BIOLOGICAL SAFETY CABINETS
Class II, 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.
EN12469:2000 Biotechnology - Performance criteria for microbiological safety cabinets.

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 EN12469:2000. 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: 180 watts for nominal width 3 foot unit; 220 watts nominal width 4 ft unit; 285 watts for nominal width 5 foot unit; and 360 watts for nominal width 6 foot unit.

1.3 SUBMITTALS

Product Data - Biological safety cabinets
Biological safety cabinets - Certification in accordance with EN12469:2000
Biological safety cabinets – Operating Manuals
Biological safety cabinets – Demonstration

1.4 QUALITY ASSURANCE

A. Each cabinet must be constructed and installed in accordance with EN12469:2000.

B. Each cabinet must be type tested by T.U.V. Nord (Hamburg, Germany) and certified to EN12469:2000 and a copy of the certificate shall be available for inspection and submitted with the tender return.

C. All cabinets must carry a side mounted, easily accessible manufacturer's plate giving type, date of manufacture, serial number and CE mark.

D. All cabinets, after installation, to be certified as passing the appropriate containment test and also to include measured airflows at the time of the test

E. A factory test for each cabinet validating proper performance including:
1. HEPA Filter leak test of downflow and exhaust filters
2. Downflow air velocity and uniformity
3. Inflow air velocity
4. Airflow smoke patterns

1.5 QUALIFICATIONS

A. Manufacturer
1. Company with minimum fifteen years documented experience in the construction of EN12469 certified Class II biological safety cabinets.
2. Cabinets should be of European manufacture and have spare parts readily available.

B. Cabinet
Each cabinet must be type tested by T.U.V. Nord (Hamburg, Germany) and certified to EN12469:2000.

1.6 WARRANTY

A Manufacturer's warranty against defects in material or workmanship covering parts & labour must be available for a period of 24 months. Standard exceptions for filters and lamps shall apply.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Thermo Scientific

2.2 CLASS II BIOLOGICAL SAFETY CABINETS

A. Exterior dimensions
1. Nominal 3 ft width – 1522mm H x 1000mm W x 800mm D
2. Nominal 4 ft width - 1522mm H x 1300mm W x 800mm D
3. Nominal 5 ft width – 1522mm H x 1600mm W x 800mm D
4. Nominal 6 ft width - 1522mm H x 1900mm W x 800mm D

B. Additional Height Range with Stand
1. Adjustable Height Stand - Work surface heights from 750 to 950 mm adjustable in 50mm increments, overall cabinet height from 2266 to 2466 mm (stand is 680 to 880 mm)
2. Motorized Stand - Work surface heights from 750 to 950 mm, overall cabinet height from 2266 to 2466 mm (stand is 680 to 880 mm)
c. Castors with Stand - Work surface heights start at 760 mm, overall cabinet height starts at 2366 mm

C. Interior dimensions
a. Nominal 3 ft width - 780mm H x 900mm W x 630mm D
b. Nominal 4 ft width - 780mm H x 1200mm W x 630mm D
c. Nominal 5 ft width - 780mm H x 1500mm W x 630mm D
d. Nominal 6 ft width - 780mm H x 1800mm W x 630mm D

D. Efficient use of space
Less than 150mm difference between the exterior and interior width ensures efficient use of lab space.

2.3 CONSTRUCTION

A. Front Window should be manufactured with 8mm safety glass.

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

C. All Interior surfaces should be constructed of 304 (1.4307) stainless steel with a 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. Working height of front window sash must be 200mm

F. Externally mounted fluorescent lighting fixture.

G. One supply and one exhaust, scan-tested, zero-probe HEPA filter, 99.995% 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 3.7m (4.9m in total with 1.2m fixed) in length.

J. Corrosion resistant diffuser below the downflow filter. Cloth diffusers are prone to being damaged easily, for example during pipetting.

K. Protective screen to prevent foreign objects from being drawn into fans.

L. A minimum of four media valves (at least two on each side, for vacuum or other) available on the cabinet.

2.4 PERFORMANCE REQUIREMENTS

A. Cabinet must have DC motors to ensure lower energy consumption and low heat emission.

B. Cabinet must have a dual DC motor system where the 2 motors independently control the exhaust / inflow and downflow. Single motor designs with or without dampers are not acceptable.

C. The motor must automatically adjust the airflow speed without the use of a damper to ensure continuous safe working conditions, even without maintenance adjustments.

D. In order to preserve safety to the user and the environment, the exhaust blower on the cabinet must continue operating when the supply blower stops working. If the exhaust blower should fail, the supply filter must also be turned off.

E. An efficient means of adjusting the downflow and inflow separately shall be provided. Additional penetrations of the shell of the cabinet should be avoided.

F. Power consumption: Not to exceed 180 watts for nominal 3 ft width, 220 watts for nominal 4 ft width, 285 watts for nominal 5 ft width, or 360 watts for nominal 6 ft width.

G. Work access opening inflow velocity with a nominal set point of 0.45m/s

H. Inflow compensation controlling inflow velocity with 3% of set value with 100% increase in filter loading.

I. The microprocessor controller must be located on a slanted front panel so it is easy to see and reach from a seated working position in front of the cabinet.

J. Visual indicator on the display panel for the following features:
1. Safety status of the cabinet - The cabinet must display performance criteria to ensure the user that they are working under safe conditions.
2. Hours of operation
3. Time of day
4. Downflow velocity display (feet per minute)
5. Operating time of optional UV lights
6. Timer for delayed start
7. Stop watch function

K. The cabinet must provide an indicator for its performance to ensure that the user knows when it is time to exchange the HEPA filter or schedule routine service.

L. No HEPA filter leakage ≥ 0.01% of upstream concentration.

M. In order to ensure consistent and reliable downflow velocity across the supply HEPA filter over the life of the cabinet, the cabinet must use a pressure sensor (rather than anemometer) to detect pressure drop across the supply filter, rather than in just one point across the downflow. The pressure sensor must be encased in order to protect the sensor from temperature, humidity and other environmental phenomena that can impact the sensor's performance.

N. All downflow measurements within 20% of average.

O. Volt free contacts shall be provided for connection to an external fan system.

P. Volt free contacts shall be provided for connection to a Building Management System (BMS).

Q. Separate downflow and inflow velocity flow alarms (audible & visual) to signal overall variation greater than 20% from set values.

R. 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.

S. Reduced flow or Night Set-Back mode

1. Reduced flow or night set back mode allowing reduction in airflow and energy consumption while maintaining cleanliness and containment when not in operation.
2. Power consumption not to exceed 40 watts for nominal 4 ft width and smaller or 70 watts for nominal widths greater than 4 ft, when in redcued energy mode.
3. Reduced energy mode should start automatically when the front window is closed.

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 750 Lux at the worksurface

C. Cabinet noise level must be less than 56dB(A) for a 1.2 m cabinet and less than 60dB(A) for a 1.8 m cabinet as measured in a sound proof room, in the center of the work aperture and in a horizontal distance of 1 m from that center.

D. Dual side wall construction with negatively pressurized interstitial space.
Additional protection in side wall with negatively pressurized interstitial space contiguous with the motor plenum. This allows the capture of potential contaminants migrating through any penetrations in the side walls due to media or cable services.

E. The window must lower beyond the worksurface for thorough cleaning of the window's inner surface without requiring the user to remove the armrest / siderails or support the window. This unique design protects the operator by maintaining inflow even when the window is lowered

F. For ease of operation, each cabinet must have a sliding sash. Night doors are unacceptable.

G. Front window must be sealable for fumigation by using a fumigation kit, tested by HPA.

H. Cabinets must be suitable for/and have the accessories for H2O2 fumigation.

I. The side walls must be made of laminated safety glass for all-round visibility and preventing the tunnel-feeling that is a common side effect of working long hours in a biosafety cabinet.

J. Easily removable armrests must be provided and sit above front air intake grill to ensure that the front air intake grills cannot be obstructed when normal work procedures are followed. Armrests which are located outside the chamber do not provide adequate support and can often be sources of contamination & difficult to clean.

K. 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
3. cross-beam UV bulbs located in sidewall panels to reduce shadows in work area

2.6 ACCESSORIES

A. Thimble connections for external exhaust allowing external exhaust variation of up to 30%:
Nominal 3 ft width– 375m3/h
Nominal 4 ft width– 501m3/h
Nominal 5 ft width– 628m3/h
Nominal 6 ft width– 754m3/h

B. Direct Duct connections for external exhaust allowing approximately 90% of exhaust air volume in operation:
Nominal 3 ft width– 259m3/h
Nominal 4 ft width– 347m3/h
Nominal 5 ft width– 434m3/h
Nominal 6 ft width– 522m3/h

C. Rear wall plumbing, up to three pre-plumbed penetrations per side

D. Multiple worksurface options

E. Service valve taps

F. Adjustable footrest

G. Ergolign saddle stool

H. IV bag holder

I. Hanging shelf for base stand