Terminal HEPA Filters and Housings and USP 797 Guidelines
January 20, 2020
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ABOUT ME

- Graduated The Ohio State University in 2000 with a BS in Biology with a specialization in Immunology
- 15+ years of experience in Biosafety and Containment Systems
- Worked at Camfil since 2011
- Currently Life Science Segment Manager
- Live in Central Ohio
Agenda: Life Science HEPA Filters and Housings

- **Background on USP 797**
  - Requirements in Current 2008 Version
  - Proposed Changes for 2019 Version
  - Current status of USP 797 2019
  - USP 800 2019 Hilights

- **Terminal HEPA Options**
  - Disposable HEPA Terminal Diffusers
  - Basic Terminal HEPA Housing features
  - Fully Configurable Terminal HEPA housing features
  - Fan powered HEPA housing options
USP 797 BACKGROUND

- USP 797 was first published in 2004.
- Current version was last revised in USP31-NF26 Second supplement on June 1, 2008.
- Current version is "Official" and enforceable.
- Current revision was released on June 1, 2019.
- Current revision was to become "Official" December 1, 2019 in USP NF 37.
- USP 797 2019 is currently postponed indefinitely.
CURRENT USP 797 – 2008 GOALS AND REQUIREMENTS

- Objective of USP 797 that pertain to Environmental controls
  - “The objective of this chapter is to describe conditions and practices to prevent harm, including death, to patients that could result from Microbial Contamination”
  - Provides minimum quality standards for drugs and nutrients based on current scientific information and best practices
  - Must prove any deviations are equal or superior with proof
CURRENT USP 797 - 2008 HEPA FILTERS

- HEPA-filtered supply air shall be introduced at the ceiling,
- Returns should be mounted low on the wall,
- ISO 7 areas must have 30 ACH unless they are recirculating (greater than 15)
- Laminar flow should be maintained with velocity at 40 fpm
- HEPA filters should be MPPS tested
  - Requires IEST Class J or K
  - No 99.99% on 0.3 micron
  - Testing to occur at factory AND again in-situ (after installation)
- Ceilings should be cleaned monthly including HEPA filters
CURRENT USP 797 – 2008 DEFINITIONS

- Ante-area is an Iso Class 8 or better area where the following occur
  - Hygiene and garbing
  - Staging of components
  - Labeling
- Goal is to perform high-particulate generating activities away from critical areas
- Provides a pressure buffer from clean to dirty areas 0.02” w.g. positive relative to surrounding Pharmacy area
- No food or drinks in these areas
Biological Safety Cabinet
  - Downward Laminar Flow
  - HEPA Filtered air
  - HEPA filtered Exhaust optimally vented outside
  - Typical product preparation area
  - Cannot be the “Sole-Source” of HEPA filtered air
  - Negative Pressure relative to room so air flows inward (optimally 0.01” w.g.)

Goal is to provide a critical area to preform the compounding

Often considered the Critical Area, Primary Engineering Control or Direct Compounding Area
CURRENT USP 797 – 2008 DEFINITIONS

- Buffer area or Cleanroom
  - Dedicated area ISO 7 or better
  - Area where primary engineering controls is physically located
  - Preparation and staging of components for compounding
  - Positively pressurized 0.02”-0.05” w.g. to Ante area
  - Windows must be sealed
  - Sinks may not be located in this area
  - Microorganisms are monitored
- Terminal HEPA units are required here
- Goal is to provide a Clean area to surround the Critical area
CURRENT USP 797 - 2008 CERTIFICATION

- Initial Startup and every 6 months or sooner (in case of identified problems) for the following preparations:
  - Hazardous Drug Preparations
  - Environmental sampling for viable and non-viables
  - Pressure differential monitoring
  - Certification of equipment and facility
Effective January 1, 2017, The Joint Commission launched its new Medication Compounding Certification program for all compounding pharmacies.

- Evaluate a pharmacies compliance with standards that were based off the sterile and non-sterile compounding requirements issued by the USP in its chapters <797> and <795>

- Onsite review conducted at least once every two years

- The program has been developed to recognize organizations that demonstrate excellence in medication compounding through a combination of standards compliance for both Joint Commission standards for medication compounding and the USP standards.

- This program is open to all organizations performing medication compounding.

- Program is Voluntary
PROPOSED CHANGES - CONSTRUCTION

- Removal of instruction on Administration of Pharmaceuticals
- Movement or radiopharmaceuticals to a separate chapter 825
- Will require ISO 7 Positively pressurized buffer room instead of currently unclassified space
- Will require an ISO class 8 Anteroom with clear separation

<table>
<thead>
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<th>ISO classification number (N)</th>
<th>Maximum concentration limits (particles/m³ of air) for particles equal to and larger than the considered sizes shown below (concentration limits are calculated in accordance with equation (1) in 3.2)</th>
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</tr>
<tr>
<td>ISO Class 9</td>
<td>3 620 000</td>
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NOTE: Uncertainties related to the measurement process require that concentration data with no more than three significant figures be used in determining the classification level.
PROPOSED CHANGES - AIR REQUIREMENTS

- Will require clearly defined Air Change rates
  - Greater than 30 ACH for Buffer Room
  - Greater than 20 ACH for Anteroom
  - Buffer rooms cannot contain Water sources
PROPOSED CHANGES - CERTIFICATIONS

- Room will need to be certified bi-annually
  - Certification includes Airflow testing
  - HEPA integrity test (Scan test)
  - Total particle count testing (room ISO level)
  - Smoke Visualization studies (Laminarity)
  - Viable Air Sampling Maintained

- A webinar on the changes is available online at [http://www.usp.org/compounding/general-chapter-797](http://www.usp.org/compounding/general-chapter-797)
CURRENT STATUS OF USP 797

September 23, 2019 USP Issued the following notice:

- “USP is postponing the official dates of the revised <795> and <797>, and the new general chapter <825> until further notice.”

- USP 797 2019
  - Currently postponed
  - What was appealed:
    - Beyond-Use Date (BUD) provisions in <795> and <797>
    - Removal of Alternative Technology provision from <797>
    - Applicability of <795> and <797> to veterinary practitioners

- USP 800 2019
  - Was not appealed
  - Has references to USP 797 2019 that make it “Informational” at this time and non-mandatory
  - USP urges that designers and Hospitals follow the standard in the interest of “advancing public health”

- A detail of the release is available online at https://www.uspnf.com/notices/compounding-chapters-postponement
CURRENT USP 800 HIGHLIGHTS

- Applies to Hazardous Drugs as defined by NIOSH
  - Storage areas must:
    - Be Negatively Pressurized
    - Directly Exhaust Air outside
    - Maintain 12 ACH for Non-sterile Compounding
    - Follows guidelines of USP 797 for Sterile Compounding
- C-Pec is equipment in which a drug is made (Containment Primary Eng. Ctrl.)
  - Should be externally vented
  - May be counted in ACH totals if it runs at all times
- C-Sec is the surrounding Cleanroom (Containment Secondary Eng. Ctrl.)
  - Physically separated from surrounding areas
  - Negative pressure of 0.01"-0.03" w.g. relative to surrounding areas
  - Have at least 12 ACH
TERMINAL HEPA OPTIONS

- Discussion on the types of products available to meet USP 797 with respect to Terminal HEPA filters
- Review or requirements
  - HEPA-filtered supply air shall be introduced at the ceiling,
  - Laminar flow should be maintained with velocity at 40 fpm
  - HEPA filters should be MPPS tested
    - Requires IEST Class J or K
    - No 99.99% on 0.3 micron
    - Testing to occur at factory AND again in-situ (after installation)
  - Ceilings should be cleaned monthly including HEPA filters
What type of HEPA housings should be used

Cheapest option

- Disposable HEPA Diffusers
  - Replace entire unit each time
  - Typically lowered into T-Bar ceilings

- Lowest Initial Cost option but high maintenance cost
- Difficult to test units individually
- Caulked back plate with collar
What type of HEPA housings should be used

Next step up
- Value focused terminal HEPA filter with housings without integrated testability
- Housing is permanently installed and filter is replaced from room-side
- Center port for Damper adjustment
- Lower filter cost but higher initial cost
- Caulked Extruded Aluminum housing
What type of HEPA housings should be used

Preferred option

- Fully welded terminal HEPA filter housing without integrated testability
- Housing is permanently installed and filter is replaced from room-side
- Grille Protects filter from damage
- Lower filter cost, upkeep cost, and testing cost, but higher initial cost
What type of HEPA housings should be used

Preferred option Continued

- Quick Connections for fast movement from unit to unit for testing
- Qualified test ports for IEST standards
- Maximizes online time for Pharmacy rooms
Removable Grille

- Flush, concealed, & hinged grille
  - Quick and easy to open
  - Smooth room-side surface
  - Easy to clean
  - No components to lose
  - Rapidly removed if needed

Advantages: The Pharmaseal comes with a flush mounted, hinged safety grille constructed of stainless steel. The concealed grille ensures protection of the filter and internal components and has a 40% open area face screen with a 2B finish. The grille has solid border with no sharp edges.
What type of HEPA housings should be used

Fan powered option

- Fully welded terminal HEPA filter housing with integrated testability
- Housing is permanently installed and HEPA filter is replaced from room-side
- Grille Protects filter from damage
- EC and Rheostat Controlled Motors are most common
- Work well when there is no available supply air from AHU
Questions?