Technology Care GmbH
Birmensdorferstrasse 467
8055 Zürich
Switzerland
Email: contact@technologycare.com
Tel. + 41 1 450 85 60
www.technologycare.com

Sampler Scan

Sampler ID: **131157**

Technology Care LLC based in Zurich, Switzerland, is a leading provider of environmental audits and precision cleaning in data centers. For over 25 years, many of the world's largest corporations have relied on our products and services to ensure that their critical environments consistently meet required standards. Our laboratory located in Zurich, Switzerland uses the latest, most innovative technologies to provide analysis of the highest quality. Many of our technologies have been developed in-house and as a result we have been awarded various patents and trademarks. Technology Care LLC is a member of the Swiss Contamination Control Society: SRRT-SwissCCS

Air Particle Concentration

Sampler ID: 131157
Report Date: 13.01.2022
Test Start: 13.02.2021
Test End: 21.02.2021
Exposure: 8 Days

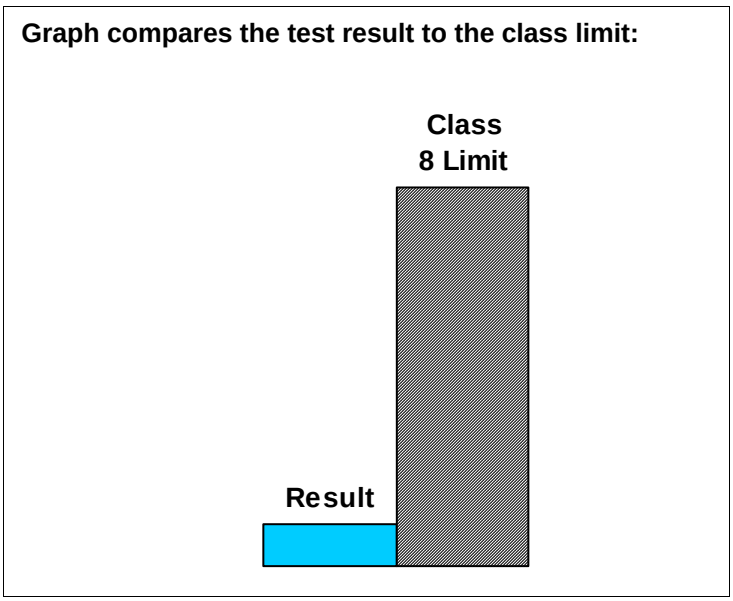
SCOPE:

The test result shows the average level of particles during the sampling period corresponding to ISO 14644-1 which is a widely accepted standard for qualifying indoor air cleanliness in terms of the concentration of airborne particles per cubic meter.

TEST RESULT:

11.10% of the ISO 14644-1 Class 8 limit

Graph compares the test result to the class limit:



ISO 14644-1 Cleanroom Classes:

Class	maximum particles/m^3						FED STD 209E equivalent
	>=0.1 µm	>=0.2 µm	>=0.3 µm	>=0.5 µm	>=1 µm	>=5 µm	
ISO 1	10	2					
ISO 2	100	24	10	4			
ISO 3	1,000	237	102	35	8		Class 1
ISO 4	10,000	2,370	1,020	352	83		Class 10
ISO 5	100,000	23,700	10,200	3,520	832	29	Class 100
ISO 6	1,000,000	237,000	102,000	35,200	8,320	293	Class 1,000
ISO 7				352,000	83,200	2,930	Class 10,000
ISO 8				3,520,000	832,000	29,300	Class 100,000
ISO 9				35,200,000	8,320,000	293,000	Room Air

Recommendations:

ISO 14644-1 Class 9: General indoor rooms.

ISO 14644-1 Class 8: Data centers, mission critical facilities, technology spaces and electronic equipment.

ISO 14644-1 Class 7: Biopharma products, sterile pharmaceuticals, electronics components, medical devices and implants; and the maintenance of sensitive aviation and avionics systems.

Bioaerosols

Sampler ID: 131157
Report Date: 13.01.2022
Test Start: 13.02.2021
Test End: 21.02.2021
Exposure: 8 Days

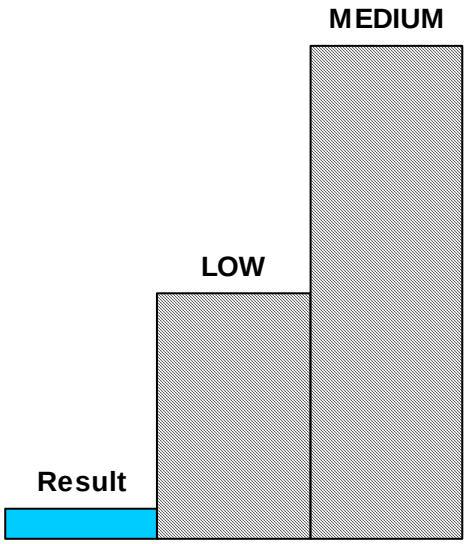
SCOPE:

The test result shows the average level of bioaerosols during the sampling period corresponding to CFU/m3. A colony-forming unit (CFU) is a unit used in microbiology to estimate the number of viable bacteria or fungal cells in a sample. Bioaerosols are an important parameter when assessing air hygiene at the workplace as well as in healthcare, pharmaceutical, cosmetics and food processing.

TEST RESULT:

Result: 63 CFU/m3 Class LOW

Graph compares the result to the LOW and MEDIUM level limits:



Bioaerosol Levels*:

Low	1-499 CFU/m3
Medium	500-999 CFU/m3
High	> 1000 CFU/m3

* Based on US National Institute for Health (NIH) and European Commission Report.

Recommendations:

Level Medium (< 1000 CFU/m3): For general indoor air (American Conference of Governmental Industrial Hygienists (ACGIH).

Level Low (< 500 CFU/m3): Hospitals and other healthcare facilities (American Conference of Governmental Industrial Hygienists (ACGIH) and the World Health Organization (WHO).

Particle Metrics

Sampler ID: 131157
Report Date: 13.01.2022
Test Start: 13.02.2021
Test End: 21.02.2021
Exposure: 8 Days

SCOPE:

The test results give valuable incites into the size and shape of particles collected by the sampler. Particles are digitally imaged and then processed using advanced image processing and analysis software. Test results which are green are within normal range and yellow if they are higher than the normal range.

Test Results:

(See next page for information)

AVG Fiber Ratio (L:W): 3.72:1
AVG Fiber Length: 75.55 microns
AVG Particle Size: 14.61 microns

Particle Deposition Rate / cm2 / Day:

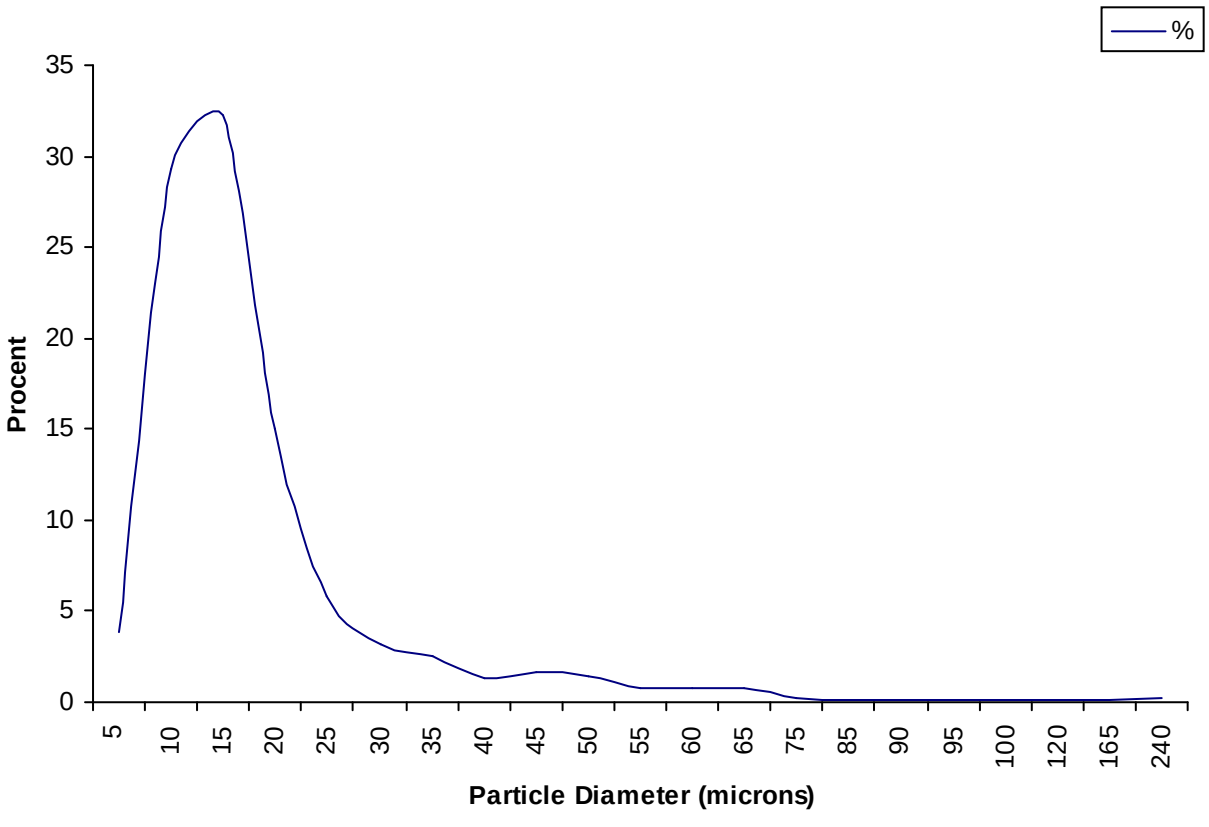
Fallout:	29599.167
All Particles:	185.071
PM10:	96.532
PM2.5:	7.173

Fiber Deposition Rate /cm2 / Day:

Fibers =>3:1 (L:W):	3.074
Fibers =>5:1 (L:W):	0.083
Fibers =>10:1 (L:W):	0

< Benchmark
=> Benchmark

Particle Size Distribution



Air Particle Metrics Report Information

Scope: This report provides advanced air particle metrics which are important when assessing contamination risks, identifying sources of contamination and improving air hygiene. For example, high levels of fibers may indicate asbestos contamination. High levels of PM10 or PM2.5 particles may indicate contamination from laser printers, combustion byproducts (e.g. smoke) and improper maintenance procedures (e.g. use of vacuum cleaners with inadequate filtration).

Benchmark: This is based on all test results in our database. Test results which are lower than the benchmark are marked green and test results which are equal to or higher than the benchmark are marked yellow.

Fallout: This is the area which is covered by particulate fallout. Unit: µm2/cm2

Particle Size: Feret diameter is used in the analysis of particle size and distribution. Unit: µm

Fibers: Fibers are defined as particles with an aspect ratio (length:width) equal to or greater than 3 :1. This definition is also commonly used for counting asbestos fibers. Fibers with aspect ratios of =>5:1 and =>10:1 are also shown.

PM10: This is particulate matter 10 micrometers or less in diameter.

PM2.5: This is particulate matter 2.5 micrometers or less in diameter. PM2.5 is generally described as fine particles.

Chlorides

Sampler ID: 131157
Report Date: 13.01.2022

Test Start: 13.02.2021
Test End: 21.02.2021
Exposure: 8 Days

SCOPE:

This test is an important indicator for inorganic contaminants with metal corrosion potential caused by contamination which contains chlorides (salt). The test results show the chloride deposition rate as well as the total amount of chlorides collected by the sampler during the sampling period.

TEST RESULTS:

Total Chloride: 0.0842 ug/cm2

The test result is lower than the limit of 5 ug/cm2 for electronic devices and installations.

Chloride Deposition Rate: 1.30 years until the limit of 5 ug/cm2 is reached.

Caution. The test result is less than 5 years which is the average life span of IT equipment. This means corrosion may cause equipment to malfunction before reaching the end of it's life cycle.

INFORMATION:

The following chloride limits, relevant in terms of corrosion chemistry, have been established by international organizations* and insurers:

- 10 µg/cm² for buildings and general installations.
- 5 µg/cm² for electronic devices and installations.

Since chloride (salt) corrodes metals, it is recommended that electronic equipment be cleaned or replaced if chloride levels exceed 5 µg/cm2. Possible sources include smoke, chemicals and acids. Elevated levels of chlorides are very serious for a technical installation since they cause severe corrosion of system components, especially when air humidity is higher than 50 RH. Even small amounts of smoke from burning PVC can cause large amounts of chlorides to contaminate equipment components. Chlorides may also be contained in concrete dust. This measurement is particularly important in assessing insurance claims resulting from damages caused by smoke or other particle events.

Because dissolved salts and other inorganic chemicals conduct electrical current, conductivity increases as salinity increases. Organic compounds like oil do not conduct electrical current very well and therefore have a low conductivity when in water.

* Source: “Comparative investigations of corrosive fire gas condensates” EMPA - Swiss Federal Laboratories for Materials Testing and Research.

pH

Sampler ID: 131157

Report Date: 13.01.2022

Test Start: 13.02.2021

Test End: 21.02.2021

Exposure: 8 Days

SCOPE:

This test is an important indicator for metal corrosion potential caused by contamination which is acidic (low pH) or caustic (high pH).The test result shows the pH of the airborne contaminants collected by the sampler during the sampling period.

TEST RESULTS (blue)

pH of contamination: 7.056 pH

Good. pH is within the 5 to 8.5 range and has little corrosive impact on most metals.

Information

When contaminants have a pH between 5 and 8.5, the pH has little corrosive impact on most metals. However, the corrosion rate increases rapidly when the pH is outside of that range. pH levels of 5 or below can lead to extreme corrosion rates and premature pitting of metallic objects. Studies* have shown that even small amounts of low pH (acidic) contaminants can corrode metals.

Metals typically develop a passivation layer with moderately alkaline (high pH) exposure, which lowers the corrosion rate as compared to acidic (low pH) exposure. While the passivation layer provides a measure of immunity to further corrosion, corrosion rates can be expected to be comparable in the transpassive region (i.e. highly alkaline versus highly acidic).

Possible sources of corrosive contaminants include smoke, chemicals and acids. This measurement is particularly important in assessing insurance claims resulting from damages caused by smoke or other particle events. In chemistry, pH is a scale used to specify how acidic or basic a water-based solution is. Acidic solutions have a lower pH, while basic solutions have a higher pH.

* Source: “Comparative investigations of corrosive fire gas condensates” EMPA - Swiss Federal Laboratories for Materials Testing and Research.