BIOLOGICAL SAFETY CABINETS
Class II, Type A2 Biological Safety Cabinet

PART 1 – GENERAL

1.1 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.

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)
NAAMM MFM (1988) Metal Finishes Manual
NSF INTERNATIONAL (NSF)
NSF 49 (2007) Class II (Laminar Flow) Biosafety Cabinetry
UNDERWRITER'S LABORATORY (UL)
UL Standard 61010-1

1.2 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 International* NSF/ANSI 49. Class II cabinets shall provide protection of experiment from ambient environment and protection of ambient environment from experiment.

B. Biological safety cabinets shall operate in an efficient and sustainable manner. Electrical consumption of new units shall be no greater than: 170 watts for nominal width 3 foot unit; 200 watts nominal width 4 ft unit; 310 watts for nominal width 5 foot unit; and 400 watts for nominal width 6 foot unit.

1.3 SUBMITTALS

Product Data - Biological safety cabinets
Biological safety cabinets - Compliance with NSF/ANSI 49
Biological safety cabinets – Operating and Service Manuals
Biological safety cabinets – Demonstration
Factory Test Reports

1.4 QUALITY ASSURANCE

A. Each cabinet will be certified by UL for electrical safety and integrity.
B. Each cabinet will be NSF listed and approved for design, construction and performance.
C. A factory test for each cabinet validating proper performance including:
1. Cabinet integrity test with pressure decay or soap bubble leak
2. HEPA Filter leak test of downflow and exhaust filters
3. Downflow air velocity and uniformity
4. Inflow air velocity
5. Airflow smoke patterns

1.5 QUALIFICATIONS

A. Manufacturer
Company with minimum ten years documented experience in the construction of NSF Listed and Approved Class II biological safety cabinets.
B. Cabinet

Cabinet shall be an NSF Listed and Approved Class II biological safety cabinet.

1.6 WARRANTY

a. Manufacturer's warranty against defects in material or workmanship covering parts and labor must be available for a period of five years. Standard exceptions for filters, lamps and glass shall apply.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Thermo Scientific

2.2 CLASS II TYPE A2 BIOLOGICAL SAFETY CABINETS

1. Exterior dimensions
   a. Nominal 3 ft width – 61.8"H x 39.4"W x 31.5"D (1568mm H x 1000mm W x 800mm D)
   b. Nominal 4 ft width - 61.8"H x 51.2"W x 31.5"D (1568mm H x 1300mm W x 800mm D)
   c. Nominal 5 ft width – 61.8"H x 63"W x 31.5"D (1568mm H x 1600mm W x 800mm D)
   d. Nominal 6 ft width - 61.8"H x 74.8"W x 31.5"D (1568mm H x 1900mm W x 800mm D)
2. Additional Height Range with Stand
   a. Adjustable Height Stand - Work surface heights from 30 to 38" (750 to 950 mm) adjustable in 2" increments, overall cabinet height from 88.5" to 95.4" (2248 to 2448 mm) [stand is 26.8" to 34.7", 680 to 880 mm]
   b. Motorized Stand - Work surface heights from 30 to 38" (750 to 950 mm), overall cabinet height from 88.6" to 96.5" (2249 to 2449 mm) [stand is 26.8" to 34.6", 680 to 880 mm]
   c. Castor Stand - Work surface heights at 30" (760 mm), overall cabinet height is 88.6" (2350 mm) [stand is 680 mm]
3. Interior dimensions
   a. Nominal 3 ft width - 30.7"H x 35.4"W x 24.8"D (780mm H x 900mm W x 630mm D)
   b. Nominal 4 ft width - 30.7"H x 47.2"W x 24.8"D (780mm H x 1200mm W x 630mm D)
   c. Nominal 5 ft width - 30.7"H x 59.1"W x 24.8"D (780mm H x 1500mm W x 630mm D)
   d. Nominal 6 ft width - 30.7"H x 70.9"W x 24.8"D (780mm H x 1800mm W x 630mm D)

2.3 CONSTRUCTION

A. Cabinet shell shall use steel no less than 19 gauge (0.0394" thick) and validated to meet the NSF performance specification where top front edge shall not move forward more than 0.063 inches (1.6 mm) from the static position when a 250 lb (110 kg) lateral force is applied to the top rear edge and the top of the sides shall not move forward more than the same amount when the same force is applied to the top of the opposite side.

B. Unit shall have all metal plenums designed for easy removal at filter change. (Non-metal, fabric type plenums are not acceptable.)

C. To facilitate cleaning, the interior sides and rear wall of the work area shall be of one piece no less than 19 gauge (0.0394” thick) Type 304 stainless steel construction with No. 4 finish. The joins between the side and rear interior walls shall have coved corners of no smaller than 0.406” radii.
D. An efficient means of adjusting the downflow and inflow separately shall be provided. Additional penetrations of the shell of the cabinet should be avoided.
E. Corrosion resistant ball valve for drain from trough beneath the work surface.
F. Externally mounted fluorescent lighting fixture.
G. One supply and one exhaust, scan-tested, zero-probe HEPA filter, 99.995% percent efficient on most penetrating particle size (H14 per EN 1822), serviceable and removable from front of unit.
H. Two duplex receptacles, GFI protected with total load capacity of at least 5 amps.
I. Single power cord 12 ft in length with a NEMA plug 5-15P.
J. Corrosion resistant diffuser below the downflow filter.
K. Protective screen to prevent foreign objects from being drawn into fans.
L. A minimum of six media valves (at least three on each side, for vacuum or other) available on the cabinet.
M. A minimum of two replaceable 3 inch cable/tubing ports (at least one on each side)

2.4 PERFORMANCE REQUIREMENTS
A. Work access opening inflow velocity: Acceptable operating range 100 – 110 fpm.
B. Inflow compensation controlling inflow velocity with 3% of set value with 100% increase in filter loading.
C. Visual indicator on the front panel for the following features:
1. Compensation reserve capability.
2. Hours of operation
3. Inflow velocity display (feet per minute)
4. Downflow velocity display (feet per minute)
5. Night Set-Back mode
6. UV on
7. Receptacles on
8. Operating speed airflow
9. Front window position
D. No HEPA filter leakage ≥ 0.01% of upstream concentration.
E. Downflow velocity ± 5 fpm of NSF/ANSI validated nominal value.
F. All downflow measurements within 20% of average.
G. Separate downflow and inflow velocity flow alarms to signal overall variation greater than 20% from set values.
H. Airflow smoke patterns test acceptable
1. Downflow is smooth with no dead spots or upward flow.
2. Smoke released behind view screen moves smoothly down and does not escape from the cabinet.
3. Smoke released outside the cabinet will not escape from the cabinet once drawn in or billow over the work surface or penetrate onto it.
4. No smoke released in the work area 2 inches from the window side or top edges will escape from the cabinet.
I. Power consumption: Not to exceed 170 watts for nominal 3 ft width, 200 watts for nominal 4 ft width or 400 watts for nominal 6 ft width.
J. Reduced flow or Night Set-Back mode allowing reduction in airflow and energy consumption while maintaining cleanliness and containment when not in operation. Power consumption during reduced flow or Night Set-Back not to exceed 70 watts for nominal 3 ft or 4 ft widths, and 120 watts for nominal 5 ft and 6 ft widths.

2.5 ERGONOMIC OPERATION REQUIREMENTS
A. 10° sloped front (the top of the cabinet is slanted away from the operator) to provide operator the space to change position forward and back while working.

B. Work area illumination: No less than 120 footcandles at the worksurface
C. Noise: No greater than 65 dB(A)
D. Front and back of window easily cleanable without special tools.
E. Armrests must sit above front air intake grill and be easily removable
F. Available UV disinfection cycle
    1. adjustable UV exposure time saved in memory to facilitate consistent operation
    2. safety interlock to prevent UV illumination when window is open

2.6 ACCESSORIES

A. Thimble connections for external exhaust allowing external exhaust variation of 30%:
    Nominal 3 ft width with 8 inch opening – 269 cfm
    Nominal 3 ft width with 10 inch opening – 336 cfm
    Nominal 4 ft width with 8 inch opening – 360 cfm
    Nominal 4 ft width with 10 inch opening – 450 cfm
    Nominal 5 ft width with 8 inch opening –448 cfm
    Nominal 5 ft width with 10 inch opening – 560 cfm
    Nominal 6 ft width with 8 inch opening – 540 cfm
    Nominal 6 ft width with 10 inch opening – 670 cfm

B. External exhaust alarm (as required by NSF 2012)
C. Universal Piping to top, side and bottom, up to two pre-plumbed penetrations per side
D. Floor anchoring brackets
E. Service valve taps
F. Adjustable footrest
G. Ergolign saddle stool
H. IV bag holder
I. Hanging shelf for base stand