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## **STERILYFT – INFORMATION WRITE UP**

UVGI (Ultraviolet Germicidal Irradiation) has been a researched, trusted and practiced process for decades on the use of UV light as a germicidal disinfectant. The effect of sterilization of surfaces, air and water have been proven extensively for its use in surfaces cleaning such as medical facility room and equipment disinfection, portable type systems for disinfection of rooms and tools, public area disinfection with robotics and even in household used hand held wands or enclosed units for sterilization of tools like manicure equipment and even personal cell phones. UVC is also used extensively through out the world as a sterilizing process to clean filtered wastes, sewage, and even public water supplies with its superior means of bacterial and viral killing power. UVC is also used in the sterilization and purification of air with the use of in duct units for large and small HVAC systems by utilizing in duct lamp placements or even manufactured filter size coil devices to introduce the irradiation to the supplied air for public occupied spaces, specifically sterile hospital environments, medical facilities, office spaces, public areas and even private homes. Air sanitization with UVC has even made it into smaller portable devices like room purifiers for residential rooms, houses and small office spaces. With this already being a widely utilized tool in the fight against infection, and for cleaning of areas where the public may be, the question needs to be asked of...why not in an elevator?

In late 2019 and now continuing into 2020, today and beyond, we as one world have suffered from a pandemic in Covid 19 that has proven to all the importance of our advancements in the cleaning, sterilizing and infectious control within our world, countries, cities, homes and places of public assembly. With the rapid spread and resulting unfortunate illnesses and deaths incurred around the world, there can be no other conclusion reached after we've been able to hopefully treat or vaccinate for this particular virus then, prevention is the ultimate weapon against all illnesses. As the medical industries around the world work tirelessly to discover, develop and create medicines, treatments and vaccinations for this virus, it is our job (the technical community and the engineering community of public reliant services such as elevators) to work to help prevent pandemics like this in any way possible within our abilities. Our fears, suffering and risks not yet over, as we move to the un-pausing of our lives and economies, we are never at more risk then we will be when moving back in to what will be "the new normal".

Our current pandemic, bringing life as we know it so far to a halt, has a new soon to come problem. Once closures are lifted, restrictions eased and the economy set back in motion, there will be a rapidly increasing surge and need to get as many people back to work as possible all over the world and in our great cities. People that will (especially in our cities with high rise multi tenant commercial spaces) find a new effect of Covid 19's battle. The issue of, how do we social distance , staying 6 feet apart, when we enter crowded rush hour building lobbies, hallways, elevator bank foyers and inside a very small elevator enclosure by comparison to these new guidelines? The reality of this issue will be very quickly seen in a step by step catastrophe of: elevators ca only accept a small number of people to safely travel with social distancing (most buildings we have discussed this with mention a four corners approach, or 4 people), flowing into an ever building back up in the elevator foyer once through very often a security access point where social distancing here will quickly become an issue, backin up into the building lobby, blocking then flowing through the lobby entrances and out on to the sidewalks

and streets. All within minutes at very large capacity office towers, and all multiplied by the fear, anxiety and frustration of the public as they soon realize that they may be adding a new hour plus long commute component to their daily life in getting to and from work. Buildings will then be introduced in to new needs of security coverage and will find out quickly that any intentions or plans of increased manual cleaning or sanitizing has now become increasingly difficult when navigating crowded areas or, in now asking extremely anxious and upset tenants to move or reposition so cleaning can be done. Once this nightmare comes to an eventual end (only to expect the same the next business day), realization that the issue will now transition to every occupied floor at the rush hour home sets in. Also, as if not terrifying enough in logistically trying to figure out how to handle this new “normal”, the question of how to handle or enforce inter-floor travel and building traffic throughout the day for outside visitors, deliveries, etc can only be handled, with respect to sanitizing and enforcement of social distancing, would to be permanently in each elevator, at all times to attend and enforce. This solution quickly becomes a realization that this approach now compounds the issue by decreasing the already stressed capacity by 1 less. All of this though paling in comparison to the overall most imperative issue. The issue of, how do we sanitize the most unsanitary area of the building? The never stopping, relentlessly demanded upon elevator?

Now I hear everyone saying “but, there’s already an exhaust fan in there! It will remove the air and viruses, right”? Unfortunately, not really. A standard exhaust fan on an elevator only operates at a typical max speed of about 335 to 375 CFM. This rate only would draw about one exchange per minute but, only at certain times. The issue is that being open to the shaftway, it is also open to the shaftway pressures. When the car is moving in the up direction, the fan would be rendered virtually useless (or counterproductive) as the pressure created by the moving elevator in the shaft would match or exceed the dynamic pressure created by the fan. Additionally, the natural ventilation (Code required base ventilation, sometimes not seen but definitely there) is also open to the shaft. This means that at rest and, amplified by baffles, would draw the shaft air back in to the car when in the down direction. This being said, the only time the standard exhaust fan is truly doing anything to provide clean air in the elevator is when the elevator is at rest and with the doors open. In that brief period, some air from either the lobby or from a floor landing is drawn in to the car. Of course, this is until the doors close and the car moves, which then pours the shaftway air back in.

All these issues above and all their problems contemplated, we have looked to develop a safe, simple way of helping out. A way of not only making the elevator a healthier environment but also to give an option of whether or not to restrict the capacity of the elevators to less than half in most cases of larger more demanded upon buildings. Something based on valid principles, scientifically validated processes, proven functionality and with a familiarity of current systems as well as easy to install and service. After extensive research, engineering, development and prototyping, we have developed for production Sterilyft as our first elevator sanitization system.

Sterilyft is based upon several already tested and proven principles currently in use today in other imperative areas. UVC irradiation for sterilization purposes, high efficiency filtering of air of air borne particles and contaminants, use of forced air to circulate public air for the intention of filtering, cleaning and providing fresh air all have been systems in place, in many different industries and applications, all over the world and for years (or even decades). WHY NOT IN ELEVATORS? Nowhere in a building is there a more widely used, crowded, unable to

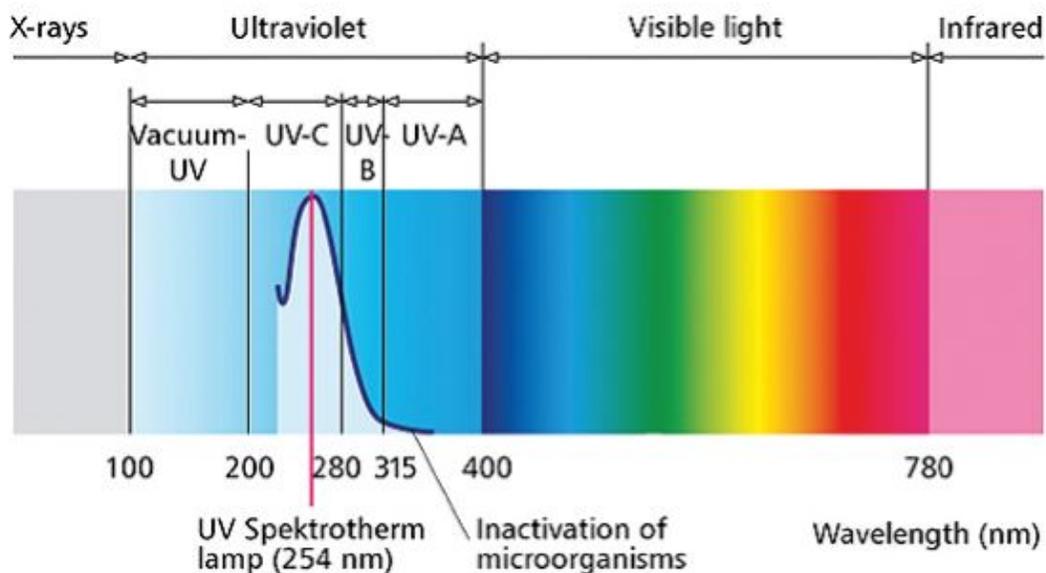
be periodically cleaned and sanitized, or more vital component to a building's systems than an elevator. If people don't get up to where there going, work doesn't get done. If people can't get down from where they are, it is an extremely dangerous hazard. Sterilyft is a choice to improve your elevator system. A tool to help protect the public. A solution to sterilization of a constantly occupied area. A means to harness multiple technologies, procedures and medicallly utilized sterilization techniques to help make the elevator a healthier, safer environment.

Sterilyft's principle design is similarly based on the same principles of hospital sterile room technologies. Air within a space is forcefully drawn to the ceiling above and away from occupants by negative pressure (draw) into an enclosure outside of public use or contact. High efficiency filters are used to cleanse the air of debris, pollutants and assist in removal of germs, bacteria and viral microorganisms. In our development, we've chosen MERV (Minimum Efficiency Reporting Value) 13 rating which screens the air current to .3 microns which by HVAC filtering standards removes Lint, dust, pollen, dust mites, mold spore, pet dander, smoke, smog, cough or sneeze airborne droplets, bacteria and virus carriers.



Use of a filter to this higher standard provides the initial service of maximum filtering of the air entering the sanitizing chamber of our unit system. This ultra fine screening also serves to trap or slow sub micro organisms (such as some viruses and bacteria) that are less than .3 microns will be able to pass through however, the movements of navigating through the filter tends to slow the particle within the suspension of the air flow. This is crucial to our next step in air cleaning.

The next step of our air cleansing is sanitization utilizing UVC light or UVGI. This process introduces the entire volume of air and all components passing through the area to germicidal UV radiation. UV is broken down in to 4 wave length categories of the invisible spectrum of light. UVA from 400 nm (or nanometers) to 310 nm, UVB from 315 nm to 280 nm, UVC from 280 nm to 200 nm and vacuum UV from 200 nm to 100 nm. Vast scientific study has found that the range of UVC radiation has special detrimental effect in inactivation of germs, bacteria and viral microorganisms.



Study has shown that UVC light radiation (our germicidal UV) specifically centered to most effective at 254 nm, has a profound effect on DNA. Without getting to scientific and boring to you the reader looking to just make the elevator safer, when UVC light at 254 nm is exposed to a cell or cellular organism, a photochemical reaction occurs with exposure to UV electromagnetic radiation emitted from the light source to where DNA is altered. Molecular lesions (cyclobutane dimers) are created in the DNA by production of thymine or cytosine bases virtually instantly under UVC strength (50 to 100 times per second). These lesions result in a condition known as polymerases (or the misreading in transcription or replication on a nucleic acid level) within the cell causing the molecule, cell and organism to be “inactive” or “dead”. As a natural occurrence, it must be noted that true sterilization or 100% disinfection can truly never be achieved due to processes know as photolyase nucleotide excision repair which is the cell repairing itself of UV damage). Hence, most commonly known 99.999% disinfection claims. Cyclobutane dimer occurrences in cells is extremely prevalent in microorganisms such as virus and bacteria that do not have a protective layering (or skin) such as humans with UV protective qualities. This same process is what causes melanomas and permanent skin damage in humans within the UVA and UVB spectrums. UVC, typically not exposed to by human skin) is far more

damaging to cellular structure. Though occurring naturally from the sun, UVC is blocked (thankfully) by the Earth's ozone layer and atmosphere otherwise, human exposure to direct sunlight would not be possible without complete skin coverage to block the radiation and eye protection to block UVC as the radiation would cause extremely serious corneal damaging or blindness.

All science aside, the damage to viral, bacterial and germ contaminants is valid. Validity to the point where UVC is currently in wide array use in multiple industries to disinfect or sanitize multiple focuses (including surfaces, water and air). Be it that the effect of UVC is based on strength of radiation and time of exposure, we've designed the system to remove the volume of air around the public inside the elevator as quickly and efficiently as possible yet, slow the air volume and trap between filters to maximize the amount of exposure.

Sterilyft, utilizes the HVAC technology of forced air and a semi-closed loop system, with the filtration technology of double MERV 13 filters and the germicidal effect of UVC radiation to help move air and contaminants away from the public, filter the air to maximum quality and disinfect to the best possible extent with the UVC source.

The simple system moves air at a calculated rate based on a 3500 lbs elevator at a rate of up to twice per minute. Typical 3500 lbs car (rounded to 7, x 6, x 8, for calculation) yielding 336 cubic feet was used in comparison to a 710 CFM maximum draw exhaust fan to pull the air in to the system chamber. This air speed is slowed throughout the enclosure (again to maximize filtering and UVC process effects) and then, through restriction of duct size in exhaust side of system, increased in speed being exhausted back in to the cab at the floor area. We've designed the system to utilize this forced air variable ducting process to help balance the intake and exhaust to assist in the best possible circulation of air and to maximize the negative pressure at the top of car.

Our Sterilyft system is designed for installation to be fast and simple. We've utilized standard flex duct connections at intake and exhaust side components to allow for placement of intake and exhaust to be liberal. 8' standard rigid flex duct at intake should allow for reaching to any point to the car for either intake. 200' of exhaust duct is included to reach exhaust location choices based on whatever current conditions are found. Our Sterilyft unit is designed to be mounted anywhere on the canopy as allowable or possible and, in the case of very small, tight or populated car tops; have developed additional mounting options available upon request to mount on adjustable stand over a component (such as the exhaust fan) and with minimal information can fabricate mounting provisions to mount to the car crosshead. Duct intake installation will entail choosing a section of canopy for install, cutting a 6" diameter hole in canopy (or as close as possible) and setting in place over the hole a start collar with two faced tape to hold in place until self tapping fasteners can be fastened in place to permanently hold the collar in place from on top of the car. Ducting will then be attached to the collar and fan unit with supplied flex duct and hose clamp retainers. The exhaust side is installed by selecting open areas where the registers (4 registers) can be installed in the base without conflict to any elevator or shaftway equipment. Slim line 1 1/2" diameter exhaust ducts can then be run down the side or rear of the cab connecting to the register boxes. We suggest an area opposite the intake to increase circulation effect of air in car and require a minimum 2" clearance from canopy to any shaftway obstruction. Once best drop location of the duct is chosen, four (4) 3" x 8" cut outs will be required in the base of the elevator below panels at the duct location. Through this opening, the

duct will be pulled to the back of the shell wall from within the cab and held temporarily with attached 2 faced tape. Utilizing the supplied stainless steel or bronze grill (depending on car metal preference), the duct is then fastened permanently to the car enclosure with fasteners through the grill from inside the car. The exhaust duct is permanently attached to car enclosure with attached bracket to top of canopy with supplied self tapping fasteners and secure straps are used to tie the duct work securely in place. Once flex duct is installed from exhaust of Sterilyft unit and exhaust duct with supplied hose clamps, the system is ready to be plugged into a 110V 3 prong (grounded) receptacle and begin filtering / disinfecting the car.

With supply of Sterilyft unit, all necessary ducting, attachments, hardware and filters with UVC lamp will be provided. In addition, we will include full installation, illustrated step by step instructions, warranty information as well as maintenance instructions with replacement part identifications and source information for components and consumables (such as filters and UVC lamps). We are additionally under construction of a website currently to access information, order points, view new product information, research results, performance results as collected, prospective and upcoming testing results. Additionally, UL submission and testing results on entire device to supersede component labeling as well as product presentation videos and installation tutorial video on how to install and maintain Sterilyft.

For contemplation of validity of installation, we suggest that the following be performed at a minimum as well as for the installation, knowledge updating and maintenance procedures for Sterilyft:

1 – A visual survey of top of car to determine where the unit will fit. With the unpredictability of top of car configuration with regard to exit size, exit location, fan location, other equipment location as well as requirements for clear exit access and refuge space, special attention will be needed to determine if alternate bracket or installation method is needed to mount Sterilyft over existing equipment or to the crosshead. We will have in stock several adjustable brackets and can make any customized bracket as needed to fit all or most situations to achieve Code compliant installation.

2 – It should be verified that proper 3” clearance is available from car canopy to shaftway obstructions. As the most popular configuration is side post type sling, the space existing for stile and rail location should be sufficient at most sides of car however, special attention will be needed to assure that any other obstructions would not conflict with ducting. Some items could be pit ladders, midway box, junction boxes, troughing, limits or travel cable loop areas.

3 – Ensure top of car has sufficient 110VAC grounded receptacle available and able to be dedicated to Sterilyft. Electrical requirement of unit is 75 Watt max consumption by fan in high position. Lamp being fluorescent requires little additional power (4 Watts) and operates on 110V as well internally from device

4 – Requests have been made, or inquisition if system can be on timer devices or a manual shutoff located for building personnel to shut down system outside of elevator. As these are a possibility, the actual installation of same would have to be performed by the installer. If installed by others, consultation to the wiring diagram within the system manuals will advise on how to wire in an auxiliary shut off or timer to the system if by pass of the on/off switch is preferred. As the unit contains safety device (micro switch) to turn off unit UVC in the case of removed cover to unit, extreme care needs to be taken to not override this necessary safety device due to inherent dangers of UVC exposure.

5 – With the handling of replacement components, being that the internal filters and light are in constant disinfection by UVC radiation, infection or risk of infection will be low or null. However, proper safety protocol for servicing, replacement of components and proper disposal of waste products should be followed. Time and care should be taken to review, prepare for and properly understand the written instructions and PPE suggestions of Sterilyft on the use, handling, maintenance and disposal of Sterilyft and its components.