PROJEK : **KERJA-KERJA BAGI PENGGANTIAN SISTEM GAS PERUBATAN (COMPRESSED AIR) DAN LAIN-LAIN KERJA BERKAITAN DI HOSPITAL SIBU, SARAWAK**

ITEM	WORKS/ACTIVITIES DETAIL/SPECIFICATIONS	UNIT	TOTAL UNIT	PRICE/ UNIT (RM)	TOTAL COST (RM)
1.0	**GENERAL REQUIREMENT**				
1.1	Work scope for this upgrading project will be design & build of Mechanical, Electrical (M&E) and Civil works related with Medical Gas Pipeline System, MGPS Plant at Hospital Sibu, Sarawak.			NA	NA
1.2	Tenderer shall be registered with **Lembaga Pembangunan Industri Pembinaan Malaysia (LPIPM/CIDB)** under **SSPK (Sistem Satu Pendaftaran Kerajaan)** in related category and speciality **(Category - M&E / Speciality - M06 - *Peralatan Perubatan* / M09 - *Pemampatan dan Penjanaan Berasaskan Mekanikal*)**. All requirements from the **Department of Occupational Safety and Health (DOSH)** shall be complied by the tenderer within the project.			NA	NA
1.3	Tenderer shall comply with all federal and local authorities current rules, regulations and standard in tendering, design & engineering, procurement, construction, testing & commisioning of the project.			NA	NA
1.4	Site visit and project brief shall be attended by tenderer/manufacturer/vendor. All disputed items such as measurement, items quantity, products quality, existing drawing dimension, electrical load and etc. shall be clarified from the tenderer detail inspection and approved by MOH technical team within the site visit.			NA	NA
1.5	Tenderer shall submit their proposal design/drawings/diagram/catalogue within tendering process and will be reviewed by MOH technical committee.			NA	NA
1.6	All work/task shall be done only with approved permit to work from management/authorized personnel from hospital. Work/task shall be done and implimented by competent personnel and monitored by authorized personnel from tenderer site. (All individual detail/resume/copy of certification shall be attached within the submited tender document)			NA	NA
1.7	Tenderer shall submit/handing over all related documents (4 copies and 1 soft copy/CD/DVD) such as products catalogue, technical specification for each products, shop drawings, Instruction for Construction (IFC) Drawings, As Built Drawings, operational & user manual and related documents & drawings in the end of the project.			NA	NA
1.8	Tenderer shall provide monthly technical/progress report within the project period, which inform MOH technical team the technical information, issues, progress pictures and current status.			NA	NA
1.9	**IMPORTANT :** Notification to the hospital administration/user/concession company shall be made before the work start. All hospital activities shall be not disturbed within the project progress. All planned and unplanned interuption shall be notified and rectified as soon as possible. (Response time shall be approved by Hospital Administration and MOH Technical team). Temporary power supply and others interupted services / equipments / components shall be provided if required. Hospital has the power to stop any works/tasks that bring any hazards to the operation, buildings, system and etc.			NA	NA

2.0	**ENGINEERING & DESIGN WORK**				
2.1	Tenderer shall appoint related consultant for this upgrading project, so that all the engineering tasks, drawings, calculations and etc. will be approved by Proffesional Engineer (P.E.). M&E Consultant shall be registered with **Board of Engineer Malaysia (B.E.M).** Consultant shall consult the contractor regarding all related tasks/issues/activities/programs.	L.S	L.S		
2.2	All pressure vessels shall be approved and certified by the **Department of Occupational Safety and Health (DOSH). Permit to install (once), Permit to Operate (once), and certificate of fitness (yearly) within the warranty** period shall be acquired by the the tenderer.				
2.3	The design proposed by the consultant shall at least comply with the **MOH standard** and **Health Technical Memorandum (HTM 2022), current standard** or higher for health care facility.				
2.4	Consultant shall submit all related documents such as:				
	1. Submission of federal and local authorities if required. (DOSH/State Authorities)				
	2. **gas flow/pipe size calculations**				
	3. **Shop Drawings/General Arrangement Drawings/Instruction for Construction (IFC) Drawings.**				
	4. **As Built Drawings (Civil and M&E) if required, such as: Structural Drawings, Architectural layout, Electrical single line diagram, pipe layout, general arrangement of medical gas plant.**				
	5. **Project planning and progress with Critical Path Method CPM (MS Project, Primavera)**				
2.5	To attend monthly meeting and a kick off meeting with MOH technical team and the contractor in finalize the design & engineering issues.				
3.0	**PRELIMINARIES OF CONSTRUCTION**				
3.1	Factory Acceptance Test (FAT) of the medical air compressor shall be made within the factory and witnessed by MOH technical team. Hydrostatic test (pressure vessel) shall be made by the manufactured, witnessed by the DOSH, MOH technical team and result/certification shall be prepared. All related tools/instrument shall be supplied and prepared by the tenderer/manufacturer.	L.S	L.S		
3.2	Mobilization and demobilization of the equipments, components and etc.	L.S	L.S		
3.3	Preparation of the construction work, site clearing, relocation of current materials, components/system, disposal activities shall be notified and approved by the MOH technical team or appointed persons. Cleaning of the work areas before, within and after the project end. The cleanliness of the work area shall be maintained in good condition. Any loaner or temporary system required for maintaining the hospital operation shall be provided by the tenderer/contractor. Without any prior notice and approval from the hospital management, all dismantle and existing equipments/components/systems shall be not brought out from the hospital area.	L.S	L.S		

3.4	To provide temporary supply arrangement if required, using existing manifold system or loose cylinder for all critical area/department which affected by the work of the installation new medical air plant.	L.S	L.S		
4.0	**CIVIL WORK**				
4.1	To construct new reinforced concrete plinth (Double layer 10mm rebar welded mesh) for the new medical air plant, detail design, plan and drawing by the consultant and approval by local authority (if required). The new foundation used for medical compressed air plant shall be designed with maximum load/weight with safety factor. (refer to submited catalogue and detail specification)	L.S	L.S		
5.0	**MEDICAL COMPRESSED AIR PLANT**				
5.1	Otherwise stated, new medical compressed air quality, function, componenets, system and plant shall comply at least with **Health Technical Memorandum, HTM - 2022: Medical gas pipeline systems.**			NA	NA
5.2	The medical compressed air system shall be designed to achieve these minimum specification:			NA	NA
	a) Medical Air system shall conform at least to **NHS HTM 2022 or higher**. Medical quality air to the **European Pharmacopoeia** monograph shall be delivered at pressures of 400kPa (4bar) gauge for supply of the hospital medical system.			NA	NA
	b). Plant Noise level: less than 80 dB (A)			NA	NA
	c). The standard range of medical air plant systems are shall be **'CE' marked under the Medical Devices Directive 93/42/EEC** with approval from notified body (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as **Class IIa Medical Devices.**			NA	NA
	d). All plant is to be connected to the **essential electricity supply.**			NA	NA
5.3	To supply and install complete package of new medical grade air compressor. All compressors shall minimumly comply with these specification and standard. Brand **Atlas Copco, Comp Air, Drager, equivalent or higher** shall be used (Catalogue & Detail Specification are required):	SET	1		
	a) Design flow for the plant shall be **minimumly 3900 litres/minute.**				
	b) The medical air compressor package and arrangement shall comply at least **HTM 2022 (2 unit compressor as a primary system and a existing MCS2 as a secondary supply)** or higher standard.				
	c). Complete package of medical grade air compressor shall be included with air intake filter, pressure safety, non-return & ball valve, pressure & temperature switch, aftercooler and automatic drainage				
	d). Compressors shall be oil injected rotary screw compressors suitable for both continuous and frequent start/stop operation at a nominal outlet pressure of 750 kPa (7.5 bar), 950 kPa (9.5 bar) or 13000 kPa (13 bar) gauge.				
	e). Compressors shall be supplied with a block and fin style after cooler with a dedicated quiet running fan to maximise cooling and efficiency.				
	f). A multistage oil separator capable of achieving 2ppm oil carry over shall be fitted to minimise contamination and maintenance				
	g). Compressor noise level: shall be less than 65 dB (A)				
	h). EFF1 (CEMEP) rated TEFC (Total enclosed, Fan Cooled), IP55 class F electric motors shall be used and incorporate maintenance-free greased for life bearings				

5.4	To supply and install complete package of new medical grade air receiver or refurbished the existing air receivers. New or refurbished air receivers shall be complied and registered with **DOSH (PTI/PTO/CF)**. Air receiver shall be minimumly complied with these specification and standard (Catalogue & Detail Specification are required): a). All new air receivers capacity shall be **minimumly 1500 liters.** (only if refurbished receivers are used) b). Receiver arrangement shall consist 2 unit of receiver in standby/duty mode or alternate mode, and there are provided with components that allow maintenance/shutdown to be done to any of receiver if required. (by-pass mode) c). Each air receiver shall be hot dip galvanised inside and out and fitted with a zero loss electronic drain (ZLD) valve. Float type drain valves are not acceptable and manual valve shall be provided only for standby mode if ZLD out of service. d). The receiver assembly shall be fitted with a pressure safety valve capable of passing the maximum flow output of the compressor at 10% receiver overpressure e). The receiver shall be further protected by a safety pressure relief valve and include a pressure gauge.	SET	1		
5.5	To supply and install complete package of new medical grade air dryer/filter/regulator system. Filter dryer shall be minimumly complied with these specification and standard (Catalogue & Detail Specification are required): a) A Duplexed filter and dryer module shall incorporate with high efficiency water separators, oil filters, heatless regenerative desiccant dryer, dust/activated carbon filters, hopcolite filters and bacterial filters with autoclavable element. b) Electrical contacts shall be installed on the filters to provide warning alarms on the dryer controller in the event of high pressure drop, dew point (ie blockage) c) Contaminants in the delivered air downstream of the bacterial filters shall be maintained at below than (shall be tested twice, within T&C and defect liability period, DLP): d) The dryer shall incorporate a ceramic dew point hygrometer with an accuracy of ±10C in the range -20 to -800C atmospheric dew point and 4-20mA analogue output c/w dewpoint dependant switching. Aluminium oxide or palladium wire sensors are not acceptable. An alarm condition shall trigger on the dryer control panel if the dew point exceeds a -460C atmospheric set point. i. H2O - 67 ppm v/v ii. Dry particulates - Free from visible particulates in a 75 litre sample iii. Oil (droplet or mist) - 0.1 mg/m³ iv. CO - 5 ppm v/v v. CO2 - 500 ppm v/v vi. SO2 - 1 ppm v/v vii. NO - 2 ppm v/v viii. NO2 - 2 ppm v/v	NOS	1		

5.6	To supply and install new central control system which provide an intelligent human machine interface incorporating on board flash memory and real-time clock for recording operational parameters in the in built event log. The central control unit shall incorporate a user friendly display with clear pictograms and LED indicators, providing easy access to system operational information.	L.S	L.S		
5.7	To supply and install new medical grade copper pipe (pipe size base on consultant calculation), valves and fitings within the plant room and medical gas manifold system (supply line system). Identification of copper pipe shall be using a standard colour code. A terminal unit at supply line system with a lockable valve shall be provided as a **test terminal**.(Certificate of medical grade copper pipe, fittings are required)	L.S	L.S		
6.0	**ELECTRICAL WORK**				
6.1	All wiring shall be run on surface, in Class 'B' galvanized steel conduits and complete with GS conduit boxes, together with all necessary metal clad lighting switch plates, switched socket plates, isolators and accessories. Underground wiring in Class 'B' galvanized steel conduits shall be layed properly with proper procedure and standard.	L.S	L.S		
6.2	To supply and install new or refurbish existing electrical board (DB/SSB) for new medical compressed air system c/w cable/cable/trunking from MSB. All electrical shall be essential supply (powered by SESCO/Generator set).	NOS	1		
6.3	To supply complete of electrical and integrate with plant control panel system for new medical compressed air system, which consist of:	NOS	1		
	a). Amp Meter and R-Y-B Volt meter shall be install within the panel. Emergency push button, start, stop buttons and start, stop, trip indicator light for compressors shall be install within the control panel. Phase indicator light also shall be install. Auto, off, manual selector shall be provided within the panel.				
	b). Control panel shall be located at Compressed air plant room.				
	c). all cables/wires shall be within the JKR standard and external cable need to be trunking properly.				
6.4	13A 3-pin waterproof switched socket point in ring circuit : 1 – gang (minimum IP 55). Accepted brands – Clipsal, PDL or MEM.	NOS	1		
7.0	**TESTING & COMMISSION (T&C)**				
7.1	To organize pre and T&C for the whole project before handing over the system. T&C will be consist of several mechanical and electrical test. Intrument certificate, test results and certifications shall be submited with hand over documents. All tools and instruments shall be provided by tenderer. Related tests are listed below (associated forms as per appendix);	L.S	L.S		
	a). **System test -** Cross-connection test				
	b). **System test -** Functional test of supply system				
	c). **System test -** Pressurr safety valves				
	d). **System test-** Warning systems				
	e). **System test -** Verification of drawings				
	f). **System test -** Purging and filing				
	g). **System test -** Quality test				
	h). **System test -** Gas identification				
7.2	To do the quality test twice (within the T&C and DLP) of the gas at the test terminal, so that delivered air is comply with the pharmaceutical standard.				
7.3	To do all electrical related T&C. Test certificates are required.				
7.4	T&C shall be done by competent(CP), authorized personnel (AP) and witnessed by MOH technical team, users, concession company and other related parties.				

9.0	**TECHNICAL TRAINING**				
9.1	To provide user and technical (maintenance staff) training.	L.S	L.S		
10.0	**WARRANTY**				
10.1	Tenderer shall give 12 months of warranty after handing over all of the system.				
10.2	Maintenace and servicing during defects and liability period for 12 months after handing over.			NA	NA
10.3	All spare part shall be available at market within/more than 10 years.				
11.0	**Any kind of work that are not included in listings above but deemed necessary to complete entire works such as which indicated in plan and specification (if there is), contractor need to listing supply types and work together under with budget expenditure.**			NA	NA
	Superintending Officer (S.O) should be mandated to fraction all cost such as that list under.			NA	NA
	a)……				
	b)……				
	c)……				
	d)……				
	e)……				
12.0	**PROVISIONAL SUM (ADDITIONAL MECHANICAL/ELECTRICAL/ARCHITECTURAL WORK), which approval by the board.**	L.S		20,000.00	20,000.00
	TOTAL PROJECT COST				
	PROJECT PERIOD				

LAMPIRAN A