

UNIVERSITY OF ALABAMA AT BIRMINGHAM

DEPARTMENT OF FACILITIES PLANNING

FACILITIES STANDARD

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NAME : Animal Room Environment
NUMBER : 15060

ORIGINAL DATE : 03-01-94
REVISION DATE : 11-03-99

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PURPOSE:

1. The general purpose of Facilities Standards is to provide the University an approved, documented criteria for construction, material stocking and replacement, consistent maintenance of facilities, code compliance, and provisions for uniformity and uniqueness of facilities standards.
2. All construction of University property, in reference to safety issues will be conducted in accordance with NFPA 241 safeguarding construction, alteration, and demolition operations, and the Standard Building Code, in Chapter 33, SAT work, demolition, and construction, to protect the health and safety of faculty, staff, patients, visitors, and students, as well as unrelated, non-project, UAB property.
3. Construction safety is the responsibility of the contractor for any project. Each responsibility, as stated in the contract documents, relate to all recognized rules, regulations and codes adapted by any agency having jurisdiction, and the guidelines established during the occupational standards and health act.
4. The purpose of this Facility Standard on Animal Room Environment is to establish minimum criteria for the design of the air conditioning systems for animal rooms.

GENERAL:

1. Animal rooms shall be designed to meet the recommendations of "Guide for the Care and Use of Laboratory Animals" as published by the U.S. Department of Health and Human Services, NIH Publications No. 86-23, Revised 1996 (Guide). Copies are available from UAB Department of Animal Resources, 934-4661 or 934-7677.
2. Spaces (see note below) shall be maintained at temperature and humidity as recommended by the above document and each individual space shall be capable of meeting the requirements for any of the animals listed since the use of spaces may be changed.

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3. Ventilation of all spaces shall comply with above standard except that maintained air changes in any space shall be a minimum of 15 air changes based on the smaller flow of either the supply or the exhaust and the nominal dimensions of the space (W x L x H). This area should be negative to the corridor.
4. The relative air pressure to adjacent access areas shall be maintained either negative or positive in the space and it shall be possible to adjust this relationship for any space depending on the use of the space.
5. All air supplied to the space shall be filtered fresh air suitable for human air conditioning use and all air shall be exhausted to the outside in such a manner that none of this air will normally be drawn back into any building air system.
6. Equipment reliability as discussed in the Guide is very important. Parallel systems of reduced capacity are required for ventilation supply and exhaust so that partial ventilation can be maintained with one supply or exhaust unit out of service. Each system shall be capable of serving all spaces. Systems diverting air or exhaust from non-critical areas into spaces can be used for this purpose, provided these units meet the same criteria as those serving critical areas.

SUPPLY SYSTEM

1. Supply duct shall be built and sealed to meet SMACNA guidelines.
2. Supply duct shall be computer designed to provide nearly equal pressure at each take-off for balancing of the system with minimum dampening. All supply ducts shall be pressure tested to uniform leakage of not more than 2%.

TERMINAL UNITS

1. Constant volume hot water reheat terminals shall control the space temperatures in each space. The humidity sensor should be located in the room exhaust duct.
2. Control valve shall be carefully selected for CV required for close control.
3. Locate units, valves, operator etc. above a minimum 24 X 24 access door in gypsum ceilings, or above other accessible lift out ceilings nearby.

SUPPLY OUTLETS

1. Supply outlets shall be spaced to provide uniform air distribution without short cycling to the exhaust inlets. Construction shall be stainless steel non-painted.

EXHAUST SYSTEM

1. Exhaust inlets shall be spaced to provide cross ventilation in the space. Construction shall be stainless steel, non-painted.
2. Inlets shall be filter grille type to include a throwaway or washable 1" thick filter, accessible from the space.
3. Control box shall be adjustable to allow the space to operate as a positive or negative space as regulated by the pressure control system.
4. All exhaust ducts shall be sized to provide equal negative pressure as outlined in the Industrial Ventilation with due consideration given to the detrimental effect of static regain on negative pressure systems.
5. All exhaust ducts shall be braced to withstand the forces trying to crush negative ducts.
6. All exhaust ducts shall be sealed to allow leakage not exceeding 2% of flow. Exhaust systems shall be tested to confirm performance.

SPACE CONTROLS (EACH SPACE)

1. Provide micro-processor controls for each space that shall provide the following in a stand-alone system:
 - A) Temperature in space shall be controlled by modulation of hot water reheat valve on the pressure independent C.V. box. Display space temperature at main control panel. Provide daily, monthly and yearly record of high and low temperature reached in each space. Reading and record shall be within + 0.5% or actual in the space. Provide an alarm signal if temperature varies + 20 F from setpoint. Humidity should be maintained according to the user's request for the animals that are kept in the area in question, usually at a range of 30-50 %.
 - B) Supply air flow into each space shall be measured with an alarm signal if flow drops below 10% of setpoint.

- C) Exhaust air flow from each space shall be monitored and an alarm signal if flow drops below or rises above 15% of setpoint.
- D) Monitor pressure relationship of space in relation to adjacent corridor and maintain the space positive to or negative to the corridor as selected by the user. This shall measure actual differential pressure, not a ratio of air quantities.
- E) The processor shall control the lighting in each space to control light level in each space to day or night levels on an adjustable time schedule with an adjustable duration. Provide a five minute mark timer for each space to override the off cycle.
- F) The processor shall control a water system flush of the drinking water system through timed opening of a drain solenoid valve and a timed opening of a by-pass solenoid valve. Valves shall be operated by 24 volt A/C system. The interval and duration of these cycles shall be programmable.
- G) Standard specification sections 15950, 15951, 15952, and 15953 shall be followed as a minimum reference for this section.

2. Central Processing Unit for space controls

- A) Perform the following within a Windows Operating System:
 - 1) Display current room temperature of each space.
 - 2) Display an alarm message of any space with more than allowable variation.
 - 3) Provide an audible alarm of the above.
 - 4) Print location of alarm(s), time and temperature at time of alarm of all areas outside of allowable limits. Repeat alarm printout every 10 minutes until all alarms are cleared.
 - 5) Record daily high and low temperatures of each space every 24 hours (midnight).
 - 6) Record monthly high and low temperature of each space every month (midnight at beginning of month).
 - 7) Record yearly high and low temperature of each space every year (midnight at beginning of year).
 - 8) Provide auto dial modem with prerecorded message to dial not less than four (4) numbers if the alarm is not reset within 5 minutes of the

first alarm signal. Numbers to be dialed shall be dialed in sequence until the call is answered.

- 9) The Central Processing Unit shall receive, display and record hourly for the past 31 days the following data from the Air Handling Unit and the exhaust fan.

O.A. Temperature (A.H.U.)
Discharge air temperature (A.H.U.)
Differential across filters (A.H.U.)
Supply air static pressure (A.H.U.)
Exhaust air temperature (Exh.)
Exhaust suction S.P. (Exh.)

DESIGN OF CENTRAL STATION EQUIPMENT

Air Handling Unit shall consist of built-up or factory manufactured casing based on size and configuration of the equipment. Unit shall be draw through type consisting of:

- 1) Outside air inlet damper as required for fire/smoke protection and shall close in case of freeze-stat operation.
- 2) Prefilters, throwaway type.
- 3) High efficiency filters, rigid frame in manufactured side entry filter box.
- 4) Preheat coil with glycol system for freeze protection, modulating control valve, fail in last position.
- 5) Cooling coil, chilled water, modulating control valve, two position. Where unit is 10,000 cfm and above, there shall be multiple cooling coils for each 10,000 cfm or portion thereof.
- 6) Centrifugal fan or fans to provide for redundancy in case of breakdown. Where multiple fans are used, they shall be driven by separate motors and drives. Where non-critical units are used for redundancy, A.H. units may be simple fan units.
- 7) Fans shall be backward inclined air foil design not lighter construction than class II, AMCA rated and labeled, factory balanced with balance report submitted to Owner. Vibration shall not exceed "smooth" rating.

- 8) Smoke/fire damper(s) on discharge of A.H. unit shall be located not closer than five (5) fan diameters of straight duct equal to the fan outlet size as required to meet AMCA rating of the fan(s). Dampers shall be airfoil type with blades mounted vertically.
- 9) Humidifier(s) shall be steam type with modulating controls located just ahead of outlet dampers.
- 10) All sub-components of the air handlers shall meet the Standard Specification Section 15650 as a minimum. The more stringent shall apply if a controversy should arise.

CONTROL OF A.H.U. & EXHAUST SYSTEMS

1. It shall be possible to run each system separately, but systems shall normally be started and stopped together manually.
2. Provide interlock with fire alarm system and freeze protection to shut-down the A.H. Unit. Freeze protection shall be external to the DDC Control System.
3. Provide variable frequency drive (VFD) for each system to control A. H. unit fan(s) and exhaust fan(s) to maintain fixed supply and exhaust pressures in the trunk ducts. (See standard on manual bypass V.F.D.).
4. Modulate preheat controls to maintain discharge air at the nominal cooling supply air temperature.
5. Modulate the cooling coil valve(s) to maintain leaving air setpoint if outside air is above nominal setpoint.
6. Measure and display locally the following: "Reference Standards 15950, 15951, 15952, and 15953"; for the room temperature, room humidity, and the room pressure verses the hallway.

NOTE: These readings are also displayed on the Central Processing Unit.

ELECTRICAL AND PLUMBING WORK RELATED TO THE ANIMAL ROOM ENVIRONMENTAL EQUIPMENT

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1. Illumination shall be provided with variable intensity controls with the maintained lighting level at 3'- 4" above the floor of 30 foot candles. Light levels shall be manually adjustable for intensity.
 2. Lights in every space shall be controlled to provide a lighting cycle adjustable to fit the use of any space.
 3. All electrical equipment in any space shall be designed for "washdown" in the space and shall be U.L. listed for such service.
 4. Noise is a special problem in spaces since all walls, floors and ceilings must be hard "washable" surfaces. Care should be taken to minimize reverberation in each space.
 5. Water sources for all animals shall be fresh drinkable city water furnished through a reduced pressure zone back-flow preventor meeting all local and national codes. Hose fittings shall be individually protected by such a back-flow preventor.

NOTE: "Spaces" referred to are those areas housing animals or closely associated with such housing as corridors, procedure rooms, storage, etc.

END OF STANDARD

Prepared by: _____

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NUMBER : 15060

ORIGINAL DATE : 03-01-94
REVISION DATE : 11-03-99

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