

Element D Services

Heating, Ventilating, and Air
Conditioning

D304104 HVAC - Pharmaceutical Air Handling Distribution

PART 1 - GENERAL

1.01 OVERVIEW

- A. This section supplements Design Guideline Element Z4075 Pharmaceutical Compounding Rooms, with specific applicable air handling unit criteria for projects involving Compounding Sterile Preparations (CSP's) in pharmaceutical spaces.
- B. Design shall be in accordance with the United States Pharmacopeia (USP) – National Formulary (NF) Standards latest Edition of USP 27-NF 22, General Tests and Assays Chapter 797, Pharmaceutical Compounding Sterile Preparations (CSP), and Chapter 800, Hazardous Drugs – Handling in Healthcare Settings.

PART 2 - DESIGN CRITERIA

2.01 GENERAL

- A. Design a dedicated air handling system to serve CSP pharmacy rooms. The room where CSP's are prepared shall maintain a sterile environment at all times and it shall be served with (N+1) air conditioning and ventilation systems to maintain the clean room certification. Both units shall operate in tandem at times, except when one unit is down, the second shall operate at full load capacity.

2.02 PHARMACUEUTICAL AIR HANDLING UNITS

- A. These dedicated custom air handling units shall be provided for conditioning and dehumidification of all designated preparation, processing, and storage support rooms.
- B. Air handling units shall be ducted single zone air distribution system using hot water or electric reheat coil terminal units.
- 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% Outside Air).
 - 2. Inlet smoke isolation dampers.
 - 3. Access section.
 - 4. Pre-filter section, 3 to 10 μ m, 30 percent as rated by ASHRAE Standard 52-76 or MERV 8 as rated by ASHRAE Standard 52.2-99.
 - 5. Access section.
 - 6. Medium efficiency filter section, 1 to 3 μ m, 65 percent as rated by ASHRAE Standard 52-76 or MERV 10 as rated by ASHRAE Standard 52.2-99.

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7. Hot water (or electric if hot water is not available) pre-heat position: Refer to requirements listed in Section D3041.
8. Access section.
9. Chilled water cooling coil.
 - a. Design two coils in a series arrangement if the cooling coil capacity exceeds the capability of a 6 row coil. Chilled water shall be piped in series through both coils and an access section shall be provided between the two coils. Chilled water velocity through the coil tubes shall be between 2 fps and 8 fps maximum (the minimum ARI standard 410 rating condition for water velocity through a coil is 1.0. fps).
 - b. Maximum differential pressure across the air side of the cooling coil shall not exceed 0.7 inch w.g.
 - c. Maximum cooling coil discharge face velocity shall not exceed 400 fpm in variable air volume (VAV) applications and 375 fpm in constant air volume (CAV) applications. Heating coil discharge face velocity shall not exceed 800 fpm. These values are required to allow for an additional margin of 10 percent capacity for future renovations.
 - d. Pipe spool connections at the coils must be bolted flange connections to allow the coils to be pulled and installed without having to remove the control valves.
10. Properly spaced UVGI lamps are to be located on the leaving air side of the cooling coil or bi-polar ionization located on the upstream side of the cooling coil. The lamps shall have the capability of developing an intense UV between 250 to 270 nm. Short-wave ultraviolet light shall destroy DNA in living microorganisms, and also breakdown organic material found in indoor air. All viewports into the AHU shall be provided with a UV protective film.
11. Access section.
12. Fan Section: direct drive fan preferred; centrifugal type fan with an airfoil blade design; minimum 12 blades per fan. The fan wheel speed shall be controlled with a VFD.
13. Final filter section: 0.3 to 1 μ m, 90 percent as rated by ASHRAE Standard 52-76 or MERV 14 as rated by ASHRAE Standard 52.2-99.
14. Discharge plenum.
15. Discharge smoke dampers.
16. High static pressure and smoke detection shutdown control and reset capability.
17. Instrument measurement taps for static pressure, temperature, etc.

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- D. Cooling coil capacity requirement should be sized using a 20 to 25-degree differential entering and leaving chilled water temperature where possible.
- E. Maximum heating coil discharge velocity shall not exceed 800 fpm.
- F. The access sections and fan section shall have service lights.

2.03 FAST ACTING 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 (or electric if hot water is not available) reheat coil. Terminal units are to be constant volume where required by space protocol and applicable Code/Standards.
- B. 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 as required to maintain space D.P. but not less than 80 CFM to allow transfer air at each door entrance.
- C. Terminal units shall be fast acting to be able to react quickly to changing airflow requirements and maintain the room pressurization.

2.04 AIR DEVICES

- A. Interior and general supply air ceiling devices shall be aluminum Omni directional square panel face diffusers are to be used for offices, conference rooms and support spaces.
- 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. Provide laminar flow diffusers (TAD) or fan filter units (FFU) equipped with 99.99 percent or MERV 19 filters where required to trap particles of $<0.3 \mu\text{m}$. These filters are to be used in the diffusers for critical laminar flow spaces locations, and also where BSC II recirculation cabinets are also being used.

2.05 DUCTWORK

- A. AHU's and associated ductwork serving these spaces shall be once-thru. There will be no return air duct.

PART 3 - SPECIAL CONTRACT DOCUMENT REQUIREMENTS

3.01 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.

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PART 4 - PRODUCTS

4.01 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
	20070101	Initial Adoption of Element	
Rev. 1	20120908	Included sustainability requirements throughout document based upon TGCE's evaluation. (Paragraphs 2.02A; 2.02 B; 2.02 C; 2.02 C 7; 2.02 C 9; 2.02 D; 202 E; 2.03 A; 2.03 B & 3.01 B)	JCD
Rev. 2	20010916	Revise 1.10.B. added motor requirement, 2.01 D. deleted the statement about 7.5 hp motor minimum size for VFD	PDN
Rev. 3	20130725	Revised 2.01 C, D, to clarify the 30 ACH and G., also 2.01 B. and G.10 to include bi-polar ionization to remove bacteria from air.	GSN & PDN
Rev. 4	20181023	Comprehensive revision to include USP 797 and 800 criteria	EYP
Rev. 5	20190301	Reissued with Owner Design Guideline Renewal 2019	FPDC

END OF ELEMENT D304104