I. Ultraviolet Light

a. **Summary**: After consulting with expert mechanical, electrical and plumbing (MEP) engineering firms, Modus has elected to utilize ultraviolet germicidal lights (1) within the HVAC system and (2) exterior upper air UV light fixtures to kill or deactivate bacteria and viruses within small airborne particles that may cause infectious diseases [1].

b. **Ultraviolet germicidal lights:** Ultraviolet germicidal lights produce short wavelength light that can damage the genetic material in the nucleus of cells of microorganisms such as bacteria and viruses.

c. **UV germicidal irradiation (UVGI):** UVGI can kill these cells or make them unable to reproduce.

d. **Two approaches**: UVGI can be incorporated into office settings in multiple ways. Modus is utilizing UV lights in two specific ways to maximize the killing or inactivation of bacteria and viruses within small airborne particles.

e. **(1) In-duct UVGI:** Modus has incorporated UV lights in the duct systems. In-duct UVGI is designed to disinfect air as it passes through the HVAC system and before it is recirculated or exhausted[2].

f. **(2) Upper Air UV Lights**: The second UV approach Modus is utilizing is upper air UVGI wall-mounted fixtures[3].

- Upper-room UVGI wall-mounted fixtures are designed for use in occupied rooms without using protective clothing and use wall-mounted, shielded UVGI fixtures to confine the germicidal radiation to the entire room area above people's heads[4].
- Studies have shown that the peak germicidal wavelengths fall between 265 nm and 270 nm[5]. Typical UV generating lamps produce 254 nm UV-C, which is very close to the peak[6]. UV-C is very effective at inactivating viral, bacterial, and fungal organisms by destroying the molecular bonds that hold their DNA together[7].
- Because the COVID-19 virus is so new, the scientific community does not yet have a specific deactivation dosage[8]. However, the scientific community does know the dosage values for comparable viruses in the same SARS virus family are 10-20 mJ/cm2[9]. Using direct UVC light at a wavelength of 254nm; this dosage will achieve 99.9% disinfection (i.e., inactivation) under controlled lab conditions[10].

[1] Lawrence Berkeley National Laboratory, Using Ultraviolet Germicidal Lights for Air Cleaning, https://iaqscience.lbl.gov/air-uv.

[2] Nicholas Reed, US National Library of Medicine, NIH, The History of Ultraviolet Germicidal Irradiation for Air Disinfection, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2789813.

[3] Id.

[4] Id.

[5] 2019 American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) HVAC Applications Handbook Chapter 62: Ultraviolet Air and Surface Treatment, www.ashrae.org/covid19.

[66] Id.

[7] Id.

[8] International Ultraviolet Association (IUVA), https://iuva.org/iuva-covid-19-faq.

[9] Id.

[10] Id.

MODUS VIVENDI

II. MERV 13 Filtration System

a. **Summary:** After consulting with expert mechanical, electrical and plumbing (MEP) engineering firms, Modus elected to upgrade the standard building filtration system to better combat the circulation of bacteria and viruses within small airborne particles that may cause infectious diseases**.** Specifically, Modus has elected to upgrade from the MERV 8 system that is frequently used in office settings to the MERV 13 filtration system. The MERV 13 filtration system is often used in hospitals and is more efficient relative to the MERV 8 system with respect to "catching" a higher percentage of "smaller" particles – these "smaller" particles include respiratory droplets that are typically 5-10 microns in size[11].

b. **MERV rating system:** The Minimum Efficiency Reporting Value (MERV) rating system is used to evaluate the effectiveness of air filtration systems[12]. The MERV rating system is used to specifically evaluate how effective air filters are at catching particles of different sizes[13].
   - Fundamentally, the higher the MERV rating, the higher the filtration capabilities are relative to capturing the smallest of particles.
   - MERV ratings range from 1 to 20 with 20 being the highest[14].
   - MERV 16 through 20 ratings are typically only found in hospitals and nuclear power plants[15].
   - There are twelve (12) differently sized particles ranging from 0.30 to 10 micrometer or micron[16]. A micron is one ten thousandth (1/10,000) of a centimeter; for context, human hair is 50 microns[17].
   - The National Air Filtration Association (NAFA) divides the differently sized particles in twelve (12) groups and these are further divided into three different ranges: E1, E2 and E3[18]**.**
   - E3, the largest particles of the three groups, includes respiratory droplets and encompasses particles sized 3.0 to 10.0 microns[19]. E1 includes the smallest particles sized 0.3 to 1.0 microns; E2 includes particles sized 1.0 to 3.0 microns, and

c. **MERV 8 vs. MERV 13:** MERV 8 is typically used in office settings and MERV 8's capture rate or "arrestance rate" relative to E3 and E2 particles is 70% and 20%, respectively[20]**.** As specified by NAFA, to be designated as MERV 13, a filter must successfully remove at least 90% of E3 particles, 85% of E2 particles, and 50% of E1 particles[21]. Modus will be utilizing a MERV 13 filtration systems thereby significantly increasing the capture rate of E3 particles- which includes respiratory droplets- relative to the standard MERV 8 option.

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[11] American Society for Microbiology, COVID0-19 Transmission Dynamics, April 20, 2020, https://asm.org/Articles/2020/April/COVID-19-Transmission-Dynamics.

[12] National Air Filtration System (NAFA), Understanding MERV- NAFA User's Guide to ANSI/ASHRAE 52.2, https://www.nafahq.org/understanding-merv-nafa-users-guide-to-ansi-ashrae-52-2.

[13] Id.

[14] Id.

[15] Id.

[16] Id.

[17] Id.

[18] Id.

[19] Id.

[20] Id.

[21] Id.

MODUS VIVENDI

III. Indoor air quality monitors

a. **Summary:** IAQ monitors (indoor air quality) are critical in monitoring indoor air quality because (1) they provide feedback regarding how the HVAC systems is capturing certain airborne particles and (2) this feedback is important in informing landlords steps they can take in reducing CO2 and VOCs (volatile organic compounds) in indoor air[22]. IAQ monitors include sensors that alert one when VOCs, CO2, etc. in the indoor air rise to a problematic level[23].

b. **AWAIR Omni:** The AWAIR Omni (Omni) monitor tracks the toxins and chemicals and specifically provides metrics for seven (7) environment-related issues: (1) CO2 (2) VOCs (3) Fine Dust (4) Humidity (5) Temperature (6) Ambient Light and (7) Ambient Noise[24]. The Omni provides real-time sensor readings and alerts to both a mobile app and easy-to-read dashboard when CO2, VOCs, etc. are high[25]. With the real-time feedback from the Omni, landlords have the necessary knowledge to take decisive and quick steps to rectify any indoor air quality situation[26].

[22] Shenging Sun et al, Indoor Air-Quality Data Monitoring System: Long-Term Monitoring Benefits, U.S. National Library of Medicine National Institutes of Health, September 25, 2019, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6806626.
[23] Id.
[24] Awair Omni, https://www.getawair.com/business.
[25] Id.
[26] Id.