4.23	Tissue movement colorization with quantification possibility for IHD/CAD patients.
4.24	Three transducer ports will be preferred.
4.25	Colour Map resolution up to 128 levels.
4.26	Study Manager (> 1.5 GB) for on-cart digital acquisition, review and editing of complete patient studies.
4.27	Facility of Real time perfusion studies
4.28	System Peripherals shall include:
	☐ CD Writer with calculation facility on playback.
	☐ Colour Video Printer.
	☐ B/W Thermal Printer.
5 Accessories, spares and consumables	
5.1	Accessories:
	☐ DVD/CD Recorder with 100 CDs and 100 DVDs
	☐ Colour Print Paper- 500 sheets
	☐ B/W Thermal Paper - 10 rolls
	☐ ECG Cable - 02nos.
	☐ MO Disc - 10pcs
5.2	All standard accessories, consumables and parts required to operate the equipment, including all standard tools and cleaning and lubrication materials, to be included in the offer.
6 Operating Environment	
6.1	The product offered shall be designed to be stored and to operate normally under Power Supply, Climate, Temperature, Humidity, etc. for Sudan.
6.2	Power supply: 220 – 240 VAC, 50Hz fitted with appropriate plug. The power cable must be at least 3 metre in length.
6.3	UPS of suitable rating conforming to international standards shall be supplied for minimum 30 min. backup for the entire system.
7	Standards and Safety Requirements
7.1	Must submit ISO13485:2003/AC:2007 for Medical Devices AND
7.2	CE (93/42 EEC Directives) or USFDA approved product certificate.
7.3	The product shall comply to IEC 60601-2-37 ed1: Medical Electrical Equipment - Part 2-37: Particular Requirements for the Safety of Ultrasonic Medical Diagnostic and Monitoring Equipment.
7.4	Type of protection against electric shocks - Class I
	Degree of protection against electric shocks for ultrasound probes Type "BF"

	For ECG electrodes Type 'CF'
8	User Training
8.1	Must provide user training (including how to use and maintain the equipment).
9	Warranty
9.1	Comprehensive warranty for 2 years.
10	Maintenance Service during Warranty Period
10.1	During the warranty period supplier must ensure planned preventive maintenance (PPM) along with corrective/breakdown maintenance whenever required.
11	Documentation
11.1	User (Operating) manual in English
11.2	Service (Technical / Maintenance) manual in English
11.3	List of important spare parts and accessories with their part numbers and costing.
11.4	Certificate of calibration and inspection from factory.

X-Ray Machine with DR System

No.	Specifications
1	Description of Functions
1.1	A single detector direct digital radiography unit for general radiology examinations with a film printer
2	Operational Requirements
2.1	It shall be suitable to be used for adult and paediatric patients in general Radiography examination.
3	System Configurations
3.1	X-ray Generator, 1 unit
3.2	X-Ray tube & tube support system, 1 unit
3.3	Fixed multipurpose wall stand, 1 unit
3.4	Detector, 1 unit
3.5	Imaging Workstation, 1 unit
3.6	Diagnostic Workstation, 1 unit
3.7	Dry X-ray film printer, 1 unit
3.8	Intercom, 1 system
3.9	Worktable and chair, 1 set each for the imaging workstation and diagnostic workstation,
4	Technical Specifications
4.1	X-ray Generator, 1 unit
4.2	With synchronization of the exposure parameters between generator and imaging workstation to document the post-exposure data.
4.3	Microprocessor based, high frequency inverter generator, the generator shall have at least 50kHz.
4.4	Generator Output: not less than 50 kW (500mA at 100kV).
4.5	Radiographic voltage: 40 kV to 150kV, in 1kV step.
4.6	Radiographic current: 10 to 500mA
4.7	Exposure time: 0.001sec (1msec) - 7sec
4.8	Anatomical Programmable Radiographic mode shall be available.
4.9	Manual & automatic exposure control and automatic brightness control shall be available.
4.1	Shall come with overload protection device.
4.11	X-Ray tube & tube support system, 1 unit
4.12	It shall be ceiling-mounted, multi-directional adjustment with synchronization control, auto-positioning and auto-focusing of the X-ray tube and the detector tray.
4.13	Travel range: Longitudinal: approximately 3000mm Transverse: approximately 1500mm
4.14	Vertical adjustment: approximately 1500mm
4.15	X-ray tube rotations with positions lock at -90 to +90° : Around vertical axis: -150 to +180° Around horizontal axis: -120 to +120°
4.16	Large focus not more than 1.2 mm
4.17	Small focus not more than 0.6 mm

4.18	Maximum tube voltage 150 KV. Maximum tube output shall match with the generator output of not less than 50 kW
4.19	Cooling method passive or forced air and/or oil cooling
4.2	The anode shall be a rotating anode, with a speed not less than 3000rpm
4.21	Anode heat capacity shall not be less than 300 kHU.
4.22	It shall come with tube overload and overheat protection.
4.23	Automatic collimator with automatic and manual exposure field setting
4.24	Fixed multipurpose wall stand, 1 unit
4.25	The stand shall be fixed on the floor or on the floor and wall with no horizontal movement needed.
4.26	The stand shall have the detector integrated with motorised vertical movement range approximately from 300 -1700cm
4.27	The detector panel shall be tiltable from -20 to 90 degree with locking positions at any degree.
4.28	Flat panel receiver can be adjusted within -20~90 degrees, and locked in the standing position per 15 degrees.
4.29	SID: any distance between 110-180cm.
4.3	With side supports or grips on both sides.
4.31	It shall synchronize the movement of X-ray tube and flat detector. With centre alignment X-ray beam to the centre of the detector.
4.32	The detector panel will be used for Radiographic exposure of patient on the Radiography table.
4.33	Detector, 1 unit
4.34	TFT flat panel single-piece non-moving detector for direct digital radiography.
4.35	Material: Caesium Iodide scintillator and/or amorphous silicon.
4.36	Grid ratio: 8:1, 10:1 or 12:1, Grid lines: not less than 35 line/cm.
4.37	Detector area: 43 x 43 cm.
4.38	Pixel size: <145 x 145um
4.39	Matrix size: 3000 x 3000 pixel
4.4	Resolution: 3.5 LP/mm
4.41	Image acquisition time: <7 seconds
4.42	Natural cooling
4.43	With dosage optimization
4.44	Radiography patient table, 1 unit
4.45	Patient table shall be height adjustment approximately from 600 - 900mm, and mobile on castors with brakes on each side
4.46	Radiography table top dimension: approximately 2200L x 650 W mm with effective X-ray transparent area of approximately 1750 x 650mm.
4.47	It shall be a radio-translucent floating table top with load capacity of approximately 200kg.
4.48	Table top transverse movement : ± 6 cm
4.49	Table longitudinal movement : ± 40 cm
4.5	Lying SID: 600-1100mm
4.51	Imaging Workstation, 1 unit
4.52	The workstation shall be made by the same X-ray machine manufacturer, generic workstation is not acceptable.
4.53	Dedicated imaging station with dedicated operation system and software.
4.54	High resolution diagnostic grade black & white flicker-free anti-glare monitor, not less than 19 inches with 1024x1280 matrix & video refresh rate of >70Hz.
4.55	With AEC, selection of anatomical and age programs, selection of manual or automatic exposure.
4.56	Image display on monitor: Preview: not more than 7 sec Complete image: not more than 15 sec
4.57	Depth of image processing: not less than 16 bits
4.58	With dynamic range extension software, automatic image range detection and editing
4.59	With image documentation and archiving software
4.6	With DICOM Work list, DICOM Print, DICOM Storage
4.61	With quality assurance program (QAP)
4.62	Come with free software upgrade within the lifespan of the system.

4.63	Diagnostic Workstation, 1 unit
4.64	The workstation shall be made by the same X-ray machine manufacturer, generic workstation is not acceptable.
4.65	High resolution diagnostic grade black & white flicker-free anti-glare monitor, not less than 19 inches with not less than 1024x1280 matrix & video refresh rate of >70Hz
4.66	With dedicated operating system and all software needed for x-ray images diagnosis, documentation, reporting, archiving..
4.67	Shall support multiple print formats, including 1:1, 2:1, 4:1, 6:1, 9:1,12:1,16:1, 20:1, 24:1
4.68	These diagnostic workstations shall be connected via networking with the imaging workstation or the main DR unit to facilitate transfer of images between the main unit and the diagnostic workstations.
4.69	Come with free software upgrade within the lifespan of the system.
4.7	Intercom, 1 system
4.71	One intercom system for communication between examination room and control room
4.72	Dry X-ray film printer, 1 unit
4.73	It is a direct thermal or laser imager that produces 14"x17", 14 x 14", 11"x14", 10 x 12" and 8 x 10" dense, high-resolution images with 256 shades of grey, in daylight without liquid chemicals.
4.74	Throughput: 100 sheets of 14" x 17" films /hour
4.75	Film size: shall have 2 film trays at a time with choice of film sizes 35 x 43cm (14 x 17") , 14 x 14", 28 x 35cm (11 x 14"), 10 x 12" and 8 x 10" for selection.
4.76	Resolution: ≥ 320 ppi (pixels per inch) geometrical resolution.
4.77	Contrast: 12 bit contrast resolution.
4.78	Film magazine: about 100 film sheets.
4.79	It shall connect with the digital x-ray machine via DICOM standard. All accessories, software and labour required for this connection shall be included in the offer.
5	Accessories, Spare Parts and Consumables
5.1	Accessories:
	☐ Lead apron-01 no.
5.2	All standard accessories, consumables and parts required to operate the equipment, including all standard tools and cleaning and lubrication materials, to be included in the offer.
6	Operating Environment
6.1	The system offered shall be designed to be stored and to operate normally under the conditions. The conditions include Power Supply, Climate, Temperature, Humidity, etc.
6.2	Power supply: 380-415VAC 3 phase 50Hz fitted with appropriate plug for X-ray generator and 220 – 240 VAC, Single phase 50 Hz, fitted with appropriate plug for other units. The power cable must be at least 3 metres in length.
6.3	UPS of suitable rating for at least 30 min. backup shall be supplied.
7	Standards & Safety Requirements
7.1	Must submit ISO 13485:2003/AC: 2007 AND
7.2	CE (93/42 EEC Directives) or USFDA approved product certificate.
7.3	Shall meet:
	☐ IEC 60601-1-3 - Part 1: General Requirements for safety - Collateral Standard: General Requirements for Radiation Protection in Diagnostic X-Ray Equipment.
	☐ IEC 60601-2-7 - Part 2-7: Particular Requirements for the Safety of High-Voltage Generators of Diagnostic X-Ray Generators.
8	User Training:
8.1	The Supplier shall conduct user training for this equipment to enable operators to use the equipment properly. The training shall include the use of all operational functions of the equipment, as well as routine checks and maintenance expected by users.
9	Warranty
9.1	Comprehensive warranty for 2 years from acceptance.
10	Maintenance Service During Warranty Period

10.1	During warranty period supplier must ensure preventive maintenance & corrective/breakdown maintenance whenever required.
11	Installation and Commissioning
11.1	The equipment to be installed by certified or qualified personnel; any prerequisites for installation to be communicated to the purchaser in advance, in detail.
12	Documentation
12.1	User (Operating) manual in English.
12.2	Service (Technical / Maintenance) manual in English.
12.3	List of important spare parts and accessories with their part numbers and costing.
12.4	Certificate of calibration and inspection from factory.

Mobile X-Ray Machine

No.	Item Specifications
	Technical Specifications
	A microprocessor controlled mobile x-ray imaging unit is to include but not limited to the following:
	Microprocessor controlled x-ray generator, > 20 KW
	It should have a digital display of mAs and kV and an electronic timer.
	KV range:40kV to 125kV
	mA range: 300 mA or more. Please specify mA and seconds separately and not mAs alone.
	Shortest exposure time: 1 ms.
	X-Ray Tube: .
	Output should match the output of the generator,
	Must have a rotating anode with at least: 2500 rpm and focal spot size should be less than Imm.
	Rotating anode tube system, with focal spots , 0.6/1.2 mm of large heat storage capacity, > 120,000 HU
	Collimator- Manually adjustable multileaf collimator, rotatable $\pm 90^\circ$
	The exposure release switch should be detachable with a cord of at least 5 meters
	Remote control operating distance > 10 metres
	Remote control operating radius- 180 deg
	Lightweight manual driven unit, with braking system.
	Small source image distance, please specify.
	Direct 220-240v/50Hz single phase power line connection with built in line voltage compensation.
	Grid(Ratio 6:1) of following sizes should be provided (1) each 12"x15" & 10"x12"

Dental X-Ray

No.	Item Specifications
	Technical Specifications
	Room Socket power supply
	60KV-- 75mA
	Time : 0.01 - 3s
	mobile cart
	Input power supply: 220 $\pm$ 20 % V AC , 50Hz

Computed Radiography system (CR)

No.	Item Specifications
	Technical Specifications
	Specifications for State of the art Latest Generation Computed Radiography (CR) system for high resolution Digital radiography
	Features
	Technical Requirements – CR system configuration shall include:

	Imaging plates (IP)
	Image reader system
	CR workstations
	RIS interface
	Remote ID and Preview stations
	Accessories and consumables
	Laser Imager
	CR Compatible imaging plates
	Following sizes are required –
	35cm x 43 cm - 4
	35cm x 35 cm - 2
	24cm x 30 cm - 2
	18cm x 24 cm - 1
	15cm x 30 cm -
	Image reader shall meet the Functional requirements :
	Various image – processing protocols available for the respective regions of body
	IP processing rate should be 60 plates / hour.
	Mechanism for Re-routing the newly acquired images to the preconfigured CR work station
	Capability of retrieving (Service Intervention) at least last 10 scanned images, as part of contingency plan.
	Capability for quick check of the image and exam data of at least the last 4 Imaging Plates scanned at the X-ray room.
	Protocol for verifying the connectivity status of configured image destinations.
	Spatial resolution of the digital image shall preferably be 2k x 2k x 12 bits for optional resolution.
	Identification and Preview
	System Functional Requirements:
	a) Capability of interfacing to HL7, Proprietary, DICOM Work list or user defined Windows/Linux based interface protocols to HIS/RIS.
	b) Please specify whether you have tested interfacing with HL7 – DICOM Bridge.
	c) Mechanism for retrieving Demographics of at least last 10 patients identified on a particular Identification Terminal.
	d) Customizable Graphic User Interface (GUI) in Identification station with facility of selecting DICOM print & storage destination.
	e) Indication of Over Exposure on the preview module.
	f) Mechanism for User release from Preview terminal in case of Auto - routing Images to Pre-defined DICOM Destinations.
	g) Customizable Graphic User Interface (GUI) for Preview terminal.
	h) Solution for storing patient demographic data for multiple exams in RIS/non RIS environment.
	i) It should be possible to put a custom configurable data field in the demographic information of the patient linked with the image.
	System should include the following Software applications:
	Please list all the optional software(s) which are available with you for enhancing the workflow and service in the Digital Radiology environment for the following:
	Advanced Processing Software
	Application Software
	Connecting Software
	Visual Output Software
	Quality Monitoring Software.
	The system should include the following SW applications as standard:
	Full Leg/Full spine image processing.
	Quality control software

	Software, which enables to see in the preview terminal the deviation from normal exposure
	and with the details of the deviation on the CR workstation.
	Software masking of the collimation areas.
	Special attention should be placed on pediatric applications.
	Software for storing images on any DICOM 3 (or newer versions) compliant stations.
	Software for printing on any DICOM printer
	CR Workstation
	System configuration requirements:
	Accept images from CR Reader without any loss of data
	Capable of Archiving & Printing selected images to a standard DICOM destination.
	Storing images in the local disk for pre-defined period.
	Mechanism for accepting New images when the local disk is full
	Should include 21" ant glare flicker free TFT/LCD color monitor
	Should include 21" Monochrome ant glare flicker free Medical Grade TFT/LCD .
	Monitor with at least 2k x 2k resolution
	CD/DVD Burner
	80 GB or more on board storage
	System Functional requirements:
	Support DICOM work list or user defined Windows based interface to HIS/RIS.
	Mechanism for retrieving Demographics of atleast last 10 patient identified on that Terminal.
	Customizable Graphic User Interface with facility of selecting DICOM print & storage destination.
	Indication of Over Exposure on the preview module.
	Mechanism for User release in case of Auto-routing Images to Pre-defined DICOM Destinations.
	Functional requirement for CR workstations:
	Built in routine for using predefined image processing parameters for image quality enhancement.
	Mechanism for storing the Patient image based on name, date, exam, etc.
	Capability of storing user defined image processing parameters.
	Capability of overwriting predefined image parameter with user-defined parameters & storing these two images separately.
	Correcting typographically in Patient Demographic module, in case the RIS connection was down and annually data entry was done.
	Capability of changing W/1, Flipping, Rotating, Zooming, Collimating Annotating incoming image.
	Auto-routing incoming image to predefined DICOM Store (SCP storage) or Print Destination (SCP Print Destination)
	Mechanism for printing Multiple Images in one film, with the possibility of slide and True Size printing.
	Capability of storing to CD
	Systems should be able to converse with other DICOM systems – such as MR work station / CT workstation / DSA lab / DR work station.
	Laser Imager System Configuration requirements: Print Images CR Workstation
	Capable of Printing Images in DICOM 3.9 format
	Mechanism to print images 14x17, 11x14, 8x10 film sizes simultaneously.
	Resolution should be 500 dpi or more.
	Capable of handling mammography plates.
	Functional requirement for Laser Imager:
	a) Capable of Printing images in High quality
	b) Mechanism for printing images in 14x17, 14x11, 10x8 film sizes.
	c) Mechanism for Printing Multiple Images in one film, with the possibility of slide printing.
	Laser Paper Printer (Optional)
	Provision for Distributed CR System should be present. Please quote separately for additional workstation image reader preview stations and image planes (Optional)

X-Ray Viewing Box - Single

No.	Item Specifications
1	Description of Function
1.1	View box used for viewing the images of X-ray, CT/MRI at healthcare facilities.
2	Operational Requirements
2.1	Single film LED view box, operates on mains electric supply.
3	System Configuration
3.1	LED View Box (Single Film), complete unit.
	☐ Vaccine Carrier-large
	☐ CFC free, PUF insulation
4	Technical Specifications
4.1	Ultra slim design.
4.2	LED backlit and shall have separate on/off function with separate rotary continuous adjustable brightness control at the bottom of panel for convenient operation.
4.3	It shall have fully electronic continuous brightness control with adjustment range approx. up to 90%.
4.4	Shall have no lag period in intensity modulation.
4.5	Front sheet shall be made of polycarbonate or acrylic with antiglare.
4.6	Shall have sturdy film clamping mechanism with automatic sensor induced on/off system.
4.7	Illumination: High bright white LEDs.
4.8	It shall have homogeneous illumination and shall have luminance of more than 1200 cd/m2.
4.9	LED light source shall have at least 20000 hours of operation.
4.1	Shall be able to hold one full large size CT/MR films at a time with film has maximum size of 43cmX 35cm.
5	System Configuration Accessories, spares and consumables
5.1	All standard accessories/consumables/parts required for the proper operation of the above item shall be included in the offer.
6	Operating Environment
6.1	The product offered shall be designed to be stored and to operate normally under Climate, Power supply , Temperature, Humidity, etc. for Sudan.
6.2	Power supply: 220 – 240 VAC, 50Hz fitted with appropriate plug. The power cable must be at least 3 metre in length.
7	Standards and Safety Requirements
7.1	Must submit ISO 9001 or ISO 13485:2003/AC:2007 AND
7.2	CE or USFDA approved product certificate.
8	User Training
8.1	Not applicable.
9	Warranty
9.1	Warranty for 2 years after acceptance.
10	Maintenance Service During Warranty Period
10.1	Standard warranty conditions are applicable.
11	Installation and Commissioning
11.1	Must supply preassembled unit, ready to use.
12	Documentation
12.1	User (Operating) manual in English.
12.2	Service (Technical / Maintenance) manual in English.
12.3	List of important spare parts and accessories with their part number and costing.

X-Ray Viewing Box - Double

No.	Item Specifications
1	Description of Function
1.1	View box used for viewing the images of X-ray, CT/MRI at healthcare facilities.
2	Operational Requirements

2.1	Double film LED view box, operates on mains electric supply.
3 System Configuration	
3.1	LED View Box Double Film), complete unit.
	☐ Vaccine Carrier-large
	☐ CFC free, PUF insulation
4 Technical Specifications	
4.1	Ultra slim design.
4.2	LED backlit and shall have separate on/off function with separate rotary continuous adjustable brightness control at the bottom of panel for convenient operation.
4.3	It shall have fully electronic continuous brightness control with adjustment range approx. up to 90%.
4.4	Shall have no lag period in intensity modulation.
4.5	Front sheet shall be made of polycarbonate or acrylic with antiglare.
4.6	Shall have sturdy film clamping mechanism with automatic sensor induced on/off system.
4.7	Illumination: High bright white LEDs.
4.8	It shall have homogeneous illumination and shall have luminance of more than 1200 cd/m2.
4.9	LED light source shall have at least 20000 hours of operation.
4.1	Shall be able to hold one full large size CT/MR films at a time with film has maximum size of 43cmX 35cm.
5 System Configuration Accessories, spares and consumables	
5.1	All standard accessories/consumables/parts required for the proper operation of the above item shall be included in the offer.
6 Operating Environment	
6.1	The product offered shall be designed to be stored and to operate normally under Climate, Power supply , Temperature, Humidity, etc. for Sudan.
6.2	Power supply: 220 – 240 VAC, 50Hz fitted with appropriate plug. The power cable must be at least 3 metre in length.
7 Standards and Safety Requirements	
7.1	Must submit ISO 9001 or ISO 13485:2003/AC:2007 AND
7.2	CE or USFDA approved product certificate.
8 User Training	
8.1	Not applicable.
9 Warranty	
9.1	Warranty for 2 years after acceptance.
10 Maintenance Service During Warranty Period	
10.1	Standard warranty conditions are applicable.
11 Installation and Commissioning	
11.1	Must supply preassembled unit, ready to use.
12 Documentation	
12.1	User (Operating) manual in English.
12.2	Service (Technical / Maintenance) manual in English.
12.3	List of important spare parts and accessories with their part number and costing.

Portable Ultrasound Machine

No.	Item Specifications
1 Description of Function	
1.1	A general purpose fully digital B & W Ultrasound imaging system.
2 Operational Requirements	
2.1	It shall operate on mains AC supply.
3 System Configuration	
3.1	System shall come with main unit, 1 probe, 1 unit of black and white video thermal printer and Ultrasound gel warmer 1 unit.

4	Technical Specifications
4.1	Latest technology and all digital beam former general purpose standalone ultrasound machine with integrated light weight mobile cart.
4.2	Main applications: OB/GYN, abdominal, peripheral vessels and small parts.
4.3	The system shall have at least 12” or higher flat LCD monitor with tilt & swivel facilities.
4.4	Shall have B-mode, M-mode, B/M mode, 2B mode & 2D mode.
4.5	The system must have at least Two active probe ports for easy use and convenient operation.
4.6	256 Grey shades for sharp contrast resolutions.
4.7	Controls for depth, gain compensation, body markers with transducer position.
4.8	Shall have real time continuous dynamic focus.
4.9	Shall have facility for image zoom, freeze, text annotation.
4.1	The system shall have extensive calculation software package for Ob/Gyn and general imaging.
4.11	The system must have provision for measurement and calculation of distance, area, volume, heart rate and circumference on the image.
4.12	The system shall have Tissue Harmonic Imaging.
4.13	Near and far gain adjustable.
4.14	Contrast, adjustable.
4.15	Focus: auto adjustable.
4.16	Shall have an alpha-numeric keyboard with easy access scans controls and track ball and status display.
4.17	Cine memory of 250 frames for cine loop playback.
4.18	Frame rate: not less than 50fps.
4.19	Display depth: minimum 28-30cm.
4.2	Dynamic range, selectable up to approximately 165dB.
4.21	Image storage: Minimum 200 patient’s images on main unit.
4.22	Shall have facility for inbuilt CD writer.
4.23	System shall be DICOM ready and capable of being interfaced with HIS/RIS/PACS.
4.24	Facility for future upgradeability.
4.25	Probe: 2 to 5 MHz convex probe for Obs. /Gyn. and abdominal application is to be supplied.
5	Accessories, spares and consumables
5.1	Accessories:
	☐ Black and white video thermal printer with 50 rolls of high density recording paper: 01 no.
	☐ DVD/CD Recorder with DICOM media transfer.
	☐ Ultrasound gel warmer: 01 unit.
5.2	All standard accessories, consumables and parts required to operate the equipment, including all standard tools and cleaning and lubrication materials, to be included in the offer.
6	Operating Environment
6.1	The product offered shall be designed to be stored and to operate normally under Power Supply, Climate, Temperature, Humidity, etc. for Sudan.
6.2	Power supply: 220 – 240 VAC, 50Hz fitted with appropriate plug. The power cable must be at least 3 metre in length.
6.3	Shall provide UPS of suitable rating with voltage regulation and spike protection for 30 minutes back-up.
7	Standards and Safety Requirements
7.1	Must submit ISO 13485:2003/AC: 2007 AND
7.2	CE (93/42 EEC Directives) or USFDA or TUV approved product certificate.
7.3	Electrical safety conforms to standards for Electrical Safety IEC 60601-2-37 Medical electrical equipment – Part 2-37: Particular requirements for the basic safety and essential performance of ultrasonic medical diagnostic and monitoring equipment.
8	User Training
8.1	Must provide user training (including how to use and maintain the equipment).
9	Warranty
9.1	Comprehensive warranty for 2 years after acceptance.

10	Maintenance Service During Warranty Period
10.1	During the warranty period supplier must ensure preventive maintenance and corrective/breakdown maintenance whenever required.
11	Documentation
11.1	User (Operating) manual in English.
11.2	Service (Technical / Maintenance) manual in English.
11.3	List of important spare parts and accessories with their part number and costing.
11.4	Certificate of calibration and inspection from factory.

Colour Doppler Ultrasound Machine

1	Description of Functions
1.1	A fully digital Colour Doppler ultrasound DICOM compatible imaging system for Radiology, OB Gyn, vascular, Cardiac, small parts applications.
2	Operational Requirements
2.1	It shall operate on mains AC power supply.
3	System Configurations
3.1	Digital colour Doppler ultrasound machine, 1 unit
3.2	2-6 MHz. broadband curved array transducer, 1 unit
3.3	3-12 MHz. broadband linear array transducer, 1 unit
3.4	4-8 MHz. broadband endocavity (TV/TR) transducer, 1 unit
3.5	2-6 MHz. volume 4D convex transducer for real-time 3D Imaging / 4D Imaging, 1 unit
3.6	3-9 MHz. volume 4D TVS transducer for real-time 3D Imaging / 4D imaging for transvaginal application, 1 unit
3.7	Cardiac Probe -Adult - Phased Array 2-5 MHz.
3.8	Cardiac Probe - Paediatric - Phased Array 4-8 MHz.
3.9	B/W Video Thermal printer of latest model, 1 unit.
3.1	Ultrasound gel warmer, 1 unit
3.11	Bidder shall indicate brand and model information here and provide technical data document for major components specified above.
4	Technical Specifications
4.1	System shall provide all-digital broadband beam forming with maximum display depth shall be at least 30 cm.
4.2	The system must be capable of supporting XRES Extreme Resolution adaptive image processing technique that performs analysis at the pixel level eliminating speckle noise artefact and dynamically enhancing tissue textures, margins and borders.
4.3	The system shall be capable of supporting Sono CT nine lines compound imaging using computed beam steering technology.
4.4	The system shall be capable of acquiring/ displaying quantitative 3D or 4D volume data with STIC capability for Foetal Echocardiography.
4.5	The system shall be capable to perform 4D acquisitions at least 30 volumes/sec.
4.6	The system shall have minimum 8000 digitally processed channels per image frame.
4.7	The system must support broadband Phased array, Convex and Linear array transducers.
4.8	System shall have at least 3 active ports.
4.9	System shall provide 232 dB fulltime input dynamic range.
4.1	Digitally controlled, 17-inch Flat Panel monitor with tilt & swivel facility.
4.11	Full alphanumeric keyboard.
4.12	Slide pot TGC & LGC gain controls with pre-defined curves.
4.13	System must be a new generation ergonomically designed to curb minimum injury to sonographer/ physician with keyboard platform rotatable and moveable (up/down).
4.14	System must support Tissue Harmonic Imaging in Phased Array, Linear Array and convex array transducers.
4.15	The system shall support full screen display of all 3D views including individual A, B and C MPR views and simultaneous display of thumbnail views on the same system display monitor.

4.16	The system must have in-built image management system with at least 80 GB HDD, CD- Writing facility and direct paper printout of images.
4.17	System must have 256 grey shades.
4.18	Cine memory of 250 frames for cine loop playback.
4.19	Frame rate: not less than 500fps.
4.2	The system must have 2D, CW, PW, Colour Doppler, THI, Colour Power Doppler, M-Mode, Pulse Inversion Harmonic Technology, High Definition Colour flow with Colour power angio imaging and full Colour Doppler echocardiography system, 2D Duplex, colour Power Angio, Directional power angio and colour panoramic .
4.21	Power Doppler for small flow shall be available along with latest technology Eflow/B Flow/Dynamic flow technology.
4.22	Colour coded tissue Doppler must be available with quantification for Myocardial thickness and strain rate imaging as option.
4.23	ECG triggers facility.
4.24	Shall have stress echo with ECG gating as option.
4.25	Anatomical M-Mode, High Q Automatic Doppler Analysis, Intelligent 2D Scan Facility, Intelligent Doppler Scan Facility, Tomographic Ultrasound Imaging Capability of Foetal brain(TUI).
4.26	System Shall offer Contrast harmonic imaging and must have optimization settings to detect contrast agents. Please specify other advanced technologies to perform better contrast harmonic imaging
4.27	Exhaustive software for Cardiovascular applications with report formats.
4.28	System must be DICOM ready and capable of being interfaced with HIS/RIS/PACS.
4.29	Following transducers to be quoted as standard:
	· 2-6 MHz. broadband curved array transducer.
	· 3-12 MHz. broadband linear array transducer.
	· 4-8 MHz. broadband endocavity (TV/TR) transducer.
	· 2-6 MHz. volume 4D convex transducer for real-time 3D Imaging / 4D Imaging
	· 3-9 MHz. volume 4D TVS transducer for real-time 3D Imaging / 4D imaging for transvaginal application.
	· Cardiac Probe -Adult - Phased Array 2-5 MHz.
	· Cardiac Probe - Paediatric - Phased Array 4-8 MHz.
4.3	To ensure maximum clinical utility, the manufacturer must demonstrate the capability of the system to successfully perform in the following types of applications:
	· Abdominal
	· Small parts and superficial
	· Paediatric
	· Musculoskeletal
	· Obstetrical
	· Gynaecological and fertility
	· Cardiac
	· Prostate
	· Vascular (Peripheral, Cerebrovascular, and Intraoperative)
4.31	The system architecture shall be designed to simultaneously process the entire bandwidth of broadband transducer received frequencies from 1 to 15 MHz
5	Accessories, Spare Parts and Consumables
5.1	Accessories:
	· Black and white video thermal printer with 10 rolls of high density recording paper: 01 no.
	· DVD/CD Recorder with 100 CDs and 100 DVDs.
	· MO Disc: 10 pcs.
	· Colour laser printer: 01 no.
	· Colour print paper: 100 sheets.
	· Ultrasound gel warmer: 02 bottles.

5.2	All standard accessories, consumables and parts required to operate the equipment, including all standard tools and cleaning and lubrication materials, to be included in the offer. Bidders must specify the quantity of every item included in their offer (including items not specified above).
6	Operating Environment
6.1	The system offered shall be designed to be stored and to operate normally under the conditions of the purchaser's country. The conditions include Power Supply, Climate, Temperature, Humidity, etc.
6.2	Power supply: 220 – 240 VAC, 50Hz fitted with appropriate plug. The power cable must be at least 3 metres in length.
6.3	Shall provide UPS of suitable rating with voltage regulation and spike protection for 30 minutes back-up.
7	Standards & Safety Requirements
7.1	Must submit ISO 13485:2003/AC: 2007 AND
7.2	CE (93/42 EEC Directives) or USFDA approved product certificate.
7.3	Electrical safety conforms to standards for Electrical Safety IEC 60601-2-37 Medical electrical equipment – Part 2-37: Particular requirements for the basic safety and essential performance of ultrasonic medical diagnostic and monitoring equipment.
8	User Training
8.1	The Supplier shall conduct user training for this equipment to enable operators to use the equipment properly. The training shall include the use of all operational functions of the equipment, as well as routine checks and maintenance expected by users.
9	Warranty
9.1	Comprehensive warranty for 2 years after acceptance.
10	Maintenance Service During Warranty Period
10.1	During warranty period supplier must ensure preventive maintenance & corrective/breakdown maintenance whenever required.
11	Installation and Commissioning
11.1	The bidder must arrange for the equipment to be installed by certified or qualified personnel; any prerequisites for installation to be communicated to the purchaser in advance, in detail.
12	Documentation
12.1	User (Operating) manual in English.
12.2	Service (Technical / Maintenance) manual in English.
12.3	List of important spare parts and accessories with their part numbers and costing.
12.4	Certificate of calibration and inspection from factory.

Digital Mammography Machine

No.	Specifications
1	Description of Functions
1.1	Mammography system to replace conventional Film/Screen based Mammography Studies with digital images instant reviewing and analysis capability with stereotactic biopsy facility.
2	Operational Requirements
2.1	Full Digital Mammography System consisting of exposure stand with attached swivel system, separate console with radiation shield, automatic exposure control and mammography X-Ray Tube.
2.2	An integrated direct-to-digital Flat Detector based on amorphous silicon technology.
2.3	A separate workstation for image positioning and patient demographic data is required.
2.4	The workstation must be able to send, receive and print according to DICOM standards.
2.5	The workstation must also be able to obtain DICOM modality, work list from connected information system and send information about performed procedure to the connected information system.
2.6	Read and Write in CD/DVD for data Storage and review.
3	System Configurations
3.1	Mainframe System: 01

3.2	X-Ray Tube Unit: 01
3.3	Flat Panel Detector: 01
3.4	Image Acquisition Workstation: 01
3.5	Stereotactic Biopsy System: 01
3.6	Archiving System : 01
4 Technical Specifications	
4.1	Mammography System:
	☐ The system must consist of a tube head and detector assembly that has isocentric rotation for every positioning.
	☐ The isocentric movements must be motorized. The patient compression device must have automatic multispeed variable compression system which senses the breast density and adjust the .compression force.
	☐ The maximum compression thickness must be 18 cm or more. The patient table must have motorised grid movement.
	☐ Magnification devices of ratio 1.5 and 1.8 must offer.
	☐ Digital display of compression force and compression thickness must be available.
4.2	X-Ray Generator and Tube:
	The X-ray generator must be high frequency with the following parameters:
	☐ KV range: at least 25-35 kV in steps of 1 kV
	☐ mAS range: 0-750 mAS or more
	☐ Exposure time: 0-700ms
	☐ Maximum mA: 180mA or more
	X-Ray Tube unit:
S No.	Specifications
	☐ Dual focus rotating anode tube with the following parameters:
	☐ focal spot size: 0.1mm and 0.3mm
	☐ Anode heat storage: 150 kHU or more
	☐ Tube heat Storage: 1.3MHU or more
	☐ Anode material: Tungsten
4.3	Flat Panel Detector:
	☐ Type of detector: Amorphous silicon
	☐ Detector size: 24cmx29cm or more with two image formats
	☐ Pixel size: 70µ or less
	☐ Image matrix in pixels: large size-3Kx 4K or more Small size: 2Kx 3K or more
4.4	Workstation for image Acquisition:
	The workstation must enable immediate image display for general survey for patient positioning. It must be able to store around 10000 images. The networking must on TCPIP protocol.
	The following image processing must be possible on the workstation:
	Image display:
	☐ Freely selectable screen layout
	☐ Windows settings (contrast and brightness setting)
	☐ Magnification, stepped and dynamic zoom
	☐ Image inversion (black/white)
	Annotation:
	☐ Left/right marking
	☐ Text additions
	☐ Lines
	☐ Rectangles and circles
	Measurements:
	☐ Distance
	☐ Angle
	☐ Density
	Image evaluation:

	☐ Contrast enhancement(with table)
	☐ Display of histogram
	☐ Length measurements
	☐ Before /after comparison
	☐ Filter
	Administration:
	☐ The demographic patient data must be retrieved directly from a HIS/RIS system
	☐ The demographic patient data can be entered manually
	☐ Retrieval of images from CD, DVD or PACS
	☐ Printing of images on DICOM – compatible printers
	☐ The workstation must be fully DICOM compatible
	☐ High Contrast 1Kx 1K TFT monitor must be provided with workstation.
4.5	Biopsy:
	☐ Please quote for Stereo tactic biopsy system which is fully compatible with FFDM.
	☐ A high resolution image of 20 lp/mm must be possible with the stereo tactic biopsy system.
4.6	Proper X-Ray shielding must be provided for the main equipment.
	5 Accessories, Spare Parts and Consumables
5.1	Accessories:
	View Boxes – slim, four in one with fluorescent tubes and shutters with magnification device and variable luminescence- 02.
5.2	All standard accessories, consumables and parts required to operate the equipment, including all standard tools and cleaning and lubrication materials, to be included in the offer.
	6 Operating Environment
6.1	The system offered shall be designed to be stored and to operate normally under the conditions. The conditions include Power Supply, Climate, Temperature, Humidity, etc.
6.2	Suitable Power supply: 220-240VAC, 50Hz OR 440 V 3 PHASE, fitted with appropriate plug.
6.3	Resettable overcurrent breaker shall be fitted for protection.
6.4	UPS of suitable rating for at least 30 min. backup shall be supplied.
	7 Standards & Safety Requirements
7.1	Must be USFDA or CE approved product.
7.2	This unit shall be certified to meet ISO9001 and/or ISO14971 and/or ISO 13485:2003/AC: 2007.
7.3	Shall meet IEC 60601-2-45 - Part 2-45: Particular Requirements for the safety of Mammographic X-ray Equipment and Mammographic Stereotactic Devices.
7.4	Safety aspects of Radiation dosage leakage must be spelt out.
7.5	Phantom for calibration must be provided.
	8 User Training
8.1	Must provide user training (including how to use and maintain the equipment).
	9 Warranty
9.1	Comprehensive warranty for 2 years.
	10 Maintenance Service During Warranty Period
10.1	During warranty period supplier must ensure preventive maintenance & corrective/breakdown maintenance whenever required.
	11 Installation and Commissioning
11.1	The equipment to be installed by certified or qualified personnel; any prerequisites for installation to be communicated to the purchaser in advance, in detail.
	12 Documentation
12.1	User (Operating) manual in English
12.2	Service (Technical / Maintenance) manual in English
12.3	List of important spare parts and accessories with their part numbers and costing.
12.4	Certificate of calibration and inspection from factory.