

## SECTION 11 53 53 - BIOLOGICAL SAFETY CABINETS

### PART 1 - GENERAL

#### 1.1 RELATED SECTIONS

- A. Section 11 53 13 – Laboratory Fume Hoods and related products
- B. Section 12 35 53 – Laboratory Casework and related products

#### 1.2 BIOLOGICAL SAFETY CABINETS

- A. Basis of Design: Kewaunee Scientific Interceptor Class II A2 Biological Safety Cabinet
  - 1. Kewaunee Scientific Corporation PO Box 1842, Statesville NC 28687
  - Tel: 704-873-7202

#### 1.3 DESIGN AND PERFORMANCE CRITERIA

- A. Biological Safety Cabinets equipped for work with low to moderate risk agents as defined in Biosafety Levels 1, 2, or 3; or Biosafety Level 4 with proper Personal Protective Equipment. Must meet or exceed:
  - 1. NSF/ANSI Standard 49-2014
  - 2. UL 61010-1 Underwriters Laboratories Inc. Electrical equipment for laboratory use  
Thimble/ Canopy when working with Volatile / Toxic chemicals (see section 2.5)
- B. Design as defined by NSF/ANSI Standard 49-2014
  - 1. Class II A2: shall be designed and constructed to function properly and operate in a safe manner, minimize contamination, provide personnel, product and environmental protection using HEPA filtration and NSF approved Inflow and Down flow requirements. Must be validated by factory test reports. Cabinet will be capable of being cleaned, disinfected and decontaminated as defined by NSF/ANSI Standard 49-2014 Annex F.
  - 2. Cabinet must maintain a nominal inflow velocity of 105 ft/min (+5 ft/min) through the work access 10" opening.
  - 3. Down flow velocity requirements. Measured 4" above sash opening.  
(Choose One)
    - a. INT-1100A2: 65 ft/min (+/-5ft/min)
    - b. INT-1400A2: 55 ft/min (+/-5ft/min)
    - c. INT-1700A2: 60 ft/min (+/-5ft/min)
    - d. INT-2000A2: 55 ft/min (+/-5ft/min)
  - 4. Cabinet shall have DEC Star® variable speed, constant airflow ¾ horsepower ECM motor.
    - a. High efficiency blower (HEB) housing with impeller driven by Axial Flux BLAC motor with full featured Sinusoidal EON motor control technology.
    - b. Motor system has a shaft-less rotor system that allows the impeller to be hub-less.
  - 5. Blower speed control must be 0-10 volt DC PWM (Pulse Width Modulation) accessed by password protected touch screen display. Use of manual turn potentiometer not allowed.
- C. Night Set Back: Cabinet shall be equipped with night set back which allows fan to reduce speed to 50% normal operating speed when sash is lowered to 1" opening.
- D. UV light function (if specified) shall have interlock feature that will not allow operation unless sash is fully closed.

#### **1.4 SUBMITTALS**

- A. Shop Drawings: submit complete shop fabrication, including plans, elevations, sections, details, fittings and thimble connections (if applicable).
- B. Informational Submittals
  - 1. Provide piping, wiring, and control diagrams. Include all connection locations and sizes. Detail inflow and down flow velocity, voltage and amperage, etc. Indicate service requirements, loads, and rough-in locations of all piped services and electrical connections.
  - 2. Certificates:
    - a. Provide factory test results indicating cabinet meets or exceeds NSF/ANSI Standard 49-2014 requirements.
    - b. Cabinet test report shall be made available. Field test is the responsibility of the owner. Shall be field tested per NSF/ANSI Standard 49-2014 standards before being placed into service. Testing to be completed by NSF accredited certifier.
    - c. Operation and Maintenance Data
      - 1. Description of equipment operation and control, motor control and alarm systems.
      - 2. Wiring diagrams showing separate circuits for outlets, lights and blowers.
      - 3. User's manual and factory test report for each Class II A2 unit by serial number.
      - 4. Each cabinet shall carry a five year warranty from delivery date.

#### **1.5 QUALITY ASSURANCE**

- A. Cabinet shall be UL 61010-1 listed for electrical safety and integrity.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Cabinet shall be palletized with "skid mate" style shocks, boxed and covered with stretch wrap for protection. Each cabinet shall come with a Drop N Tell indicator.

#### **1.7 PROJECT CONDITIONS**

- A. Biological Safety cabinet shall not be delivered or installed until building is totally enclosed, dry-walled, painted and HVAC system is fully functional.

### **PART 2 – PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Basis of Design: Kewaunee Scientific Interceptor Class II A2 Biological Safety Cabinet
  - 1. Kewaunee Scientific Corporation PO Box 1842, Statesville NC 28687  
Tel: 704-873-7202  
(Choose One)
    - a. INT-1100A2: Exterior dimensions – 43 3/16" w x 32 1/16" d x 92 1/4" h
    - b. INT-1400A2: Exterior dimensions – 55 1/16" w x 32 1/16" d x 92 1/4" h
    - c. INT-1700A2: Exterior dimensions – 66 9/16" w x 32 1/16" d x 92 1/4" h
    - d. INT-2000A2: Exterior dimensions – 78 7/16" w x 32 1/16" d x 92 1/4" h
- B. Comparable product by one of the following permitted.
- C. Other substitutions not permitted.

## 2.2 MATERIALS

- A. Work Surface: 16 gauge, type 304 stainless steel with no. 4 finish
- B. Cabinet Interior: 16 gauge, type 304 stainless steel with no. 4 finish
- C. Cabinet Exterior: 16 gauge and 12 gauge cold rolled steel minimum, exterior coating shall be VOC free, acid resistance powder coat finish.
- D. Glass: ¼" laminated safety glass with no frame. No permanent etchings on glass.
- E. Airfoil: 16 gauge, type 304 stainless steel with no. 4 finish
- F. Armrest: Aluminum extruded oval comfort shaped armrest included as standard.
- G. DEC Star® variable speed, constant airflow ¾ horsepower ECM motor
- H. Electrical outlets. Ground Fault Circuit Interrupter (GFCI) with drip proof cover.
- I. Internal Plenum shall be 16 gauge cold rolled steel minimum, coating shall be VOC free, acid resistance powder coat finish. Plenums designed of flexible material are not acceptable.
- J. HEPA Filters shall be metal framed with closed cell neoprene gaskets. Filters shall have metal screen on both sides for media protection.

## 2.3 CONSTRUCTION

- A. Interior walls shall be single piece construction with coved corners for ease of cleaning.
- B. Work surface shall be single piece construction, dished with coved corners, polished chrome knobs for lifting, with anchoring pins to ensure proper position.
- C. Exterior removable panels shall be made of 16 gauge cold rolled steel, and shall be removable without tools for access to service connections.
- D. Each cabinet body shall be fully welded. All gaskets shall be closed cell neoprene type providing a gas and soap bubble-tight seal.
- E. Interior work area shall be constructed of type 304 stainless steel with no. 4 finish construction maintaining containment area under negative pressure.
- F. Drain Pan 16 gauge type 304 stainless steel, shall be capable of holding at least one gallon, all corners shall be radiused for ease of cleaning. Stainless steel ball valve shall be included for drainage.
- G. Plenum shall be telescoping allowing unvarying airtight seal of HEPA filters. Plenum shall telescope using a filter clamping device comprised of an extensible and retractable linkage mechanism connected to the telescoping plenum. Each filter clamping device shall be actuated from a single point located at the front of the cabinet, such that it shall not be necessary to reach into the cabinet to actuate the filter clamping device.
- H. Service fittings shall be offset. Primary service fittings forward positioned 3 ½" from the sash opening and secondary fittings 17" from the sash opening.
- I. Sash operation shall be of anti-racking design using notched steel reinforced nylon belt and sprocket system. Cable type sash operation not acceptable.
- J. Cabinet shall have full color monitor with touch screen controls, fully programmable and password protected to ensure operator safety. Monitor shall be located on lower portion of front panel. Monitor shall provide continuous "Face Velocity" and "Remaining Filter Capacity" readouts at all times during operation. Cabinet shall have audible and visual alarms to alert user of unsafe sash height, unsafe filter loads, and unsafe face velocity, including pre-programmed user thresholds for warnings, alarms, and UV operation indicating remaining lamp life and UV use timers. Alarm mute feature shall be provided to allow brief equipment loading. Audible alarm will resume after 5 minutes. Monitor shall display a "latch" message after power outage or high / low face velocity incident. Latch message must remain continuously until cleared by end user.
- K. Lighting - Cabinet shall have externally mounted T5 fluorescent lamp with solid state ballasts and shall illuminate a minimum of 90 foot candles at work surface per NSF/ANSI Standard 49-2014 standard.

- L. Filters- Front loading, HEPA 99.99% efficient on all particles 0.3 micron by DOP test, (both exhaust and supply). Filters shall be metal framed and removable without disassembly of control panel or view screen assembly. Filters shall have metal screen on both sides for media protection.
- M. Calculated Air Velocity- 105 fpm nominal through 10" NSF certified sash opening with audible and visual alarms when sash is not located at required 10" operating height.
- N. Electrical Requirements- A dedicated 115VAC, 20amp, 60Hz single phase circuit shall be required.
- O. Electrical Devices- Two GFCI outlets in the work area protected by an independent breaker. Cabinet shall be wired with single 12 foot 20 amp power cord with NEMA 5-20P plug.
- P. Operating noise level of the BSC shall not exceed the noise level measured 15" above work surface and 12" in front of the leading edge of the cabinet:  
(Choose One)
  1. 65dBA INT-1100A2
  2. 62dBA INT-1400A2
  3. 63dBA INT-1700A2
  4. 65dBA INT-2000A2
- Q. Gaskets – Shall have closed cell neoprene gasket to form airtight seal at positive pressure plenum.
- R. Airfoil - 16 gauge, type 304 stainless steel with no. 4 finish
- S. Armrest: Aluminum extruded oval comfort shaped armrest included as standard.
- T. Base stand - 16 gauge cold rolled steel minimum, fully welded assembly with modesty panel and leveling guides. Coating shall be VOC free, acid resistance powder coat finish.  
(Choose One)
  1. Telescoping manually adjustable with range of motion 28" to 35".
  2. Telescoping electrically adjustable with Range of motion 28" to 35".

**2.4 OPTIONAL ACCESSORIES**

- A. Casters (Duratex Phenolic wheel) with front locking wheels
- B. UV Germicidal lamp – 254 nanometer germicidal bulb
- C. Canopy or Thimble connection
- D. Ergonomic footrest
- E. Butterfly Valve
- F. Service fittings provided with 90° elbow
- G. IV Pole

**PART 3 - INSTALLATION**

**3.1 SET UP**

- A. Supplier shall receive and assemble ready for final connections.
- B. Final connection to building is not part of this construction document
- C. Unit must be certified before use by NSF accredited field certifier. Certification is responsibility of owner. Field certification includes:
  1. down flow velocity profile test
  2. Inflow velocity test
  3. Airflow smoke pattern test
  4. HEPA filter leak test
  5. Cabinet integrity test
  6. Site installation assessment tests
- D. User manual and Technical manual shall be provided with cabinet in both hard and soft copies.

**END OF SECTION**