



NOTIFICATION

NO. SO (STAND) 1-30/2020; In pursuance of the recommendations of the notified PVMS Committees and subsequent approval of **Departmental Standardization Committee (DSC)**, the Competent Authority has been pleased to approve the PVMS specification of **1.5 Tesla MRI with Wide Bore 70 cm High End (Radiology Specialty)** for all the Procuring Agencies under the administrative control of SHC & ME Department.

2 The procurement process shall be carried out strictly in accordance with Punjab Procurement Rules-2014 and other relevant rules / regulations / policies.

3 Need of the Procuring Agency for items (main / optional) must be reasonably justified.

4 All Procuring Agencies (Hospitals, Medical Colleges, Universities, and Institutions) under the administrative control of the SHC&ME Department are bound to follow these PVMS Specifications. The previously notified PVMS Specifications for **1.5 Tesla MRI with Wide Bore 70 cm High End** are hereby repealed with immediate effect.

**SECRETARY
SPECIALIZED HEALTHCARE AND
MEDICAL EDUCATION DEPARTMENT**

No & Date Even: -

A Copy is forwarded for information & necessary action to;

1. All VCs & Principals of Medical Health Institutions, SHC&ME Department.
2. All Superintendents of Teaching Hospitals, SHC&ME Department
3. All Head of Special Medical Institutions, SHC&ME Department
4. Director ICT Cell, SHC&ME Department, with the request to upload these PVMS Specification on the Departmental website.
5. PSO to Secretary SHC & ME Department, Lahore.
6. P.S to Special Secretary (D&R), SHC&ME Department.
7. P.A to Additional Secretary (Procurement), SHC&ME Department.

steel. 28-11-25
(ENGR. MUHAMMAD ATEEB)
SECTION OFFICER (STANDARDIZATION)

PVMS OF MEDICAL EQUIPMENT	
Clinical Specialty	Radiological Equipment
Generic Name	MRI 1.5 T (with 70cm wide Bore) High End.
Clinical Purpose	High-end 1.5T MRI for tertiary care must deliver high-resolution anatomical and functional imaging across all major organs including neuro, spine, MSK, cardio, abdominal, pelvic and liver studies with full oncologic capability and optimized imaging for advanced metal implants according to IEC standard.
TECHNICAL SPECIFICATIONS	
Latest Generation, latest Technology High Resolution 1.5 Tesla MRI system. Wide Bore 70cm.	
1. Magnet:	
02	Magnet Type: Super-Conductor
03	Field strength: 1.5 Tesla
04	Helium Boil off: Zero boil-off guarantee with full helium warranty shall be provided by the supplier. The supplier will also be responsible for unconditional coverage of any magnet quench, including all associated repair, restoration, helium refill, and related costs, without exception.
05	Shielding method: Active /passive
06	Shimming Method: Both Active & Passive
07	Bore Diameter: 70 cm
08	Magnet Length: 175 cm or less
09	Magnet Field Stability: 0.1 ppm/hr
10	FOV: 5-50 cm or better
11	Magnet Homogeneity: 1.0 ppm or less in 40cm.
12	Fringe Field: 0.5 mT line Fringe field (axial x radial): 4.00 m x 2.50 m or less
13	Other features: Operating panel on both sides of gantry with patient positioning display. laser light localization, In-Bore lighting & ventilation.
14	RF SYSTEM:
i	Transmitter Type: Digital transmission and Receiving /Optic Fiber based RF system
ii	Transmitter Power: 15 KW or more
iii	RF receives Channels: 95 or above standard simultaneous independent receiver channels that can be used simultaneously in one single scan. or one single FOV, each channel generating an independent partial image using optical fiber transmission.
15	Peak/Max Gradient: 44mT/m or more
16	Peak/Max Slew Rate: 200mT/m/s or more
17	EXAMINATION COILS: System should offer imaging capability for brain, neck, spine, whole body, peripheral, vascular and knee imaging etc. and other clinical applications, with following minimal coils of high SNR. Offered coils must have parallel imaging capability for at least head, neck, spine, body, shoulder, knee and

18	Whole Body	breast. Capability to hold whole CNS imaging in the single scan with multiple coil connectivity.
19	Head and neck	Gantry Integrated Whole Body imaging Coil
20	Spine	16 Elements or more, Array Head Coil Imaging
21	Neuro-Vascular Coil	Spine 32 Element or more spine coil for optimum coverage of full spine in combination.
22	Torso Coil	25 Element Array Neuro-Vascular Coil for Aortic Arch and Carotid Imaging in combination.
23	Dedicated Knee coil	30 Element or more with coil in combination (Parallel Imaging compatible).
24	Dedicated Breast Coil	16 elements or more. (parallel imaging compatible)
25	Flexible Coils:	8 or more elements.
i	Large Flexible Coil	12 elements or more (parallel imaging compatible)
ii	Medium Flexible Coil	08 elements or more (parallel imaging compatible)
iii	Multiple Coil Connection:	At least 3 coils (Head, body & Spine) must be connectable simultaneously.
26	Ultra-Flexible Blanket Type:	
i	Large (Qty 02)	Large Body Coil (Shape/Contour/biometric /Air/Smartfit for Torso Imaging of at least 32 elements or more imaging with coil combination
27	ACQUISITION PARAMETER	
i	Slice thickness 2D (0.5 mm or better) and 3D (0.1 mm or better) (Slice thickness should be separately defined for 2D and 3D)	
ii	Parallel Imaging:	The system should offer parallel imaging capability
iii	(Sense/ ASSET/ iPAT/ Speder/ RAPID or equivalent)	
iii	Acquisition matrix	1024 x 1024
28	PATIENT COUCH AND COMFORT	
i	Type	Motorized patient table with height lowering capability
ii	Weight Bearing Capacity	225 or more
iii	Table Length	2.0 meters
iv	Min. Height	0.7 meter or less
v	Scan Length	1.5 meters or more
vi	Gating	ECG Cardiac gating system, Peripheral pulse gating system or Respiratory gating System or VCG or compatible
vii	Motion Correction	Motion correction for all anatomy (Abdomen, Breast etc)
viii	Acoustic Noise reduction	Latest, state of the art acoustic noise reduction capability with motion correction must be quoted
29.	Intercom Integrated Two Way Communication between Patient & Operator	
30.	Safety /Emergency Run Down, Safety Switches for Emergency Ramp Down	
31.	Feet first scanning Overhead/ couch built in camera along with LCD display (CONSOLE / HOST/ RECON)	
32.	Standard Console Standard Key Board and Mouse, Automated scanning capability and user-friendly interface base.	
33.	Hard Disk Capacity: 1TB or more /or manufacturers maximum specified with minimum storage capacity of 1,600,000 or more uncompressed image at 256 x 256 matrix.	
34.	DVD/CD R/W, DVD /CD Writer must be included	
35.	Connectivity/Networking: DICOM 3.0 Query/Retrieve, Modality Work list, storage & print to be included.	
36.	Display Monitor: 23 inches or more LCD/LED monitor (Flicker free & High Resolution).	
37.	Reconstruction Speed Minimum 50000 FFT/Sec or more (256x256 Matrix) at full field of view.	
38.	Image Reconstruction: Latest generation system as per manufacturer recommendation with minimum 32 GB RAM or more.	
39.	All Imaging sequences and MR applications as listed below	

40. MRI DEDICATED / MULTIMODALITY WORKSTATION

- i. Original Workstation supplied by the Manufacturer as MRI system to be offered, with all required evaluation and post-processing applications minimum 3 in number or thin client solution offering same functionality with licensed software having 3 in number of concurrent user licenses with necessary hardware).
- ii. Standard Console: Standard Key board And Mouse, user friendly interface base.
- iii. Hard Disk Capacity: 1TB or more /or manufacturers maximum specified with minimum storage capacity of 1,600,000 or more image at 256 x 256 matrix.
- iv. DVD/CD R/W, DVD /CD Writer must be included
- v. Connectivity/Networking: DICOM 3.0 Query/Retrieve, Modality Work-list, Storage & Print to be included

41. Display Monitor

- i. 23 inches or more LCD monitor (Flicker free & High Resolution)
- ii. Latest generation system as per manufacturer recommendation with minimum 32 GB RAM or more.
- iii. Original licensed operating system latest version as per manufacture release.
- iv. Post Processing for Basic and Advanced to be included. The evaluation packages for applications

42. STANDARD IMAGING SEQUENCES, BASIC & ADVANCED APPLICATIONS FOR CONSOLE AND WORKSTATION APPLICATION SOFTWARE: (With lifetime software upgradability and dedicated license)

- i. Spin Echo (single and multi-echo)
- ii. Fast Spin Echo
- iii. Gradient Echo
- iv. 3D Motion correction for all anatomy including brain and body.
- v. Phase Contrast 2D & 3D
- vi. Fat Suppression (at least 4/5 different techniques)
- vii. Contrast Enhanced MRA with automatic table movement
- viii. 3D isotropic imaging.
- ix. Diffusion Imaging with 256 ADC maps/direction/Vectors for application in brain and body in real time.
- x. MRCP 2D and 3D
- xi. Perfusion imaging with online calculation of hemodynamic maps like mean transit time, time to peak, time of arrival etc.
- xii. Bolus tracking for real time synchronization of contrast bolus arrival.
- xiii. Single and multi-shot EPI-free selection capability of single or multi shot EPI
- xiv. Dynamic Imaging (brain, liver, breast)
- xv. Brain Volume Imaging or similar
- xvi. Diffusion Tensor Imaging + Tractography (On Console and post processing on Workstation or on separate workstation of same manufacturer)
- xvii. Spectroscopy - Single Voxel (On Console and post processing on Workstation or on separate workstation of same manufacturer)
- xviii. Spectroscopy - Multi-Voxel (Brain, Breast and Prostate) (On Console and post processing on Workstation or on separate workstation of same manufacturer)
- xix. Flow Analysis software with display of peak velocities
- xx. Motion Correction for all anatomy and in functional imaging.
- xxi. Fluoro Triggered MRA
- xxii. MPR-Multi Planner Reconstruction.
- xxiii. Magnetization transfer imaging
- xxiv. Advanced volumetric imaging with T2, T2 Flair and Proton density weighted contrast.
- xxv. Cartilage Mapping software (Manufacturer's specific) for non-invasive imaging method for early detection of osteoarthritis.
- xxvi. Time Resolved Imaging in high resolution of multi-phase 3D volumes of any anatomy for fast accurate visualization of the vasculature.
- xxvii. 3D non-contrast enhanced MRA application for brain, carotid and peripheral arterial imaging. 3D Arterial Spin Labeling - Non-Contrast whole brain perfusion.
- xxviii. High resolution T2 weighting for clear depiction of inner ear structures and facial nerve.
- xxix. Susceptibility weighted imaging (SWI) / FSBB software with an additional feature to create phase maps to differentiate between microbleeds and microcalcifications.
- xxx. The firms should quote all other optional and advanced available applications / packages for neuro, vascular / angiography, oncology, brain, abdomen, orthopedics etc.

- xxxi. High resolution zoom for visualization of small anatomical areas using dedicated applications like Zoom it / Zoom Diffusion / Focus / Zoom DWI.
- xxxii. Compressed speeder / compressed sensing / hyper sense / compressed sense for both 2D and 3D scans.
- xxxiii. Metal artefact reduction software must be provided.
- xxxiv. Deep learning with reconstruction phase for the motion free with resolution gain to reduce the acquisition time and increase image resolution based.
- xxxv. artificial Intelligence Algorithm for 2D/ 3D Sequences on all body regions as Below:
- xxxvi. Complete AI based software complete package (Deep Resolve package, /Smart Speed package/AICE-PIQE/AirRecon DL.

43. OPTIONALS: (I/O to specify)

The Cardiology advance imaging Package is designed to enhance diagnostic capabilities for cardiac imaging and related applications. It is most beneficial for hospitals with active Cardiology and Cardiac Surgery departments, where the required clinical expertise and patient volume are available to utilize its full potential.

- i. Comprehensive Cardiac post processing must be offered for cardiac function, Morphology and Tissue characterization along with the reading and reporting of Cardiac MR Analysis and must include the following:
- ii. 4D Viewer.
- iii. LV & RV function with LAX & SAX.
- iv. 2D Flow & vascular.
- v. Integrated Reporting Module.
- vi. Strain (Tissue Tracking).
- vii. Tissue Characterization/Tissue tracking.
- viii. T1 mapping.
- ix. T2 mapping.
- x. Iron Quantification (T2* mapping).
- xi. Semi-Q Perfusion/Perfusion curve.
- xii. Black blood Imaging to suppress blood signal for optimized myocardial and lumen visualization.
- xiii. Multi Slice / Multi Phase imaging for functional studies.
- xiv. T2 based 3D sequences with real-time motion correction for non-invasive imaging of coronary arteries
- xv. Deep Learning contouring/ Automated Deep Learning contouring.
- xvi. Complete free breathing cardiac examination for the best quality cardiac imaging, including free breath cardiac cine.

44. ACCESSORIES: (Procuring agency to select as per its actual requirement)

- i. MRI Compatible wheel Chairs: QTY 2
- ii. MRI Compatible Trolley: Qty 2
- iii. MRI Compatible IV Pole Qty 1
- iv. Metal detectors door Qty 1
- v. Hand-held Metal detector Qty 2
- vi. Standard set of phantoms for calibration of MRI.
- vii. 4MP HD IP CCTV cameras with complete accessories and installation (x 08 cameras) outside the RF Cage.
- viii. Online pure sine Wave Double Conversion UPS (Capacity to be define by Procuring agency) for whole MRI operations, with a minimum backup time of 20 minutes on full load, (MGE, Emerson, Liebert, Chloride, Riello, APC, GE or Equivalent).
- ix. Programmable, MRI Compatible Dual Head power injector with flow / volume and temperature control. Mounted on mobile base with 500 disposable syringes of 65 and 115ml capacity and connecting tubes (Medrad-Bayer/ Angiostat / Madtron /Tyco/Guerbet or equivalent).
- x. DICOM 3 Ready Dry Laser Camera / Imager, multi-size up to 14" x 17" for different size films (Carestream, Agfa, Fuji, Konica or equivalent) for black & white printing on film, including 2000 films.
- xi. Film Viewer (x 04) for images up to 14" x 17" with variable light control and shutter, with 4 1 format; LED type.
- xii. Imported Water Chillers as per requirement of the system with standby arrangement of same capacity Chiller.
- xiii. RF cage as per manufacturer's recommendation (IMPORTED and validated by he manufacturer) and according to site requirement with non-magnetic outlets for anesthesia ventilator.
- xiv. Audio system for patient during MRI.
- xv. Renovation and up gradation of waiting area and reporting room.
- xvi. MR compatible stretcher.

- xvii. **POWER GENERATOR** (Capacity is to be defined by Procuring Agency). Including civil works, ATS panel, Sound Proof Canopy, Foundation Pads, Earthing, fencing and cabling.
- xviii. Independent Transformer (200KVA or more) is to be provided by the supplier. Procuring agency would facilitate with the documentation if required.

45. OPTIONAL ACCESSORIES/SOFTWARE PACKAGES: (Procuring agency to select as per its actual requirement)

- i. MRI angiogram (cardiac), flow measurements, offline analysis, coronary imaging
- ii. Advanced orthopedic software.
- iii. Advance vascular package including 3D peripheral arterial imaging.
- iv. Advance Liver imaging.
- v. Functional imaging software and hardware.
- vi. Fetal anomaly survey / Equivalent software.
- vii. MR Elastography (Licensed by Mayo clinic) with dedicated software and hardware
- viii. Functional MRI/ (BOLD Imaging) with online processing along-with specified hardware for functional MRI.
- ix. MRI compatible transport ventilator.
- x. MRI compatible adult/Pediatrics anesthesia machine with compatible ventilator, mobile type. Two Gas Model machine (oxygen and nitrous). Oxygen Monitor, Isoflurane vaporizer, Compatible with AMBU bag. Close circuit system, Circle absorber, flow meter with sets compatible cylinders.
- xi. MRI Compatible patient care monitor for ECG, SPO₂, Temp and EtCO₂
- xii. MRI compatible Syring Pump and Infusion Pump.

46. Axillary Works (Procuring agency need to define detail BOQ of Axillary work so that they can incorporate with their proposal).

1. Interior Works

The supplier shall provide and complete all interior works including:

- Wall panelling.
- Flooring (as per hospital standards).
- Painting and finishing.
- Integration of oxygen, medical air, and suction outlets with the existing hospital pipeline system

2. Civil Works for Waiting Area

The supplier shall carry out the necessary civil works in the MRI Waiting Area, which include:

- Construction/formation of a reception counter
- Renovation and finishing of all related structural and interior elements

3. Provision of Furniture and Accessories

The supplier shall supply and install complete furniture and accessories for the MRI waiting area, including but not limited to:

- Benches/seating arrangements
- LCD TV
- Water dispenser
- Any additional items required to meet hospital standards

4. Electrical Works

The supplier shall execute all electrical works from the main power station to the MRI room, including:

- o Earthing system
- Power racks and cable trays
- Circuit breakers
- Electrical Distribution Board (DB)
- All necessary wiring and conduits as per electrical and OEM standards

47. SITE PREPARATION: (If required)

Site Renovation and Turnkey Installation Requirements

1. Scope of Work

The supplier shall be responsible for the complete site renovation of the MRI Room, Console Room, and UPS Room. The scope includes, but is not limited to, the following:

Installation and validation of the RF Shielded Room, including mandatory RF leakage testing to ensure shielding effectiveness of 90–100 dB, as per standards.

Renovation of RF doors, air-conditioning systems, false ceiling, painting, and installation of antistatic flooring.

Upgrading or replacement of the Electrical Distribution Board (DB), earthing system, and power cabling from the main transformer / hospital LT panel up to the MRI site.

2. Turnkey Project Requirement

The installation shall be executed as a turnkey project. Any modification, rectification, or upgradation required in the existing site to meet OEM specifications shall be the sole responsibility of the supplier.

3. Installation Compliance

The supplier shall ensure a complete interface-free installation, strictly following:

Manufacturer's installation guidelines

Site requirements

Environmental and structural considerations

All necessary measures to guarantee artifact-free imaging during examinations and procedures.

4. Responsibility

The supplier shall bear full responsibility for ensuring that the installed system operates optimally and meets all OEM-recommended conditions, safety standards, and performance criteria.

48. UPGRADE-ABILITY

i. The system should have a software upgrade route to higher versions with undertaking of above two by the principal manufacturer, that is their latest version been used worldwide.

49. WARRANTY

i. 05- Years Manufacturer's comprehensive warranty of the unit along with Consumables like helium gas, UPS batteries, all type of coils and other third-party items will be provided including service and spare parts for components of the system.

50. POST WARRANTY SERVICE MAINTENANCE CONTRACT

i. A fixed value (as per decided by the procuring agency) will be the cost of the Comprehensive Service Maintenance Contract after expiry of the warranty period. Contract will include the same terms and condition of warranty clauses service, parts (including consumable items (Helium gas and coils all type) for the next 05 years.

51. REMOTE SERVICES

i. The firms will provide the remote service connectivity through modem with manufacturer's remote service center for services purpose.

Optional: As per required by the institute.

i. The firms will also provide the connectivity/license to share the global resources for information, images, clinical protocols and research purposes and remained valid till the life of the machine.