

SECTION 230300 – PROGRAMMING CONSIDERATIONS FOR HVAC

1.0 Design Criteria

- A. ASHRAE 90.1 Compliance: University of Pennsylvania buildings shall comply with the Commercial Energy Efficiency Requirements of ASHRAE Standard 90.1-2016. The ASHRAE 90.1-2016 compliance paths shall be followed instead of the International Energy Conservation Code (IECC) requirements as permitted by 2018 IECC Section 401.2 Application.
- B. During the schematic phase of the project, the A/E shall determine in conjunction with the user group design criteria including indoor temperature/humidity, lighting levels, acoustic levels, air quality/filtration, pressurization, minimum ventilation, biosafety level, space occupancy, schedules, reliability requirements, heat load densities, electrical load densities, services required (including service quality and pressure), type and quantity of exhaust devices and quantities of program equipment (such as refrigerators, freezers, centrifuges, autoclaves, ware washers, flow cabinets, etc.) so that mechanical and electrical systems can be designed to support specific or modular equipment requirements.

2.0 Energy

- A. The A/E shall strive to set program criteria with the users which take into account the energy use and other natural resource use that may ultimately be required to satisfy that criteria. The A/E, working with FRES, shall set an initial energy budget (btu/sf/yr) for the project.

3.0 Equipment

- A. The A/E shall carefully ascertain equipment requirements so that heat rejection, electrical usage, and other utility consumption data are defined for system design. Spatial requirements for equipment must be closely reviewed, and layouts shall allow for access to all piping, wiring, and ductwork connections. Mechanical systems shall be designed and de-tailed so that they do not induce harm to or impede the operating efficiency of program equipment. Pressure regulators, safety relief valves, gravity drainage facilities, temperature controls, and backflow protection devices shall be provided as required to protect equipment.

4.0 Flexibility

- A. When planning new facilities or renovations to existing, the A/E shall consider HVAC and piped service capacity on a modular basis to allow for future flexibility. The amount of flexibility required is to be considered on a project by project basis. Examples include considering laboratory planning on a modular basis, allowing a preset quantity of fume hoods per module as a basis of the HVAC system sizing. This allows future flexibility to add fume hoods beyond the present program. Similar considerations should be given for HVAC space cooling load capacity and piped service locations.

5.0 Containment

- A. On a project by project basis, the A/E shall review with the University Office of Environmental Health and Radiation Safety (OEHRs) the proposed types of containment devices

such as fume hoods, biosafety cabinets, local exhaust points, etc. Review shall consist of sash arrangement; face velocities and personnel protection design criteria. A/E shall define all personnel exposure points (such as solvent transfer points) and review the design of associated protection devices with the OEHRs.

6.0 Ventilation

A. ASHRAE 90.1-2016 Compliance Requirements:

- a. Ventilation System Controls shall be provided in accordance with Section 6.4.3.4 of ASHRAE 90.1-2016, including all associated exceptions.
- b. Ventilation Controls for High-Occupancy Areas shall be provided in accordance with Section 6.4.3.8 of ASHRAE 90.1-2016, including all associated exceptions.

B. A/E shall define the minimum required air change rates for the space served considering space dilution and outdoor air ventilation requirements. For vivarium spaces, coordinate accepted air change guidelines with the use of ventilated cage racks. Consider lowering room air change rates if ventilated cage racks are used. It is preferred that all ventilated cage racks exhaust directly into the building exhaust system.

7.0 Pressurization

A. A/E shall determine the space pressurization requirements for the proposed spaces and the accepted methods to maintain pressurization during all system modes of operation.

8.0 Reliability/Redundancy

A. A/E shall determine the critical loads and requirements from the space program and propose the appropriate level of system redundancy that maintains the critical loads during a system or utility failure. As part of this analysis, the A/E shall determine systems to be supplied by stand-by/emergency power to support critical loads.

9.0 Remote Monitoring

A. A/E shall determine (in conjunction with the user) the remote monitoring requirements of the project at the Operations Control Center (OCC). For example, lab equipment, environmental rooms, etc.

10.0 Piped Services

A. A/E shall determine (in conjunction with the user) the quality of piped services required to support the program. A/E shall apply appropriate piping materials and arrangement to maintain the quality of the services required.

11.0 Waste Treatment

A. A/E shall identify any waste treatment requirements for the specific program requirements.