

## **BIOSAFE ENGINEERING GENERAL SPECIFICATIONS**

Infectious Waste Treatment System (Twin Tower)

STI Series 2000 (4000 lb./hr. average capacity)

### 1.0.00 Scope

Furnish labor, materials, tools and equipment required, complete fabrication, delivery, assembly, test, evaluation and in-service training for the required number of units.

### 2.0.00 Contractor

Equipment furnished shall be BioSAFE Engineering, LLC Series 2000, 4000 Lb./hour capacity Medical Waste Treatment System as described in the following specification. The equipment furnished shall meet all requirements as applicable under the National Electrical Code regarding electrical design, construction and installation.

### 3.0.00 Infectious Waste Treatment System General Specification

The Infectious Waste Treatment System shall be capable of inactivation of *Bacillus Atropheus* (formerly *B. subtilis*) spores. Inactivation meaning 6-log reduction of the above test indicator or better. The entire system shall not incorporate combustion of any materials to accomplish the required levels of biological Log Reduction. The entire system shall operate on electricity as the primary source of power.

### 4.0.00 The Equipment

The basic configuration of these units shall be as shown in the attached drawings.

#### 4.1.01 Feed Mechanisms-Twin Hydraulic cart Lifts

Two Cart dumping devices shall be included to lift the specified roll-around carts or boxes and dump their contents into the top of the unit. These devices shall include a locking protective cage preventing operation of the unit until the cage door is shut and interlocked. This assembly shall be coated with a corrosion resistant paint. The Cart Dumping units shall be electric or hydraulic in operation and shall include the drive package required for operation. These devices shall be computer interlocked to control feed rates for consistent operation of the entire system.

#### 4.1.01A Feed Mechanisms-Stainless steel feed conveyors

As an alternative to cart dumping units, each shredding tower may be fed via a stainless steel belt conveyor to conserve loading height requirement. If so equipped, the belt conveyor shall be constructed of stainless steel and shall contain wipers to prevent the accidental introduction of waste materials below the feed belt which could become entrained between the feed belt and the feed belt rollers.

4.1.02 Two feed hoppers shall be supplied at the top of the unit and shall transition between the cart dumpers or feed belt conveyor and the shredder units. The hoppers shall be constructed of stainless steel. An access panel shall be supplied at the side of each hopper to permit access to the primary shredder. An interlock switch will be mounted in close proximity to the hopper access door sensing closure of the hopper door at all times.

Should the switch sense the opening of the hopper access door, the shredding unit below the hopper will no longer rotate.

4.1.03 Two Shredders shall be included with the system and be located below the in-feed hoppers. Each shredder shall be capable of an average throughput of 4000 pounds per hour each. The shredders shall incorporate counter rotating cutting teeth and spacers. The shredders shall operate at low speeds (under 50 RPM) and shall be driven via integral gear reduction unit and electric motor. The electric drive motor driving the shredding package shall be 480VAC, 3 phase, 60HZ, TEFC design. Protection for the shredders is provided via sensors for rotation, and electrical amperage sensing devices. Should the cutting teeth fail to rotate during the duty cycle, the electrical pressure sensing mechanism will disengage the drive motor from the shredder gearbox and simultaneously stop the rotation of the cutter shafts. A reversing sequence will follow prior to second or third attempts to destroy the waste. A screen shall be installed below the counter rotating cutters with holes that generate a finer particle size. In general, waste materials exiting the shredders shall be bulk reduced and unusable.

4.1.04 A bifurcated transition chute shall be supplied to transition from the shredders to the steam conveyor. This chute shall be constructed of stainless steel. This chute shall have an integral access panel permitting access to the interior of the transition. The access panel shall be fastened in place via quick fasteners to ease in removal and replacement. An interlock switch will be located on the chute sensing closure of the access door. Should the door be opened, rotation of moving devices is stopped. The bifurcated transition shall contain spray nozzles, which will mix and apply the chemical solution to the waste for odor control. Spray nozzles shall evenly distribute the chemical solution onto the waste particles.

4.1.05 A steam conveyor shall be supplied with the equipment. The steam conveyor and integral screw shall be primarily constructed of a heavy gage stainless steel. The steam conveyor shall be capable of holding enough contents to permit a minimum residence time of sixty (60) minutes prior to exiting the end of the conveyor. The steam conveyor shall contain thermocouples that sense the operational temperature of the steam conveyor. The rotational speed of the conveyor shall be variable and set to ensure equipment retention time and efficacy. The thermocouples are attached to microprocessors that permit the rotation of the steam conveyor screw only when desired operational temperatures have been reached. The steam conveyor shall be fitted with the following: a) a steam jacket section, and b) a section having a series of steam injectors along the sides permitting the direct introduction of steam to the interior of the steam conveyor. Steam injection is controlled via the equipment process controller. The bearing assembly at the introduction end of the conveyor is internal with no rotating components that protrude through the bottom of the conveyor. A removable end plate on the bottom end of the conveyor eases maintenance of the bearing assembly. The steam conveyor is driven at the top end of the conveyor via an electric motor/gear reducer combination. The electric motor shall be 3 Phase, 480VAC, 60HZ, TEFC design. The gear reducer power is transmitted via a chain drive mounted on the gear reducer and the rotating screw. A mounting plate on the top end of the steam conveyor shall permit mounting of the gear reduce and motor combination. A steam vent connection is supplied on the top side of the steam conveyor at the exit end. This connection will permit negative pressure

inside of the steam conveyor to remove excess water vapor. The steam conveyor shall have leg assemblies that are constructed from mild steel tubing. Leg assemblies shall be removable for shipping and installation purposes and shall be coated with a corrosion resistant paint.

4.1.06 Structural framework for the shredder, chute work and hopper shall be steel tubing. The entire frame structure shall be in sections that bolt together on site for final assembly purposes. The framework assemblies shall be primed and coated with corrosion resistant paint.

4.1.07 An electrical panel shall be furnished with the equipment. The electrical panel shall be constructed of stainless steel to prevent corrosion. This panel shall have an integral equipment disconnect that isolates the internal electrical components and controls from the power source upon the opening of the enclosure doors. The panel shall be of NEMA 4 or better construction to resist the migration of moisture from outside the panel to the panel interior. The panel shall contain an integral Touch Screen indicating the status of major components during operation. All components within the electrical enclosure shall be UL or CUL listed or registered components where possible. The equipment electrical panel and all associated interconnecting wiring shall comply with the codes set forth by the National Electrical Code of North America or harmonized standards under the European community and will contain a "CE MARKING" indicating compliance to those standards unless otherwise stipulated. The electrical panel shall be connected to 480VAC, 3 phase, 60HZ, 400 AMP service unless otherwise specified. A standard CAT-5 Ethernet connection is required utilizing one static I.P. address.

4.1.08 The equipment shall have the required pressure switches, gauges and pumps to automatically supply the odor control chemical to the shredded waste. The chemical flows shall range from 0-0.1 liters per minute to 1.0 liters per minute.

4.1.09 The system shall contain a negative pressure system that consists of a radial pressure blower, HEPA filter housing with pre-filters and HEPA filters, and interconnecting ductwork to the equipment. The negative pressure blower motor shall be rated to operate at 480VAC, 3 phase, 60HZ and be of TEFC design. Interconnecting ductwork shall be PVC or equal. The HEPA filter housing shall be constructed to allow for slide in/slide out pre-filters. The HEPA filters shall have a minimum operational efficiency of 99.97 @ 0.3 microns. The system negative pressure blower shall be capable of a minimum of 2000 CFM at 90 mm of Water Column. The system shall include all necessary dampers to allow for system balance and test upon installation.

4.1.10 The system shall contain an additional separate radial blower to provide negative pressure at the exit end of the steam conveyor rated to operate at 380VAC, 3 phase, 50HZ and be of TEFC design. This blower shall serve to exhaust sterilized water vapor from the processed waste materials.

4.1.11 A steam boiler is required to operate the system. The boiler should be capable of delivering a minimum of 1800 pounds/hr steam at a maximum of 15 Psig pressure. The boiler should include an integral make-up water tank, blow down tank, and various other instruments to protect the boiler in the event of low water condition, etc. Gauges shall be

supplied to monitor system pressure at the tank. The steam boiler system shall be owner supplied and tied into the STI Series 2000 system after installation of the STI machine is complete and prior to system start up testing.

#### 5.0.00 Shipping and Delivery

Shipments shall be made on an F.O.B. point of Manufacture basis. The Purchaser shall be responsible for all freight charges, taxes, and handling fees, including required insurance.

#### 6.0.00 Installation

The contractor/manufacturer shall be responsible to supervise and provide necessary labor, rigging, assembly, and testing of the unit. All labor and equipment required to effect installation are provided by the contractor/manufacturer. Workman's Compensation Insurance for the contractor's employees is provided by BioSAFE Engineering. In-service training in the equipment operation and training in maintenance are provided by BioSAFE Engineering. All associated site preparation necessary to complete the installation of these products including the associated required utilities including but not limited to steam boiler, electrical piping, plumbing, vents to outside and supply of the self-contained compactor are by the owner. All utility stub-ins must be within 10 feet of the equipment prior to installation.

#### 7.0.00 Technical and In-Service Training Program

In as much as the effective operation of the Infectious Waste Treatment System is dependent upon staff familiarization and training, a detailed In-Service training program shall be provided to the user. The program will be conducted after installation of the equipment at a mutually agreed upon date. A detailed outline of this In-Service and training program shall be submitted with content and scope clearly defined. The content shall include but not be limited to the following items in detail satisfactory to insure optimum operation by the user staff:

Maintenance and Engineering training including mechanical assembly, mechanical and electrical components, filtration systems and air flow, troubleshooting, operational process description, functional design and performance, operational protocols, suggested emergency contingency plan, microbial monitoring and quality assurance techniques, certificate of completion for operator/maintenance In-Service Training Program.

(End of Specification)