DIVISION 11

EQUIPMENT

SECTION 11160
LOADING DOCK EQUIPMENT

1.0 GENERAL

1.1 THIS SECTION INCLUDES

1.2 SUMMARY

A. This Section includes the following:
   1. Dock bumpers.
   2. Dock levelers.

B. Related Sections include the following:
   1. Division 3 Section "Cast-in-Place Concrete" for concrete work for recessed loading dock equipment.
   2. Division 5 Section "Metal Fabrications" for curb angles at edges of recessed pits and loading dock platform edge channels.

1.3 DEFINITIONS

A. Operating Range: Maximum amount of travel above and below the loading dock level.
B. Working Range: Recommended amount of travel above and below the loading dock level for which loading and unloading operations can take place.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, rated capacities, operating characteristics, furnished specialties, accessories, dimensions of individual components and profiles, and finishes.
B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, details, and attachments to other work.
C. Maintenance Data: For loading dock equipment to include in maintenance manuals.
D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
   1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

1.6 PROJECT CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate installation of anchorages for loading dock equipment. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Recessed Loading Dock Equipment: Coordinate size and location of pits to ensure proper clearances and operation of equipment.
   1. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

1.8 WARRANTY

A. Special Warranty for Dock Levelers: Manufacturer's standard form in which manufacturer agrees to repair or replace dock-leveler components that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including cracked or broken structural support members and load-bearing welds.
      b. Deck plate failures including cracked plate or permanent deformation in excess of 1/4 inch between deck supports.
      c. Faulty operation of operators, control system, or hardware.
   2. Warranty Period for Structural Assembly: 10 years from date of final acceptance by the Owner.
   3. Warranty shall be for unlimited usage of the leveler for the specified rated capacity over the term of the warranty.

2.0 – PRODUCTS

2.1 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade 55.

C. Steel Tubing: ASTM A 500, cold formed.

D. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.2 DOCK BUMPERS

A. Manufacturers:

1. Kelley Company, Inc.; a United Dominion Company.
2. Pawling Corporation.
3. R. C. Musson Rubber Co.
4. Rite-Hite Corporation.

B. Laminated-Tread Bumpers: Fabricated from multiple, uniformly thick plies cut from fabric reinforced rubber tires. Laminate plies under pressure on not less than two 3/4-inch- diameter, steel supporting rods that are welded at one end to 1/4-inch- thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than 1 inch of tread plies extending beyond the face of closure angles.

C. Anchorage Devices: Hot-dip galvanized steel anchor bolts, nuts, washers, bolts, sleeves, cast-in-place plates, and other anchorage devices as required to fasten bumpers securely in place and to suit installation type indicated.

2.3 RECESSED DOCK LEVELERS

A. General: Recessed, hinged-lip-type dock levelers designed for permanent installation in concrete pits preformed in the edge of loading platform; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.

B. Quality Standard: MH 30.1, "Safety, Performance and Testing of Dock Leveling Devices," except for rated capacity.

C. Rated Capacity: Capable of supporting total gross load indicated without permanent deflection or distortion, as determined by actual tests according to MH 30.1.

D. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform in the following manner:
   1. Vertical Travel: Provide operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact.
   2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
   3. Lip Operation: Manufacturer's standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.

E. Hydraulic Operating System: Electric-powered hydraulic raising and hydraulic lowering of ramp, controlled from a remotely located push-button station. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Include means for lowering ramp below platform level with lip retracted behind dock

bumpers. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than 3 inches.

1. Electric Motor: Provide manufacturers standard 1 Hp motor designed to operate on 480v, 3 phase power (to be confirmed).
2. Remote-Control Station: Single-button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 12 box. Ramp raises by depressing and holding button; ramp lowers at a controlled rate by releasing button.
    a. Dual-Panel Control Station: Remote-control station for operating side-by-side dock levelers.
    b. Keyed Lockout: Provide keyed control to use Remote-Control Station so that station is inoperable without removable key in place and switched to “on” position.

F. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
1. Hinged Lip: Full width, piano-type hinge with heavy-wall hinge tube and greased fittings, with gussets on lip and ramp for support.
2. Toe Guards: Equip open sides of rising ramp over range indicated with metal toe guards mounted flush with ramp edges and projecting below ramp.
    a. Finish: Factory finish dock levelers after assembly and testing. Paint toe guards yellow to comply with ANSI Z535.1.
3. Cross-Traffic Support: Manufacturer's standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.
4. Maintenance Strut: Integral strut to positively support ramp in up position during maintenance of dock leveler.
5. Integral Dock Bumpers: Fabricated from 4-inch- thick, heavy molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240. Provide two dock bumpers for each recessed dock leveler, attached to face of loading dock with expansion bolts.

G. Accessories:
1. Curb Angles: 76 mm by 76 mm by 6 mm (3-by-3-by-1/4-inch) galvanized steel curb angles for edge of recessed leveler pit, with 13mm (1/2-inch) diameter by 150 mm (6-inch) long concrete anchors welded to angle at 150 mm (6 inches) on center.
2. Abrasive skid-resistant surface.

3.0 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of loading dock equipment.

B. Examine walls and floors of pits for suitable conditions where recessed loading dock equipment is to be installed. Pits shall be plumb and square and properly sloped for drainage from back to front of loading dock.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate size and location of loading dock equipment indicated to be attached to or recessed into concrete and furnish anchoring devices with templates, diagrams, and instructions for their installation.
B. Set curb angles in concrete edges of dock-leveler recessed pits with tops flush with loading platform. Fit exposed connections together to form hairline joints.
C. Place self-forming pan system for recessed dock levelers in proper relation to loading platform before pouring concrete.
D. Clean recessed pits of debris.

3.3 INSTALLATION

A. General: Install loading dock equipment, including motors, pumps, control stations, wiring, safety devices, and accessories as required for a complete installation.
   1. Rough-in electrical connections according to requirements specified in Division 16.

B. Dock Bumpers: Attach dock bumpers to face of loading dock in a manner that complies with requirements indicated for spacing, arrangement, and position relative to top of platform and anchorage.
   1. Bolted Attachment: Attach dock bumpers to preset anchor bolts embedded in concrete or to cast-in-place inserts or threaded studs welded to embedded-steel plates or angles. If preset anchor bolts, cast-in-place inserts, or threaded studs welded to embedded-steel plates or angles are not provided, attach dock bumpers by drilling and anchoring with expansion anchors and bolts.

C. Recessed Dock Levelers: Attach dock levelers securely to loading dock platform, flush with adjacent loading dock surfaces and square to recessed pit.

3.4 ADJUSTING AND CLEANING

A. Adjust loading dock equipment for proper, safe, efficient operation.
B. Test dock levelers for vertical travel within operating range indicated.
C. Restore marred, abraded surfaces to their original condition.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain loading dock equipment.

3.6 LOADING DOCK EQUIPMENT SCHEDULE

B. Laminated-Tread Dock Bumper:

1. Thickness: 6 inches.
2. Horizontal Style: 10 inches high by manufacturer's standard dimension.

C. Recessed Dock Leveler:

1. Operation: Hydraulic operating system with multi-button remote-control station.
2. Rated Capacity: 25,000 lbs.
3. Platform Size: 1828 mm x 2438 mm (6 feet wide by 8 feet) in length.
4. Vertical Travel: Minimum working range of 300 mm (12 inches) above and 300 mm (12 inches) below adjoining platform.
5. Length of Lip Extension: 400 mm (16 inches) .
6. Compensation Capacity: Automatic vertical and lateral.
7. Platform: 5mm (3/16-inch)- thick, nonskid steel plate.
8. Hinged Lip: 16 mm (5/8-inch)- thick, nonskid steel plate.
9. Frame: Manufacturer's standard type.
10. Toe-Guard Range: Entire upper operating range.
11. Finish: Painted in manufacturer's standard color yellow color.

END OF SECTION 11160

SECTION 11530
CONTRACTOR FURNISHED AND INSTALLED LAB EQUIPMENT

1.00 GENERAL

1.01 SCOPE OF WORK:

A. THIS SECTION INCLUDES

1. Basis-of-design laboratory equipment that the Contractor is expected to furnish and install. Technical specifications follow in this Division and in Division 3.

2. The list includes:

   a. Fume Hoods and Exhaust Devices

   b. Biosafety Cabinets – Class II, Type A2 with Thimble Connection Accessory

   c. Laboratory Sterilizers

   d. Cage and Rack Washers

   e. Laboratory Overhead Service Carriers

   e. Controlled Environment Rooms

B. UNDIVIDED RESPONSIBILITY

Unless specified otherwise, because of special coordination requirements, the scope of work described in this Section shall be provided by the supplier of the Section 12355 METAL LABORATORY CASEWORK scope of work.

1.02 PRODUCTS NOT FURNISHED UNDER THIS SECTION

A. Class III Biosafety Cabinet or Glovebox - utility requirements need to be installed to more flexibility in accommodating a glove box with future research funding.

B. Individually Vented Cages and Rack System

1.03 DESCRIPTION

A. Provide laboratory equipment products, design and install ventilation and electrical systems for in a modular pattern for future flexibility.

B. Coordinate the delivery of equipment and components with the work of several subcontractors.

C. Supervise the start of building systems and field testing of equipment.

D. Witness the start-up and testing of key building systems.

B. Laboratory equipment and accessories shall be ordered and delivered factory pre-piped and pre-wired. Contractor shall comply with Division 1 section “Submittals”..

1.04 REFERENCE STANDARDS

A. Scientific Equipment and Furniture Association (SEFA), except as superseded by this specification.

B. NSF 49 – Biosafety Cabinet certification

C. National Fire Protection Association (NFPA 45) "Standard on Fire Protection for Laboratories Using Chemicals", latest version.

D. Biosafety in Microbiological and Biomedical Laboratories (BMBL), 2011 or latest edition, Department of Health and Human Services, Centers for Disease Control (CDC) and the National Institutes of Health (NIH).

2.00 PRODUCTS

Not Used.

3.00 EXECUTION

See Divisions 11, 12, and 13, specifications and basis of design product information

END OF SECTION 11531

SECTION 115313
FUME HOODS AND EXHAUST DEVICES

1.0 GENERAL

1.01 SCOPE:

A. THIS SECTION INCLUDES

1. Chemical Fume Hoods, including bench mounted hoods.
2. Safety alarm system.
3. Top of hood enclosures.

B. UNDIVIDED RESPONSIBILITY

Unless specified otherwise, because of special coordination requirements, the scope of work described in this Section shall be provided by the supplier of the Section 12355 METAL LABORATORY CASEWORK scope of work.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

Furnish fume hood pressure sensing devices to Division 15 for installation.

1.03 RELATED SECTIONS

A. Section 12355 METAL LABORATORY CASEWORK: Vent pipe from acid storage cabinets into fume hoods.

B. Division 15: Exhaust Ductwork and Connection to Exhaust Collar.

C. Division 16: Electrical Wiring to Fume Hood Junction Boxes.

D. Division 16: Properties of Lighting Fixtures and Lamps.

E. Division 15: Integrated Automation.

1.04 DESCRIPTION

A. Provide fume hoods, complete with accessories as described herein. Each Laboratory Module shall be provided with one fume hood nominally 1200mm wide.

B. Fume hoods with accessories shall be pre-piped and pre-wired.

1. Pre-piped service fittings to single point connection for each service at (150 mm) above top of hood or as otherwise shown. Cup sink tailpiece shall be provided with fume hood. Refer to details on Laboratory Furnishings drawings for service fittings. P-trap, waste piping and tailpiece extensions for cup sinks, if required, shall be furnished and installed by Division 15. Comply with Division 15 requirements for piping and installation requirements.

2. Pre-wire all electrical devices to junction box at top of hood. Provide wire terminal blocks and terminal identification. Comply with Division 16 requirements for electrical work.

3. Work of this Section requires close coordination with Work of other Divisions. Sequence all Work to ensure an orderly progress in the project without removal of previously installed Work and so as to prevent damage to finishes and products.

1.05 REFERENCE STANDARDS

A. Scientific Equipment and Furniture Association (SEFA), except as superseded by this specification.

B. Occupational Safety and Health Administration, Federal Register 29 CFR 1910, "Occupational Exposures to Hazardous Chemicals in Laboratories."

C. American National Standards Institute/American Industrial Hygiene Association (ANSI/AIHA Z9.5 "Standard for Laboratory Ventilation."

D. American National Standards Institute ANSI Z97.1 "Standard for Safety Glass."

E. NFPA 70 (NEC), Article 50.

F. National Fire Protection Association (NFPA 45) "Standard on Fire Protection for Laboratories Using Chemicals".

G. American Conference of Government Industrial Hygienists (ACGIH) ACGIH-2092S "Industrial Ventilation."

1.06 DESIGN AND PERFORMANCE CRITERIA

Where indicated on Laboratory Furnishings drawings, designated fume hoods shall be furnished and installed in a manner to make them accessible to the disabled in accordance with the Americans with Disabilities Act, Uniform Federal accessibility Standards, and any local building code or regulation having jurisdiction. The height of the highest point of access to the work surface above finished floor shall not exceed 34 inches. Fittings for piped services and electrical receptacles shall be of a design and in a location in order to be considered accessible.

A. Vertical sash operating position for 4 foot (1200mm) hoods: 18 inches (760 mm) from countertop.

B. Maximum Pressure Drop: 0.50 inch w.g. Submit certification.

C. Average Face Velocity: 80-100 feet per minute at operating sash position, with maximum allowable variance of 20 feet per minute, plus or minus, at any point.

D. Constant volume type shall have built-in automatic compensating bypass to maintain constant exhaust air volume, regardless of sash position. Provide low resistance directionally louvered panel in lintel bypass, so that as sash is lowered from opening to fully closed position, maximum increase in face velocity shall not exceed three times average velocity at operating position.

E. Variable air volume type shall have bypass sufficient in size to allow 25 percent flow with sash closed. Bypass must be achieved through low resistance opening at top of front lintel panel. Bypass shall be designed to provide a smooth down flow effect.

F. Entrance perimeter of hood shall have an airfoil or streamlined profile on top, sides and bottom. Provide a minimum one-inch space at bottom to allow passage of a three-prong electrical plug. Profile shall produce a constant air flow across countertop with minimal eddy effect.

G. Design hoods with sash enclosures, gasketed or sealed penetrations and connections as required to limit air leakage to 3 percent of design air flow quantities shown.

H. Rear baffles shall facilitate even air flow through all parts of open sash. Provide a fixed top slot, a fixed center slot, and a fixed bottom slot.

I. Countertop hoods shall have an interior vertical clearance of 48 inches (1200 mm) from a point 6 inches (150 mm) behind sash to 28 inches (700 mm) behind sash.

J. Classified area fume hood electrical requirements shall be in accordance with NFPA 70 (NEC), Article 500.

K. Octave band analysis

1. For fume hoods operating with a face velocity of 100 fpm, test data of octave band analysis verifying hood is capable of a 50 NC value when connected to a 50 NC HVAC source. Measurements shall be taken 915 mm in front of open sash, 1,525 mmabove the floor, at 0.51 m/s face velocity.

2. For fume hoods operating with a face velocity of 125 fpm, test data of octave band analysis, verifying hood is capable of a 50 NC value when connected to a 50 NC HVAC source. Measurements shall be taken <ENG>60 inches</ENG>1,524 m above the floor, in front of open sash at 0.64 m/s face velocity.

1.07 SUBMITTALS

Submit the following in accordance with Section 01100 SUBMITTAL PROCEDURES:

A. Shop Drawings

1. Coordinate shop drawing submittals of both this Section and Section 12352 METAL LABORATORY CASEWORK so that each recognizes and incorporates each others products.

2. Show dimensions, construction details, materials and gauges, electrical and power and control wiring diagrams, and vents from cabinets below where applicable. Show relationship to adjoining materials and construction. Shop Drawings shall be in the form of reproducibles or photocopies, not to exceed 11 inches by 17 inches (A3) in size. Blueline prints are not acceptable.

B. Product Data

Description of hoods, including construction details, materials, gauges, sash lock and release procedure, hardware cut sheets, piping of equipment and description of re-lamping procedures.

C. Samples

Finish and color samples, fittings, countertops, hardware and other samples to the extent requested.

D. Design Data

Fume Hoods: Seismic anchorage and attachment calculation

E. Certificates

1. Statement giving face velocity, operating volume and pressure drop at operating sash position for each size hood.

2. Certify that fume hoods will not exceed design maximum at specified operating conditions.

3. Fume hood testing: Submit certified ASHRAE 110 factory test results for

4. Four-foot Benchtop / Countertop constant volume bypass hood (vertical sash)

5. "As Manufactured" (AM) Fume Hood Testing in Manufacturing Facility: Provide certification that each type and size of fume hood has achieved an AM performance rating equal or better than 0.05 ppm and size of fume hood has achieved an AM performance rating equal or better than 0.05 ppm with 4.0 Lpm tracer gas release rate when tested in accordance with ASHRAE 110.

6. Fume Hood Sound Level Certification: Provide certification of fume hood compliance with design criteria for maximum allowable noise within laboratories.

7. Octave band analysis

8. Provide certification of fume hoods verifying hood is capable of a 50 NC value when connected to a 50 NC HVAC source as specified.

9. Demonstration and Instruction Statement from Government.

F. Operation and Maintenance Data

Operating and maintenance manuals - Submit for review and Government's use, complete operating and maintenance manuals. Manuals shall be approved and available for use during instruction.

1.08 QUALITY ASSURANCE

A. Coordinate work of this Section with Section 12352 METAL LABORATORY CASEWORK.

B. Provide interface products of style, material, finish, and color in order to produce a homogenous installation.

C. Unless specified otherwise test and rate performance in accordance with ANSI/ASHRAE 110 Method of Testing Performance of Laboratory Fume Hoods.

D. Fume Hoods shall be UL tested and labeled and conform to Class A requirements of ANSI/AIHA Z9.5 Laboratory Ventilation.

1.09 QUALIFICATIONS

Work in this Section shall be manufactured by a firm having a minimum eight (8) years documented project experience, and an established organization and production facilities including all tools, equipment and special machinery necessary for specializing in the fabrication and installation of the type of equipment required with skilled personnel, factory trained workmen and an experienced engineering department. Each shall have the demonstrated knowledge, ability and the proven capability to produce the specified equipment of the required quality and the proven capability to complete an installation of this size and type within the required time limits.

1.10 MANUFACTURER'S FACTORY TEST FACILITY

Company maintaining a factory test facility which provides variable exhaust and make-up air control. A facility that provides fume hood make-up air using floor-to-ceiling wall diffusers is not acceptable. Test facility shall contain, as permanent equipment, ANSI/ASHRAE 110 testing equipment as specified for performance testing.

2.0 PRODUCTS

2.01 ACCESSIBILITY FOR THE PHYSICALLY DISABLED

Where indicated on Laboratory Furnishings drawings, fume hoods shall be furnished and installed in a manner to make them accessible to the disabled in accordance with the Americans with Disabilities Act and any state or local building code or regulation having jurisdiction. The height of the highest point of access to the work surface above finished floor shall not exceed 34 inches. Fittings for piped services and electrical receptacles shall be of a design and in a location in order to be considered accessible.

2.02 MATERIALS

A. Sheet Steel
ASTM A 1008/A 1008M-07a high quality mild cold rolled and leveled.

1. Minimum Thickness: 1.2 mm.

B. Stainless Steel
ASTM A 240/A 240M Type 304, except use Type 316 18-8 where shown or specified.
1. Minimum Thickness: 1.6 mm.

C. Welding: All stainless steel welding material shall be of similar type to sheet material.
1. Welds shall be made without discoloration, ground, polished, and passivated to blend with a NAAMM MFM No. 4 finish.

D. Glass
1. Laminated safety glass, ANSI Z97.1, 7/32 inch thick, clear.

E. Countertops
1. Cast epoxy resin with marine edge. Factory-molded, modified epoxy resin formulation. Uniform mixture throughout with smooth, non-specular finish.

F. Fume Hood Liner and Baffle
1. Polyresin. Reinforced polyester panel, smooth finish and white color in final appearance. Flexural strength: 96.53 mPa. Flame spread: 15 or less per UL 723 and ASTM E 84. Baffle shall be same material as liner. Liner thickness: 4.76 mm; Baffle thickness: 6.35 mm, minimum.

G. Service Fixtures
1. Remote control type, chrome plated, color coded. Cold water fixtures shall have remote vacuum breakers. Follow Section 12 35 53.13 METAL LABORATORY CASEWORK.

H. Electrical Receptacles and Switches
1. 3-wire, 20-amp, 220/380V AC with stainless steel face plates.

I. Wiring
1. Minimum No. 12 gauge. Follow Division 26.

J. Light Fixtures
1. T8 fluorescent lamps with electronic ballasts, and control via switch on face of fume hood.

K. Instruction Plate
1. Corrosion resistant or plastic plate attached to the fume hood exterior with condensed information addressing the recommended locations for apparatus and accessories, baffle settings, if adjustable, and use of sash.

2.03 COUNTERTOP FUME HOODS

A. General

Fabricate exterior parts of fume hoods from sheet steel. Where backs of hoods are exposed to view, finish backs flush.

B. Sash

C. Clear-view sash, providing a clear and unobstructed side-to-side view of fume hood interior and service fixtures.

D. Laminated safety glass; stainless steel frames; acid resisting gasketing or sealant.

E. Fully recess sash tracks.

F. Bottom sash rail with integral, formed, full width, flash pull. Form rail to accept lead weights for fine balancing for exact and positive operation.

G. Rear-hung, trackless counterweight system to prevent tilting, binding and creeping of sash. Include pulley-cable configuration to retain sash in event of breakage of either side cable.

H. Provide sash travel stop to limit vertical opening to operating sash position specified under Design and Performance Criteria. Sash stop shall have a releasing device to allow full sash opening for equipment setup and/or cleaning. Limiting device shall automatically reset when sash is lowered back to below operating sash position.

2.3.3 Front Bottom Air Foil

16-gauge stainless steel.

2.3.4 Baffles

Baffles shall be fixed and non-adjustable. Baffles shall be removable for cleaning.

2.3.5 Interior Fastening Devices

Stainless steel.

2.3.6 Exhaust Outlet Collars

Follow Division 15.

A. 20-gauge Type 316L stainless steel when connecting to welded stainless steel ductwork system.

B. Type 304 stainless steel when connecting to sealed ductwork system.

2.3.7 Superstructure

Double wall construction with outer shell of furniture steel and inner liner as specified. Maximum wall thickness; 5 inches (127 mm).

A. Conceal service fixture piping in double wall construction. Provide removable access panels on both sides of hood interior.

B. Pre-punch front fascia panels on each side to receive remote controls for service fixtures. Provide stainless steel plug buttons for holes not used.

2.3.8 Bypass Grill

Low-resistant type 1.27 mm steel with upward directional louvers.

2.3.9 Work Surface

32 mm dished epoxy resin, in compliance with Section 12352 METAL LABORATORY CASEWORK requirements. Color: Grey.

2.3.10 Interior Liner

Fasten liner material to a 16-gauge by 32 mm U-channel, frame, continuous along each edge where different liner panels are joined. Do not use L-shaped discontinuous angles for joining liner segments.

2.3.11 Fume Hood Sash

A. Vertical Sash: Full-view, with clear, unobstructed, side-to-side view of fume hood interior and service fixture connections. Sash to have a 890 mm nominal, sight line and a 724 mm, nominal, vertical access height.

C. Counter balance system.

D. Single weight, cable and pulley, counter balance system to prevent sash tilting and permit ease of operation at any point along full width pull. Maximum 3kg pull required to raise or lower sash throughout its full length of operating sash opening.

E. Design system to hold sash at any position without creep and to prevent sash drop in the event of cable failure.

F. Sash shall have the capability to be raised to full 724 mm, nominal, vertical opening for loading or unloading of large apparatus.

G. Sash stop: To allow manual override with automatic reset for an 457 mm sash opening.

2.3.12 Lighting

A. Factory installed maximum length, UL approved, double lamp fluorescent fixture in hood roof.

B. Design for 1020 lumens at countertop.

C. Isolate fixture from hood interior with safety glass panel and vapor tight seal.

D. Include lamps and switch with fixture.

E. Arrange fixture enclosure in such manner to permit easy relamping from outside of hood.

2.3.13 Electrical Devices

Factory install electrical devices and wire to terminal box on hood roof. Provide wire terminal blocks and terminal identification.

2.3.15 Electrical Fixtures

Factory install electrical fixtures to standard junction box on top of hood, except when box in required to be located in base cabinet under hood.

2.3.16 Finish

As specified under Section 12352 METAL LABORATORY CASEWORK.

2.3.17 Exterior Color

As selected by Architect from manufacturer's full color line and complying with finish requirements.

2.3.18 Safety Label

Provide self-adhesive polyester label, as described on the drawings. Labels shall indicate safe operating conditions with respect to fume hood sash position. Labels solely indicating 100 fpm face velocity sash position are not acceptable. Manufacturer: Lab Safety Supply, Inc. or approved equal.

2.04 CANOPY HOODS

2.4.1 Construction

Ceiling bulkhead of finished gypsum board on steel channels.

2.4.2 Lining

Epoxy paint finish on moisture-resistant gypsum board.

2.4.3 Condensation Gutter

2.4.4 Exhaust Collar

Corrosion resistance equal to canopy hood liner material. Make collar airtight with no open seams.

2.5 SAFETY ALARM SYSTEMS

2.5.1 Constant Volume - Standalone Monitor Only

A. Manufacturers:

1. TSI, Model 8610-AS Everwatch;
2. Siemens Series FHM-546-00303;
3. Tek-Air Series FYC-2500;
4. Tritek Series HMS-1600;
5. Or equal.

B. Alarm shall signal an unsafe operating condition when face velocity falls below a pre-set level. System shall consist of:

1. Digital display to register face velocities between 0 and 150 feet per minute. Include transformer, if required, to power monitor. Provide transformer with fuses on primary and secondary sides.
2. Audible alarm emitting sound level not less than 85 dB.
3. Green LED indicator for "normal" operation.
4. Red LED indicator with audible alarm for both high and low alarm.
5. Audible alarm silencer switch, with yellow LED indicator for mute. Operation of switch shall not cancel red warning light.
6. Test mode to simultaneously test LED function and alarm set-point.
7. Reset button.
8. Face velocity sensor; ceramic coated platinum RTD, temperature compensated over a range of 55-95 degrees F, and capable of measuring velocities between 0-1000 feet per minute.

9. High and low alarm contacts for remote monitoring.

C. Provide all hardware required for sensing ports on inside side wall of fume hood and external of the fume hood for room pressure reference. Install face velocity monitor in accordance with the manufacturers recommendations.

D. The fume hood monitor shall accept a dry contact closure from BMS to reset face velocity setpoint to a reduced unoccupied setpoint. The alarm setpoints shall also be reset, such that a nuisance alarm is not generated when the flow setpoint is increased or decreased.

2.5.2 Variable Volume - Flow Control Through Building Monitoring System (BMS)

A. Provide a cutout for an operator display panel which shall be provided by the BMS contractor and installed on the front of the fume hood.

B. The BMS shall control the exhaust air terminal to maintain the face velocity at setpoint.

2.6 TOP OF HOOD ENCLOSURES

Sheet steel enclosures above fume hoods to 3 inches above finished ceiling. Follow standards specified for metal laboratory casework under Section 12 35 52 METAL LABORATORY CASEWORK regarding gauges, construction and finish. Make enclosures removable.

2.7 VERTICAL SASH ENCLOSURES

A. Provide sheet metal enclosure to completely encase vertically operated sash when sash is in full open position.

B. Enclosure shall prevent air or fume leakage into ceiling plenum space above fume hoods. Provide resilient gaskets as required.

C. Enclosure shall be easily removable and replaceable to allow access to light fixture housing.

2.8 FACTORY PERFORMANCE TESTING PROCEDURES

A. Provide two week notice of scheduled testing. Testing to be witnessed by parties designated by the COR.

B. Test one hood of each design and size in accordance with ANSI/ASHRAE 110. Submit certified test results. Fume hoods tested to be first ones of type and size manufactured for this project.

C. Test Conditions: Test hoods with ceiling supplied make-up air in a test area where face velocity temperature and room air flow can be monitored and documented.

D. Testing to include all provisions identified in latest ASHRAE 110 standard.

E. Demonstrate compliance to ANSI/AIHA Z9.5, Class A, as manufactured (AM) requirements.

2.9 FINISHES AND COLORS

Steel: Manufacturer's standard chemical resistant, satin finish, baked or power coat enamel follow A7 Series drawings for colors.

3.0 EXECUTION

3.1 SITE CONDITIONS

A. Prior to installation of the Work of this Section, carefully inspect the installed Work specified in other sections and verify that all such Work is complete to the point where this installation may properly commence.

B. Verify that all Work has been installed in complete accordance with the original design, received submittals, and the manufacturer's recommendations.

C. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATIONS

A. As specified under Section 12352 METAL LABORATORY CASEWORK.

B. Coordinate with Section 12352 METAL LABORATORY CASEWORK for venting base cabinets into fume hood plenums.

C. Provide separate vent pipe from acid and non-flammable storage cabinets to 6 inches above countertop. Locate behind rear baffle plenum of fume hood.

3.3 MANUFACTURERS FIELD SERVICES

A. Balancing Agency under Division 15 shall provide technical evaluation and approval of test methods and procedures. Provide two week notice of testing to all parties.

B. Field test:

1. Each fume hood to ASHRAE 110 test standards.
2. Demonstrate compliance to ANSI/AIHA Z9.5, Class A, as installed (AI) requirements.

C. Program, calibrate and adjust all tuning parameters setpoint data, and hi/low alarms for each face velocity monitor after deserved face velocity has been set and measured. Verify

operation of alarms at set values. Coordinate with Division 23 and verify operation of alarm setpoint reset, based on unoccupied signal from Division 23.

D. Adjust interior baffles to produce a uniform velocity of 30 - 48 m per minute at hood face. Take velocity readings to verify.

E. Verify exhaust air quantity does not exceed design, plus allowable leakage.

F. Verify hood pressure drop does not exceed specified criteria.

G. Adjust and retest hoods that do not meet specified performance.

H. Replace hoods which do not meet standards after repetitive testing.

3.4 MAINTENENCE MANUALS AND INSTRUCTIONS

A. Manufacturer's representative to provide 2 hours of instruction. Videotape instruction showing recommended operation and maintenance of each type of hood specified.

B. Operating and maintenance manuals: Accompanying certification, submit for review and Government's use, complete operating and maintenance manuals that describe proper operating procedures, maintenance and replacement schedules, component parts list, wiring diagrams, and closest factory representative for components and service.

3.5 ADJUSTING, CLEANING, AND PROTECTION

A. Repair or remove and replace defective work as approved by the Architect upon completion of installation.

B. Adjust all moving or operating parts to function within their design parameters.

C. Clean equipment, touch up as required.

D. Protect all units before, during, and after installation. Damaged materials due to improper protection shall be cause for rejection.

END OF SECTION 11531

SECTION 11534
CLASS III BIOLOGICAL SAFETY CABINETS

SEE SECTION 01230 – ALTERNATES.
PRICING FOR PRODUCT AND SERVICES UNDER THIS SECTION IS NOT REQUIRED FOR BASE BID PROPOSAL EVALUATION.

1.00 GENERAL

1.02 SCOPE OF WORK

A. Section Includes
   1. Class III Biosafety Cabinet
   2. In line Pass-through chamber.
   3. Rapid Transfer Ports in stainless steel access doors.

B. Related Sections - Section 01800 COMMISSIONING.

1.03 REFERENCES AND STANDARDS

The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN GLOVEBOX SOCIETY (AGS)
AGS-G0001 (2007) Guideline for Gloveboxes, Third Edition

CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)
CDC BMBL (2007) Biosafety in Microbiological and Biomedical Laboratories, 5th Edition and latest online updates.

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)
NAAMM MFM (1988) Metal Finishes Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
NFPA 70 (2007) National Electrical Code - 2008 Edition

1.04 QUALITY ASSURANCE

A. National Institutes of Health (NIH)
National Cancer Institute, Office of Research Safety, and the Special Committee of Safety and Health Experts, "Laboratory Safety Monograph: Supplement to the NIH Guidelines for Recombinant DNA Research", current edition.

B. Centers for Disease Control/National Institutes of Health (CDC/NIH)
   1. CDC BMBL: Biosafety in Microbiological and Biomedical Laboratories (BMBL), current edition.
   2. Primary Containment for Biohazards; Selection, Installation and Use of Biological Safety Cabinets, 2nd Edition, September 2000.

1.05 SYSTEM DESCRIPTION

A. Class III BSC System will consist of one complete line as follows:
   1. Single-sided working compartment with in-line dunk tank, two rapid transfer ports (RTP); one on left side end of unit to permit docking of canister from clean corridor outside containment, and one on side of unit to permit removal of product from dunk tank.
   2. Owner will require ability to use a Microscope within the glovebox.
      a. Provide two sealable, gasketed penetrations through exterior case for cable connections between lenses and remote viewing monitors.
      b. Basis of design (BOD) microscope is the Olympus BX51 polarized microscope with narrow-band 365 nm fluorescence capabilities. BOD microscope to be equipped with Smiths Detection Fourier transform infrared (FT-IR) IllunimatiR attachment for micro-FTIR analyses.
      c. BOD set-up to include a camera accessory to share imaging with remote computer set-up outside the containment area.

1.06 DESIGN AND PERFORMANCE CRITERIA

A. Design Criteria
   1. General
      Custom design Class III BSC system, conforms with the definition of Class III Biological Safety Cabinets found in the Laboratory Safety Monograph published by the National Institutes of Health, January 1979, CDC/NIH BMBL, and Primary Containment for Biohazards; Selection, Installation and Use of Biological Safety Cabinets.
   2. Decontamination Methods
      a.. Interior and exterior surfaces able to withstand chlorine dioxide, vaporous hydrogen peroxide (VHP) and formaldehyde gas decontamination.
      b. Design each system for decontamination using chlorine dioxide, vaporous hydrogen peroxide (VHP) and formaldehyde gas generator apparatus.

B. Ergonomics
   1. The glove ports are located lower on the viewscreen for comfort based on the heights of male and female staff.
   2. Sloped viewscreens, RTPs, access doors and method of operation, portability of animal transfer cart, accessibility of internal and external services
   3. Provide casters for transport and access behind cabinet

C. Performance Criteria
   1. Leak Tightness - Goal is to have a tight enclosure where leakage will not exceed a leak rate of 1 x 10-5 cc/sec at 3 inches W.G. pressure, with cabinet containing 100 percent halide gas (SF6).
      Since test concentration of halide gas is 1 percent, detector would be operated at a sensitivity of 1 x 10-7 cc/sec to account for dilution of test gas.

2. Filter Efficiency - HEPA filters certified to have filtration efficiency of 99.99 percent for 0.3 μm particles.
3. Rapid Transfer Port (RTP) - To achieve repeated sealability to Class III leak tightness standards.
4. Biosafety Cabinets Connected to Containment Barrier System - Capable of becoming integrated into a room that shall be tested for air tightness as specified in Section 01457 ROOM INTEGRITY TESTING.

D. Seismic Performance - Withstand effects of earthquake motions by bracing.

1.07 EARLY SUBMITTAL PACKAGE

A. Complete material for evaluation is requested - when submitted with bid proposals under Section 01230- Alternate.

B. Documentation verifying all specification requirements will be met.
1. Utility requirements: Mechanical and electrical services have been designed for the services and loads as described herein. If a manufacturer requires in excess of the services indicated, either or type, size, quantity or quality, that cost will be borne by the Contractor and shall not be justification for a change order. All products specified in this section shall be provided by a single manufacturer for integration into the fabricated Class III biosafety cabinet.
2. Compliance with all reference requirements and performance tests.

C. Manufacturers' qualifications.
1. Company specializing in design and manufacture of products specified, with minimum documented successful experience in the manufacture of Class III biological safety cabinets as follows:
   a. BSC and pass-through compartment: 10 years.
   b. Rapid Transfer Port: 10 years.
2. Provide evidence of successful product support for in-house manufactured parts and outside vendor supplied items.
3. Provide evidence of ability to perform required system testing.
4. Written references from three clients who were supplied Class III gloveboxes by the manufacturer.
5. Evidence of ability to furnish and install the equipment as specified in this section at the specified project location.

D. Concept drawing with sufficient design details to permit a technical review. Adherence to general layout, scope of operations, and specifications will be essential to proper evaluation.

E. Dunk Tank: Provide detailed documentation including requirements for connection to Class III BSC.

F. Clarification documents as required, indicating, but not limited to the following:
1. Specific materials, components, and systems.
2. Connection of pass-through compartment to containment barrier panels.
3. Ergonomic relationships including location and orientation of glove ports, sloped view screens, RTPs and access doors with method of closure, portability of animal

transfer carts, accessibility of internal and external services, and human inter-relationships.

4. Performance characteristics.
5. Provide minimum clearance dimensions for installation and removal of equipment including considerations for rigging.
6. Furnish evidence of BSCs' and containment barrier systems' ability to meet air tightness requirements specified in Section 01457 ROOM INTEGRITY TESTING.

1.08 SUBMITTALS

The following shall be submitted in accordance with Division 1 - SUBMITTAL PROCEDURES:

A. Preconstruction Submittals
   1. Provide early submittal package within 90 days after Notice to Proceed.
   2. Proceed with submittals indicated below only after information listed under Early Submittal Package has been approved by the Government.

B. Shop Drawings
   1. Class III Biological Safety Cabinet lines - Show materials, complete construction details, fittings, duct connections, filters and other information necessary to fully describe each unit and its installation.
   2. In preparing shop drawings, fabricator shall verify that component parts and assembly of each item will support superimposed loads, without deflection detrimental to function, appearance and safety. Ensure compliance to seismic requirements. Indicate:
      a. Connection of dunk tank cleaned cleaned specimen container to BSC by way of RTP.
      b. Connection of clean incoming specimen container to stainless steel entry door by way of RTP.
      c. Connection of BSC pass-through compartment to containment barrier panel (containment barrier systems).
      d. Connection and interface details for sterilizer, pass-through compartment, RTPs, and dunk tank including bolt pattern, gaskets, etc.
      e. Installation details.
      f. Performance and technical characteristics.
      g. Interior and exterior finishes.
      h. Interior and exterior dimensions and required clearances, including clearances for access and service, and mechanical and electrical requirements.
      i. Rough-in of water, waste, electrical power and other services to which connections are to be made. Show entire assembly including wiring, piping and ductwork service requirements.

C. Product Data - Class III Biological Safety Cabinet
   1. Show test designs, performance charts, including battery pack.
   2. Submit manufacturers' installation instructions.

3. Sample warranty.

D. Samples - Class III Biological Safety Cabinets
   1. Duplicate 6-inch long typical interior corner weld of BSC.
   2. Representative size removable view screen door and gasket, showing corner condition.

E. Test Reports

   Testing
   1. Submit certified test reports indicating compliance with specifications for specified performance characteristics and physical properties.
   2. Submit list of testing protocols and procedures for approval before conducting tests.
   3. Submit proposed Test Report document for complete assemblies for approval prior to conducting tests.
   4. Start-up Report: on-site certification report for each unit.

F. Certificates
   1. Statement of Manufacturer Qualifications.
   2. Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
      a. Certify that factory and field tests have been performed and that Work meets or exceeds specified requirements.
      b. Certify that each Class III unit meets or exceeds requirements of Laboratory Safety Monograph leak tightness factory and field tests.

G. Operation and Maintenance Data
   1. Description of equipment operation and control, motor control and alarm systems.
   2. Recommended procedures, maintenance instructions, and recommended maintenance schedule.
   3. Wiring diagrams showing separate circuits for outlets, lights and blowers.
   4. Details of operation, service and maintenance.
   5. List of recommended spare parts.

H. Closeout Submittals - Special Warranty -as specified in this Section.

1.09 QUALITY ASSURANCE

A. UL Listed Components

   Use UL listed components according to NFPA 70 National Electric Code or Government-approved international accreditation for electrical components..

B. Manufacturer Qualifications
   1. Company specializing in design and manufacture of products specified, with minimum documented successful experience in the manufacture of Class III biological safety cabinets as follows:
      a. Class III BSC and pass-through compartment: 7 years.
      b. Rapid Transfer Port: 7 years.
   2. Provide evidence of successful product support for in-house manufactured parts and outside vendor supplied items.

3. Provide evidence of ability to perform required system testing.

1.10 DELIVERY, STORAGE AND HANDLING

A. Package or crate, and brace products to prevent damage or distortion of equipment in shipping and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings or equivalent protection. Provide temporary skids under large or heavy units.
B. Provide equipment or its parts ready for installation in accordance with construction schedule. Verify required delivery date sufficiently before delivery to ensure that construction is not delayed. Do not deliver products to site until conditions are such that no damage will occur to them while in storage.
C. Store equipment at site in a manner to prevent damage to equipment.
D. Uncrate equipment only immediately prior to installation.

1.11 POST AWARD MEETING

A. Within 120 days after award of project a post award meeting shall be held among biological safety cabinet manufacturer, Government, and Contractor.
B. The meeting will include manufacturer's sales representative, manufacturer's design engineer and manufacturer's field installer.
C. Purpose of the meeting will be to review physical requirements for Class III cabinet lines including but not limited to:
    1. Physical requirements, service requirements, and rigging requirements for installation in the facility.
    2. Connection details between:
        a. BSC pass-through compartment and containment barrier panel.
        b. BSC and dunk tank.
        c. BSC and microscope.
        d. Rapid transfer port and stainless steel window panel.
        e. BSC exhaust duct to exhaust system.
    3. Other design and installation issues related to BSC line design and installation, including but not limited to containment barrier system detailing.

1.12 COORDINATION

A. Provide items required to be cast into wall for containment barrier seal.
B. Coordinate integration of Owner’s sterilizer into cabinet line.
C. Coordinate connection details of animal transfer cart and stainless steel door with stainless steel door manufacturer.

1.13 WARRANTY

A. Special Warranty -
Warrant Class III cabinet systems for 10 years from Beneficial Occupancy Date.

1.14 COMMISSIONING

Follow Division 1 for commissioning requirements related to this Section.

2.00 PRODUCTS

2.01 MANUFACTURER

A. Manufacturers
Subject to compliance with specified requirements, acceptable manufacturers include but are not limited to: The Baker Company, Germfree, Getinger / La Calhene or equal.

2.02 FABRICATION - WORKING COMPARTMENTS AND PASS-THROUGH COMPARTMENTS

A. General
1. Configuration: Double-sided. Front is working side with gloveports. Back is viewing side to permit visibility from interior windows to clean corridor outside containment.
2. Stainless steel construction, Type 316L, NAAMM MFM No. 4 finish, minimum 11 gauge, fully welded, with the exception of view screens and gloves.
3. Radius inside corners and joints minimum 15 mm radius for cleanability.
4. Welded, gasketed and/or hermetically seal joints. Sealant joints are not permitted.
5. End panels: Integrally welded to cabinet with radiused corners.
6. Gaskets at doors, windows, etc: compatible with chlorine dioxide, VHP and formaldehyde gas, approved by AE.
7. Fabricate cabinet and components in sections as required to fit through available building access (doors, corridors, service elevator) for site assembly. No on-site welding permitted.
8. Provide continuous surfaces inside cabinet to ensure ease of cleanability and decontamination.
9. Surfaces, welds, and connections: smooth, to minimize chance of puncturing personal protective equipment.

B. Pass-through Compartment
1. Nominal dimensions: 760 mm deep by 760 mm long.
2. Work area height: 840 mm.
3. Floor to work surface height: Nominal 916 mm.
4. Height to centerline of gloveports: 1219 mm.
5. Liquid chemical decontamination. Provide two-cycle chemical shower process. Cycle one: Atomizing chemical disinfectant shower. Cycle two: Water rinse cycle. Provide piping and atomizing nozzles for chemical cycle, piping and nozzles for rinse cycle, and drain.

6. Provide two non-handed oval glove ports.
7. Connect Compartment to wall assembly by bioseal.

C. Working Compartment
1. Nominal dimensions: 760 mm deep by 1372 mm long.
2. Work area height: 840 mm.
3. Floor to work surface height: Nominal 916 mm.
4. Height to centerline of gloveports: 1219 mm.
5. Provide two non-handed oval glove ports.
6. 457 mm x 457 mm clear opening gastight guillotine door into Pass-through Compartment operable from Working Compartment.
7. Hinged cabinet front to accommodate changing and maintenance of aerosol delivery equipment.

D. View Screen and Glove Ports
1. View Screen on Working Side
   a. 10 mm thick laminated safety glass, sealed in stainless steel gasketed frame, bolted to cabinet front, except 10 mm thick polycarbonate for section of view screen accommodating RTP.
   b. Angle: Sloped at 10 degrees from vertical in accordance with AGS-G0001.
   c. Cover bolts with stainless steel studs with acorn caps.
2. View Screen on Non-working Side
   a. 10 mm thick laminated safety glass, sealed in stainless steel gasketed frame, bolted to cabinet front.
   b. Angle: Sloped at 10 degrees from vertical in accordance with AGS-G0001.
   c. Cover bolts with stainless steel studs with acorn caps.
3. Glove Ports
   a. Non-handed 203 mm oval glove ports with single-piece sleeve and glove, complete with stainless steel glove port covers. Orientation to be determined in conjunction with Government at time of mock-up.
   b. Double groove glove port rings: stainless steel, removable. Nominal spacing of glove ports: 457 mm o.c.
   c. Gloves: Capable of changing without breaking containment.
   d. Provide two pairs of gloves for each port; material selection to be determined by Government.

E. Dunk Tank
1. Integral chemical-, corrosion-, and scratch-resistant dunk tank with operable lids inside and outside BSC working compartment, for material transfer.
2. Maintain 300 by 300 by 300 mm operable access path.
3. Provide stainless steel drain and cap (ball valve?).
4. Size dunk tank to allow for baffle to be submerged minimum 4-inches in liquid contents. Locate dunk tank at end of BSC or as directed otherwise.

F. Base Stand
1. Fully welded stainless steel angle frame, capable of supporting fully loaded BSC.

2. Each leg able to be leveled independently.
3. Meet seismic requirements.
4. Complete with drop-down or retractable stainless steel shelf, size to accommodate laptop computer.

G. Air Flow -

Type of air flow: Laminar.

1. Inlet and Exhaust Air Plenums
   a. Integral air supply and exhaust system balanced to provide 0.5" W.G. negative pressure relative to room. Inlet and exhaust air plenums will contain blower/fans, and manually adjustable and locking gastight dampers (at 2 inches W.G. pressure).
   b. 100 percent exhaust air.
   c. Size of connection to be determined in cooperation with manufacturer.
2. Filters
   a. Fiberglass or washable polyurethane pre-filter with 69.6 percent average arrestance per standard AFI test. Provide removable access from cabinet exterior.
   b. Supply and exhaust: Scan-tested zero-probe HEPA filter 99.99 percent efficient on 0.3 micron particles by DOP test, serviceable and removable from exterior of unit without disconnecting ductwork.
      1). Supply air: Single HEPA filter. Utilize room air to supply cabinet.
      2). Exhaust air: Double in-line HEPA filters. Connected to dedicated BSL-3 Class III exhaust.
3. Decontamination
   a. Provide gastight manual dampers on each side of filter housings of working compartment and pass-through compartment to isolate filters.
   b. Provide supply and return connection ports to facilitate VHP and formaldehyde gas decontamination of each specific zone as follows:
      1). Supply HEPA filter.
      2). Exhaust HEPA filter(s).
      3). Working compartment.
      4). Pass-through compartment.

H. Controls and Connections

On one side of cabinet (location to be determined at shop drawing stage).

I. Illumination
1. Externally mounted fluorescent lighting fixture producing 1000 lux at work surface.
2. Serviceable from exterior.
3. Controls on outside of cabinet (location of controls to be determined at mock-up stage).

J. Interior Electrical Requirements
1. One 120V, 15 Amp duplex receptacle inside pass-through chamber. Two 120 V, 15 Amp duplex receptacles inside working chamber.
2. Sealed penetrations.

3. Each receptacle separately switched from instrument panel, with light indicating "ON" position.
4. Weatherproof covers and receptacle cords.
5. Quantity: Three.
6. Location: Determined for bench instrument.

K. Cabinet Electrical Requirements
1. 230 VAC, 20 amps, 1 phase, 50 Hz, hardwired supplied with junction box(es).
2. Provide instrument panel with 15 amp circuit breaker.
3. Operator controls to provide breaker switches for 4 places. Include switches for blower, light, mute (sound), audible alarm.

L. Bulkhead Fittings for Electrical and Mechanical Services
1. Bulkhead connectors with elastomeric seals that are easily and cleanly removable and reusable.
2. Penetrations using applied sealants are not permitted.
3. Standard blank-out plugged penetrations for future fittings must be sealed gas-tight.
4. Type and quantity of mechanical fittings: Refer to Mechanical specifications and drawings.
5. Shut-off valves: Provide stainless steel full port ball valves inside and outside BSC for air, water and vacuum services.
6. Pressure regulators: Provide stainless steel pressure regulator, 0 – 100 psi, inside BSC for air service only.
7. Location of fittings and services to be determined during mock-up period.
8. Provide vacuum services with double liquid trap and double hydrophobic HEPA filter capable of being decontaminated, on outside of BSC.

M. Monitoring Points
1. Provide industry standard analog outputs (4-20mA) signal for remote monitoring of each pass-through compartment, and working compartment's temperature, humidity and differential pressure levels.
2. Pressure transmitter shall measure interior cabinet pressure with reference to room pressure.
3. Provide clearly labeled terminal strip for connection of these signals to building monitoring.

N. Accessories - Provide the following:
1. Gastight inlet air shut-off valve.
2. Photohelic pressure gauge for continuous monitoring of cabinet pressure, complete with in-line HEPA filter and switches. Built in pressure sensor alarm with upper and lower settable pressure control set point limits. Audible and visual alarms. Digital and analog readout for local and remote monitoring.
3. Two (2) penetrations terminate in internal hose barb connections with ball valves..

2.03 RAPID TRANSFER PORT (RTP) TRANSFER DEVICES

A. General
Rapid transfer ports, canisters, alpha and beta flange assemblies installed in Class III biological safety cabinets to be products of a single manufacturer.

B. Rapid Transfer Port (RTP)
1. Used for transferring items to/from BSC in a canister. Subject to compliance with specified requirements, acceptable products include but are not limited to: Rapid Transfer Port by Central Research Laboratories, DPTE by la Calhène.
2. Manually operated, and mechanically interlocked rotating alpha flange assembly on BSC and beta flange assembly. Interlocks shall prevent operation of RTP door when beta assembly is not docked, or when port door is open.
3. Gasketed and gastight design for repeated closures.
4. Provide door key for canister.
5. Size:
   a. RTP1: 190 mm diameter complete with 300 mm long stainless steel canister or container.
   b. RTP2: 457 mm diameter complete with 300 mm long stainless steel canister or container.

2.04 CONTAINMENT BARRIER SYSTEM

A. Gastight system consisting of mild steel or stainless steel wall frame (channel) cast into wall construction, stainless steel angle frame, silicone gasket, and 1/4 inch stainless steel plate containment barrier. Provide stainless steel threaded studs, acorn nuts and washers to attach gasket and stainless steel plate. Ship wall frame in advance of BSC for casting into the barrier wall

B. Through the containment barrier system, BSCs shall become integrated into a room that shall be tested for air tightness as described in specification Section 01457 ROOM INTEGRITY TESTING. Furnish evidence of containment barrier system's ability to meet this requirement with early submittal package and shop drawing submittal. Refer to Part 3 Field Quality Control.

2.05 SOURCE QUALITY CONTROL

A. Shop Testing
The Owner has the right to witness shop testing. Notify the Owner minimum two weeks in advance of testing.

B. Third Party Testing
The Owner reserves the right to require third party testing, paid for by the manufacturer, for products of manufacturers unfamiliar to the Owner.

C. Test Passing and Gaining Acceptance
Should tests fail, adjust units as required to pass tests and gain acceptance. Manufacturer shall pay for all costs (including travel, meals, accommodation, etc.) for Government and AE to witness re-testing.

D. Factory Tests
   1. Perform Leak Tightness Test of assembled cabinet line at factory before shipment to site.
      a. Cabinet pressure test to verify continuous operation at specified negative operating pressure.
      b. Test in accordance with the Laboratory Safety Monograph test procedures; leakage shall not exceed a leak rate of 1 x 10-5 cc/sec at 3 inches W.G. pressure, with cabinet containing 100 percent halide gas (SF6). Since test concentration of halide gas is 1 percent, detector shall be operated at a sensitivity of 1 x 10-7 cc/sec to account for dilution of test gas.
   2. HEPA filter integrity test.
   3. Electrical testing.
   4. Alarm and interlock testing.

E. Components and Systems Factory Tests
   Perform factory tests on components and systems as follows
   1. Working compartment as a stand-alone unit.
   2. Working compartment in combination with microscope access and viewing.
   3. Pass-through compartment as a stand-alone unit.

3.00 EXECUTION

3.01 EXAMINATION

A. Prior to Commencement of Installation
   Prior to commencement of installation, ensure mounting devices, members and surfaces are satisfactory for fitting, and adequate for securing of work.

B. Site Measurements
   Take site measurements of construction to which Work of the Section must conform, and through which access must be made, before Work is delivered to site, to ensure that adaptation is not required which would result in construction delay.

3.02 INSPECTION

A. Supply and Exhaust Duct Terminations
   Verify that supply and exhaust duct terminations are in place and that support systems are functioning.

B. Field Dimensions
   Verify field dimensions for fabrication of cabinets.

3.03 INSTALLATION

A. Manufacturer's Recommended Specifications
Install Work to meet manufacturer's recommended specifications, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

B. Hardware and Fasteners
1. Work shall include rough hardware, fastenings and other items necessary for secure installation.
2. Use only fastening suitable for materials.

C. Prevent Distortion or Displacement
Install Work straight, plumb, level, and secured to prevent distortion or displacement.

D. Securing HEPA Filters and Ventilation Connections
Secure ventilation components to Class III BSC as required to maintain them in place, and so that they function properly with no damaging vibrations.

E. Connections for Decontamination, Plumbing and Electrical Services
Install equipment with connections provided as required for plumbing and electrical services.

F. Electrical Disconnects
Provide service clearance of 916 mm in front of all electrical disconnects for a width of 813 mm. Coordinate with mechanical and electrical.

3.04 FIELD QUALITY CONTROL

A. Installation and On-Site Testing
1. Testing for Performance in Wall Assembly:
a. BSCs connected to containment barrier system: shall be capable of becoming integrated into a room that shall be tested for air tightness as described in Section 01457 ROOM INTEGRITY TESTING.
b. Furnish evidence of BSCs' and containment barrier systems' ability to meet this requirement with early submittal package and shop drawing submittal.
2. Leak Tightness Test for Assembled Biological Safety Cabinet
a. Cabinet pressure test to verify continuous operation at specified negative operating pressure.
b. Test in accordance with the Laboratory Safety Monograph test procedures; leakage shall not exceed a leak rate of 1 by 10-5 cc/sec at 3 inches W.G. pressure, with cabinet containing 100 percent halide gas (SF6). Since test concentration of halide gas is 1 percent, detector shall be operated at a sensitivity of 1 by 10-7 cc/sec to account for dilution of the test gas.

B. On-Site Tests
1. Working compartment as a stand-alone unit connected to dunk tank.
2. Working compartment in combination with pass-through compartment.
3. Pass-through compartment as a stand-alone unit.

3.05 SYSTEM START-UP

A. Adjustments - Adjust fixtures and other moving or operating parts to function smoothly and correctly.

B. Field Test Units - Field test each unit under normal operating conditions through its full cycle. Include tests of filters, intake and exhaust air velocities, airflow pattern evaluations as it relates to decontamination and pressure tests where applicable. Readjust and retest units that do not meet specified standards. Replace units which do not meet standards after repetitive tests.

C. Coordination - Coordinate certification of cabinets with CxA.

3.06 ADJUSTMENT AND CLEANING

A. Verification - Verify installed products function properly. Adjust accordingly to ensure satisfactory operation.

B. Damaged Or Defective Work - Refinish or replace damaged or defective work so that no variation in surface appearance is discernible.

C. Surfaces - Clean and polish surfaces that are visible when installation is completed.

3.07 DEMONSTRATION AND INSTRUCTION

A. Provide Demonstration and Instruction
Provide up to 8 hours of demonstration and instruction on each type of unit furnished, using manufacturer's representative.

B. Regular Daily Operations and General Maintenance
Thoroughly instruct staff in regular daily operations and general maintenance of each item of equipment.

C. Further Inspections
Return for additional time as may be required between sixty and ninety days after operation begins to further inspect and check the operation.

3.08 PROTECTION

Protect installed equipment from damage by Others until Beneficial Occupancy Date.

END OF SECTION 11534

SECTION 11535
BIOLOGICAL SAFETY CABINETS

1.00 GENERAL

1.01 SCOPE OF WORK

A. Included under this Section:
1. Contractor Furnished, Contractor Installed Class II, A2 Biological Safety Cabinet with Thimble Connection.
2. Biosafety Cabinets will be factory tested and certified as being NSF 49 compliant.

B. Related Sections
1. Division 1 - COMMISSIONING OF EQUIPMENT for commissioning requirements.

C. Division 15 - Laboratory Gas Connections.

D. Division 15 - Ductwork Connections.

E. Division 16 - Electrical Connections.

1.02 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

A. NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)
NAAMM MFM (1988) Metal Finishes Manual

B. NATIONAL SAFETY FOUNDATION INTERNATIONAL (NSF)
NSF 49 (2007) Class II (Laminar Flow) Biosafety Cabinetry

1.03 DESIGN AND PERFORMANCE CRITERIA

A. Provide biological safety cabinets with workspace for testing and experimentation of low to moderate risk agents in the Classes and Types indicated, as defined by (NSF) National Sanitation Foundation Standard No. 49. Class II cabinets shall provide protection of experiment from ambient environment and protection of ambient environment from experiment.

B. Cabinets shall be provided with means to decontaminate the protective environment between experiments by use of gas petcocks to allow introduction of suitable gases and by use of ultra-violet germicidal lighting.

C. Provide access to the workspace by means meeting requirements of the particular class and type of cabinet and as follows:

1. Class II:

   a. Type A2 (Convertible Cabinet): Suitable for testing and experimentation with low to moderate risk biological agents treated with minute quantities of toxic chemicals and trace quantities of radionuclides that will not interfere with the work if recirculated in the downflow air. Variably controlled, open front work access composed of 70 percent, HEPA filtered, recirculated cabinet air and 30 percent HEPA filtered exhaust air. Recirculated air shall descend over work area in a laminar flow pattern and exit through front and back grilles into a negative air plenum. Negative pressure shall be maintained at the front access, and room air entering shall be drawn into the front grille preventing flow to the work area. Positive pressure contaminated ducts and plenums must be surrounded by negative pressure areas. The exhaust air may be vented to the room or to the building exterior through thimble connections.

1.04 SUBMITTALS

The following shall be submitted in accordance with Division 1- SUBMITTAL PROCEDURES.

A. Shop Drawings - Biological safety cabinets

B. Product Data - Biological safety cabinets

C. Design Data - Biological safety cabinets: Seismic restraint

D. Test Reports - Field Test

E. Certificates - Biological safety cabinets Compliance with NSF 49.

F. Operation and Maintenance Data - Biological safety cabinets Demonstration and instructions

1.05 QUALITY ASSURANCE

List each biosafety cabinet as certified by U.L. for electrical safety and integrity.
Cabinets shall provide biological containment protection for both operator and product proven by physical factory tests.

1.06 QUALIFICATIONS

A. Manufacturer

Company can demonstrate experience in the manufacture of products specified with minimum ten years documented experience in similar project types and in the project's regional location.

1.07 MAINTENANCE SERVICE

A. Maintenance Service

Furnish maintenance service for two-years from beneficial occupancy date. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required to maintain specified or normal operation. Use only parts and supplies as used in the manufacture and installation of the original equipment.

B. Emergency Callback Service

Perform maintenance, including emergency callback service during normal working hours. Provide 24 hour-per-day, 7 day-per-week emergency callback service.

C. Response Time - 2 hours or less.

D. Continuing Maintenance Service

Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

2.0 PRODUCTS

2.01 MANUFACTURERS

Final Owner's approval must be obtained, based on a risk assessment of laboratory operations, the particular agents intended for use and the selection of specific manufacturer's equipment. This approval applies to the all manufacturers.

At the end of this section is a list of companies and individuals that have NSF 49 certification.

2.02 CLASS II TYPE A2 BIOLOGICAL SAFETY CABINETS

A. Schedule:

The Contractor will Furnish and Install biosafety cabinet units as noted herein which require thimble-connections that are connected by hard-duct to the laboratory exhaust system. Flexible hoses are not acceptable connections for building laboratory exhaust.
1. Laboratory where risk assessment requires BSC to have accessory for thimble connection.
All other Class II Type A2 biosafety cabinets will be Government Furnished, Government Installed.

B. Construction

1. Bench Cabinet exterior - 16 gauge, cold-rolled steel, polyurethane finish. Cabinet interior - one-piece 16 gauge type 304 stainless steel, NAAMM MFM No. 4 finish, side walls and rear wall with 11 mm radiused (rounded) corners.
2. Cabinet Interior - Provide slotted side walls adjacent to front access opening for high velocity return air. Recessed 18 gauge, type 304 stainless steel, NAAMM MFM No. 4 finish with 5 mm radiused corners. Sealant joints are not permitted. Provide welded, gasketed and/or hermetically sealed joints for cabinet components to achieve a gas-tight seal when completely assembled. Telescoping stainless steel leg assembly adjustable to 762 mm to 914 mm work surface. Provide vertical sliding front view screen with 6 mm thick safety plate glass with high velocity suction slots at top/sides to prevent escape of gases, vapors or particulates. View screen adjustable from 480 mm open to fully closed for system shutdown. Provide all metal air plenums.

C. Illumination

Externally accessible and replaceable ceiling-mounted fluorescent lighting fixture producing 1257 lumens at the work surface. The ballast to be electronic, containing thermal protection with automatic reset.

D. Filters

Bench type biosafety cabinets - One supply and one exhaust, scan-tested, zero-probe HEPA filter, 99.99 percent efficient on 0.3 micron particles by DOP test, serviceable and removable from front of unit. Exhaust filter also accessible from top of unit. Provide air balancing damper in filter housing area to maintain design criteria.

All HEPA supply filters shall be accessible through quick-release design.

E. Calculated Air Velocity

Bench type biosafety cabinets - 3048 to 3400 mm per minute (100 to 110 fpm) through 203 mm high work area access opening with adjustable audible alarm which sounds when view screen is not at its proper operating height.

The cabinets shall have all positive pressure plenums surrounded by a vacuum relative to the room. Cabinets shall have minihelic gauges to display pressure drops over the HEPA supply filters.

F. Motor/Blower Combinations

Provide motor/blower combination capable of producing a constant air volume despite increased resistance in filter loading as follows:

1. Four foot wide nominal (1220 mm unit) capable of automatically handling an 80 percent increase in pressure drop across filter with not more than 10 percent reduction in total air

delivery. With manual speed controller, a 180 percent increased pressure drop shall be attainable.

2. Six foot wide nominal (1820 mm unit) capable of automatically handling an 80 percent increase in pressure drop across filter with not more than 10 percent reduction in total air delivery. With manual speed controller, a 180 percent increased pressure drop shall be attainable.

G. Electrical Requirements

1. Four foot wide unit 220V, 1 phase, 50 Hz; provide one 12 foot power cord with 20 amp plug - NEMA 5-20P. Unit UL listed as certified for electrical integrity.

a. Blower Motor /lights: 9 amps.
b. Two Duplex Receptacles (Circuit Breaker): 3 amps.
c. Total Running Amps: 12 amps.

2. Six foot wide unit: 220V, 1 phase, 50 Hz; provide one 12 foot power cord with 20 amp plug - NEMA 5-20P. Unit UL listed as certified for electrical integrity.

a. Blower Motor/lights: 11 amps.
b. Two Receptacles (Circuit Breaker): 3 amps.
c. Total Running Amps: 14 amps.

H. Bulkhead Fittings (Electrical and Mechanical)

Use bulkhead connectors with elastomeric seals that are easily and cleanly removable and reusable. Penetrations using applied sealants not permitted. Standard blank-out plugged penetrations for future fittings must be sealed gas-tight.

I. Gaskets

Neoprene or silicone rubber to suit installation conditions and cabinet function. Minimum 19 mm wide by 3 mm thick, fitted over bolt studs.

J. Air Balance Adjustments

Provide an adjustable air balancing damper to compensate for differences in resistance of supply and exhaust filters when and if they are changed at a later date.
Balancing of cabinet work zone downflow (recycling flow) to exhaust flow shall be accomplished with an internal exhaust flow damper, externally adjustable with screwdriver and sealed with liquid tight fastener.

K. Sound Level

Walk-in units shall have no more than 67 decibels measured 381 mm (15 inches) above the work tray and 305 mm (12 units) in front of the viewing window.

L. Accessories

1. Stainless steel air diffuser and filter protector in the top of the work area (bench type units). Aluminum protector above the work zone (walk-in units).

2. One stainless steel ball valve from drain pan located in knee space on right side (bench type units).

3. Protective screen under drain pan capable of preventing foreign objects from being drawn into the blower system.

4. Three plugged penetrations in work area side walls to accommodate optional petcocks.

5. Minihelic gauge.

6. Thimble exhaust transition (see QL series drawings for locations, coordinate with Division 15 - Ductwork Connections)

7. Armrest as approved for NSF 49 certification.

2.04 SOURCE QUALITY CONTROL

Perform biological aerosol test on at least one cabinet from each production run.

3.00 EXECUTION

3.01 INSPECTION

A. Verify that supply and exhaust duct terminations are in place and that support systems are functioning.

3.02 INSTALLATION

A. Follow Section 01450 QUALITY CONTROL for Quality Control of installation.

B. Install BSC units in locations indicated and in accordance with manufacturer's instructions.

3.03 SYSTEM START-UP AND TESTING

A. Adjust fixtures and other moving or operating parts to function smoothly and correctly.

B. Field test each unit under normal operating conditions through its full cycle in accordance with NSF 49, Annex F. Include tests of filters, intake and exhaust air velocities, airflow pattern evaluations, vibration, lighting intensity, noise level, electrical leakage and ground circuit resistance and polarity, and pressure tests where applicable. Readjust and retest units that do not meet specified standards. Replace units which do not meet standards after repetitive tests.

3.04 DEMONSTRATION AND INSTRUCTIONS

A. Manufacturer's representative to provide 4 hours of demonstration and instruction on each type of unit furnished.

END OF SECTION 11535

CLOSE WINDOW TO EXIT NSF LISTINGS

The Public Health and Safety Organization

NSF Product and Service Listings

These NSF Official Listings are current as of **Monday, September 09, 2013** at 12:15 a.m. Eastern Time. Please contact NSF International to confirm the status of any Listing, report errors, or make suggestions.

Alert: NSF is concerned about fraudulent downloading and manipulation of website text. Always confirm this information by clicking on the below link for the most accurate information: http://info.nsf.org/Certified/Biosafety/Listings.asp?

NSF/ANSI 49
Class II (Laminar Flow) Biosafety Cabinetry

Cabinet Style
A = Bench Unit With Base or Adjustable Legs Provided
B = Bench Unit Without Base or Adjustable Legs Provided
C = Console

Window Type
H = Hinged
S = Sliding
F = Fixed

Bench Height
NA = Not Applicable
NP = Not Provided

CBV = Concurrent Balance Value

Due to a change in nomenclature in NSF/ANSI 49 - 2002 “Class II (Laminar Flow) Biosafety Cabinetry,” Class II, Type A cabinets are now referred to as Class II, Type A1 and Class II, Types B3 and A/B3 cabinets as Class II, Type A2. Class II, Types B1 and B2 cabinets remain unchanged.

Allentown, Inc.

Allentown

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Model Number	Cabinet Type/Style	Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options

34850 Safety Cabinet[1] [2]	A2	A	100 - 110	50 - 60	N/A	4	10S	36	Casters I.V. Pole U.V. Light
34860 Safety Cabinet[1] [3]	A2	A	100 - 110	50 - 60	N/A	6	10S	36	Casters I.V. Pole U.V. Light

[1] The first four digits of the serial number refer to date of manufacture.
[2] Beginning with serial number 070570504. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator manual for appropriate correction factor) without adjusting cabinet airflow balance. Downflow nominal set-point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2004.
[3] Beginning with serial number 070570502. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator manual for appropriate correction factor) without adjusting cabinet airflow balance. Downflow nominal set-point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2004.

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Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
BCG401[1]	B2	C	100 - 110	35 - 45	664 @ 1.6	4	8S	35	I.V. Pole U.V. Light Casters
BCG601[1]	B2	C	100 - 110	35 - 45	993 @ 1.6	6	8S	35	I.V. Pole U.V. Light
NCB405[3]	B1	C	100 - 110	65 - 75 50 - 60	276 @ 0.7	4	8S	NA	I.V. Pole U.V. Light
NCB405-INT[3] [4]	B1	C	100 - 110	65 - 75 50 - 60	276 @ 0.7	4	8S	NA	I.V. Pole U.V. Light
NCB605[3]	B1	C	100 - 110	65 - 75 50 - 60	443 @ 0.8	6	8S	NA	I.V. Pole U.V. Light
NCB605-INT[3] [4]	B1	C	100 - 110	65 - 75	443 @ 0.8	6	8S	NA	I.V. Pole

				50 - 60					U.V. Light
SG 403A HE[2] [5]	A2	A	100 - 110	45 - 55	N/A	4	8S	37	I.V. Pole
				42 - 52					U.V. Light
									Casters
SG 403A HE[2] [6]	A2	A	100 - 110	47 - 57	N/A	4	10S	37	I.V. Pole
				40 - 50					U.V. Light
									Casters
SG 503A HE[2] [7]	A2	A	100 - 110	53 - 63	N/A	5	12S	37	Casters
				46 - 56					I.V. Pole
									U.V. Light
SG 503A HE[2] [8]	A2	A	100 - 110	50 - 60	N/A	5	8S	37	Casters
				48 - 58					I.V. Pole
									U.V. Light
SG 603A HE[2] [9]	A2	A	100 - 110	47 - 57	N/A	6	10S	37	I.V. Pole
				40 - 50					U.V. Light
SG 603A HE[2] [9]	A2	A	100 - 110	47 - 57	N/A	6	8S	37	I.V. Pole
				40 - 50					U.V. Light

[1] Beginning with serial number 103539 for the 4-foot model and serial number 103706 for the 6-foot model. Inflow nominal setpoint of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate calculated method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor), without adjusting cabinet airflow balance. Downflow nominal set point was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2010a. This cabinet qualifies only with the armrest installed. This cabinet is approved with additional petcocks on the sidewalls and a low static pressure exhaust plenum. Cabinet models BCG401 INT and BCG601 INT are Certified for alternate motor/blower combinations and input power supply.

[2] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate calculated method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor, if applicable).

[3] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate calculated method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Zoned downflow nominal set points of 70 fpm (zone 1 - comprised of the rear and middle rows) and 55 fpm (zone 2 - the row closest the window opening) were established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2011. NCBX05 model approved with prefilters located under the work surface placed over the primary supply filters.

[4] Approved for alternate power modes of 220V/50Hz and 220V/60Hz.

[5] Beginning with serial number 93621. This model qualifies for both uniform and non-uniform (zoned) downflow. The acceptable uniform downflow range is 45-55 fpm. The acceptable non-uniform downflow ranges listed above begin with zone 1 (45-55 fpm) at the rear of the work area (compromised of lateral rear and center rows) and end with zone 2 (42-52 fpm) (comprised of front lateral row) behind the front window enclosing the work area. Downflow nominal set points were established with the I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2007. This cabinet qualifies only with the armrest installed. Cabinet model number suffixes SP and HE INT are Certified for alternate motor/blower combinations and input power supply.

[6] Beginning with serial number 93621. This model qualifies for both uniform and non-uniform (zoned) downflow. The acceptable uniform downflow range is 45-55 fpm. The acceptable non-uniform downflow ranges listed above begin with zone 1 (47-57 fpm) at the rear of the work area (compromised of lateral rear and center rows) and end with zone 2 (40-50 fpm) (comprised of front lateral row) behind the front window enclosing the work area. Downflow nominal set points were established with the I.V. Pole and U.V. Light

removed. This cabinet model was Certified to NSF/ANSI 49-2007. This cabinet qualifies only with the armrest installed. Cabinet model number suffixes SP and HE INT are Certified for alternate motor/blower combinations and input power supply.

[7] Beginning with serial number 90883. This model qualifies for both uniform and non-uniform (zoned) downflow. The acceptable uniform downflow range is 50-60 fpm. The acceptable non-uniform downflow ranges listed above begins with zone 1 (53-63 fpm) at the rear of the work area (comprised of lateral rear and center rows) and ending with zone 2 (46-56 fpm) (comprised of front lateral row) behind the front window enclosing the work area. Downflow nominal set points were established with the I.V. Pole and U.V. Light removed. This cabinet model was certified to NSF/ANSI 49-2007. This cabinet qualifies only with the armrest installed. This model was certified with optional workarea prefilters installed. ATS autolift with casters is an additional acceptable option. Cabinet model number suffixes SP and HE INT are certified for alternate motor / blower combinations and input power supply.

[8] Beginning with serial number 90883. This model qualifies for both uniform and non-uniform (zoned) downflow. The acceptable uniform downflow range is 50-60 fpm. The acceptable non-uniform downflow ranges listed above begins with zone 1 (50-60 fpm) at the rear of the work area (comprised of lateral rear and center rows) and ending with zone 2 (48-58 fpm) (comprised of front lateral row) behind the front window enclosing the work area. Downflow nominal set points were established with the I.V. Pole and U.V. Light removed. This cabinet model was certified to NSF/ANSI 49-2007. This cabinet qualifies only with the armrest installed. This model was certified with optional workarea prefilters installed. ATS autolift with casters is an additional acceptable option. Cabinet model number suffixes SP and HE INT are certified for alternate motor / blower combinations and input power supply.

[9] Beginning with serial number 93808. This model qualifies for both uniform and non-uniform (zoned) downflow. The acceptable uniform downflow range is 45-55 fpm. The acceptable non-uniform downflow ranges listed above begin with zone 1 (47-57 fpm) at the rear of the work area (comprised of lateral rear and center rows) and end with zone 2 (40-50 fpm) (comprised of front lateral row) behind the front window enclosing the work area. Downflow nominal set points were established with the I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2007. This cabinet qualifies only with the armrest installed. Cabinet model number suffixes SP and HE INT are Certified for alternate motor/blower combinations and input power supply.

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Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
11228 bbc 86[1]	A2	A	100 - 110	60 - 70	N/A	4	8S	25	I.V. Pole U.V. Light
11235 bbc 86[2] [3]	A2	A	100 - 110	60 - 70	N/A	3	8S	33	I.V. Pole

11236 bbc 86[2] [3]	A2	A	100 - 110	60 - 70	N/A	6	8S	33	I.V. Pole

[1] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set-point of 65 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2009.
[2] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate calculated method with thermal anemometer in a constricted (80 mm high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 65 fpm was established with I.V. Pole removed. This cabinet model was Certified to NSF/ANSI 49-2011.
[3] Approved for alternate power modes of 220V/50Hz and 220V/60Hz.

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Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
CHC-777A2-03[1] [3]	A2	A	100 - 110	65 - 75	N/A	3	8S	33	Casters I.V. Pole U.V. Light
CHC-777A2-04[1] [3]	A2	A	100 - 110	65 - 75	N/A	4	8S	33	Casters I.V. Pole U.V. Light
CHC-777A2-06[1] [4]	A2	A	100 - 110	65 - 75	N/A	6	8S	33	Casters I.V. Pole U.V. Light
CHC-888B2-04[2] [4]	B2	A	100 - 110	60 - 70	818 @ 2.4	4	8S	33	I.V. Pole U.V. Light
CHC-888B2-06[4] [5]	B2	A	100 - 110	55 - 65	1231@3.16	6	8S	32	I.V. Pole U.V. Light

[1] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's alternate recomemded method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor), without adjusting cabinet airflow balance. Downflow nominal set point was established with

I.V.Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2007. This cabinet qualifies only with the armrest installed.
[2] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's alternate recomemded method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor), without adjusting cabinet airflow balance. Downflow nominal set point was established with I.V.Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2009.
[3] Certified for use with power supplies of 115V/60 Hz, 220V/50 Hz, and 220V/60 Hz.
[4] Certified for use with power supplies of 115V/60 Hz and 220V/60 Hz.
[5] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's alternate recommended method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor), without adjusting cabinet airflow balance. Downflow nominal set point was established with I.V.Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2010. This cabinet qualifies only with the armrest installed.

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Facility : New Taipei City, Taiwan

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
AHA-143-AA-A[1]	A2	A	100 - 110	68 - 78	N/A	4	8S	26	I.V. Pole U.V. Light
AHA-143-AB-A[1] [2]	A2	A	100 - 110	68 - 78	N/A	4	8S	26	I.V. Pole U.V. Light
AHA-143-BA-A[1]	A2	A	100 - 110	68 - 78	N/A	4	8S	26	I.V. Pole U.V. Light
AHA-143-BB-A[1] [2]	A2	A	100 - 110	68 - 78	N/A	4	8S	26	I.V. Pole U.V. Light

[1] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's alternate recomended method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor), without adjusting cabinet airflow balance. Downflow nominal set point was established with I.V.Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2009.
[2] Certified for use with power supply of 220V/50Hz.

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Facility : Bintan Island, Indonesia

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
LA2-4A1-E[1] [2]	A2	A	100 - 110	65 - 75	N/A	4	9S	34	I.V. Pole U.V. Light
LA2-4A2-E[1]	A2	A	100 - 110	65 - 75	N/A	4	9S	34	I.V. Pole U.V. Light
LA2-4A3-E[1] [3]	A2	A	100 - 110	65 - 75	N/A	4	9S	34	I.V. Pole U.V. Light
LA2-5A1-E[1] [2]	A2	A	100 - 110	65 - 75	N/A	5	9S	36	I.V. Pole U.V. Light
LA2-5A2-E[1]	A2	A	100 - 110	65 - 75	N/A	5	9S	36	I.V. Pole U.V. Light
LA2-5A3-E[1] [3]	A2	A	100 - 110	65 - 75	N/A	5	9S	36	I.V. Pole U.V. Light
LA2-6A1-E[1] [2]	A2	A	100 - 110	60 - 70	N/A	6	8S	35	I.V. Pole U.V. Light
LA2-6A2-E[1]	A2	A	100 - 110	60 - 70	N/A	6	8S	35	I.V. Pole U.V. Light
LA2-6A3-E[1] [3]	A2	A	100 - 110	60 - 70	N/A	6	8S	35	I.V. Pole U.V. Light
LB2-4B2[4]	B2	A	100 - 110	55 - 65	803 @ 1.9	4	8S	36	I.V. Pole U.V. Light
LB2-6B2[5]	B2	A	100 - 110	55 - 65	1269 @ 2.1	6	8S	36	I.V. Pole U.V. Light
LR2-4S1-E[1] [2]	A2	A	100 - 110	65 - 75	N/A	4	9S	34	I.V. Pole U.V. Light
LR2-4S2-E[1]	A2	A	100 - 110	65 - 75	N/A	4	9S	34	I.V. Pole U.V. Light
LR2-4S3-E[1] [3]	A2	A	100 - 110	65 - 75	N/A	4	9S	34	I.V. Pole U.V. Light
LR2-5S1-E[1] [2]	A2	A	100 - 110	65 - 75	N/A	5	9S	36	I.V. Pole U.V. Light
LR2-5S2-E[1]	A2	A	100 - 110	65 - 75	N/A	5	9S	36	I.V. Pole U.V. Light
LR2-5S3-E[1] [3]	A2	A	100 - 110	65 - 75	N/A	5	9S	36	I.V. Pole U.V. Light
LR2-6S1-E[1] [2]	A2	A	100 - 110	60 - 70	N/A	6	8S	35	I.V. Pole U.V. Light
LR2-6S2-E[1]	A2	A	100 - 110	60 - 70	N/A	6	8S	35	I.V. Pole U.V. Light
LR2-6S3-E[1] [3]	A2	A	100 - 110	60 - 70	N/A	6	8S	35	I.V. Pole

U.V. Light

[1] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 70 fpm was established with I.V. Pole and U.V. Light removed.This cabinet model was Certified to NSF/ANSI 49-2011.

[2] Certified for use with a power supply of 230V/50Hz.
[3] Certified for use with a power supply of 230V/60Hz.
[4] Beginning with serial number 2005-10005. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2004. The nominal downflow set point was changed from 70 fpm to 60 fpm during the 5-year recertification test for this model in 2011, starting with serial number 2011-51874.
[5] Beginning with serial number 2005-9857. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2004. The nominal downflow set point was changed from 70 fpm to 60 fpm during the 5-year recertification test for this model in 2011, starting with serial number 2011-56614.

Kewaunee Scientific Corporation

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Facility : Statesville, NC

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
INT-1100[1] [2]	A2	A	100 - 110	60 - 70	N/A	3	10S	33	I.V. Pole U.V. Light
INT-1400[2] [3]	A2	A	100 - 110	50 - 60	N/A	4	10S	33	I.V. Pole U.V. Light
INT-1700[2] [4]	A2	A	100 - 110	55 - 65	N/A	5	10S	33	I.V. Pole U.V. Light
INT-2000[2] [3]	A2	A	100 - 110	50 - 60	N/A	6	10S	33	I.V. Pole

INT-B1400[5]	B2	A	100 - 110	55 - 65	967 @ 1.7	4	8S	27	U.V. Light I.V. Pole U.V. Light
INT-B2000[5]	B2	A	100 - 110	55 - 65	1256 @ 1.9	6	8S	34	U.V. Light I.V. Pole U.V. Light

[1] Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable) without adjusting cabinet airflow balance. Downflow nominal set-point of 65 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2009.
[2] Certified for use with power supplies of 115V/60Hz and 230V/50Hz.
[3] Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable) without adjusting cabinet airflow balance. Downflow nominal set-point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model qualifies only with the armrest installed. This cabinet model was Certified to NSF/ANSI 49-2009.
[4] Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable) without adjusting cabinet airflow balance. Downflow nominal set-point of 60 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model qualifies only with the armrest installed. This cabinet model was Certified to NSF/ANSI 49-2009.
[5] Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable) without adjusting cabinet airflow balance. Downflow nominal set-point of 60 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model qualifies only with the armrest installed. This cabinet model was Certified to NSF/ANSI 49-2010a.

Labconco Corporation

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Kansas City, MO 64132
United States
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Visit this company's website

Facility : Kansas City, MO

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
30231 Logic+ Series[1] [2]	A2	A	100 - 110	50 - 60	N/A	3	10S	36	I.V. Pole U.V. Light

30238 Logic+ Series[1] [3]	A2	A	100 - 110	50 - 60	N/A	3	8S	36	Canopy Connection I.V. Pole U.V. Light
30241 Logic+ Series[3] [4]	A2	A	100 - 110	50 - 60	N/A	4	10S	36	Canopy Connection I.V. Pole U.V. Light
30248 Logic+ Series[3] [4]	A2	A	100 - 110	50 - 60	N/A	4	8S	36	Canopy Connection I.V. Pole U.V. Light
30251 Logic+ Series[3] [5]	A2	A	100 - 110	50 - 60	N/A	5	10S	36	Canopy Connection I.V. Pole U.V. Light
30258 Logic+ Series[3] [5]	A2	A	100 - 110	50 - 60	N/A	5	8S	36	Canopy Connection I.V. Pole U.V. Light
30261 Logic+ Series[3] [6]	A2	A	100 - 110	50 - 60	N/A	6	10S	36	Canopy Connection I.V. Pole U.V. Light
30268 Logic+ Series[3] [6]	A2	A	100 - 110	50 - 60	N/A	6	8S	36	Canopy Connection I.V. Pole U.V. Light
30348 Logic+ Series[3] [7]	B2	A	100 - 110	50 - 60	734 @ 1.7	4	8S	36	Bag-In/ Bag-Out I.V. Pole U.V. Light
34610 Logic Series[3] [8]	B2	A	100 - 110	50 - 60	1218 @ 2.2	6	8S	36	Bag-In/ Bag-Out I.V. Pole U.V. Light
31241 Logic+ PuriCare[3] [4]	A2	A	100 - 110	50 - 60	N/A	4	10S	36	I.V. Pole U.V. Light Canopy Connection
31261 Logic+ PuriCare[3] [6]	A2	A	100 - 110	50 - 60	N/A	6	10S	36	I.V. Pole U.V. Light Canopy Connection

[1] Beginning with serial number 13030000. Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted access opening, using the manufacturer-supplied probe holder and sash stop (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2011. This cabinet model is Certified for use with optional sidewall Vacu-PassTM

Cord & Cable Portal.
[2] Certified for use with power supplies of 230V/50 Hz and 230V/60 Hz.
[3] Certified for use with power supplies of 100V/50 Hz, 100V/60 Hz, 230V/50 Hz, and 230V/60 Hz.
[4] Beginning with serial number 070570502. Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted access opening, using the manufacturer-supplied probe holder and sash stop (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2012. This cabinet model is Certified for use with optional sidewall Vacu-PassTM Cord & Cable Portal.
[5] Beginning with serial number 070570511. Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted access opening, using the manufacturer-supplied probe holder and sash stop (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2012. This cabinet model is Certified for use with optional sidewall Vacu-PassTM Cord & Cable Portal.
[6] Beginning with serial number 070570503. Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted access opening, using the manufacturer-supplied probe holder and sash stop (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2012. This cabinet model is Certified for use with optional sidewall Vacu-PassTM Cord & Cable Portal.
[7] Beginning with serial number 070570502. Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted access opening, using the manufacturer-supplied probe holder and sash stop (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2012. This cabinet model is Certified for use with optional sidewall Vacu-PassTM Cord & Cable Portal.
[8] Beginning with serial number 070900000. Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted access opening, using the manufacturer-supplied probe holder and sash stop (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2007. This cabinet model is Certified for use with optional sidewall Vacu-PassTM Cord & Cable Portal.

NOTE: Bench stand models 3730300, 3730310, 3780200 and 3780100 may be used with cabinets in the 30231/30238 Logic+ series. Bench stand models 3730400, 3730410, 3780201 and 3780101 may be used with cabinets in the 30241/30248 Logic+ series and the 31241 PuriCare series. Bench stand models 3730500, 3730510, 3780203, 3780106, 3780107, 3780312, and 3780316 may be used with cabinets in the 30251/30258 Logic+ series. Bench stand models 3730600, 3630610, 3780202 and 3780102 may be used with cabinets in the 30261/30268 Logic+ series and the 31261 PuriCare series. Bench stand model 3730400 may also be used with the 30348 Logic+ Series. All bench stand models beginning with 378 may be used with or without the optional wheel kit (PN# 3784000).

Microzone Corporation

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Visit this company's website

Facility : Nepean, Ontario, Canada

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
BK-2-4[2] [3]	A2	A	100 - 110	61 - 71	N/A	4	10H	27	U.V. Light I.V. Pole
BK-2-4B3[2]	A2	A	100 - 110	61 - 71	N/A	4	10H	27	U.V. Light I.V. Pole
BK-2-4B3-BT[2]	A2	B	100 - 110	61 - 71	N/A	4	10H	NA	U.V. Light I.V. Pole
BK-2-4BT[2] [3]	A2	B	100 - 110	61 - 71	N/A	4	10H	NA	U.V. Light I.V. Pole
BK-2-6[1] [3]	A2	A	100 - 110	61 - 71	N/A	6	10H	27	U.V. Light I.V. Pole
BK-2-6B3[1]	A2	A	100 - 110	61 - 71	N/A	6	10H	27	U.V. Light I.V. Pole
BK-2-6B3-BT[1]	A2	B	100 - 110	61 - 71	N/A	6	10H	NA	U.V. Light I.V. Pole
BK-2-6BT[1] [3]	A2	B	100 - 110	61 - 71	N/A	6	10H	NA	U.V. Light I.V. Pole

[1] Beginning with serial number 802-0954 and all subsequent units. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. A corresponding nominal set-point of 118 fpm was confirmed using manufacturer's recommended alternate method with thermal anemometer above exhaust filter without adjusting cabinet airflow balance. Downflow nominal set-point of 66 fpm was established with U.V. Light and I.V. Pole installed. Certified for use with power supply of 220 V / 50 Hz.
[2] Beginning with serial number 801-1693 and all subsequent units. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. A corresponding nominal set-point of 122 fpm was confirmed using the manufacturer's recommended alternate method with thermal anemometer above exhaust filter without adjusting cabinet airflow balance. Downflow nominal set-point of 66 fpm was established with U.V. Light and I.V. Pole installed. Certified for use with power supply of 220 V / 50 Hz.
[3] This model has an A2 type design clasification.

Nuaire, Inc.

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Facility : Plymouth, MN

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
NU-425-400[1] [2] [3]	A2	A	100 - 110	55 - 65	N/A	4	10S	32	I.V. Pole U.V. Light
NU-425-400[1] [2] [3]	A2	A	100 - 110	55 - 65	N/A	4	8S	32	I.V. Pole U.V. Light
NU-425-500[1] [3] [4]	A2	A	100 - 110	55 - 65	N/A	5	10S	32	U.V. Light I.V. Pole
NU-425-500[1] [3] [4]	A2	A	100 - 110	55 - 65	N/A	5	8S	32	U.V. Light I.V. Pole
NU-425-600[1] [3] [5]	A2	A	100 - 110	55 - 65	N/A	6	8S	32	I.V. Pole U.V. Light
NU-425-600[1] [3] [5]	A2	A	100 - 110	55 - 65	N/A	6	10S	32	I.V. Pole U.V. Light
NU-427-400[1] [3] [6]	B1	A	100 - 110	65 - 75	282 @ 0.7	4	8S	32	Bag-In/ Bag-Out I.V. Pole U.V. Light
NU-427-600[1] [3] [10]	B1	A	100 - 110	65 - 75	474 @ 0.9	6	8S	32	I.V. Pole U.V. Light Bag-In/ Bag-Out
NU-430-400[1] [3] [8] [9]	B2	A	100 - 110	55 - 65	785 @ 1.7	4	8S	32	Bag-In/ Bag-Out I.V. Pole U.V. Light
NU-430-600[1] [3] [7] [8]	B2	A	100 - 110	55 - 65	1250 @ 1.8	6	8S	32	Bag-In/ Bag-Out I.V. Pole U.V. Light
NU-480-400[1] [3] [11]	A2	A	100 - 110	55 - 65	N/A	4	8S	33	I.V. Pole U.V. Light
NU-480-400[1] [3] [11]	A2	A	100 - 110	55 - 65	N/A	4	10S	33	I.V. Pole U.V. Light
NU-480-500[1] [3] [11]	A2	A	100 - 110	55 - 65	N/A	5	8S	33	I.V. Pole U.V. Light
NU-480-500[1] [3] [11]	A2	A	100 - 110	55 - 65	N/A	5	10S	33	I.V. Pole U.V. Light
NU-480-600[1] [3] [11]	A2	A	100 - 110	55 - 65	N/A	6	10S	33	I.V. Pole U.V. Light
NU-480-600[1] [3] [11]	A2	A	100 - 110	55 - 65	N/A	6	8S	33	I.V. Pole U.V. Light
NU-677-400[12]	A2	A	100 - 110	55 - 65	N/A	4	12S	38	Canopy Connection U.V. Light

NU-677-500[13]	A2	A	100 - 110	55 - 65	N/A	5	12S	38	Canopy Connection U.V. Light
NU-677-600[14]	A2	A	100 - 110	55 - 65	N/A	6	12S	38	Canopy Connection U.V. Light

[1] Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. A corresponding inflow nominal set-point of 105 fpm (corrected to local air density) was confirmed using manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening for appropriate correction factor, if applicable, without adjusting cabinet airflow balance.

[2] Beginning with series 60 and higher. Downflow nominal set-point of 60 fpm was established 4 inches above the plane of the window with the I.V. Pole and U.V. Light removed. This cabinet qualifies only with the armrest installed. This cabinet qualifies with optional DC motor installed. This cabinet model was Certified to NSF/ANSI 49–2004.
Listed model designation NU 437 with electronic control panel and airflow monitor.
Listed model designation NU 440 with electronic airflow control system.
Listed model may be prefaced with Q, N, L or S (i.e. NU-Q425-400).

[3] Listed model may be suffixed with E. Certified for use with power supplies of 230V/50Hz and 230V/60Hz.

[4] Beginning with Series 60 and higher. Downflow nominal set-point of 60 fpm was established 4 inches above the plane of the window with the I.V. Pole and U.V. Light removed. This cabinet qualifies only with the armrest installed. This cabinet qualifies with optional DC motor installed. This cabinet model was Certified to NSF/ANSI 49-2004.
Listed model designation NU 437 with electronic control panel and airflow monitor.
Listed model designation NU 440 with electronic airflow control system.
Listed model may be prefaced with Q, N, L, or S (i.e. NU-Q425-500).

[5] Beginning with series 60 and higher. Downflow nominal set-point of 60 fpm was established 4 inches above the plane of the window with the I.V. Pole and U.V. Light removed. This cabinet qualifies only with the armrest installed. This cabinet qualifies with optional DC motor installed. This cabinet model was Certified to NSF/ANSI 49–2004.
Listed model designation NU 437 with electronic control panel and airflow monitor.
Listed model designation NU 440 with electronic airflow control system.
Listed model may be prefaced with Q, N, L or S (i.e. NU-Q425-600).

[6] Beginning with Series 60 and higher. Downflow nominal set-point of 70 fpm was established 4 inches above the plane of the window with the I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2011. This cabinet qualifies with the optional DC motor installed. Listed model may be prefaced with Q, N, L or S (i.e. NU-Q427-400).

[7] Beginning with series 60 and higher. The downflow nominal set-point of 60 fpm was established 4 inches above the bottom of the sash with the I.V. Pole and the U.V. Light removed. This cabinet model qualifies only with the armrest installed. This cabinet qualifies with the optional DC motor installed. This cabinet model was Certified to NSF/ANSI 49-2009. Listed model may be prefaced with Q, N, L, or S (i.e. NU-Q430-600).

[8] Listed model designation NU 435 without U.V. Light option.
Listed model may be prefaced with Q, N, L or S (i.e. NU-Q435-400).

[9] Beginning with series 60 and higher. The downflow nominal set point of 60 fpm was established 4 inches above the bottom of the sash with the I.V. Pole and U.V. Light removed. This cabinet model qualifies only with the armrest installed. This cabinet qualifies with the optional DC motor installed. This cabinet model was Certified to NSF/ANSI 49-2009. Listed model may be prefaced with Q, N, L, or S (i.e. NU-Q430-400).

[10] Beginning with series 40 and higher. Downflow nominal set-point of 60 fpm was established 4 inches above the plane of the window with the I.V. Pole and U.V. Light removed. This cabinet qualifies with the optional DC motor installed.
Listed model may be prefaced with Q, N, L or S (i.e. NU-Q427-600). This cabinet model was Certified to NSF/ANSI 49-2011.

[11] Beginning with series 1 and higher. The downflow nominal set-point of 60 fpm was established 4 inches above the bottom of the sash with the I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2009. Listed model may be prefaced with Q, N, L, or S (i.e. NU-Q480-400). Listed model designation NU-475 with analog control panel. Listed model designation NU-477 with electric control panel and airflow monitor.

[12] Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. A corresponding inflow nominal set-point of 105 fpm (corrected to local air density) was confirmed using manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening and applying appropriate correction factor without adjusting cabinet airflow balance. The downflow nominal set-point of 60 fpm was established 4 inches above the bottom of the sash with the U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2011. NuAire canopy model NU-911-402 was evaluated as part of the NSF Certification testing procedures.

[13] Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. A corresponding inflow nominal set-point of 105 fpm (corrected to local air density) was confirmed using manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening and applying appropriate correction factor without adjusting cabinet airflow balance. The downflow nominal set-point of 60 fpm was established 4 inches above the bottom of the sash with the U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2011. NuAire canopy model NU-911-502 was evaluated as a part of the NSF Certification testing procedures.

[14] Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. A corresponding inflow nominal set-point of 105 fpm (corrected to local air density) was confirmed using manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening and applying appropriate correction factor without adjusting cabinet airflow balance. The downflow nominal set-point of 60 fpm was established 4 inches above the bottom of the sash with the U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2011. NuAire canopy model NU-911-602 was evaluated as part of the NSF Certification testing procedures.

Smartlab Scientific Corp.

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886 227 150655

Facility : # 1 China

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
SA2-11[1] [2]	A2	A	100 - 110	60 - 70	N/A	3	8S	33	I.V. Pole
SA2-14[3]	A2	A	100 - 110	60 - 70	N/A	4	8S	25	I.V. Pole U.V. Light
SA2-18[1] [2]	A2	A	100 - 110	60 - 70	N/A	6	8S	33	I.V. Pole

[1] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate calculated method with thermal anemometer in a constricted (80 mm high) access

opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 65 fpm was established with I.V. Pole removed. This cabinet model was Certified to NSF/ANSI 49-2011.

[2] Approved for alternate power modes of 220V/50Hz and 220V/60Hz.

[3] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate calculated method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 65 fpm was established with I.V. Pole and UV Light removed. This cabinet model was Certified to NSF/ANSI 49-2009.

Thermo Fisher Scientific

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Germany
49 61 813 5277
Visit this company's website

Facility : Marietta, OH

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
1305[1]	A2	A	100 - 110	58 - 68	N/A	4	8S	36	Armrest I.V. Pole U.V. Light
1306[1] [2]	A2	A	100 - 110	58 - 58	N/A	4	8S	36	Armrest I.V. Pole U.V. Light
1307[1]	A2	A	100 - 110	58 - 68	N/A	6	8S	36	Armrest I.V. Pole U.V. Light
1308[1] [2]	A2	A	100 - 110	58 - 68	N/A	6	8S	36	Armrest I.V. Pole U.V. Light
1320[5] [6]	A2	B	100 - 110	58 - 68	N/A	3	10S	36	Armrest I.V. Pole U.V. Light
1321[5] [6]	A2	A	100 - 110	58 - 68	N/A	3	10S	36	Armrest I.V. Pole U.V. Light
1322[5] [6]	A2	B	100 - 110	58 - 68	N/A	3	10S	36	Armrest I.V. Pole U.V. Light
1323[5] [6]	A2	A	100 - 110	58 - 68	N/A	3	10S	36	Armrest U.V. Light I.V. Pole
1325[1]	A2	A	100 - 110	58 - 68	N/A	4	8S	36	Armrest I.V. Pole

1326[1] [2]	A2	A	100 - 110	58 - 68	N/A	4	8S	36	U.V. Light Armrest I.V. Pole
1327[1]	A2	A	100 - 110	58 - 68	N/A	6	8S	36	U.V. Light Armrest I.V. Pole
1328[1] [2]	A2	A	100 - 110	58 - 68	N/A	6	8S	36	U.V. Light Armrest I.V. Pole
1330[2] [5] [6]	A2	B	100 - 110	58 - 68	N/A	3	10S	36	U.V. Light Armrest I.V. Pole
1331[2] [5] [6]	A2	A	100 - 110	58 - 68	N/A	3	10S	36	U.V. Light Armrest I.V. Pole
1332[2] [5] [6]	A2	B	100 - 110	58 - 68	N/A	3	10S	36	U.V. Light Armrest I.V. Pole
1333[2] [5] [6]	A2	A	100 - 110	58 - 68	N/A	3	10S	36	U.V. Light Armrest I.V. Pole
1335[1]	A2	A	100 - 110	58 - 68	N/A	4	8S	36	U.V. Light Armrest I.V. Pole
1336[1] [2]	A2	A	100 - 110	58 - 68	N/A	4	8S	36	U.V. Light Armrest I.V. Pole
1337[1]	A2	A	100 - 110	58 - 68	N/A	6	8S	36	U.V. Light Armrest I.V. Pole
1338[1] [2]	A2	A	100 - 110	58 - 68	N/A	6	8S	36	U.V. Light Armrest I.V. Pole
1339[5] [6]	A2	B	100 - 110	58 - 68	N/A	3	8S	36	U.V. Light Armrest I.V. Pole
1340[5] [6]	A2	A	100 - 110	58 - 68	N/A	3	8S	36	U.V. Light Armrest I.V. Pole
1341[5] [6]	A2	B	100 - 110	58 - 68	N/A	3	8S	36	U.V. Light Armrest I.V. Pole
1342[5] [6]	A2	A	100 - 110	58 - 68	N/A	3	8S	36	U.V. Light Armrest I.V. Pole
1345[4]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	U.V. Light Armrest I.V. Pole
1346[4] [7]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	U.V. Light Armrest I.V. Pole
1347[4]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	U.V. Light Armrest I.V. Pole
									U.V. Light

1348[4] [7]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	Armrest I.V. Pole U.V. Light
1350[5] [6]	A2	B	100 - 110	58 - 68	N/A	5	8S	36	Armrest I.V. Pole U.V. Light
1351[5] [6]	A2	A	100 - 110	58 - 68	N/A	5	8S	36	Armrest I.V. Pole U.V. Light
1352[5] [6]	A2	B	100 - 110	58 - 68	N/A	5	8S	36	Armrest I.V. Pole U.V. Light
1353[5] [6]	A2	A	100 - 110	58 - 68	N/A	5	8S	36	Armrest I.V. Pole U.V. Light
1354[3]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	Armrest I.V. Pole U.V. Light
1355[4]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	Armrest I.V. Pole U.V. Light
1356[4] [7]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	Armrest I.V. Pole U.V. Light
1357[4]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	Armrest I.V. Pole U.V. Light
1358[4] [7]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	Armrest I.V. Pole U.V. Light
1359[4]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	Armrest I.V. Pole U.V. Light
1366[2] [5] [6]	A2	B	100 - 110	58 - 68	N/A	5	8S	36	Armrest I.V. Pole U.V. Light
1367[2] [5] [6]	A2	A	100 - 110	58 - 68	N/A	5	8S	36	Armrest I.V. Pole U.V. Light
1368[5] [6]	A2	B	100 - 110	58 - 68	N/A	5	10S	36	Armrest I.V. Pole U.V. Light
1369[5] [6]	A2	A	100 - 110	58 - 68	N/A	5	10S	36	Armrest U.V. Light I.V. Pole
1370[5] [6]	A2	B	100 - 110	58 - 68	N/A	5	10S	36	Armrest I.V. Pole U.V. Light
1371[5] [6]	A2	A	100 - 110	58 - 68	N/A	5	10S	36	Armrest I.V. Pole U.V. Light
1372[2] [5] [6]	A2	B	100 - 110	58 - 68	N/A	5	8S	36	Armrest U.V. Light I.V. Pole
1373[2] [5] [6]	A2	A	100 - 110	58 - 68	N/A	5	8S	36	Armrest

1375[4]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	I.V. Pole U.V. Light Armrest
1376[4] [7]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	I.V. Pole U.V. Light Armrest
1377[4]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	I.V. Pole U.V. Light Armrest
1378[4] [7]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	I.V. Pole U.V. Light Armrest
1380[2] [5] [6]	A2	B	100 - 110	58 - 68	N/A	5	10S	36	I.V. Pole U.V. Light Armrest
1381[2] [5] [6]	A2	A	100 - 110	58 - 68	N/A	5	10S	36	I.V. Pole U.V. Light Armrest
1382[2] [5] [6]	A2	B	100 - 110	58 - 68	N/A	5	10S	36	I.V. Pole U.V. Light Armrest
1383[2] [5] [6]	A2	A	100 - 110	58 - 68	N/A	5	10S	36	I.V. Pole U.V. Light Armrest
1384[3]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	I.V. Pole U.V. Light Armrest
1385[4]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	I.V. Pole U.V. Light Armrest
1386[4] [7]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	I.V. Pole U.V. Light Armrest
1387[4]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	I.V. Pole U.V. Light Armrest
1388[4] [7]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	I.V. Pole U.V. Light Armrest
1389[3]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	I.V. Pole U.V. Light Armrest
1390[2] [5] [6]	A2	B	100 - 110	58 - 68	N/A	3	8S	36	I.V. Pole U.V. Light Armrest
1391[2] [5] [6]	A2	A	100 - 110	58 - 68	N/A	3	8S	36	I.V. Pole U.V. Light Armrest
1392[2] [5] [6]	A2	B	100 - 110	58 - 68	N/A	3	8S	36	I.V. Pole U.V. Light Armrest
1393[2] [5] [6]	A2	A	100 - 110	58 - 68	N/A	3	8S	36	I.V. Pole U.V. Light Armrest

1395[7] [8]	A2	A	100 - 110	58 - 68	N/A	4	8S	36	U.V. Light Armrest I.V. Pole
1396[1] [2]	A2	A	100 - 110	58 - 68	N/A	4	8S	36	U.V. Light Armrest I.V. Pole
1397[7] [8]	A2	A	100 - 110	58 - 68	N/A	6	8S	36	U.V. Light Armrest I.V. Pole
1398[1] [2]	A2	A	100 - 110	58 - 68	N/A	6	8S	36	U.V. Light Armrest I.V. Pole U.V. Light

[1] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set-point of 63 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2004.

[2] Certified for use with power supply of 230V/50Hz and 230V/60Hz.

[3] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set-point of 63 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2004. Certified for use with power supply of 220V/50Hz.

[4] Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 63 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2004.Certified for use with power supply of 230V/50Hz and 230V/60Hz.

[5] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's alternate recomended method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor), without adjusting cabinet airflow balance. Downflow nominal set point was established with I.V.Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2009.

[6] May be used with alternate, adjustable height electric stand (maximum bench height of 35 inches).

[7] Certified for use with power supply of 220 V / 50 Hz and 220 V / 60 Hz.

[8] Beginning with serial number 188122-1 and 188108-1 for models 1395 and 1397, respectively. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 63 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2009.

Facility : Shanghai, China

Model Number	Cabinet Type/Style	Inflow Velocity	Downflow Velocity	CBV (cfm) at Static	Cabinet Width	Window Ht/Type	Bench Ht	Acceptable Options

			(fpm)	(fpm)	Pressure (in w.g.)	ft.	in.	Max in.	
1354[1]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	Armrest I.V. Pole U.V. Light
1359[1]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	Armrest I.V. Pole U.V. Light
1384[1]	A2	A	100 - 110	58 - 68	N/A	4	10S	36	Armrest I.V. Pole U.V. Light
1389[1]	A2	A	100 - 110	58 - 68	N/A	6	10S	36	Armrest I.V. Pole U.V. Light

[1] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set-point of 63 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2004. Certified for use with power supply of 220V/50Hz.

Facility : Langenselbold, Germany

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
KS12[1]	A2	A	100 - 110	70 - 80	N/A	4	10 10H S	34	Full Side Windows U.V. Light I.V. Pole Armrest Casters
KS15[4]	A2	A	100 - 110	65 - 75	N/A	5	10 10H S	35	Full Side Windows I.V. Pole U.V. Light Armrest Casters
KS18[2]	A2	A	100 - 110	65 - 75	N/A	6	10 10H S	34	Full Side Windows I.V. Pole U.V. Light Casters
KS9[3]	A2	A	100 - 110	65 - 75	N/A	3	10 10H S	35	Full Side Windows I.V. Pole U.V. Light Armrest Casters

[1] Beginning with serial number 40292176. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. A corresponding inflow nominal set-point of 105 fpm (corrected to local air density) was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor, if applicable) without adjusting cabinet airflow balance. This cabinet model was Certifed with a 4 section work surface. This cabinet model was Certified to NSF/ANSI 49-2002.

[2] Beginning with serial number 40292176. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. A corresponding inflow nominal set-point of 105 fpm (corrected to local air density) was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor, if applicable) without adjusting cabinet airflow balance. This cabinet model was Certified with a 6 section work surface. This cabinet model was Certified to NSF/ANSI 49-2002.

[3] Beginning with serial number 40329642. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor) without adjusting cabinet airflow balance. This cabinet model was Certified with a 3 section work surface. This cabinet model was Certified to NSF/ANSI 49-2002.

[4] Beginning with serial number 40349384. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator's manual for appropriate correction factor) without adjusting cabinet airflow balance. This cabinet model was Certified with a 5 section work surface. This cabinet model was Certified to NSF/ANSI 49-2002.

Thermo Fisher Scientific

401 Millcreek Road
Marietta, OH 45750
United States
740-373-4763

Facility : # 1 USA

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
1310[1] [2]	B2	A	100 - 110	50 - 60	810 @ 1.9	4	8S	36	Bag-In/ Bag-Out I.V. Pole U.V. Light
1360[3] [4]	B2	A	100 - 110	50 - 60	1218 @ 2.2	6	8S	36	Bag-In/ Bag-Out I.V. Pole U.V. Light

[1] Beginning with serial number 070570502. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer's operator manual for appropriate correction factor) without adjusting cabinet airflow balance. Downflow nominal set-point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2004. Model 1311 is equivalent to Model 1310, but comes equipped with U.V. lighting (Listed as an acceptable option).
[2] Certified for use with alternate power supplies. Model 1315 is equivalent to model 1310, but is rated for use with power supplies of 230V and 50/60 Hz and is equipped with a Chinese-compatible plug. Model 1316 is equivalent, but is rated for use with power supplies of 230V and 50/60 Hz and is equipped with U.V. lighting and a Chinese-compatible plug. Model 1317 is equivalent, but is rated for use with power supplies of 230V and 50/60 Hz and is equipped with a North American 230 Volt-compatible plug. Model 1318 is equivalent, but is rated for use with power supplies of 230V and 50/60 Hz and is equipped with U.V. lighting and a North American 230 Volt-compatible plug.
[3] Beginning with serial number 070900000. Inflow nominal set-point of 105 fpm was established with a direct airflow reading instrument. This nominal set-point was confirmed using the manufacturer's recommended alternate method with thermal anemometer in a constricted (4.25 inch height) access opening (consult manufacturer’s operator manual for appropriate correction factor) without adjusting cabinet airflow balance. Downflow nominal set-point of 55 fpm was established with I.V. Pole and U.V. Light removed. This cabinet model was Certified to NSF/ANSI 49-2007. Model 1361 is equivalent to Model 1360, but is equipped with U.V. lighting (listed as an acceptable option).
[4] Certified for use with alternate power supplies. Model 1362 is equivalent to model 1360, but is rated for use with power supplies of 230V and 50/60 Hz and is equipped with a Chinese-compatible plug. Model 1363 is equivalent, but is rated for use with power supplies of 230V and 50/60 Hz and is equipped with U.V. lighting and a Chinese-compatible plug. Model 1364 is equivalent, but is rated for use with power supplies of 230V and 50/60 Hz and is equipped with a North American 230 Volt-compatible plug. Model 1365 is equivalent, but is rated for use with power supplies of 230 V and 50/60 Hz and is equipped with U.V. lighting and a North American 230 Volt-compatible plug.

Z-SC1 Corp.

4148A St-Catherine West
Suite 337
Westmount, QC H3Z 0A2
Canada
877-381-5500

Facility : # 1 China

Model Number	Cabinet Type/Style		Inflow Velocity (fpm)	Downflow Velocity (fpm)	CBV (cfm) at Static Pressure (in w.g.)	Cabinet Width ft.	Window Ht/Type in.	Bench Ht Max in.	Acceptable Options
ZSC1-3FTA2[1] [2]	A2	A	100 - 110	60 - 70	N/A	3	8S	33	I.V. Pole
ZSC1-4FTA2[3]	A2	A	100 - 110	60 - 70	N/A	4	8S	25	I.V. Pole U.V. Light
ZSC1-6FTA2[1] [2]	A2	A	100 - 110	60 - 70	N/A	6	8S	33	I.V. Pole

[1] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate calculated method with thermal anemometer in a constricted (80 mm high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 65 fpm was established with I.V. Pole removed. This cabinet model was Certified to NSF/ANSI 49-2011.
[2] Approved for alternate power modes of 220V/50Hz and 220V/60Hz.
[3] Inflow nominal set point of 105 fpm was established with a direct airflow reading instrument. This nominal set point was confirmed using the manufacturer's recommended alternate calculated method with thermal anemometer in a constricted (3 inch high) access opening (consult manufacturer for appropriate correction factor, if applicable), without adjusting cabinet airflow balance. Downflow nominal set point of 65 fpm was established with I.V. Pole and UV Light removed. This cabinet model was Certified to NSF/ANSI 49-2009.

Number of matching Manufacturers is 14
Number of matching Products is 175
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Class II Biosafety Cabinet Field Certifier Accreditation Program

The listed individuals have successfully completed both written and practical examinations, demonstrating the ability to perform the tests listed in annex F of NSF/ANSI 49.

Canada

Jeremy D. Andersen
Environmental Monitoring Services Ltd.
6251 Azure Road
Richmond, BC V7C 2N8
Canada
604-837-1088

Certificate Number: 0X080-04
Date of Initial Accreditation: 10/06/03
Expiration Date: 10/06/18

Additional Service Locations:

International, Canada

China

Donney M. W. Leung
Fugro Technical Services Ltd.
Fugro Development Centre, 5 Lok Yi St.
17 M.S. Castle Peak Road
Tailam, N.T. Hong Kong
China

Additional Service Locations:

Asia

852 2452 7165

Certificate Number: 1T550-02
Date of Initial Accreditation: 03/02/06
Expiration Date: 03/02/16

Hong Kong

Additional Service Locations:

Asia, Canada, Singapore, International, China

Henry Chiu
Kou Hing Hong Scientific Supplies Ltd
Clifford Centre, G/F
778 Cheung Sha Wan Road
Kowloon
Hong Kong
852 23917783

Certificate Number: 0J230-05
Date of Initial Accreditation: 02/11/02
Expiration Date: 02/11/17

International

Ronald Kin Kong Wong
The Chinese University of Hong Kong
University Safety and Environment Office
The Chinese University of Hong Kong
Room 1,G/F, Lady Shaw Building
Cuhk, Shatin, N.T.,
Hong Kong
852 26098531

Certificate Number: 0T180-04
Date of Initial Accreditation: 11/12/02
Expiration Date: 11/12/17

Philippines

Additional Service Locations:

Philippines, International

James Peewee C. Vizconde
PHILAB Industries Inc.
7847 Bagtikan Street
San Antonio, Makati City
Philippines
65 65 420 833

Certificate Number: C0090085-01
Date of Initial Accreditation: 09/21/12
Expiration Date: 09/21/17

Republic of Korea

Additional Service Locations:

International

Edmonds Donghoon Park
Biostream Technologies Co., Ltd.
345-13 Hagal-dong, Giheung-gu
Yongin-si, Gyeonggi-do 446-930
Republic of Korea

82 31 204 7900

Certificate Number: C0041519-01
Date of Initial Accreditation: 08/29/13
Expiration Date: 08/29/18

Chayeol Yu
CHCLAB Co., Ltd.
520-1, Yongsan-dong
Yuseong-gu, Daejeon 305-500
Republic of Korea
82 42 933 0887

International

Certificate Number: C0076941-01
Date of Initial Accreditation: 02/20/12
Expiration Date: 02/20/17

Singapore

Additional Service Locations:

Bugarin Clifford Catipay
Esco Micro Pte Ltd.
21 Changi South Street 1
486777
Singapore
65 6542 0833

International, Singapore

Certificate Number: C0130560-01
Date of Initial Accreditation: 03/07/13
Expiration Date: 03/07/18

Kenny Chee Siang Lin
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Singapore
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International

Certificate Number: C0089986-02
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Expiration Date: 10/17/16

Goh Khim Aik Joseph
Clyde-IFC (S) Pte Ltd.
47 Gul Circle
629580
Singapore
65 6785 0700

Asia, Malaysia

Certificate Number: 2X890-04
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Expiration Date: 03/02/16

Jimmy Lee Kah Heng
Yizeta Pte Ltd
33 Ubi Ave 3, Vertex, #05-17

International

Singapore 408868
Singapore
65 90621026

Certificate Number: 4D680-03
Date of Initial Accreditation: 12/07/07
Expiration Date: 12/07/17

David Kwan Thiam Hock — International
Gelman Singapore Pte Ltd
27 Woodlands Ind. Park E1
#03-06 Hiangkie Ind. Building
757718
Singapore
65 62696211

Certificate Number: 0X630-02
Date of Initial Accreditation: 08/02/11
Expiration Date: 08/02/16

Chan Chun Kwong — International
Bio-Shield Asia Pte Ltd.
Block 102F Pasir Panjang Road
#06-03
Singapore 118530
Singapore
65 6276 8884

Certificate Number: 0R050-02
Date of Initial Accreditation: 11/22/10
Expiration Date: 11/22/15

Lee Wei Liang — International
Gaia Science Pte. Ltd.
Blk. 102F Pasir Panjang Road
Singapore 118530
Singapore
65 62 76 8884

Certificate Number: C0077170-01
Date of Initial Accreditation: 07/10/12
Expiration Date: 07/10/17

Bryan Ong Poon Keong — Asia
Intersourcing Technology Pte Ltd
Block 9002, #03-28, Tampines Street 93
528836
Singapore
65 6786 9549

Certificate Number: 0S720-05
Date of Initial Accreditation: 12/19/02
Expiration Date: 12/19/17

Seow Poh Seah — International

Esco Micro Pte. Ltd.
21 Changi South Street 1
486777
Singapore
65 65420833

Certificate Number: C0090938-01
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CONNECT WITH NSF

SECTION 115363
LABORATORY STERILIZERS

1.00 GENERAL

This section provides for the Contractor's purchase, installation and coordination of laboratory steam sterilizers.

1.01 SCOPE OF WORK

A. Section Includes

1. Equipment Tag ATCLV1: Small single door steam sterilizer, recessed.
2. Equipment Tag ATCLV2: Medium single door steam sterilizer, recessed.
3. Equipment Tag ATCLV3: Medium single door steam sterilizer, cabinet.
4. Equipment Tag ATCLV4: Medium double door steam sterilizer, right hinged, bioseal.
5. Equipment Tag ATCLV5: Medium double door steam sterilizer, left hinged, bioseal.

B. Related Sections

1. Division 15 Mechanical ventilation and piped services
2. Section 11537 Modular Stainless Steel Walls

C. Products Supplied

1. Products supplied but not installed in this Section:

   Equipment Tags ATCLV4 and ATCLV5: Medium double door steam sterilizers will have bioseals. The Biological Barrier system described in this section are to be shipped by manufacturer for the Contractor to install during rough framing of 12th floor partitions. Delivery and installation on the 12th floor require coordination with construction schedule to protect materials delivered in advance of installation.

1.02 DESIGN AND PERFORMANCE REQUIREMENTS

A. Sterilizers

Capable of passing biological challenge tests as described in AAMI ST46 Steam Sterilization and Sterility Assurance.

B. Sterilizers in Biosafety Level 3 (BSL-3)

1. Capable of daily operations with no unscheduled maintenance including gasket replacement for a period of one year. Typical cycles 2 - 3 loads/day in BSL-3.

2. Gasket replaceable and serviceable by personnel from the clean side of the partition and without entering the containment area.

3. Entire gasket and entire inside face of door capable of being cleaned and visually inspected by operator.

4. Compressed gasket (crush or passive) door seals only; no back-up system, surveillance or other utilities are permitted for operation of door seals. Door seal must be maintained with complete loss of utilities.

C. Biological Barriers and Sterilizers

1. Biological barriers and sterilizers for use in BSL-3 shall be capable of becoming integrated into a room that shall be tested for air tightness as described in Section 01457 ROOM INTEGRITY TESTING.

D. Standalone Steam Generators

1. Shall deliver manufacturer recommended steam to steam sterilizers at minimum pressure. Connection shall provide pressure and volume as required.

2. Single point connection to jacket.

3. Single safety relief valve for steam vessels within sterilizer.

E. Chilled Water

1. Single point connection supply, and single point connection return to each sterilizer.

2. Maximum water temperature: 60 degrees F. (15.5 Degrees C.)

3. Maximum water pressure drop within unit (including heat exchanger and throttling control valve): limit to 10 psi (69 kPa).

F. Process Water

1. Single point connection supply, and single point connection return to each sterilizer.

2. Maximum water temperature: 88 degrees F.

3. Maximum water pressure drop within unit (including heat exchanger and throttling control valve): limit to 15 psi.

G. Lab (City) Water

1. Single point connection supply to each sterilizer.

2. Maximum water temperature: 70 degrees F.

3. Maximum incoming water pressure: 40 psi.

H. Electrical Power Requirements

480V, 3 phase, 60 Hz. (TBD) efficient power based on 50 Hz Philippine power.

I. Seismic Performance

Sterilizers shall withstand the effects of earthquake motions.

1.03 NOT USED

1.04 EARLY SUBMITTAL PACKAGE

A. Submit the following as a complete package. Submittals with incomplete material for evaluation may be rejected.

1. Documentation verifying all specification requirements will be met.

2. Manufacturer's qualifications.

3. Detailed documentation including sterilizer model numbers proposed, with modifications required to meet specifications specifically identified. Include shop or clarification drawings as required, indicating specific materials, components, systems, and performance characteristics included in price.

4. Include specific comment on anticipated life cycle of door gaskets under constant use as described in the design requirements and regular maintenance schedule.

5. Provide minimum clearance dimensions for installation and removal of equipment including considerations for rigging and maintenance access.

6. Third party notified body test protocol and test certificates for biological challenge test, and biological barrier system quality assurance test (wall frame and gasket).

7. Evidence of sterilizer and biological barrier system's ability to meet air tightness requirements specified in specification Section 01457 ROOM INTEGRITY TESTING and as specified in this section "Source Quality Control".

1.05 SUBMITTALS

The following shall be submitted in accordance with Section 01100 SUBMITTAL PROCEDURES.

A. Preconstruction Submittals

Early Submittal Package - Provide early submittal package within 90 days after NTP. Proceed with submittals indicated below only after information listed under Early Submittal Package has been approved by the Government.

B. Shop Drawings

1. Sterilizers -

a. Submit shop drawings indicating materials and accessories.

b. Indicate on shop drawing location of equipment and rough-in of steam, water, waste, electrical power and other services to which

connections are to be made. Show entire assembly including wiring, and piping requirements.

c. In preparing shop drawings, fabricator shall verify that component parts and assembly of each item will support superimposed loads, without deflection detrimental to function, appearance and safety.

d. Provide P and ID for sterilizers.

e. Submit maximum vacuum pump discharge rate (CFM).

2. Modular Walls for Sterilizers in BSL-2, BSL-3 and ABSL-2

Indicate plans, elevations, assembly details, profiles, sizes, reinforcing, equipment openings, access doors, and components. Indicate mounting details for stainless steel rail wall guards specified in Section 10 26 13.

C. Product Data

1. Describe unit construction, size and finish, and performance charts.

2. Provide temperature and pressure sterilization characteristics as specified.

3. Sample warranty.

D. Test Reports

1. Biological Challenge Test

2. Biological Barrier System

3. Quality Assurance Test

E. Certificates

F. Manufacturer Qualifications.

G. Field Service Report.

H. Start-up Report - On-site certification report for each unit.

I. Manufacturer's Instructions

Installation instructions- Submit manufacturers' installation instructions.

J. Operation and Maintenance Data

1. Equipment data for incorporation into operations and maintenance manuals.

2. Recommended procedures and operation and maintenance instructions.

3. Maintenance materials or special tools required for regular maintenance.

4. Recommended maintenance schedule for trouble free operation.

5. Full technician and mechanics maintenance manual with shop drawings submission.

K. Closeout Submittals

L. Warranty - Special warranty specified in this Section.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. Company specializing in manufacture of products specified with minimum ten years documented experience.

2. Provide evidence of ability to perform work including list of successfully completed projects of similar size and scope in BSL-3 environments and list of references with contact information.

B. Biological Challenge Test

Biological challenge test results in accordance with AAMI ST46 Steam Sterilization and Sterility Assurance indicating each type of sterilizer meets or exceeds test requirements prior to commencement of manufacturing of units for the Project.

1.07 POST AWARD MEETING

Immediately after award of Contract, a post award meeting will be held in the offices of the Owner.

A. Meeting Attendees

AE, Contractor, Contracting Officer, manufacturer's sales representative, manufacturer's design engineer, and manufacturer's field installer.

B. Purpose of Meeting

To review physical requirements for sterilizers, service requirements for sterilizers, rigging requirements for installation in the facility, containment barrier detailing and other issues related to sterilizer design and installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Equipment

Equipment shall be complete in every respect ready for operation. Provide power, lighting, control and alarm devices, motors, starters, heaters, terminal boxes and other devices specified to be mounted on equipment. Provide compartments as required by code, complete with numbered terminals, on equipment, for services ready for field connection.

B. Package or Crate and Brace Products

Package or crate, and brace products to prevent damage or distortion of equipment in shipping and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings or equivalent protection. Provide temporary skids under large or heavy units.

C. Building Access

Review and coordinate access through building to final location before delivery of equipment to site.

D. Equipment Delivery

Provide equipment or its parts ready for installation in accordance with construction schedule. Verify required delivery date sufficiently before delivery to ensure that construction is not delayed. Do not deliver products to site until conditions are such that no damage will occur to them while in storage.

E. Equipment Storage

Store equipment at site in a manner to prevent damage to equipment.

F. Uncrate Equipment

Uncrate equipment only immediately prior to installation.

1.09 WARRANTY

A. Manufacturer's Standard Warranty

Provide as part of the base bid, the manufacturer's standard warranty.

B. Special Warranty

Provide to the Contractor the cost of an extended warranty.

C. Special Warranty Period

Extend warranty period to 36 months from date of Beneficial Occupancy.

1. Separate Costs- Provide separate cost of a 36-month warranty per sterilizer type and location.

1.10 COMMISSIONING

Refer to Section 01800 for commissioning requirements related to this Section.

2.00 PRODUCTS

2.01 MANUFACTURERS

Shall have at least 8 years of experience in manufacturing sterilizers and shall have supplied laboratory sterilizers and pressure vessels to facilities that have been certified for work at biosafety level 3. In addition, the companies shall certify that service personnel are available to provide maintenance within 24-hours of a service call. The list of facilities where products are currently installed (preferably in the Philippines and Southeast Asia) and the contact numbers at those locations shall be provided.

2.02 GENERAL

A. Reinforcement and Anchorage

Provide reinforcing and anchorage for built-in products. Design for seismic requirements.

B. Insulate to Prevent Electrolysis

Insulate between dissimilar metals, and metal and concrete or masonry to prevent electrolysis.

C. Electrical Components

Equipment shall include all electrical components, UL approved, required by jurisdictional authorities, and to protect the equipment for damage during operation.

D. Components, Connections, Devices and Controls

Equipment shall include components, connections, devices and controls required for full and safe operation.

E. Disconnects

Coordinate position of disconnects with walls, equipment and modular panels to allow full and free access.

F. Location and Quantity of Equipment

Location and quantity of equipment is indicated on the drawings.

G. Accessible Devices

Minimize locating instrumentation, controls, gauges, and other devices above sterilizer. Locate instrumentation, controls, gauges, and other devices on medium and large sterilizers accessible from service areas.

2.03 EQUIPMENT

A. All Sterilizers

1. Shall be provided with steam from standalone electric steam generators unless otherwise noted.
2. Jacket steam transferred to chamber to pipe assembly with 2-position control valve and check valve.
3. Complete with control and manual valves, steam pressure regulators, thermostatic steam traps, piping, and electrical connections required for connections to building utility services.
4. Complete with water ejector or liquid ring vacuum pump for chamber evacuation.
5. Chamber high water and temperature alarms.
6. Chamber high water and pressure door interlocks.

7. ASME BPVC SEC VIII D1 Safety Valve.
8. Drain temperature controlled effluent to below 140 degrees F unless otherwise specified.
9. Vacuum breaker assembly with door interlock.
10. Jacket steam condensate returned to building steam condensate return system.
11. Insulated chamber jacket. Insulation chloride-free to prevent stainless steel corrosion.
12. Control lock-out switch: Limit switch on chamber door to prevent cycle from starting unless door seal is tight against chamber.
13. Power activated doors for doors 48 inches or wider, or where scheduled, equipped with overload protection, automatic stop when encountering obstructions and operable in manual mode in case of power failure or maintenance inspection.
14. Digital dry contacts wired back to the BMS to indicate on/off status, and alarm.
15. Liquid load probe.

B. BSL-3 Sterilizers

1. All exposed mild steel surfaces of sterilizer within the laboratory, excluding stainless steel and interior of the chamber: High temperature epoxy coated.
2. Safety mechanism to prevent containment breach: level sensor.
3. Diaphragm (filled) gauges and pressure transducers: direct connection to chamber.
4. Isolation valves and injection ports: to allow proper and safe maintenance of sterilizer.

2.04 CHAMBER CONSTRUCTION

A. Manufacturer's Standard Construction

Manufacturer's standard construction for type and size of sterilizer indicated.

2.05 CHAMBER DOOR CONSTRUCTION AND OPERATION

A. Manufacturer's Standard Door

Provide manufacturer's standard door for type and size of sterilizer scheduled, except provide crush (passive) door seal only on sterilizers within or at containment barrier (Wall Seal Type 3).

B. Wall Seal Type 3

Refer to "Wall Seal Type 3 - Biological Barrier System" for additional door requirements where Wall Seal Type 3 is scheduled.

2.06 CONTROL SYSTEM

A. Control System

Provide control system, display and interface for type and size of sterilizer scheduled; allowing for multi-flow door operation, minimum 18 programmable cycles/sterilizer, and as follows:

B. Adjustable Cycle Values

Provide adjustable cycle values including time, temperature and post-exposure drying time, and operating features. Control system shall have capability to allow operator to adjust sterilization temperature setting to 275 degrees F with extended time exposure, including but not limited to contaminated to non-contaminated flow with minimum runs times of 90 minutes for gravity and vacuum cycles, and 2 hours for liquid cycles at minimum 250 degrees F; contaminated to contaminated, non-contaminated to non-contaminated, or single door operation with no minimum run time; pass-through operation from non-contaminated to contaminated with cold jacket.

C. Control Panel Monitor

Provide control panel monitor and control all phases of each sterilizing cycle. Provide control panel on load (containment) side of double door sterilizers, and control panel interface on unload (non-containment) side of double door sterilizers. Remotely mount control panel on load (containment) side as indicated on drawings or as directed, using concealed conduit and quick connect.

D. Video/Audio Interface Panel

Provide video/audio interface panel on both sides of double door sterilizers in BSL-3. Video/audio interface panel may be integral to or separate from control panel and control panel interface. Connect video/audio panel using 'quick connect' on containment side of sterilizer if not integral to control panel monitor. Minimum video screen size 102 by 102 mm. Provide audio intercom system with volume control.

E. Printer

Provide one printer for each sterilizer to provide record of cycle data. Provide five rolls of printer paper with each printer. Provide printer on non-containment side of double door sterilizers. Connect printer using 'quick connect'.

F. Internal Battery System

Internal battery system to retain cycle information in memory.

G. Stand-by Power Supply

Stand-by power supply to ensure safe shutdown mode in case of power failure on each unit.

H. Manual Control Operation

Manual control operation in cases of emergency power failure or maintenance inspections, stepping through of cycle parameters to allow safe restart. Access to manual operation to be secured.

I. Resistance Temperature Detectors

Provide resistance temperature detectors (RTD) in chamber, drain line and sterilizer jacket.

J. Cycle Changes

Provide password protected lock-out for cycle changes for sterilizers in BSL-3. Provide for minimum four levels of programmable access controls.

K. Cycle Override

Password required for cycle override for sterilizers in BSL-3.

2.07 STERILIZER CYCLES

A. Gravity Cycle

For the sterilization of heat and moisture-stable goods at 100 to 141 degrees Cand decontamination of bagged non-biohazardous laboratory wastes. Gravity cycle utilizes the gravity air-displacement principle.

B. Liquid Cycle

For the sterilization of liquids and media in vented borosilicate glass or metal containers at 100 to 135 degrees C. Liquid cycles utilize the optimal solution cooling feature, during exhaust (cooling) phase, to control the exhaust rate.

C. Prevacuum Cycle

For efficient high-volume sterilization of porous, heat and moisture stable materials at 100 to 141 degrees C. The prevacuum cycle utilizes a mechanical air evacuation system. A vacuum pump removes air from within the chamber prior to sterilization.

D. Liquid Air Cool

Provides water to the jacket, and air pressure to the chamber to improve exhaust time for liquid loads to reduce boilover.

E. Leak Test Cycle

For verification of door seal and piping system integrity. Cycle parameters are pre-programmed and fixed. The maximum leak rate is 1.0 mm Hg/minute over a 10-minute period following a fixed stabilization time.

F. Daily Removal Air Test (DART) Cycle

For verification of effective removal of residual air in the chamber and load during testing. Test cycle determined if even and rapid steam penetration into test load has occurred. Cycle parameters are preprogrammed and fixed.

G. Effluent Decontamination Cycle

For processing of contaminated BSL-3 waste, designed to entrap and deactivate effluent exiting sterilizer drain, all condensate is sterilized with load. Air evacuated from chamber to be passed through 0.2 micron effluent filter.

2.08 CROSS CONTAMINATION PREVENTION (RECESSED STERILIZERS)

A. Wall Seal Type 1 - No Seal Required

B. Wall Seal Type 2 - Vermin Seal

1. Seal consisting of stainless steel closure panels sealed to wall.

2. Provide door interlock.

C. Wall Seal Type 3 - Biological Barrier System

1. Gastight biological barrier system consisting of stainless steel or mild steel wall frame (bent plate), heat resistant 1/4 inch thick nitrile rubber gasket, and containment sealing flange manufactured of 1/4-inch thick hot rolled carbon steel, high temperature epoxy coated, or stainless steel welded to sterilizer body. Provide threaded studs, hex nuts, lock washers, and clamping bars (all stainless steel construction) to attach gasket and complete seal between wall frame and containment sealing flange. No sealants permitted.

2. Ship wall frame in advance of sterilizer for building into barrier wall.

3. Wiring and plumbing penetrations through containment sealing flange: Potted using epoxy resin sealant. Seal individual wires at conductor. Terminate insulation at seal on each side. Provide 100 percent redundant wiring system for future use.

4. Minimum one door on double door sterilizer will be in closed and sealed mode at all times with biological barrier system intact. Crush (passive) door seal only.

5. Through the biological barrier system, sterilizers shall become integrated into a room that shall be tested for air tightness as described in specification Section 01 45 70 ROOM INTEGRITY TESTING. Furnish evidence of sterilizer and biological barrier systems ability to meet this requirement with early submittal package and shop drawing submittal.

6. Sterilizer and Biological Barrier System form an integral part of the containment barrier, which shall be capable of performing with pressure difference from non-contained to containment side of sterilizer as follows:

a. BSL-3 and ABSL-3: 0.25-inches W.C.

D. Door Interlock

1. Provide password protected door interlock system to prevent inadvertent exposure of contaminated air or products to non-contaminated areas, and to suit multi-flow door operations.

2. Program doors to prevent both doors from being opened simultaneously. Program sterilizers to keep non-contaminated end door from opening until after sterilization cycle has been properly completed after contaminated end door has been opened. Provide user controlled by-pass capability for maintenance purposes. Allow for minimum four programmable controller codes.

2.09 DISCHARGE AND ENVIRONMENTAL PROTECTION

A. Standard Discharge: Discharge jacket effluent to condensate return.

B. Discharge chamber effluent to open drain after cooling to 140 degrees F by way of single-wall closed loop process water heat exchanger.

C. No additional environmental protection.

2.10 STERILIZERS

Sterilizers listed below are manufacturer's standard catalogue products modified to meet additional specified requirements. Manufacturer may propose deductive alternates from Base Price for consideration for alternative models meeting same size and function requirements.

2.10.1 ATCLV1: Small Single Door Steam Sterilizer

A. Containment Level: BSL-2, ABSL-2.

B. Chamber size (nominal internal): 508 by 508 by 965 mm.

C. Style: Recessed.

D. Door: Power activated, vertical sliding.

E. Cycles: Prevacuum/gravity/liquid/effluent decontamination.

F. Discharge Type: 1.

G. Chamber Evacuation: Water ejector.

H. Heat exchanger for water effluent quenching to 140 degrees F.

I. Accessories: Track assembly, one load car and one transfer carriage per sterilizer.

J. Control panel: Mounted on unit. Provide control system to modulate water feed based on water level, open and close two-position plant steam to maintain clean steam output pressure and conductivity sensor to automatically blow unit on detection of high level of dissolved solids.

2.10.2 ATCLV2: Medium Single Door

A. Containment Level: BSL-2.

B. Chamber size (nominal internal): 660 by 660 by 1216 mm.

C. Style: Recessed.

D. Door: Power activated, vertical sliding.

E. Cycles: Pre-vacuum, Gravity/Liquid, Effluent Decontamination.

F. Discharge Type: 1.

G. Chamber Evacuation: Liquid ring vacuum pump.

H. Heat exchanger for water effluent quenching to 140 degrees F.

I. Accessories: Track assembly, one load car and two transfer carriages per sterilizer.

J. Control Panel: Mounted on unit.

2.10.3 ATCLV3: Medium Single Door

A. Containment Level: BSL-2.

B. Chamber Size (nominal internal): 660 by 660 by 1216 mm.

C. Style: Cabinet.

D. Door: Hinged, Right-handed, Manual.

E. Cycles: Pre-vacuum, Gravity/Liquid, Effluent Decontamination.

F. Discharge Type: Standard.

G. Chamber Evacuation: Liquid ring vacuum pump.

H. Heat exchanger for water effluent quenching to 140 degrees F.

I. Accessories: Track assembly, one load car and two transfer carriages per sterilizer.

J. Clean steam generator: Standalone steam to steam clean steam generator in Media Prep only (Room 2ED061). Steam generator contained within service area, fed with RO/DI water and plant steam. Stainless steel process piping. Output: approximately 200 lbs/hour.

K. Control panel: Mounted on unit.

2.10.4 ATCLV4: Medium Double Door

A. Containment Level: BSL-3.

B. Chamber size (nominal internal): 660 by 660 by 1216 mm.

C. Style: Recessed through one or two walls as indicated on Drawings, complete with inspection door(s) mounted in extended fascia.

D. Door: Power activated, vertical sliding.

E. Cycles: Pre-vacuum, Gravity/Liquid, Effluent Decontamination.

F. Cross Contamination Protection - Wall Seal Type 3, lagged wall frame for BSL-3.

G. Discharge Type: Standard.

H. Chamber Evacuation: Liquid ring vacuum pump.

I. Control Panel: Remote mounted.

J. Services, valves, controls, piping, conduits: positioned to one side of unit to allow offset installation (service to one side of unit only).

K. Accessories: Track assembly, one load car and two transfer carriages per sterilizer.

2.10.5 ATCLV5: Medium Double Door

A. Containment Level: BSL-3.

B. Chamber Size (nominal internal): 660 by 660 by 1216 mm.

C. Style: Recessed through one or two walls as indicated on Drawings, complete with inspection door(s) mounted in extended fascia.

D. Door: Power activated, vertical sliding.

E. Cycles: Pre-vacuum, Gravity/Liquid, Effluent Decontamination.

F. Cross Contamination Protection - Wall Seal Type 3, lagged wall frame for BSL-3.

G. Discharge Type: Standard.

H. Chamber Evacuation: Liquid ring vacuum pump.

I. Control Panel: Remote mounted.

J. Services, valves, controls, piping, conduits: positioned to one side of unit to allow offset installation (service to one side of unit only).

K. Accessories: Track assembly, one load car and two transfer carriages per sterilizer.

2.11 MODULAR WALLS FOR STERILIZERS IN BSL-3

A. Prefabricated system to provide wall-to-wall enclosure of sterilizer service area as indicated on the drawings. Configure layout as noted on plans and elevations. Provide panels, column supports, trim angles, louvers, corner posts and access doors as required to provide a permanent self-supporting enclosure without attachment to wall, ceiling and floor surfaces. Panel reinforcement and stiffeners shall not be permitted on exposed face of panels.

B. General:

1. Exposed components, including but limited to panels, trim angles, access doors, louvers: stainless steel, No. 4 finish.

2. Concealed components including support structure: stainless steel or mild steel with corrosion-resistant finish.

C. Panel construction shall be box-shaped, fabricated of minimum 0.05-inch thick stainless steel sheet, No. 4 finish on exposed face side. Panels shall be non-progressive, demountable, each panel independently removable for total accessibility to sterilizer services.

D. Incorporate radius corners, lockable access doors as indicated on plans and elevations.

E. Coordinate and design panels to allow for panel-mounting of stainless steel rail wall guards and support brackets specified in Section 10 26 13 WALL AND CORNER

GUARDS. Where wall guards impede access door operability, wall guards shall be removable from panel without use of tools.

F. Access doors: complete with stainless steel lift-off hinges and positive latching mechanism.

G. Corners and edges shall be ground smooth.

2.12 STERILIZER FABRICATION

A. Joints and Junctions

Fit joints and junctions between components tightly, in true planes, and to prevent entry of water to collect in component voids. Cap open ends of sections exposed to view.

B. Fabrication Requirements

Fabricate work with materials and component sizes, metal gauges, reinforcing anchors, and fastenings of adequate strength to ensure that it will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended and specified use. Conceal and weld connections wherever possible.

C. Exposed Edges

Cleanly and smoothly finish exposed edges of materials including holes and cutouts.

D. Built-in Products

Provide reinforcing and attached anchorage for built-in products.

E. Holes and Connections

Provide holes and connections for work installed under other specification sections.

2.13 SOURCE QUALITY CONTROL

A. Biological Challenge Test

In accordance with AAMI ST46 Steam Sterilization and Assurance

B. Factory Leak Test for Sterilizers in BSL-3

1. Prior to commencing full production, fabricate each type of biological barrier system for quality assurance testing. Biological barrier system must incorporate all components specified including sterilizer. Independent third-party conducted test shall demonstrate air tightness in a laboratory situation. Incorporate biological barrier system into airtight chamber and:

2. Create pressure differential of 6-inch WC between inside and outside of chamber. Hold the pressure differential for 30 minutes.

a. Acceptable result: Zero air leakage over 30 minutes.

C. Notification

Notify the Owner's Representative and the Construction Manager four weeks before testing. The Owner reserves the right to witness testing.

D. Adjustments

Adjust units as required to pass tests and gain acceptance. Further manufacturing shall match the accepted sample units.

E. Test Report

Submit test report issued by notified or registered body for each type of biological barrier system tested.

3.00 EXECUTION

3.01 EXAMINATION

A. Prior to Commencement of Installation

Prior to commencement of installation, ensure mounting devices, members and surfaces are satisfactory for fitting, and adequate for securing of work. Locations of sterilizers are indicated on A6 series drawings by their Equipment Tag.

.B. Site Measurements

Take site measurements of construction to which Work of the Section must conform, and through which access must be made, before Work is delivered to site, to ensure that adaptation is not required which would result in construction delay.

C. Utilities Coordination

Inspect and verify that required utilities are available, in proper locations, and ready for use prior to equipment installation. Coordinate with Divisions 11, 15 and 16 for location, size and type of services required.

3.02 INSTALLATION

A. General

Provide anchorage information, roughing-in dimensions, templates and service requirements for installation of Work of this Section, and assist or supervise, or both, the setting of anchorage devices, and construction of other Work incorporated with equipment specified in this Section in order that they function as intended.

B. Manufacturer's Recommended Specifications

Install Work to meet manufacturer's recommended specifications, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

C. Hardware and Fastenings

Work shall include rough hardware, fastenings and other items necessary for secure installation.

D. Suitable Fastenings

Use only fastening suitable for materials, do not use through fastenings at floor or walls.

E. Preventing Distortion or Displacement

Install Work straight, plumb, level, and secured to prevent distortion or displacement. Shim as necessary with concealed shims. Where required, use grout on which iron oxide deposits will not form.

F. Secure Fixed Equipment

Secure fixed equipment to building structure or construction as required to maintain it permanently in place, and so that it functions properly with no damaging vibrations to the building itself.

G. Soap Bubble Test

Perform soap bubble test on each Type 3 Wall Seal once building has become fully operational and pressures on opposing sides of the barrier can be determined prior to the room integrity test. Adjust each wall seal until no soap bubbles are produced.

H. Plumbing and Electrical Services

Install equipment with connections provided as required for plumbing and electrical services.

I. Service Clearance

Provide service clearance of 900 mm (36-inches) in front of all electrical disconnects for a width of 760 mm (30-inches). Coordinate with Division 16.

J. Modular Wall Installation

Erect modular wall panels plumb, level, square, and conforming to layout indicated. Butt panels together closely to form fine flush joint line. Installation shall be free of sharp edges and corners.

3.03 START-UP

A. Start Systems Prior to Demonstration

Start systems prior to demonstration to ensure proper supply of services and functions of units. Demonstrate the successful completion of a standard cycle on each of five consecutive days.

B. Testing and Adjustment

After start-up of equipment, test and adjust equipment.

3.04 ADJUSTMENT AND CLEANING

A. Verification of Products

Verify installed products function properly, adjust accordingly to ensure satisfactory operation.

B. Lubricate Equipment

Lubricate equipment as specified by equipment manufacturer.

C. Damaged or Defective Work

Refinish or replace damaged or defective work so that no variation in surface appearance is discernible. Refinish Work at site only if approved by Government.

D. Clean and Polish

Clean and polish all surfaces that are exposed to view from any location on completion of installation.

3.05 TRAINING

A. Operations and General Maintenance

Provide services of competent, factory-trained service representatives to thoroughly instruct staff in the regular daily operations and general maintenance of each item of equipment.

B. Representatives

The representative shall spend minimum of one 8-hour day at beginning of regular operation of equipment to complete this instruction in a satisfactory manner, and shall return for additional time as may be required between sixty and ninety days after operation begins to further inspect and check the operation at no additional cost to the Government.

3.06 PROTECTION

Protect installed equipment from damage until the Beneficial Occupancy Date.

END OF SECTION 11536

SECTION 115373
MODULAR STAINLESS STEEL WALLS

1.0 GENERAL

1.01 SCOPE OF WORK

A. Stainless steel non-progressive, demountable partition systems for concealing body, piping, wiring, and other equipment appurtenances related to sterilization equipment, wash equipment, and tissue digester. The partitions also provide for confining excessive equipment heat and vapor to the enclosure area. Finished wall appearance shall compliment the equipment and adjacent structural surfaces.

B. All system components shall be factory prefabricated and match-labeled to engineered system drawings for jobsite installation. The system panels shall not require studs for assembly and each panel shall be independently removable. Panels shall be supported by head tracks and floor tracks. Openings shall be coordinated with equipment shop drawings for panel openings.

The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

1.02 REFERENCES

ASTM INTERNATIONAL (ASTM)

ASTM A 167	(1999; R 2004) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM C 177	(2004) Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
ASTM C 209	(2007) Standard Test Methods for Cellulosic Fiber Insulating Board
ASTM E 84	(2007b) Standard Test Method for Surface Burning Characteristics of Building Materials

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MFM	(1988) Metal Finishes Manual

1.03 PERFORMANCE REQUIREMENTS

Each modular wall shall meet applicable requirements of the following standards

A. ASTM A 167 for stainless steel, alloy 304.

B. ASTM E 84 method of test for burning characteristics of building materials.

C. ASTM C 209 testing for percent of water absorption by volume.

D. ASTM C 177 testing for thermal conductivity.

1.04 DESIGN AND PERFORMANCE CRITERIA

A. Design partition system to accommodate a variety of panel widths to fill in between equipment, adjacent walls, floors, and ceilings.

B. Partitions, wall starts, head tracks, floor tracks, doors, vents, trim, etc. shall be fabricated using Type 304 stainless steel with a no. 4 brush finish, 16 gage minimum. The brush finish grain shall be oriented vertically on all components, except head tracks and floor tracks, for a consistent architectural finished appearance.

C. Partition panels, vents, and doors shall be of the non-progressive type, capable of being removed and/or relocated without disturbing other panels.

D. All mechanical components shall be non-combustible, distortion free, uniform in dimension, construction and appearance, made to suit specific function and to have been proven in use.

E. All insulation used on panels shall be certified as having a flame spread of 25 or less and a smoke developed rating of 50 or less per ASTM E 84. The standard insulation thickness shall be 1/2 inch (13 mm). Insulation water absorption shall be 0.2 percent or less by volume per ASTM C 209. Thermal conductivity of the insulation shall be 0.27 Btu in./h ft2 degrees F (W/m K), or less. Apply insulation to the backside of the panel.

F. Insulation adhesive shall be certified as having a flame spread of 25 or less and a smoke developed rating of 50 or less per ASTM E 84.

G. Wall panel sections of the system shall be 610 mm width, or less.

H. The system shall be designed as a formed single skin panel with flush #4 brush metal on the finished side and insulation and joints restricted to the back service side only. Formed surface skins shall be optionally available for the service side of the system, offering an appearance equal to the #4 brush finished side, and with no fasteners showing.

I. All components of the system shall be factory tagged for coordination with all submittal documents and shop drawing data.

J. Panel-to-panel fastening hardware shall be of a type which require no tools for operation and are not visible from the finished front of the system (or back if optional finished rear formed panel skins are used).

1.05 SUBMITTALS

A. Shop Drawings

Modular Wall system - Indicate plans, elevations, assembly details, profiles, sizes, connections, reinforcing, equipment openings, door and glazed openings, partition modules, components, anchorages, and fastening to adjacent structure.

B. Product Data

1. Modular Wall system - Manufacturer's printed product literature and specifications. Certificates

2. Modular Wall system - Manufacturer s written certification that materials and assemblies comply with the specified performance characteristics and physical requirements.

3. Manufacturer's Warranty.

4. Manufacturer's written installation instructions.

1.06 QUALITY ASSURANCE

A. anufacturer - Company specializing in fabrication of specified modular wall system and components with a minimum of five years documented experience.

B. Installer - Company or person specializing in installations of specified modular wall systems and components with a minimum of three years documented experience. Installer shall be approved by modular wall components manufacturer.

C. Pull Test on Panel Retainer Clip

Provide evidence that each clip will withstand direct pull of 68 kg.

D. Project Experience To judge workmanship, substrate preparation, operation of equipment and material application, provide written notice to the A/E listing a minimum of six (6) projects of similar size and scope completed within the 12 months preceding this work and which can be physically inspected for such compliance confirmation.

E. Coordination Requirements - Requirements for meetings to coordinate materials and techniques, and to sequence related work, shall be as indicated by the Architect/Engineer.

1.07 QUALIFICATIONS

Welders: AWS certified.

1.08 PRE-INSTALLATION MEETINGS

A. Conduct pre-installation meetings two weeks prior to commencing work of this Section and prior to on-site installations (or as indicated by Contracting Officer), to verify project requirements, substrate conditions, coordination with other building trades, manufacturer s installation instructions, and warranty requirements.

B. Specify any special and unique packing, shipping or handling requirements, and special measures needed to prevent damage to products prior to application or installation.

1.09 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle materials in strict accordance with the manufacturer's written recommendations.

B. Store all materials indoors, in dry locations. Ensure that materials do not come in contact with ground or with other damp substrates.

C. Leave protective coverings in place until final cleaning of building. Provide instructions for removal, before final inspection, of protective covering.

1.10 WASTE MANAGEMENT AND DISPOSAL

Make arrangements for handling, disposal, and fees if applicable for all disposable materials and trash resulting from the work of this Section at the Pre-Construction Meetings. Coordinate with the Contracting Officer as required.

1.11 WARRANTY

A. Manufacturer's Warranty

Submit for the Owner's review and acceptance the manufacturer's warranty document, executed by an authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights that the Owner may have under Contract Conditions.

B. Warranty Period - 18 months, commencing on date of Substantial Completion. Warranty covers labor and repair or replacement of defective components for 18 months after completion of modular wall system installation.

2.00 PRODUCTS

2.01 MANUFACTURERS

Manufacturers shall have a minimum of 5 years producing modular wall/ equipment enclosure panels per the quality assurance requirements previously noted.

2.02 MODULAR WALL/EQUIPMENT ENCLOSURE PANELS

A. Manufacturer -

Stainless steel equipment enclosure panels shall be provided by the equipment manufacturer to match the finish of the enclosed equipment where indicated on the Drawings.

B. Description

Prefabricated enclosure system to surround sterilizing, washing and related equipment specified in Section 11536 LABORATORY STERILIZERS and this section. Enclosure may include front wall or back and side walls in any combination. Enclosure shall conceal equipment body, piping, wiring, and other appurtenances, confine excessive equipment heat and vapor to enclosure area, and provide a finished wall appearance to complement the equipment and adjacent surfaces.

C. Materials

1. Panels - 16 gauge, Type 304 stainless steel.
2. Trim Angles and Corner Posts - 16 gauge, Type 304 stainless steel.
3. Access doors - Sandwich panel consisting of 16 gauge exterior panel and 16 gauge interior panel, Type 304 stainless steel.
4. Finish - NAAMM MFM No. 4; finish shall match adjacent equipment.

5. Louvers - 18 gauge, Type 304 stainless steel.

6. Insulation - Closed-cell, flexible, elastomeric insulation, sheet or roll, black in color: Armacell AP/Armaflex SA, or equal. Insulation shall be manufactured without the use of CFCs, HFCs, or HCFCs. Insulation shall be formaldehyde-free, low VOC s, fiber free, dust free, and resistant to mold and mildew. Insulation shall be bonded to metal surface.

   a.. Density: 127 to 245 g/m3(.

   b. Thickness: 13 mm.

7. Column Support - Refer to Slotted Channel Framing specification in Section 12355 METAL LABORATORY CASEWORK.

D. Construction

1. Description -

   Box-shaped panels, finished on face side and insulated on reverse side. Pre-drilled for connecting hardware. Provide insulation to the backside of all panels, trim angles, and corner posts. Provide insulation between the two panels of the access doors. Corners shall be tack welded. Panel construction shall including framing and stiffening as necessary to prevent oil canning or deflection of panel between supports. No sharp edges are permitted.

   a. Vertical Panels - Panels shall cover the areas between pieces of equipment; supported by support posts. Provide leveling shims to accommodate uneven floors.

   b. Column Supports - Support columns shall provide rigidity for vertical panels. Anchored to building structural ceiling and bolted to vertical panels.

   c. Horizontal Panels - Panels enclose openings remaining in the wall after equipment has been set in place.

   d. Trim Angles - Trim angles conceal clearance openings between modular wall and adjacent building walls and ceiling.

2. Access Doors - Sizes: Width as indicated on drawings by 2032 mm high. Door shall be insulated and constructed of 16 gauge outer panel and 16 gauge inner panel. Provide cylinder lock keyed to building system. All hardware shall be stainless steel. Hinges shall be of lift off design. Refer to plans for door swing.

3. Horizontal Support Angles: - Bolt horizontal support angles to top of horizontal and vertical panels to provide a surface to which ceiling trim angles can be connected. Support angles also provide additional support to entire wall.

4. Corner Post - Provide corner posts at junction of two faces of modular walls.

E. Enclosure of Wash or Sterilizer Service Areas

In areas where panels are designed to enclose wash or sterilizer service areas, modular wall shall extend to underside of gypsum board ceiling/bulkhead. Coordinate with Reflected Ceiling Plans.

F. Gasketing

Provide continuous gasketing to prevent vermin intrusion. Install continuous at junction of ceiling height partitions with floors, ceilings and abutting walls and vertical surfaces.

G Access Door Hardware

1. Hinge - Continuous, stainless steel with stainless steel pin.

2. Latch- Keyed spring lock assembly with manual release on the inside.

2.03 FINISHES

A. General

Comply with NAAMM MFM for recommendations for applying and designating finishes. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and Polish Surfaces

Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Grain direction of all component surfaces shall be oriented to run in the vertical direction as facing a finished wall.

C. Passivate and Rinse Surfaces

When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

3.0 EXECUTION

3.01 PREPARATION

A. Verify Dimensions

Verify dimensions on site, record distances from walls and bulkheads to equipment boundaries, floor to ceiling distance at the position of washers and sterilizer equipment.

B. Verify Floors and Ceilings

Verify that floors and ceilings are level and ready to accept partition assembly and/or are in a state of construction equal to the conditions under which the modular wall system shall be installed. The Contracting Officer shall certify the conditions under which the modular walls shall be installed. Report deficiencies to the Architect, Construction Manager and Owner.

C. Working Environment

Ensure that working environment is appropriate and that necessary services are available.

3.02 INSTALLATION

A. Modular Wall Systems Installation Instructions - Install modular wall systems in strict compliance with manufacturer's written recommendations, specifications, and product technical bulletins.

B. Floor Finishes - Install system after floor finishes and in accordance with flooring manufacturer s written instructions.

C. Conform to Layout - Erect partitions plumb, level and square, or angled as applicable, to conform to layout specified. Adjust components to allow for irregularities in adjacent construction and relate accurately to finished ceiling and floor coverings.

D. Panel Hardware - Install panel hardware as required, typically four (4) per vertical panel seam. Butt panels together closely so that they form fine flush joint line. If custom conditions dictate, use bolted hardware, only if approved by the Architect, otherwise use tool free hardware to make up joints to maintain ease of access and modularity for the Government.

E. Base Molding and Troweled Epoxy - Base molding and/or troweled epoxy at floor to wall intersections is by others and not part of the work of this section.

3.03 CLEANING AND PROTECTION

A. All equipment shall be protected before, during and after installation. Protect from paint, debris, and damage in the course of the construction sequence. Damage to material due to improper protection shall be cause for rejection.

B. Packaging and debris and other waste resulting from installation of equipment shall be removed.

C. At no time shall worker use the installed equipment as a work bench, scaffolding, or for other uses.

D. Clean panels in accordance with manufacturer's written instructions.

E. Adjust operable parts for correct function.

END OF SECTION 11537

Read and accepted as part of the Contract:

Bidder / Contractor

SECTION 11538
CAGE AND RACK WASHERS AND OTHER VIVARIUM EQUIPMENT

1.00 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, tools, equipment, to design and build the correctly-sized architecture and engineering infrastructure for the Owner Furnished and Installed laboratory and vivarium equipment that are described in this section.

B. Per Section 01230 – Alternates, provide bid for furnishing and installing the equipment listed below as part of the fit-out of the future Vivarium on the 12th floor of the new NIH in accordance with provisions of Contract Documents.

C. Completely coordinate with work of other trades.

1.02 SECTION INCLUDES

D. Laboratory Washers and Dryers:

1. Laboratory Glassware Washers, GW-1

E. Vivarium Washers:

1. Cage and Rack Washer (Contractor Furnished and Installed, Section 01230), CRW-1
2. Cage and Bottle Washer (Contractor Furnished and Installed, Section 01230), CBW-1

F. Bottle Filler:

1. Batch Type (Contractor Furnished and Installed, Section 01230), BF-1.

G. Bedding Dispenser:

1. Freestanding Cabinet Type, BDF-1

H. Bedding Disposal:

1. Containment Cabinet – Dry Bag Type (Contractor Furnished and Installed, Section 01230), BDC-1.
2. Freestanding Grinder Type, BDC-2

I. Tissue Digester. (Contractor Furnished and Installed, Section 01230), TD-1

J. Animal Transfer Station, ATS-1

K. Ice Maker, IM-1

L. Disposers, DIS-1

M. Misting Tunnel. (Contractor Furnished and Installed, Section 01230),MST-1

N. Decontamination Lock, (Contractor Furnished and Installed, Section 01230), DL-1

O. Modular Wall/Equipment Enclosure Panels (Contractor Furnished and Installed), MWE-1.

P. Air Shower Pass-Through. (Contractor Furnished and Installed, Section 01230), ASPT-1

1.03 UNDIVIDED RESPONSIBILITY

A. Scope of work described in this Section shall be provided by supplier of Section 12355 scope of work and the Related Sections.

1.04 REFERENCES

A. Standards:

1. ASTM A167: Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip; 1999.
2. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials; 2000a.
3. ASTM MT1010: Support Columns.
4. ASME Section VIII, Division 1, Unfired Pressure Vessels Code: for steam coils.
5. UL 1262, as certified by ETL Testing Laboratory Inc.
   a. Except units with pH neutralization and detergent monitoring system.

1.05 DESCRIPTION

A. Provide side panels to cover all exposed sides of cabinet-type equipment designed for under-counter installation.

B. Sequence work with other Divisions to assure orderly progress.

C. Utility Requirements: Mechanical and electrical services have been designed for the services and loads as described for individual equipment items herein. If a manufacturer requires services in excess of those indicated, either of type, size, quantity or quality, that cost will be borne by the Contractor and shall not be justification for a change order.

D. Design equipment pits around standard pit of successful bidder.

1. Submit manufacturer certified pit drawing within 30 days of Award of Contract from Owner to Contractor.
2. Manufacturer shall provide height adjustments, thresholds, and other items required to mount machines.

1.06 SUBMITTALS

A. Shop Drawings:

1. Submit complete shop fabrication and installation drawings, including plans, elevations, sections, details, finished and materials dimensions, utility connections and locations, sizes and loads, and schedules.
2. Show relationship to adjoining materials and construction and requisite service, operating and installation clearances.
3. Identify connection points, locations and sizes to building services and systems.
4. Identify where equipment requirements deviate from service/utility provisions identified in the Construction Documents.

B. Product Data:

1. Submit complete materials list, including catalog data and performance data of materials, equipment, and products for work in this Section.

C. Samples: Submit two (2) samples of each type of specified finish and color range.

D. Project Information:

1. Submit detailed anchorage and attachment drawings and calculations to show compliance with seismic restraint requirements.
   a. Engineering design shall be performed and sealed by registered Engineer, licensed to practice structural engineering in the state of the project location.
   b. Refer to the Structural Drawings for seismic design criteria.
2. Provide piping, wiring, and/or control diagrams, including all connection points and sizes to building services and systems.
   a. Provide flow rates, pressure drops, temperature and pressure requirements, voltage and amperage, etc.
3. Notice of factory testing.
4. Manufacturer's installation, start-up and adjustment instructions.
5. Statement of installer qualifications.
6. Factory Authorized Testing (FAT) Procedures:
   a. Requirements and Documentation.
   b. Include NIST calibration documentation.
7. Material Safety Data Sheets (MSDS).

E. Contract Closeout Information:

1. Certification stating equipment is complete and ready for intended function.
2. Operations/Maintenance Manuals:
   a. Operating and maintenance manuals describing proper operating procedures.
   b. Maintenance and replacement schedules.
   c. Components parts list including non-proprietary parts using component manufacturer’s parts numbers.
   d. Closest factory representative for components and service.
   e. Non-proprietary list of valves and other serviceable components.
3. Start-up report.
4. Demonstration and instruction report.

1.7 QUALIFICATIONS

A. Manufacturer’s Qualifications:

1. Manufacturer specializing in products specified with minimum ten (10) years experience.
   a. Exception: Two (2) years of experience are required for decontamination locks.
2. Manufacturers shall have established organizations and production facilities necessary for fabrication and installation of equipment specified, with skilled personnel, factory trained workmen and an experienced engineering department.
   a. Upon request, provide three references of similar installations.

B. Installer Qualifications:

1. Installer shall have an established organization including all tools, equipment and special machinery necessary for specializing in the installation of equipment specified, with skilled personnel and factory-trained workmen.
2. Firm specializing in installation of products specified, with minimum five (5) years experience, and authorized by manufacturer to install product.
   a. Upon request, provide three references of similar installations.
3. Installer shall have replacement parts, tools, equipment, apparatus, devices and other items required for normal and emergency maintenance, and employees fully skilled in equipment maintenance, within two (2) hours arriving time of project site.

1.8 REGULATORY REQUIREMENTS AND SUBSTITUTIONS

A. Regulatory:

1. Specified products, materials, or systems for Project may include engineering or on file standards required by the Regulatory Agency.
2. Substitution of products, materials or systems may require additional engineering, testing, reviews, approvals, assurances, or other information for compliance with Regulatory Agency requirements or both.
3. Provide all Agency approvals or other additional information required.
4. When applicable, comply with:
   a. Underwriters Laboratory Standards.
   b. National Electrical Code.

B. Substitutions:

1. Substitution shall not affect dimensions shown on Drawings.
2. The Contractor shall pay for changes to the building design, including engineering design, detailing, utility and service requirements, and construction costs caused by the requested substitution.
3. Substitutions shall have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts shall be locally available for the proposed substitution.

1.9 PRODUCT HANDLING

A. Protect work before, during and after installation including installed work and materials of other trades. Maintain polyethylene film or other protective covering until start-up.

B. Deliver laboratory equipment after wet operations in building are complete.

C. Laboratory equipment shall be stored in a ventilated area, protected from weather, with relative humidity of 50 percent or less at 21 DegC 70 DegF.

D. Modular Wall/Equipment Enclosure Panels:

1. Deliver modular wall system after wet operations in building are complete.
2. Store modular wall system in a ventilated place, protected from the weather, with relative humidity therein of 50 percent or less at 21 DegC 70 DegF.
3. Protect finished surfaces from soiling and damage during handling and installation.

4. Protect installed modular wall system from debris, paint and damage from adjoining construction work.

E. Replace, repair and restore damaged work to original condition.

1.10 MAINTENANCE SERVICE

A. Maintenance service shall supplement warranty requirements.

B. Furnish routine preventative and emergency maintenance service for two years from final acceptance.

C. Include periodic examination, adjustment, and maintenance of equipment.

D. Repair or replace worn parts, using only standard parts produced by equipment manufacturer.

E. Furnish 7-day-a-week emergency service during maintenance period, providing maintenance personnel on site within 24 hours, should a shutdown or emergency develop between regular examinations.

2.00 PRODUCTS

2.01 LABORATORY GLASSWARE WASHERS: BASE CABINET HEIGHT (GW-1)

A. Acceptable Manufacturers:

1. Base:
   a. Miele Appliances, Inc.
2. Optional:
   a. Steris Corporation.
   b. Lancer USA, Inc.
   c. Steelco-USA Inc.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design:

1. Free-Standing Electrically Heated Glassware Washer by Miele.
2. Description:
   a. Undercounter-size glassware washer and dryer designed for laboratory use, with a minimum of nine wash programs.
   b. Washer shall be capable of direct injection washing and drying.
3. Dimensions:
   a. Chamber: 521mm wide x 521mm deep x 470mm high 20-1/2 IN wide x 20-1/2 IN deep x 18-1/2 IN high.
   b. Overall: 902mm wide x 699mm deep x 851mm high 35-1/2 IN wide x 27-1/2 IN deep x 33-1/2 IN high.
4. Installation Type:
   a. Cabinet enclosed unit for freestanding installation.
5. Features and Characteristics:
   a. Interior:
      1) Sides, back, and top: Type 304 stainless steel.

2) Floor and door: Type 316 or Type 304 stainless steel.
3) All surfaces shall be polished. Chamber shall be laser welded with no weld marks.

b. Exterior: Type 304 stainless steel with brushed finish.
c. Sound Levels:
1) Freestanding Installation:
a) Washing: 54 dB at 1m from washer.
b) Drying: 52 dB at 1m from washer.
d. Circulation Pump:
1) 348 L/m 92 GPM, minimum, constructed of ABS plastic impeller and housing.
2) Pump shall include speed sensor to shut down washer in event of obstruction or pump failure, and to prevent overheating.
e. Drain Pump:
1) Provide separate drain pump to prevent cross contamination between drain and intake cycles.
f. Heater rating: 6 kW.
g. Water-Proof System:
1) Incoming water lines shall be double-wall and be protected with electronically-activated solenoids, and shall include float sensor in washer drip pan.
2) Float switch shall shut off incoming water and activate drain pump in the event of a leak
h. Steam Condenser:
1) Provide steam condenser and send condensate to drain; no external venting shall be required.
i. Water Softener:
1) Provide built-in water softener with adjustable water hardness control.
j. Detergent Dispensers:
1) Provide pull-out drawer for 5L liquid detergent container.
2) Detergent shall be automatically dispensed into washer.
3) System shall include detergent level sensor and flow sensor to monitor system.
k. Neutralizer Dispenser:
1) Provide pull-out drawer for 5L liquid neutralizer container.
2) Detergent shall be automatically dispensed into washer.
l. Cleaning Mechanism:
1) Dual rotary spray arm located at the top and bottom of the chamber.
2) Direct injection manifold shall be provided for upper, lower, or dual-level injection baskets, or middle rotary spray arm.
m. Flow Meters:
1) Provide flow meters on water supply lines for precise water fills. System shall include float switch to prevent overfill.
n. Water Temperatures:
1) Wash: Programmable up to 93 DegC 199 DegF.
2) Final Rinse: Programmable up to 93 DegC 199 DegF.
3) Temperatures shall be monitored by dual sensors for accuracy.
o. Drying System:

1) HEPA filtered forced air-drying cycle with adjustable temperature and time.
2) A second stage shall be programmable for cool down.
3) Optional spindle injectors shall be used to dry interior of narrow-necked glassware.

p. RS-232 port for connection to printer for monitoring/validating washer cycles.
q. Chamber Validation Port:
1) Provide test port for monitoring chamber conditions.
r. Alarm:
1) Alarm shall alert operator to machine status and error conditions.
s. Pressure Reducing Valves (PRV):
1) Provide pressure reducing valves, as required by the equipment, to reduce incoming steam, water and compressed air to manufacturer-recommended operating pressures.
t. Provide door cup for powder detergents.

6. Programs:
a. 10 programs, minimum, including at least 4 standard wash programs with programmable cycle times and temperatures, and at least 1 custom program slot.
7. Required Accessories: Provide one of each of the following for each washer.
a. Upper Basket with rotary spray arm: Miele O 188 for various inserts.
b. Upper Injector Basket with drying connection: Miele O 175 with 34 injectors for narrow neck laboratory glassware.
c. Lower Basket: Miele U 874 for various inserts.
d. Mobile Cart: Mielcar MC/1 with height adjustable legs.
8. Required Options:
a. Provide door cup for powder detergents.
9. Utility Requirements: Refer to Laboratory Equipment Schedule.

2.02 CAGE AND RACK WASHER: OSCILLATING SPRAY TYPE (CRW-1)

A. Acceptable Manufacturers:

1. Base:
a. Steris Corporation.
2. Optional:
a. GetingeUSA.
b. Lynx Product Group.
c. Schlyer Machinery Company, Inc.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design:

1. Basil Model 4700 Cage and Rack Washer.
2. Size:
a. Chamber (nominal): 1168mm wide x 2337mm long x 2159mm high 46 IN wide x 92 IN long x 85 IN high.
b. Overall Machine (nominal): 2184mm wide x 2508mm long x 2642mm high 86 IN wide x 98-3/4 IN long x 104 IN high.

C. Description:

1. Heavy duty, large capacity, hydrospray washer with microprocessor control system for use in the sanitation of soiled, reusable animal care devices including cages, racks, debris pans, and feeder bottles.

D. Configuration:

1. Refer to drawings for door, cabinet, and recessing requirements.

E. Mounting:

1. Pit-mounted. Provide stainless steel pit transition/threshold plates.

F. Washing Cycles: Programmable washing cycles shall include the following options (optional cycles indicated shall be able to be programmed by the Owner):

1. Pre-wash.
2. Wash.
3. Acid Wash.
4. First rinse, non-recirculated.
5. Second rinse, non-recirculated.
6. Final rinse, may be recirculated for pre-wash.
7. Vapor exhaust.
8. Heated air drying.
9. Descaling system:
   a. Provide chemical injection pump with flow meter, 15m 50 FT of tubing and pick-up tube for chemical containers to descale the interior of the chamber and of the alkaline tank.
   b. Automatic descaling cycle shall be selectable by operator.

G. Construction and Fabrication:

1. Wash chamber, base and sump:
   a. All-welded Type 304 stainless steel with No. 2B finish, of smooth construction without crevices or ledges for the potential build up of debris and contamination.
   b. Base and sump shall be 2.8mm 12 GA; walls shall be 2.0mm 14 GA.
   c. Base and chamber sump shall be of one-piece, welded construction with the base containing integral floor gutters and floor grating supports.
   d. If disassembly is required for entry into building, cabinet sections shall be flanged, bolted, with formed channels across the joints, or similar construction, to prevent leakage; base shall be site-welded.
2. Chamber floor:
   a. Stainless steel gratings over entire load area, removable for cleaning and maintenance.
3. Inclined floor grating shall pitch cart(s) for drainage.
4. Chamber shall be insulated with 50mm 2 IN fiberglass rigid or equivalent chlorine-free rigid insulation, covered by protective stainless steel jacket.
5. Noise level:
   a. 80 dBA maximum in cage wash areas during operation of equipment.

b. Provide vibration isolation for pumps and equipment if necessary.
c. Mounts shall be designed to protect equipment and machinery against damaging vibration for the specified type of equipment and installation.

6. Doors:
   a. 1.6mm 16 GA, Type 304 Stainless steel with No. 4 finish, double wall reinforced construction, insulated with non-hygroscopic rigid insulation, minimum 50mm 2 IN thick.
      1) Provide double-glazed, tempered glass view panel to permit operator to see inside the chamber with the door closed.
      2) Provide door gutters to direct water back into washer.
   b. Hardware:
      1) Hinges:
         a) Three cast bronze, chrome-plated or stainless steel hinges, fitted with rubber seal to prevent water seepage.
         b) Door swing as indicated on drawings.
      2) Safety Latch:
         a) Spring-loaded, stainless steel friction safety latch hardware to release door open from within chamber.
      3) Provide appropriate gasketing and sweeps to prevent leakage of water, vapors and heat.
         a) Material shall be resilient, capable of maintaining seal after long term use, such as EPDM or silicone.
   c. Door Interlock, Double Door Units:
      1) Shall be fitted to prevent both doors from being opened simultaneously and prevent the clean side/unload door from being opened until the cycle has been completed, also to prevent operation unless both doors are closed.
7. Automatic Floor Tilt System:
   a. Standing water shall be eliminated by means of an automatic floor tilt system that shall pitch cart(s) for drainage at beginning of cycle and return to level position at completion of cycle, by the design of the floor and presentation racks, or by other means provided by the manufacturer.
8. Trim:
   a. Stainless steel trim to prevent vermin intrusion between washer and adjacent modular wall or construction.
9. All fittings, valves, threaded piping and connections shall be NPT.
10. Piping:
    a. Steam Supply, external: Schedule 80 black iron.
    b. Internal, External Water, and Recirculating Piping: Type 304 stainless steel.
    c. Drain: Type 304 stainless steel.
11. Valves:
    a. Valves and pumps shall be non-proprietary.
    b. Valves:
       1) Provide manual ball valves on water and steam supply piping.
       2) Provide easily removable unions at service connections.

3) Provide automatically-actuated ball valves to control the output of the jet system, drain, or detergent return system.

c. Recirculating Valves, Drain Valves, and Components:
   1) Type 304 stainless steel.
d. Pressure Reducing Valve:
   1) Equipment shall be provided with pressure reducing valves, as required by the equipment, at incoming utility feeds.
e. All shut off valves shall be supplied with a minimum 10mm 3/8 IN hole for tagging and lock-out procedures or valve manufacturer-supplied handle locking device.

12. Water Hammer Arrester:
    a. Provide on water supply piping.
    b. Oscillating Jet System:
    c. Washer shall be equipped with a stainless steel oscillating jet spray system for all treatment solutions.
    d. Machined jets shall be Type 304 stainless steel and shall be mounted on spray trees suspended from an oscillating carriage traveling on self-lubricating machined wheels.
    e. Jets shall be positioned to reach all cart surfaces including the underside of shelves and base.
    f. Each spray header shall also include additional jets spraying outward to wash and rinse the interior chamber walls.
    g. System shall include a safety system to prevent the oscillating header from damaging items being washed.
13. Chamber Rails:
    a. Provide Type 304 stainless steel rails in chamber interior to protect oscillating jets from damage.
14. Chamber Light:
    a. Two exterior-mounted, 17W fluorescent lamps or similar long-life light sources, with sealed tempered glass window to washing chamber.
15. Steam Coil:
    a. 4.8mm 7 GA, Type 304 stainless steel steam coil with No. 2B finish, designed to ASME Section VIII, Div. 1, Unfired Pressurized Vessel Code, with automatic temperature control to maintain temperature of the treatment solution.
    b. Steam coil shall be easily removable for maintenance.
    c. Heating system shall be complete with condensate return and steam traps.
16. Heat Exchanger/Hot Water Booster:
    a. Provide inline steam-to-water heat exchanger to boost incoming water temperature to 10 DegC to 27 DegC 50 DegF to 80 Deg.
    b. Equip with bucket trap at steam inlet.
17. Temperature Guarantee:
    a. Provide guaranteed final rinse at programmed temperature.
    b. Final rinse timer shall not begin until recirculated final rinse water reaches the set temperature.
18. Automatic Level Control:
    a. Provide automatic level control float device; sensor not acceptable.

b. Device is for recirculating sump or staging tanks to ensure sump/tank is filled to proper level prior to pump operation.
c. Design to prevent overfilling; include drain overflow.

19. Pump shall be appropriately sized, 10 HP minimum, with a mechanical seal to deliver all treatments under pressure.
    a. Pump shall be equipped with a direct reading pressure gauge.
20. Injection Ports:
    a. Provide four injection ports and dry electrical contacts for dispensing and chemical treatment pumps. Include sampling port(s).
21. Drain System:
    a. Drain system shall be designed to minimize potential for cross-contamination between cycles, and rapid and thorough removal of water.
    b. Residue shall be fully removed from sump before next cycle begins.
    c. Controls shall allow operator to hold or drain final rinse solution for any cycle.
    d. Debris Screen:
        1) Type 304 stainless steel, easily removable, self-cleaning debris screen.
        2) Drain Discharge Cool Down System with Cold Water Injection:
            a) Washer shall be equipped with a cold water inlet valve, integral with drain line.
            b) Cold water shall be added to the effluent as it is discharged to reduce temperature to 60 DegC 140 DegF or below.
22. Vent Damper:
    a. Provide automatically-actuated vent damper in exhaust line.
    b. Provide a set of dry contacts in control panel for connection under Division 25.
    c. Contacts shall be controlled by the automatic exhaust cycle of the washer.
    d. Coordinate damper with building exhaust ductwork.
23. Blower/Exhaust Fan:
    a. Provide top-mounted stainless steel blower from exhaust chamber to building exhaust system.
    b. Blower shall be inter-wired with the microprocessor control system to exhaust residual vapors from within the wash chamber.
24. Safety Features:
    a. Explosion Relief Door Latches:
        1) Spring-loaded explosion relief safety latches that readily open when pushed from inside the wash chamber.
    b. Automatic Shutdown:
        1) Provided if door is opened during operation, with restart button to begin operation have door has been closed.
    c. Interior Shut Down System:
        1) Red cable mechanism on each side of chamber interior to immediately shut down operation if pulled.
    d. Door Interlock, double door units:
        1) Shall be fitted to prevent both doors from being opened simultaneously and prevent the clean side/unload door from being opened until the cycle has been completed.

2) Also to prevent operation unless both doors are closed.

e. Emergency Stop Button:
   1) Red button at each door of washer to immediately cease all washer operations.
   2) Button must be pulled out to restart operations.

f. An audible horn and flashing warning light at each door shall signal that a cycle is about to start.
   1) A cycle start delay period of a minimum of 5 seconds shall occur in conjunction with the operation of the audible and visual signals.

g. An audible alarm bell shall sound at each door of the washer to alert the operator when an alarm situation has occurred.
   1) Alarm reply touch pad must be pressed to silence the alarm.

25. Floor Spray Header: Provide stationary spray header mounted in the floor of the unit to ensure complete exposure to the underside of wash load to treatment solutions.
26. Manifolded Rack Coupling:
    a. Valving and coupling system provided to automatically divert solution to a manifolded rack for processing.
    b. Coupling shall be automatic and not require operator assistance.

H. Control System:

1. Washer shall be provided with a microcomputer, touch pad control system that monitors and automatically controls all process operations and functions.
   a. Cycle menu shall have capacity for eight cycles, including six preset cycles.
   b. Provide battery backup of microprocessor memory.
   c. Treatment times, temperature settings, and other key cycle parameters shall be programmable, and have the ability to be locked by supervisor.
   d. Controller shall be UL listed.
2. Control panels and electrical connections shall be water-tight and vermin-proof.
   a. Main panel shall be lockable.
   b. Control panel shall be located on washer, unless indicated otherwise on drawings.
3. A display screen shall display cycle program data on demand and real time in-process cycle performance.
4. Load End: Include the following features:
   a. Cycle control settings.
   b. Cycle status indicators.
   c. Cycle time settings.
   d. Cycle temperature settings.
   e. Final rinse drain or retention control.
   f. Adjustable drain time.
   g. Emergency power off button.
   h. Manual drain command.
   i. An integral impact strip chart printer shall record all cycle program and in-process performance data.
   j. Connections for treatment operation options.
   k. RS-232 port for downloading information to remote computer.

l. Integral data collection system: Chronological performance data shall be stored for up to 90 days, nominally.

5. Unload End: Include the following features:
   a. Cycle status indicators.
   b. Visual cycle complete indicators.
   c. Emergency power off button.
6. Controller shall require a single electrical connection; provide transformer, as required.
7. Coordinate control system with Owner-supplied remote bulk detergent storage tanks.

I. Required Options and Accessories to be provided:

1. Cold water fill for pre-wash, wash, and /or rinse.
2. Automatic Watering Rack Flush System:
   a. Provide two quick-connect hoses and pressure reducer to flush two automatic watering type racks with fresh hot water during final rinse phase.
3. Barrier Wall Flange Assembly:
   a. Provide 1.0mm 20 GA, Type 304 stainless steel trim flange with No. 4 finish to enclose the opening between end of washer and adjacent construction.
   b. Provide barrier wall flange at each recessed wall opening.
4. Side Storage Tanks: Provide tanks and pumps for alkaline and acid wash solutions to be reused.
5. Acid and Alkaline System:
   a. Provide separate liquid detergent injection pumps, detergent pick up tubes, conductivity controllers, conductivity probes, and 15m 50 FT of tubing for each system.
   b. Unit shall automatically monitor and directly inject detergent into chamber sump during the acid and alkaline wash phases.
6. Effluent Monitoring and Neutralization System:
   a. Washer shall be equipped with control hardware and pH probe to monitor and control the pH level of drain discharge.
   b. pH level shall be checked each time washer attempts to drain.
   c. If discharge is within a pre-set range, the washer shall drain; otherwise, the proper neutralizing agent shall be injected and the solution recirculated and tested again.
   d. Process shall be repeated up to three times until all parameters are satisfied.
   e. If parameters are not satisfied after the third test, an alarm shall sound.
   f. System shall include all controls, separate liquid neutralization injection pumps, detergent pick up tubes, and 15m 50 FT of tubing for each, acid and alkaline neutralization, pH probe, etc., and shall be inter-piped and inter-wired for automatic operation.
7. Remote oil-less air compressor, with tank and pressure switch, when required for washer operation.
8. Cage Processing Rack: Stainless steel rack to process cages from 127mm 5 inches to 203mm 8 IN high.
   a. Rack shall be mounted on stainless steel casters with roller bearings.
9. Cage Processing Rack for Central Header System:
   a. Stainless steel spray header and cage racks for processing large volumes of standard cages.

b. Header system shall be mounted on stainless steel casters and roller bearings and automatically couple to manifolded rack coupling system.

10. Feeder Bottle Rack:
    a. Stainless steel, multi-jet, wheeled cart for bottle, sipper tube, and utensils, fitted with interlocking spray manifold that quick connects to distribution flange at base of machine.
    b. Rack shall be mounted on stainless steel casters with roller bearings.
    c. Four-basket capacity.
11. Feeder Bottle Basket: Stainless steel bottle baskets; 5 by 5 arrangement, 454ml 16 OZ bottles. Quantity: to match capacity of feeder bottle rack.
12. Feeder Bottle Basket: Stainless steel bottle baskets; 5 by 5 arrangement, 227ml 8 OZ bottles. Quantity: to match capacity of feeder bottle rack.
13. Feeder Bottle Basket: Stainless steel bottle baskets; 4 by 6 arrangement, 454ml 16 OZ bottles. Quantity: to match capacity of feeder bottle rack.
14. Feeder Bottle Basket: Stainless steel bottle baskets; 4 by 6 arrangement, 227ml 8 OZ bottles. Quantity: to match capacity of feeder bottle rack.
15. Pan Processing Rack: Stainless steel rack to process pans with maximum 76mm 3 IN depth.
    a. Rack shall be mounted on stainless steel casters with roller bearings.
16. Seismic tie-down kit to comply with Seismic Zone 3 and 4 requirements.

J. Utility Requirements:

1. Refer to Laboratory Equipment Schedule.
2. Washer shall be inter-piped and inter-wired so that only one connection is required for each service or utility.

2.03 CAGE AND BOTTLE WASHER (CBW-1)

A. Acceptable Manufacturers:

1. Base:
    a. Steris Corporation.
2. Optional:
    a. GetingeUSA, Inc.
    b. Lynx Product Group.
    c. Schlyer Machinery Company, Inc.
    d. Tecniplast USA Incorporated.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design:

1. Basil Model 3700 Cage and Bottle Washer by Steris Corporation .
2. Size:
    a. Chamber (nominal): 1219mm wide x 864mm long x 787mm high 48 IN wide x 34 IN long x 31 IN high.
    b. Overall Machine (basic, nominal): 1956mm wide x 978mm long x 2108mm high 77 IN wide x 38-1/2 IN long x 83 IN high.

C. Description:

1. A heavy duty, cabinet type hydrospray washer designed for thorough, efficient cleaning of cages, bottles, debris pans and miscellaneous items used in the care of laboratory animals.

D. Configuration: Refer to drawings for door, cabinet, and recessing requirements.

E. Washing Cycles: Programmable washing cycles shall include the following options (optional cycles indicated shall be able to be programmed by the Owner):

1. Pre-wash.
2. Alkaline Wash.
3. Acid Wash.
4. First rinse, non-recirculated.
5. Second rinse, non-recirculated.
6. Final rinse, may be recirculated for pre-wash.
7. Vapor exhaust.

F. Construction and Fabrication:

1. Wash chamber, base and sump:
   a. All-welded, 2.8mm 12 GA, Type 304 stainless steel, with of No. 4 finish and smooth construction without crevices or ledges for the potential build up of debris and contamination.
   b. Base and chamber sump shall be of one-piece, welded construction with the base containing integral floor gutters and floor grating supports.
2. Chamber shall be insulated with 50mm 2 IN fiberglass rigid or equivalent chlorine-free rigid insulation, covered by protective 1.0mm 20 GA, Type 304 stainless steel jacket, with a No. 4 finish.
3. Noise leve: 80 dBA maximum, in cage wash areas during operation of equipment.
   a. Provide vibration isolation for pumps and equipment if necessary.
   b. Mounts shall be designed to protect equipment and machinery against damaging vibration for the specified type of equipment and installation.
4. Doors:
   a. 2.0mm 14 GA, Type 304 Stainless steel with No. 4 finish, counterbalanced, vertical sliding doors, double wall reinforced construction, insulated with non-hygroscopic rigid insulation, minimum 50mm 2 IN thick.
   b. Provide double-glazed, tempered glass view panel to permit operator to see inside chamber with door closed.
   c. Hardware:
      1) Provide appropriate gasketing and sweeps to prevent leakage of water, vapors and heat.
         a) Material shall be resilient, capable of maintaining seal after long term use, such as EPDM or silicone.
5. Service Doors:
   a. 1.6mm 16 GA, Type 304 stainless steel with No. 4 finish.
   b. A top service access panel shall be provided for servicing.
6. Trim:

a. Type 304 stainless steel trim, with No. 4 finish, to prevent vermin intrusion between washer and adjacent modular wall or construction.

7. All fittings, valves, threaded piping and connections shall be NPT.
8. Piping:
   a. External Steam: Schedule 80 black iron.
   b. External Water: Brass.
   c. Internal and Recirculating Piping: Type 304 stainless steel.
   d. Drain: Type 304 stainless steel.
9. Valves:
   a. Valves and pumps shall be non-proprietary.
   b. Valves: Provide manual ball valves on water and steam supply piping. Provide unions at service connections. Provide automatically-actuated ball valves to control the output of the jet system, drain, or detergent return system.
   c. Recirculating Valves, Drain Valves, and Components: Type 304 stainless steel.
   d. Pressure Reducing Valve: Equipment shall be provided with pressure reducing valves, as required by the equipment, at incoming utility feeds.
   e. All shut off valves shall be supplied with a minimum 10mm 3/8 IN hole for tagging and lock-out procedures or valve manufacturer-supplied handle locking device.
10. Water Hammer Arrester:
    a. Provide on water supply piping.
11. Washer shall be equipped with a centralized lubricating system for convenient maintenance.
12. Washing Mechanism:
    a. The unit shall incorporate one of the following mechanisms for delivering washing action:
       1) Oscillating Jet System:
          a) Washer shall be equipped with a stainless steel oscillating jet spray system for all treatment solutions.
          b) Machined jets shall be Type 304 stainless steel and shall be mounted oscillating header along top, bottom, and sides of wash chamber.
          c) Oscillating header shall travel on self-lubricating machined wheels.
          d) Jets shall be positioned to reach all load surfaces including the underside.
          e) System shall include a safety system to prevent the oscillating header from damaging items being washed.
       2) Rotary Spray Arm System:
          a) Washer shall be equipped with rotary spray arm system to provide maximum spray coverage with an overlapping pattern of wares and spray-down of cabinet interior.
          b) All components shall be Type 304 stainless steel, except wear parts which shall be Delrin material.
          c) Spray arms shall be removable for arm and nozzle cleaning; terminal end shall be removable.
13. Steam Coil:

a. 4.8mm 7 gauge, Type 304 stainless steel steam coil with No. 2B finish, designed to ASME Section VIII, Div. 1, Unfired Pressurized Vessel Code, with automatic temperature control to maintain temperature of the treatment solution.
b. Steam coil shall be easily removable for maintenance.
c. Heating system shall be complete with condensate return and steam traps.

14. Heat Exchanger/Hot Water Booster:
    a. Provide steam coil to boost incoming water temperature to 82.2 DegC 180 DegF.
    b. Equip with bucket trap at steam inlet.
15. Temperature Guarantee:
    a. Provide guaranteed final rinse at programmed temperature.
    b. Final rinse timer shall not begin until recirculated final rinse water reaches the set temperature.
16. Automatic Level Control:
    a. Provide automatic level control float device; sensor not acceptable.
    b. Device is for recirculating sump or staging tanks to ensure sump/tank is filled to proper level prior to pump operation.
    c. Design to prevent overfilling; include drain overflow.
17. Pump shall be appropriately sized, 5.52 kW 7.5 HP minimum, with a mechanical seal to deliver all treatments under pressure.
    a. Pump shall be equipped with a direct reading pressure gauge.
18. Central Spray Header System:
    a. Additional vertical, stainless steel spray arm for use with processing rack accessories.
    b. Arm shall swing up and out of way, and be secured, within the chamber when not in use.
    c. An automatic shut off valve shall be provided to hold the central spray header when not in use.
19. Injection Ports:
    a. Provide one detergent injection port and dry electrical contacts for dispensing and chemical treatment pumps.
    b. Include sampling port.
20. Drain System:
    a. Drain system shall be designed to minimize potential for cross-contamination between cycles, and rapid and thorough removal of water.
    b. Residue shall be fully removed from sump before next cycle begins.
    c. Controls shall allow operator to hold or drain final rinse solution for any cycle.
    d. Debris Screen:
        1) Type 304 stainless steel, easily removable, self-cleaning debris screen.
21. Vent Damper:
    a. Provide automatically-actuated vent damper in exhaust line.
    b. Provide a set of dry contacts in control panel for connection under Division 25.
    c. Contacts shall be controlled by the automatic exhaust cycle of the washer.
    d. Coordinate damper with building exhaust ductwork.
22. Blower:
    a. Provide top-mounted stainless steel blower from exhaust chamber to building exhaust system.

b. Blower shall be inter-wired with the microprocessor control system to exhaust residual vapors from within the wash chamber.

23. Safety Features:
    a. Automatic Shutdown:
    b. Provided if door is opened during operation, with restart button to begin operation have door has been closed.

G. Control System:

1. Washer shall be provided with a microcomputer, touch pad control system that monitors and automatically controls all process operations and functions.
    a. Controller shall have 12 cycle menu of treatment processes to accommodate a wide variety of load and processing requirements.
    b. Provide battery backup of microprocessor memory.
    c. Treatment times, temperature settings, and other key cycle parameters shall be programmable, and have the ability to be locked by supervisor.
    d. Controller shall be non-proprietary, and shall be UL listed.
2. Control panels and electrical connections shall be water-tight and vermin-proof.
    a. Main panel shall be lockable.
    b. Control panel shall be located on washer.
3. A display screen shall display cycle program data on demand and real time in-process cycle performance.
4. Load End: Include the following features:
    a. Cycle control settings.
    b. Cycle status indicators.
    c. Cycle time settings.
    d. Cycle temperature settings.
    e. Final rinse drain or retention control.
    f. Adjustable drain time.
    g. Emergency power off button.
    h. Manual drain command.
    i. An integral impact strip chart printer shall record all cycle program and in-process performance data.
    j. Connections for treatment operation options.
    k. RS-232 port for downloading information to remote computer.
    l. Integral data collection system: Chronological performance data shall be stored for up to 90 days, nominally.
5. Unload End: Include the following features:
    a. Cycle status indicators.
    b. Visual cycle complete indicators.
    c. Emergency power off button.
6. Controller shall require a single electrical connection; provide transformer, as required.
7. Coordinate control system with Owner-supplied remote bulk detergent storage tanks.

H. Required Options and Accessories to be provided:

1. Barrier Wall Flange Assembly:

a. Provide 1.0mm 20 GA, Type 304 stainless steel trim flange with No. 4 finish to enclose the opening between end of washer and adjacent construction.
b. Provide barrier wall flange at each recessed wall opening.

2. Acid and Alkaline System:
   a. Provide separate liquid detergent injection pumps, detergent pick up tubes, conductivity controllers, conductivity probes, and 15m 50 FT of tubing for each system.
   b. System shall provide timed, direct injection of respective detergent into chamber sump during the acid and alkaline wash phases.
3. pH Monitoring and Neutralization System:
   a. Washer shall be equipped with control hardware and conductivity probes to monitor and control the pH level of drain discharge and the concentration of detergent being used.
   b. Process shall be repeated up to three times until all parameters are satisfied. If parameters are not satisfied after the third test, an alarm shall sound, System shall provide all controls, separate liquid neutralization injection pumps, detergent pick up tubes, and 15m 50 FT of tubing for each, acid and alkaline neutralization, pH probe, etc., and shall be inter-piped and inter-wired for automatic operation.
4. Cage Processing Rack:
   a. Stainless steel rack to process cages from 127mm to 203mm 5 IN to 8 IN high.
   b. Rack shall be mounted on stainless steel casters with roller bearings.
5. Remote oil-less air compressor, with tank and pressure switch, if required for washer operation.
6. Mouse Cage Processing Rack:
   a. Stainless steel rack to process 32 mouse cages, 190mm wide x 292mm long x 127mm high 7-1/2 IN wide x 11-1/2 IN long x 5 IN high.
7. Rat Cage Processing Rack: Stainless steel rack to process 12 rat cages, 267mm wide x 483mm long x 203mm 10-1/2 IN wide x 19 IN long x 8 IN high.
8. Mouse Cage Processing Rack for Central Header System:
   a. Stainless steel rack to process 48 mouse cages, 190mm wide x 292mm long x 127mm high 7-1/2 IN wide x 11-1/2 IN long x 5 IN high.
9. Rat Cage Processing Rack for Central Header System:
   a. Stainless steel rack to process 18 rat cages, 267mm wide x 483mm long x 203mm 10-1/2 IN wide by 19 IN long by 8 IN high.
10. Feeder Bottle Basket: Stainless steel bottle baskets; 4 by 6 arrangement, 454ml 16 OZ bottles. Quantity: 3.
11. Feeder Bottle Basket: Stainless steel bottle baskets; 4 by 6 arrangement, 227ml 8 OZ bottles. Quantity: 3.
12. Pan Processing Rack:
    a. Stainless steel rack to 8 process pans.
13. Transfer Cart.
14. Seismic tie-down kit to comply with Seismic Zone 3 and 4 requirements.

I. Utility Requirements:

1. Refer to Laboratory Equipment Schedule.

2. Washer shall be inter-piped and inter-wired so that only one connection is required for each service or utility.

2.04 BOTTLE FILLER: BATCH TYPE, BF-1

A. Acceptable Manufacturers:

1. Base:
   a. Steris Corporation.
2. Optional:
   a. GetingeUSA, Inc.
   b. Lynx Product Group.
   c. Schlyer Machinery Company, Inc.
   d. TBJ Incorporated.
3. Other manufacturers desiring approval comply with Section 01600.

B. Basis of Design:

1. Basil Model 1000 Feeder Bottle Filler by Steris Corporation.

C. Description:

1. Batch type, manifold type filler designed for filling basket loads of feeder bottles used in the care of laboratory animals.
2. Automatic operation:
   a. Filler shall be equipped with a solenoid water valve and push button reset timer for automatic operation.
   b. Electrical control panel shall contain main power switch, push button reset timer, and operational lights.
   c. Control panel shall be capable of being mounted to the right of left side of the splash hood.

D. Overall Filler:

1. Dimensions: 660mm wide x 1168mm long x 1575mm high 26 IN wide x 46 IN long x 62 IN high.

E. Filler Head Configuration: Provide two interchangeable manifolds: one with 4 by 6 jets, and one with 5 by 5 jets.

F. Construction:

1. Drain pan and legs shall be constructed of 2.0mm 14 GA Type 304 stainless steel with a No. 3 or 4 finish and integral, watertight welds.
   a. Legs shall be provided with adjustable leveling feet.
2. Valves and Piping:
   a. Type 316 stainless steel.
   b. Provide filler with quick-connect attachment for interchanging manifolds.
   c. Provide quick operating 1/4 turn stainless steel valve with Teflon seals and seats for controlling water supply to header.
3. Water Supply Connection:
   a. Provide 1.8m 6 FT flexible connector with liquid-tight, quick connect fittings.

b. Provide liquid-tight quick connect fittings at shut off valve on bottle filler and at shut off valve installed under Division 15.

4. Pressure Reducing Valve:
   a. Equipment shall be provided pressure reducing valves at incoming utility feeds.
5. Conveyor:
   a. CPVC rollers on Type 304 stainless steel conveyor frame and basket storage.
6. Bottle Basket:
   a. Type 304 stainless steel, fully welded, sized for bottle filler. Provide one for each filler head configuration indicated.
7. Electrical:
   a. Unit shall be provided with a 6-foot (1.8m), minimum, liquid-tight power cord and plug.
8. Seismic Tie Down designed to comply with Seismic Zone 3 & 4 requirements.

G. Utility Requirements: Refer to Laboratory Equipment Schedule.

2.05 BEDDING DISPENSER: FREESTANDING CABINET TYPE, BD-1

A. Acceptable Manufacturers:

1. Base:
   a. Steris Corporation.
2. Optional:
   a. GetingeUSA, Inc.
   b. Lynx Product Group.
   c. Schlyer Machinery Company, Inc.
   d. TBJ Incorporated.
   e. Tecniplast USA Incorporated.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design:

1. Basil Model 9600 Bedding Dispenser by Steris Corporation.

C. Description:

1. Semi-automated unit designed to dispense bedding into two (2) rodent cages simultaneously as they are placed in the unit.
2. Dispenser shall be capable of handling most chip-type, free flowing solid bedding as currently used in the care of laboratory animals.

D. Dimensions:

1. Overall Machine: 2350mm high x 864mm deep x 1016mm wide 92-1/2 IN high x 34 IN deep x 40 IN wide.
2. Maximum Cage: 330mm high x 330mm wide 13 IN high x 13 IN wide.

E. Construction:

1. All structural support shall be stainless steel.
   a. All sprockets, shafts, chains, etc. shall be carbon steel.
2. Hoppers:
   a. Storage bins shall be 2.0mm 14 GA stainless steel.

b. Total hopper capacity shall be a minimum of 425L 15 CF.

3. Work Surface:
   a. Stainless steel 10mm 3/8 IN diameter welded rod grid designed to permit the dumping of bagged bedding through the grid to the storage bin.
   b. Grid shall be easily removable for cleaning or maintenance.
4. Exhaust and Dust Collection System:
   a. Provide exhaust fan, exhaust duct and dust collector to remove dust generated by filling operation and eliminate need for connection to building exhaust system.
   b. System shall be electrically connected to the bedding dispenser.
   c. Dust collector shall produce have a maximum noise level of 78 dB.
5. Controls:
   a. Main power on-off switch for bedding transfer system, and a method for precise metering and distribution of bedding.
6. Pressure Reducing Valve:
   a. Equipment shall be provided pressure reducing valves at incoming utility feeds.

F. Required Options:

1. Air Compressor:
   a. Dispenser shall be provided with a compressor to supply the air required for the bedding release valve.
   b. Compressor shall be inter-wired and inter-piped for automatic operation.
2. Seismic Tie Down: Dispenser shall be designed to comply with Seismic Zone 3 and 4 requirements.

G. Utility Requirements: Refer to Laboratory Equipment Schedule.

2.06 BEDDING DISPENSER: CONVEYORIZED TYPE, BD-1

A. Acceptable Manufacturers:

1. Base:
   a. Steris Corporation.
2. Optional:
   a. GetingeUSA, Inc.
   b. Lynx Product Group.
   c. Schlyer Machinery Company, Inc.
   d. TBJ Incorporated.
   e. Tecniplast USA Incorporated.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design:

1. Basil Model 3600 Bedding Dispenser by Steris Corporation.

C. Description:

1. Automatic, conveyorized unit designed to dispense bedding into animal cages as they pass through unit.

2. Storage hopper shall be filled by dumping bedding into the hopper located alongside cage conveyor bed.
3. A controlled level of bedding material shall be dispensed to each cage as it passes through the dispenser.
    a. Amount of bedding shall be variable by adjusting a dispensing rate knob.
4. Excess bedding that falls through the roller conveyor shall be returned to storage hopper by the dispensing conveyor.
5. Bedding dispenser shall operate in conjunction with the tunnel washer.
6. Refer to drawings to determine hopper location.

D. Critical Dimensions:

1. Conveyor shall be approximately 1067mm 42 IN wide, tunnel opening shall be 305mm 12 IN high.

E. Construction:

1. Structural Support: Type 304 stainless steel.
2. Storage Hopper: 2.0mm 14 GA stainless steel.
3. Cage Conveyor: PVC rollers.
4. Dispensing Conveyor System:
    a. Low-friction ultra-high molecular weight (UHMW) polyethylene guides and wear pads for smooth, quiet travel throughout dispensing cycle.

F. Features:

1. Control Panel:
    a. POWER ON/OFF selector switch, UNIT STOP maintained Push-Pull button, DISPENSER pushbutton, DUST COLLECTOR pushbutton and a DISPENSER SPEED ADJUSTMENT knob for adjusting the bedding rate.
2. Cage Conveyor System:
    a. Rollers shall be designed for free movement on the hub and ease of removal for cleaning.
3. Dispensing Conveyor System:
    a. Include heavy chain that allows bedding to pass through the chain without jamming in the drive sprockets and variable speed dispenser belt motor.
4. Service Access Panels:
    a. Provide access panels for sprocket and chain repair of cage conveyor roller. Unload and load end of dispenser shall have access panels.
    b. Loading hopper shall have hinged cover. Dispensing belt shall have removable cover.
5. Clean-out Door:
    a. Provide on unload end of dispenser to allow access to lower hopper.
    b. Provide drain connection with plug in the lower hopper aids in cleaning and draining the unit.
6. Dust Collection System:
    a. Provide dust collection system to remove dust generated by the filling operation and to eliminate the need for connection to building exhaust.

b. System shall include blower and 208L 55-gallon drum connected to the dispenser vent.
c. System shall have ON/OFF switch on control panel and shall capable of being located up to 3m 10 FT from dispenser.

7. Exhaust Ducts:
   a. Include vacuum ducts strategically disposed inside dispenser chamber for efficient dust removal.
8. Adjustable Legs:
   a. Provide to allow leveling of unit and to adjust conveyor height.
9. Storage Dispensing Hopper:
   a. 0.33m^{3}11-1/2 CF capacity.
10. Photoelectric Conveyor Stop:
    a. Provide photoelectric switch at the end of the conveyor to stop the conveyor drive when an item reaches the end of the conveyor.
11. Seismic Tie Down: Dispenser shall be designed to comply with Seismic Zone 3 and 4 requirements.

G. Utility Requirements: Refer to Laboratory Equipment Schedule.

2.07 BEDDING DISPOSAL CONTAINMENT CABINET – DRY BAG TYPE, BDC-1

A. Acceptable Manufacturers:

1. Base:
   a. NuAire.
2. Optional:
   a. The Baker Company.
   b. Labconco Corporation.
   c. Allentown Caging Equipment Co., Inc.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design:

1. Model 607-400 by NuAire.

C. Description:

1. Specially designed ventilated enclosure offering personnel protection while performing rodent cage changing.

D. Dimensions:

1. Overall Machine: 1270mm wide x 735mm deep x 2005mm high 50 IN wide x 29 IN deep x 79 IN high.

E. Materials:

1. Sheet Steel: 1.3mm 18 GA, cold-rolled, carbon steel sheet.
2. Stainless Steel Sheet: Type 304 stainless steel with No. 4 finish.
3. Polycarbonate and 13mm 1/2 IN acrylic panels.
4. Finish (on sheet steel): Baked Urethane or Epoxy powder coating; color to be selected from manufacturer's standard options.

F. Construction:

1. Filter:
   a. HEPA filter exhaust (99.99 percent efficient on 0.3 microns).
   b. Provide pre-filter and odor removal filter.
   c. Filters shall be removable from front.
2. Work Surface:
   a. Stainless steel with opening in work surface to waste receptacle below.
3. Airflow:
   a. 0.508m/sec 100 FPM with 405mm 16 IN, nominal, sash opening.
4. Polycarbonate hinged viewing window/sash.
5. Clear acrylic side panels.
6. Cabinet:
   a. Cabinet shall be steel; frame mounted on locking casters.
   b. Provide stainless steel push/pull bar on side.
7. Light:
   a. Fluorescent light fixture, available from the outside for lamp replacement.
8. Waste Receptacle: On casters.
9. 3m 10 FT power cord.

G. Utility Requirements: Refer to Laboratory Equipment Schedule.

2.08 BEDDING DISPOSAL CONTAINMENT CABINET – FREESTANDING GRINDER, BDC-2

A. Acceptable Manufacturers

1. Base:
   a. Garb-el Products Company.
2. Optional:
   a. GetingeUSA, Inc.
   b. Schlyer Machinery Company, Inc.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design:

1. "P" Series by Garb-el Products Company.

C. Description:

1. Freestanding bedding dump and disposal system to dispose of bedding and debris.
   a. Water shall be mixed with ground debris and be discharged as slurry into the sewer system.
2. Unit shall consist of grating over load funnel leading to chamber with hammer mill grinder, enclosed in stainless steel cabinet.

D. Construction and Features:

1. Length: 914mm 36 IN nominal.
2. Top, Backsplash and Sides:
   a. Type 304 or Type 316 stainless steel.
   b. Freestanding units shall have backsplash on three sides.

3. Grinder Motor: 5.52 kW 7.5 hp.
4. Worm Screw: Stainless steel.
5. Hopper Grid: Stainless steel.
6. Safety System: Provide emergency push/pull stop button to cease processing functions and activate audible alarm.
7. Electrical: Control panel shall be inspected and labeled in accordance with U.L. standards.
8. Downdraft System:
    a. Downdraft slots shall be provided between the grinding chamber and the hammer mill compartment, covered with wire mesh to prevent large particles from entering the downdraft exhaust system.
    b. Provide 50mm 2 IN exhaust connection.
    c. Downdraft system shall be connected to building exhaust system unless a dust collection system is specified.
9. Dust Collection System:
    a. Provide dust collection system with dump station to remove dust generated by the dumping operation and eliminate need for connection to building exhaust system.
    b. System shall consist of 0.74kW 1 HP blower and 136L 36 GAL container/bag connected to the vent of the dump station, and shall be inter-wired with the dump station, and equipped with an on/off switch mounted on the control panel.
    c. System shall have a maximum of 1100m^3/hr 650 CFM with filtration to 50 microns.
    d. System shall be housed in 24 GA powder coated metal cabinet mounted on casters.
10. Pre-Rinse Hose Station:
    a. Flexible hose with spray nozzle shall enable operator to pre-rinse cages and pans to remove debris.

E. Controls:

1. Limit switches shall disable system operation to prevent personnel injury when the grates are removed.

F. Utility Requirements: Refer to Laboratory Equipment Schedule.

2.09 TISSUE DIGESTER, TD-1

A. Acceptable Manufacturers:

1. Base:
    a. BioSAFE Engineering.
2. Optional:
    a. Progressive Recovery Inc.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Vessel Capacity: ____kg ____ LBS.

C. References:

1. AFBMA: Anti-Friction Bearings Manufacturers Association.
2. AISC: American Institute of Steel Construction.
3. AISI: American Iron and Steel Institute.
4. ANSI: American National Standards Institute.

5. ASME: American Society of Mechanical Engineers.
6. ASTM: American Society of Testing and Materials.
7. AWS: American Welding Society.
8. ISA: Instrument Society of America.
9. NEC: National Electrical Code.
10. NEMA: National Electrical Manufacturers Association.
11. NFPA: National Fire Protection Association.
12. OSHA: Occupational Safety and Health Administration.
13. SDI: Steel Deck Institute.
14. SSPC: Steel Structures Painting Council.
15. UL: Underwriters Laboratory.

D. Description:

1. Manufacturer shall engineer and fabricate a self-contained, ventilated carcass disposal system.
2. Manufacturer shall provide engineering and services as required to provide a fully engineered, operational skid-mounted system.
    a. Engineering and services shall include, as a minimum the following activities:
        1) Sizing and design of all components, based on the operational conditions specified. This shall include, but not be limited to pressurized components, distribution system, relief valve discharge, and post-cycle pressure relief system.
        2) Design of all piping and other accessories within the skid boundaries, including pressure loss calculations.
            a) Drawings shall be created for all piping systems, complete with piping and valve sizes, pipe and valve numbers, and dimensional information.
        3) Arrangement of all piping and equipment to allow for proper equipment access.
        4) Creation of general arrangement and structural load diagram drawings.
            a) General arrangement drawings shall show plan and elevation views of the supplied equipment as it will be located in the Owner's facility.
        5) Assembly of a complete erection package, including the necessary requirements and specifications for field piping, wiring and insulation, as well as for installing the equipment.
3. Unit shall provide alkaline hydrolysis of tissue being processed at the appropriate ratios and concentrations to digest quantity specified, depending on tissue density for the treatment and disposal of anatomic and pathologic waste.
4. Approved alkaline hydrolysis processes require processing infectious material in a hydroxide solution calculated on a mass per mass basis equal or greater than 9 percent of the infectious material, which corresponds to 15 percent sodium hydroxide solution (NaOH) or 19.3 percent potassium hydroxide solution (KOH)[3] of the total processed tissue weight.
5. Unit shall process all tissue, fixed tissue, fat, carcasses, collagen entrained in bones, eggs, hair, feathers, etc.
    a. Protein material shall be hydrolized, and fats shall be saponified.
        1) Unit shall sterilize cellulose materials such as grasses, animal bedding, and non-protein items.

2) Unit shall be capable of destroying formalin, glutaraldehyde, and phenol fixing agents.
3) Unit shall be able to destroy specific antineoplastic agents, biological toxins, and many chemical toxins.

6. Waste Product:
   a. The final product of tissue digestion shall be liquid with low BOD levels allowing for discharge to sanitary sewer, and a small amount of solids for landfill.

E. Efficacy Testing and Process Information:

1. Prion Destruction Research:
   a. Infectivity studies research data
      1) Cranial inoculation of animal carcasses with 301 V, processed in a Tissue Digester, followed by neutralization and injection into VM mice for a minimum of 18 month with no signs infectivity after that period.
   b. MALDI-TOF – Protein Analysis data
      1) Evaluation of Protein must show protein, amino acid, and polypeptide sizing to be less than 20 residuals long.
2. Dioxins:
   a. Sample analysis: Samples are to be analyzed for dioxin and polychlorodibenzofuran by high-resolution gas chromatography-mass spectrometry.
   b. Results: Results of the analysis should show no new synthesis of dioxins or PCD-furans in the alkaline hydrolysis process.
3. Mycobacterium Agents:
   a. Test Organism: Mycobacterium Terrae, ATCC 15755 – No growth for results after processing in tissue Digester.
   b. Protocol:
      1) Test Organism:
         a) Culture suspensions will be prepared from Middle brook 7H10 agar for sterility testing and handling of positive controls.
         b) A standardized inoculum equivalent to a 1.0 McFarland standard containing approximately 3 X 108 CFU/ml will be prepared in sterile saline. The density of the turbidity will be verified by using the quantitative culture method.
         c) Place approximately 2ml of organism suspension into each sterile stainless steel holding vessel and seal closed.
      2) Processing:
         a) A total of 6 test run will be processed; 3 with animal waste and 3 without animals.
         b) A total of 4 organism suspensions will be used for each test run; 3 test organisms and 1control organism.
         c) Load one 5 gallon basket with animal waste and insert into the Tissue Digester.
         d) Insert 3 stainless steel holding vessels containing bacterial suspensions onto a hanger so that when suspended into the 3 Digester apparatus the test sites will include: head space (the air space between the inside top of the lid and

the liquid), top liquid, and bottom liquid. The fourth vessel will serve as a non-sterilized positive control.

e) Operate the Tissue Digestion System with and without animal waste at approximately 121 degrees C for 3 hours.
   (1) Follow manufacturer's operating instructions for the sterilization process.

f) After completion of the process cycle, allow system to cool 15 minutes.
   (1) Transport vessels to a certified biological testing laboratory to verify the sterility of the vessels and their contents.

3) Culture and Validation of Sterility:
   a) All cultures will be processed under a Biological Safety Cabinet.
   b) Carefully unseal each vessel and inoculate culture media.
      (1) Place 0.1 ml of suspension onto a Middlebrook 7H10 plate and use sterile spreader to inoculate the entire plate.
      (2) Place 1.0 ml of suspension into a Bactec 13A Modified 7H12 Middlebrook Medium.
   c) Incubate all media at 36 degrees C, 6 percent CO_2 for 21 days.
   d) Read plates for growth.
      (1) Refer to Bactec 460 Procedure to detect growth
   e) Using serial ten-fold dilution in sterile water, perform quantitative cultures on non-sterilized positive controls suspensions.
4) Results:
   a) No growth of sterilized organism suspensions and growth (@ 108 CFU/ml) non-sterilized positive control indicates acceptable sterilization.

4. Bacterial Agents:
   a. Test Organism: Geobacillus Stearothermophilus – No growth
   b. Protocol:
      1) Load the selected size Tissue Digester with the appropriate weight of animal waste.
      2) Place one BI vial into four stainless steel holding vessels lined with one wet 100mm x 100mm 4 inch x 4 inch cotton gauze (protects vials and provides moisture).
         a) Insert 3 of the vessels onto a hanger so that when suspended into the Digester apparatus the test sites will include: head space (the air space between the inside top of the lid and the liquid), top liquid, and bottom liquid.
         b) Mark the fourth vessel as a non-sterilized control.
      3) Process the animal waste with three BI's in the Tissue Digestion System at a minimum of approximately 121 DegC for 3 hours.
         a) Follow manufacturer's operating instructions for sterilization process.
      4) After completion of the process cycle allow system to cool for 15 minutes.
         a) Obtain from each vessel the sterilized, non-incubated test BI and allow to cool prior to crushing.
      5) Slip the coil off the Attest™ vial.
         a) Identify BI by noting sterilizing unit, load number (site), and processing date on the indicator label.

6) Close the cap of the BI, crush the ampule, and tap the BI on a hard surface to wet the strip at the bottom of the vial.
7) One non-sterilized BI (vessel 4) will be included, each time a processed vial is incubated, as a positive control.
   a) The lot numbers of processed and non-sterile BI's must be the same.
8) Calibration of Auto-reader incubator:
   a) Place the processed BI in the reader well and hold down until either the red or green indicator light comes on.
   b) Press and hold the calibration button until the yellow light stops flashing and the green light stays on.
   c) After releasing the calibration button, remove the BI from the reader well.
   d) Place the BI in the reader well again, if the green light illuminates, continue.
9) Incubation and Reading:
   a) Place the processed BI's in the incubation well. All BI's must be incubated within one hour after removal from the Digester apparatus.
   b) Close, crush, tap and incubate the non-sterilized positive control vial.
   c) Incubate the processed and positive control BI's for 3 hours at 60±2 DegC.
   d) After incubation, place the positive control BI in the reader well and hold down until the red indicator light (fluorescent positive) comes on.
   e) Place the processed BI in the reader well and hold down until the green indicator light (fluorescent negative) comes on.
   f) After the 3 hours fluorescent readout, incubate all BI's an additional 48 hours in a water bath at 60±2 DegC for a visual color change readout.
10) For efficacy testing, three sterilization process runs will be performed.
   a) Each process run will contain three test vials and one non-sterilized positive control vial.

c. Results:
   1) A fluorescent positive (red light or +) after 3 hours of incubation indicates a sterilization process failure.
      a) A fluorescent negative (green or -) indicates an acceptable sterilization process.
   2) A visual color change to yellow after 48 hours of incubation indicates bacterial growth and a sterilization failure. No color change (remains purple) indicates adequate sterilization.

5. Information on the destruction of Aldehyde–containing fixatives and embalming fluids:
   a. Description of how process effects agents
6. Information on destruction Antineoplastic Agents
   a. Description of how process affects agents.

F. Construction:

1. Vessel:
   a. Material: Type 316L stainless steel.
   b. Vessel shall be ASME certified as a 'U' vessel to operate at an internal working pressure of 6.9 bar 100 psi and full vacuum at 177 DegC 350 DegF.

c. Vessel shall utilize a steam coil with a minimum rating of 10.34 bar at190 DegC 150 PSIG at 375 DegF for heating.
d. Vessel sides and door(s) shall be insulated with 75mm 3 IN minimum, asbestos and chloride free fiberglass insulation.
e. Vessel shall have a 2.8mm 12 GA, Type 304 stainless steel outer shell and door domes; jacket shall have a brushed finished.
f. Vessel shall have 68kg 150 pound rated RFSO flange connections, 1360kg 3000 pound, coupling connections, or heavy wall sanitary connections.
g. Vessel shall be supported on Type 304 or 316 stainless steel legs on load cells attached to a Type 304 stainless steel skid with leveling feet.
h. Welding shall be in accordance with ASME B31.1 Process Piping, and the ASME Boiler and Pressure Vessel Code, Section I Power Boilers, Section VIII Rules for Construction of Pressure Vessels, and Section IX Welding Qualifications.

2. Door(s):
   a. Door(s) shall be insulated and sealed with an EPDM double O-ring gasket.
   b. Door seal shall include O-ring air seal test.
   c. Door(s) shall be provided with a handle, and manually latch.
   d. Double door units shall have interlock to prevent improper opening of doors.
3. Pump:
   a. Liquid end of pump shall be Type 316 stainless steel.
   b. Pump shall include a double mechanical cartridge seal.
   c. Pump design shall be appropriate for the conditions of the operation.
4. Include all piping, and valves to provide for a complete system and appropriate for the conditions of the operation, including corrosion resistance.
   a. Isolation valves shall be positive shut off ball type.
   b. All valves shall be fully ported, unless otherwise noted.
   c. Steam traps shall be provided with isolation and bypass valves.
   d. The unit shall have a vessel pressure sensor and provide automated monitoring and safety protections resulting from the pressure monitoring.
   e. Pressure Reducing Valve:
      1) Equipment shall be provided with pressure reducing valves, as required by the equipment, at incoming utility feeds.
   f. Manual gate and globe valves shall have rising stems.
      1) Manual gate and globe valves shall be of an OS&Y design with PTFE gaskets and packing.
      2) Valve construction shall be carbon steel or stainless steel, as appropriate for service.
   g. Manual ball valves shall be quarter turn type with PTFE seats, packing, and seals.
      1) Valve construction shall be carbon steel or stainless steel, as appropriate for service.
      2) Ball valves on all lines other than air service shall be two-piece.
      3) Ball valves on air lines are not required to be three-piece.
      4) Ball material shall be ASTM A108 chrome plated for carbon steel service and ASTM A276 for stainless steel service.
   h. All block valves shall be quarter turn ball valves.

1) Automatic block valves shall be supplied with solenoid valves.
2) All block valves shall be provided with limit switches and local indicators to indicate valve open/closed status.

i. All relief valves in contact shall be of stainless steel construction with PTFE seats and seals.
j. Check valves shall be of all stainless steel construction and shall have PTFE gaskets.
k. Solenoid valves shall have 120 VAC, 60 Hz, single phase solenoids.
1) Valve enclosure shall be NEMA 4.
2) Solenoids shall be rated to be continuously energized and shall have provisions for manual actuation.
3) Coil insulation shall be Class F.
4) Coils shall be watertight.
5) Seals shall be rated to 200 DegC minimum.
6) Exhaust filters shall be mounted at the exhaust of the solenoid valve.
7) Needle valves on the filters shall be able to be used as throttles to control the speed of the actuated device.
8) All supplied solenoid valve shall have provisions for manual actuation.
l. Steam and Water valves shall be air piloted angled plunger valves rated for steam service to 1 million or more cycles, and greater than 1 million cycles in water service.

5. Controls:
a. Controller shall be in NEMA 4 enclosure with touch screen.
1) Touch screen shall display graphic description of system components, cycle times, temperatures, tank levels, pressures, and other important system parameters.
2) An alarm screen shall be available to document and track system alarms.
b. Controller shall be PLC type with power disconnect switch with lockable handle, circuit breakers as required, transformers as required.
1) The PLC shall provide a comprehensive list of alarms and rankings, and appropriate dry contacts sufficient to send ranked alarm data to the building automation system specified under Division 25.
c. PLC shall allow for multiple levels of security to prevent unauthorized access.
d. On loss of power, the PLC will shut down in an orderly manner, all I/O to their predictable state.
1) When power is restored, the CPU will automatically restart and resume the cycle it was in prior to power loss.
e. The system shall be fully automated in operation, requiring the operator to only load the tissue and press one or more buttons to initiate a fully automated cycle.
f. The vessel shall be on load cells to provide accurate readings to the control system to allow automatic tissue weighing, alkali calculation, water infusion, alkali infusion, and cycle control.
g. The unit shall feature an automated pH correction system to lower the pH of the digested effluent to a range acceptable by the end customer.
h. Controller shall include flash card to record program parameters, program failure alarms, and dry contacts for connection under Division 25.
i. Provide Ethernet for remote diagnostic monitoring.

6. Electrical:
    a. All electrical construction shall be according to NEMA standards and utilizing components that satisfy U.L. standards.

G. Operation:

1. System shall be fully automated in operation, requiring the operator only load the vessel, and activate one or more switches to initiate a fully automated cycle.
    a. System shall be able to operate unattended by the operator once the cycle is initiated.

H. Required Options:

1. Provide OSHA-compliant handrails and stairs.
2. Seismic Tie Down: Dispenser shall be designed to comply with Seismic Zone 3 & 4 requirements.

I. Utility Requirements: Refer to Laboratory Equipment Schedule.

2.10 ANIMAL TRANSFER STATION, ATS-1

A. Acceptable manufacturers:

1. Base:
    a. NuAire, Inc.
2. Optional:
    a. The Baker Company, Inc.
    b. Tecniplast USA Incorporated.
    c. Allentown, Inc.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design:

1. NuAire NU-619.
2. Baker AniGARD II Animal Transfer Station.
3. Tecniplast CS5 EVO Plus Changing Station.
4. Allentown Phantom Animal Transfer Station.
5. Interior Work Height: 635mm 25 IN, nominal.
6. Work surface height: Lift mechanism providing 305mm 12 IN, minimum, of height adjustment; range shall include 914mm to 1067mm 36 IN to 42 IN, above finished floor.
7. Cabinet Height: 2337mm 92 IN extended, maximum.
8. Exterior Width: 1525mm 60 IN, maximum, not including pull bars.
9. Cabinet shall fit through 914mm 36 IN wide door without disassembly.
10. Cabinet shall deliver HEPA-filtered, ISO Class 5 air to the work area in a vertical laminar downward flow.
11. Two long sides shall be available for operators.
12. Provide knee space below worksurface.

C. Materials:

1. Work Surface and Down Draft Plenum:
    a. 1.6mm 16 GA, Type 304 stainless steel, with No. 4 finish, or scratch-resistant, autoclavable solid phenolic.

2. Cabinet and Uprights:
    a. Cold rolled steel, aluminum, or molded plastic. Exterior finish, metal components: white powder-coated enamel.
3. Viewscreen:
    a. 6mm 1/4 IN safety glass or scratch-resistant polycarbonate
    b. There shall be no permanent etchings on viewscreen.

D. Construction:

1. Cabinet shall be mounted on 125mm to 150mm 5 to 6 IN casters with polyolefin wheels and brakes. One pair of casters shall be locking type.
2. Motorized lift mechanism.
3. Screen Style: Hinged window shall open to at least 533mm 21 IN above the worksurface.
4. Access Opening: 356mm 14 IN.
5. Worksurface: Provide perimeter perforations for exhausting the work area and lift handles and mechanism to support worksurface in lifted position to access exhaust pre-filter and for cleaning.
6. Spill Tray: Stainless steel, liquid-tight, spill tray with stainless steel ball valve for drainage.

E. Features:

1. Lighting:
    a. Lamps: T8 fluorescent type with electronic ballast and separate light switch.
    b. Light Level: 860 lux 80 FC, nominal, at the work surface.
2. Electrical:
    a. Provide 7.62m 25 FT, minimum, retractable power cord with NEMA 5-15P or 5-20P plug.
3. Blower:
    a. Provide DC-ECM or AC 3-phase motor.
    b. Airflow Velocity: Uniform downflow air pattern creating air curtain to protect animals and operators. Airflow over the center of the worksurface shall be between 0.25 and 0.51m/s 50 and 100 fpm.
    c. Blowers shall automatically handle a 60 percent minimum increase in filter loading without a decrease in total air delivery of more than 10 percent. Provide voltage compensating motor speed controller that automatically compensates for voltage changes to maintain constant voltage to the motor. Manual adjustment of speed controller shall allow a 150 percent increase in filter loading and maintain total air delivery at or above 90 percent
4. Provide minihelic gauge(s) to monitor filter loading up to 50mm 2 IN WG.
5. Filters:
    a. Include supply and exhaust HEPA filters with pre-filter(s).
    b. Supply and exhaust HEPA filters shall be 99.99 percent efficient on all particles 0.3 micron by DOP test.
    c. Filters shall be removed through the work area.
6. Electronic microprocessor control panel shall include:
    a. Blower switch.
    b. Light switch.

c. Electrical Receptacle.
7. Pull bar with 405mm x 405mm 16 IN by 16 IN folding tray.
8. Hand sanitizer.

F. Listings: Underwriters Laboratories.

1. Utility Requirements: Refer to General Laboratory Equipment Schedule on drawings.

2.11 ICE MAKER, IM-1

A. Acceptable Manufacturers:

1. Base:
   a. Manitowoc.
2. Optional:
   a. Hoshizaki America, Inc.
   b. Scotsman.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Ice Flaker and Storage Bin:

1. Basis of Design:
   a. SF-0406A/B420 ice flaker with storage bin by Manitowoc.
2. Description:
   a. Ice flaker with stainless steel auger and storage bin.
   b. Dimensions: 1943mm high x 559mm wide x 863mm deep 71.5 IN high x 22 IN wide by 34 IN deep.
   c. Finish: stainless steel with No. 4 finish.
3. Flaker:
   a. Ice Producing Capacity: 194kg 428 LBS of flaked ice in 24 hours.
   b. Compressor Unit: Air-cooled.
   c. Operating Requirements:
      1) Air Temperature: 7.2 DegC to 32.2 DegC 45 DegF to 90 DegF.
4. Ice Storage Bin:
      1) Description: 141kg 310 LBS capacity ice storage bin.
5. Warranty:
   a. Warrant parts and labor on flaker for two (2) years and compressor for five years from Date of Substantial Completion.
6. Utility Requirements: Refer to Laboratory Equipment Schedule.

2.12 DISPOSER, DSP-1

A. Acceptable Manufacturers:

1. Base:
   a. In-Sink-Erator, Racine, WI 53406, Tel: 800 558-5712.
2. Optional:
   a. Waste King by Anaheim Manufacturing, Anaheim, CA 92807, Tel: 800 454-4423.

3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design: In-Sink-Erator Model SS-75, 0.55kW 3/4 HP heavy-duty commercial disposer, or equal.

C. Description:

1. Features:
   a. Manual on/off switch for wall mounting above sink.
   b. Syphon breaker to prevent to prevent backflow into water supply pipe.
   c. Flow control valve to automatically provide proper amount of water for efficient operation.
   d. Solenoid valve to insure water is in disposer when disposer is operational.
   e. Provide support legs when recommended by manufacturer for application.
   f. Provide all necessary mounting hardware.
2. Provide sink flange assembly for 89mm to 102mm 3-1/2 IN to 4 IN sink opening. 38mm 1-1/2 IN waste connection. Coordinate with sink.

D. Utility Requirements: Refer to Laboratory Equipment Schedule.

2.13 MISTING TUNNEL, MST-1

A. Acceptable Manufacturers:

1. Base:
   a. ViraTek, Inc.
2. Optional:
   a. Viking Medical.
3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design:

1. Model LE2828 by ViraTek.

C. Exterior Dimensions: 710mm wide x 710mm high 28 IN wide x 28 IN high

D. Tunnel opening: 965mm wide x 1524mm long x 1715mm high 38 IN wide x 60 IN long x 67-1/2 IN high.

E. Description: Self-contained, portable sanitizer designed to provide complete coverage of any product conveyed through the work opening with Chlorine dioxide mist.

1. Construction:
   a. Housing:
      1) 1.6mm 16 GA Types 304 and 316 stainless steel, polished finish.
      2) Wrapped, seamless construction.
      3) Upper housing, pan, and associated hardware shall be Type 316 stainless steel.
   b. Covers, and doors:
      1) 1.6mm 16 GA Types 304 and 316 stainless steel, polished finish.
   c. Supports:
      1) Type 316 stainless steel structural frame.
   d. Reservoir:

1) PVC.
2) Reservoir shall provide operator with option to recirculate or dispose sanitizer.
3) Reservoir shall have visible level indicator.

e. Conveyor:
1) Type 304 stainless steel drive chain with ultra-high molecular weight (UHMW) polyethylene or stainless steel sprockets and stainless steel flat wire belts.

f. Pump:
1) Plastic and stainless steel.

g. Piping:
1) Type 316 stainless steel and plastic with plastic valves.
2) Provide valve at end of piping to flush piping.

h. Spray Nozzles:
1) Acetyl plastic with stainless steel filter screens.
2) Nozzles shall provide 100 percent coverage.

i. Casters:
1) Type 304 stainless steel with 125mm 5 IN polyurethane wheels and locking brakes.

2. Features:
a. Unit shall be self-contained and portable, mounted on casters with locking brakes.
b. Chamber shall be equipped with vinyl strip curtains at each tunnel opening.
c. Conveyor system shall be provided with DC drive motor with variable conveyor speed.
1) Speed shall be conveniently adjusted depending on product being conveyed from 0 to 15.24m/min 0 to 50 FPM.
2) Interior conveyor shall be dual 1 by 1 stainless steel flat wire belts.
3) Unload conveyor shall be pitched roller conveyor with stop, collapsible from 2440mm to 610mm 96 IN to 24 IN.
4) Unload conveyor shall be capable of being detached for convenience when transported.

d. Spray System:
1) Spray nozzles with easily removable, 200 mesh filter screens.
2) Nozzles shall be positioned in chamber to provide complete coverage.
3) System shall include recirculating tank, drain valve, in-line pump suction strainer, and needle valve.
4) Spray nozzles shall be located between belts to ensure full spray impact on product without masking caused by conveyor.
5) Reservoir capacity shall be 11.35L 3 GAL.

e. Controls:
1) Plastic NEMA 4 control panel, complete with motor starters, relays, and timers for conveyor speed controller and pump shut off sensor.
2) Plastic pushbutton enclosures for starting/stopping unit at load end, and at unload end for emergency stopping.
3) Provide sensor to shut off pump if no product has been conveyed for a pre-set period of time.
4) All wiring shall be in accordance with the NEC.

2.14 DECONTAMINATION LOCK, DL-1

A. Acceptable Manufacturers:
   1. Base:
      a. Tecniplast USA Incorporated
   2. Optional:
      a. Lynx Product Group.
      b. Pharma Biotech System Components Ltd. (PBSC).
      c. Steris Corporation.
   3. Other manufacturers desiring approval comply with Section 01 63 00.

B. Basis of Design: Tecniplast IWT 9ALPTC Series Decontamination Lock.
   1. Size:
      a. Useable Chamber (minimum nominal): 1120mm wide by 2130mm long by 2200mm high 44 IN wide by 84 IN long by 86 IN high.
      b. Overall Machine (nominal): 2001mm wide by 2230mm long by 2682mm high 78.75 IN wide by 91.75 IN long by 105.5 IN high, not including pit.

C. Description: Decontamination lock for the decontamination of large and/or heat-sensitive equipment for use with vaporized, gaseous, or fogged decontaminating agents. Decontaminant agent generator shall not be included.

D. Decontaminant:
   1. Vaporized hydrogen peroxide.
      a. Provide distribution fan.
   2. Chlorine dioxide gas.
      a. Provide distribution system with humidifier.
      b. Provide water connection and drain connections for humidifier.
   3. Chemical fog.
      a. For fogging agents, provide atomizers, floor drain, side chemical reservoir and three dosing pumps, and single charge mixing and dispensing vessel.
      b. Self-Cleaning Cycle:
         1) Provide piping, solenoid valve, water injection port for rinsing of vessel and pipework, roof-mounted rotary water jets for rinsing chamber, and chamber drain for operation of automatic self-cleaning cycle to remove chemical residue
         2) Water Hammer Arrester:
            a) Provide water hammer arrester on water supply piping.
         3) Drain:
            a) Type 304 stainless steel recessed floor channel with perforated grid to restrict objects from flowing into drain.
            b) Channel shall be pitched to drain.

E. Configuration: Refer to drawings for door, cabinet, and recessing requirements.

F. Mounting:
   1. Pit-mounted.
      a. Provide stainless steel pit transition/threshold plates.

G. Construction and Fabrication:
   1. Unit shall be constructed entirely of Type 304 stainless steel with a No. 3 or 4 finish, and plastic materials resistant to the decontaminants, as required.

a. All welds shall be continuous and ground smooth.
b. Chamber shall have stainless steel jacket.
c. Chamber Floor:
    1) Chamber floor shall be contiguous with chamber and have anti-skid properties.
    2) Chamber floor shall accommodate a live load of 1000kg 2200 LBS.
d. Chamber Rails: Provide Type 304 stainless steel protection rails on the chamber interior side walls.

2. Doors:
    a. 1.6mm 16 GA, Type 304 stainless steel with No. 4 finish, double wall reinforced construction, insulated with non-hygroscopic rigid insulation, minimum 50mm 2 IN thick. Provide tempered, tinted glass view panels, fitted with resilient gaskets, to permit operator to see inside the chamber with the door closed.
    b. Doors shall be provided with a minimum of three hinges.
    c. Door shall be furnished with an encased inflatable gasket.
    d. Door Interlock, double door units:
        1) Shall be fitted to prevent both doors from being opened simultaneously and prevent the clean side/unload door from being opened until the cycle has been completed and to prevent operation unless both doors are closed.
3. Trim:
    a. Stainless steel trim to prevent vermin intrusion between washer and adjacent modular wall or construction.
    b. Provide Type 304 stainless steel enclosure and access panels with No. 3 or 4 finish to enclose mechanical core.
4. Gas Injection Point:
    a. Gas injection point shall be positioned near the chamber diffuser allowing for even distribution of agent within the chamber.
5. Provide cam-lock supply/return, as required, connectors for quick and safe connection of decontaminant source and generator monitoring system.
6. Sampling Ports:
    a. Provide two test points on front of unit for use with portable gas detector for safe opening of chamber door and for chamber pressure monitoring.
7. Portable Gas Detector:
    a. Provide portable gas detector to determine that residual agent concentration in the chamber is below safety exposure limit.
    b. Detector shall have rubber edge on service hose that fits perfectly in the sampling ports.
8. Service connections and serviceable components shall be designed and located in a manner for ease of maintenance.
9. All fittings, valves, threaded piping and connections shall be NPT or tri-clamp fittings, unless specified otherwise herein.
10. Piping:
    a. Type 304 stainless steel.
11. Valves:
    a. Valves and pumps shall be non-proprietary.
    b. Pressure Reducing Valve:

1) Equipment shall be provided pressure reducing valves at incoming utility feeds, as required.

c. All shut off valves shall be supplied with a minimum 10mm 3/8 IN hole for tagging and lock-out procedures or valve manufacturer-supplied handle locking device.

12. Electric Receptacle:
    a. Provide NEMA 5-20R electrical receptacle internal to the chamber for equipment connection.
13. Chamber Light:
    a. Provide exterior-mounted, fluorescent fixture, or similar long-life light source, with sealed tempered glass window to chamber.
    b. Light shall automatically turn on for the duration of each operating cycle, and be provided with external 3-way switches at each door for manual light operation when chamber is not operating.
14. Noise level shall not exceed 70 dBA during operation of equipment: provide vibration isolation for pumps and equipment if necessary.
    a. Mounts shall be designed to protect equipment and machinery against damaging vibration for the specified type of equipment and installation.
15. Leveling Adjustment:
    a. Provide adjustable mechanism to level the machine.
16. Filtration Unit:
    a. Provide built-in pre-filter, catalyst filter and HEPA filter.
    b. Pre-filter shall protect catalyst filter and absorb humidity.
    c. Catalyst filter shall be cartridge type filters designed to break down identified decontaminating agent into safe substances.
    d. HEPA filter shall reduce any airborne particles from passing through after the catalyzer and to clean the air used to rinse the chamber.
    e. Filtration unit shall eliminate the need for exhaust ductwork.
17. Fast Aeration Unit:
    a. Provide recirculation fan, air blade, valves and piping, or similar components for a complete operable aeration system to reduce cycle time.
    b. Recirculation fan shall be capable of providing a maximum airflow of 1000m^3/h 585 CFM.
    c. Components shall withstand the decontaminants.
    d. Exhaust ductwork is not required if this feature is provided with the filtration unit.
18. Building Exhaust System Connection:
    a. Blower/Exhaust Fan:
        1) Provide stainless steel blower from exhaust chamber to assist building exhaust system in evacuating decontaminant from chamber.
        2) Fan shall be provided with air-tight butterfly valve for chamber sealing.
        3) Blower shall be inter-wired with the microprocessor control system to exhaust chamber.
        4) Control system shall adjust motor speed and vary air flow rate as required for cycle performance.
        5) Duct connection shall be by building ventilation system contractor.
    b. Supply Air System:

1) Provide roof-mounted, automatically-actuated supply butterfly valves to provide supply air to the chamber during the exhaust cycle.
2) Duct connection shall be by building ventilation system contractor.

19. Safety Features:
    a. Emergency Exits:
        1) Provide push buttons inside the chamber, adjacent to each door, to allow emergency exit from chamber, or equivalent.
    b. Provide portable or wall-mounted gas detectors to detect decontaminant leakage.
    c. Safety Door Switch:
        1) Provide microswitch requiring doors to be completely closed to start or continue operations.
    d. Provide pressure switch to constantly monitor inflatable gasket pressure to ensure proper sealing of chamber.
    e. Emergency Stop Button:
        1) Red pushbutton below each controller touch screen to immediately cease all operations and activate the exhaust fan if decontaminating agent has been delivered to the chamber.
        2) Button must be pulled out to restart operations.
    f. Overpressure Vent:
        1) Provide mechanical relief valve in chamber to vent air in case of over-pressurization of chamber if the pressure exceeds 250Pa 0.3626 PSI.
        2) Pressure shall be released to the soiled side of chamber.
    g. Provide the following features for chambers serving BSL-3 or ABSL-3 environments.
        1) Safety PLC controlling door interlock.
        2) Air vent with HEPA filter to decontaminate air piping within the chamber.
        3) Sampling ports shall be protected with key lock to prevent unwanted opening and cross contamination.

H. Control System:
1. Decontamination lock shall be provided with a microprocessor PLC controller that monitors and automatically controls all process operations and functions.
    a. Provide touch screens on load and unload sides of chamber.
    b. Controller shall be UL listed and located in insulated, stainless steel control box.
    c. Processor shall have memory card back up.
2. Control panels and electrical connections shall be installed in water-tight and vermin-proof cabinet.
    a. Cabinet shall be lockable.
    b. Control panel shall be located on decontamination lock, unless remote mounting is indicated on drawings.
3. A backlit, touch screen LCD display shall display cycle program data on demand and real time in-process cycle performance.
4. Controller shall require a single electrical connection; provide transformer, as required.
5. Provide printer to record registration of decontamination relevant data and parameters.
6. Data communication port.
7. Cycles:
    a. Controls shall be programmable and be adjustable to decontaminating agent and

materials to be processed.

b. General cycles to be provided:
   1) Start cycle.
   2) Door gasket inflation.
   3) Energizing of internal electrical receptacle.
   4) Decontaminant contact.
   5) Decontaminant removal via exhaust fan.
   6) Cycle accomplished message.
   7) Release of clean side door.

I. Required Options and Accessories:
   1. Stainless steel presentation rack.
      a. Rack shall receive stainless steel tubular frame and wire shelves to support equipment to be decontaminated.
      b. Barrier Wall Flange Assembly: Provide 1.0mm 20 GA, Type 304 stainless steel trim flange with No. 4 finish to enclose the opening between end of washer and adjacent construction.
         1) Provide barrier wall flange at each recessed wall opening.
   2. Remote oil-less air compressor, with tank and pressure switch, when required for decontamination lock operation compressor shall not exceed 79 dBA when operating.
   3. Seismic tie-down kit to comply with Seismic Zone 3 and 4 requirements.

J. Utility Requirements:
   1. Refer to Laboratory Equipment Schedule.
   2. Decontamination lock shall be inter-piped and inter-wired so that only one connection is required for each service or utility.

2.15 MODULAR WALL/EQUIPMENT ENCLOSURE PANELS, MWE-1

A. Acceptable Manufacturer:
   1. Stainless steel equipment enclosure panels shall be provided by equipment manufacturer to match finish of enclosed equipment where indicated on Laboratory Furnishings and Equipment drawings.

B. Description:
   1. Prefabricated enclosure system to surround sterilizing, washing and related equipment. Enclosure may include front wall with back and side walls in any combination.
      a. Enclosure shall conceal equipment body, piping, wiring, and other appurtenances, confine excessive equipment heat and vapor to enclosure area, and provide a finished wall appearance to complement the equipment and adjacent surfaces.
   2. Panels shall be sandwich panels with an internal frame.
   3. Maximum panel dimension shall be 1194mm wide x 3048mm tall 47 IN wide x 120 IN tall.

C. Materials:
   1. Modular Panel Construction:
      a. Each panel shall consist of interior and exterior metal skins with a solid core of insulation and shall incorporate an integral mechanical method of fastening and sealing the joints to provide a vapor tight seal.
         1) Fabricate panels to meet building dimensions.

2) Panel edges shall be tongue-and-groove.
3) Provide internal panel reinforcement to support panel-mounted items. Access doors shall be constructed similar to modular panels.
4) Joints shall be designed for clear silicone sealant with backer rod or bond breaker at rear of seal, interior and exterior, to assure tight fitting joints.
5) Panel Thickness: 75mm 3 IN.

b. Skin Sheets:
1) Exterior Skin (exposed to occupied room): 1.0mm 20 GA, Type 304 stainless steel.
2) Interior Skin (exposed to mechanical space): 1.0mm 20 GA, Type 304 stainless steel.
a) Interior skin shall be welded to exterior skin or attached with stainless steel self-tapping sheet metal screws or 3mm 1/8 IN diameter stainless steel rivets.
3) Skin Finish: No. 3 or 4, to match adjacent equipment.
4) Recycled Steel Content:
a) A minimum of 20 percent of the stainless steel used in the fabrication of modular wall skins shall consist of the sum of post-consumer recycled content plus one-half of the pre-consumer content, based on the cost of the total value of materials.

c. Insulation Core:
1) 76mm 3 IN, fire retardant, foamed in place polyurethane ASTM E 84 with a flame spread of 25 or less.

d. Internal Frame:
1) Four-sided, extruded aluminum sections.

e. Any exposed welds shall be ground smooth.
1) Panels shall be free of defects, open corners, sharp edges, burrs, and imperfections that may affect the safety, serviceability, and appearance of the finished assembly.

f. Modular panels shall be sized and constructed to prevent oil-canning of panel skins.

2. Floor, Wall, and Ceiling U-Shaped Channels:
a. 0.8mm 22 GA Type 304 stainless steel, finished to match exterior panel skin.
1) Attach to adjacent concrete or masonry construction with appropriate 32mm 1-1/4 IN expansion anchors.
b. Floor channel shall have an internal aluminum track to support the sandwich panels consisting of two pieces to allow for vertical adjustment in sloped floor applications.

3. Trim Angles:
a. 1.3mm 18 GA Type 304 stainless steel.
b. Finish shall match exterior panel skin.

4. Door:
a. Door construction shall be similar to the modular panel construction.
b. Doors shall be flush with the finished room side of the modular panel skin.

5. Louvers:
a. Basis of Design: Titus Model 350RL-SS.
b. Roll-formed, Type 304 stainless steel blades and frame,.
c. 19mm 3/4 IN blade with 35 degree deflection.

D. Construction:
   1. Refer to details and plans on the drawings.
   2. Exposed fasteners are not allowed in the panels or tracks on the exterior, occupied room, side.
E. Access Door Hardware:
   1. Hinge:
      a. Brushed stainless steel flush-mounted hinges.
   2. Cylinder Lock:
      a. Stainless steel storeroom lock.
      b. Manufacturer, handle and trim style shall match similar hardware specified in the building.
   3. Strike:
      a. Provide stainless steel strike plate with recessed dust box.
   4. Gasket:
      a. Provide magnetic jamb and head gasket and door sweep to prevent vermin intrusion.
   5. Provide seismic attachment to comply with Seismic Zone 3 and 4 requirements.

2.16 AIR SHOWER PASS-THROUGH, ASPT-1

A. Acceptable Manufacturers:
   1. Base:
      a. Terra Universal Inc.
   2. Other manufacturers desiring approval comply with Section 01 63 00.
B. Construction:
   1. Powder coated steel chamber with access ramp on both sides for carts and large equipment.
   2. Chamber shall be equipped with clear acrylic interlocking doors.
C. Dimensions:
   1. 610mm x 610mm x 610mm 36 IN wide by 36 IN deep by 48 IN high.
D. Chamber shall be equipped with adjustable nozzles direcingt high-velocity streams of HEPA filtered air to dislodge particles from materials placed in chamber.
   1. Nozzles shall be arranged in a uniform manner on side walls for effective distribution of filtered air.
   2. Filtered air shall be directed downward, through grills and hollow walls, and back to filter.
   3. Filter shall remove 99.99 percent of particles as small as 0.3 microns.

3.00 EXECUTION

3.01 EXAMINATION

A. Examine surfaces designated to receive work for conditions that would adversely affect the finished work.
B. Repair or replace surfaces not meeting tolerances or quality requirements governing substrate construction prior to start of work.
C. Verify that surfaces, prepared openings, or support structures are ready to receive work.
D. Verify field measurements and opening dimensions are as instructed by manufacturer.

E. Inspect and verify that the required utilities are available, in proper locations and ready for use, prior to equipment installation.

3.02 SITE CONDITIONS

A. Inspection: Prior to installation of laboratory equipment, carefully inspect the installed work specified in other Sections and verify that all such work is complete to the point where this installation may properly commence.

B. Discrepancies: In the event of discrepancy, immediately notify the Architect.

3.03 PREPARATION

A. Coordinate with other Divisions for location, size, and type of mechanical, power and communications services required.

B. Before shipping, equipment shall be cleaned inside and outside, be free of rust, loose scale, and other deposits.
   1. Finished surfaces shall be protected to prevent shipping and/or storage damage.
   2. All threaded connections, flanges, and couplings shall be protected.

C. Equipment to be disassembled before shipment to allow for rigging through a 1825mm x 2130mm 72 IN x 84 IN door frame at the job site.

D. Delivery shall be coordinated so that equipment can be positioned in-place prior to installation of door frames of smaller dimensions.

E. Equipment shall be securely crated and/or packaged to prevent damage during shipment.
   1. Loose parts shipped inside of the unit shall be secured.

F. The vendor shall be responsible for delivery of the unit(s) to the job site, setting the equipment in place, unpacking and reassembly.

G. The vendor shall verify that required utilities are available, in proper locations, and ready for use.

H. “Beginning of installation” means acceptance of existing conditions by the vendor.

I. Upon unpacking of the equipment, the vendor shall remove all debris, crating material and packaging from the location.

3.04 WORK REQUIRED OF OTHER SECTIONS PRIOR TO INSTALLATION

A. Install shutoff valves on service lines.

B. Install fused disconnect switches (with lockout in OFF position) in electric supply lines near the equipment.

C. Provide building service lines supplying specified pressures and flow rates.

D. Provide illumination of service area, with provision of convenience outlet for maintenance.

3.05 INSTALLATION

A. General:

   1. Equipment shall be installed by personnel approved by the respective manufacturer.
   2. Install all equipment per manufacturer's recommendations and reviewed submittals.
   3. All installation materials, products, and procedures used shall be in accordance with manufacturer’s printed installation instructions.

4. Properly align and position all equipment.
5. Manufacturer's Field Services:
    a. Provide manufacturer's field services to supervise installation.
        1) Manufacturer's personnel shall be on site prior to installation to inspect field conditions and make preparations for installation.
        2) Installation shall under the direct supervision of the manufacturer's personnel until the completion of initial start up.

B. Vivarium Washers:

1. Installer shall be responsible for on-site assembly and installation including shipping, unloading, rigging, set-in-place, assembly, leveling, interconnections, hook-up to building utilities, start-up and testing.
2. Coordinate with Divisions 15 and 16 the installation and location of building services for equipment, such as isolation valves, vacuum breakers, fused disconnect switches, and floor drains.
    a. Ducted ventilation to exterior of building shall slope towards washer with drip legs at low points.
3. With Owner's Representative, operate washer and test full range of cycles and preprogrammed parameters over a minimum period of 30 hours to verify operation.
    a. At a minimum, washers shall match their performance during factory inspection, including target cycle times.
    b. All safety devices shall be challenged.
    c. Record all test data onto start-up log and checklist to be supplied to Owner after completion of start-up.
4. Cover washer, piping and controls after installation, to protect against dust and damage until Date of Substantial Completion.

C. Modular Wall/Equipment Enclosure Panels:

1. Protect finished surfaces from soiling and damage during handling and installation.
    a. Keep covered with polyethylene film or other protective covering.
2. Bolt panels to adjacent panels through pre-drilled holes.
    a. Bolt channel clips to underside at top and bolt to support column at rear.
3. Install ceiling trim angles using expansion shields and screws.
4. Anchor vertical panels to floor with expansion bolts.
5. Protect installed modular wall system from debris, paint, and damage in the course of the construction sequence.

D. Connection to Building Systems:

1. Refer to Laboratory Plumbing and Electrical drawings and Divisions 15 and 16 for final connections.

3.06 FACTORY TESTING

A. Manufacturer shall shop calibrate and field verify all instruments.

B. Functional tests shall be performed at the factory for all supplied equipment through the PLC by Manufacturer.

C. Manufacturer is responsible for correcting any deficiencies identified during shop testing procedures.

D. Test results shall be made available to the Owner upon request.

E. Factory Acceptance Test (FAT)

1. Equipment requiring FAT:
    a. Glassware washers.
    b. Glassware dryers.
    c. Rack and cage washers.
    d. Cage and bottle washers.
    e. Bottle fillers.
    f. Bedding dispensers.
    g. Misting tunnel.
    h. Tissue Digesters.
    i. Decontamination lock.
2. Equipment shall be provided with service identical to those that will be provided on site, including piped services connections, flows and temperature, as applicable, and electrical service.
3. The manufacturer shall:
    a. Issue Factory Acceptance Test protocols and notification to the Owner at least 30 days in advance of scheduled testing for Owner comment and approval.
    b. Execute tests and measurements.
    c. Analyze test results.
    d. Describe any and all deviations in test report and make any necessary corrections. Retest/repeat procedures, if required.
    e. Check that register deviations are complete and documentation is correct.
    f. Verify calibration of test equipment.
    g. Check the conclusion of the test conformity.
    h. Sign test report after completion and submit to Owner.
4. Test requirements:
    a. Performance testing of equipment on items to be processed in accordance with the inspection procedure below:
        1) Manufacturer and Owner will coordinate the provision of items to be processed supplied either by Owner or from a research facility in local proximity to the equipment supplier's factory.
        2) Manufacturer and Owner will coordinate number and types of items to be processed during factory testing.
        3) During performance testing, items to be processed will be visually inspected and must be accepted as being physically clean, free of dirt, unsoiled, and unstained.

4) Cycle time performance will be compared to target cycle times specified above. Equipment supplier shall work with Owner to make adjustments at the factory to minimize cycle times should these times exceed target performance.

5. Owner's authorized representative(s) shall have the right to inspect all work during and after fabrication completion and shall perform and witness testing.
   a. This inspection shall occur at the vendor's manufacturing facility.
   b. Facility shall have utilities as required to perform full testing of the equipment.
   c. The representative's decisions to reject material or workmanship for non-compliance with the Specification, Drawings and purchase order shall be final.
6. Owner's representative(s) inspection shall include, but not be limited to the following items:
   a. Manufacturer's adherence to the terms of Purchase Order, particularly in the areas of schedule and required documents.
   b. Manufacturer's adherence to the Contract Documents, including any latest revisions thereof.
   c. Manufacturer's adherence to fabrication procedures as mandated by Code, Specifications and Drawings.
   d. Fabrication within tolerances as established by Code, Specifications, and Drawings, whichever is most stringent.
   e. Full operation of the equipment including proper functioning of the following items:
      1) Microprocessor controls.
      2) Valves.
      3) Pumps.
      4) Sensors.
      5) Alarms.
      6) Printers.
      7) Safety features.
      8) All operational cycles.
      9) All other operational components of the sterilizer.
   f. Overall workmanship of equipment and accessories.
7. FATs shall include the following:
   a. Verification of equipment and scope of delivery.
   b. Verification of the pipe work.
   c. Verification of mechanical installation.
   d. Verification of electrical installation.
   e. Verification of utilities.
   f. Verification of documentation.
   g. Vacuum leak rate test.
   h. Test protocol run analysis.
8. Manufacturer shall prepare and maintain a Deviation Tracking List identifying all deviations or faults that occur during the FAT.

9. Acceptance by the Owner's representative shall not relieve the manufacturer of the responsibility for workmanship conforming to the Contract Documents and the Purchase Order.

3.07 START UP AND TESTING

A. Test, clean, and adjust equipment and apparatus installed to ensure performance meets specified requirements.

B. Operate each unit and test full range of cycles over a continuous period. Record test data.

C. Adjust and re-test any units not meeting requirements.

3.08 CLEANING

A. Packaging and debris and other waste resulting from installation of equipment shall be removed.

B. Repair or remove and replace defective Work as directed by the Architect upon completion of installation.

C. Clean finished equipment, touch up as required and remove and refinish damaged or soiled areas.

D. Prior to final acceptance by the customer, equipment that has become damaged will be repaired or replaced according to the terms of the warranty and any external soiled surfaces will be cleaned.

3.09 DEMONSTRATION AND INSTRUCTIONS

A. Refer to Section 01820 for equipment specified in Part 2.
B. Test equipment prior to demonstration.
C. Ensure equipment, including specified accessories, is operational.
D. Provide demonstration of equipment operation and instruction of Owner's personnel.
E. Demonstration operating capability of equipment and systems. Include control and safety features, and service and maintenance procedures.
F. Engage services of qualified instructor to instruct and train Owner's operating and maintenance personnel in operation, service, and maintenance of equipment.
   1. Provide at least two hours of instruction for each type of equipment.
   2. If Decontamination Lock is specified, provide Portable Gas Detector to the Owner’s Representative at this time.

3.10 PROTECTION

A. All equipment shall be protected before, during and after installation.
B. Protect from paint, debris, and damage in the course of the construction sequence.
C. Damage to material due to improper protection shall be cause for rejection.
D. At no time shall worker use the installed equipment as a work bench, scaffolding, or for other uses.

END OF SECTION 11538

Read and accepted as part of the Contract:

Bidder / Contractor

SECTION 11534
ROOM AIR PRESSURE VISUAL INDICATION

1.00 GENERAL

1.01 SCOPE OF WORK

A. Furnish a mechanical device that informs someone entering a lab or other room with hazardous fumes that exhaust is working and room have negative pressure.

B. Will be installed through walls or doors. Equipment will be installed at BSL-3 laboratory suite entry and internal doors.

1.02 SUBMITTALS:

A. Per Division 1 – "Submittals".

2.00 PRODUCTS

2.01 AIR PRESSURE VISUAL INDICATOR

A. Design Standard Manufacturer: Air Flow Direction Inc., Product: Baulin-tube Indicator. Substitutions are permitted subject to equal and equivalent safety indicator.
B. Description: Model ADI-69-V-N/P [Model ADI-69-V-CURVE]
C. Indicator type: Visual Only.
D. See Mechanical drawings for locations of Positive and Negative pressurized rooms.
E. See Architectural drawings for locations of indicator devices.
F. Provide standard end caps.

3.00 EXECUTION

3.01 INSTALLATION

A. Installer shall be responsible for on-site assembly (if required) and installation; including coordination of rough-in opening required in walls.

B. Test, clean and adjust equipment and apparatus to ensure performance meets specified requirements.

C. With the Owner present, verify operation following balancing and testing of HVAC system as specified in Division 15.

D. Protect against dust and damage until Date of Beneficial Occupancy.

END OF SECTION 11540

Read and accepted as part of the Contract:

Bidder / Contractor