

## 9.4 QUESTIONS and ANSWERS

The following are general guidelines for the operator of the unit. If any questions arise, please do not hesitate to contact Mechline or your Mechline dealer.

### 9.4.1 How do I know the HyGenikx unit is working?

Firstly, the green cross light indicator will be illuminated on the front of the unit to show the product is operating. After 12 months of use the built-in warning system will tell you when the lamp (and battery) requires replacement to ensure peak efficiency.

There will be a definite change in the environmental air quality. Internal environments that have a usual lingering background odour, whether from cooking/food, body odour, cleaning products, waste material, or a combination of these, will smell noticeably fresher. This change will be most obvious at the start of a working day, clearly demonstrating the unit is working.

Areas where it is easier to monitor performance are those with obvious odour issues, such as a washroom, changing room or bin store. Here, odours will be significantly reduced or eliminated completely.

### 9.4.2 How are your products different to fragrance units?

(General) They go far beyond odour control. Rather than masking odours they remove smells by targeting and killing the root cause, which is usually microorganisms. (Food) In food storage microorganisms are responsible for spoilage and the shortening of food life. Independent testing has demonstrated how we extend food life (specifically vegetables and soft fruits) by reducing the microorganisms. **Note:** *This unit is not to replace product "use by" date.*

### 9.4.3 What do they smell like? Is there a fragrance?

The absence of unpleasant background odours is usually the first thing customers notice. The 'smell' is described as "clean and fresh" and has often been likened to mountain air. No masking fragrances are used. **Note:** *Within the first 48 hours of use it is not unusual for the unit to produce a slightly metallic odour, this is caused by the lamp bedding in. This should dissipate within 48 hours.*

### 9.4.4 In addition to odours, what are the microorganisms that are reduced by this technology?

Bacteria, Viruses, Mould, Fungi. Multiple independent tests demonstrate the efficacy against the most prevalent of these including Listeria, E coli, Staphylococcus aureus, Staphylococcus epidermis, Aspergillus fumigatus, MS-2 Coliphage, MRSA and Clostridium difficile.

### 9.4.5 Does air need to pass through a unit to be sanitised?

No, our technology uses both internal and external processes so although contaminants passing through the unit will be sanitised, it also produces cleaning air which circulates throughout. This is why HyGenikx can cover such a large area.

### 9.4.6 Will units reduce bacteria on walls and surfaces or just in the air?

Cleaning air from the unit will target and reduce all contamination wherever the 'clean' air can reach. Test results show substantial reduction in both air and surface contamination in relatively short periods of time.

### 9.4.7 How would you explain your technology in simple terms?

The specialist Germicidal UV lamp combined with Titanium Dioxide catalyst cleaning plates eliminate any odours and harmful microorganisms drawn into the unit. The lamp also produces a purifying plasma (Plasma Quatro), which convects from the unit and circulates around the room sanitising the air and surfaces. Part of the process also has an ionising effect, which will reduce the amount of airborne dust and debris.

### 9.4.8 Can you explain your technology in more depth?

HyGenikx units are fitted with powerful dual waveband Ultraviolet lamps. A high-intensity broad spectrum ultraviolet lamp, with UVC 254 nm germicidal light wavelengths is the first part of photocatalytic air purification technology. A wider set of ultraviolet wavelength 185 nm are employed for catalyst activation. Although UV light alone will degrade toxic organic compounds, reaction rates are much faster with photocatalytic assistance.

The catalyst material in the HyGenikx [photocatalytic purifier] is Titanium Dioxide, TiO<sub>2</sub>.

Titanium dioxide is also a semiconductor. When a semiconductor is bombarded with light of certain wavelengths, electrons in the material's valence band are excited into the conduction band. This means they are free to move and their energy ends up splitting nearby water molecules into two parts, hydroxyl radicals and super-oxide ions. Free radicals are uncharged atoms or molecules with unpaired electrons. Unpaired electrons are highly reactive, so free radicals quickly engage in chemical reactions. Hydroxyl radicals are among the most powerful oxidizers in the world, stronger than chlorine, ozone, and peroxide, and also very short lived.

Superoxide is created by the addition of one electron to oxygen. This free radical has a relatively long half-life: less than one second.

Bacteria, viruses and volatile organic compounds (VOCs), are held together by carbon-carbon, carbon-oxygen or carbon-hydrogen bonds. Oxidizers destroy these bonds and fragment the molecule into smaller compounds which are broken down until only carbon dioxide and water are left.

A photocatalytic purifier can eliminate particles down to 0.001 microns from air, including the very tiny lung penetrating particles. Most HEPA air filters cannot remove particles smaller than 0.3 microns.

Pollens, dust mite allergens, pet dander, mould, bacteria, and viruses in the air, are on the list of items removed through Photocatalytic reaction. HyGenikx, incorporating this technology, can eliminate toxic gas VOC pollutants including formaldehyde, exhaust fumes, benzene, toluene, and odours like ammonia and hydrogen sulphide from our air.

- **Germicidal Irradiation** by dual UV light (Ultraviolet) kills microorganisms (bacteria, viruses and mould) by disrupting their DNA and removing their reproductive capabilities.
- **PCO – Photocatalytic Oxidation**, UV reacts with our Catalyst (TiO<sub>2</sub> Titanium Dioxide) to form highly reactive but short lived oxidising Hydroxyl Radicals (OH) which break down Volatile Organic Compounds (VOCs).
- Interaction of the Dual waveband UV with the TiO<sub>2</sub> heterogeneous catalyst both creates and breaks down Oxygen molecules transforming Oxygen into a highly reactive states of Ozone and Superoxide Ions which leave the unit as “**Plasma Quatro**”.
- **Plasma Quatro** is the gas energized by the high intensity UV light. It leaves the unit with the airflow and consists of a mixture of activated oxygen, triatomic oxygen and superoxide ions. These interact with each other giving a very efficient purification of the air and all exposed surfaces. Many times more efficient than ozone or UV light working alone.

#### 9.4.9 The unit produces ozone. Is this dangerous?

Whilst HyGenikx is not an ozone generator, a very small volume of ozone is released as a by-product of the combination of technologies used. This unique combination of technologies is guaranteed to both achieve results and be completely safe in operation. In every case the ozone levels present fall well below the lowest international safety levels worldwide (World Health Organization - 0.05ppm), as stipulated by EUOTA. This has been verified for all unit variations with independent laboratory testing carried out by “Odournet”.

We all breathe ozone, every day of our life, in fact what we perceive to be fresh air is approximately 0.013ppm of ozone.

If there was a thunderstorm nature would produce **between 0.3/0.05ppm** which gives us that nice fresh smell that follows.

Ozone (O<sub>3</sub>) is a form of oxygen. It is a colourless gas with a distinctive odour and is a normal constituent of the earth's atmosphere. It is about 1.6 times heavier than air (density 2.144 g/l). Ozone is produced naturally from oxygen whenever sufficient ultraviolet (UV) radiation or electrical discharges occur, for example at high altitudes or by the action of lightning. Such natural occurrences are unlikely to produce hazardous concentrations at ground level. The majority of ozone found near ground level is formed by photochemical reactions involving oxides of nitrogen and hydrocarbons.

**HSE UK - COSHH** – For areas of Continuous occupation – **HSE limit 0.1ppm**

**World Health Organization** – Continuous occupation desired level – **0.05ppm**

*Questions and Answers continued overleaf...*