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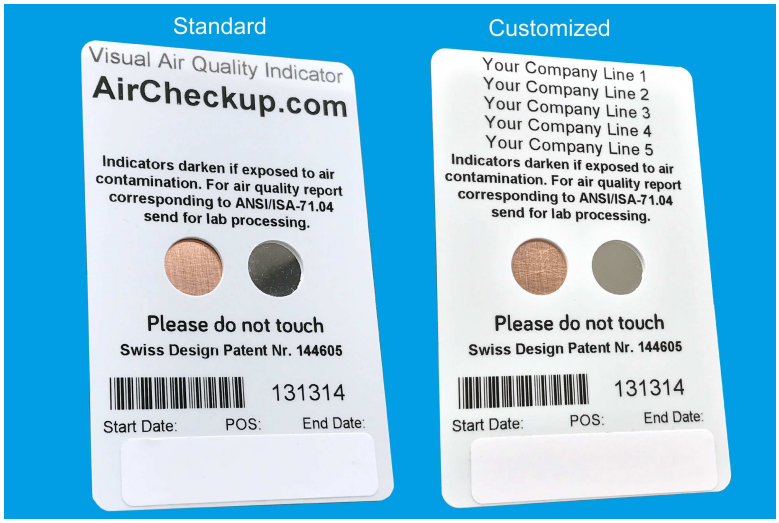
AirCheckup Sampler Report



Multilevel BOOKMARKS are included to facilitate navigation within this document. If the bookmarks are not visible (left side) click the "Bookmarks" tab or F6 key (Adobe Acrobat).

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

Contents

ISO 14644-1 Air Particle Report

Sampler ID: 130384

Report Date: 14.04.2021

Test Start: 30.12.2019

Test End: 16.01.2020

Exposure: 17 Days

SCOPE:

Test results correspond to ISO 14644-1:2015 which is a widely accepted standard for qualifying indoor air cleanliness. ISO 14644-1:2015 specifies the classification of air cleanliness in terms of concentration of airborne particles. ASHRAE recommends that data centers maintain ISO 14644-1 Class 8 or lower (see "Gaseous and Particulate Contamination Guidelines For Data Centers" - ashrae.org).

TEST RESULT:

Air particle concentration corresponding to standard ISO 14644-1

15.48% of ISO 14644-1 Class 8 (Limit for indoor air: ISO 14644-1 Class 9).

Information:

ISO 14644-1:2015 is an internationally accepted standard that specifies the classification of air cleanliness in terms of the concentration of airborne particles per cubic meter.

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

Air Particle Size Distribution

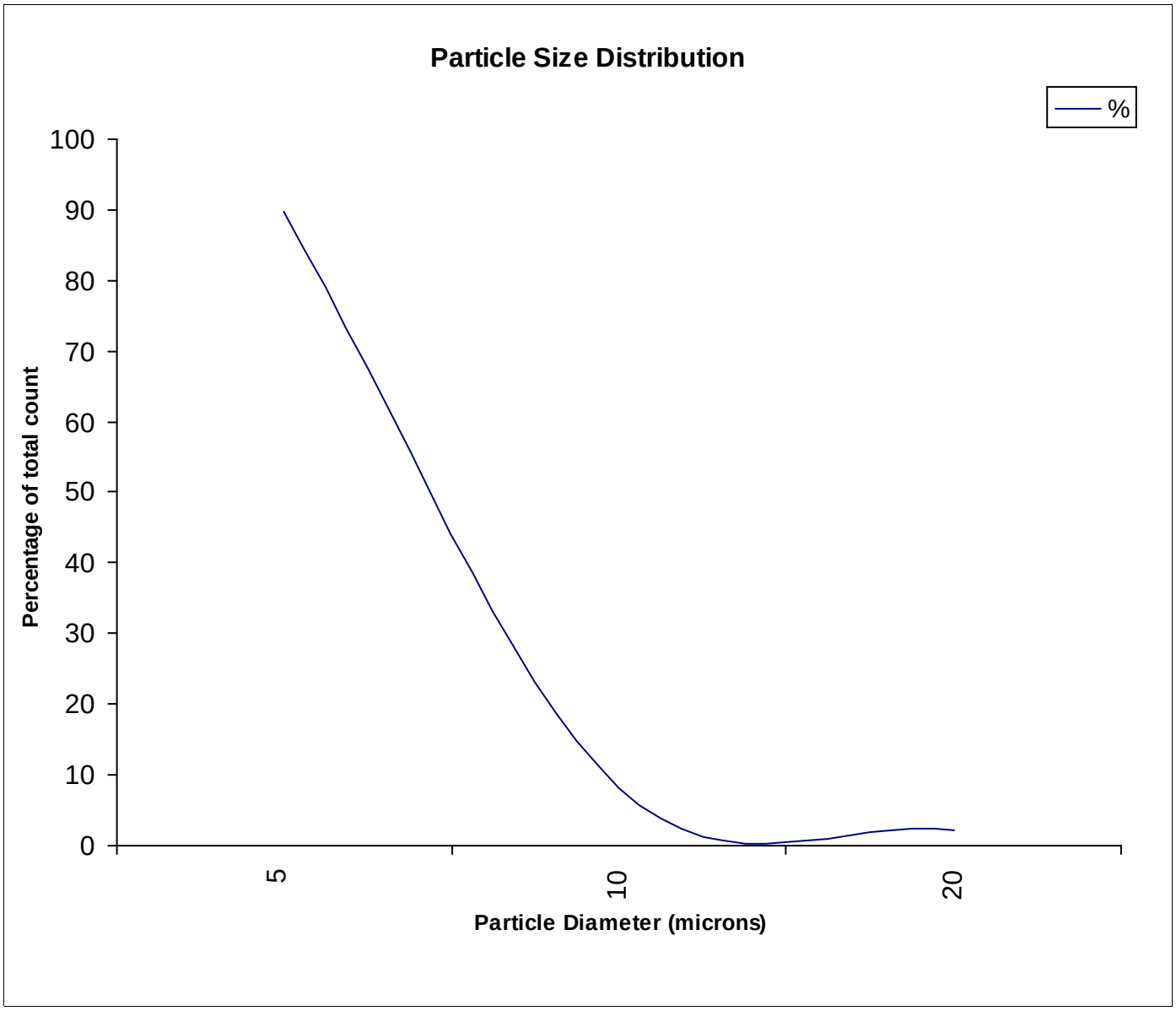
Sampler ID: 130384 **Test Start:** 30.12.2019

Report Date: 14.04.2021 **Test End:** 16.01.2020

Exposure: 17 Days

Test Results:

AVG Particle Size: 1.49 microns



Airborne Chlorides

Technologycare.com

Sampler ID: 130384

Report Date: 14.04.2021

Test Start: 30.12.2019

Test End: 16.01.2020

Exposure: 17 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: 0.2570 ug/cm2

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

Chloride Deposition Rate: 0.91 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 Report

Sampler ID: 130384

Report Date: 14.04.2021

Test Start: 30.12.2019

Test End: 16.01.2020

Exposure: 17 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: 6.800 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.