

Test Your IAQ (indoor Air Quality) IQ

Following are the answers

1) What is ASHRAE's* minimum MERV rating recommended for recirculating HVAC systems in non-healthcare facilities?**

- A. MERV 11
- B. MERV 13
- C. MERV 14
- D. MERV 15
- E. MERV 17

The correct answer is B – ASHRAE recommends the equivalent of MERV 13 and HEPA filtration for non-healthcare and healthcare facilities, respectively.

2) Which of the following can reduce the risks of disseminating infectious aerosols in buildings?

- A. Air distribution patterns
- B. Differential room pressurization
- C. Personalized ventilation
- D. Controlling temperature and relative humidity
- E. All of the above
- F. B and D only

The correct answer is E – All of the methods listed can help to dilute the concentration of infectious aerosols. Typically, no single method outperforms a combination of them.

3) To minimize aerosol concentrations, it is worth considering manually increasing outdoor air ventilation to 100% in non-healthcare facilities when:

- A. Outdoor air temperature is between 50° and 90°F
- B. The level of infectious aerosols is high
- C. Indoor and outdoor conditions permit
- D. The humidity level falls below 45%
- E. All of the above
- F. None of the above

The correct answer is C – This is an application of the old saying, “The solution to pollution is dilution.” Maximizing the intake of outdoor air is a sure way to dilute infectious and other matter contained in indoor air. Unfortunately, increasing outdoor air will increase HVAC system load on as well as energy consumption.

4) The effectiveness ultraviolet germicidal irradiation (UVGI) in inactivating or killing infectious aerosolized pathogens can be affected by:

- A. Lamp (light) intensity

- B. Dwell time
- C. Temperature
- D. Humidity
- E. Airflow (CFM)
- F. All of the above

The correct answer is F – There are many factors to consider when applying UVGI in any arrangement including ductwork, upper-room, etc.

5) Which of the following are widely used for particulate removal?

- A. Upper-room UVGI
- B. Chemical disinfectants
- C. Vaporized hydrogen peroxide
- D. Pulsed xenon
- E. All of the above
- F. None of the above

The correct answer is F – None of these technologies would be used solely for particulate removal. In some cases they have nearly zero effect reducing particulate, however they might all be considered for the inactivation or destruction of airborne pathogens.

6) HEPA filters were first developed in the 1940s to minimize the spread of:

- A. Poisonous gas
- B. Bacteriological agents
- C. Radioactive contaminants
- D. Smoke particles
- E. All of the above
- F. None of the above

The correct answer is C – HEPA filters were first used to contain airborne radioactive particles for the Manhattan Project. They provide a high degree of removal of airborne organisms such as viruses and bacteria as well as particulate such as smoke, dust and dander. They have very limited effectiveness on gaseous contaminants such as VOCs and poisons.

7) Which of the following techniques are used to control the spread of airborne pathogens in healthcare settings?

- A. Positive pressure
- B. Negative pressure
- C. Neutral pressure
- D. A & B
- E. All of the above

F. None of the above

The correct answer is E – The choice of room pressurization is highly dependent upon the type of patient. Positive pressure rooms are generally used to protect patients from airborne pathogens. Negative pressure rooms are generally used to protect facility occupants from infectious patients. Neutral pressure is used for common areas.

8) When considering a portable HEPA air filtration unit, which are the most important characteristics?

- A. Fan motor size
- B. Location of inlet and exhaust openings
- C. Size of the HEPA filter
- D. Exhaust air volume flow and distribution
- E. All of the above
- F. None of the above

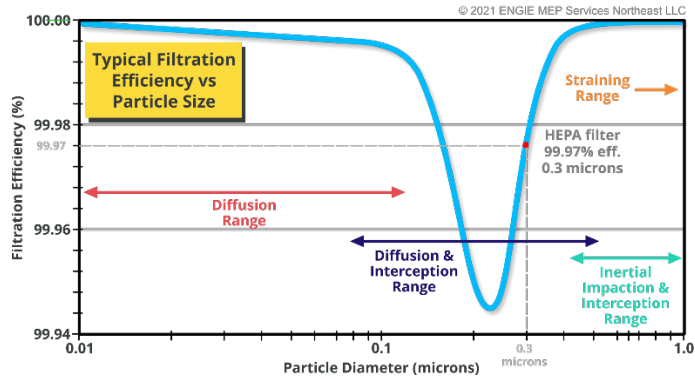
The correct answer is D – The quantity and distribution of air from a portable air filtration unit is most important. If air is not adequately mixed in all parts of a room, the filtration process will be compromised.

9) HEPA filters are very poor at removing particles smaller than 0.3 microns in diameter: True or False?

The correct answer is False – HEPA filters remove particulate using four different mechanisms:

- Straining/sieving: Straining occurs when the particle size is larger than the mesh size of the filtration media
- Inertial impaction: Larger particles with sufficient inertia become separated from the airflow path through the filter media and end up colliding with the media
- Interception: Particles are intercepted when they make physical contact with filter media and have insufficient inertia to escape from the media
- Diffusion: Diffusion is the primary filtration mechanism for particles ≤ 0.1 microns. Being so small, the random path of these particles is caused by collisions with air molecules which leads to a high percentage of the particles colliding with the media

The graphic shows how a typical HEPA filter has a minimum efficiency for particles around 0.2 microns, but that the filtration efficiency increases for smaller particle sizes.



10) A mechanical air filter's overall effectiveness of reducing particle concentrations depends on which of the following factors?

- A. Filter efficiency
- B. Airflow rate
- C. Particle size
- D. Location in the HVAC system
- E. All of the above
- F. None of the above

The correct answer is E – While all of the listed factors affect an air filter's efficacy, others such as humidity, vibrations and other airstream contaminant chemistry may also have an effect.

* ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers

** MERV - Minimum Efficiency Reporting Value