CORRIGENDUM – I

Sub: Internal and External Medical Gas System works for Construction of District Head Quarter Hospital (DHH) at Kendrapara Odisha state.


BIDDERS SHOULD NOTE THE FOLLOWING CHANGES:

1. Additional Technical Specifications (MGPS- Medical Gas Pipeline System).

2. All other terms & conditions remain unchanged.

CONTRACTS DIVISION - WRO
ADDITIONAL TECHNICAL SPECIFICATION

MGPS (MEDICAL GAS PIPELINE SYSTEM)

1.0 OXYGEN SYSTEM:

a. **Fully Automatic Oxygen Control Panel (Flow 1200 LPM):** Installation of fully Automatic pneumatically operated O₂ control panel. Visual indication of the manifold is provided by 3 gauges inside the control panel, Indicating Pressure of the Rt. & the Lt. hand bank and the supply pressure from control panel to distribution system with sensing facilities to provide visual signals and other ancillary services such as heaters. Panel would be fitted with audio alarm indication to facilitate in changeover of empty cylinder. The entire manifold will be hydraulically tested at more than 130 Kg/Cm² pressure and would be duly degreased for Medical Oxygen Service.

b. **Oxygen Manifold (2 banks with 16 Nos cylinders):** Installation of O₂ manifold of Size (16 working + 16 Standby) for Indian type bulk cylinders, high pressure copper annealed tail pipes complete with middle frame, chains for individual bulk O₂ cylinder, NRV's and 32 nos. pig tail pipes. It would be capable to withstand a working pressure of 145 kg/cm² and would be tested at 300 kg/cm². Complete as required.

c. **Oxygen Manifold (Emergency) (2 banks with 6 nos cylinders):** Installation of O₂ manifold of Size (6 working + 6 Standby) for Indian type bulk cylinders, high pressure copper annealed tail pipes complete with middle frame, chains for individual bulk oxygen cylinder, NRV's and 12 nos. pig tail pipes. It would be capable to withstand a working pressure of 130 kg/cm² and would be tested at 300 kg/cm².

d. **Oxygen outlets with probes:** Installation of Oxygen Outlets as per standards. Terminal units would be capable of single-handed insertion and removal of the medical gas probe. The wall mounted first fix assembly shall consist of brass pipeline termination block with copper stub pipe secured between a back plate and a gas specific plate to allow limited radial movement of the copper stub to align with the pipeline. The gas specific plate shall be permanently fixed to the backplate.

e. **Oxygen Flow Meters:** Installation of O₂ flow meters complete with humidifier bottle. The flow meter would be constructed with chromium plated brass body and shall be extremely robust to take care of the day to day usage demand. Flow meter cartridge type knob would be easy to maintain, would offer optimum adjustment quality and shall have superior designing and engineering to provide high levels of accuracy, with no significant effect from restrictions caused by
down-stream equipment. The flow meters will have 0-15 LPM (litres per minute) range for oxygen.

### 2.0 NITROUS OXIDE SYSTEM:

2.1 **Full Automatic Nitrous Oxide (N₂O) Controls (500 LPM):** Installation of full Automatic pneumatically operated N₂O control panel; with heater. The entire manifold would be hydraulically tested at more than 250 Kg/Cm² pressure and shall be duly degreased.

2.2 **Nitrous Oxide (N₂O) Manifold (2 Banks with 6 Nos Cylinders):**
Installation of N₂O manifold with 6 Nos cylinders + 6 Nos standby, complete with middle frame, chains, NRV's 12 nos. pig tail pipes. The Manifold will have high pressure copper annealed tail pipes with one end having brass bull nose suitable for Nitrous Oxide cylinders and the other end suitable for Manifold Non–Return Valves. Each manifold will have one terminal header and a NPT connection for the Automatic Control Panel.

2.3 **Nitrous Oxide (N₂O) Manifold for Emergency (2 Banks with 3 Nos Cylinders):**
Installation of N₂O manifold with 3 Nos. cylinders + 3 Standby complete with middle frame, chains, NRV's 6 nos. pig tail pipes. The Manifold will have high pressure copper annealed tail pipes with one end having brass bull nose suitable for Nitrous Oxide cylinders and the other end suitable for Manifold Non–Return Valves.

2.4 **Nitrous Oxide (N₂O) outlets with probes:** Installation of Nitrous Oxide outlets as Perstandards. Terminal units shall be capable of single-handed insertion and removal of the medical gas probe. The wall mounted first fix assembly shall consist of brass pipeline termination block with copper stub pipe secured between a back plate and a gas specific plate to allow limited radial movement of the copper stub to align with the pipeline. The gas specific plate shall be permanently fixed to the backplate.

### 3.0 CARBON DIOXIDE SYSTEM:

3.1 **Semi Automatic Carbon Dioxide Control (50 LPM):** Installation of Semi Automatic pneumatically operated CO₂ control panel, with heater. The entire manifold will be hydraulically tested at 250 Kg/Cm² pressure and shall be duly degreased.

3.2 **Carbon Dioxide Manifold (2 Banks with 2 Nos Cylinders):**
Installation of CO₂ manifold with 2 Nos cylinders + 2 Standby cylinders, complete with middle frame, chains and NRV's 4 nos. pig tail pipes. The Manifold will have high pressure copper annealed tail pipes with one end having brass bull nose suitable for Carbon dioxide cylinders and the other end suitable for Manifold Non–Return Valves.
Valves. Each manifold will have one terminal header and a NPT connection for the Automatic Control Panel.

3.3 **Carbon Dioxide Manifold for Emergency (2 Banks with 1 Nos Cylinders):** Installation of CO₂ manifold with 1 Nos Cylinder + 1 Standby, complete with middle frame, chains, NRV’s 2 nos. and pig tail pipes. The Manifold would have high pressure copper annealed tail pipes with one end having brass bull nose suitable for Carbon dioxide cylinders and the other end suitable for Manifold Non – Return Valves.

3.4 **Carbon Dioxide outlets with probes:** Installation of Carbon Dioxide outlets as Perstandards. Terminal units shall be capable of single-handed insertion and removal of the medical gas probe. The wall mounted first fix assembly shall consist of brass pipeline termination block with copper stub pipe secured between a back plate and a gas specific plate to allow limited radial movement of the copper stub to align with the pipeline. The gas specific plate shall be permanently fixed to the backplate.

4.0 **COMPRESSED AIR SYSTEM:**

**Compressed Air System :** Installation of Two nos of Compressed Air system compressors having oil free air compressor (minimum 68 CFM) Model, Base mounted Model BFT 150D–9E or similar, equipped with air receiver capacity of 1000 ltrs; and complete with Air Dryer of 60 cfm. It will consist of oil–free, stationery, air cooled, silenced (Reciprocating) air compressor. It would be equipped with electrical motors, Air reservoir Tank, Air filters, Pressure Regulator–cum–filter and Air Dryer with moisture separator along with interconnecting pipes with necessary valves and fittings thereof as required.

- **Medical Air Outlets with Probes for Medical Area (4 Bar):** Installation of Compressed Medical Air (4 Bar) outlets as Perstandards. Terminal units shall be capable of single-handed insertion and removal of the medical gas probe. The wall mounted first fix assembly shall consist of brass pipeline termination block with copper stub pipe secured between a back plate and a gas specific plate to allow limited radial movement of the copper stub to align with the pipeline. The gas specific plate shall be permanently fixed to the backplate.

- **Medical Air Outlets with Probes for Surgical Area (7 Bar):** Installation of Compressed Medical Air (7 Bar) outlets as Perstandards. Terminal units shall be capable of single-handed insertion and removal of the medical gas probe. The wall mounted first fix assembly shall consist of brass pipeline termination block with copper stub pipe secured between a back plate and a gas specific plate to allow limited radial movement of the copper stub to align with the pipeline. The gas specific plate shall be permanently fixed to the backplate.
5.0 VACUUM SYSTEM:

Vacuum System (Minimum capacity 4000 LPM, 450 Hg): Installation of Two Nos of Vacuum Central system completes with Vacuum pumps (2Nos X 7.5 KW) Model – NES 300 reciprocating base frame mounted with motor along two three medical Vacuum pumps each with electrical motors, silencers and bacterial filters. They would be capable of removing more than 99.9% of oil and smoke particles from the exhaust.

5.1 Vacuum Outlets with Probes: Installation of Vacuum outlets shall be as per standards. Terminal units shall be capable of single-handed insertion and removal of the medical gas probe. The wall mounted first fix assembly shall consist of brass pipeline termination block with copper stub pipe secured between a back plate and a gas specific plate to allow limited radial movement of the copper stub to align with the pipeline. The gas specific plate shall be permanently fixed to the backplate.

6.0 COPPER PIPES: Installation of Medical Grade copper pipe with required copper fittings. All pipes shall be drawn half hard temperature, solid drawn, seamless, phosphorous deoxidized, non-arsenic and degreased copper conforming to EN BS:13348:2008/ASTM B819 Standard EN 1057:1996 (originally BS 2871-1971 Part 1, and chemical composition as per BS-6017 of 1981 table 2. The supply of copper pipe should be accompanied with manufacturers test certificate for the physical properties of copper pipes and their Chemical composition. The sizes that would be used shall be conforming to the standards and widely used installation practices, which shall be the following:

- 12 mm
- 15 mm
- 22 mm
- 28 mm
- 42 mm
- 54 mm
- 76 mm
- 108 mm

The detailed schematics as regards to the piping system would be provided in detailed drawings and execution plans.

7.0 ISOLATION BALL VALVES:

These Shutoff Valves permit specific areas of the piping system to be isolated in the event of a problem as well as for maintenance, repair, testing, or expansion without the whole system being turned OFF.

There are two types of shutoff valves:
Manual: They are usually installed where they are visible and accessible at all times.

Service shutoff valves: They are designed to be used only by authorized personnel. They are in locked cases or have their handles secured and tagged to prevent accidental closing.

Manual valves are installed in boxes with frangible or removable windows. A quarter-turn valve with an indicating handle has become standard component and would be used here as well. Each valve would be marked to indicate its function, gas, and area controlled as well as a caution that it should be closed only in an emergency. A shutoff valve is required at the outlet from the supply source. This allows the entire supply source to be isolated when and as required. The main supply line must be equipped with a manual shutoff valve near the entry into the building unless the source shutoff valve is accessible from within the building. It will be at a location well known and readily accessible to those responsible for operating and maintaining the system but where any attempt to tamper with it could be noticed.

- Each riser will be equipped with a manual shutoff valve adjacent to the connection to the main supply line.
- Each branch (lateral) line except those lines supplying anesthetizing locations and other vital life support and critical areas (such as post anesthesia care, intensive care, and coronary care units) will have a service shutoff valve where the lateral branches off the riser.
- A manual shutoff valve will be provided immediately outside each vital life support or critical care area and which would be readily accessible in case of an emergency.

8.0 ALARMS:

Types of Alarms used:

a) Master Alarm System:

A master alarm system will be provided to monitor the central supply and the distribution system for all medical gas systems.

b) Area Alarm System:

Critical life support areas such as OTs, Post anesthesia care units, All Intensive care unit(s), and the like will have an area (local) alarm system to indicate if the pressure increases or decreases 20% from normal line pressure. In anesthetizing locations, the alarm will be upstream of the shutoff valves to the individual rooms. An appropriately labeled warning signal panel for area alarms will be installed at the nurses’ station or other suitable location that will provide responsible surveillance.

9.0 BED HEAD PANEL (for ICU/ICCU/NICU/PICU/MICU Beds): Extruded Aluminum made with powder coat finish, having 5 Nos gas outlets, 2 Nos electric panels having 4 Nos of
6/16 Amp switches and 4 Nos of electrical sockets (6/16 Amp), Make:- Legrand or Equivalent type, Provision For Nurse Call display, SS IV pole with holder and utility basket etc.

10. OT PENDANT (CEILING MOUNTED): Single arm swiveling pendent having 2 Nos of O2, 2 Nos Of Vac, 1 No of Nitrus Oxide, 1 No Medical Air (4 Bar), 1 No Surgical Air (7 Bar) and 1 No of CO2 gas outlet point. 6 nos of electric switch and sockets (Legrand 6/16 Amp or Equivalent), The pendant should have 2 Nos of IV poles (SS 304) and 2 Nos Of Monitor selvels.

11. BS STANDARDS:

1. BS 1710:1984 – Identification of pipelines
2. BS EN 1412:1996 – Copper & Copper Alloys – Pipes
3. BS EN 13348:2001 – Copper pipes & Tubes
4. BS EN 1254-1:1998 – Copper pipe Fittings
5. BS 476-4:1970 – Fire resistant test on building material
6. BS 476–(20–23):1987 – Fire resistant test on building material
7. BS 60529:1992 – Degree of protection (IP Code)

12 COLOUR CODING (BENCHMARK BE STANDARDS):

1) Oxygen (O2): Yellow & White
2) Nitrous Oxide (N2O): Yellow & blue
3) Medical Air 4 Bar (MA–4): Blue, Black & White
4) Medical Air 7 Bar (MA–7): Blue, Black & White
5) Medical Vacuum, listed as a medical gas but in fact is suction system: Blue & Yellow
6) Carbon Dioxide (CO2): Yellow & Grey
7) Nitrogen (N2): Blue & Black