SECTION 11 53 00 - LABORATORY EQUIPMENT

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Chemical Fume Hoods
      a. Acceptable types of fume hoods include conventional with variable air volume control. Unacceptable types include conventional with constant volume and auxiliary air.
      b. Chemical fume hood exhaust applications must be considered as an entire system that includes both supply air and exhaust air needs. Consider the following issues to be applied to all retrofit fume hood applications, not on a select basis:
         1) Ventilation air for fume hood make-up must be provided to the laboratory space. The make-up air should not be recirculated space air and should be 100% outside air. The laboratory environment must be under negative pressure, at about a 90% airflow ratio.
         2) The preferred fume hood superstructure should be a variable air volume type configuration (constant face velocity with varying sash height) with a vertical sash and balanced and adjusted to meet the required fpm for the specified equipment. The hood manufacturer should be similar to Kewaunee and ideally a 4 foot nominal length (700 cfm), with specified optional services; such as vacuum or natural gas -- if necessary. The hood must include a low velocity alarm, similar to Kewaunee No. 839.
         3) The exhaust fan should be a utility set specifically designed for the proposed application, similar to New York Blower GP series fan (airfoil wheel). Special fan coatings and dark resistant construction are not necessary unless out-of-the-ordinary circumstances are present. The fan should include a weather cover, belt guard, spring vibration isolators, housing drain with cap, bolted cleanout door with gasket, TEFC motor with fixed pitch belt drive. Refer to 23 05 93 – Testing, Adjusting, and Balancing for HVAC.
         4) The exhaust fan must be labeled per the University Equipment Identification Number Standards. Exhaust fan will be fed from a dedicated electrical circuit.
         5) The exhaust fan must be provided with an up-blast discharge with stack termination at a minimum of 10 feet above the roof. The stack must be supported with an adequate framing structure and the stack must be connected to the exhaust fan with a flexible connector. The exhaust stack exit velocity must be about 3,000 fpm (or as required by wind wake analysis) which is achieved by using a discharge cone or transition fitting to increase the velocity. The stack diameter should be full sized until the termination cone.
         6) The fume hood exhaust riser will require a leakage test per SMACNA standards at the specified negative pressure. In most cases, the duct riser will be galvanized steel, spiral seam construction - use stainless steel only if required by special circumstances. The ductwork fittings must be sealed air tight per welded seams or some other suitable means. Adjustable gore fittings are not acceptable for fume hood applications.
         7) Fume hoods using boiling acids need to operate as constant volume fume hoods, where constant maintained flow is required at all times to prevent condensation in the ductwork. The duct work and exhaust terminal will require a special coating or material to prevent rusting and premature failure of the system.
      c. Other types of exhaust devices such as canopy hoods, storage cabinets, slot hoods, snorkels, etc. are generally not accepted as substitutes for fume hoods.
      d. Design and installation of fume hoods is strictly controlled according to the following procedures:

1) User identifies to the University Project Manager requirements for fume hoods which include types, size, number, and list of chemicals and compatibilities.
2) The University Project Manager submits requirements and chemical list to the University Environmental Health and Safety (EHS) for classification of hood. Hood classification identifies acceptable uses for the fume hood and required face velocity.
3) The Classification and chemical list is submitted to mechanical engineer to use in designing the exhaust duct and fan system and selection of suitable materials.

e. Fume hoods require outside air makeup through the central system or with dedicated HVAC systems. Fume hood exhaust systems shall not be connected to general building exhaust systems. However, exhaust systems dedicated to laboratory where hood is located can be connected to hood exhaust.
f. All fume hoods shall have face velocity audible and visual alarms.
g. Other standards for the exhaust system, ductwork, air balance, controls and utilities are identified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC, Section 23 09 00 – Instrumentation and Control for HVAC and Section 23 09 93 – Sequence of Operations for HVAC Controls.
h. Provide third party validation and certification that fume hood complies with ASHRAE 110 as installed.
i. Coordinate required fpm per use in accordance with the manufacturer's recommendations with the University EHS through the University Project Manager.

2. Biological Safety Cabinets
   a. Biological safety cabinets and fume hoods cannot be connected with common ductwork or fans. Biological safety cabinets will be fed from a dedicated electrical circuit.
   b. Contact the University EHS through the University Project Manager for specifications.
   c. Provide third party validation and certification that biological safety cabinet complies with NSF Standard 49 as installed. Certify cabinet during commissioning by NSF certified individual.
   d. Comply with CDC BMBL 5th edition, 2009, Appendix A Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets.
   e. BSCs may be recirculating (Class II, Type A) or exhausted by canopy- or thimble-connection (Class II, Type A2) or hard-ducted Class II, Type B1 or B2, dependent upon work to be conducted and risk assessment.
   f. Provide Biological Safety Cabinet appropriate for the use being performed.
3. Chemical Storage Cabinets:
   a. Provide sufficient storage cabinets or space in accordance with anticipated user needs.
   b. Vent corrosive liquid storage cabinets under fume hoods or free standing storage cabinets directly into exhaust systems. Do not provide cabinet fans. Typical exhaust rates should be 50 cfm.
   c. Per NFPA 30, do not vent flammable liquid storage cabinets. Coordinate any variance with the Authority Having Jurisdiction (AHJ).
   d. Provide adequate space in room layout for storage cabinets.
   e. Provide storage equipment appropriate to the use being performed.
4. Sterilizing Equipment:
   a. Sterilizers can be provided with new steam generators supplied with DI water for clean steam. Power plant steam should be used as primary energy source. Plant steam can also be used with DI water-to-steam heat exchangers. It must be verified that adequate plant steam is available for specified sterilizer.
   b. Sterilizers should be specified based upon the users required operational temperature.
   c. Contractor shall notify the University Project Manager to set up service schedule for the sterilizing equipment.
   d. Adequate exhaust and ventilation should be supplied to maintain sterilizer specifications for temperatures in space provided for installation.
   e. Adequate space of no less than 2' clearance on all sides and back of unit for maintenance and repairs shall be provided.

5. Coordinate with the University EHS through the University Project Manager for waste water pretreatment requirements.
6. Refer to 23 60 00 – Laboratory Piping Systems for venting requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manifolded Hoods: Subject to compliance with requirements, provide products by the following:
1. Baker.
2. Hamilton.
3. Kewaunee.

B. Biological Safety Cabinets: Available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Baker
2. Nuaire

C. Washers and Autoclaves: Subject to compliance with requirements, provide products by the following:
1. Bellimed (Preferred)
2. Tuttnauer

PART 3 - EXECUTION

3.1 COMMISSIONING

A. The University will hire a third party commissioning agent. The Architect, Engineer, and Contractor are to coordinate with the Commissioning Agent.

3.2 ADJUSTING

A. Complete testing and balancing prior to commissioning. See 23 05 93 – Testing, Adjusting, and Balancing for HVAC.

3.3 CLEANING

A. Test, clean, and certify all equipment.

END OF SECTION 11 53 00