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INDOOR AIR QUALITY Information

1st September 2021

1. **Why we need healthy air in our workplace?**
2. **What is clean indoor air?**
3. **What is unhealthy indoor air?**
4. **What standards are in place to conform to?**
5. **What popular solutions are on market?**
6. **What is thermography?**
7. **What is UK Government is asking us to do?**
8. **What does a report look like?**
9. **What does the solution look like?**
10. **What does the future hold?**

References

1. The WELL Building Standard™
2. WHO air pollution guidance
3. The impact of PM2.5 on the human respiratory system
4. Associations of Cognitive Function Scores with Carbon Dioxide
5. Risk of sick leave associated with outdoor air supply rate
6. Effect of ventilation improvement during a tuberculosis outbreak in underventilated university buildings
7. **study shows how better indoor environments enhance cognitive function**
8. VOCS EMISSIONS FROM SOURCES IN A PARTITIONED OFFICE ENVIRONMENT
9. Working While Sick May Be Bad for Business
10. Environment Bill 2020

1. Why do we need healthy air in our workplace?

Productivity and Health can both decline in a workplace with poor air quality, contributing to bad breeding ground for viruses and moulds.

Some things to look out for:

Indoor air quality is essential for a healthy office environment.
However, as modern buildings have become more energy efficient, they have also become more airtight, increasing the potential for poor indoor air and pathogens.
Covid-19 has introduced many new chemicals in the office that can give off VOC gasses hampering good air quality; this and closing windows to keep heat in soon will add to the problem this Autumn and Winter if we don't act now.

The UK Government and WHO have reacted to an alarming study from Harvard.
New emphasis on CO2 & PM 2.5 build up control in indoor space in 2021/22.

In a 2015 collaborative study by Harvard T.H. Chan School of Public Health, SUNY Upstate Medical University and Syracuse University, it was discovered that people who work in well-ventilated offices have significantly higher cognitive function scores when responding to a crisis or developing a strategy.

For six days, 24 participants including architects, designers, programmers, engineers, creative marketing professionals, and managers worked in a controlled office environment at Syracuse University. They were exposed to various simulated building conditions including a conventional office environment environment with high VOC concentration, "green" conditions with enhanced ventilation and conditions with artificially increased levels of CO2.

It was discovered that cognitive performance scores for the participants who worked in the green environment were on average double those of the participants who worked in conventional environments.

Physiological effects of poor indoor air

Apart from reduced cognitive abilities, poor air quality at a workplace can cause more palpable symptoms like allergic reactions, physical fatigue, headaches, and eye and throat irritation. The British Lung Foundation and the NHS have much to say on this subject.
Financially speaking, poor indoor air quality can be costly to a business.
Health problems like respiratory issues, headaches and sinus infections can lead to higher levels of absenteeism as well as presenteeism (working while sick).

2. What is clean indoor air?

That is simple but hard to achieve indoors.

Clean air contains no unhealthy substances for human consumption.
The chemical composition of air varies and acclimatises itself to its environment.

Clean air:

Contains no harmful pathogens or spores that are detrimental to mammals.
Air that has been rejuvenated frequently with renewed O_2 and removed CO_2.
The minerals encapsulated in the surf are useful to humans and not detrimental.
Delivered at +/- 15c of ambient temperature.
Delivered in 40-60% Relative Humidity.
The Ions are in balance with the surrounding building.

What is air:

Air is the invisible mixture of gases that surrounds the Earth.
Air contains important substances, such as oxygen and nitrogen, that most species need to survive.
Human beings, of course, are one of those species. Sometimes, the word "atmosphere" is used instead of the word "air."

Standard Dry Air is the composition of gases that make up air at sea level.
It is a standard scientific unit of measurement. Standard Dry Air is made up of nitrogen, oxygen, argon, carbon dioxide, neon, helium, krypton, hydrogen, and xenon.
It does not include water vapor because the amount of vapor changes based on humidity and temperature. Because air masses are constantly moving, Standard Dry Air is not accurate everywhere at once.

Nitrogen and oxygen make up about 99% of Earth's air. People and other animals need oxygen to live.
Carbon dioxide (CO_2), a gas that plants depend on, makes up less than 0.04% normaly.

Plants and animals each produce the gases that the other needs to live. Plants need carbon dioxide (CO_2) people and other animals exhale carbon dioxide as a waste product. People and other animals need oxygen (O_2) plants produce oxygen.

3. What is unhealthy indoor air?

Air that is detrimental to our health & comfort.
Air that maintains viruses, funguses that other pathogens detrimental to us.
Air that has a relative humidity outside 40-60% according to WHO standard.
Air containing unhealthy levels of CO_2 & particulates that can stick in your lungs
Air that is not rejuvenated regularly (stale dead air, as an example)

Some causes of unhealthy air:

Dampness and High humidity (61-99%)
People breathing out CO_2 and moisture full of nutrients for mould to thrive
Cow's breathing out CO_2 and methane full of nutrients for mould to thrive
Environmental locations (**example:** office next to sewage plant or dairy farm)
Temperature of air **10-15c** above or below ambient air temperature.
Man-made pollutants like **hand sanitiser** or chemicals like paint or **Ozone gas**.
Negative building pressure forcing in particulates from outside contaminated air
Like: pollen, soot, VOC gas, spores, air born viruses, mosquitoes and insects.

Factors to consider:

Building location

A building's location can often influence the type and number of indoor pollutants. Close proximity to automotive traffic may be a source of dust and soot particles. Also, buildings located on previous industrial sites, or an elevated water table can be subjected to damp and water leaks, as well as chemical pollutants.
The same goes for those near agricultural farming land and manufacturing.
Finally, if there's renovation activity occurring in the building or nearby, dust and other construction material by-products may circulate through the building's ventilation system; it can be as simple as gases from paint drying.

Industry:

Some industries produce bad air quality for people that need managing.

Environment:

Some locations are next to hazards and need managing.

Hazardous materials (COSHH 2002)

Asbestos was a popular material for insulation and fireproofing for many years, so it can still found in a variety of materials like thermoplastic used in some desks and **vinyl floor** tiles, and bitumen roofing materials to name a few.

Also the spores in the air that make your apple go brown are all around us.
Asbestos doesn't pose a threat unless disturbed, for example during remodelling or adapting. It's the fibres that are responsible for asbestos-related diseases such as mesothelioma and lung cancer. Once the fibres are released into the air, they are easily inhaled and although they won't cause damage right away, there's still no cure for asbestos-related diseases.
Although asbestos is now banned, it's still present in many public buildings around the world. According to the WHO, an estimated 125 million people worldwide are exposed to asbestos in the workplace.
Even if you work or live in a newer building, asbestos exposure is still a possibility; building owners must promptly contact specialists for asbestos removal so that wider contamination can be prevented.
Funguses and spores have the same level of threat to your health as asbestos, all you need to do is add damp dark areas for mould colonies to grow and spread in the air.

Inadequate ventilation

"close the window you are letting all the heat out"

Indoor air quality largely depends on an effective, well-maintained ventilation system that circulates and replaces used air with fresh air.

Although standard ventilation systems aren't designed to remove huge quantities of pollutants, they do their share in reducing air pollution in the office environment.
But when a building's ventilation system isn't working properly, the indoors is often under negative pressure, which can lead to increased infiltration of pollution, mould **spores** and particles dwelling in the humid air that are harmful to us.

Air conditioning, or in the UK more commonly dehumidification, will remove the water from the air and when the air passes through, the unit will **rapidly** reduce in temperature killing most viruses and other pathogens, only leaving mould spores intact.
This is better than air that is too hot and humid which feeds viruses and fungi.

Note: if you open the window in Spring to let out CO_2 you let in pollen and other unwanted air born contaminants that can make problems for us.

4. What standards are in place to comply to?

HM Government | World Health Organization | Public Health England

None to date (September 2021)

To date (September 2021) only guidelines and compelling recommendations

Official bodies like:
WHO, WELL and UK Government HSE departments are all advising not legislating.

Some outdoor standards exist in some market sectors and locations to date.

Indoor air quality recommendations from world leaders:

Air adapts itself to different environments.

And people acclimatise to the environment **so** not one formula for all can ever exist with any level of accuracy.

That makes standards impossible to achieve for all sectors.

You can only legislate on what does not go into the air, like the COSHH directive to date for indoor office air quality.

None of the below are legislative

References:

1. The WELL Building Standard™
2. WHO air pollution guidance
3. WHO guidelines for indoor air quality (PDF)
4. Environment Bill 2020
5. The Health and Safety Executive's (HSE)
6. Public Health England (PHE)
7. Radon: limitation of human exposure
8. World Society of Sustainable Energy Technologies WSSET
9. UK GOV - Clean Air Strategy 2019
10. UK GOV - Air quality factsheet
11. Public Health England - NICE – Indoor air quality (PDF)

5. What popular solutions are on market?

ULV Fogging

ULV, or **U**ltra-**L**ow **V**olume **fogging**, is a technique which aerosolises a chemical in order to apply it evenly. ULV fogging is often deployed via the use of a backpack and handheld nozzle, Ghostbusters-style. The sterilant is compartmentalised as a liquid solution and is sent to the nozzle when the trigger is compressed. The 'fog', in this case, is created by a built-in motor which forces the air in the nozzle to swirl, creating a high power, low-pressure mist. The fog is typically comprised of comparatively large droplets, ranging from between 5-30 microns in size. The sterilant, as with dry fogging, works by penetrating, immobilising and destroying the mould cells it encounters. The biggest issue with ULV fogging specifically is the size of the particle which it creates. It's problematic for a number of reasons:

- Mould spores vary in size but typically range from 4 – 20 microns in size. Therefore, the sterilant will not be able to go everywhere mould spores can, meaning not all the mould is going to be destroyed. As long as some mould spores are allowed to survive, there's a chance of reappearance following treatment.
- Another issue with the larger, wetter droplets ULV creates is that the fog quickly condenses on surfaces. As a result, it doesn't dwell in the air for long before it condenses on a surface. This means the majority of airborne spores and harmful mycotoxins aren't destroyed.

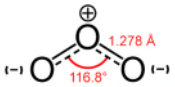
If the majority of airborne mould spores go untouched, then the mould has not been systematically eradicated.

The airborne spores will eventually settle on surfaces. The fact you've already had mould tells us, unfortunately, that you have the requisite conditions for it to thrive. The mould will invariably resurface and continue to spread. Crucially, your health is still at risk.
Remember some mould and funguses are food for viruses in the office.
Mycotoxins attach themselves to mould spores and when airborne, can be inhaled, posing a significant risk to health. Enough so that the government deem it on the same threat level as asbestos.
On the plus side it is a good 1st wave starting point for flooring and textiles that take time to absorb a liquid, before a dry micro-mist is performed.

Not Chemicals are the same, some are not suitable

Ozone O_3

Safe level =



Please note:

this is a **poison** (please don't use unless it's last resort and you want to kill the environment)

It's not just a gimmicky name or play on words, ozone technology uses the same naturally occurring gas that can be found in the upper levels of Earth's atmosphere: O3 or trioxygen. It's as simple as it sounds. The air we breathe, O2, or dioxygen, consists of two oxygen atoms, while ozone fog, O3, contains three. It's the presence of this third, more loosely connected oxygen atom, that makes ozone an unlikely candidate as a fungicide. The third oxygen atom is prone to detaching from the ozone molecule and reattaching to other molecules, oxidising them in the process. The process of oxidation breaks down microbial membranes, proteins, and nucleic acids, essentially eroding the very fabric of living organisms. Hudson and Sharma's study (2009) for the Journal of the International Ozone Association summarised the benefits of ozone technology:

'Ozone gas has several advantages over alternative liquid treatments; **it is easy and cheap to produce** from air or oxygen, and it diffuses quickly into all parts of a room, including cracks and crevices'.

Sounds great right? **Unfortunately**, O3 does not discriminate when finding matter to break down through oxidation. In fact, the level of ozone required to systematically and comprehensively destroy mould **is extremely toxic to humans**. Consider the following from the United States Environmental Protection Agency (EPA), who states:

"(there is) evidence to show that at concentrations that do not exceed public health standards, ozone is not effective at removing many odour-causing chemicals…viruses, bacteria, mould, or other biological pollutants."

In other words, the level at which ozone is effective in comprehensively destroying pathogens and mould is also the level at which it would begin to destroy cells in the human body, making it **extremely unsafe**. Your office would have to be empty for days following the treatment. That or the level of ozone is reduced, meaning the mould is not completely eradicated. So, it's not the easiest method to get right when treating pathogens or mould. It's a fine balance between a likely reoccurrence of the problem or endangering your life.

Are Ozone Generators Effective in Controlling Indoor Air Pollution?

Available scientific evidence shows that at concentrations that do not exceed public health standards, ozone has little potential to remove indoor air contaminants. ***Link to more information*** Ozone Generators that are Sold as Air Cleaners | US EPA

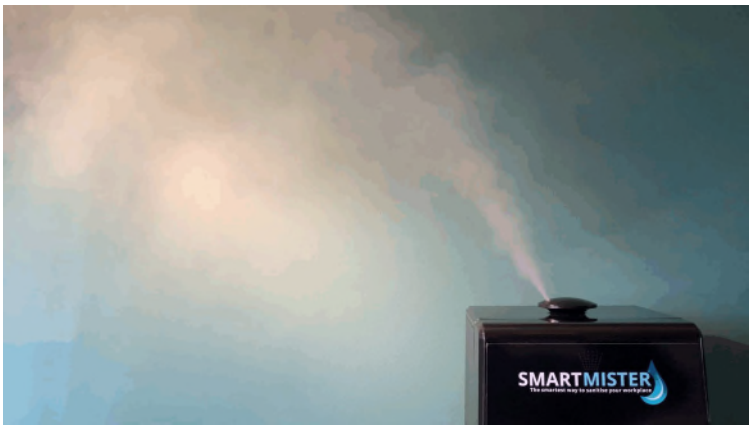
References:

United States Environmental Protection Agency

Link to more information Ozone Generators that are Sold as Air Cleaners | US EPA

Ozone and Your Health, EPA-456/F-09-001 (airnow.gov)

Dry micro-misting



Dry micro-misting is only part of the clean air and mould eradication process.
You **can't** just buy a fogger online and turn it on to keep your workplace safe.

Preferably, you find a professional service like ours which explains, identifies, treats and proves a result with data to the Well Building standard to give you evidence of contribution and peace of mind.
But, when it comes to eradicating mould, we believe the science stands with dry mist. It has the micron size to get everywhere mould spores do, it has the 'dryness' to dwell in the air long enough to tackle the stubborn airborne spores and mycotoxins and, when coupled with positive air pressure and the changing ions as ours is, it can access the hidden spaces under floors, behind walls and wallpaper and within soft furnishings. Finally, when used in conjunction with a non-toxic biocide, it is quick, safe and family-friendly, meaning minimal disruption. What better way to sign off, then showing you a microscopic view of mould cells before, during and after a SmartMister treatment.

Full disclosure: our business uses dry micro-misting, it's a more refined version of fogging, so we're a bit biased, with good reason.
We believe we can uphold and objectively demonstrate by the science.
SmartMister dry micro-misting system is the only technology in the UK which eradicates most types of mould including surface mould, airborne spores and mycotoxins and the hidden mould behind cavity walls, under floorboards and in soft furnishings. What's more, our microbial biocide film coats all surfaces, preventing it from coming back as easily.

SmartMister's trademarked micro-misting technology uses sound and air to gasefy SMS biocide to a smaller molecular size of 4 microns on average; that's not possible with ULV technology. This means three things: **First**, it is unable to condense on surfaces and dwells in the air; eradicating the abundance of mould spores and harmful mycotoxins traditional methods can't deal with. **Second**, our dry micro-mist machine creates positive air pressure with bipolar ionisation, meaning the dry mist is forced to fill the entire volume of an office space forcing the biocide to dwell on every surface and object. **Third**, it can reach every conceivable space within your office including behind cavity walls, meaning we are able to comprehensively treat every last trace of mould and spores that lead to pathogens and toxins.

Q.02 Is it safe and Is it regulated? What is it made from? water, activated salt

Yes it's free from any harsh chemicals. The solution is non-toxic and non-hazardous which is safe for human contact and the environment. It is also safe to use in food preparation areas and on clothing and packaging to many standards. The simple answer is de-mineralised electric water and salt, about 95/5%; a safe, organic, stable product, safe for pets.

UVC-c light

Good for **sterilising** air over many hours but doesn't fix the problem at source

good for keeping on top of airborne pathogens in working hours.

UV-c light works best when it is inside a box and pules air in sterilised it, then expelling the dead air out killing of any life in the air including Covid.

Works like a HEPA filter for organic matter without having to landfill and handle the bio waste.

TWO things to consider: Can you get all the air in a large office to pass in and out of a small box on the floor or wall and how long will that take to remove problems.

You also still have to deal with the CO_2 and other gases contaminating the air.

Some units have internal HEPA air filtration built in.

Just ask for pure HEPA filtration in your UV systems.

UV light can also be used in HVAC ducting systems.

Bipolar ionisation

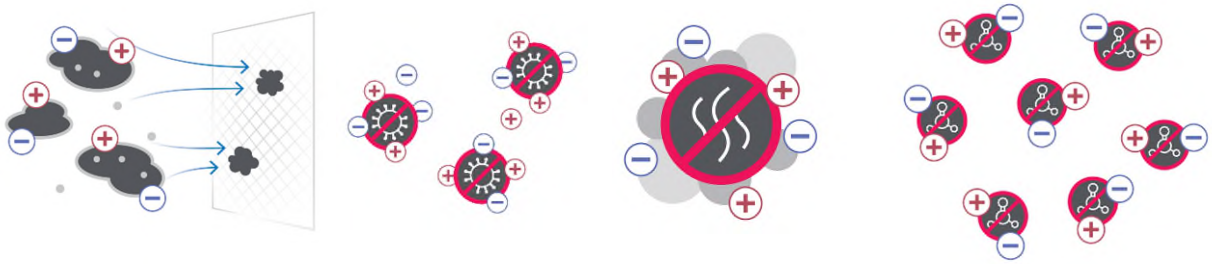
Good for sterilising air over many hours
but doesn't fix the problem at source
Similar to the effects of UV-c light above
normally usen in HVAC systems as part of a wider solution.

Ions: Mother Nature's Little Air Scrubbers.

Plasma Air products are mounted in the central air conditioning system of any building. As air passes over the products, millions of positively and negatively charged ions are formed – just like in nature. These bipolar ions disperse into the occupied space through the duct system, proactively attacking airborne contaminants where they cause the most problems for occupants. Plasma Air is safe, low maintenance, easy-to-install, energy efficient, and highly effective on pollutants such as particulate matter, bacteria, viruses, mold spores, odors, and VOCs.

How Bipolar Ionization Works to Clean the Air of Pollutants

Much like sunlight does in the atmosphere (UV-c), Plasma Air technology produces a natural bio-climate rich in positive and negative oxygen ions.
The negative ions contain an extra electron while the **positive ions** are missing an electron resulting in an unstable condition. In an effort to restabilise, these bipolar ions seek out atoms and molecules in the air to trade electrons with, effectively neutralizing particulate matter, bacteria and virus cells, odorous gases and aerosols, and VOCs in the process.
Airborne particles are charged by the ions causing them to cluster and be caught in filters

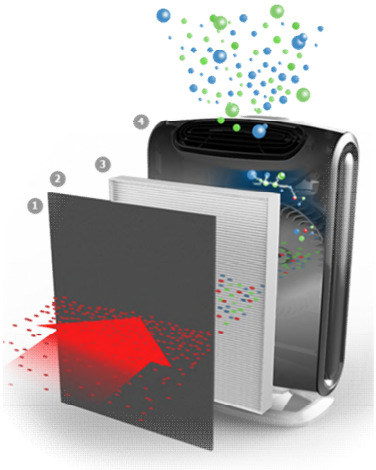


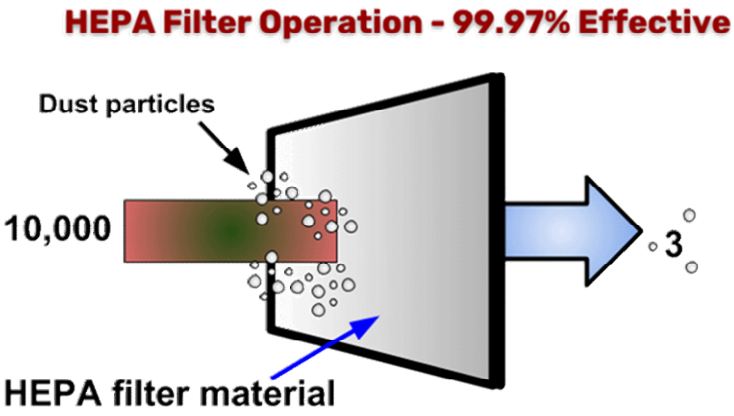
HEPA filtration

"**H**igh **E**fficiency **P**articulate **A**rresting"

This is the most common solution for most industries for good reasons.

You pull air in from a large office space, squeeze it through a HEPA filter and expel it out the other side with 99.97% of all harmful PM 2.5 stuck fast in the filter, that you land fill and replace when full just like your vacuum bag.





How does a HEPA filter work?

HEPA stands for High Efficiency Particulate Arresting filters. The HEPA was originally used by the U.S. Atomic Energy Commission in the 1950s to remove small radioactive particles. HEPA filters are designed to capture very small air particles. The accordion shape of the filter increases the surface area, allowing it to capture considerably more particles to be disposed of later time and **place**.
As air passes through the filter, the particles become trapped in the accordion maze of filter fibres **(this will not remove gas like VOC and very small particles)**.
Dust, spores and pet dander are easily caught by the HEPA filter. It is important to note the differences between a True HEPA Filter and a HEPA-type or HEPA-like Filter are vast (not all HEPA filters are made equal).

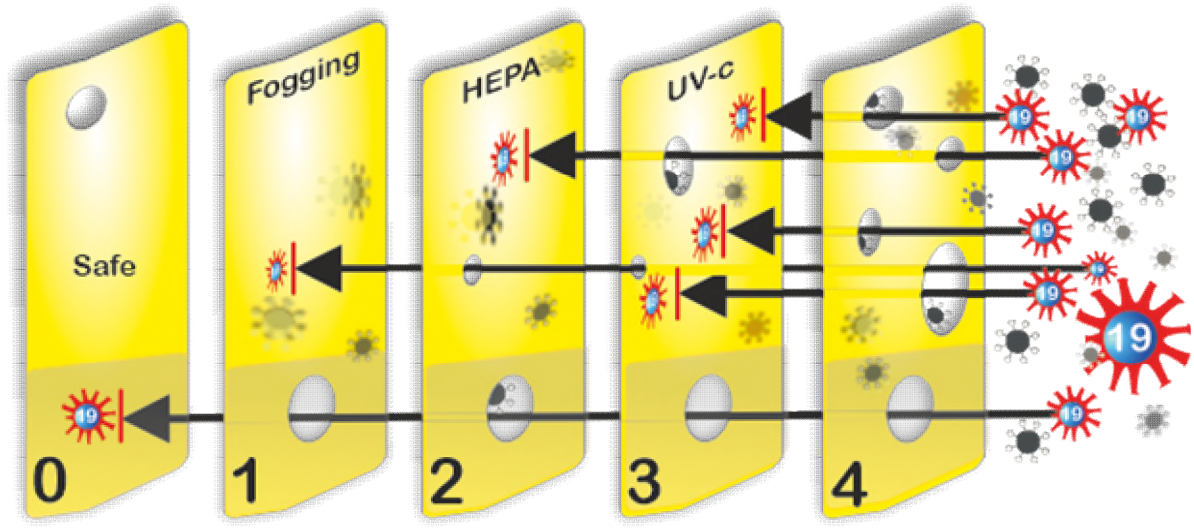
TWO things to consider: Can you get all the air in a large office to pass in and out of a small box on the floor or wall and how long will that take to remove problems. and knowing what you have captured how to handle the waste filter when its full.

HEPPA air filtration works well at maintaining levels of already clean air if you are smart.

Some HEPPA air purifiers go further and have sensors and ionization built in like:

Fellows: AeraMax® Professional Purifiers

The smartest solutions use a bit of all above to combat the differences in your workplace.

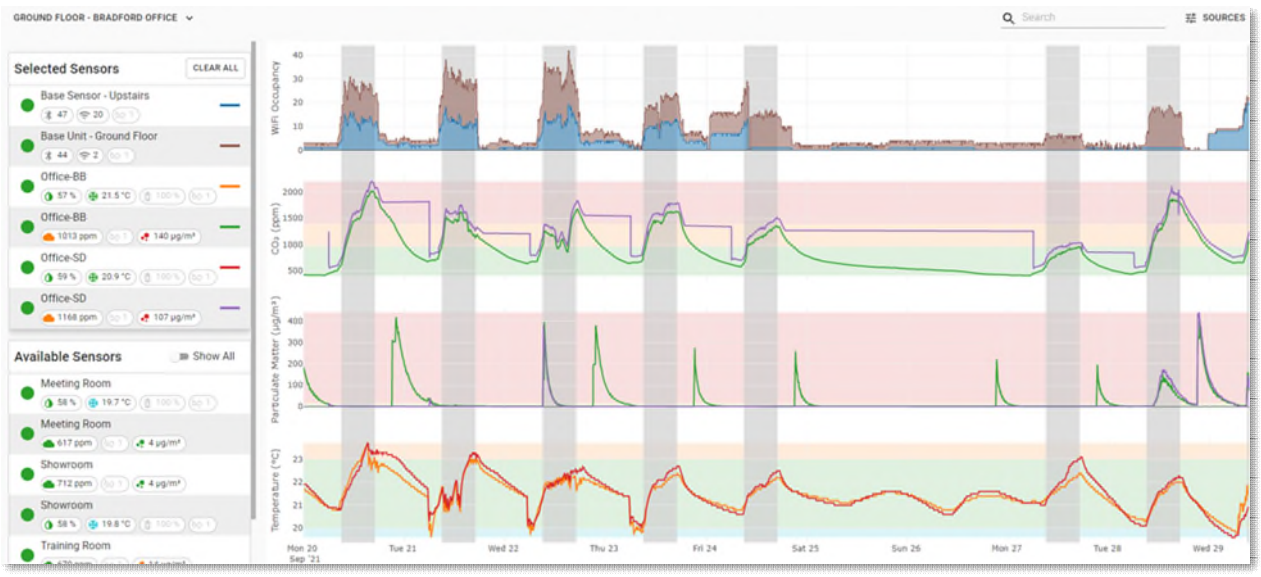


The market is full of well worded adverts for products all full buzz words.

You will only know is it works if you have before and after data to test results.

Case studies are only good for the building it was used in, each building has different problems and need information to do an effective job each time.

know your problem 1st



What is thermography?

Wikipedia

Infrared thermography, thermal video and thermal imaging, is a process where a thermal camera captures and creates an image of an object by using infrared radiation emitted from the object in a process, which are examples of infrared imaging science.

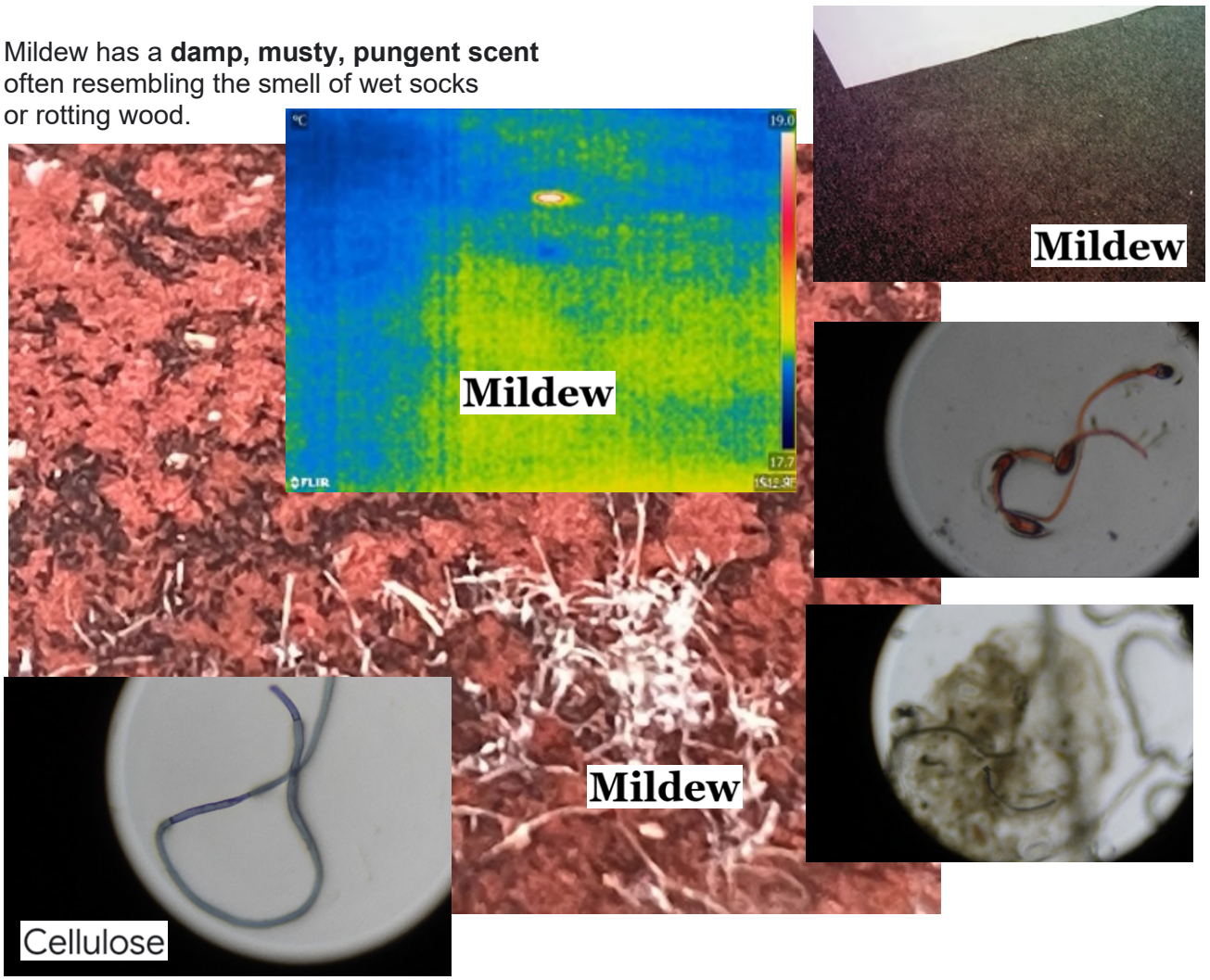
If you treat organic pathogen material with a biocide it reacts by giving out heat

This example shows a cluster of mould that can host Covid-19 virus not visible to us but can release spores in the air contributing to poor air quality.

If PM2.5 particle reading is much higher than the outdoor air at a window it is normally for good reason, it maybe just dust, but if the humidity is high It may contain live spores.

You may only feel damp flooring

Mildew has a **damp, musty, pungent scent** often resembling the smell of wet socks or rotting wood.



6. What the Government is asking us to do?

Follow the science and adapt faster than the problem

3 action points

Survey your air quality for CO_2 and PM2.5 as early indications of bad indoor air

Take measures to normalise or fix the above

Repeat

What do I need?

1. **Use sensors in your workplace to record CO_2, PM, VOC, Temp / Humidity Ion, & Ozone in 2023 organic matter 2025).**
2. **Install mechanical or biological devices to fix the air and rejuvenate it.**
3. **Report on the times it went wrong and get better at doing it.**

WHO, HSE, WELL, & other world advisors in indoor clean air say

Clean indoor air is to contain: PM 2.5, 35 µg/m3. CO2 bellow 700

Your rights as an employee

You have the right to work in a place where the risks to your health and safety are properly controlled by your employer.

Workplace regulations are there to protect from potentially harmful pollutants. The company that you work for should do a risk assessment to identify what could harm you and if necessary, how they must control these risks.

7. What does a report look like?

Indoor Air Quality Testing

Solar Ready Ltd provides expert and independent assessment, advice and monitoring of indoor air quality, emissions, and indoor issues across all client sectors,

Below is a summary of the 3 types of reports.

A. Quick air test

CO_2, PM2.5, VOC, Temperature & Humidity

B. Comprehensive test

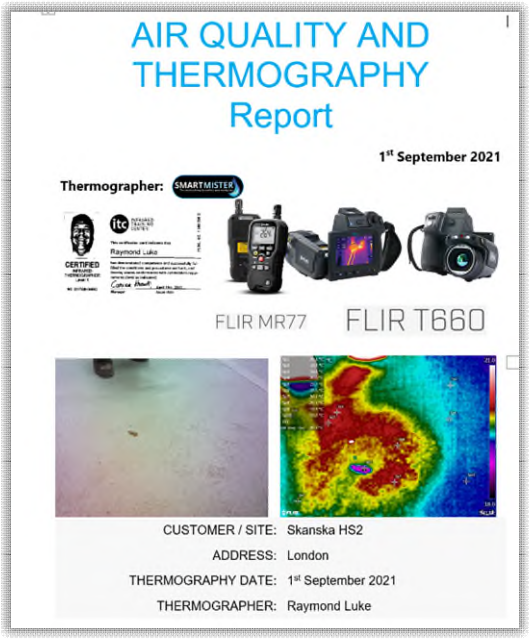
CO_2, PM-1-10, VOC, Ion, Temperature & Humidity, O_3

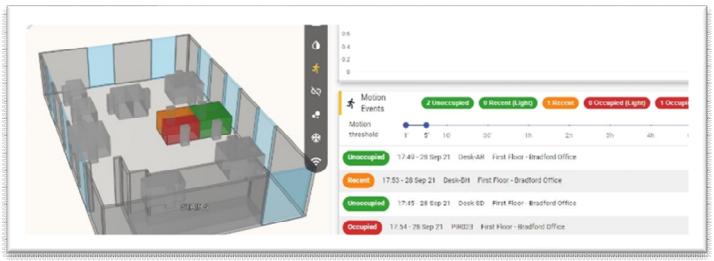
C. Full examination

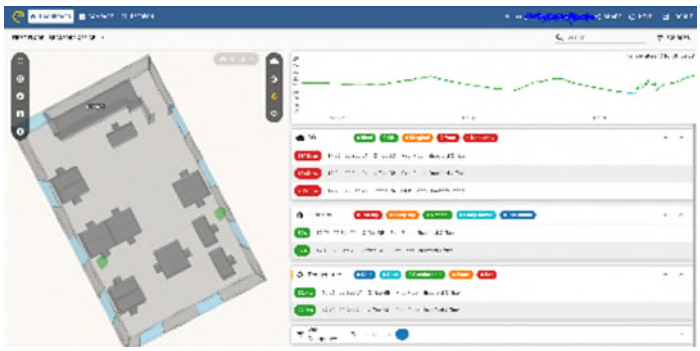
CO_2, PM-1-10, VOC, Ion, Temperature & Humidity, O_3, ATP, Microbial, Thermography, Pin test, Tape test, culture test.

We show Conclusions & Recommendations and action points to resolve any possible problems.

See page 33 for example of report and page 10 of live dashboard



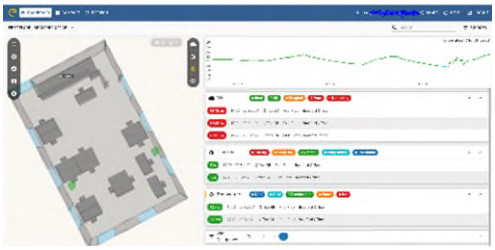




Real world Report for First Floor - Office in Bradford

Date of report: Wednesday September 29th 2021

Reporting for period: Wednesday 1-29th September 2021



Hours analysed are **between 9:00 and 18:00.**
Weekends **are** included in the analysis.

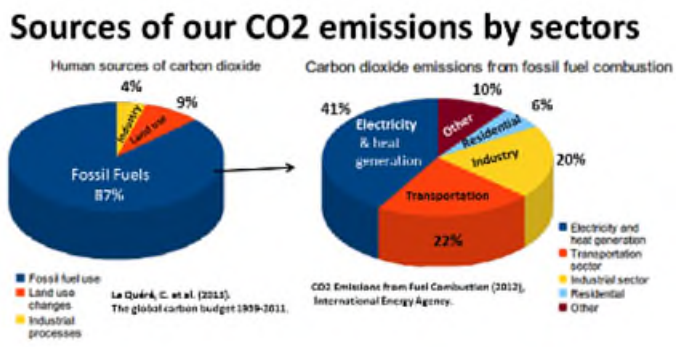
About this report

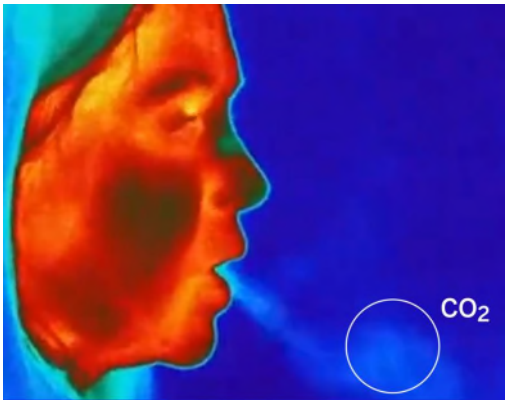
Using continuous monitoring data from multiple sensors distributed throughout occupied areas, we can assess the performance of building systems and policy. This analysis can be used ensure the right environment is being provided to occupants in all areas and under all conditions of use, insight that cannot be gained from spot checks alone.
The factors measured can have a dramatic effect on comfort, productivity and the risk of viral transmission, this analysis can demonstrate the building health or, if necessary, identify areas that can be improved.

The following analysis is split to consider each environmental factor.

CO_2

The primary source of carbon dioxide (CO_2) indoors is usually due to people breathing. High indoor CO_2 levels have been shown to lead to: reduced cognitive function and productivity[1] (presenteeism), higher rates of absenteeism[2] and an increased risk of viral infection transmission[3]. Building standard bodies such as CIBSE, RHEVA and ASHRAE advocate the use of CO_2 levels as a proxy measure for the risk of infection: higher CO_2 levels indicate higher risk of infection.
Continuous measurements of CO_2 levels are an effective method of identifying poor ventilation and the associated risks. The levels of CO_2 measured will depend on occupancy, usage and ventilation, UK government (SAGE) advice is that multi-occupant spaces that are used regularly and reach levels above **1500 ppm** should be identified and prioritised for improvement.





To analyse the data we split the CO_2 levels (measured in ppm) into 5 bands:

1. Ideal (<750 ppm) - Conditions are optimal for 100% productivity; viral risk is low.

2. OK (750-950 ppm) - Productivity reduces by 15% at 950ppm; equivalent to CIBSE approved ventilation rate of 10l/s/person.
3. Marginal (950-1400 ppm) - Productivity in complex tasks is reduced by 50% at 1400ppm; viral transmission risk is increased.
4. Poor (1400-2000 ppm) - Cognitive functions such as decision making and strategic thinking are significantly affected; viral transmission risk is high.
5. Unhealthy (2000+ ppm) - In extreme cases this may cause headaches, sleepiness, increased heart rate and is above recommended CIBSE guidelines; risk of viral transmission is very high.

Analysis

Summary

Table (below): Minimum, average (mean) and maximum values per sensor.

	Minimum	Average	Maximum
All sensors	423 ppm	1164 ppm	2488 ppm
Office-BB	423 ppm	1164 ppm	2488 ppm

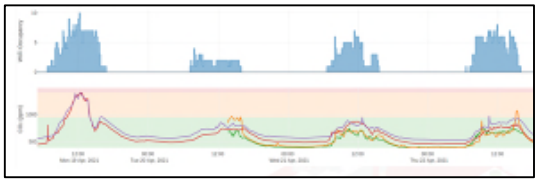
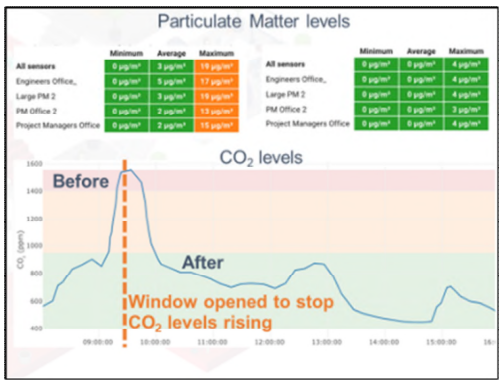


Table (below): Percentage of time measured in each band range. (For example if the sensor spends 1 of every 4 hours within a particular range and 3 of 4 in another those bands will show 25% and 75%.)

	Ideal	OK	Marginal	Poor	Unhealthy
All sensors	29.2%	8.9%	25.6%	32.1%	4.3%
Office-BB	29.2%	8.9%	25.6%	32.1%	4.3%



References

8. Associations of Cognitive Function Scores with Carbon Dioxide
9. Risk of sick leave associated with outdoor air supply rate
10. Effect of ventilation improvement during a tuberculosis outbreak in underventilated university buildings

Particulate Matter PM 1, 2.5 & 10

Particulate matter readings give and indication as to the pollution levels in the air.
Air pollution is a major environmental risk to health. Examples are soot, pollen, dust, spores, crumbs, organic matter, and clothing fibres to name 10%.
Ambient air pollution in both cities and rural areas was estimated to cause 4.2 million premature deaths worldwide per year in 2016; this mortality is due to exposure to small particulate matter of 2.5 microns or less in diameter (PM2.5), which cause cardiovascular and respiratory disease, and cancers[1]. Our sensors measure the levels of PM2.5 in the indoor environment. PM levels are particularly influenced by external conditions such as traffic fumes and weather patterns and can be generally reduced with air filtrations systems. Consistently high levels of particulate matter indoors raises significant concern for the occupants. Overall mortality and mortality of cardiopulmonary diseases as well as lung cancer has been shown to increase by 4%, 6% and 8%, respectively, for every 10 µg/m3 increase in PM2.5 levels[2].

To analyse the data we split the Particulate Matter levels (measured in µg/m³) into 3 bands:

- Clean (<10 µg/m³) - WHO guidelines for Fine Particulate Matter (PM2.5) is < 10 µg/m³ annual mean
- Moderate (10-20 µg/m³) - WHO guidelines for Fine Particulate Matter (PM2.5) is < 25 µg/m³ for a 24-hour mean, not to exceed more than 3 days per year
- High (20+ µg/m³) - A US study indicated that the average life span was extended by 0.35 years for every 10 µg/m³ decrease of PM2.5

Summary

Table (below): Minimum, average (mean) and maximum values per sensor.

	Minimum	Average	Maximum
All sensors	0 µg/m³	19 µg/m³	395 µg/m³
Office-BB	0 µg/m³	19 µg/m³	395 µg/m³

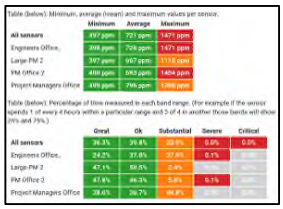
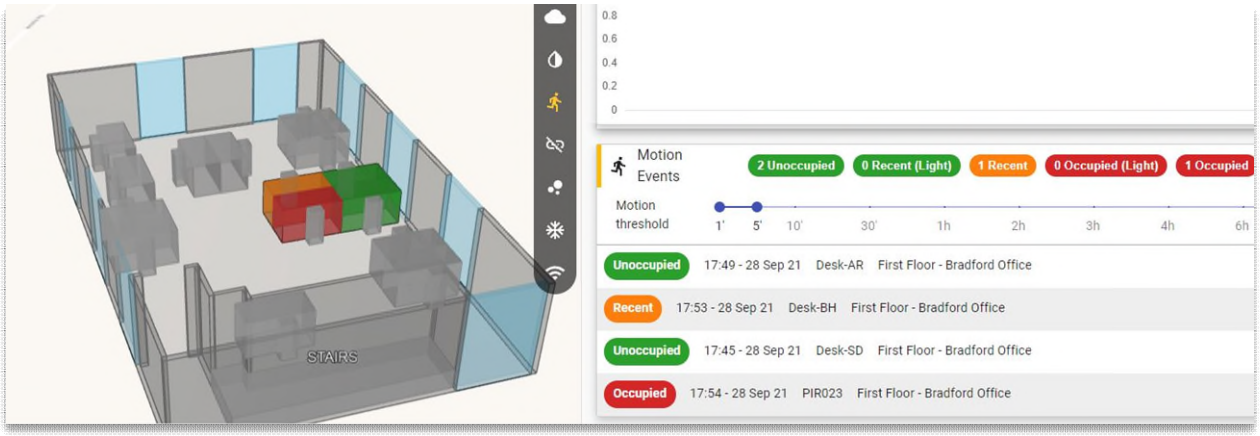


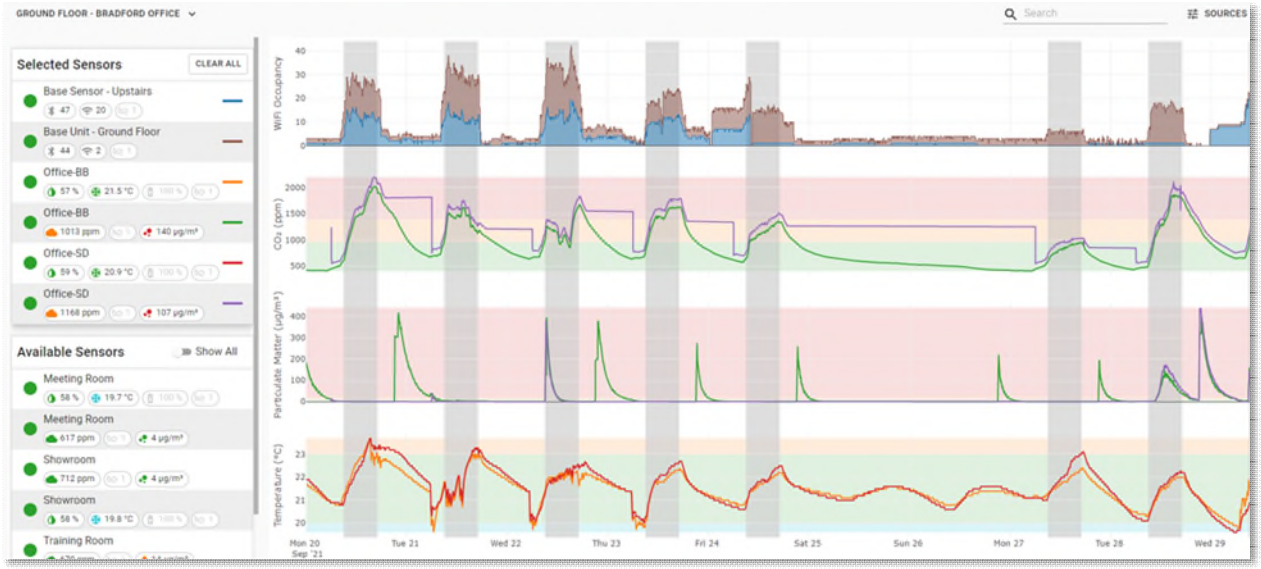
Table (below): Percentage of time measured in each band range. (For example if the sensor spends 1 of every 4 hours within a particular range and 3 of 4 in another those bands will show 25% and 75%.)

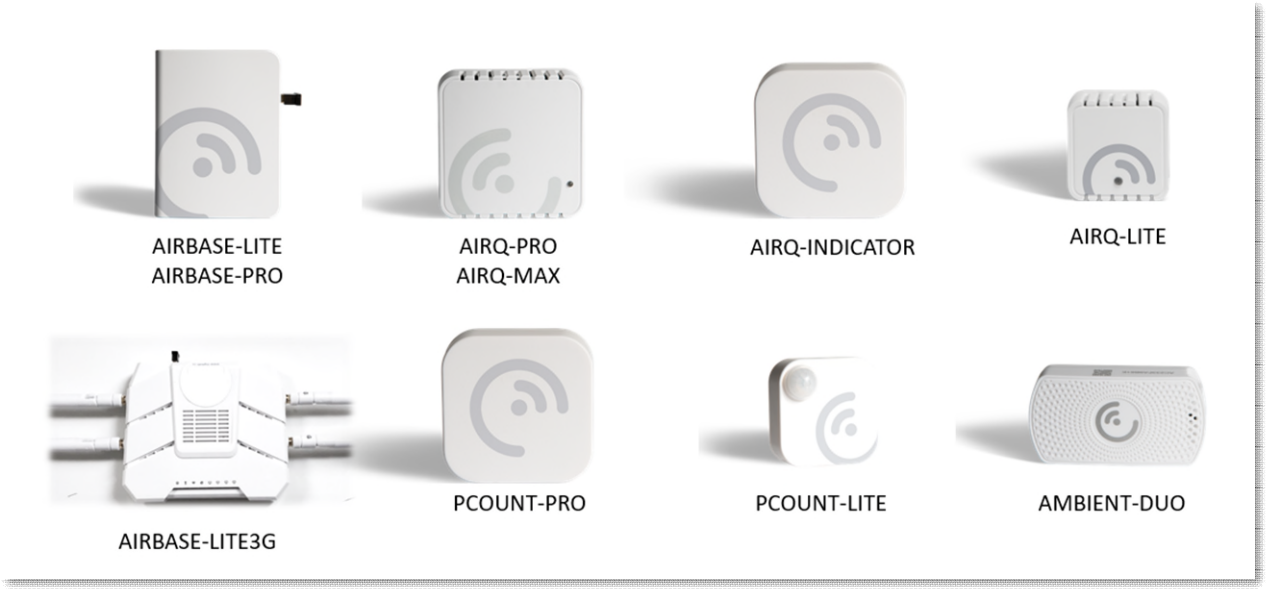
	Clean	Moderate	High
All sensors	93.2%	1.9%	4.9%
Office-BB	93.2%	1.9%	4.9%

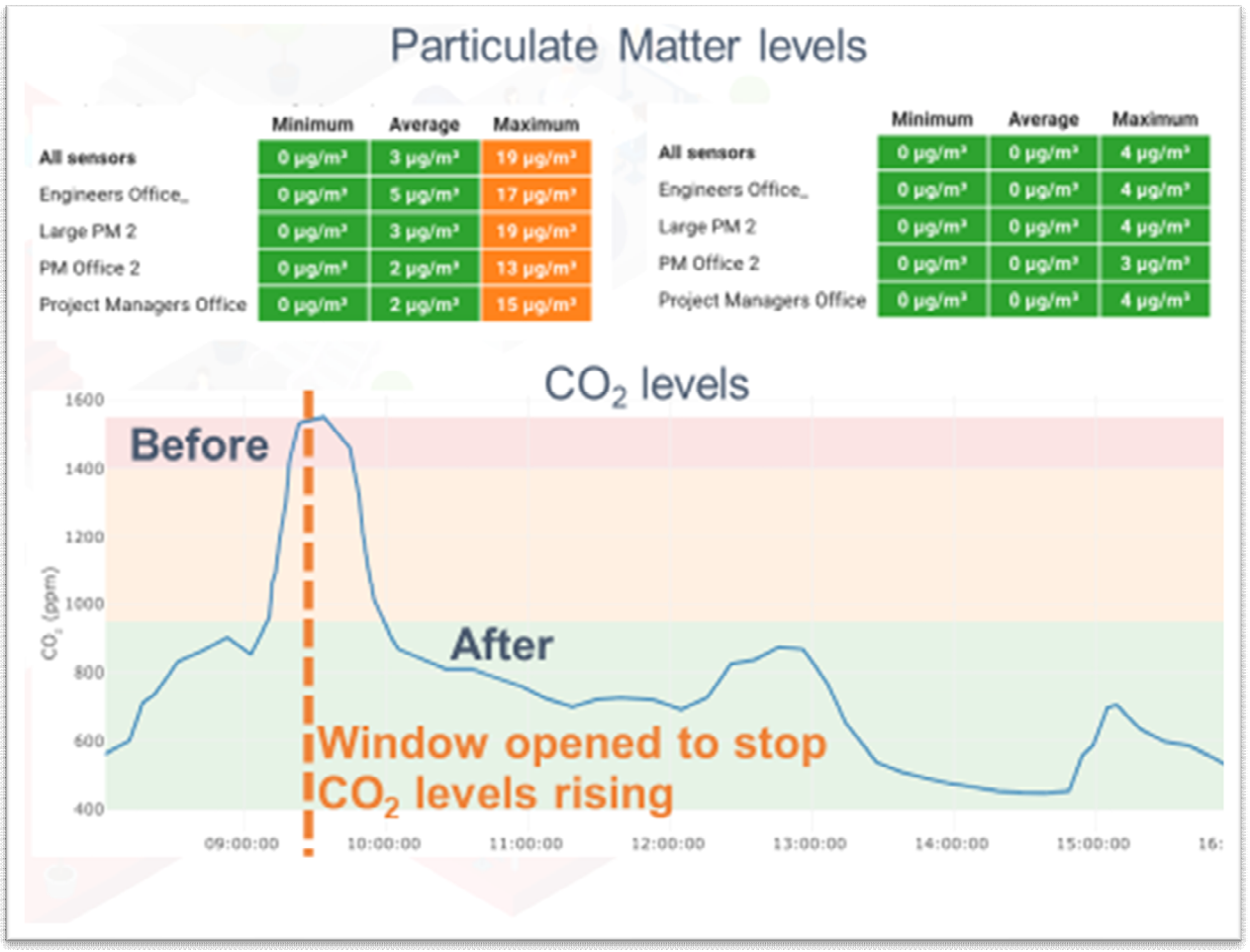
Safe Air improvements	Before	After
Measurement	IAQ wasn't measured so we had no data other than how we felt.	With the air now being measured and the dashboard information available we now know what happens & can improve air quality by opening windows & doors.
CO_2 levels	CO_2 levels in unventilated rooms would regularly exceed guidelines (link), which: • Increases viral transmission risk • Reduces cognitive ability	CO2 levels are now measured and as such the team are able to see when they are rising and look to open doors and windows to bring some fresh air into the space as it is currently unvented.
Awareness and Action	Increased awareness due to COVID, but no workplace metrics to act upon.	Detailed IAQ metrics now available. Awareness and essential training fulfilled.
Air Purification	None	The air in each office is now being cleaned with Clear displays indicating the quality of the air.
Behavioural Change	Decision making was made on personal preference rather than real IAQ metrics.	People are acting upon the information & alerts provided. Opening windows & doors, etc.
Wellness & Feel Good	With no air purification and measurement of CO2 and PM levels the area was not set up for promoting staff confidence in the space.	There has been a noticeable improvement in Air Quality with positive comments from staff and some hay-fever sufferers saying their symptoms are reduced in the office.


DASHBOARD
COMPARE
REFRESH
SHARE
HELP
LOGOUT
FIRST FLOOR - BRADFORD OFFICE
Search
SOURCES
STAIRS
Temperature °C for Office-BB
CO₂
0 Ideal
0 OK
0 Marginal
2 Poor
1 Unhealthy
1918ppm 17:26 - 29 Sep 21 Office-SD First Floor - Bradford Office
1865ppm 17:24 - 29 Sep 21 Office-BB First Floor - Bradford Office
2061ppm 17:25 - 29 Sep 21 Office-PA First Floor - Bradford Office
Humidity
0 Too dry
0 Fairly dry
2 Optimal
0 Fairly humid
0 Too humid
60% 17:26 - 29 Sep 21 Office-BB First Floor - Bradford Office
57% 17:18 - 29 Sep 21 Office-SD First Floor - Bradford Office
Temperature
0 Cold
0 Cool
2 Comfortable
0 Warm
0 Hot
22.4°C 17:26 - 29 Sep 21 Office-BB First Floor - Bradford Office
22.9°C 17:18 - 29 Sep 21 Office-SD First Floor - Bradford Office
WiFi Occupancy
Total occurances:
11


STAIRS
Motion Events
2 Unoccupied
0 Recent (Light)
1 Recent
0 Occupied (Light)
1 Occupied
Motion threshold
1'
5'
10'
30'
1h
2h
3h
4h
6h
Unoccupied 17:49 - 28 Sep 21 Desk-AR First Floor - Bradford Office
Recent 17:53 - 28 Sep 21 Desk-BH First Floor - Bradford Office
Unoccupied 17:45 - 28 Sep 21 Desk-SD First Floor - Bradford Office
Occupied 17:54 - 28 Sep 21 PIR023 First Floor - Bradford Office

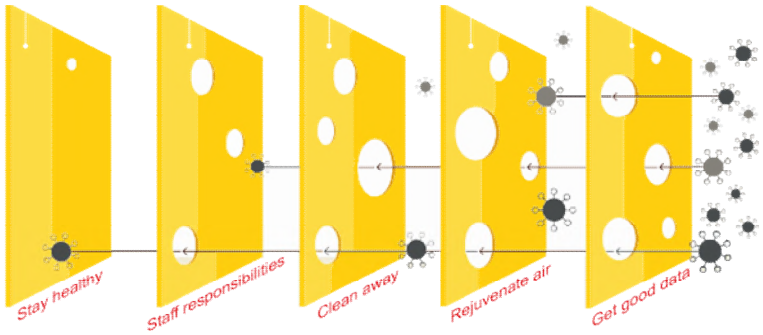

GROUND FLOOR - BRADFORD OFFICE
Search
SOURCES
Selected Sensors
CLEAR ALL
Base Sensor - Upstairs
Base Unit - Ground Floor
Office-BB
Office-BB
Office-SD
Office-SD
Available Sensors
Show All
Meeting Room
Meeting Room
Showroom
Showroom
Training Room
WiFi Occupancy
CO₂ (ppm)
Particulate Matter (µg/m³)
Temperature (°C)
Mon 20 Sep '21
Tue 21
Wed 22
Thu 23
Fri 24
Sat 25
Sun 26
Mon 27
Tue 28
Wed 29


AIRBASE-LITE
AIRBASE-PRO
AIRQ-PRO
AIRQ-MAX
AIRQ-INDICATOR
AIRQ-LITE
AIRBASE-LITE3G
PCOUNT-PRO
PCOUNT-LITE
AMBIENT-DUO


Particulate Matter levels
Minimum Average Maximum
All sensors 0 µg/m³ 3 µg/m³ 19 µg/m³
Engineers Office_ 0 µg/m³ 5 µg/m³ 17 µg/m³
Large PM 2 0 µg/m³ 3 µg/m³ 19 µg/m³
PM Office 2 0 µg/m³ 2 µg/m³ 13 µg/m³
Project Managers Office 0 µg/m³ 2 µg/m³ 15 µg/m³
Minimum Average Maximum
All sensors 0 µg/m³ 0 µg/m³ 4 µg/m³
Engineers Office_ 0 µg/m³ 0 µg/m³ 4 µg/m³
Large PM 2 0 µg/m³ 0 µg/m³ 4 µg/m³
PM Office 2 0 µg/m³ 0 µg/m³ 3 µg/m³
Project Managers Office 0 µg/m³ 0 µg/m³ 4 µg/m³
CO2 levels
Before
After
Window opened to stop CO2 levels rising
CO2 (ppm)
1600
1400
1200
1000
800
600
400
09:00:00
10:00:00
11:00:00
12:00:00
13:00:00
14:00:00
15:00:00

9. What does the solution look like?

We are constantly adapting to the problem



To simplify:

1st phase know your problem with data to record before and after benchmarks.

2nd phase rejuvenate and sanitise the air when people are not affecting it, say in an empty office at 4 AM.
That can be a solution like dry-micro misting the air with a biocide to kill off any and all pathogens including spores, unwanted bio material etc, or pulling all the air in and out of a UV-c light chamber over many hours, catching all the dead particles in a HEPA filter for disposal at a later time or before people return.

Note: please never use Ozone it works too well and kills all living things dead.

Remove the inert dead dust from the floor and surfaces with an air filtration system or cleaning method like HEPA filtration or a cleaners micro cloth.

Repeatedly test the air for returning abnormal levels of CO_2, particulate matter, and abnormal gas to react to, normally with sensors in key areas and database.

Verify cleanliness with spot testing of surfaces with ATP test and microbial test.

Display all data for public awareness and problem solving.

Give people personal responsibility for own workspace space and don't put all the responsibility onto the cleaners.

Staff responsibilities:

Wash or sanitise your hands in SMS-HOCl or soap / hot water every 3 hours sanitise your work surface and high touch areas with SMS spray every 3 hours

Look at wellbeing score, or air/surface quality score on information screen and adapt to keep clean and safe as possible.
Report any possible concerns for actioning.

10. What does the future hold?

Now that we are aware of the devastating change a recuring virus can make to our workplace and wellbeing we want to be more individually responsible for minimising future problems to us and our workplace.

We will be encouraged, and legislated to provide a safe environment to work in.

This includes us all, to change our habits and not to allow our workplace to host unwanted pathogens, spores, and decay.

To slow down the evolution of viruses we need to create a hostile environment for them, that will slow them down allowing us to out-evolve them and test new automated defence systems.

This is done with common sense and effort and a bit of science.

Basic rules as I see it:

Don't give an enemy food,
Viruses and other pathogens feed on our waste, so clean your waste up and think about your actions like spilling food or picking spots.

Make time to clean your workspace and don't depend on the cleaners to come in.

Take personal responsibility to clean your own desk every 3 hours and your hands regularly, making it harder for any problems to happen. If you use an organic biocide like SMS you will have a positive impact on your environment and will reduce the risk of problems to you and others in your workspace.

Information on YouTube: SmartMister - YouTube

END of education

OUR PREFERED SERVICE

Sanitisation & Decontamination Micro-misting Service

Anti-viral
Anti-bacterial
Anti-mould
Anti-odour
Anti-pollen
Anti-pollutant


BluTest

Test Report: EN 14476 2013 Chemical disinfectants and antiseptics – Virucidal quantitative suspension test for chemical disinfectants and antiseptics used in human medicine - Test method and requirements (phase 2/step 1)

We share the same workspace make it safe with SmartMister

Professional antiviral and antibacterial Sanitisation to include mould eradication in air purification.

SmartMister provides a comprehensive sanitisation, disinfection and decontamination for service for businesses premises to the Well Building standard level of recommendations. Whether you've had a confirmed case of Coronavirus or you simply want to take precautionary measures with lockdown restrictions easing, our dry micro-misting technology is the optimum solution to ensure smooth operation and peace of mind for customers and staff following sound advice and guidance from the Well Building Standard.

Our deep clean solution sanitises business premises, creating safe spaces that are cleaned to hospital-grade standards with no harsh chemical bi-products that are harmful to you or the environment.

We use a two-step dry micro-mist process to kill any existing germs, viruses, and pathogens and lay down an anti-microbial film on all surfaces, touchpoints, and equipment.

This ensures any pathogen introduced to the premises in high-traffic areas, following our treatment are eradicated and add a lasting defence.

By using our innovative, dry micro-misting technology we can cover large areas with a uniform SMS biocide and achieve a comprehensive coverage of all surfaces seen and unseen.

Our SMS mist creates positive air pressure, meaning our biocide fills the entire volume of the room or building until it comes into contact with every surface and pathogen in the air.

‘Mould begins to grow as soon as its spores land on a damp, fibre-rich material (wood, fabric, wall…) and it can spread around the office within 24 to 48 hours in high humidity. It colonises in one- to twelve-days and grows one square inch per day. In less than a week, it can cover surface areas of several square feet if it has a welcoming environment like high humidity and plant life blown in from an open window or discarded food from staff lunch.

A professional, therefore, would look to apply a mould treatment in a systematic and comprehensive way, in order to attain a near-total coverage of your workplace and its constituent parts (this requires commitment, ingenuity and knowledge).

Complete infection control
The smartest way to a healthier environment

Testing and sampling for pathogens and mould in air and on the surfaces

SmartMister offer a comprehensive air quality and mould testing service to determine the level of risk in your workplace.
We collect samples of microorganisms from the air and the surfaces to be analysed under close inspection, from which we can produce vital information about the air quality and level of threat that any spores / moulds and other particulate matter may pose to your health and wellbeing, we also record gases like Co2 and VOC as indicators.

Tools used:

Pin, IR thermal, ATP, PH, Air quality (Co2, PM1-10, VOC, T/H), tape test to identify species under microscope plus years of experience.

Treating the mould and spores identified to clean the air and surfaces

We can treat both visual and airborne mould and pathogens in your workplace.
Airborne mould particles can be especially hard to detect as they are not visible to the human eye, so specialist technology is required, such as those below.
We use a dry 4 micron biocide gas to reach all areas that can't be seen, then re-test after treatment to determine LOG reduction and levels of eradication and air safety.

How does SmartMister (SMS) dry micro-misting work?

SmartMister dry micro-misting (fogging) with SMS (SmartMister Solution) is a proven method of significantly decreasing or eradicating mould, spores, and pathogens, from both surfaces and air.
SmartMister is the only misting environmental remediation technology which can simultaneously eradicate surface, airborne and hidden mould and pathogens.
This treatment is safe for people, pets, and your furniture. It is made from de-mineralised electric water and salt. SMS particles encapsulate the contaminants and oxidise the shell starving them to death whilst changing the pathogens environmental conditions.
HOCl is a naturally occurring biocide found in humans, capable of eradicating human pathogens / bacteria on contact, and moulds in hours, not weeks like other treatments.
HOCl is in our lungs now keeping us safe from spores and other pathogens in the air.
The SmartMister treatment method delivers a uniformed amount of SMS-HOCl using air as a transport medium, the dry mist SMS will remain on surfaces for many years if not disturbed adding long term protection and creating a hostile environment for moulds.
The SMS particle size of 4 microns will suspend in the air humidity and not damage surfaces or condense to water.
The SMS will permanently change the Ph value of the environment making it hostile to microbial life for many years helping your wellbeing and not putting spores into the air.
SMS is free from any harsh chemicals. The solution is non-toxic and non-hazardous which is safe for human contact and the environment. It's also safe to use in food preparation areas and on clothing / packaging to many BS/EU standards.
SMS is tested and complies with the European and British Biocide Regulations.

We also successfully comply with the following regulations:
EU-directive 1999/45/EC EU 528/2012 and meet biocidal efficacy standards to BSEN 1276, 13704, 14476, 13727, 1650, 14204, 13697) and has proven to be very effective in peer reviewed application studies across infection control in professional healthcare.

Introduction to the treatment

The two-step procedure creates a more effective method than traditional tear out, and replace procedures normally at significantly lower cost and time requirements.

Surface: SmartMister creates positive air pressure meaning our biocide is forced to dwell on every conceivable surface and at 4 microns enters into the grain.
The positively charged SMS and the changed environmental Ph change will act fast.

Airborne: As the mist is 'dry', it can't condense, meaning it dwells in the air eradicating all spores and harmful mycotoxins and pathogens harmful to mammals.

Hidden: A uniform delivery of the mist is forced under floorboards, behind cavity walls and into soft furnishings and textiles.

Lasting prevention: Using the same technology, we lay our anti-microbial film on all surfaces which prevents future mould growth.

SMS has proved effective against micro-organisms including, but not limited to:

Bacteria:
Campylobacter jejuni, Escherichia coli including (0157), Enterococcus species, Helicobacter pylori, Listeria
Legionella pneumophila, Pseudomonas aeruginosa, Staphylococcus aureus (including MRSA), Samonella - cholerasuis, Mycobacteria tuberculosis, Mycobacterium avium intracellulare, Acineobacter baumannii

Bacterial Endospores:
Bacillus cereus, Bacillus subtilis, Clostridium difficile, Clostridium sporogenes

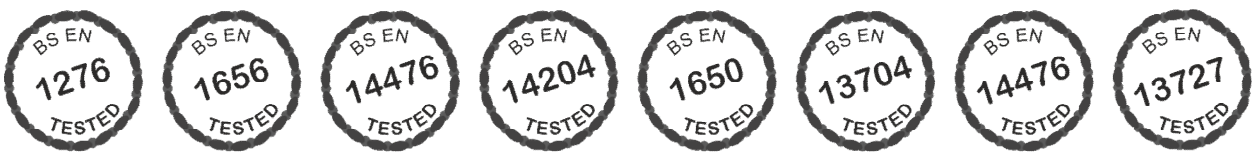
Fungi:
Aspergillus niger, Candida albicans, Trichophyton mentagrophytes

Viruses:
Adenovirus type 4, Bacteriophage Ms2, Hepatitis A & B, Herpes type 1, HIV-1, Infectious bronchitis, Influenza including H1N1, H5N1 and H7N9, MS2 virus, Norovirus (Human and Murine), Orthopoxvirus, Polio enterovirus 1 & 2

Yeasts:
Zygosaccharomices bailii, Candida albicans

Moulds
Botrytis (grapy mould), Powdery mildew

Protozoa
Cryptosporidium muris, Cryptosporidium parvum



Not all fogging is created equal

You'd be forgiven for thinking fogging is fogging – that one professional mould removal expert who uses it is much the same as the next. But the reality is quite different. There is quite a spectrum of fogging techniques, each with their own relative set of strengths and limitations.

Do-it-Yourself fogging and cleaning

Ryobi RY18FGA-0 18V Cordless Fogger/Chemical Sprayer, 18 V
★★★½☆ 113
£129.99
prime FREE delivery by Tuesday,

Before you order a fogger from Amazon and a chemical you read about on Google, we just want to acknowledge the benefits and limitations of the DIY methods at your disposal. A quick Google search, or even intuition, might point you in the direction of that bottle of bleach or ammonia sitting under your sink.

But, if you were mulling that over, we'd urge you to reconsider. Bleach does not destroy mould, it just depigments it. This means that the mould is less or no longer visible but very much still alive, breathing spores and harmful mycotoxins into the airspace.

Ammonia can work or kill you trying if **not** used properly and on the correctly identified problem.

Mould is a living organism which has defence mechanisms refined by natural selection over millions of years in some cases (if you have cleaned your shower mould then it comes back).

When threatened, it will spore more aggressively into your airspace.

If you spray it with any generic over the counter cleaning product, all you achieve is to aggravate it.

Doing so inadvertently makes the problem worse. It increases the number of airborne spores seeking out new places to take root and grow as well as the harmful mycotoxins which attach themselves to them. Doing-it-yourself will probably get rid of the visible mould for a time.

But, when it comes back, which it will, it will probably be worse than the first time.

Most importantly of all, it also increases the risk to your health posed by the increase of airborne mycotoxins and the horror show of illnesses they cause or exacerbate in the vulnerable staff.

GOV.UK

Mosquito Spraying and Fogging

UK SAGE Say's not recommended for people

Common questions and answers:

Is Our Treatment Non-toxic?

Yes, if you're exploring the services offered by mould removal and decontamination companies, you're likely curious as to the safety of the specialist mould treatment they use. Below we discuss the safety of our own mould remediation technology and specialist mould cleaning services.
If you're aware of the toxic properties and by products of household mould, then you're highly likely to want to identify a non-toxic treatment to resolve the problem.
After all, why replace the toxic agents of the mould with toxic chemicals?
At SmartMister, we're proud of our non-toxic treatment process. As a heath-first mould decontamination and removal company, we're extremely conscientious with regard to the substances we use to eradicate the mould.

Is Fogging Safe?

Following our treatment, your office will be a healthier place for you and your staff to work. Your airspace will be free of mould spores and the toxic agents they produce like mycotoxins, pollen, pathogens, spores, glucans, hyphal fragments etc will be significantly reduced.
Furthermore, SMS is a mineral-based solution. This means it's a naturally occurring chemical compound (electric water and salt). This is important as the way in which it 'kills' mould and pathogens is mechanical. In other words, it doesn't change the organic property of a mould cell. It physically eradicates the mould. This means it won't change the organic properties of the cells in your body or have a negative reaction with you or your environment.

Do I have mould or just bad air?

Perhaps you've noticed a patch of black mould growing as a result of a recent leak or condensation problem. Or maybe you have a wider mould problem or health symptoms that would indicate the presence of airborne mould and mycotoxins in the office.
An air quality test and a surface test can show you what you can't see or use a microscope.

How do you treat the problem?

We identify the problem with comprehensive testing of air and surfaces.
We dry micro-mist a non-toxic chemical compound into the office as one part of a wider treatment plan: our biocide, SMS and our SmartMister automated delivery device.
Our dry micro-mist is the means by which we eradicate any harmful mould and render it inert, meaning it can be removed safely in addition to stopping it from coming back.
It's important to note, however, the misting is just a part of a wider treatment plan.
This means we understand how the delicate balance of humidity, air temperature, surface temperature, structural integrity, air pressure and ventilation combine to cause mould growth. When we remediate your mould problem, we tailor our approach to take into account all of the variables within your workplace.

SmartMister Solution (SMS):

Our biocide solution to eradicate pathogens and mould is our technology, created in the UK.
We are the manufactures of the solution.
We can give COSHH and chemical registrations on request and also show certification of effectiveness from BS and EU standards authorities.

SMS breaks down into **two parts**, **salt** and **water vapour** leaving a fine grey powder (salt) to keep or clean away as desired.
Both of these are common non-hazardous chemicals that can be purchased over the counter in any supermarket and are part of our body's natural immune system.
At the point at which you return in the morning to your workplace the SMS will have broken down into two harmless by-products and any dead organic matter can be cleaned away safely.

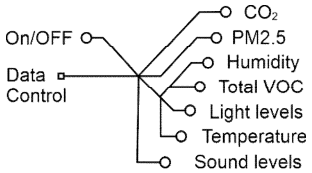
More importantly, SmartMister's small particle size of 4 microns forces the biocide into such a small particle size that it is unable to condense into water droplets.
This is what gives the micro-misting its characteristic 'dryness'.
This means the micro-mist doesn't condense on surfaces but rather dwells in the air.
It's this property that facilitates SmartMister's unique ability to eradicate airborne mould spores and reduce harmful mycotoxins as well as killing all viruses.
The SMS dry micro-mist creates positive air pressure by filling the airspace with SMS until the entire volume of the room is filled. This means the biocide is forced to dwell against every surface and find every conceivable space in a room.
This is how we achieve systematic and comprehensive coverage. Because it can't condense, once we open the windows upon concluding the first phase of treatment, the air pressure falls and the biocide disperses, or we can use a dehumidifier for speed if required.
Harmless though it is, there'll be very little active SMS remaining in your office at the conclusion of the treatment.
We can add an anti-microbial film if required to protect problematic areas longer.
We apply it once all mould in the office has been eradicated and wiped away. It forms a covalent bond with all surfaces which prevents mould from coming back. The anti-microbial film is made up of positively charged molecules. Microscopically, it looks like a bed of nails as the salt atoms create a spike. Any new pathogens introduced to the property following our treatment are electrostatically attracted to the positive charge and the spike pierces the outer membrane, denaturing the microbe and allowing the environmental Ph change to kill from within the cells.

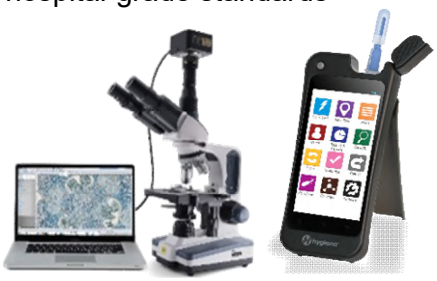
Deep clean - infection control for your business

We administer our biocide SmartMister Solution (SMS), using our dry micro-mister.
It kills on contact all viruses and bacteria on surfaces and in the air, guaranteeing comprehensive sanitisation and then moves onto the mould.
This creates a safe environment for the cleaners and staff to maintain.
SmartMister sanitising in the evening and air filtration in office hours is ideal.

Data-driven

Our SmartMister ensures all areas fall within RLU pass thresholds. We use the ATP Cleaning Verification System to ensure all areas are sterilised to hospital-grade standards and provide results post-treatment.
As well as tape test for microscopic examination, we also use handheld air sensors and specialised calibrated tools





Ongoing cover

We can install a small desktop unit that can be scheduled to run in the evening to keep on top of any potential problems and maintenance to keep your air and surfaces free from viruses, spores and pathogens, then use a daytime unit to capture any people- related particles newly introduced in office hours.

BS EN 1276 TESTED · BS EN 1656 TESTED · BS EN 14476 TESTED · BS EN 14204 TESTED · BS EN 1650 TESTED · BS EN 13704 TESTED · BS EN 14476 TESTED · BS EN 13727 TESTED

Peace of mind and after treatment:

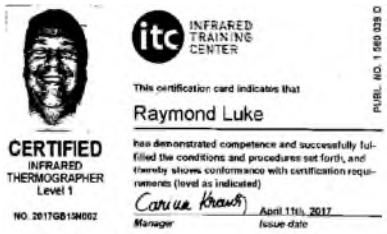
You'll get an array of educational materials from us, both digital and physical, to let your staff and customers know how seriously you're taking the cleanliness of your building's workspace.
We are happy to educate and inform your staff in a group meeting.

Real-world example of work to remedy findings

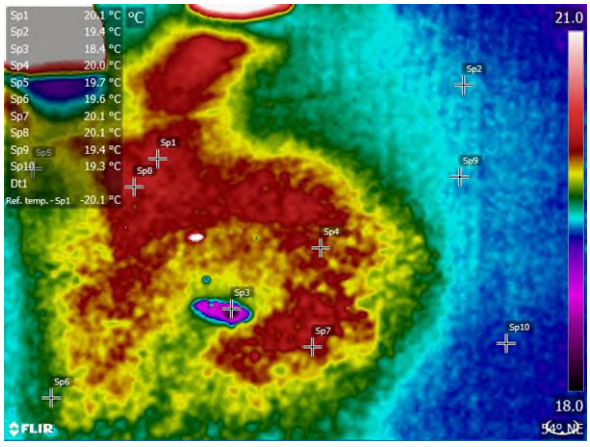
Some details redacted

AIR QUALITY AND THERMOGRAPHY Report

Thermographer:



FLIR MR77 FLIR T660



CUSTOMER / SITE:	HS2 building
ADDRESS:	London
THERMOGRAPHY DATE:	1st September 2021
THERMOGRAPHER:	Raymond Luke

Testing and sampling

Solar Ready Ltd offers a comprehensive air quality and mould testing service to determine the level of risk in your workplace.

We collect samples of micro-organisms from the air and the affected surfaces to be analysed under close inspection, from which we can produce vital information about the air quality and level of threat that the moulds may pose to your health and wellbeing.

Tools used:
Pin, IR thermal, ATP, PH, Air quality (Co2, PM1-10, VOC, T/H), Scrape Tape test to identify species under microscope and also years of experience.

Treating the mould and spores identified to fix air

We have treated both visual and airborne mould/spores in your workplace. Airborne mould particles can be especially hard to detect as they are not visible to the human eye, so specialist technology is required, such as those below.

We use a dry 4 micron biocide gas to reach all areas that can't be seen, then re-test after treatment to determine LOG reduction and levels of eradication and air safety.

Treatment	Location	befour	after
Humidity	ground floor room 11	87%	48%
PM 2.5	ground floor room 11	11	27
CO2	ground floor room 11	504	813
Microbial load	ground floor room 11	RED	GREEN
ATP RLU	ground floor room 11	3265	62
Tape test	ground floor room 11	RED	GREEN
PM10	ground floor room 11	21	44

How does SmartMister (SMS) dry micro-misting work?

SmartMister dry micro-misting (fogging) with SMS (SmartMister Solution) is a proven method of significantly decreasing or eradicating mould, spores, and pathogens from both surfaces and air.
SmartMister is the only misting environmental remediation technology which can simultaneously eradicate surface, airborne and hidden mould and pathogens.
This treatment is safe for people, pets and your furniture. It is made from de-mineralised electric water and salt. SMS particles encapsulate the contaminants and oxidise the shell starving them to death whilst changing the pathogens' environmental conditions.
HOCl is a naturally occurring biocide found in humans, capable of eradicating human pathogens / bacteria on contact and moulds in hours, not weeks like other treatments.
HOCl is in our lungs now keeping us safe from spores and other pathogens in the air.
The SmartMister treatment method delivers a uniformed amount of SMS-HOCl using air as a transport medium. The dry mist SMS will remain on surfaces for many years if not disturbed, adding long term protection and creating a hostile environment for moulds.
The SMS particle size of 4 microns will suspend in the air humidity and not damage surfaces or condense to water.
The SMS will permanently change the Ph value of the environment making it hostile to microbial life for many years helping your wellbeing and not putting spores into the air.
SMS is free from any harsh chemicals. The solution is non-toxic and non-hazardous which is safe for human contact and the environment. It's also safe to use in food preparation areas and on clothing / packaging to many BS/EU standards.
SMS is tested and complies with the European and British Biocide Regulations.
We also successfully comply with the following regulations:
EU-directive 1999/45/EC EU 528/2012 and meet biocidal efficacy standards to BSEN 1276, 13704, 14476, 13727, 1650, 14204, 13697) and has proven to be very effective in peer reviewed application studies across infection control in professional healthcare.

Introduction to the treatment

The two-step procedure creates a more effective method than traditional tear out and replace procedures, normally at significantly lower cost and time requirements.

Surface: SmartMister creates positive air pressure meaning our biocide is forced to dwell on every conceivable surface and at 4 microns enters into the grain.
The positively charged SMS and the changed environmental Ph change will act fast.

Airborne: As the mist is 'dry', it can't condense, meaning it dwells in the air eradicating all spores and harmful mycotoxins and pathogens harmful to mammals.

Hidden: A uniform delivery of the mist is forced under floorboards, behind cavity walls and into soft furnishings and textiles.

Lasting prevention: Using the same technology, we lay our anti-microbial film on all surfaces which prevents future mould growth.

Medisol have proved effective against microorganisms including, but not limited to:

Bacteria:
Campylobacter jejuni, Escherichia coli including (0157), Enterococcus species, Helicobacter pylori, Listeria
Legionella pneumophila, Pseudomonas aeruginosa, Staphylococcus aureus (including MRSA), Samonella - cholerasuis, Mycobacteria tuberculosis, Mycobacterium avium intracellulare, Acineobacter baumannii

Bacterial Endospores:
Bacillus cereus, Bacillus subtilis, Clostridium difficile, Clostridium sporogenes

Fungi:
Aspergillus niger, Candida albicans, Trichophyton mentagrophytes

Viruses:
Adenovirus type 4, Bacteriophage Ms2, Hepatitis A & B, Herpes type 1, HIV-1, Infectious bronchitis, Influenza including H1N1, H5N1 and H7N9, MS2 virus, Norovirus (Human and Murine), Orthopoxvirus, Polio enterovirus 1 & 2

Yeasts:
Zygosaccharomices bailii, Candida albicans

Moulds
Botrytis (grapy mould), Powdery mildew

Protozoa
Cryptosporidium muris, Cryptosporidium parvum

Examination (3rd level of testing)

Open all the inspection hatches in ceiling grid, to perform visual and tools tests

Use IR camera to examine void and contrast media on identified high risk area

Use pin and temperature / moisture test

Use air particle test to look for active spores

Use IR camera to examine carpet and contrast media on identified high risk areas

Take tape swabs to help identify species under a microscope

Take air flow readings in void and check for dead air and spores

Findings

Some ceiling void areas that have mould are shown on floorplan pictures below

Some contaminated flooring areas are identified on below floor plan

This helps us understand the abnormal air quality

Moulds and funguses are identified and are treatable in the time restraints agreed

Treatment

Flooring:

Spray flooring with SMS biocide and allow to dry naturally
Vacuum inert material away
after 24 hours dry-mist with SMS and allow to settle for 3 hours

Ceiling void:

Spray with biocide at 6-14 microns and allow to dry naturally
Allow to settle
Use UV-c light wand on any dark moulds
Seal all hatches and dry-mist with SMS and allow to settle for 3 hours
remove humidity to below 50%

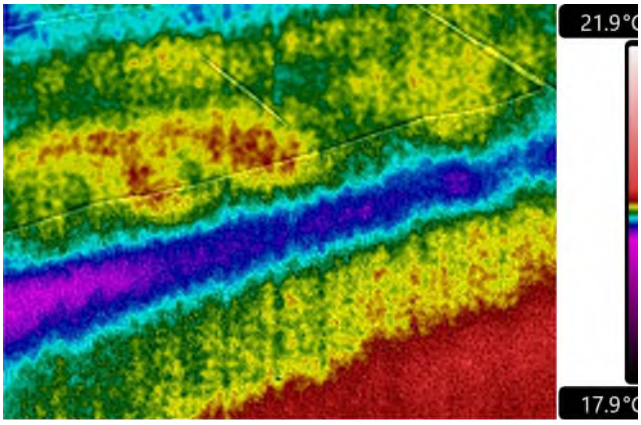
Open furthest away hatch and perform Ph, ATP & air-particle test to prove saturation

Allow positive air pressure to normalise in void.

Picture of flooring that tests positive for high moisture and poor air quality 3rd floor see floor plan

FLIR0366.jpg | 346° N 01/09/2021 | 14:00

Measurements	
Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00

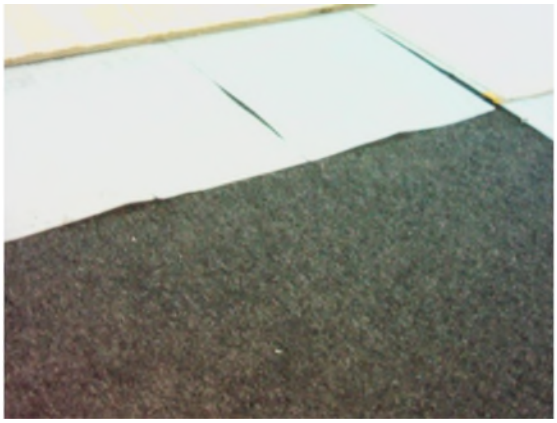


Text annotation

3rd floor water under glue

File information

Created	01/09/2021 15:00:46
File name	FLIR0366.jpg
File size	1096 KB
Width	640
Height	480
Minimum temp.	19.6 °C
Maximum temp.	20.2 °C



Text annotation

In the top picture the darker the colour the cooler the water
The red is showing a reaction to the SMS and is a good indicator that the mould it being killed off

The bottom picture is mould taken with a tape test and revealed under a microscope as red mildew mould
This a form of red mould

Measurements

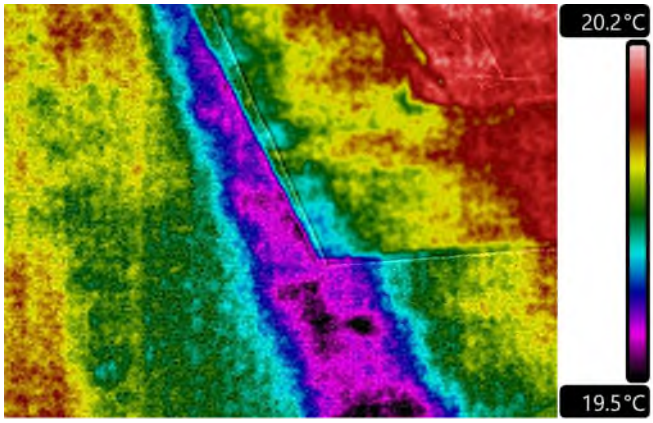
Meterlinks

Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00

Text annotation

3rd floor water under glue

In the top picture the darker the colour the cooler the water
The red is showing a reaction to the SMS
and is a good indicator that the mould it being killed off



FLIR0367.jpg

Camera information

Camera model	FLIR T660
Camera serial	55909930
Range max.	150.0 °C
Range min.	-40.0 °C
Field of view	24.99

Note
3rd floor water under glue

FLIR0370.jpg | 64° NE 01/09/2021 | 14:04

Measurements	
Ambient temperature of room	= 20.0c
Lowest temperature of void	= 18.3c
Highest temperature of the void	= 23.0c

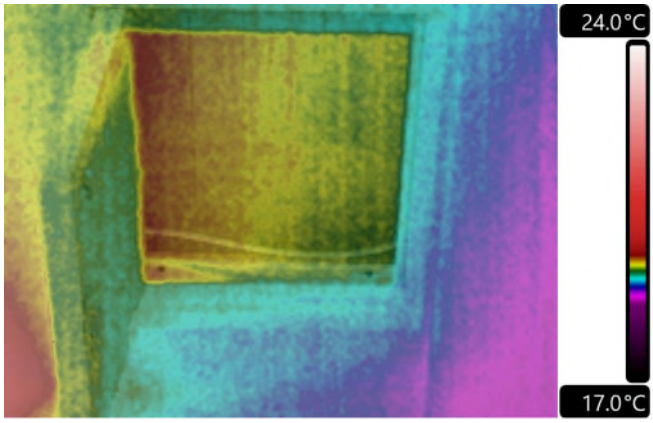
Meterlinks

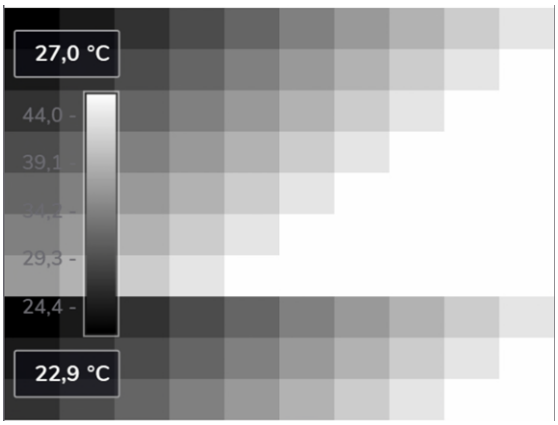
Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00

Text annotation

Mould in this void reacted to SMS and burnt off within 3 minutes

No further action required





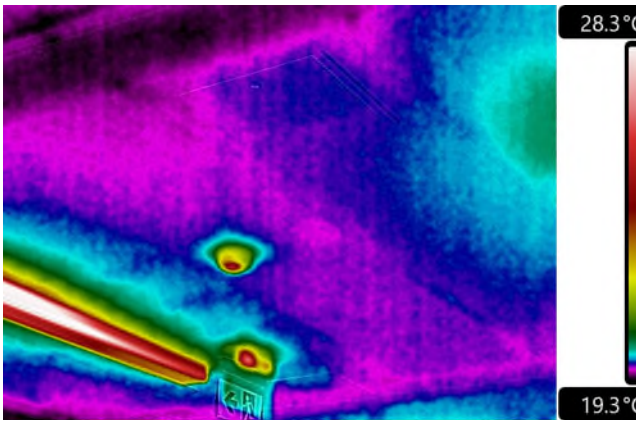
Note

FLIR0374.jpg | 287° W 01/09/2021 | 14:06

Measurements	
Ambient temperature of room	= 20.0c
Lowest temperature of void	= 17.8c
Highest temperature of the void	= 26.3c

Meterlinks

Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00



Text annotation

Note

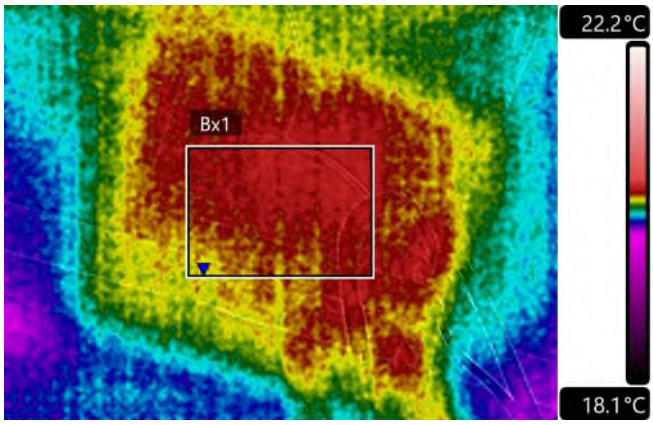
Heat from the lights and sensor is rising and accumulating in the void between the fire brakes above and increasing the humidity.This will help mould and spores grow and spreadThe spores will find way into office air and some into peopleMould needs high humidity for water and no direct sun light to grow it gets food from people's skin and dust.RECOMMENDATIONS:Add anti-mold HOCl boards into the void to stop microbial life forming.Or add mechanical ventilation with air quality sensors

FLIR0376.jpg |

01/09/2021 | 14:07

Measurements	
Bx1 Average	20.4 °C
Bx1 Maximum	20.5 °C
Bx1 Minimum	20.3 °C

Ambient temperature of room = 20.0c
Lowest temperature of void = 19.0c
Highest temperature of the void = 21.5c



Meterlinks

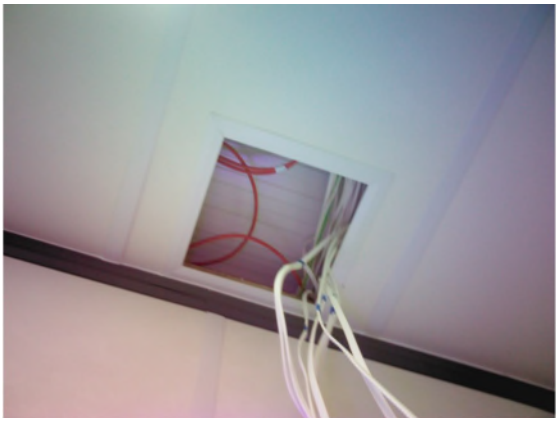
Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00

Text annotation

Mould spores detected with high ATP count of RLU 3056
No active mould in void

No actions required after 2nd treatment

ATP LH after treatment 24 hours later RLU 82



FLIR0377.jpg |

01/09/2021 | 14:07

FLIR0378.jpg | 246° SW

01/09/2021 | 14:08

01/09/2021 | 14:52

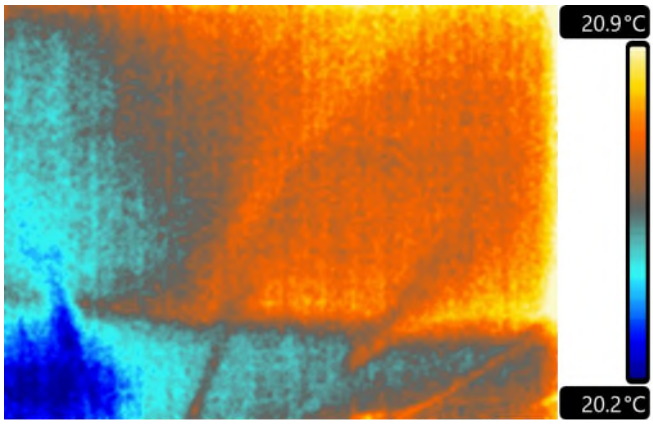
Measurements

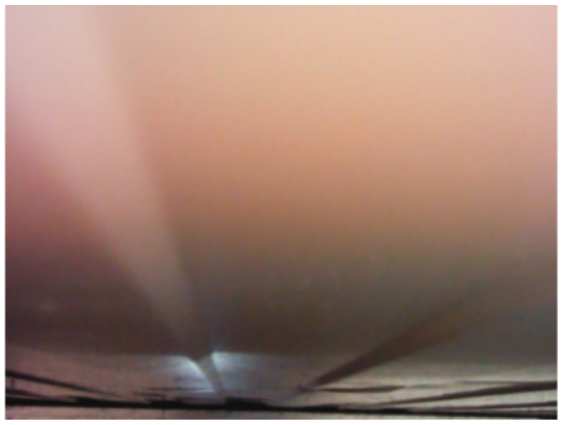
Meterlinks

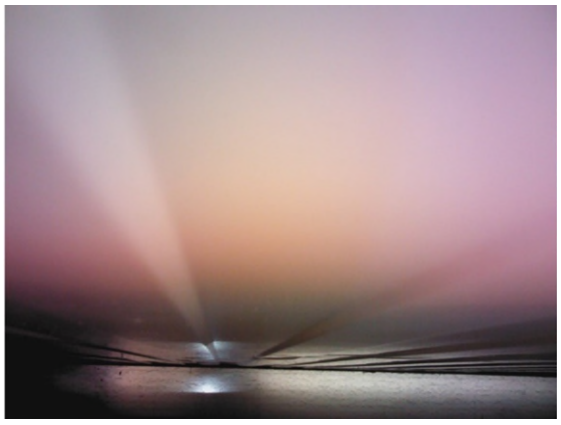
Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00

Text annotation

No problems after 1 treatment







Note

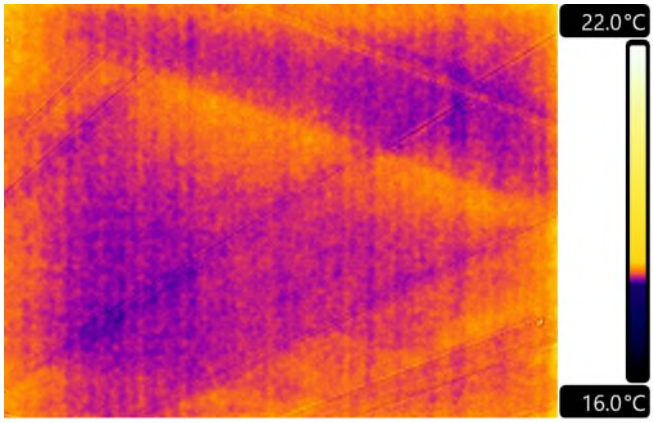
FLIR0384.jpg | 140° SE 01/09/2021 | 14:53

FLIR0396.jpg | 29° NE 01/09/2021 | 15:51

Measurements

Meterlinks

Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00



Text annotation

2nd floor
Water trapped in boards

No hasards

Note

FLIR0400.jpg | 146° SE 01/09/2021 | 16:04

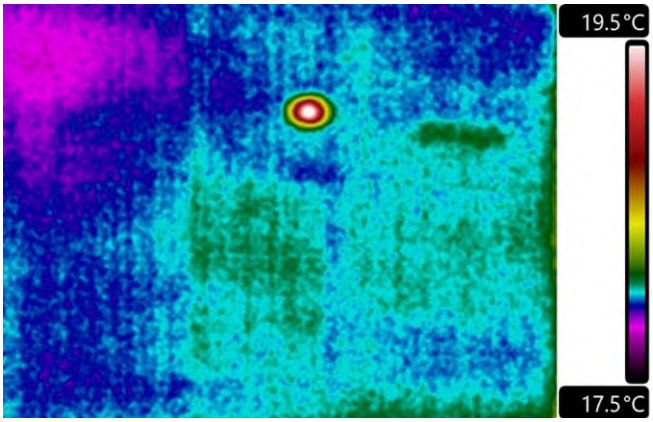
Measurements	
Areas	-

Meterlinks

Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00

Text annotation

High levels of microbial life all eradicated



Note
flooring

FLIR0402.jpg | 151° SE 01/09/2021 | 16:04

Measurements

Meterlinks

Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00

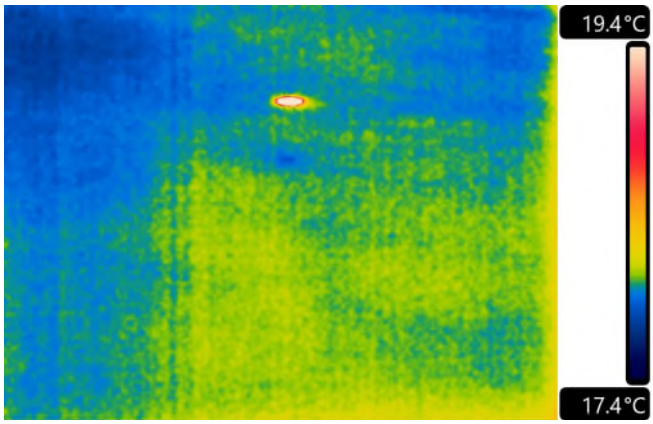
Text annotation

4th floor outside meeting room near fire escape

High microbials and dirt

Some water in flooring near outside wall

No life no problems found

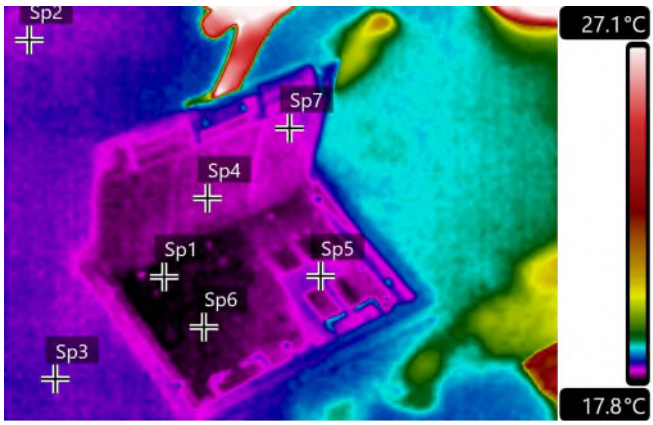


Note

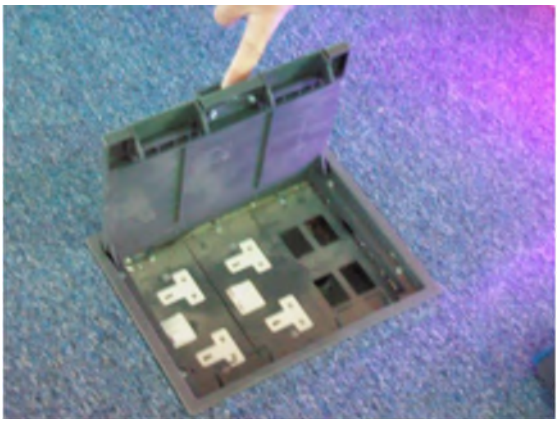
FLIR0404.jpg | 344° N 01/09/2021 | 16:06

Measurements	
Sp1 Value	17.9 °C
Sp2 Value	18.2 °C
Sp3 Value	18.3 °C
Sp4 Value	18.0 °C
Sp5 Value	18.2 °C
Sp6 Value	17.9 °C
Sp7 Value	18.2 °C

Meterlinks



Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00



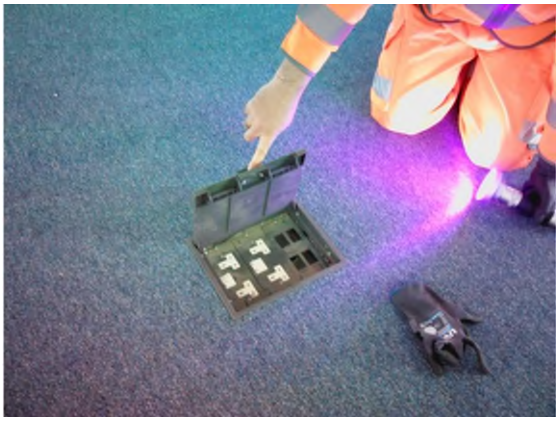
Text annotation

3rd floor need trapped water under flooring

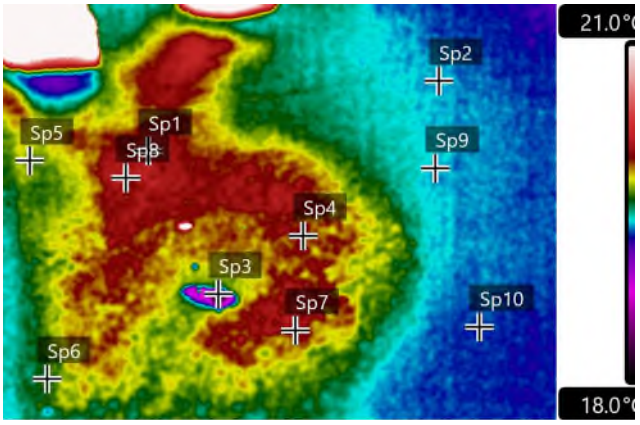
Water vaper is slowly leaking out the floor panel

Will dry out the floor by spring 2022

No spores in air but 80% RH



FLIR0405.jpg | 01/09/2021 | 16:06



FLIR0410.jpg | 54° NE

15/09/2021 | 20:21

Measurements	
Sp1 Value	20.1 °C
Sp2 Value	19.4 °C
Sp3 Value	18.4 °C
Sp4 Value	20.0 °C
Sp5 Value	19.7 °C
Sp6 Value	19.6 °C
Sp7 Value	20.1 °C
Sp8 Value	20.1 °C
Sp9 Value	19.4 °C
Sp10 Value	19.3 °C

Meterlinks

Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00

Ground floor near gym

Live microbial life reacting to SMS sprey

All good after 2nd spray and 2 hours

FLIR0420.jpg | 285° W

15/09/2021 | 20:52

Measurements

Ground floor reacting and killing high amounts of spores

Fixed after 4 hours and 2 treatments

Source was found in nurses room and removed

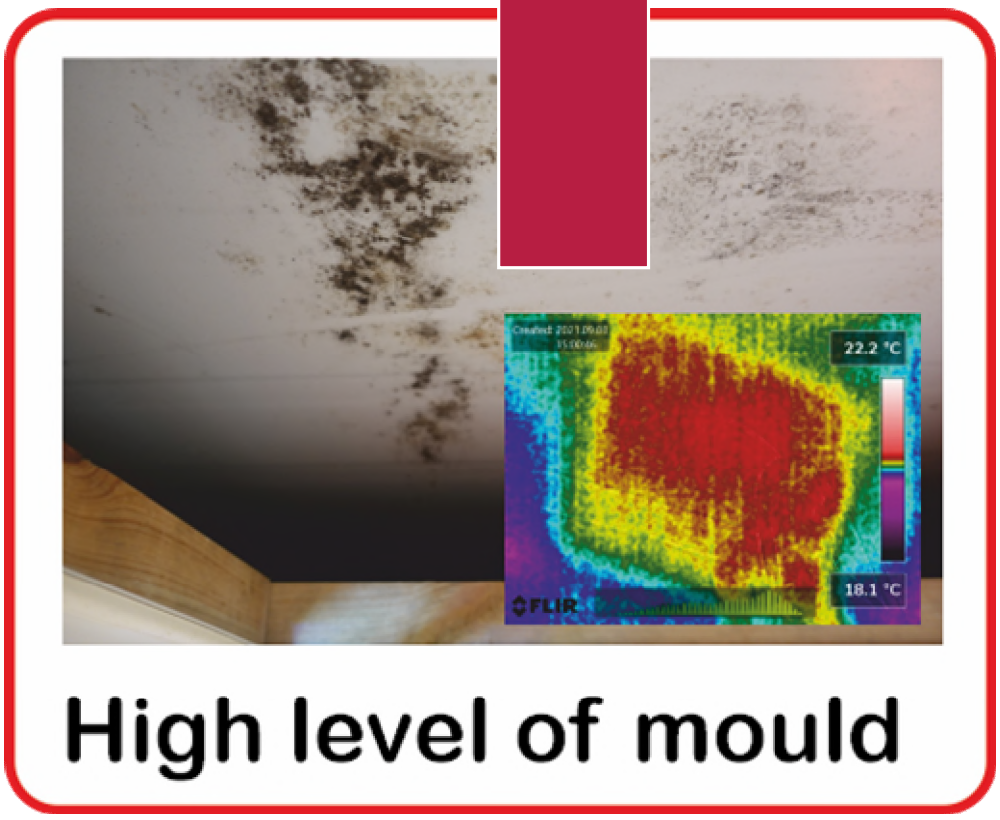
Parameters	
Emissivity	0.95
Reflected temperature	20.0 °C
Distance	1.0 m
Atmospheric temperature	20.0 °C
Relative humidity	50%
External optics temperature	20.0 °C
External optics transmission	1.00

Dry micro-misting SMS at positive pressure

UV-c and bio tape highlighting organic mater

PM2.5 SMS particles well above minimum requirements of 144 to eradicate the problems in the air

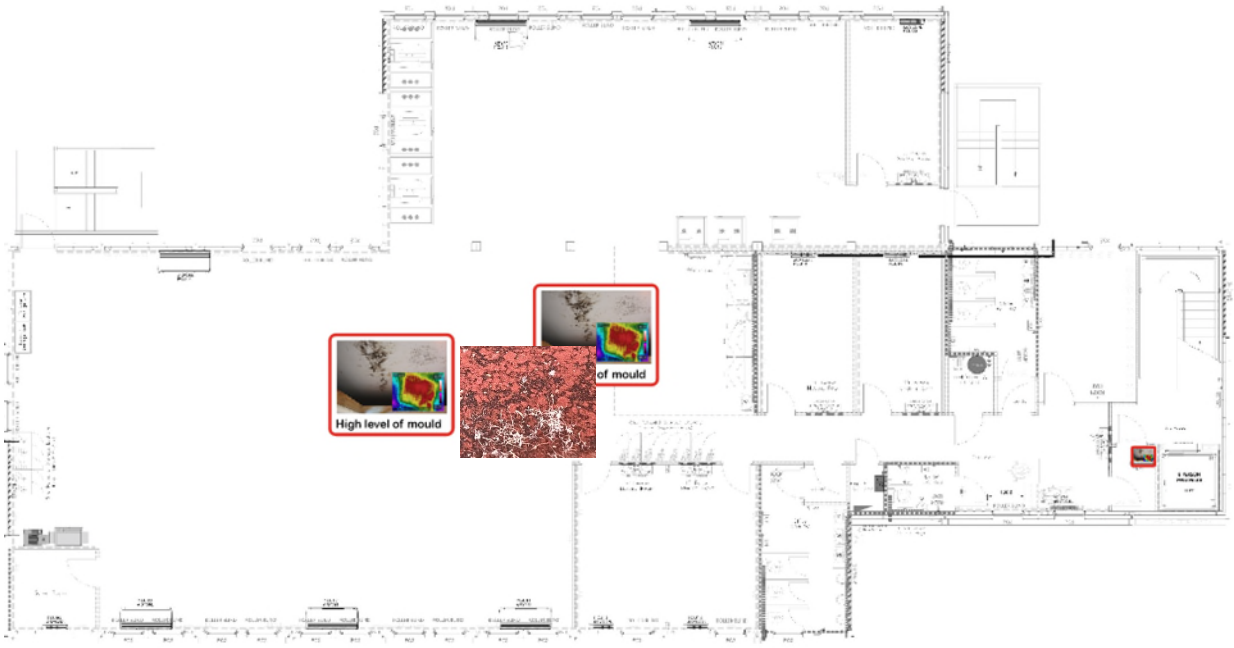
Dry micro-mist at 4 microns pumped at 180 L per minute creatin a positive pressure in void



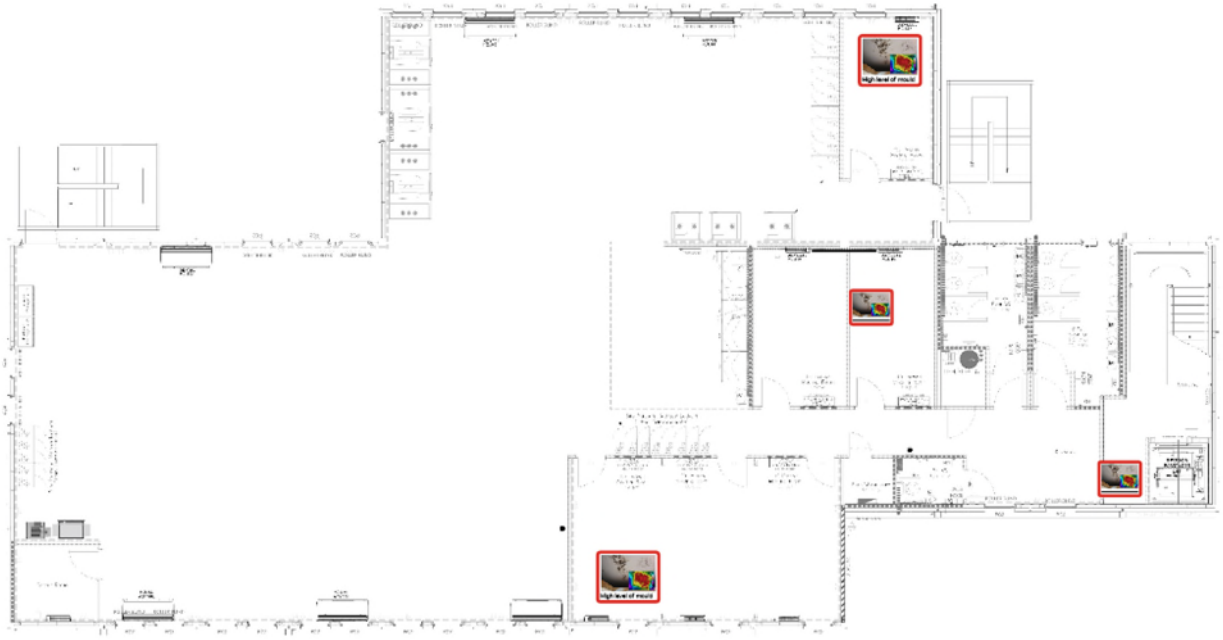
High level of mould

granby terrace first floor

FIRST FLOOR (Granby Terrace Bridge Compound Office / Welfare Building)

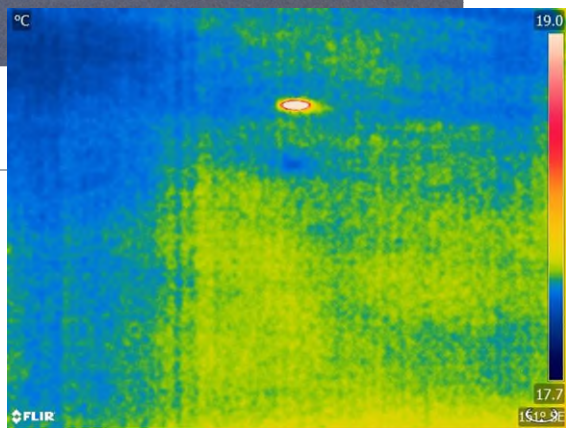


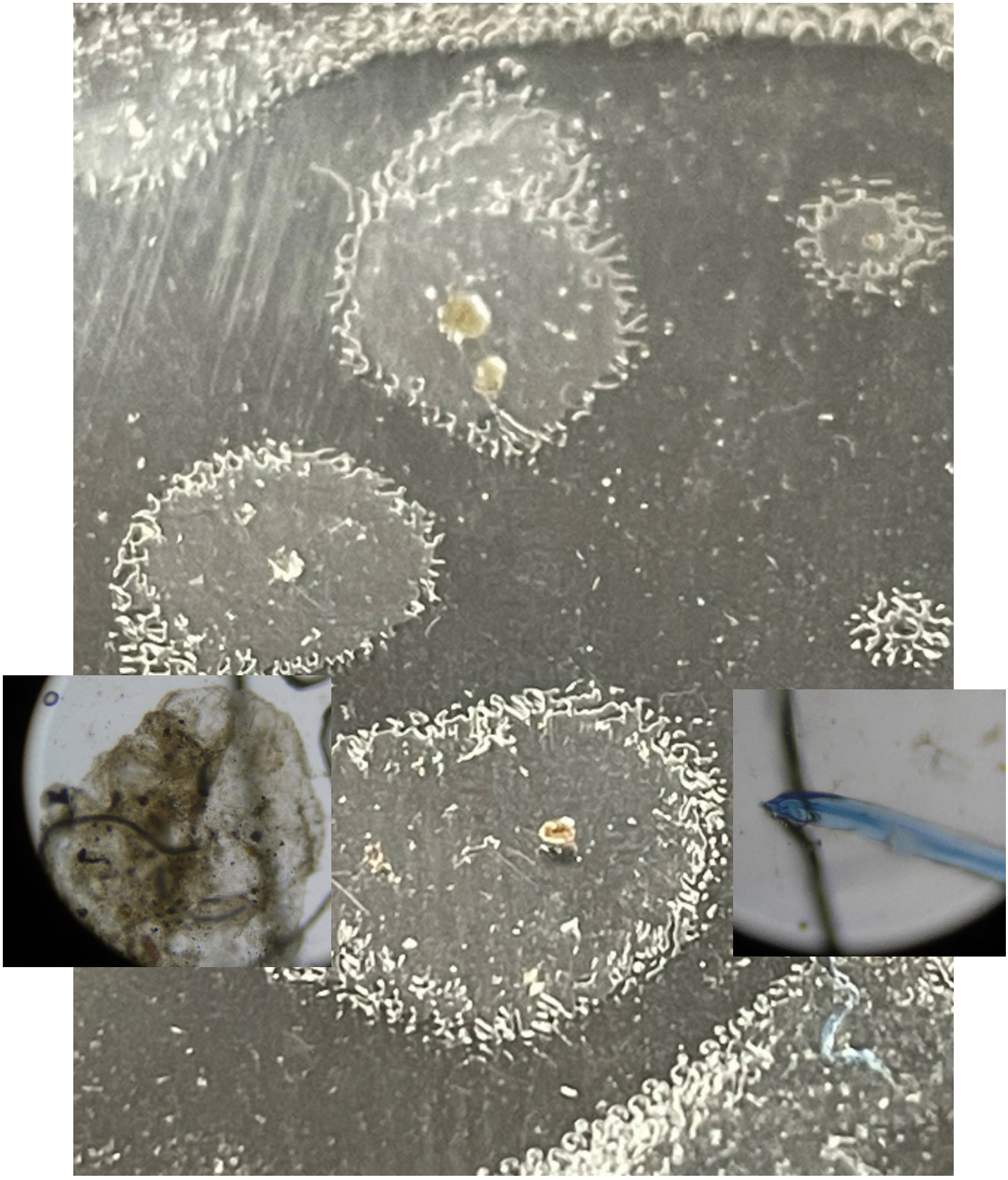
THIRD FLOOR (Granby Terrace Bridge Compound Office / Welfare Building)



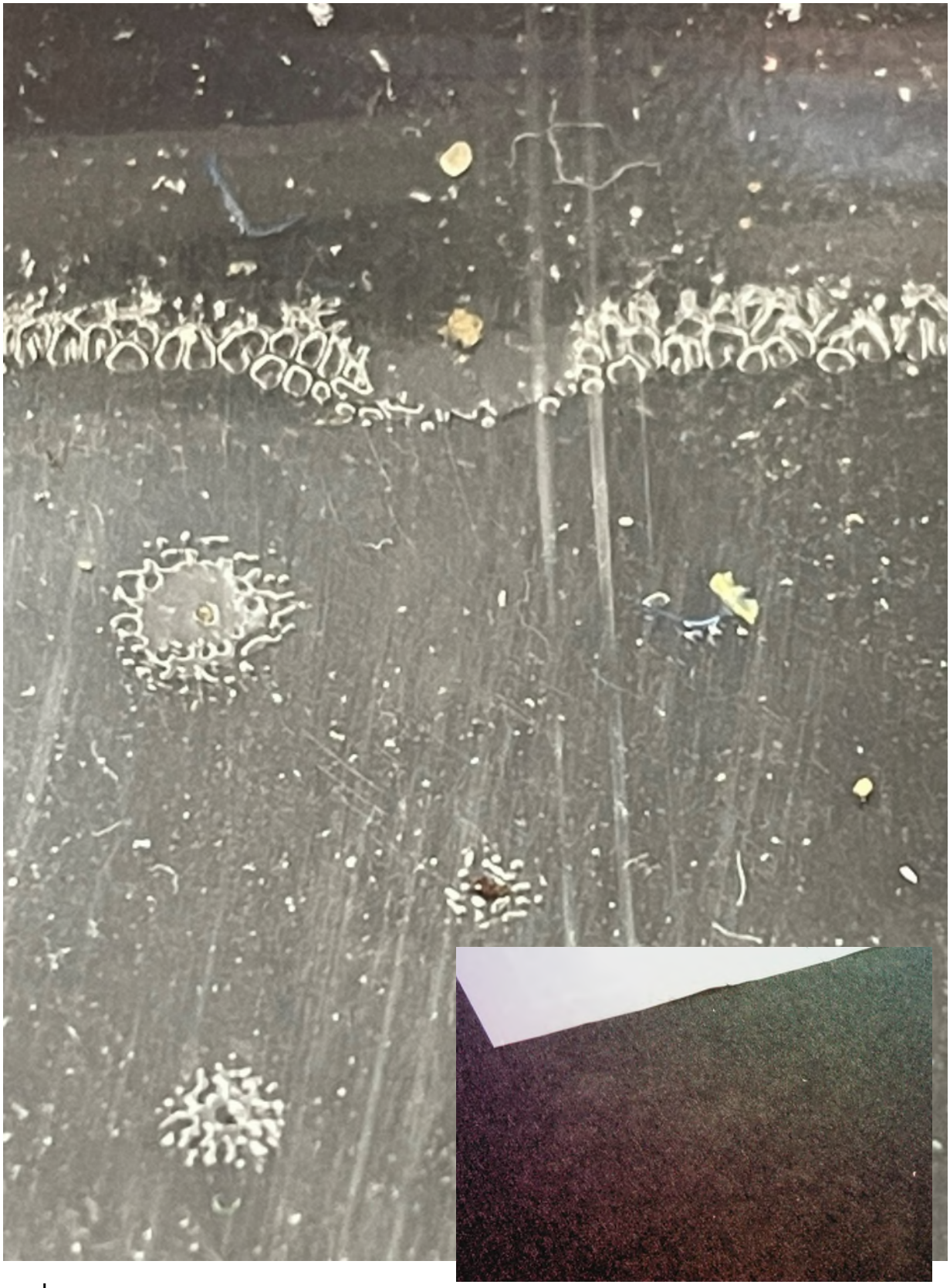
granby terrace-fourth floor

Mould eradication



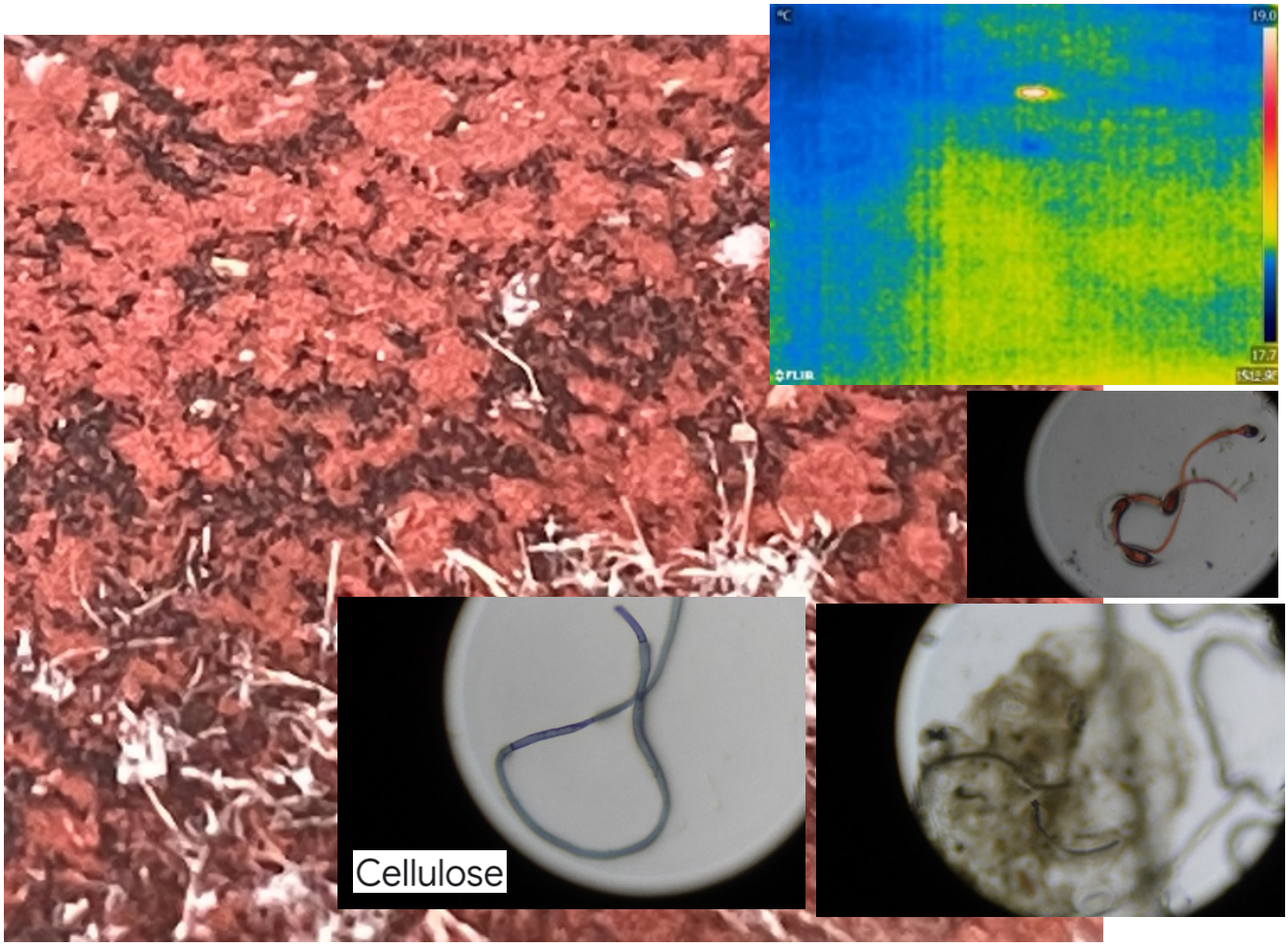


Serpula lacrymans



3rd floor damp flooring

Mildew has a **damp, musty, pungent scent** often resembling the smell of wet socks or rotting wood.

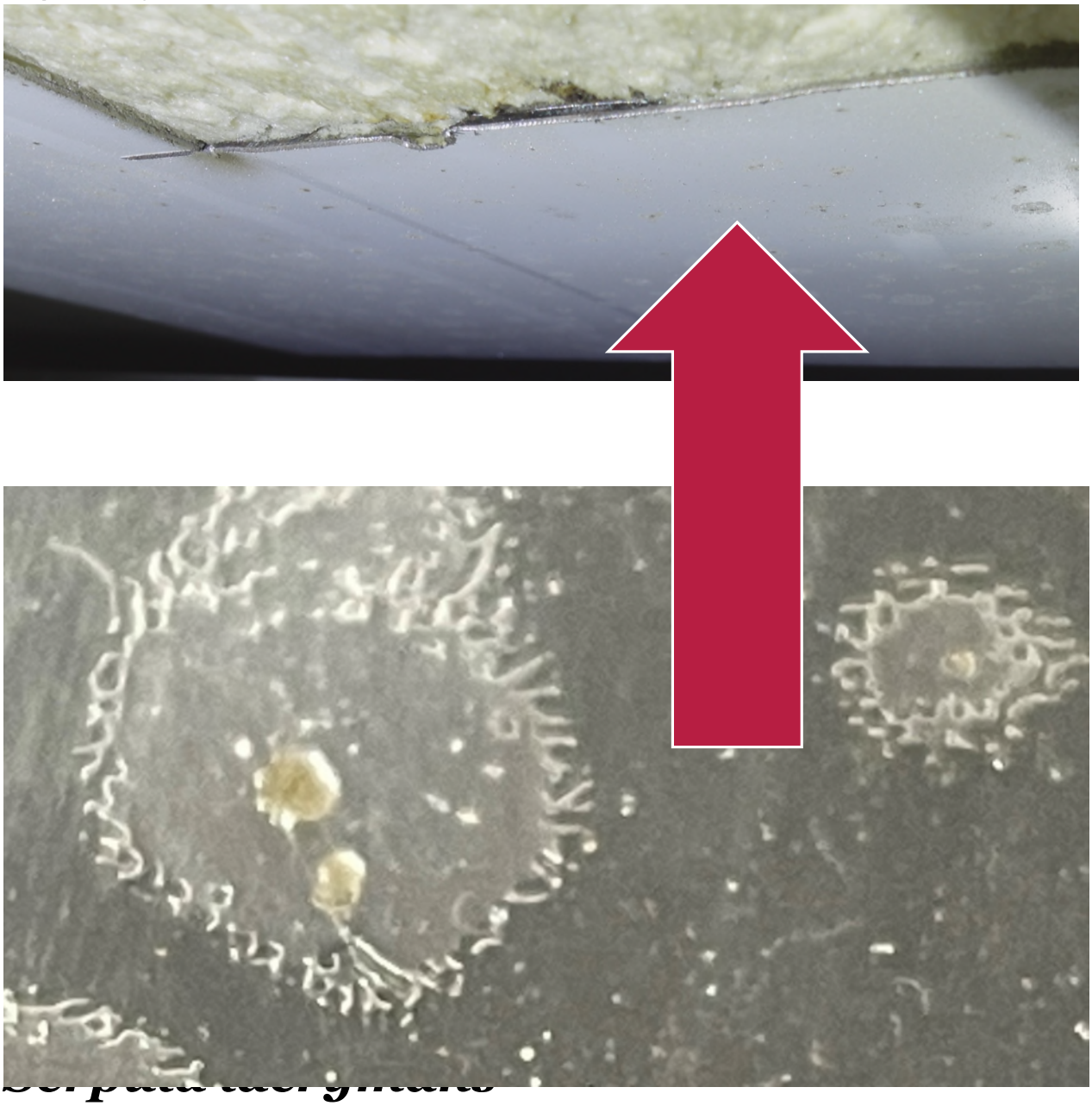


Mildew

From Wikipedia, the free encyclopedia

Mildew is a form of fungus. It is distinguished from its closely related counterpart, mould, largely by its colour: moulds appear in shades of black, blue, red, and green, whereas mildew is white. It appears as a thin, superficial growth consisting of minute hyphae (fungal filaments) produced especially on living plants or organic matter such as wood, paper or leather.[1][2] Both mould and mildew produce distinct offensive odours, and both have been identified as the cause of certain human ailments.

Serpula lacrymans



From Wikipedia, the free encyclopedia

Serpula lacrymans is one of the fungi that cause damage to timber referred to as dry rot. It is a basidiomycete in the order Boletales. The *Serpula lacrymans* has the ability to rapidly colonise sites through unique and highly specialised mycelium which also leads to greater degradation rates of wood cellulose.

SUMMARY of files used

File Name	Date	Time	Note
FLIR0366.jpg	01/09/2021	14:00	
FLIR0367.jpg	01/09/2021	14:00	
FLIR0368.jpg	01/09/2021	14:02	
FLIR0369.jpg	01/09/2021	14:02	
FLIR0370.jpg	01/09/2021	14:04	
FLIR0371.jpg	01/09/2021	14:04	
FLIR0372.jpg	01/09/2021	14:05	
FLIR0373.jpg	01/09/2021	14:05	
FLIR0374.jpg	01/09/2021	14:06	
FLIR0375.jpg	01/09/2021	14:06	
FLIR0376.jpg	01/09/2021	14:07	
FLIR0377.jpg	01/09/2021	14:07	
FLIR0378.jpg	01/09/2021	14:08	
FLIR0379.jpg	01/09/2021	14:08	
FLIR0380.jpg	01/09/2021	14:52	
FLIR0381.jpg	01/09/2021	14:52	
FLIR0382.jpg	01/09/2021	14:52	
FLIR0383.jpg	01/09/2021	14:52	
FLIR0384.jpg	01/09/2021	14:53	
FLIR0385.jpg	01/09/2021	14:53	
FLIR0386.jpg	01/09/2021	14:56	
FLIR0387.jpg	01/09/2021	14:56	
FLIR0388.jpg	01/09/2021	14:57	
FLIR0389.jpg	01/09/2021	14:57	
FLIR0390.jpg	01/09/2021	15:23	
FLIR0391.jpg	01/09/2021	15:23	
FLIR0392.jpg	01/09/2021	15:24	
FLIR0393.jpg	01/09/2021	15:24	
FLIR0394.jpg	01/09/2021	15:24	
FLIR0395.jpg	01/09/2021	15:24	
FLIR0396.jpg	01/09/2021	15:51	
FLIR0397.jpg	01/09/2021	15:51	
FLIR0398.jpg	01/09/2021	15:51	
FLIR0399.jpg	01/09/2021	15:51	
FLIR0400.jpg	01/09/2021	16:04	
FLIR0401.jpg	01/09/2021	16:04	
FLIR0402.jpg	01/09/2021	16:04	
FLIR0403.jpg	01/09/2021	16:04	
FLIR0404.jpg	01/09/2021	16:06	
FLIR0405.jpg	01/09/2021	16:06	

END of report