

Particles: Standard ISO 14644-1

Sampler ID: 132695

Test Start: 01.01.2023

Report Date: 01.07.2023

Test End: 01.06.2023

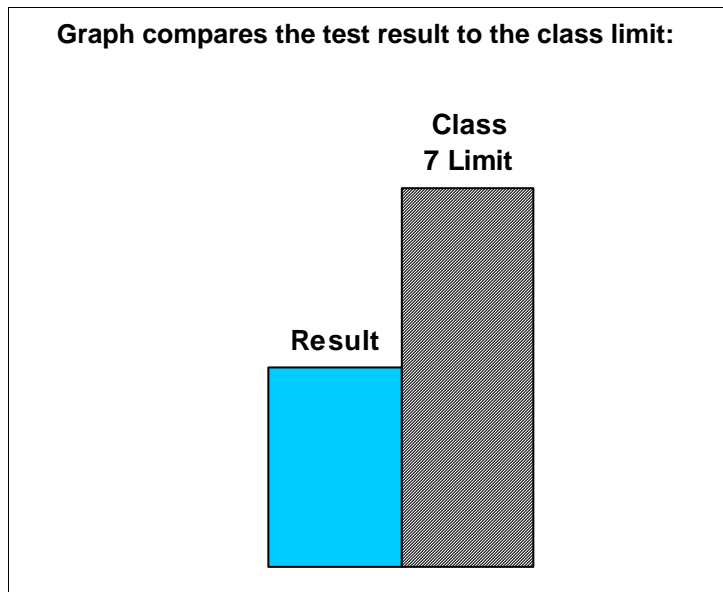
Exposure: 151 days, 0 hours, 0 minutes

SCOPE:

This report corresponds 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:

52.72% of the ISO 14644-1 Class 7 limit



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.

Chlorides

Sampler ID: 132695

Test Start: 01.01.2023

Report Date: 01.07.2023

Test End: 01.06.2023

Exposure: 151 days, 0 hours, 0 minutes

SCOPE:

This test is an important indicator for 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 Soluble Salts: 0.1401 ug/cm²



The test result is lower than the 10 ug/cm² limit for buildings and general installations.

Deposition Rate: 29.52 years until the limit of 10 ug/cm² is reached.



Good. The test result is more than 5 years which is the average life span of IT equipment.

INFORMATION:

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

- 10 µg/cm² for buildings and general installations.

Possible sources include smoke, chemicals and acids. Elevated levels of salt 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. Salt 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.

Copper Reactivity

Sampler ID: 132695

Test Start: 01.01.2023

Report Date: 01.07.2023

Test End: 01.06.2023

Exposure: 151 Days

SCOPE:

This test shows the actual amount of corrosion which occurred on the metal coupon. Test results correspond to ANSI/ISA-71.04 which is an internationally accepted standard that categorizes copper corrosion in relation to the deployment and reliability of electronic equipment.

TEST RESULTS:

Equipment Reliability Correlation based on ANSI/ISA-71.04 Standard for copper reactivity.

Copper:
359 Angstroms/30 Days

Test result corresponds to severity level G2 - Moderate (European standard EN 60721-3-3 Level 3C2). An environment in which the effects of corrosion are measurable and may be a factor in determining equipment reliability.

Expected Corrosive Gas Concentrations:

H2S 3 - 10 ppb
SO₂,SO₃ 10 - 100 ppb
Cl₂ 1 - 2 ppb
NO_x 50 - 125 ppb

Name	Symbol	Information
Hydrogen Sulfide	H ₂ S	Hydrogen sulfide (H ₂ S) is a colourless gas with a characteristic odour of rotten eggs which being denser than air may pool in low areas in still conditions. Sources: Hydrogen sulfide occurs naturally in some environments such as sulfur springs, swamps and salt marshes, and is often associated with the decomposition of organic material. Human activities and industries that may produce hydrogen sulfide include: sewage treatment plants and farming operations.
Sulfur Dioxide	SO ₂ , SO ₃	Sulfur dioxide has a pungent, irritating odour, familiar as the smell of a just-struck match. Sources: The largest source of SO ₂ in the atmosphere is the burning of fossil fuels by power plants and other industrial facilities. Smaller sources of SO ₂ emissions include: industrial processes such as extracting metal from ore; natural sources such as volcanoes; and locomotives, ships and other vehicles and heavy equipment that burn fuel with a high sulfur content.
Chlorine, Chlorine Dioxide	Cl ₂ , ClO ₂	Chlorine gas can be recognized by its pungent, irritating odor, which is like the odor of bleach. Sources: Aluminum manufacture, paper mills, refuse decomposition, cleaning products.
Oxides of Nitrogen	NO _x	Pungent odour. Sources: Automobile emissions, fossil fuel combustion, microbes, chemical industry.

ANSI/ISA -71.04 Corrosion Severity Levels:

Severity Level	Copper Corrosion	Description
G1 - Mild	<300 Angstroms / 30 days	Sufficiently well controlled, corrosion is not a factor.
G2 - Moderate	<1000 Angstroms / 30 days	Effects of corrosion are measurable and may be a factor.
G3 - Harsh	<2000 Angstroms / 30 days	High probability that corrosive attack will occur.
GX - Severe	>2000 Angstroms / 30 days	Only specially designed and packaged equipment would be expected to survive.

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For lab report contact:

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- 1) Standard ANSI/ISA 71.04-1985
- 2) Standard ISO 14644-1

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Swiss Design Patent Nr. 144605
Made in Switzerland



132695

Start Date: POS: End Date: