

FTS SPECIFICATION

Gaseous and Particulate Contamination Guidelines for Data Centers FTS 04230

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Content

0.0	Control of document	2
0.1	Distribution list	2
0.2	Change history	2
0.3	Approval	2
1.0	Introduction	2
2.0	Ambient Temperature	2
3.0	Humidity	2
4.0	Particulate contamination	3
5.0	Gaseous contamination	4
6.0	Control of airborne contaminants	4

0.0 Control of document

0.1 Distribution list

FTS Intranet	http://intranet.ts.fujitsu.com/pcc (Environmental Protection)
Quality Representatives und MDs	

0.2 Change history

Author:	Version:	Date:	Change in chapter	Comment
Birgit Kämpfle Dieter Feuerer	1.0	19.03.2010		
Birgit Kämpfle Dieter Feuerer	2.0	26.03.2010	1.0 Introduction	Inclusion of storage systems
Birgit Kämpfle Dieter Feuerer	3.0	31.03.2010	1.0 Introduction 4.0 Particulate contamination	Revised introduction Adding subchapter structure
Birgit Kämpfle Dieter Feuerer	3.1	02.04.2014	0.1 Distribution list 6.0 Control of airborne contaminants	Intranet-Link has changed new photo from "Eco checker"

0.3 Approval

Name:	Department/function:	Date:	Signature:
Armin Kumpf	FTS SO QM	31.03.2010	Signature on the original form

1.0 Introduction

The present specifications apply throughout Fujitsu Technology Solutions (FTS). The specifications are valid for the operation of our products in Data Centers.

The specifications are based on an altitude of up to 1800 m.

Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the products in Data Centers. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the products in Data Centers to malfunction or cease functioning altogether. The environmental specifications set forth limits for particulates and gases that are intended to avoid such damage.

FTS therefore recommends the implementation of appropriate remedial measures. Implementation of remedial measures to mitigate such environmental contamination is a customer responsibility

2.0 Ambient Temperature

In accordance to ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) White Paper TC 9.9 "[Gaseous and Particulate Contamination Guidelines for Data Centers](#)" :

18 °C (64.4 °F) - 27° C (80.6 °F)

3.0 Humidity

In accordance to ASHRAE White Paper "[Gaseous and Particulate Contamination Guidelines for Data Centers](#)"

The humidity is limited to less than 60% with the lower and upper dew point temperatures of 5.5 °C (41.9 °F) and 15 °C (59 °F) .

4.0 Particulate contamination

In accordance to ASHRAE White Paper "[Gaseous and Particulate Contamination Guidelines for Data Centers](#)"

4.1 Data centers must meet the cleanliness level of ISO 14644-1 class 8.

For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness may be met simply by the choice of the following filtration:

- The room air may be continuously filtered with MERV 8 filters.
- Air entering a data center may be filtered with MERV 11 or preferably MERV 13 filters.

For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.

Table 1 below provides maximum concentration levels for each ISO Class.

Table 1: ISO 14644-1 air cleanliness classification vs. maximum particle concentrations allowed (particles/m³)

ISO CLASS	Maximum Number of Particles in Air (particles in each cubic meter equal to or greater than the specified size)					
	Particle size					
	> 0.1 µm	> 0.2 µm	> 0.3 µm	> 0.5 µm	> 1 µm	> 5 µm
Class 1	10	2				
Class 2	100	24	10	4		
Class 3	1000	237	102	35	8	
Class 4	10,000	2,370	1,020	352	83	
Class 5	100,000	23,700	10,200	3,520	832	29
Class 6	1,000,000	237,000	102,000	35,200	8,320	293
Class 7				352,000	83,200	2,930
Class 8				3,520,000	832,000	29,300
Class 9					8,320,000	293,000

Note: Uncertainties related to the measurements process require that data with no more than three (3) significant figures be used in determining the classification level.

4.2 Sources of dust inside data centers should be reduced.

The deliquescent relative humidity of the particulate contamination should be more than 60% RH.

Definition: The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

4.3 Data centers must be free of zinc whiskers.

Verification: Surface debris is randomly collected from 10 areas of the data center on a 1.5-cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.

5.0 Gaseous contamination

In accordance to IEC 60721-3

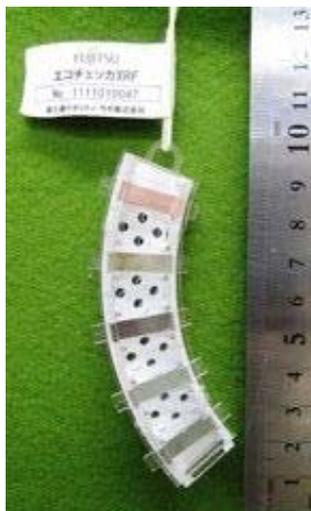
Data centers must keep the limits for chemical active substances in accordance to IEC 60721-3 Class 3 C1.

Environmental parameter	IEC 60721-3 3C1 Maximum value	
Sulphur dioxide SO ₂	0.1	mg/m ³
Hydrogen sulphide H ₂ S	0.01	mg/m ³
Chlorine Cl ₂	0.1	mg/m ³
Hydrogen chloride HCl	0.1	mg/m ³
Hydrogen fluoride HF	0.003	mg/m ³
Ammonia NH ₃	0.3	mg/m ³
Ozone O ₃	0.01	mg/m ³
Nitrogen oxides NO ₂	0.1	mg/m ³

6.0 Control of airborne contaminants

For the control of airborne contaminations in Data centers FTS strongly recommend the use of the Fujitsu Eco checker.

Eco checker is a device that contains metal pieces of 5 different kinds in a small case. After exposing eco checker to subject environment for 30 days, discoloration in metal test pieces are compared against the "Reference color" to identify description of corrosive gas and its approximate concentration. The kinds of gas detectable with this device are sulfur dioxide gas, hydrogen sulfide, and gas of chlorine-kind.



More information about the Eco Checker: <http://jp.fujitsu.com/group/fql/en/services/analysis/method/ecochecker/>