

Element D Services

Heating, Ventilating, and Air
Conditioning

D304102 HVAC - Laboratory Air Handling Distribution

PART 1 - GENERAL

1.1 OVERVIEW

- A. This section supplements Design Guideline Element D3041 on air handling distribution with additional criteria for projects involving design of laboratory space.
- B. Refer to Design Guideline Element D3041 for the following:
 - 1. General design criteria related to outside air pretreat units, terminal units, air devices, fan coil units, unit heaters, stairwell pressurization fans, ductwork, and exhaust / intake louvers.
 - 2. Special Contract Document Requirements and products applicable to the Project.

PART 2 - DESIGN CRITERIA

2.1 GENERAL

- A. Design dedicated air handling systems to serve laboratory and associated laboratory support areas. Where project conditions permit, office / administrative space should be served by a separate air handling system. Refer to Design Guideline Element D3041.
- B. One air handling system may serve both laboratory and office areas depending on the complexity and scale of the Project. If a single air handling system is designed, supply air serving the office areas shall be used as make-up air for the laboratories or returned back to the air handling unit.
- C. The need for humidification is to be evaluated based on laboratory needs during Programming. If humidification is required, locate humidifiers inside air handling units or combined zones where possible. Humidifiers must utilize chemically untreated clean steam at 15 psig. Humidity control is to be provided based on the smallest number of zones which can provide the needed humidification (to reduce installation and maintenance costs), while also providing energy efficient system operation. A/E shall evaluate and recommend if humidification is necessary on any particular air handling unit.

2.2 LABORATORY AIR HANDLING UNITS

- A. Custom air handling units shall be provided for the conditioning and dehumidification of all outside air to laboratories, designated support rooms, and flex rooms that are used as interim laboratory space. The option of using an energy recovery device must be considered to help reduce energy consumption and utility cost in conditioning and dehumidifying outside air. Refer to Design Guideline Element D3041 for energy recovery requirements.
- B. Air handling units serving the laboratory spaces provide conditioned air through a ducted air distribution system. Each air handler shall have filters supply fans and other mechanical components shall be configured as N+1 redundancy or with the redundant components being

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- on standby status. The supply fans, dampers, etc. shall be interlocked with respective system exhaust air fans. Each fan must be accessible for maintenance and replacement without service interruptions.
- C. Each air handler shall be a variable volume draw through type (except where space protocol and applicable Code/Standards merit otherwise) and shall include the following components:
1. Inlet plenum (100 percent outside air).
 2. Inlet smoke dampers per NFPA.
 3. Access section.
 4. MERV 8 pre-filters as rated by ASHRAE Standard 52.2 latest edition.
 5. Hot water pre-heat coil: prefer that coil supply and return headers be piped on one side of the air handler. Refer also to requirements listed in Design Guideline Element D3041.
 - a. Provide a heating hot water recirculating pump on the bypass piping of the preheat coil for freeze protection and activate pump when air leaving the preheat coil falls below 38F.
 6. Access section.
 7. Chilled water cooling coil: prefer that coil supply and return headers be piped on one side of the air handler. Refer also to requirements listed in Design Guideline Element D3041.
 - a. If two cooling coils are required to achieve the design leaving air temperature setpoint, the two coils need to be piped in series, and an access section will be required to maintain the second cooling coil.
 8. Fan Section: direct drive fan(s) The fan wheel speed shall be controlled with a VFD.
 9. MERV 14 final filters as rated by ASHRAE Standard 52.2 latest edition.
 10. Discharge plenum.
 11. Discharge smoke dampers per NFPA.
 12. High and low static pressure and smoke detection shutdown control and reset capability.
 13. Low temperature freeze stat upstream of the cooling coil with reset capability.
 14. Instrument measurement taps for static pressure, temperature, etc.
- D. Maximum cooling coil discharge velocity shall not exceed 400 fpm.
- E. Cooling coil capacity requirement should be sized using a 20 degree differential entering and leaving chilled water temperature where possible. Chilled water piping shall be series counter

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flow. Refer to Design Guideline Element D3030.

- F. Maximum heating coil discharge velocity shall not exceed 700 fpm.
- G. The access sections and fan section shall have LED strip service lights. Refer to construction specifications.

2.3 AIR TERMINAL UNITS

- A. Distribution of conditioned air to each zoned room or corridor shall be controlled by a variable volume terminal unit equipped with a hot water reheat coil. Terminal units must be constant volume where required by space protocol and applicable Codes/Standards.
- B. Perimeter zones and high occupancy spaces such as meeting rooms shall be served by ultra quiet constant volume series fan powered terminals units with ECM fan motors and supplemental zone heat.
- C. Terminal units must have air flow rate settings to achieve either positive or negative room pressurization requirements. The offset between supply and exhaust airflow rates shall be minimum 90 CFM to allow transfer air at each door entrance.
- D. Terminal units shall be made of aluminum material for rooms with MRI machines or similar equipment.
- E. For rooms requiring lab-tracking controls and air flow devices refer to the design matrix and consult with the Owner on the type of lab-tracking system to be used.
- F. Provide unoccupied setbacks with zonal pushbutton override capability.

2.4 AIR DEVICES

- A. Interior and general supply air ceiling devices shall be square plaque with functional performance. Labs with MRI machines or similar equipment shall use diffusers made with aluminum.
- B. Size the diffuser on delivery of design air flow rate within the established noise criteria limit. Supply air throw velocities shall not exceed 1.5 feet per second at a room elevation 6 feet above the finished floor.
- C. Laminar flow diffusers are to be used at room locations where Chemical Fume Hoods (CFH) and Biological Safety Cabinets (BCS) are being used.
- D. A/E needs to evaluate the effects of diffusers with multi-directional throws in areas that may be impacted by air throw near chemical fume hoods, radioisotope hoods, BSCs, and also chemical balance rooms. Other diffusers with proven desired effect in research laboratories should also be considered.

2.5 DUCTWORK

- A. Laboratory spaces require a once-through system; no return air. Air supplied by this system will be relieved via a ducted exhaust system. Refer to Design Guideline Element D304202

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Laboratory Exhaust and Ventilation.

- B. Ductwork, quench piping, and supports placed within MRI/NMR rooms shall be constructed with non-ferrous material.

PART 3 - SPECIAL CONTRACT DOCUMENT REQUIREMENTS

3.1 GENERAL

- A. If there are adjacent structures where airborne effluent has the potential to affect the Project, the A/E shall evaluate the need for a building wind tunnel study to aid in finalizing the height and location of the outside air intake.
- B. Owner prefers to locate outside ventilation air intakes on the side of the building and not on the roof.

PART 4 - PRODUCTS

4.1 GENERAL

- A. Refer to Owner's Master Construction Specifications. These are available on the Owner's Design Guidelines website: <http://www2.mdanderson.org/depts/cpm/standards/specs.html>

PART 5 - DOCUMENT REVISION HISTORY

Issue	Date	Revision Description	Reviser
	20190301	Original Issuance	
Rev. 1			

END OF ELEMENT D304102