

**MINISTRY OF EXTERNAL AFFAIRS
(GOVT. OF INDIA)**

**DISTRICT GENERAL HOSPITAL, DIKOYA
SRI LANKA**

Tender

for

**Supply Installation Testing & Commissioning of Bio Medical Waste
Management System at District General Hospital, Dikoya, Sri Lanka**

VOLUME – IV

TECHNICAL SPECIFICATION

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TECHNICAL SPECIFICATIONS OF BIO-MEDICAL WASTE MANAGEMENT SYSTEM

Scope of Work : **Supply, Installation, Testing, Commissioning of Bio-Medical Waste Management System and Turnkey work and handover to the District hospital Dikoya, Srilanka including Defect liability Period and environmental clearance from the local authority of**

Incinerator

Fully automatic in operation

1.00 Solid Waste Incinerator .

- 1.01 Incinerator type Controlled air & pyrolytic.
- 1.02 Combustion chambers 2nos. (PCC & SCC)
- 1.03 Type of waste Biomedical waste.
- 1.04 **Capacity -Capable to combustion more than 100 Kgs/day (8hrs-working time)**
- 1.05 MOC MS castable refractory lined.
- 1.06 Feeding & Dishing system Manual.
- 1.07 Burners 2nos. (1 for PCC & 1 for SCC)
- 1.08 Fuel Diesel (LDO/HSD)
- 1.09 Type of burners Monoblock.
- 1.10 Burner modulation ON/OFF.
- 1.11 Type of venturi ejector Conical & vertical.
- 1.12 Type of fans (Ejector & Combustion) Centrifugal.
- 1.13 Emission parameters As per CPCB norms.
- 1.14 Primary combustion chamber (PCC) temperature $800 \pm 50^{\circ}\text{C}$
- 1.15 Secondary combustion chamber (SCC) temperature $1050 \pm 50^{\circ}\text{C}$

2.00 Emergency Stack 1 set.

- 2.01 Type Cylindrical, top mounted on venturi ejector.
- 2.02 Height 3 Mtrs.

3.00 Combustion Air Piping 1 set.

4.00 Oil Piping 1 set.

5.00 Oil Day Tank 1 set.

- 5.01 Capacity 500 litres

6.00 Venturi Scrubber 1set.

- 6.01 Type High Energy
- 6.02 MOC SS-316.
- 6.03 Scrubbing medium Water + NaOH solution.

7.00 Recirculation Pump With Motor 1set.

- 7.01 Type Monoblock.
- 7.02 MOC of wetted parts SS 316

8.00 Droplet Separator cum Recirculation Tank 1 set.

- 8.01 Type Cylindrical, Vertical.
- 8.02 MOC MSRL.
- 8.03 Type of droplet separator Cyclonic.

9.00 ID Fan With Motor 1set.

- 9.01 Type Centrifugal.
- 9.02 MOC Casing - MSRL, Impeller - SS 304.

10.00 Alkali Dosing System 1 set.

- 10.01 Pump Type Plunger pump metering.
- 10.02 MOC of wetted parts PP.
- 10.03 Dosing medium NaOH solution

11.00 Stack 1set.

- 11.01 Type Cylindrical & guy rope supported.
- 11.02 Height 30 Mtrs.
- 11.03 MOC MSRL.

12.00 Flue Gas Duct (Between Incinerator, Scrubber, ID Fan &Stack) 1set.

- 12.01 Type Cylindrical.
- 12.02 MOC Part MS and part MSRL.

13.00 Manually Operated Dampers 2sets.

- 13.01 MOC MS.

14.00 Control Panel 1set.

- 14.01 Type Cubical, control cum MCC.
- 14.02 Fittings PLC, main switch, MCBs, indicating lamps, contactors, MPCBs, push buttons, hooter etc. duly wired and enclosed in powder coated, dust proof sheet metal box.
- 14.03 Operating voltage 415 V AC, 50 Hz.

15.00 Instruments & Sensors

- 15.01 Air pressure switches 2nos.
- 15.02 Water pressure switch 1no.
- 15.03 Thermocouples 4nos.
- 15.04 Water level switch 1no.

- 15.05 Digital temperature controllers 4nos.
- 15.06 Pressure gauge 1no.
- 15.07 Water level gauge 1no.
- 15.08 Limit switches 4nos.

16.00 Makes of Boughtout Items

- 16.01 Burners - Oroflam/FBR/Ecoflam (Italian makes)/Equivalent
- 16.02 Motors - ABB/Crompton Greaves/Havells/Equivalent
- 16.03 PLC - Delta/Equivalent
- 16.04 Temperature controllers - Delta/Selec/Equivalent
- 16.05 Switchgear - Telemecanique/Schnieder/Eaton/Equivalent
- 16.06 Refractory - Calderys/Equivalent
- 16.07 Air pressure switches - Honeywell/Orion/Equivalent.
- 16.08 Water pressure switch - Indfos/Orion/Equivalent.
- 16.09 Limit switches - BCH/Equivalent.

Bio-Medical Waste Autoclave

Horizontal Cylindrical High Pressure Steam Sterilizer Bis Mark IS: 3829 (Part 1)

Horizontal Cylindrical High Pressure Steam Sterilizer, manufactured as per BIS Specification No. IS 3829 (Part 1)-1978, with the latest amendments and bearing ISI Mark IS: 3829 (Part 1).

- **Capacity: Sterilization more than 50 Kg waste per day(8hrs-working time)**
- Mode of Heating: Electrically heated by immersion heaters wired for operation on 3-phase 4-wire, 400/440 volts 50 Hz A.C. Supply.
- Working pressure: 20 Lbs/Sq.Inch. 1.26 kgf/cm².
- Operating Pressure: 1.05 + 0.15 kgf/cm² approx. (20 psi).
- Operating Temperature: about 110 & 121 degrees centigrade.
- Exhaust: Fast Exhaust within 7 minutes & slow exhaust from 7 to 30 minutes.
- Hydrostatic Test: The shell is subject to hydrostatic test to twice the working pressure.
- Performance: The sterilizer shall be capable of performing the following operations constituting one full cycle of sterilization.
 - Generate steam and build up working pressure in the jacket, without admitting it to the chamber:
 - Admit steam to the chamber and allow it to build up to working pressure and temperature.(maintaining pressure in the jacket) and retaining working temperature for at least 2 hours;
 - Exhausting the chamber pressure, retaining the jacket pressure; and

- Drying of load in chamber (if required) through the circulation of dry filtered air entering through a drying system.
- Dished Door: Fitted with one dished door SS-316 and brass Hinges, with SS radial arms to manipulate smoothly by well-insulated handles, and shall have gunmetal Door Locking assembly & automatic pressure locking device to provide complete safety to the operating personnel against any explosive opening of the door under high pressure. Provision is made to tighten the dished door while in locked position. A molded steam and heat resisting silicone joint less gasket shall be fitted to the door.

Material of Construction:

- Chamber & Back Plate: SS sheet of grade (04Cr18Ni10) 316 non-magnetic-10 SWG.
- Jacket: SS sheet of grade (04Cr18Ni10) 304 non-magnetic – 12 SWG.
- End Ring: SS 304 non-magnetic – 10 mm.
- Connections & Piping: Made of Stainless Steel having bright finish.
- Dished Door: Stainless Steel 16 mm thick.
- Outer cover: SS sheet 304 Quality.
- Operating Valve: To Control the cycle of sterilization as per ISI standards.
- Safety Valve: As a pressure switch for controlling pressure is provided on jacket, spring-loaded safety valve is provided to jacket as a safe guard against excess pressure in the jacket.
- Ejector: A powerful ejector system to create partial vacuum, which shall help in quick drying.
- Drying System (Vacuum): With Bacteria Filter allows dry filtered hot air into the chamber during drying cycles.
- Vacuum Breaker: Prevents formation of accidental vacuum in jacket due to steam condensation.
- Plug Screen: Fitted in Chamber, prevents the Chamber from clogging with lint and sediment.
- Dial Thermometer: Indicates the working temperature in the Chamber accurately.
- Pressure Gauge: Indicates the pressure of steam in the jacket.
- Compound Gauge: Indicates the vacuum and pressure in the chamber.
- A Pocket (For Thermograph): The provision to fit the bulb for the temperature recorder.
- Steam Trap and Check Valve: Fitted into the discharge line for automatic removal of residual air and condensate to give optimum sterilization temperature.
- Boiler (Steam Generator): Fitted to underside of shell. Boiler shall be fitted with:
 - Immersion type heating elements 9kw Load.
 - A low water protection for heaters provided to cut off electricity supply to heaters through a float level switch and magnetic air break contactor if the water level runs below heater level.
- Feed water System to feed water in to the Boiler as and when water level goes down.

- Water level gauge glass indicates level in boiler (capable of self-locking in case of breakage).
- Water inlet with non-return valve and drain valve etc.
- Pressure controls switch to control and keep pressure constant in the jacket.
- Boilerplate of Stainless Steel AISI-316 (10/12mm thick) & Nuts and bolts shall be of stainless steel.
- An extra pressure gauge and safety valve is provided in the boiler.
- In addition, equipped with Toggle Switch and indicating red & green Lamps.
- Tray (Stainless Steel): Provided in the Chamber of suitable size.
- The whole unit shall be mounted on a tubular pipe stand duly painted with best heat resisting paint.
- The unit shall be made as per I.S.I. Specification No. IS:3829 (Part 1) and bear I.S.I. Mark IS 3829 (Part 1).

Accessories:

- Audio Visual Alarm with Timer.
- Thermograph with 500 recording charts.
- Rack with Trays complete SS-316.
- Digital Temperature Controller with probe.
- Digital temperature indicator with 2 temperature probes.
- Water Softener Plant.
- Additional manual arrangement for filling Boiler with solution to descale boiler.

Medical Waste Shredder

- Should be of robust design with minimum maintenance requirement.
- Should be properly designed and covered to avoid spillage and dust generation. It should be designed such that it has minimum manual handling.
- The hopper and cutting chamber of the shredder should be so designed to accommodate the waste bag full of biomedical waste.
- The shredder blade should be highly resistant and should be able to shred waste sharps, syringes, scalpels, glass vials, blades, plastics, catheters, broken ampoules, intravenous sets/ bottles, blood bags, gloves, bandages etc. It should be able to handle/ shred wet waste, especially after microwave/ autoclave/ hydroclave.
- The shredder blade should be of non- corrosive and hardened steel.
- The shredder should be so designed and mounted so as not to generate high noise & vibration.

- If hopper lid or door of collection box is opened, the shredder should stop automatically for safety of operator.
- In case of shock- loading (non- shred able material in the hopper), there should be a mechanism to automatically stop the shredder to avoid any emergency/ accident.
- In case of overload or jamming, the shredder should have mechanism of reverse motion of shaft to avoid any emergency/ accident.
- The motor should be connected to the shredder shaft through a gear mechanism, to ensure low rpm and safety.
- The unit should be suitably designed for operator safety, mechanical as well as electrical.
- The shredder should have low rotational speed (maximum 50 rpm). This will ensure better gripping and cutting of the biomedical waste.
- The discharge height (from discharge point to ground level) should be sufficient (minimum 3 feet) to accommodate the containers for collection of shredded material. This would avoid spillage of shredded material.
- The minimum capacity of the motor attached with the shredder should be adequate enough for carrying out for more than **50 Kg/ day(8hrs-working time)**, and should be three phase induction motor. This would ensure efficient cutting of the bio-medical waste as prescribed in the bio- medical waste (Management & handling) Rules.

Needle destroyer

- Should incinerate the needle using low voltage electrical current.
- It should reach a temperature of 1600-1700°C to turn the needle into ash.
- The process should be rapid taking 1-2 seconds
- There should be no visible sparking or arcing
- After incineration the needle debris should be contained in a built in receptacle/container which may be disposable or reusable
- Should have a cutter to cut the nozzle of the syringe with minimal agitation
- Should destroy or deform the needle and syringe by mechanical means
- The cutting blades should be of the best quality

Transportation Trolley

- The container should be made of sturdy plastic material resistant to acid, alkali and chemicals.
- Should be designed and constructed so that they do not have sharp edges.
- Container must be detachable and there must be provision for washing the container
- Should be easy to clean, disinfect and drain.
- Should be covered with a sturdy plastic lid attached with hinges and latch facilities so that biomedical waste bags are not exposed to environment.
- Iron body frame of trolley MS iron i.e. angle iron 25 mm by 25 mm and 3 mm in thickness.
- Should be able to contain any leakage from the damaged containers.
- The waste should be easily loaded, secured and unloaded.
- Should hold minimum four bags of **50 liters capacity** each.
- Should be color coded yellow/blue/white/black and have biohazard sign and name of the hospital.
- Should have four wheel drives, two wheel movable and two fixed. Should be rubber bounded to cast iron long life, high load capacity and road grip size 6 inch with sealed ball bearing.
- Should have wheel locks to prevent the wheel barrow from rolling on its own.

IN ADDITION TO THE ABOVE, FOLLOWING TURNKEY WORKS FOR INSTALLATION AND COMMISSIONING OF BMW AT DICKOYA HOSPITAL SRILANKA ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR :

- Bidder must take into consideration in its bid, costs to be incurred for any additional work pertaining to Civil, Electrical, Plumbing, Sanitary and any other protections relevant as per State/Central Govt. regulation/local authority of Srilanka, Furniture, Servo stabilisers, U.P.S. etc. required for successful installation testing and commissioning of the system and the offered price should include all such costs, each Schedule is to be considered a package in itself and contractor to execute the order package on a “turn key basis”.
- **Laying of GI water pipe line** with necessary taps, joints, elbows, Unions, Tees and valves of GI made and IS-1239 standard (Latest version) to various supply points in the BMW Room from single point supply(Provided by the hospital).
- Installation and commissioning of **Electric distribution panel** with all switchgears, wiring and controls etc of L&T/ Siemens/ ABB/GE or Schneider make) for distribution of power supply to various load points in the BMW Room from single point power supply(Provided by the hospital).

- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, Fans, Cool air Fans, Exhaust fan etc in the BMW room.
- Number of fans, **power point**, bulbs/tube light. Apart from these supplies to the individual equipments with ELCB & MCB in the BMW room.
- Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for BMW.
- Installation of all **electrical cabling** must be of IS: 1554 (As per latest amendment) standard and wiring as per IS: 732 standard and proper earthing of all BMW equipments and other electrical instrument and accessories in the BMW room as per standard guidelines of BIS.
- All the items supplied should be reputed make as approved by engineer.
- Construction/laying of **Draining/Sewer system** from all the equipments/Sinks to the main drain (outside the BMW) with proper trap and flow system and tapping.
- Arrangement for requisite **Fire Fighting** for BMWS including approval from or as per State/Central Govt. regulation/local authority/Statutory body if required

In addition to the above mentioned equipment/appliances, if the contractor thinks it necessary to include any other equipment/appliances, accessories etc. for the Laundry then that may be provided after approval from Engineer in-charge.

The sizes are approximate. Minor variations in sizes shall be acceptable subject to prior approval of the Engineer.

APPROVED MAKES FOR BMWS

1.	Air Blower	SWAM/ EVEREST/ KAY/Beta
2.	Blower/Pump/ Motor	KIRLOSKAR/ NGEF/ SIEMENS/CROMPTON/ABB
3.	Compressor	EMERSON/ TECHUMSHAH/COPELAND/DANFOSS
4.	Cable	GLOSTER/UNIVERSAL/NATIONAL/ KALINGA
5.	Aeration System	NORTON/ UEM/ V.K.ENVIROTECH/MM AQUA
6.	Butter Fly Valve	AUDCO/ KEYSTONE/ KSB/CRI/Castle
7.	Control Panel	L & T/ SIEMENS/ SCHNEIDER
8.	Valve	LEADER/ ZOLOTO /CRI/Castle
9.	PVC Pipe Class III with Fitting	FINOLEX/ SUPREME/ PRINCE/ ORI-PLAST

10.	G.I. / M.S. Pipe Heavy Class	TATA/ JINDAL/SAIL /SURYA PRAKASH/HSL/ITC
11.	MCCB/Contactor/Relay	L&T/ABB/SIEMENS/SCHNEIDER
12.	Pressure Gauges	H.GURU /FIEBIG
13.	Stainless steel	TATA/SALEM/JINDAL/MUKUND/ BHAYANDER/ AMBICA
14.	GI Sheets	TATA/SAIL/JINDAL/BHUSHAN STEEL
15.	Aluminium Sheet	BALCO/NALCO/HINDALCO
16.	Grilles/Diffusers	RAVISTAR/CARYAIRE/ MAPRO/DYNACRAFT

Note :

- **The bidder should attach Technical Compliance item wise with respect to the above technical specifications and turnkey work along with Printed catalogues and Manufacturer's Authorization in the techno-commercial bid.**
- **The contractor shall be responsible for the complete works including submission of working drawing and walk through view.**
- **Bidder should provide complete parts manual/Service manuals for all systems and subsystems.**
- **Final electrical safety test, system test and calibration should be done by authorized person with test instruments.**
- **All electrical accessories like cable wire, electrical outlets, switches etc, should be fire proof of reputed make, certified for electrical safety.**
- **Wherever makes have not been specified for certain items, the same shall be as per BIS and as per approval of HSCC.**
- **The contractor should provide test certificate for all materials and equipments used for BMWMS**
- **Training of personnel of the Institute should be 15 days at least**
- **The contractor should prepare and submit layout plan to HSCC for approval before beginning of supply and installation.**