SECTION 115400 - VIVARIUM EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract; including General and Supplementary Conditions and Division Specifications, apply to work of this section.

1.2 WORK INCLUDED

A. Furnish all labor, materials, tools, equipment and services for all equipment as indicated in accord with provisions of Contract Documents.

B. Completely coordinate with work of all other trades.

C. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation. Installation will include all required assembly.

D. Equipment listed in this specification is classified by who furnishes (F) and installs (I) equipment items.

1. OFOI: Owner furnished/owner installed
2. OFCI: Owner furnished/contractor installed
3. CFCI: Contractor furnished/contractor installed

E. Equipment in this section:

- Sect | Equipment Description
- 2.1 CRW: Cage & Rack Washer
- 2.2 TW: Tunnel Washer (with In-Line BD)
- 2.3 BD: Bedding Dispenser (In-Line Type)
- 2.4 MW: Modular Wall
- 2.5 BF: Bottle Filler
- 2.6 CBDS: Clean Bedding Delivery System

1.3 RELATED WORK

A. Relevant trade contractors will provide all rough openings, pits, substrate preparation and blocking for all equipment installations.

B. Mechanical contractor will provide exhaust rough-ins and final connections for all equipment installations.

C. Plumbing contractor will provide all supply/return service line, drain and vent rough-ins and final connections for all equipment installations.
D. Electrical contractor will provide all electrical service rough-ins, receptacles and final connections for all equipment installations.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in necessary crafts and who are completely familiar with specified requirements and methods needed for proper performance of the work of this section.

B. Dimensions, voltages, electrical power requirements, and utility connections are based on items specified. Relevant trade contractor is responsible for all costs associated with service or dimensional adjustments.

C. Equipment may be inspected by Owner at manufacturer's plant prior to shipment. Equipment found not in accord with specifications and approved drawings may be rejected. Replace rejected equipment at no cost to Owner. Provide Owner's Representative two (2) week prior notice to all factory testing.

D. Electric operated and/or heated equipment will comply with applicable standards of National Electrical Manufacturer's Association (NEMA), National Electric Code (NEC) and Underwriters' Laboratories, Inc. (UL) or Electrical Testing Lab (ETL) or CSA.

E. Manufacturer Qualifications: Manufacturer is a firm having an established organization and factory, with production facilities specializing in type of equipment specified, having an experienced engineering department and an established history of similar installations of equal scope and complexity. Manufacturer will demonstrate ability to produce specified equipment of required quality and a proven capacity to complete an installation of this size and type within required time limits. Manufacturer will have at least 3 years/5 installations of experience, at least 3 current references from the last 3 years and a service response time, as described below, to be considered eligible to bid. Service response time to a telephone inquiry will be same day followed up by a factory trained technician at site within 24 hours of telephone inquiry; all serviceable components warehoused or readily available to service personnel; and fast access to shop drawings of all equipment in field. Any misrepresentations or negative references will be considered grounds for bid rejection.

F. Acceptable Manufacturers: Each piece of equipment listed includes manufacturer's name and catalog number, establishing levels of quality, specific construction features, operating conditions and desired features and accessories. By indicating other manufacturer's names does not relieve perspective bidders of their obligation to prove that their submissions are equal to specified equipment in size, construction, performance, basic features, options and accessories prior to award.

G. Installer Qualifications: Manufacturer, or approved in writing by manufacturer.

H. Factory Acceptance Tests (FAT) and Site Acceptance Tests (SAT): UK to confirm if required.  
   1. CRW/TW- FAT
      a. FAT shall consist of a continuous 2-hour fully operational wet test.  
      b. A successful FAT shall be defined as a 2-hour continuous system run between MTF (Mean Time to Fail) followed by a simulation of all potential fault conditions with corrective actions demonstrated.  
      c. Owner's representatives shall witness FAT.  
      d. Provide owner's representative 4 weeks prior notice to all scheduled FAT dates;
e. Only after a successful FAT is witnessed and formally acknowledged in writing by Owner’s representatives shall equipment be shipped to job site.

f. Owner’s representatives travel and attendance expenses associated with the FAT are to be EXCLUDED from the Contract bid pricing;

g. All Manufacturer’s personnel attendance costs related to the FAT are to be included as part of the Contract bid pricing;

h. All costs related to FAT shall be included in Manufacturer’s Contract bid pricing; Such costs may include, but are not limited to shipping, assembly, cage components, utility costs, bedding waste disposal and space rentals;

i. Equipment failing FAT shall be modified or replaced at no change in Contract price.

j. Contractor is to identify location of Automation FAT as part of the Contract bid pricing.

2. CRW/TW- SAT

a. SAT shall consist of a continuous 2-hour fully operational wet test of CRW and TW.

b. A successful SAT shall be defined as three, 2-hour shifts with a minimum 95% production rate to complete the processing of TBD (720 output/hr.) cage bottoms per 8 hour shift, followed by a simulation of all potential fault conditions with corrective actions demonstrated.

c. Upon their full and complete satisfaction, the Owner’s representatives shall formally acknowledge completion of a successful SAT, in writing;

d. All costs related to SAT shall be included in manufacturer’s bid price.

e. Equipment failing SAT shall be modified or replaced at no change in Contract price.

f. Owner’s representatives shall witness SAT.

g. Provide owner’s representative 4 weeks prior notice to all site testing.

I. Owner has the right to inspect equipment at Manufacturer’s plant prior to shipment. Equipment not in accordance with specifications and approved drawings may be rejected. Replace rejected equipment at no cost to Owner.

1.5 SUBMITTALS

A. Specification Compliance. Submit copy of relevant item specification section (from this document) and clearly note in bold print any substitutions, modifications or objections.

B. Product Data. Submit manufacturer’s specifications and installation instructions for each item of laboratory equipment furnished. Indicate on product data which optional devices and operations are proposed for inclusion with equipment. Where substitutions for specified items of laboratory equipment are proposed, submit data substantiating the proposed equipment is equal to that specified. Manufacturer’s specifications must contain a full, detailed explanation of all variations in operating and/or performance requirements.

C. Shop Drawings. In addition to work shown on manufacturer’s printed product data, submit dimensional roughing-in drawing, at minimum scale of 1/2” = 1'-0", showing equipment placed in actual project site conditions adjacent to other equipment and relationship to the work of other trades, as well as mechanical and electrical requirements. Rough-in drawings will clearly indicate where equipment connection varies from relevant trade contractor supply source. Submit dimensioned fabrication drawings for custom fabricated equipment, including plans, elevations, and sections, at minimum scale of 3/4" = 1'-0", showing materials and gauges used.

D. Samples. Submit samples of exposed finishes when requested by Architect.
E. Operational and Maintenance Data. Submit operating and maintenance instructions and parts listing for each item of fixed laboratory equipment. Include this data, product data, shop drawings, wiring diagrams, and any other data required by Owner, in three-ring maintenance manual. Prepare draft copy of operation and maintenance manual for Owner's review. Submit four (4) copies of final, accepted manual for Owner's use.

F. Manufacturer's Qualifications. Letter confirming required minimum experience, references and service response time.

G. Applicable standards approval from NEMA, NEC, UL, and ETL or as specified with the individual equipment items.

1.6 PRODUCT DELIVERY, STORAGE, HANDLING AND INSTALLATION REQUIREMENTS

A. General. All equipment in this specification OFOI, OFCI or CFCI. Certain equipment items will include MA, MAS and/or MED.

B. Owner Furnished/Owner Installed (OFOI): The owner will purchase, deliver, receive, unload, store, unpack, assemble, set-in-place, install and clean up equipment.

C. Owner Furnished/Contractor Installed (OFCI): The owner will purchase and deliver equipment to jobsite. Relevant trade contractor (the "contractor") will receive, unload, store, unpack, assemble, set-in-place, install and clean up equipment. Deliver to jobsite in manufacturer's original labeled containers. Contractor to provide any fasteners supports or other miscellaneous items necessary for complete installation. All rough-ins and final connections by contractor. Contractor will use all means necessary to protect materials of this section before, during and after installation and to protect installed work and materials of all other trades. Contractor will confirm in writing that installed equipment meets or exceeds manufacturer's specifications. Contractor will provide owner's representative with rough-in and installation drawings of installed equipment.

D. Contractor Furnished/Contractor Installed (CFCI): Relevant trade contractor (the "contractor") will purchase, deliver, receive, unload, store, unpack, assemble, set-in-place, install and clean up equipment. Deliver to site in manufacturer's original labeled containers. Contractor will provide any fasteners, supports or other miscellaneous items necessary for complete installation. All rough-ins and final connections by contractor. Contractor will use all means necessary to protect materials of this section before, during and after installation and to protect installed work and materials of all other trades. Contractor will confirm in writing that installed equipment meets or exceeds manufacturer's specifications. Contractor will provide owner's representative with rough-in and installation drawings of installed equipment.

E. Manufacturer Assembly (MA): Manufacturer will provide adequate assembly personnel for as long as it takes to complete installation to satisfaction of owner's representative. Manufacturer's field supervision personnel may or may not be union depending on conditions of site. If schedule demands it, manufacturer will agree to have their field assembly personnel work overtime at no additional cost. Manufacturer assembly and MED included in equipment price.

F. Manufacturer's Assembly Supervision (MAS): Manufacturer will provide adequate assembly supervision personnel for as long as it takes to complete installation to satisfaction of owner's representative. Manufacturer's field supervision personnel may or may not be union depending on conditions of site. If schedule demands it, manufacturer will agree to have their field supervision personnel work overtime at no additional cost. Manufacturer assembly supervision included in equipment price and provide following:
1. Trip(s) to job site to coordinate specific technical project requirements.
2. Trip(s) to job site to instruct equipment assembly and installation crews.
3. Trip(s) to job site to check final assembly and installation trouble-shoot and start-up equipment.
4. One (1) one-day trip to job site to instruct Owner on proper operation and maintenance of equipment. Scheduling of on-site equipment demonstration to be at convenience of Owner.

G. Manufacturer’s Equipment Demonstration (MED): Manufacturer will provide one (1) one-day trip to the jobsite to instruct Owner on proper operation and maintenance of equipment. Cost of this service included in equipment price. Scheduling of on-site equipment demonstration at the convenience of Owner.

1.7 WARRANTY

A. Except where more stringent warranty requirements are noted in individual equipment descriptions, all equipment furnished under this section guaranteed for a minimum of one (1) year, parts and labor, from date of substantial completion or specific equipment final acceptance (whichever is later) against defective materials, design and workmanship. Manufacturer(s) shall provide warranty. Defects will be promptly rectified at manufacturer or contractor's expense after notification by Owner's representative.

1.8 JOB CONDITIONS

A. Drawings show arrangement and location of items of equipment. If it is necessary to vary from arrangement shown, because of structural, mechanical, electrical or other considerations, make such variations only after approval of Owner's representative and at no additional cost to Owner.

B. Verify all dimensions at building.

C. Confirm that all equipment will be able to be moved through building in order to reach its designated location. Provide dimensional information of equipment showing length, width and depth of equipment (or largest component) as it is intended to be moved through building. Dimensions should include all packaging, palting and transportation equipment dimensions so as to allow leave-out of overhead, walls, etc., to allow equipment to safely be transported to installation point. Failure to do so will result in removals and reinstallation’s to be charged to manufacturer or contractor.

D. If autoclaves are specified with integral steam generators using either potable or RGW water, they will be designed and constructed to allow for “in-place” acid de-scaling and flushing operation.

1.9 MANUFACTURER LISTINGS

A. Some manufacturer's listed in these specifications can be contacted at the following telephone numbers:
   1. Northwestern Systems Corp- Better-Built (604. 952.0925)
   2. PVS Process Equipment (716.646.0181)
   3. Lynx Product Group (716. 751.3100)
PART 2 - PRODUCTS

2.1 CRW: CAGE AND RACK WASHER

A. Product Description.

1. Application: The Cage and Rack Washer shall be a standard length heavy duty, large capacity hydro spray washer designed for thorough, efficient cleaning of cages, racks, debris pans and miscellaneous items used in the care of laboratory animals.

2. Standards:
   a. Certified to UL 61010-1 Ed: 2 UL Standard for Safety Electrical Equipment for Measurement, Control, and Laboratory Use by a third party inspection agency – ETL.
   b. Certified to CSA C22.2 No. 61010-1 Ed: 2 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use by a third party inspection agency – ETL.
   c. Evaluated and conforms to IEC 61010-1 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use by a third party inspection agency – ETL.
   d. Evaluated and conforms to CENELEC EN 61000-6-4 Electromagnetic Compatibility (EMC) – Part 6-4 Generic Standards – by a third party inspection agency – ETL.
   e. Evaluated and conforms to CENELEC EN 61000-6-2 Electromagnetic Compatibility (EMC) – Part 6-2 Generic Standards – by a third party inspection agency – ETL.
   f. Evaluated and conforms to IC ICES-003 & FCC CFR47 Part 15/B Report Measurements by a third party inspection agency – ETL.

3. Size:
   a. Minimum Compartment: 48"W x 88"H x 90"L
   b. Maximum External Size: 86"W x 114"H x 94"L
   c. Minimum Pit: 96.5"W x 100"L x 7.5"D Chamber inside bottom shall align with finished floor. Coordinate final pit dimensions, pit pads, miscellaneous metal requirements and floor drain location.

4. Operation: Operator places items to be cleaned within compartment, closes door and presses automatic cycle push button. Machine proceeds through treatment schedule and automatically shuts off at completion of the cycle. Operator then opens door and removes cleaned items.

5. Treatment Schedule: A multiple cycle treatment schedule. The standard treatment cycle may consist of the following phases: Pre-Wash, up to 4 Wash phases, up to 3 Rinse phases, Final Rinse, and Exhaust/Dry. All cycle phases can be selected or de-selected with Supervisory access. All cycle phases are adjustable. The cycle once activated shall be completely automatic. A typical cycle shall be as follows:
   a. Prewash
      Water for prewash is able to be held over in the sump from final rinse or delivered directly into the washer. Phase time is programmable from 0 to 9999 seconds and up to 190°F. Spraying through the dedicated Wash spray jet delivery system. Provide ability to drain to sewer after each cycle.
b. Acid Wash
Hot acid solution from the non-heated acid side tank is delivered into the chamber. Acid solution is returned to the acid side tank or drained at end of phase. Phase time is programmable from 0 to 9999 seconds and up to 190°F. Provide separate reservoir, piping, dedicated Wash spray jet delivery system and pump to hold and deliver acid wash solution. Provided ability to automatically return wash solution to reservoir or drain to sewer after each cycle. No water shall remain in the base (sump) of the machine, as this is a temporary collection area only.

c. Acid Rinse
Fresh domestic hot water from the rinse facility supply is pumped into the chamber through the dedicated spray jet delivery system. Final rinse water can be held over in the sump for Prewash. Phase time is programmable from 0-100 seconds and up to 190°F.

d. Drain (following Acid Rinse)
During this time, the self-cleaning filter is back flushed with fresh cold water to ensure debris removal and the washer sump is gravity drained. This drain time has a programmable duration.

e. Exhaust
Vapor exhaust phase removes hot humid air from the unit’s chamber. A stainless steel exhaust vent damper with pneumatic actuator is included. An electrical signal used by Mechanical Contractor is provided. Phase time is programmable from 0 to 9999 seconds.

6. Construction:
   a. All components must be non-proprietary, off-the-shelf parts that are locally available for purchase.
   b. The standard unit shall raise incoming hot water temperature from 120°F to 180°F.
   c. Surface area of stump steam coils must be sufficient for the machine to heat and be ready for operation within the expected cycle times using the utilities specified herein. All side tank temperatures to be displayed on control system.
   d. Steam coils shall be designed to ASME Section VIII, Div. 1, Unfired Pressurized Vessel Code and be easily removable for cleaning and maintenance. Steam coils shall be flanged connected to allow removal for servicing. Steam coils shall not be welded in place.
   e. A stainless steel automatic self-cleaning debris filter shall be provided in the re-circulation piping. The treatment pump shall be provided with a self-cleaning debris filter having perforations smaller than the spray arm orifices. The filter shall be inter-piped with the unit’s plumbing system to filter all re-circulated solutions and inter-wired with the unit’s controls to automatically flush debris to drain
   f. The base, wash chamber, external detergent tank(s), rinse tank and piping delivery systems are type 304 stainless steel. All pumps and spray jets are type 316 stainless steel. No rubber or plastic hoses, clamps or copper piping is allowed.
   g. Chamber shall be of double wall construction, type 304 stainless steel, insulated with non-hygrosopic rigid insulation, minimum of 1 inch thick. Chamber sections shall be flanged and bolted together along the exterior using type 304 stainless steel fasteners. Neoprene rubber gasket placed between the mating flanges and reinforced with formed channels across the joints.
   h. The wash chamber is to be designed with smooth side wall construction to reduce ledges or corners where gross debris may accumulate. All interior and exterior joints are to be sealed to prevent leakage from the chamber.
   i. The base is provided with a water collection sump area and floor grating supports. The collection sump is equipped with its own transfer pump to return all solutions from the chamber to the side tank(s). Sump shall have no openings beyond base of machine to emit vapor from re-circulating solutions.
j. Acid Detergent side tank has a minimum 70 gallon capacity and is non-heated. The side tank is equipped with an automatic analog water level control (no mechanical float switches allowed), automatic drain valve, and overflow piping. The PLC and touch screen operator interface shall display water level of the side tank temperature.

k. The unit is to be provided with manually operated, swing out, side hinged cabinet type door with heavy-duty stainless steel hinges. Pneumatic, inflatable gaskets are not acceptable. A stainless steel threshold plate is to be provided at each door. The chamber door(s) shall be of 16 gauge, type 304, #4 finish stainless steel double wall reinforced construction. Each door is to be provided with one tempered glass 20” W x 26” H minimum observation window. All doors are to be insulated with non-hygroscopic rigid insulation, minimum of 1 inch thick. For pass through units doors are interlocked to maintain the soiled and clean barrier status.

l. Oscillating Jet System shall consist of the following
   1) Spray pattern with 110° of vertical oscillation.
   2) Ten (10) self-draining oscillating spray arms mounted horizontally along the sidewalls of the chamber. Stainless steel spray jets with separate piping for wash (160 nozzles) and rinse (100 nozzles). Total of 260 jets.
   3) Oscillating system driven by air cylinders not housed within the chamber.
   4) Micro switches must be provided on the air cylinder to guarantee it achieves its full stroke.
   5) All piping and other components of the spray system shall be constructed of type 304 stainless steel. Spray jet nozzles shall be type 316 stainless steel.
   6) Spray arms are to be removable for cleaning.

m. Temperature guarantees shall be provided as follows:
   1) Rinse. Washer shall be provided with an 180F rinse temperature guarantee. Rinse timer will not start timing until non-recirculating water temperature has reached at least 180F, thus assuring entire rinse time at 180F minimum. Temperature probe to be located just prior to system's spray jets.
   2) Wash Solution. Washer shall be provided with an 180F wash solution temperature guarantee. Wash timer will not start timing until recirculating wash solution temperature has reached at least 180F, thus assuring entire wash time at 180F minimum. Recirculating temperature to reach 180F within 2-3 minutes after wash solution begins recirculation.

n. Within the control box shall be transformer for the 1-60-115 control circuit, magnetic starters with overload protection for all motors and all other electrical components required for the machine operation.

o. The following safety features shall be provided:
   1) Explosion relief door latches shall be provided for hinged doors allowing easy egress from the chamber.
   2) In the event that either door is opened during the cycle the unit will automatically shut down. The door must be closed before restart can be initiated.
   3) If the operator terminates the cycle via the touch screen, all machine operation is terminated prior to the system unlatching the door. To resume operation the door must be closed and the start button pressed to initiate cycle.
   4) The chamber interior shall be provided with a pull cable system mounted along both sides of the cabinet. The cable shall be plastic coated stainless steel braided cable installed inside the full length of the chamber enabling the washer to be immediately stopped from the interior by pulling the cable
An audible alarm will annunciate on the touch screen upon activation of the interior shut down system. The cable pull switch must be reset and power switch will need to be cycled before restarting.

5) Cycle start commands cannot occur unless both doors are fully closed.

6) A red twist-lock emergency stop button shall be provided on both load and unload end of the machine. If either button is pushed, the washer will immediately cease all operations. To resume operation, the button must be twist-released outward and the cycle restart command sequence initiated.

7) Mechanical pressure relief vent to ensure chamber does not over pressurize.

8) Audible alarm and flashing warning light on soiled side control system shall signal that a cycle is about to start. A cycle start delay of a minimum of 5 seconds shall occur in conjunction with the operation of the audible and visual signals.

p. Automatically actuated pneumatic ball valves to control output of pump to jet system, drain, or detergent return system.

q. Interpiped and interwired so that only one connection shall be required for each service or utility.

r. Water line to be protected from hammering through the proper application of slow pneumatically operated valves. Water hammer arrestors are not required.

s. Place all serviceable components on either right or left hand side of washer as indicated on the Equipment Drawings.

t. Additional door for pass-through operation complete with safety switch and lights indicating washer is in operation or cycle is complete. Door shall meet all requirements stated above.

u. Top and sides insulated with minimum 1” thick rigid fiberglass covered by a protective stainless steel jacket.

v. Washer shall be controlled by a name brand control system that monitors and automatically controls all process operations and functions via highly visible color screen panel mounted on the load end of the unit.

1) Allow operator to program and store a minimum of eight (8) unique complete cycles in a selectable menu of treatment processes.

2) Cycle phase times, temperatures and other key process parameters must be programmable and may be locked by supervisory password.

3) All cycle programming controlled by access code to insure process integrity.

4) Cycle programming must be reviewable on demand, with operator option to print cycle parameters (if a printer is included with the equipment).

5) Shall display real time in process cycle performance.

6) Programming must be accepted in military time and Fahrenheit. Times and temperatures expressed in minutes/seconds and tenths of a degree increments respectively.

7) Microcomputer controller to have internal battery to back up all programming, including user created cycles, for up to one (1) year from power loss.

8) All cycle deviations are alarmed both visually and recorded. All alarms must be acknowledged by operator.

9) A built-in service diagnostic program must be provided to permit system calibration and verification of satisfactory component operation. Service program must be secured by an access code.

10) Machine to be equipped with 10 amp Form C dry contacts to communicate with building DDC system and send a signal when the unit is turned on or off and a door is opened or closed.

11) Microcomputer controller must be provided with provisions for communication via Ethernet port.
7. Program Security:
   a. The controls shall come standard with the “Advanced Adjustable Multi-Tiered Password Protection System”. Cycle programming shall be set by supervisory personnel to insure process and cycle security. Treatment times, temperature settings, and other key cycle parameters shall be programmable. A tiered password system allowing up to eleven (11) different passwords shall be available for incremental access to the various program parameters. As the operator comfort and confidence level increases, supervisory personnel shall have the ability to grant increased security access to specific program parameters.
   b. Built-in Advanced Diagnostics
      1) The controls shall feature several advanced diagnostics systems to include-
         Advanced Alarm and Data Logging-
            a) This program feature provides user friendly alarm log, recovery and checking screens. Additionally, an alarm pop-up box with description and possible causes for the fault are integrated into the touch screen.
      2) Advanced Diagnostics
         a) The control program shall be provided with a graphical P&ID flow chart with real-time integrated service flow and Input/Output Summary screen allowing operators and service personnel quick access to machine function status.
      3) Advanced Maintenance and Troubleshooting
         a) The control program shall be provided with an integrated P&ID chart screen with touch cell descriptions and an image based Service View screen with touch cell descriptions, providing operators and maintenance personnel a quick visual reference to parts and their descriptive information.
      4) Parts List ID and Visual Reference
         a) The control program shall be provided with a Parts List Identification screen complete with pop up visual reference, symbols, and part # ID to assist operators and maintenance personnel with troubleshooting activities.
      5) Technician Mode Coordinated I/O Charts
         a) In the Service/Technician Mode, Technicians shall be provided with access to coordinate, color code descriptive information, I/O status, wire number designations, I/O module color for each of the inputs and outputs of the system.
      6) Chemical Pump Priming Function
         a) The control program shall be provided with a Chemical Pump Priming screen to allow supervisory and chemical agent personnel the ability to pre-program an adjustable time for chemical pump priming during chemical drum change out procedures. This feature shall insure that chemical lines are primed with chemicals prior to washer operations during the cycle process.
      7) Statistics Mode and Activ™ PM
         a) The control system shall be provided with a statistics mode that keeps track of a wide variety of parameters such as per Cycle Usage, Total number of Cycles Operated, Hours of Operations. In addition to the recording of general statistics, this mode shall have the ability to forecast a PM (Preventative Maintenance) Schedule, referred to as Activ™ PM. Each component shall be actively monitored for usage so that scheduled Preventative Maintenance programs will be more proactive. The control system shall alert the maintenance personnel through a data log when each individual component has reached its anticipated life expectancy.
      8) Advanced Alarm and Data Logging
a) This program feature shall provide a user friendly alarm log, recovery, and checking screens. Additionally, an alarm popup box with description and possible causes for the fault shall be integrated into the touchscreens.

9) Factory Ethernet Connectivity
   a) The unit shall be provided with an Ethernet connection for remote online diagnostics, software upgrades, and troubleshooting. Factory based service personnel shall be able to assist local service remotely identifying system malfunctions and recommendations for repair. This option shall require coordination between the suppliers’ Engineering and the Facility’s IT Department.

10) Touchscreen Ethernet Web Server Connectivity
   a) The unit shall be provided with an Ethernet connection to the touchscreen for remote online diagnostics, and troubleshooting. Any approved personnel without any additional software will have the ability to view the touchscreen parameters right from their PC (by others). The individual shall be able to monitor, control, make changes or troubleshoot the operation of the unit. This option shall require coordination between the suppliers’ Engineering and the Facility’s IT Department.

c. Ship disassembled into sections that will pass through an 8'-0" wide x 7'-0" high doorway. Mechanical components such as pumps, valves, heat exchangers, reservoirs, and tanks are to be contained within one mobile frame capable of fitting through the above standard doorway.

d. Automatic pneumatic damper; mounted in the exhaust line and interwired with the automatic cycle. Damper shall be open during exhaust cycle and closed during machine operation.

e. The interior of the chamber shall be illuminated by an exterior mounted compact fluorescent light fixture. Illumination shall be through a sealed tempered glass window.

f. "Reusable-Throwaway" Acid Solution System. The washer shall be provided with an Acid Non-Heated Storage Tank. This option shall reduce energy consumption, and hot water consumption, and reduce chemical usage. Acid solution shall be automatically returned to the reservoir and used for subsequent cycles or drained immediately. A counter shall keep track of number of cycles to alert operators when to refresh the storage tank.

g. Cool-down system to reduce all sump drain discharges to 140F, or less, controlled by microprocessor.

h. Time-based volumetric neutralization of sump controlled by microprocessor. System must discharge effluent in a monitored, guaranteed range of 6-9 pH. If neutralizing agents are spent, an alarm will sound and machine will stop until neutralizing agents are replenished or system is manually overridden.

i. Instantaneous steam to water heat exchanger to raise hot water supply temperature 60 - 80F. Heat exchanger shall be brazed plate style for steam-to-steam water heater. Heat exchanger shall be inter-piped and inter-wired for automatic operation. Tube and shell type heat exchangers are not acceptable.

j. A dedicated low volume drain pump shall be provided to assist with evacuating the sump without overflowing the floor drain located in the pit.

k. Stainless steel entry/exit pit transition plates to bridge space between unit and pit.

l. Auxiliary accessory wash system with internally mounted quick-disconnect solution coupling capable of diverting wash and rinse recirculated solutions through attached accessories. System must be inter-piped and inter-wired for automatic operation upon operator selection.

m. Rack manifold flush system capable of flushing two (2) automatic water racks with house automatic-watering (AW) water during the final rinse cycle. Provide two (2)
quick disconnect hoses in wash compartment. Operation of the system should be included as a selectable phase during any wash cycle and should not interfere with the spray system (in coverage or range of motion) at any time. A pressure reducing station shall be provided on the incoming flush water to prevent potential damage to the racks. System shall be interpiped and interwired for automatic operation.

n. Integral Self-Priming Automatic Chemical Dispenser: Peristaltic pumps dispense pre-determined amount of liquid chemical into wash solution staging tank(s). Detergent injection system capable of being calibrated. Chemical containers may be stored up to 25 feet from washer using 50 ft. long color-coded tubing extensions.

o. A 40-column strip chart impact printer with paper take-up will be provided to record all cycle program parameters and process performance data. Each program time / temperature profile may be printed as required.

8. Provide the following accessories with each unit.
   a. One (1) stainless steel feeder bottle washing carts with a quick disconnect fitting designed to process six (6) baskets of bottles per load each. Coordinate basket size and configuration with Owner.
   b. One (1) heavy duty, stainless steel cage wash carts designed to hold rodent cages from 5” - 8” in height, on four rows per side of cart. Cart shall accommodate up to 96 standard mouse cages or 48 standard rat boxes. Cart shall feature automatic swivel-type retainers to secure cages rigidly in place during cleaning and four swivel casters constructed of stainless steel with neoprene wheels. Cart shall be nominally 84”L x 82”H x 32”W maximum.
   c. Pressure Relief Valve: To limit the amount of pressure buildup so that the rated pressure in the vessel is not exceeded.

9. Materials (all stainless steel, S.S., type 304):

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Wash Solution Reservoir(s)</td>
<td>12 Gauge 304 S.S. #3 Finish</td>
</tr>
<tr>
<td>c. Door Frames</td>
<td>2” x 2”x 3/16” S.S. Angle.</td>
</tr>
<tr>
<td>d. Door Panels</td>
<td>16 Gauge S.S. #3 Finish</td>
</tr>
<tr>
<td>e. Side and Top Panels</td>
<td>14 Gauge S.S. #3 Finish</td>
</tr>
<tr>
<td>f. Recirculating Pump Piping</td>
<td>304 S.S. with threaded union</td>
</tr>
<tr>
<td>g. Internal Water and Steam Piping</td>
<td>304 S.S.</td>
</tr>
<tr>
<td>h. External Steam Piping</td>
<td>Schedule 80 Black Iron.</td>
</tr>
<tr>
<td>i. Steam Condensate</td>
<td>Schedule 80 Black Iron.</td>
</tr>
<tr>
<td>j. External Water Piping</td>
<td>304 S.S.</td>
</tr>
<tr>
<td>k. Spray Jets</td>
<td>S.S.</td>
</tr>
<tr>
<td>l. Grating</td>
<td>304 S.S.</td>
</tr>
<tr>
<td>m. Steam Coils</td>
<td>304 S.S.</td>
</tr>
<tr>
<td>n. Insulated Jacket</td>
<td>20 Gauge S.S. #3 Finish.</td>
</tr>
</tbody>
</table>

10. Utility Requirements:

   | a. E:  | 3/60/480V, 17.1 A       |
   | b. S:  | 2” NPT, 70-75 psig (peak flow rate 1200 lb. /hr.) |
   | c. Cond: | 2” NPT            |
   | d. HW: | 1½” NPT 40 psig. Dynamic min. 40 GPM at 140°F |
   | e. CW: | 1½” NPT 35 psig. Dynamic min. 60 GPM at 50°F +- 5°F |
   | f. CAir: | ½” NPT (80-100 psig), max. 4-6 CFM |
   | g. D: | 4” NPT (min. 4” floor drain pipe required with 12” floor sink. |
   | h. Exh: | 12” I.D., 500CFM Each |
B. Equipment item(s) shall be CFCI with MA, MAS & MED.

C. Basis of Design: Better-Built Model R630 Cage and Rack Washer. Unit(s) manufactured by LYNX, Steelco or Others shall be considered equal provided that they meet the requirements of this specification.

2.2 TW: TUNNEL WASHER

A. Product Description.

1. Application: Heavy duty, conveyorized, hydrospray washer designed for thorough, efficient cleaning of cages, debris pans, bottles, feeder bowls and miscellaneous items used in care of laboratory animals.

2. Standards:
   c. Evaluated and conforms to CSA C22.2 No. 94.1-07 First Ed. / UL 50 Twelfth Ed. Enclosures for Electrical Equipment, Non-Environmental Consideration, 09/04/07 by a third party inspection agency.
   d. Evaluated and conforms to CSA C22.2 No. 94.2-07 First Ed. / UL 50E First Ed. Enclosures for Electrical Equipment, Environmental Consideration, 09/04/07 by a third party inspection agency.

3. Size:
   a. Tunnel (minimum inside clear): 36"W x 24"H
   b. Conveyor Size: 36"W belt.
   c. Conveyor Speed: Variable 2 - 6 feet/minute.
   d. Sections: The standard length is 20'-0" based upon a 36" load section, 48" pre-wash, 48" wash, 60" rinse/final rinse, and 48" unload section. With the 96" dryer section the washer’s overall length is 28'-0".

4. Operation: Items to be cleaned are loaded manually in inverted position on load end of conveyor belt. Items are conveyed automatically through various treatments and discharged.

5. Treatment Schedule: A treatment schedule shall be automatically programmed as follows:
   a. Pre-Wash: Water recovered from the recirculated rinse tank under pump pressure flushes items to remove gross debris. Spent solution is directed to automatic drain discharge cool down system.
   b. Wash: Hot detergent solution is recirculated through the jet system under pump pressure. Temperature adjustable to 190°F. Detergent solution remains in the wash tank and is recirculated onto subsequent loads. Detergent solution remains in the wash tank and is recirculated onto subsequent loads.
   c. Recirculated Rinse: Hot water is recirculated through the jet system under pump pressure. Temperature adjustable to 190°F. Rinse water remains in the rinse tank and is recirculated onto subsequent loads. Rinse water is continuously refreshed by the addition of the fresh final rinse water. Rinse water remains in the rinse tank and is recirculated onto subsequent loads. Rinse water is continuously refreshed by the addition of the fresh final rinse water.
d. Final Rinse: Hot water from house supply is heated through a steam heat exchanger and sprayed through the jet system. Spent solution drains to recirculated rinse tank. Temperature adjustable to 195°F

6. Construction:
   a. All components must be non-proprietary, off-the-shelf parts that are locally available for purchase.
   b. Frame, recirculating tanks, and cabinet of one piece welded stainless steel construction. Frame equipped with adjustable legs and supports for pumps, steam heat exchanger and drive mechanism. No rubber or plastic hoses, clamps or copper piping is allowed.
   c. Top and sides insulated with 1” thick rigid fiberglass insulation covered by a protective stainless steel jacket.
   d. Splash proof doors provided for access to jet systems and interior. Doors insulated with 2” thick rigid fiberglass insulation and equipped with silicone bulb sealing gaskets, latches and heavy duty self-closing hinges. Doors removable for cleaning or maintenance.
   e. Each recirculating tank equipped with an automatic solution level control, safety overflow piping, manual drain valve and stainless steel steam coil heating for the recirculating treatment solutions. Automatic digital temperature controllers mounted on the operator’s panel will display and monitor recirculating solution temperatures.
   f. Interior wall trim panels along the entire length of the machine to reduce gross debris accumulation points along the side walls of the machine and to prevent in-process items from being obstructed and caught on the sides of the mesh belt during normal process movements.
   g. Stainless steel steam coil heating for wash and recirculating rinse tanks complete with condensate return, steam traps and strainers. Steam coils shall be designed to ASME Section VIII, Div 1, Unfired Pressurized Vessel Code and be easily removable for cleaning or maintenance. Coils shall not be welded in place.
   h. Control of the hot water temperature through the external Heat Exchanger shall be by an analog PID steam valve. The setting and control of this valve shall be from the main control system and displayed on the touchscreen.
   i. Wash solutions under pressure from a minimum 5 HP pump and recirculated rinse and pre-wash systems shall be under pressure from a minimum 5 HP pump. Both pumps Worthington close coupled “Monobloc” type, or approved equal, with mechanical seals. Each pump system with a direct reading pressure gauge.
   j. Pre-wash, wash and recirculating rinse sections equipped with easily accessible stainless steel basket type filter screens. Screens manufactured from perforated or mesh stainless steel with perforations smaller than machined jet orifices to filter all recirculated solutions and prevent jets from clogging. Access to filter screens shall be easily achieved through a hinged cover on the side mounted filter tanks. “Drawer type” screens are unacceptable.
   k. Jet spray systems for pre-wash, wash and recirculating rinse sections composed of machined jets fitted into headers. Each solution treatment chamber provided with spring loaded, positive connection manifold spray header(s) connected to the washer piping system. Manifold coupler and plug connectors are Type 316 stainless steel. Manifold system is fitted with nylon wheels and wheel guides within a track mount and quick release handle for easy removal without use of tools. Manifold systems that use O-rings without a positive spring loaded system will not be allowed.
   l. Electrical control system:
      1) Within control box are transformers for 1-60-115 volt control circuit; magnetic starters with overload protection for all motors and all other electrical components required for operation.
2) Unload end is equipped with a drive system emergency stop button and warning lights.

m. Safety Features:
   1) Emergency push/pull stop buttons at both load and unload ends of unit to terminate all process and conveyance functions. Processing resumed by resetting emergency stop button and activating cycle start button.
   2) Each chamber door with a disconnect switch to terminate all process and conveyance functions upon opening of any door. Processing cannot be resumed unless all doors are fully closed. All emergency conditions are audibly and visually enunciated.

n. Final rinse jet system consists of spray headers with machined jets and a throttle valve in the line for optimum water use. System equipped with a steam heat exchanger to raise house hot water supply temperature by 60 - 80°F. Heat exchanger supplied with temperature gauge and steam throttle valve to adjust final rinse system temperature.

o. Energy Saver Heat Exchanger. Washer is supplied with a heat recovery system with payback analysis. Heat recovered from Rinse system is to be drawn out and transformed into reusable energy and used to pre-heat the fresh water for the final wash process.

p. Drive system shall consist of a minimum 1/3 HP DC motor, gear reducer, automatic safety overload clutch and variable speed drive.

q. Conveyor system shall include a stainless steel heavy duty 1/2 x 1 flat wire mesh belt, sprockets at both drive and idler ends for positive tracking of belt, adjustable take-up bearings on idler end, and stainless steel guides and supports along entire length. A stainless steel drain pan with a 2” drain connection under the entire length of conveyor.

r. Five (5) detergent injection ports and dry electrical contacts for installation of automatic detergent injection. Washer sump equipped with two (2) 1” NPT fittings/couplings for connection of external devices.

s. Water line to be protected from hammering by using slow closing valves.

t. Low water cut-off for both recirculating that will cease operations and automatically fill tank to proper level. Status lights shall indicate which tank is low and operations will resume automatically when tank is full.

u. Stainless steel baffles and double rubber curtains between each treatment section and at both ends. Removable double layer curtains on each section of the tunnel washer provided to minimize solution carry over.

v. All serviceable components located on one side and top of washer interpiped and interwired so that only one connection is required for each service and utility except drain.

w. Stainless steel trim flanges to enclose opening between machine and masonry opening.

x. Pre-wash, wash and recirculating rinse sections equipped with easily accessible stainless steel basket type filter screens. Screens manufactured from perforated or mesh stainless steel with perforations smaller than machined jet orifices to filter all recirculated solutions and prevent jets from clogging. Access to filter screens shall be easily achieved through a hinged cover on the side mounted filter tanks.

y. All pumps, valves, piping and other components that come in contact with recirculating solutions shall be furnished in stainless steel.

z. Shipped in sections for entry into building. Ship disassembled into sections that will pass through an 8'-0" wide x 7'-0" high doorway.

aa. Sections shall then be bolted into place on site to eliminate any possibility of leakage.

bb. 3’ long minimum powered discharge extending the main conveyor past the dryer section.
cc. Temperature guarantee for both recirculating tanks. If recirculating solution temperature drops below set temperature, conveyor belt shall temporarily stop until recirculating solution reaches proper temperature. Status lights will indicate which tank is not at proper temperature.

dd. Hot Air Dryer Section with Sloped Belt and Forced Air Nozzles. The unit shall be provided with an insulated stainless steel hot air drying section, 8ft in length and equipped with a steam coil and blower system. System shall incorporate a sloped belt at dryer in-feed to facilitate the draining of water from the washed items. A blower system incorporating forced air nozzles shall pulse and disperse water droplets prior to washed items exiting the drying system. Manufacturer must list minimum five (5) North American facilities where proposed design is operational.

ee. A microcomputer with a 5” TFT color Touchscreen interface monitors and controls all aspects of the washer cycles and process operations. Eight (8) fully adjustable programmable cycles come with the unit. Cycle times and temperatures shall be expressed in minutes/seconds and degree increments respectively. Temperatures shall be selectable and displayed in either Fahrenheit or Centigrade. In the event of a power failure, a battery backup of the microcomputer shall be provided.

ff. The controls shall come standard with the “Advanced Adjustable Multi-Tiered Password Protection System”. Cycle programming shall be set by supervisory personnel to insure process and cycle security. Treatment times, temperature settings, and other key cycle parameters shall be programmable. A tiered password system allowing up to eleven (11) different passwords shall be available for incremental access to the various program parameters. As the operator comfort and confidence level increases, supervisory personnel shall have the ability to grant increased security access to specific program parameters.

gg. Built-in Advanced Diagnostics

1) The controls shall feature several advanced diagnostics systems to include:

2) Advanced Alarm and Data Logging
   a) This program feature provides user friendly alarm log, recovery and checking screens. Additionally, an alarm pop-up box with description and possible causes for the fault are integrated into the touch screen.

3) Advanced Diagnostics
   a) The control program shall be provided with a graphical P&ID flow chart with real-time integrated service flow and Input/Output Summary screen allowing operators and service personnel quick access to machine function status.

4) Advanced Maintenance and Troubleshooting
   a) The control program shall be provided with an integrated P&ID chart screen with touch cell descriptions and an image based Service View screen with touch cell descriptions, providing operators and maintenance personnel a quick visual reference to parts and their descriptive information.

5) Parts List ID and Visual Reference
   a) The control program shall be provided with a Parts List Identification screen complete with pop up visual reference, symbols, and part # ID to assist operators and maintenance personnel with troubleshooting activities.

6) Technician Mode Coordinated I/O Charts
   a) In the Service/Technician Mode, Technicians shall be provided with access to coordinate, color code descriptive information, I/O status, wire number designations, I/O module color for each of the inputs and outputs of the system.

7) Chemical Pump Priming Function
   a) The control program shall be provided with a Chemical Pump Priming screen to allow supervisory and chemical agent personnel the ability
to pre-program an adjustable time for chemical pump priming during chemical drum change out procedures. This feature shall insure that chemical lines are primed with chemicals prior to washer operations during the cycle process.

8) Statistics Mode and Activ™ PM  
   a) The control system shall be provided with a statistics mode that keeps track of a wide variety of parameters such as per Cycle Usage, Total number of Cycles Operated, Hours of Operations. In addition to the recording of general statistics, this mode shall have the ability to forecast a PM (Preventative Maintenance) Schedule, referred to as Activ™ PM. Each component shall be actively monitored for usage so that scheduled Preventative Maintenance programs will be more proactive. The control system shall alert the maintenance personnel through a data log when each individual component has reached its anticipated life expectancy.

9) Advanced Alarm and Data Logging  
   a) This program feature shall provide a user friendly alarm log, recovery, and checking screens. Additionally, an alarm popup box with description and possible causes for the fault shall be integrated into the touchscreens.

10) Ethernet Connectivity to PLC. The unit shall be provided with the Remote Data Transfer System (BBRDTS) where the data files in the compact flash card can be transferred to a central PC via Ethernet and a windows FTP program. The PLC shall be connected to the facilities network via Ethernet and the supervisor must have the capability to upload, download, and delete data files from each washer control system from their office PC. This option shall require coordination between the suppliers’ Engineering and the Facility’s IT Department. A main office PC (supplied by others) and Ethernet connection port (supplied by others) near the equipment shall be required.

11) The unit shall be provided with an Ethernet connection for remote online diagnostics, software upgrades, and troubleshooting. Factory based service personnel shall be able to assist local service remotely identifying system malfunctions and recommendations for repair. This option shall require coordination between the suppliers’ Engineering and the Facility’s IT Department.

12) Touchscreen Ethernet Web Server Connectivity. The unit shall be provided with an Ethernet connection to the touchscreen for remote online diagnostics, and troubleshooting. Any approved personnel without any additional software will have the ability to view the touchscreen parameters right from their PC (by others). The individual shall be able to monitor, control, make changes or troubleshoot the operation of the unit. This option shall require coordination between the suppliers’ Engineering and the Facility’s IT Department.

hh. Cold water injection system to cool effluent from pre-wash section. System automatically activated when washer is turned on and controlled and recorded by microprocessor. In addition, a cold water injection system mounted in line to the drain line to cool spent recirculated treatments shall be controlled by an actuated ball valve which automatically opens when sump valves are open. By mixing with cold water, all drain discharges are cooled to a minimum of 140F, or less, before gravity draining.

ii. Configured to accept pH neutralization and detergent concentration control system with all necessary couplings, electrical and data connections.

jj. Washer shall be designed and pre-programmed with the ability to descale the pre-wash, wash, and rinse chambers simultaneously.
kk. A photoelectric switch shall be located at the end of discharge conveyor to stop powered conveyor drive when an item reaches end of conveyor. Photoelectric switch can be activated/deactivated by microprocessor and/or a control panel switch depending upon whether cage components continue through to the bedding dispenser or not.

ll. Bedding dispenser shall be interwired with tunnel washer control panel to allow three-way on/off operation.

mm. The main control panel shall be inspected and labeled in accordance to the UL, ETL or CSA standards.

nn. An RS485, or Ethernet port shall be provided to permit the capability to download cycle real-time performance data to a remote computer terminal.

oo. A Down Loadable memory Chip shall be supplied with the unit that is capable of storing original factory computer programs.

7. Materials (all stainless steel, S.S., type 304):

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Frame</td>
<td>2&quot;x2&quot;x3/16&quot; S. S. Angle</td>
</tr>
<tr>
<td>b. Tanks</td>
<td>12 Gauge S.S. #3 Fin.</td>
</tr>
<tr>
<td>c. Cabinets</td>
<td>14 Gauge S.S. #3 Fin.</td>
</tr>
<tr>
<td>d. Recirculating Pump Piping</td>
<td>S.S.</td>
</tr>
<tr>
<td>e. Internal Water and Steam Piping</td>
<td>S.S.</td>
</tr>
<tr>
<td>f. External Steam Piping</td>
<td>Schedule 80 Black Iron</td>
</tr>
<tr>
<td>g. External Water Piping</td>
<td>Brass</td>
</tr>
<tr>
<td>h. Spray Jets</td>
<td>S.S.</td>
</tr>
<tr>
<td>i. Internal/External Drain Piping</td>
<td>S.S.</td>
</tr>
<tr>
<td>j. Steam Coils</td>
<td>7 gauge S.S. #2B Fin.</td>
</tr>
<tr>
<td>k. Barrier Flange/Insulated Jacket</td>
<td>20 Gauge S.S. #3 Finish</td>
</tr>
</tbody>
</table>

8. Utility Requirements:

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. E: 3/60/480V. 40 amps</td>
<td></td>
</tr>
<tr>
<td>b. S1: 2&quot; NPT (30-80 psig, 1400 lbs./hr. flow rate)</td>
<td></td>
</tr>
<tr>
<td>c. S2: 2&quot; NPT (30-80 psig, 1000 lbs./hr. flow rate)</td>
<td></td>
</tr>
<tr>
<td>d. Cond. 2&quot; @ 1&quot; NPT. (max. lift 10'-0&quot;)</td>
<td></td>
</tr>
<tr>
<td>e. HW: 1-1/2&quot; NPT, 40 psi, 15-50 gpm @ 120°F ± 5°F, 12 gal/min continuous</td>
<td></td>
</tr>
<tr>
<td>f. CW: 1&quot; NPT, 35 psi, 35 gpm @ 50°F ± 5°F</td>
<td>Flow rate-37 psig with integral Garbel unit</td>
</tr>
<tr>
<td>g. D1: 2&quot; NPT minimum 3&quot; floor drain pipe req’d</td>
<td></td>
</tr>
<tr>
<td>h. D2: 1 ½&quot; NPT minimum 3&quot; floor drain pipe req’d</td>
<td></td>
</tr>
<tr>
<td>i. D3: ¾&quot; OD discharge from heat exchanger safety relief valve may exceed 200°F</td>
<td></td>
</tr>
<tr>
<td>j. Spcl: Dry contacts for DDC.</td>
<td></td>
</tr>
<tr>
<td>k. CA: ½&quot; NPT 100 psi, 4 cfm flow rate</td>
<td></td>
</tr>
</tbody>
</table>

B. Equipment item(s) shall be CFCI with MA, MAS & MED.

C. Basis of Design: Better-Built T236 Tunnel Washer. Unit(s) manufactured by Lynx, Steelco or Others shall be considered equal provided that they meet requirements of this specification.

2.3 BD: BEDDING DISPENSER (IN-LINE TYPE)

A. Product Description.

1. Application: Automatic, conveyorized unit designed to dispense bedding into animal cages as they pass through unit. Dispenser capable of handling all solid bedding as currently used in care of laboratory animals.

2. Size:
a. Tunnel Height: 12”.
b. Conveyor Belt Width: 36”.
c. Conveyor Belt Height: 28” AFF.
d. Hopper Capacity: 10 cubic feet.
e. Hopper Loading Height: 50” AFF.
f. Overall machine: 96”W x 76”H x 120”L.
g. Unload Conveyor length: 60”

3. Operation:
a. Storage-dispensing hopper is filled by dumping bedding into hopper located alongside cage conveyor bed.
b. To dispense bedding, both drive and dispensing motors turned on. A sheet of bedding shall be continuously dispensed from above cage conveyor. Sheet shall extend the full width of cage conveyor. As cages pass top-side-up through this sheet of bedding, a controlled level of bedding material is deposited into cages. Cages can pass beneath hopper in any random pattern and will be filled with same amount of bedding per square inch of cage bottom. Rate at which bedding is dispensed is adjustable, so amount of bedding deposited in cages can be varied. Bedding that falls outside cages will fall through open belt conveyor and into bottom loading hopper. It shall then be returned to side storage hopper by dispensing conveyor. Cages may be manually loaded onto dispenser conveyor top-side-up, or cages may be automatically inverted and transferred to dispenser conveyor as they come out of tunnel washer.

d. Unload Conveyor length: 60”

4. Construction:
a. All components must be non-proprietary, off-the-shelf parts that are locally available for purchase.
b. Storage-dispensing hopper 14 gauge stainless steel. All structural supports stainless steel. All sprockets, shafts and chains carbon steel. Unit supported on four adjustable legs to level unit and set conveyor height.
c. Cage conveyor constructed of powered stainless rollers. The belt powered rollers are on 3” centers and are provided with stainless steel roller bearings. The roller system has no pinch points and will not carry the bedding out of the dispensing section.
d. Controls include a start-stop switch and speed control for the minimum 1/2 HP variable speed motor that powers dispensing belt and a start-stop switch for minimum 1/2 HP drive motor that powers cage conveyor.
e. Automatic Cage Flipping Device. Cages are automatically flipped upright onto the roller conveyor through a mechanical device. Cage flipping device must be able to flip a wide variety of cages including mice and rat cages without manual intervention at a success rate of 99%. Frequency of flipping must be adjustable and gravity drop flip alone is unacceptable. Manufacturer must have automatic flipping device functioning in a North American facility for more than 5 years. Video of flipping device functioning at a facility must be submitted.
f. Inlet for Automatic Delivery. A 4” inlet located on top of the unit next to the hopper cover is provided for the automated delivery of clean bedding materials.
g. Energy Saver Mode. When integrated with tunnel washer, the bedding dispenser is capable of recognizing when no cages are being processed from the tunnel washer and will automatically set unit into an energy saving mode.
h. A hinged cover installed on loading hopper. A removable cover installed over dispensing belt.
i. A clean-out access panel located on discharge end of dispenser for easy access to lower hopper. Drain connection and removable debris tray at load end of cage conveyor to prevent wetting of bedding in lower hopper. Drain connection with plug in lower hopper to facilitate cleaning and draining unit.
j. Dust collection system to remove dust generated by filling operation and eliminates need for connection to building exhaust. System shall consist of a minimum 1 HP blower and 36 gallon collection bag connected to vent of the dispenser. System interwired with bedding dispenser and equipped with an on-off switch mounted on control panel.

k. Ship disassembled for entry into building with uncrated sections able to pass through an 8'-0" wide x 7'-0" high doorway.

l. A photoelectric switch located at the end of discharge conveyor to stop the powered conveyor drive when an item reaches the end of conveyor.

m. Bedding dispenser interwired with tunnel washer (TW) control panel to allow three-way on/off operation.

5. Utility Requirements:
   a. E 1/60/120V/20 amps.
   b. D 1½" NPT

B. Equipment item(s) shall be CFCI with MA, MAS & MED.

C. Unit(s) shall be equal to Better-Built D236 In-Line Bedding Dispenser. Unit(s) manufactured by Lynx, TBJ, Steelco or Others shall be considered equal provided that they meet requirements of this specification.

2.4 MW: MODULAR WALL SYSTEM

A. Product Description.

1. Modular wall must meet ASTM specification A167 for stainless steel, alloy 304. The panel box sections shall be finished on both sides with type 304 stainless steel, #4 brush finish, 16 gage minimum. The brush finish grain shall be oriented vertically on all components, except head tracks and floor tracks, and infilled with a moisture-resistant, sound-deadening insulation. Partition panels, vents, and doors shall be of the non-progressive type, capable of removal and/or relocation without disturbing other panels.

2. Sectional modular wall shall be as indicated on the Drawings (length and height shall be field verified) and nominally 2" thick. Manufacturer will coordinate and provide rough openings for CRW and TW. Modular wall shall completely seal openings between equipment, walls, floors and ceiling.

3. Provide 36" x 84" stainless steel doors where noted.

4. Provide louvers in wall above each appliance to capture vapor and steam and allow them to be drawn into the enclosure created by walls.

5. Provide all necessary ceiling and wall trim angles, integral leveling devices (attached to vertical panels and concealed by base; shims will not be acceptable), vertical panels, horizontal panels and sanitary bases (at floor/wall intersection) for a complete and tight installation. All components to be Type 304 stainless steel.

6. Unit to meet local seismic design requirements.

7. Coordinate all equipment cutouts with selected vendor's submittal data.

B. Equipment item(s) shall be CFCI with MA & MAS.

C. Basis of Design: Better-Built Modular Wall. Unit(s) manufactured by LYNX or Others will be considered as equal provided that they meet the requirements of this specification.

2.5 BF: BOTTLE FILLER
A. **Product Description**

1. **Application:** Manual feeder bottle filling system.
2. **Size:** 44"W x 24"D x 48"H
   a. Basket: Vendor to confirm with Owner appropriate basket size and configuration without change in contract cost.
   b. Bottles (provided by users): 8-16 oz. capacity.
3. **Operation:** Operator places up to one (1) basket load of clean bottles into upright position and manifold head fill bottles to desired amount. When completed, operator removes basket from filling station and inserts stoppers and sipper tubes into bottles.
4. **Construction:**
   a. All components must be non-proprietary, off-the-shelf parts that are locally available for purchase.
   b. Fill head fabricated from 304 stainless steel. One (1) header each for 8oz and 16oz bottle to match basket configuration as provided by the Owner.
   c. Control panel contains on/off switch and adjustable dispensing fill rate control for automatic dispensing. Push button control to be provided for solenoid to regulate filling time and rate.
   d. Unit shall be provided with two (2) incoming water supplies with independent solenoid valves. Operator selection of water source shall be made by toggle switch on the main control panel. Source selection system shall include a manual supply flush function.
   e. Located below bottle baskets is a splash drain that collects any water runoff from baskets during filling process.
   f. Stainless steel guard supplied to protect header and its components. Header supplied with stainless steel jets and fill piping. Each header shall be fitted with a quick disconnect to facilitate different header configurations.
   g. Unit shall include a roller loading table to allow staging of both empty bottles to be filled, as well as filled bottle awaiting distribution.
5. **Acid proportioner (by UK’s Detergent Vendor- QUIP) shall be interpiped and interwired for automatic operation with unit to accurately mix a base treatment solution into the drinking water for the purpose of chlorination, acidification or medication of the drinking water. The system consists of a water reservoir, a treatment solution reservoir, a mixing chamber, treatment solution pumps and valves and an automatic control system.**
6. **Utility Requirements**
   a. E 1/60/120V/15 amps
   b. D 1 ½” NPT
   c. CW ¾” NPT, 75psig max, 10gpm

B. **Equipment item(s) shall be CFCl with MA, MAS & MED.**

C. **Basis of Design:** Better-Built BFS Series. Unit(s) manufactured by Lynx or Others shall be considered equal provided that they meet the requirements of this specification.

### 2.6 CBDS: CLEAN BEDDING DELIVERY SYSTEM

A. **Product Description.**

1. **The Pneumatic Bedding Material Conveyance System is an automated, multicomponent system designed to distribute clean bedding materials from a centralize location to one or more dispensing points throughout the facility. The system shall be capable of handling the specified bedding or feed without regular manipulation or intervention by operating personnel. The number of delivery points shall be scalable and accommodate both inline and stand-alone dosing apparatus.**
B. Manufacturers:
   1. PVS Process Equipment (716.646.0181)
   3. Dust Control Inc. (910.395.1898).

C. Bulk Bag Unloading Station:
   1. Operation: Bulk bedding bags are placed under the carriage assembly with standard pallet jack. The bulk bag is connected to the unloader without lifting off the ground and the upper bag feed snout is secured in place with a dust tight inflation collar. The suction head lowers through the sealed collar and begins to draw material out of the bag and into the transfer piping system. As material is drawn out of the bag, the bag is automatically actuated to allow for removal of all bedding from the bag without direct operator interaction. When the bag is emptied, the control system will alert the operator to replenish the supply. If multiple unloading stations are present in the system configuration, the controller shall automatically switch to the next loaded and available unloading station, providing uninterrupted operation.
   2. Location: Bulk bag unloading station shall be located within the bedding storage space as identified by the project plans. Conveyance distance in equivalent linear feet not to exceed 300 feet.
   3. Dimensions:
      a. Maximum External Size: 18" W x 56" L x 102" H
      b. Maximum Footprint: 16" W x 16" L

D. Pneumatic Transport Pipe Network:
   1. Location: Conveyance pipe shall be routed per project plans in above ceiling space unless noted otherwise in specific locations.
   2. Dimensions:
      a. Conveyance Pipe: Pipe size to be engineered per manufacturer’s equipment design. Maximum 4-inch (100-mm) OD.
      b. Vacuum Lines: Pipe size to be engineered per manufacturer’s equipment design. Maximum 6-inch (150-mm) OD.
   3. Construction:
      a. Piping shall be 16 gauge, type 304 stainless steel with standard mill finish.
      b. Bends shall have a sweep radius of 10 times the pipe diameter, but not less than the 24” centerline radius.
      c. Clean outs to be strategically located for easy access to aid in system maintenance.
d. Provide type 304 stainless steel three-bolt compression pipe couplings with integral gasket, gasket protector, and grounding strap
e. Equipment connections shall be made utilizing industrial grade, smooth bore clear flexible hose with end cuffs and static grounding, limited to locations at equipment connections.
f. Provide pipe support hardware required for installation.
g. Piping shall be insulated for sound in occupied areas as indicated in the contract drawings.

E. Material Filter Receiver:
1. Operation: During conveyance, the clean bedding material is drawn from bulk storage through the conveyance pipe network and deposited into the material receiver. Once the receiver is filled to high level, it will deposit the contents into the bedding dispenser through the actuated outlet valve.
2. Location: At the loading point of the dispenser to be filled.
3. Dimensions:
   a. Maximum External Size: 26” W x 30” L x 46” H.
4. Utilities:
   a. Electrical: 120 VAC, 1-Phase, 60 Hz, 5 Amp
   b. Compressed Air: 1/2” NPT; 80 PSIG, 4-6 CFM Intermittent Use
5. Construction:
   a. Material receiver shall be of type 304 stainless steel construction, minimum 12 Ga. with a uniform matte finish.
   b. Filter Elements shall collect any dust that is generated during the conveyance process. Dust is routed to the dispenser collection bin for disposal.
   c. Filters shall employ an automated cleaning system to prevent excessive material buildup without requiring direct operator intervention.
   d. Provide level sensors for detecting material high level in the hopper.
   e. A pneumatically actuated inlet gate valve shall be utilized to control the flow of material into the material receiver.
   f. An automatic discharge valve allows bedding to fall by gravity into the bedding dispenser.
   g. Receiver shall be mounted directly to the dispensing unit to be filled. Were possible, hard pipe final connections should be coordinated between the receiver and dispenser manufacturers.

F. Central Vacuum Blower Package
1. Operation: Negative pressure within the piping network and attached components is created by a vacuum producer, which allows for the conveyance of clean bedding from the fill point to the container.
2. Location: Blower package shall be located in an equipment room identified by the project plans.
3. Dimensions:
   a. Maximum External Size: 78"W x 36"L x 62"H
4. Utility Requirements:
   a. Electrical: 460 VAC, 3-Phase, 60 Hz, 60 Amp
   b. Compressed Air: 1/2" NPT; 80 PSIG, 4-6 CFM Intermittent Use
   c. Communications: Plenum Rated CAT 5e or CAT 6.
5. Construction:
   a. Unit shall be a high-efficiency TEFC motor directly coupled to the blower. Belt-driven blower packages will not be accepted.
   b. Blower shall be provided to meet the system performance criteria. Blower shall provide constant levels of airflow at all times and shall not be susceptible reductions in flow resulting from line restrictions.
c. Blower and motor assembly to be mounted on a table top base utilizing isolation pads to ensure quiet operation. Base shall be mild steel construction with industrial powder coated finish.

d. A vacuum pressure gauge shall be provided to monitor and verify blower operation.

e. A mechanical vacuum relief valve shall be integrally mounted on the blower intake to ensure maintenance of a safe operating condition of the downstream system. Valve must be sized for a relief pressure of the lowest rated component to protect equipment from damage.

f. A thermal overload protection package shall be fitted to the blower to prevent overheating.

g. Discharge of the blower shall be routed through and absorptive type silencer to maintain quiet operation within the space.

h. Operation of the blower package shall be by a PLC program specifically configured for the facility’s operations and bedding type. All operating conditions necessary for adequate control shall be relayed back to the PLC via standard communication protocol.

i. VARIABLE FREQUENCY DRIVE – Blower motor speed is to be controlled by utilizing a variable frequency drive to modulate power input. Others means of motor speed control will not be accepted.

j. INTERNAL ACOUSTICAL ENCLOSURE – Unit shall be mounted in and enclosed by a preassembled cabinet constructed of mild steel with industrial powder coated finish. The cabinet shall be acoustically controlled to reduce operating noise to a safe level (as defined by OSHA).

k. EXHAUST AIR PRESSURE GAUGE – An analog pressure gauge shall be provided at the blower enclosure to allow for the monitoring of the exhaust discharge pressure.

l. EXHAUST AIR PRESSURE TRANSMITTER – A digital pressure transmitter shall be provided integrally mounted in the exhaust airstream for the measurement of discharge pressure. Information shall be transmitted to the system controller for use in operational condition monitoring and trouble shooting.

m. dBa reading exceeds 80 dBa.


G. Allergen Dust Collector:

1. Operation: Dust laden air from the Bedding Dispenser is drawn through the collection ducts to the filters by a collector mounted fan. Heavy objects shall be separated from the finer dust. Finer dust is then filtered from the air and is then exhausted from the unit to room atmosphere. Designed to operate in conjunction with integrated downdraft collection ducting with the Bedding Dispenser design.

2. Location: As identified by the project plans. Adequate access to front of unit to be provided for proper operation and maintenance.

3. Dimensions:
   a. Maximum External Size: 55" W x 29" D x 84" H.

4. Utility Requirements:
   a. Electrical (3 HP): 460 VAC, 3-Phase, 60 Hz, 10 Amp
   b. Compressed Air: 1/2" NPT; 80 PSIG, 4-6 CFM

5. Construction:
   a. Floor standing support frame to be mild steel construction with industrial powder coated finish.
   b. Filter housing shall be constructed of type 304 stainless steel construction with a uniform matte finish.
   c. Provide one (1) sealed dust collection container with a minimum capacity of 25 gallons. Container shall include a quick latch style cover for connection to the collector outlet and vacuum equalization system to aid in the complete filling of the
waste container liner and eliminate nuisance alarms. Cover to be provided with flexible hose for connection to the collector outlet. Container must be fitted with a removable dolly to allow for easy loading and unloading. Provide one (1) customized discharge container lid for integration with existing owner-furnished container. Lid shall include a vacuum equalization system to aid in the complete filling of the waste container liner and eliminate nuisance alarms. Lid to be provided with a flexible hose for connection to the collector outlet. Owner to provide one (1) clean sample container for reference and verification. Sample container to be returned to the owner prior to system turnover.

d. Provide automatic filter cleaning system. System shall be sized such that it is capable of cleaning filters on demand, continuously or on line. Filters shall not require direct operator contact for daily cleaning.

e. Discharge from blower shall be to local atmosphere. Discharge muffler to be provided as required to maintain operational noise levels below 70db at 3ft. No external exhaust ducting shall be required. Discharge from blower shall be to external atmosphere. Discharge muffler to be provided as required to maintain operational noise levels below 70db at 3ft. All unit exhaust shall be externally ducting.


H. Integrated Control Package:

1. Master Control Panel:

a. Operation: Main control package shall be provided to monitor all operating conditions, provide constant feedback to operator at multiple locations, and to alert operators of any alarmed conditions. In addition, this panel shall allow for manual operation of individual system components for the purpose of maintenance and troubleshooting.

b. Location: Control package shall be located in a NEMA 4/12 rated enclosure within the equipment room identified by the project plans.

c. Dimensions:

1) Maximum External Size: 48"W x 10"L x 60"H:

d. Utility Requirements:

1) Electrical: 460 VAC, 3-Phase, 60 Hz, 60 Amp
2) Compressed Air: 1/2" NPT; 80 PSIG, 4-6 CFM
3) Communications: Plenum Rated CAT 5e or CAT 6

e. Construction:

1) Panel shall be constructed to NEMA 4/12 enclosure standards.
2) Structural support frame to be mild steel construction with industrial powder coated finish.
3) Non-proprietary PLC control system to monitor and automatically control all process operations, functions and interfaces.
   a) User maintenance screens and parameter entry screens will be password protected.
   b) The PLC shall have the ability to accept remote communications for purposes of software maintenance, upgrades, and for fault isolation.
4) Provide integrated 6" color touch screen interface with PLC microprocessor control system. Touch screen shall allow operator to monitor, adjust and troubleshoot system. If located in an exposed area, an integral touchscreen guard shall be included to protect touch screen and controls from damage.
5) Provide an Ethernet connection for remote online diagnostics, software upgrades, and troubleshooting. The PLC will be connected to the facilities network via wired Ethernet, allowing factory personnel to upload, download and modify data files from the system controller.
6) The control system shall have analog to digital vacuum level transducers installed on both sides of the primary filter. The vacuum level inputs shall be
used by the PLC to determine an overpressure situation, filter element condition, and to display current vacuum level on touch screen. The control system tracks vacuum motor run time in hours and displays both total hours and total maintenance hours rest prompt on the touch screen.

7) Maintenance functions including all system sensors will have a soft lamp on the touch screen, providing a status indicator of the sensor. All system valves will have a manual ON / OFF switch and status soft lamp to indicate current valve position and allow manipulation.

8) The filter clean function will have a manual start and stop switch and indicator lamp. The vacuum pressure sensors shall have set-up and calibration capability.


2. Remote Control Panel

a. Operation: Remote control package shall be provided to monitor all operating conditions, provide constant feedback to operator at multiple locations, and to alert operators of any alarmed conditions. System wide component operation is not a functionality of this panel.

b. Location: Remote control panel(s) shall be located at system components requiring continual operator interaction and system status feedback. This shall include, but is not limited to system loading point(s) and point(s) of distribution.

c. Dimensions:
   1) Maximum External Size: 24”W x 24”H x 8” D

d. Utility Requirements:
   1) Electrical: 120V, 1-Phase, 60 Hz, 10 Amp
   2) Compressed Air: 1/2” NPT; 80 PSIG, 4-6 CFM
   3) Communications: Plenum Rated CAT 5e or CAT 6X

e. Construction:
   1) Panel shall be constructed to NEMA 4X enclosure standards.
   2) Remote I/O controller provided to interface directly with main panel PLC.
   3) Provide integrated 6” color touch screen for operator interface with main panel PLC microprocessor controller. Touch screen shall allow operator to control local system component and monitor, overall operation and alarm conditions. If located in an exposed area, an integral touchscreen guard shall be included to protect touch screen and controls from damage.
   4) Panel shall accommodate compressed air regulator and solenoids as required for local component operation.


I. Equipment item(s) shall be CFCI with MA, MAS & MED.

J. Basis of Design: PVS Process Equipment Model VX Clean Bedding Delivery System. Unit(s) manufactured by Better-Built or Other Clean Bedding Delivery System shall be considered equal provided that they meet the requirements of this specification.

PART 3 - EXECUTION

3.1 INSPECTION

A. Check for shipping damage. Reject units with scratches, dents or other defects that cannot be readily corrected.
B. Check job site to insure that rough-ins and substrates are correct and that equipment will fit as indicated on Equipment Drawings.

C. Do not proceed with installation until defects or oversights are corrected.

3.2 INSTALLATION

A. Deliver equipment to the job site freight paid.

B. Uncrate all equipment and place in locations shown on Equipment Drawings. Remove all crating materials and packing debris.

C. Install all items in accordance with Manufacturer's standards. Provide all accessories necessary for a complete installation.

D. Verify plumbing, ventilation and electrical connection requirements for all equipment and coordinate connections with work of Divisions 22, 23 and 26.

E. For equipment requiring final steam and condensate piping connections, refer to Division 23 Section 232213 Steam Piping and Specialties (e.g. piping, fittings, steam traps) and Section 230523 General Duty Valves for HVAC piping (e.g. steam and condensate valves).

3.3 ADJUST AND CLEAN

A. Check operation and installation of equipment. Make adjustments as necessary to meet Manufacturer's or these specifications (whichever is more stringent).

B. Installer shall replace items, which do not operate properly, have defacing marks or damage that cannot be satisfactorily repaired as determined by the Owner's Representative. Replace parts at no cost to Owner.

C. Clean and polish equipment in accordance with Manufacturer's recommendations before and after demonstration for Owner. Leave ready for use with copy of instruction manual attached to equipment in a manner to be specified by Owner's Representative.

D. Each manufacturer shall submit with his Contract Price proposal an itemized list of available accessories for Owner's selection as part of this work. Provide unit prices for these accessory items; unit price cost shall be valid through entire construction period of project and for an additional 90 days after substantial completion.

3.4 SERVICE CONTRACT

A. Each manufacturer shall submit a service contract for his piece of equipment and cost of same. Owner shall determine if contracts are to be accepted.

END OF SECTION 115400