NOVAERUS

Frequently Asked Questions

Contents

Frequently Asked Questions

Novaerus portable units are highly effective in any situation with an ongoing need to safely reduce pathogens that lead to infections and illnesses, mitigate odours and neutralise environmental contaminants in indoor air.

Our portfolio is unique in that it enables healthcare facilities to continuously safeguard individual people at the point of care or rapidly remediate the air in an entire room or space with powerful devices that provide high equivalent ACH or CADR in a cost-effective way.

Novaerus products are built using robust, reliable and sophisticated technology that offer high efficacy performance and medical electrical equipment certifications. Our technology has been shown to safely and effectively reduce bacteria, viruses, VOCs, and particulate matter in laboratory testing, clinical research and trials. It's these results that set us apart from the standard air purifiers on the consumer market today.

Within this document, we refer to the industry as air purification and our products as air purifiers, but it should be noted that we are focusing on the premium / high-end of the industry.

Disclaimer

The information contained within this document is designed to provide helpful guidance on some key queries that we have frequently received from our customers. Our intention is to provide updates to the document on an ad hoc basis – adding more FAQs as they arise.

As we continue to invest heavily in our market-leading research, and as the industry matures, there may be new findings that enhance our understanding of use cases, benefits, the total cost of ownership improvements, the life span of products etc. As such, we hold the right to make changes to the content of the document at any time.

1 | How many devices do we need per room?

There are currently two differing opinions within the ventilation and air purification industry of how a reduction in infection and other negative outcomes (sick building syndrome, illnesses, allergies etc.) due to contaminated air can best be achieved.

1. Air purification of the entire room or space
2. Air purification at the individual person level

The two points of view are very different, yet both are supported by powerful empirical research data that they can dramatically reduce HAIs, SSIs, sick building syndrome, allergies etc.

Air Purification of the entire room or space

1. The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) has championed the view that air contaminants need to be cleaned from an entire room or indoor space to reduce the risk of people acquiring infections.
2. Air Changes per Hour (ACH) is the key measurement used to determine the effectiveness of ventilation and air purification systems in reducing risk at room level.
   a. 1 ACH means the entire volume of air in a given space has been completely replaced in 1 hour
   b. In HVAC systems, the ACH is often accomplished with a mix of outdoor air and indoor air re-circulated through filters (e.g. HEPA in hospitals)
3. ASHRAE has developed ACH recommendations for HVAC system design parameters in commercial buildings, with hospitals having some of the highest recommended level of ACH figures e.g. a minimum of 20 ACH for an operating theatre (with at least 4 from outside air).
   a. These ACH design parameter recommendations are based on Wells-Riley formula which states the probability of infection through infectious droplet nuclei is inversely correlated to the ventilation rate (m^3/h).
4. ACH is now a well-understood term in the healthcare industry and as a result, the terminology has now crept into the stand-alone air purifier product sector of the medical device industry.
5. As the number of Air Changes per Hour is determined by the size of the room, device manufacturers often provide the efficacy of their air purification devices in terms of the efficiency at which the air is cleaned, measured as m^3/h or CFM.
   a. This allows the ACH for any given space to be quickly calculated
   b. In the air purification space, these m^3/h or CFM measurements are often termed equivalent Clean Air Delivery Rate (eCADR)

Air Purification at the individual person level

1. The American Conference of Governmental Industrial Hygienists (ACGIH) state that Air Changes per Hour (ACH) is a poor basis for the goal of reducing infections and illnesses.
2. Their attitude is that the focus should be on the problem and not the size of the room. As people are a major source of pathogens in healthcare environments, they recommend personalised ventilation/air purification as the best way to mitigate risk of infection and illness.
3. ACGIH advises that air purification technology be positioned in close proximity to the individual person at risk or to those who are contributing to the risk of others, targeting their breathing zone (respiratory infection) or body zone (wound SSIs). This provides the greatest benefit at the lowest cost; healthcare facilities will see a reduction in HAIs and SSIs and the individual will observe superior air quality however energy costs will be lower than ACH solutions that generally require large HVAC systems as part of their solution.
4. The Occupational Safety and Health Administration (OSHA) supports the ACGIH viewpoint and thus in industrial environments, they recommend solutions aimed at an individual and not the space or room.

With this base information, the following are the key steps required to determine device type(s) and quantity needed:

STEP 1: Determine Customer Attitude Towards Air Purification (room level or individual person level)

Novaerus is uniquely positioned in that it has a range of powerful solutions that can target both points of view. As each method has its own merits and is favoured by different groups, it is important to first talk to customers to determine which of the two attitudinal groupings they belong to.

If they have no preference, it is better to focus on quoting solutions that provide air purification focused at the individual person level as these provide a much lower total cost of ownership. This will provide a competitive advantage if quoting against a company offering solutions targeted at room level.

STEP 2: Determine Threat Level

Air purification is aligned to threat; the probability of attaining illness or infection from the air and the severity of illness or infection to the person when acquired. The higher the threat level, the more powerful the solution required to mitigate the risk.

The customer should provide guidance on whether the threat is high, medium or low. The threat level can be identified by reviewing the following:

1. The historic trend/number/percentage of patients acquiring HAIs/SSIs in the hospital or department
2. Any current macro threats at national level e.g. measles epidemic (USA), TB (SE Asia)
3. Impact of seasonal conditions on patient and staff e.g. flu or allergy season
4. The environment where the air purification device will be located - an operating theatre or ICU will have a higher threat level than a standard ward or nurses workstation.
5. The level of traffic in the environment – the more people moving through a room or space, the greater the risk
6. The health status of the patients in the environment - patients who are immunocompromised have a greater risk of attaining a HAI, staff working in an isolation room have a greater risk of getting sick from highly contagious patients.

7. How invasive a procedure is on patient - chemotherapy, radiation, minor surgery etc.
8. Current air purification technology – does the environment already have a HEPA filter in their HVAC system (low risk) or does it have no HVAC at all (high risk)?

STEP 3: Determine Size of Space for Solution

For room level, identify the volume of room or space to be treated (in m^3 or cubic feet). For example;

- <=16m^2 = small
- >16 m^2 and <= 32m^2 = medium
- Up to 50m^2 = large

For individual level

- Personal breathing zone (for protection against respiratory infections and illnesses)
- Full body/bed zone/staff workstation (for protection against wound infections, staff health and safety)

STEP 4: Determine Intended Usage

1. Continuous 24/7 Usage - Protection
   a. Fixed Installation
      - Wall mounted– unit mounted 2/3 up the wall
   b. Portable
      - Stand-mounted – 1 or 2 units mounted on a stand with wheels to allow movement to close proximity of the patient to enable decontamination of the breathing zone or bed zone
      - Tabletop mounted – unit placed on a patient locker or staff desk with a focus of decontaminating the breathing zone
      - On wheels*
2. Point in Time Usage - Rapid Remediation
   a. Portable
      - Stand-mounted
      - Tabletop mounted
      - On wheels*

*Defend 1050 only

This following table provides directional guidance for recommending device type and quantity, mapping attitude, threat level, size of space and usage. It is intended to help prepare quotations for the majority of customers who do not have specific requirements.

The guidance for device and quantities follows a conservative path to ensure we always exceed customer needs in line with application requirement.

If a customer has their own specific requirements, for example, a required number of ACH for a given space, then please contact Novaerus. We can help prepare a tailored response to the opportunity.

Air Purification Level	Threat Level	Size of Space	Usage	Recommended Product	Quantity
Individual Person Level	High	Breathing Zone	Continuous	Protect 800	2
		Bed Zone/Staff Work Station	Continuous	Protect 800	3
	Medium	Breathing Zone	Continuous	Protect 800	1
		Bed Zone/Staff Work Station	Continuous	Protect 800	2
	Low	Breathing Zone	Continuous	Protect 200	1
		Bed Zone/Staff Work Station	Continuous	Protect 200	1
Room Level	High	Large Room	Continuous	Defend 1050	1
			Point in Time	Defend 1050	1
		Medium Room	Continuous	Defend 1050	1
			Point in Time	Defend 1050	1
		Small Room	Continuous	Defend 1050	1
			Point in Time	Defend 1050	1
	Medium	Large Room	Continuous	Defend 1050	1
			Point in Time	Defend 1050	1
		Medium Room	Continuous	Protect 800	5
			Point in Time	Defend 1050	1
		Small Room	Continuous	Protect 800	3
			Point in Time	Defend 1050	1
	Low	Large Room	Continuous	Protect 800	2
			Point in Time	Protect 800	2
		Medium Room	Continuous	Protect 800	1
				Protect 800	1
			Point in Time	Protect 800	2
		Small Room	Continuous	Protect 800	1
			Point in Time	Protect 800	1

2 | Where to place your Novaerus device?

Protect 200

Protect 200

The Protect 200 was designed to be placed as close to the patient or staff member as possible. Place the unit on a bedside locker or workstation desk.

The non-invasive unit has a low noise level, emits no bright lights or harmful by-products and so is optimally designed for use in a person's personal breathing zone.

This unit offers low full life costs, using less power than a lightbulb and requiring almost no servicing. We recommend having one device per person as a cost-effective solution for infection control.

Protect 800

Protect 800

The Protect 800 was designed to be wall-mounted in close proximity to patient beds or staff working areas. Mount the unit approximately 2/3 up the wall to allow the unit to purify the air in the main breathing zone.

The Protect 800 can also be mounted on a portable stand to allow for closer proximity to the patient. This is ideal in situations where threat assessment is high, for example, to reduce the spread of infection from a highly infectious patient to others.

Defend 1050

Defend 1050

When operating in rapid remediation mode for a short-term cleaning cycle, place the Defend 1050 in the middle of the room. The unit can then be easily wheeled from room to room to enable treatment of multiple rooms with one device.

When operating continuously within a high-risk area that requires maximum air purification performance at all times to minimize threat, the Defend 1050 can be moved closer to the wall to ensure it is not intrusive.

In this use-case, guidance should be provided to the end user that the unit should never be positioned with the inlet vent tight against a wall. The unit should be positioned with the back side near the wall and the front side facing the room. The unit should be placed as close as possible to the main threat, for example, an operating table or isolation room bed.

3 How do Air Changes per Hour impact the effect of our devices?

Air changes per hour (ACH) is a measure of the number of times the total air volume in a room or space is completely removed and replaced in an hour. This terminology is typically used within the HVAC sector to indicate a system's highest operational performance level for a given room volume, which is important in understanding how quickly and efficiently a room will be ventilated, heated or cooled down.

ACH refers to the changing of air in the environment; bringing fresh outside air into the room and displacing the polluted indoor air. However, the air can be replaced with a combination of re-circulated air from inside room as well as the outside air. If the air is not decontaminated within the HVAC system by filtration and/or another air purification technology, contaminated air is just replacing contaminated air. As such, ACH is not synonymous with improved indoor air quality.

In surgery settings, where HVAC systems utilize HEPA filters, ACH does indicate more pure air replacement, however, this purified equivalent ACH is not the same as the airflow ACH value of the HVAC system. The figure depends on the filtration efficiency by the following formula:

ACH = HVAC Airflow × Efficiency of Filtration (or another air purification technology)

ASHRAE* provide guidance on minimum Air Changes per Hour requirements for key rooms within surgery and critical care. For example, a treatment room requires a minimum of 6 ACH and an operating theatre requires a minimum of 20 ACH. Please note these standards continue to evolve and thus the values are subject to change.

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

Novaerus portables are designed to actively kill and trap* pathogens in the air 24/7, instead of simply changing/replacing the air in a room.

The Protect range, including the Protect 200 and Protect 800/900, is designed for use as close to the patient or staff member as possible to continuously purify the air. These units safeguard the breathing space around an infectious or immuno-compromised patient to reduce the spread of infection.

The Protect units are non-invasive, with low noise levels and no bright lights or harmful by-products and offer low operating costs, using less power than a lightbulb and requiring almost no servicing. The units are optimally designed for protecting an individual or space, not for ventilating a room and so airflow is relatively low. For this reason, focusing on ACH is inapt for this range.

*if the unit uses filters, such as the Defend 1050

If a customer has a specific requirement to supplement the ACH of a currently installed HVAC system or achieve an ACH rating in a room without a HVAC system, the Novaerus Defend 1050 model can provide powerful air purification which can easily translate to purified equivalent ACH (peACH) for a given room volume.

peACH is the number of air changes per hour, for a given room volume, where100% of contaminants have been killed and/or trapped. Although the peACH comes from recirculating the internal air through the portable unit, it is as clean (or cleaner) than the air coming through HVAC, assuming it uses HEPA filters. The Defend 1050 peACH rating for a given room can be synonymous with ACH in that instance.

Some peACH ratings for the Defend 1050 are provided below for various room sizes:

Room Area	25m²	50m²	75m²	100m²
Room Height	2.4m	2.4m	2.4m	2.4m
peACH/ACH	14.8	7.4	4.9	3.7

Note: The US Centre for Disease Control states that if an air purification device is used to clear a room of air contaminants within a healthcare facility, it should provide a minimum of 2 Air Changes per Hour. The Defend 1050 delivers more peACH/ACH than this for all spaces.

4 How do Novaerus devices impact Laminar Air Flow?

Laminar Air Flow (LAF) is defined as air moving at the same speed and in the same direction, with no or minimal cross-over of air streams, or lamina.

Within the healthcare setting, a filtered, vertical laminar air flow is provided above an operating table with the aim of reducing the risk of surgical site infection (SSI).

Unlike in a laboratory or manufacturing setting where the laminar air flow operates within a full enclosure, in a healthcare facility, it operates as a virtual curtain. As such, the laminar curtain is subject to external pollutants from the hands of surgeons or nurses reaching into the LAF zone, scrubs or clothing of a person who leans in or surgery tools and equipment entering the LAF zone to perform surgery.

The laminar air flow is also subject to interference from staff bodies moving around and creating cross turbulence close to the patient.

It is important to understand that LAF in operating theatres can never be as perfect as in a full enclosure. Therefore, it is vital that all areas around the operating table that are not receiving laminar air flow are continuously purified. This ensures contaminants don't make their way into the LAF via the surgical staff.

It is important to note that the air coming from a Novaerus Defend 1050 is as clean or cleaner than the LAF air.

5 How does Novaerus technology work in negative/ positive pressure rooms?

Positive pressure rooms (e.g., operating theatres) and negative pressure rooms (e.g., isolation wards) are created by HVAC systems that have access to both internal (recirculated) and external (outside) air.

Novaerus devices are focused on treating the air in a room or space by means of re-circulation. As such,they do not impact either a positive or a negative pressure room.

6 Does Novaerus technology impact all pathogens in the same way?

Novaerus products Kill or Trap and Kill all pathogens including bacteria, viruses, mould spores, allergens and VOCs.

Novaerus plasma kill technology treats all pathogens the same. Upon contact with the electromagnetic field surrounding the plasma DBD coil, multiple physical reactions occur including electroporation, electron bombardment, oxidation and etching, leading to the physical distortion and deformation of the overall structure of the microorganism.

The filter trap technology captures two kinds of contaminants:

- particulate-like of various sizes ranging from 0.1 µm or less to 10s of µm
- gas-like

Particulate-like pollutants are trapped on the HEPA filter fibres. Gas-like pollutants are trapped inside the pores of the carbon filter.

This filter has a high efficacy; HEPA filters that adhere to EN 1822 standard must remove >99.95% of particulates in the air. Due to the different size and resilience of each airborne pathogen, the time taken to remove them from the air is different for each contaminant type/strain.

7 | What is the life span of the filters?

The life span of the filters will depend on how often the machine is in use, the fan speed setting and the environment it is being used in. We have outlined some estimations below:

- **Pre-filter** – 3 months

- **Carbon filter** – 4 months

- **HEPA filter** – 1 year (please use filter check)

Changing the filters as specified will help to keep the unit performing with high efficacy and extend the life of the components.

- The pre-filter removes large particles (>10 µm), preventing particle build-up on the fan, internal components and plasma coils, extending the life of these parts. Removing the large particles extends the life of the HEPA filter as it then only exposed to smaller particles (<10 µm).
- The pre-filter and HEPA filters combined remove most particulate, except for some of the smallest particles (< 0.1 µm) and gases. This prevents clogging of the carbon filter with particulate, allowing it to efficiently trap gases in its pores and ultimately extending its life span.

8 | How long will it take to treat the room?

The key to this question is what does treat mean?

Log Reductions

The log scale is often used in healthcare settings to describe the degree to which pathogens have been removed from an environment. Firstly, it is important to determine what level of reduction the customer expects.

The US Environmental Protection Agency (EPA) defines hygienically clean as log 2 reduction (99% of all contaminants removed), sanitization as log 3 reduction (99.9% of all contaminants removed), disinfection as log 5 to log 6 (99.999 – 99.9999% of all contaminants removed) and sterilization as log 6 reduction (99.9999% of all contaminants removed).

Next, we must consider the size or volume of the room.

The Novaerus Protect range is designed to continuously treat the air. As such, the devices should operate

24/7 in a hospital and during the normal working hours in admin buildings, etc.

The Defend 1050 is designed for rapid remediation. Research has indicated that it can achieve a log 3 air sanitization of *Staphylococcus epidermidis* within a 30 m^3 space in 15 minutes.

Note, personalised air purification can be as effective as room-level air purification. Therefore, it may be important to focus on placing the units as close to the person or problem as possible.

9 Are there any risks of interference with other equipment in the room?

Novaerus devices have been certified to IEC 60601-1 and IEC 60601-1-2 (medical electrical equipment). This means they have been proven not to interfere with any other equipment in a healthcare environment.

10 What is the expected lifespan of the device?

There are a number of factors that impact the lifespan of the device:

- Number of hours the device is operated in a 24-hour period*
- Number of days per year the device is operated*
- The type of environment/surrounding air quality
- Frequency of pre-filter clean or replacement
- Frequency of replacement of HEPA and carbon filters**

Each Novaerus product has a 2-year warranty period.

The design life/product lifespan of each device is up to 5 years.

* typically, the Protect units are run 24/7.
** for Defend 1050 device only

11 What is important in considering Total Cost of Ownership (TCO)?

Total Cost of Ownership Costs

- Initial purchase price
- Operational electricity cost
  - Cost = power consumption of device × time device is in use × cost of electricity (over a 5-year typical lifespan)
- Servicing cycle labour
  - Cost = cleaning pre-filter, replacing HEPA and carbon filters*
- Replacement parts*
  - A 5-year life period of operation accounts for 20 pre-filters, 15 carbon filters and 5 HEPA filters

Any conversations around the total cost of ownership should also include conversations on return on investment (ROI).

The cumulative financial benefits of air purification in healthcare will be much greater than the total cost of ownership of the products thus providing a compelling ROI.

*for Defend 1050 only

12 How can we indicate a strong Return on Investment (ROI)?

Return on Investment Benefits

Cost Reduction

- Fewer lawsuits related to patients who contracted HAIs and SSIs
- Fewer extended patient stays due to HAIs and SSIs
- Reduction in cost of antibiotics and other drugs required to treat HAIs and SSIs
- Reduction in cost of incision and drainage of a postsurgical site infection
  - This impacts revenue streams and productivity as the surgical suite and the OR team are required, so new cases cannot be scheduled.
- Reduction in cost of expensive isolation rooms for infectious patients
- Reduction in manual cleaning costs (labour and chemicals)
  - With Novaerus, pathogens are removed from the air 24×7, leading to less surface contamination and the removal of odours. This allows for longer cycle times between cleaning.
- Reduction in insurance premiums
  - Facility owned evidentiary reports to prove reduction in HAIs and SSIs as a result of air purification products

Productivity Improvement

- Reduction in staff absenteeism due to illnesses and infections contracted within the facility
  - Fewer requirements for high-cost contract staff or overtime to cover absenteeism
- Reduction in staff presenteeism due to well-being issues as a result of sick building syndrome (Fatigue, Depression, Migraines etc.)
- Increase in staff cognitive performance and motivation (improved productivity and decision making)
  - Lower risk of costly mistakes by staff suffering from fatigue or cognitive clarity that are symptoms of sick building syndrome and mouldy environments
- Increase in room/space utilisation post chemical sterilisation or refurbishment
- Reduction in heightened patient surveillance (after acquiring HAI or SSI) by nurses and doctors

Improved Revenue Streams

- Increased patient, bed and room turnaround, as well as improvements in staff and room productivity, will optimize revenue performance
- Reduced risk of admissions closure due to infection or illness outbreaks (e.g. Flu or Norovirus)

Note: the benefits should also be calculated over the same period of time as the total cost of ownership (typically 5 years) to ensure optimum ROI.

13 Are there any spare parts?

The only key spare parts to hold are filters.

14 Should windows be closed when operating Novaerus products?

The opening of windows can be complementary to using air purification devices depending on the contamination level of the outside air and provided there is no HVAC system in the building designed specifically to heat, cool and ventilate rooms.

Benefits

1. Opening windows can provide dilution of air contaminant concentrations, especially when the contaminant source is constant e.g. odours. However, if there is an HVAC system in place, and this system uses filters, the indoor air will be cleaner than the outdoor air entering via the open window. In this case, closing windows is the better option.
2. Opening windows can provide a cooling effect in summer if there is no air conditioning system in place. This provides comfort for patients and staff, but it also must be noted that high temperatures and high relative humidity can be a breeding ground for germs and fungi.
3. Novaerus devices do not remove CO_2 from the air. CO_2 can be reduced by ventilating an environment; opening windows or using a ventilation system like an HVAC system. These systems usually include some degree of filtration to reduce the number of pollutants carried by outdoor air into indoor environments. In rooms with a high concentration of people, CO_2 levels can rise and oxygen levels lower if there is no ventilation. Though there is minimal risk of CO_2 intoxication, research does indicate that a rise in CO_2 correlates to a rise in odorous substances. Higher levels of CO_2 can also lead to concentration issues and headaches.

Note: Outdoor air can be polluted with particulate matter, such as carbon particulate from combustion engines, VOCs and toxic gases, such as carbon monoxide and nitrogen dioxide. The outdoor pollution level may vary with the time of the day, for example may be higher during rush hour, and can also depend on the location of the building, for example may be higher if the building is located next to a factory or a motorway. During spring and summer, the air can contain pollen which can cause issues for those with allergies.

Some points to consider;

Novaerus devices are primarily designed to kill microorganisms in the air such as viruses, bacteria and fungi. While these may come from outdoor air, the higher risk is with the transmission of airborne infection from within indoor environments.

The Defend 1050 includes filtration media in addition to the plasma discharge. These filters can help reduce odours and toxic gases. The Defend 1050 has been tested in third-party labs and has shown substantial efficacy against formaldehyde, nitrogen dioxide and toluene.

15 We use UV to disinfect the operating room, why do we need Novaerus products to purify the air?

There are different embodiments of using UV technologies; upper room decontamination, disruptive environment disinfection and in-duct (HVAC) applications.

Using UV lamps for sterilisation is typically a point in time solution. The lamps can quickly sterilise an unoccupied room, however, due to the harmful effect that UV rays can have on people, the room cannot be in use. Competing technologies include steaming under pressure, dry heat sterilisation, chemical cleaning agents such as formaldehyde and fogging misters such as peracetic acid or hydrogen peroxide.

Both technologies, UV and plasma-based air purification, can be used together. UV irradiation is more effective for the decontamination of surfaces while plasma technology, with or without filters, decontaminates the air.

As a point in time solution, once UV is turned off, air and surface contaminants will start to increase as people re-enter the room. Housekeeping staff regularly carry out manual cleaning of surfaces between the UV fumigation process. Similarly, there needs to be a solution to continually cleanse the air.

Novaerus products are designed to continuously and safely purify the air in occupied areas 24/7, ensuring a high standard of hygiene between room sterilising or fumigation, if using fogging or misting solutions.

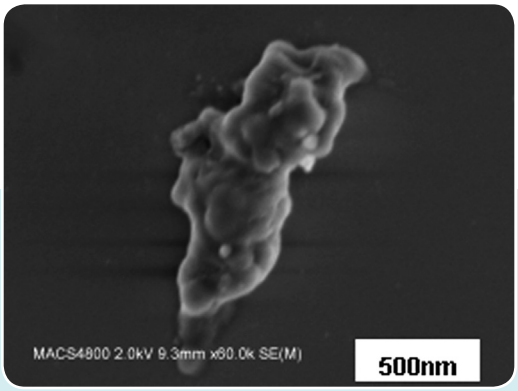
16 Does plasma leave any residue or by-products during operation?

Plasma technology rapidly inactivates airborne pathogens at the DNA level, resulting in strong chemical and structural changes. The Protect 200 and Protect 800 are designed to kill microorganisms, not to trap them. Dead cells may be found in the outlet air from either of these devices.

The dead cells of *E. coli, Staphylococcus* and *Aspergillus* were collected after exposure to Novaerus plasma in the publications reported by NASA. The below imagery depicts the effect of Novaerus plasma on *E. coli* bacteria.

If a customer requires inactivation of microorganisms and removal of dead cells and other particulate matter from the air, the Defend 1050 is the better choice. The Defend 1050 is fitted with a high-efficiency particulate arrestance (HEPA) filter which traps the dead cells after inactivation by the plasma.

Healthy *E. coli* bacteria
prior to exposure



E. coli bacteria
after exposure to Novaerus plasma

17 | Can I check the efficacy of the device over time?

Novaerus has carried out efficacy testing on units returned from the field in our microbiology lab. This testing has shown that units as old as two years in operation continue to be as effective against bacteria as new units.

Based on our internal quality controls process and world-class manufacturing systems, we can guarantee consistency of devices through operational life, ensuring there is no need to check the efficacy during lifespan. If the device is used as intended and maintained as per the user manual, it will operate as expected including its efficacy against microorganisms.

18 | Which viruses has Novaerus been tested against?

Novaerus technology has been independently tested against a range of viruses, showing consistent kill rates across both enveloped and non-enveloped strains.

There are many different types of viruses in existence due to the variety of genomic structures. Viruses contain more structural genomic diversity than plants, animals, archaea, or bacteria.

It is not possible for us to test against all types of viruses. We have therefore selected to test a range of viruses that are pathogenic to humans. We have also selected certain viruses that act as surrogates for other viruses that are too dangerous to be tested. These include enveloped and non-enveloped classes.

The following table shows the range of viruses we have tested, along with the common surrogates associated with each virus.

Testing Laboratory	Novaerus Device	Bioaerosol	Culture Type	Structure	Commonly used as a surrogate for
ARE labs	NV900/NV800	MS2 Bacteriophage	Virus	Non-enveloped, icosahedral positive-sense single stranded RNA virus	Norovirus[1], Influenza Viruses*[2], SARS-CoV**[2], Respiratory Syncytial Virus (RSV)[2], Ebola Virus[3], Poliovirus[4], Rhinovirus[4], Foot and Mouth[4],
Airmid Healthgroup	NV1050	Influenza A	Virus	Enveloped	
Airmid Healthgroup	NV1050	Human Parainfluenza virus	Virus	Enveloped RNA Virus	Measles[5]
Korea Testing Laboratory	NV1050	Phi-X174 Virus	Virus	Positive-sense single stranded RNA virus	Enterovirus[6], Parvovirus[6], Hepatitis B[7], Hepatitis C[7], HIV[6].

*Influenza H1N1 – MS2 is very resistant to air sampling under dry conditions, the opposite is observed for influenza[3]

**SARS-CoV (Coronavirus) – MS2 is 7/10 times more resistant to aerosolization, sampling and UV light than coronavirus[2]

Our patented plasma rapidly destroys pathogens using a combination of physical reactions (electroporation, electron bombardment, etching etc.). This has been tested and proven in independent testing carried out by the NASA Ames Research Centre, California.

This process is not selective in its destruction. Given the rapid and consistent kill rates achieved using Novaerus, it is reasonable to anticipate that our plasma technology will show similar impact and rapid kill rates across all viral particles.

Due to the small size of viruses, many filtration technologies are unable to trap viral particles. As Novaerus is a non-selective, rapid killing technology, it offers a unique and safe solution to kill airborne viruses 24/7, reducing the risk of disease and infectious outbreaks.

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Defend 1050
(NV1050)

Protect 800/900
(NV800 / NV900)

Protect 200
(NV200)

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