














Copy of marking plate:

	100-240V 1.5A max. 50-60Hz			
	Type: KISS 1U PCI960 - A MN  2-A08R-2xxx SN  123456789			
		FT1 <input type="checkbox"/>	checkout status	FT2 <input type="checkbox"/>

	24 VDC 7.0A max.			
	Type: KISS 1U PCI960 - B MN  2-A08R-2xxx SN  123456789			
		FT1 <input type="checkbox"/>	checkout status	FT2 <input type="checkbox"/>

	48 VDC 3.5A max.			
	Type: KISS 1U PCI960 - C MN  2-A08R-2xxx SN  123456789			
		FT1 <input type="checkbox"/>	checkout status	FT2 <input type="checkbox"/>

**Summary of testing:**

Test item is in compliance with IEC/EN 60950-1:2006 standard.

Clause 1.6.2	Power Input Measurements
Clause 1.7.1	Power Rating
Clause 2.1.1.1	Accessibility to Energized parts
Clause 2.2	SELV circuits – voltage measurements (normal and fault conditions)
Clause 2.5	Limited power sources
Clause 2.6.3.4	Resistance of earthing conductors and their terminations
Clause 2.9.2	Humidity conditioning test
Clause 4.1	Stability
Clause 4.2	Mechanical strength test
Clause 4.5	Thermal requirements (optional)
Clause 4.6	Openings in enclosures
Clause 5.1	Touch current and protective conductor current measurements
Clause 5.2	Electric strength
Clause 5.3	Abnormal operating and fault conditions tests

<b>Particulars: test item vs. test requirements</b>	
Equipment mobility .....	stationary / fixed / for building-in
Operating condition .....	continuous
Mains supply tolerance (%) .....	-10/ +6 %
Tested for IT power systems .....	No
IT testing, phase-phase voltage (V) :	N/A
Class of equipment .....	Class I: Type –A and –C and Class III: Type –B
Mass of equipment (kg) .....	Approx. 10 kg
Protection against ingress of water .....	Ordinary
<b>Test case verdicts</b>	
Test case does not apply to the test object .....	N/A
Test item does meet the requirement .....	P(ass)
Test item does not meet the requirement .....	F(ail)
<b>Testing</b>	
Date of receipt of test item .....	01.04.2008
Date(s) of performance of test .....	02. – 07.04.2008
General remarks	
<p><b>"This report is not valid as a CB Test Report unless appended by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IEC 60950-1".</b></p> <p>The test result presented in this report relate only to the object(s) tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p> <p>"(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a comma (point) is used as the decimal separator.</p>	

**General product information:**

The Kontrons Industrial Silent Server KISS is the System for Server applications in Industrial environment.

Within this test report always the stronger test requirements were taken under consideration!

**1. The Power Supplies (PSUs)**

All computer types are powered by internal installed Switch Mode Power Supplies (PSUs)

- Those PSUs are certified in accordance with EN 60950-1, IEC 60950-1 and UL 60950-1.
- Input of all AC PSUs is either (100 - 240 VAC)
- Input of DC PSU is 24 VDC and 48 VDC
- All PSU-Outputs fulfill SELV conditions
- All PSUs fulfill requirements regarding operator protection, against contact with hazardous live parts

For more PSU-Information please refer to table " list of critical component "

**2. Series, KISS type designation:**

The KISS 1U Models (2- A08R -2xxx) features PICMG1.3 single board computer support and due to the flexible design provides Multi Core and PCI-based solutions. With PICMG1.3 designs, the KISS 1U server offers performance currently up to Intel®Core™ 2 Duo T7400 or Intel Core Solo Celeron 440, Intel 945GM Chipset, 533 MHz FSB and up to 4 GB DDR2 memory. Intel®Core™2 Duo processors provide up to twice the performance, when compared to the Intel® Pentium® M processors, at a given GHz clock rate and can be as low as 31 Watts. The AC-Model has a 270W , 100 - 240 VAC Power Supply Unit, the DC-Models 2- A08R -2xxx use a 200W 24VDC and 48VDC PSUs.

.....  
Each Series can be individually equipped with components like drives, interface cards, e.g. as long as the components are mentioned in the list of critical components or correspond with described requirements.

The character X represents the type of PSU and can be any letter from A to Z. The list of critical components shows all types of already tested PSUs and includes a reference list of letters A to Z and belonging PSU !

Following types were tested within this investigation:

**3. Technical Data:**

<u>KISS AC Model Type 270W:</u>	<b>KISS 1U PCI960-A</b>
	Input: 100 - 240 VAC 60 - 50 Hz max. 1.5 A
<u>KISS DC Model Type 200W:</u>	<b>KISS 1U PCI960-B</b>
	Input: 24 VDC max. 7 A
<u>KISS DC Model Type 200W:</u>	<b>KISS 1U PCI960-C</b>
	Input: 48 VDC max. 3.5 A

#### 4. Insulation system (Type: 2- A08R -2xxx)

There are Mains- and SELV-Circuits. Following insulation systems are existing:

- A) Mains to PE ---> Required, Basic Insulation (BI)  
 Fulfilled by the use of certified PSU
- B) Mains to SELV ---> Required, Reinforced Insulation (RI)  
 Fulfilled by the use of certified PSU
- C) Operational Insulation

The compliance of this insulation system was evaluated within belonging investigation

#### 5. Protection against contact with hazardous live parts and hazardous energy.

**Within operation manual it is defined:**

the DC KISS Versions Type -B and Type -C, connects to the dc source by permanent wiring methods (pluggable equipment type b or permanently connected equipment). A readily accessible disconnect device shall be incorporated in the building installation wiring. The following types of disconnect devices are permitted:

- the plug on the power supply cord;
- a mains plug that is part of DIRECT PLUG-IN EQUIPMENT;
- an appliance coupler;
- isolating switches;
- circuit breakers;
- any equivalent device.



The equipment installation instructions for the DC KISS versions Type -B and Type -C shall so state and shall also specify the requirements for short-circuit primary protection or overcurrent primary protection or, where necessary, for both. This instruction is in own responsibility of the distributor of equipment.

#### 6. Test conditions

- Within this test report all PSUs were taken under consideration. A self-test program took care that computer and peripherals were steady running under max. working conditions. All standard tests were conducted with a maximum equipped computer-system (basic unit configuration). Where necessary (for instance chapters heating tests, single fault condition tests) extra tests were performed in order to show the standard compliance of options/peripherals not used in basic unit configuration.

Via the term

Following is an overview regarding the measured power consumption of basic unit configuration:

Type: 2- A08R -2xxx

- |                           |       |      |
|---------------------------|-------|------|
| a) CPU Board              | ----> | 35 W |
| b) All Drives/Peripherals | ----> | 27 W |
| c) Additional Power *     | ----> | P    |

\* = The total secondary loading power depends on the output data of the PSUs. For testing the output power requirements, given by the PSUs-Data sheets (technical data sheets, certificates), were taken into consideration.

Additional power (P) was simulated with special electronic load PCI- Interface boards (trademark KONTRON) inside the unit. Each PCI – Interface board creates electronic load of max. 25 W.

“ Additional Power (P) = permitted max. Secondary-Output minus power of all drives/peripherals “, that means: -Power (X) minus worst CPU-Boards-Power

X and P from 2- A08R -2xxx in dependence of used PSU-Type:

**PSU-Type A (270W)** ----> X = 270 as a result P = 208 W

The available P additional power limited for the tests: 50 W (2xPCI).

**Within operation manual it is defined:**

- a. Total output of DC power for this subject power supply is 270 W.
- b. The +12V1 and +12V2 total output shall not exceed 18A.
- c. The +3,3V and +5V total output shall not exceed 130 W max.
- d. The normal rating of each used USB interface should not exceed 3,5 W.
- e. The power of each used PCI interface should not be higher than 25 W.
- f. Always taking care that the cooling openings of the unit are free for unhindered stream of air.

**PSU-Type B (200W)** ----> X = 200 as a result P = 138 W

The available P additional power limited for the tests on 50 W (2xPCI).

**Within operation manual it is defined:**



Before attempting to connect power to the **KISS 1U PCI960-B**, make sure of the following conditions:

- The DC power supply gives the correct DC voltage +24V (tolerance -10/ +6 %).
  - All circuit breakers must be in the OFF position before installing or removing the power connections.
  - Do not work on the DC power lines while the system is connected to power.
- b. Total output of DC power for this subject power supply is 200 W.
  - c. The +3,3V and +5V total output shall not exceed 80 W max.
  - d. The power of each used PCI interface should not be higher than 25 W.
  - e. The normal rating of each used USB interface should not be higher than 3,5 W.
  - f. Always taking care that the cooling openings of the unit are free for unhindered stream of air.

**PSU-Type C (200W)**

----&gt;

X = 200

as a result P = 138 W

The available P additional power limited for the tests: 50 W (2xPCI).

**Within operation manual it is defined:**

a.



Before attempting to connect power to the **KISS 1U PCI960-C**, make sure of the following conditions:


- The **KISS 1U PCI960-C** must be installed in a Restricted Access Location (RAL). The IEC, EN and UL 60950-1 define a restricted access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.
- The **KISS 1U PCI960-C** is shipped with protective earthing terminals on the rear of the chassis. To reduce the risk of electric shock, always ensure that these terminals are connected to earth within the installation.

b.



A warning carries information about procedures, which must be followed to reduce the risk of electric shock and danger to personal health:

- Connect a protective earth cable to the protective earth terminals on the rear side of the chassis. The

protective earth terminals are marked with the earth symbol (IEC 60417, 5019).  The earth symbol indicates the location on the unit of the protective earthing terminals. Connect the other end of this earth cable to a true earth or the same earth as other equipment within the restricted access location. The protective earth connection must comply with all applicable national, local, and site regulations. The minimum conductor size is 0,75 mm<sup>2</sup> / 18 AWG.

- Never disconnect the protective earth conductor or operate the equipment in the absence of a suitably installed earth conductor.
- Only trained and qualified personnel should be allowed to install or replace the **KISS 1U PCI960-C**
- Each power line is required to have its own circuit breaker. Connect the DC cables to the circuit breakers according to the marketing instructions.
- All circuit breakers must be in the OFF position before installing or removing the power connections.
- The **KISS 1U PCI960-C** is capable of accepting 36V DC to 72V DC in abnormal conditions. It is highly recommended that only 48V DC to 60V DC is used.
- The DC power supply gives the correct DC voltage 48V DC to 60V DC.
- Do not work on the DC power lines while the system is connected to power.
- Bare parts at the power connector must be located with covering guard part.

- c. Total output of DC power for this subject power supply is 184 W.
- d. The output load at +3,3V and +5V together must not exceed 80 W.
- e. The power of each used PCI interface should not be higher than 25 W.
- f. The normal rating of each used USB interface should not exceed 3,5 W.
- g. Always taking care that the cooling openings of the unit are free for unhindered stream of air.

## 7. SELV Circuits (Safety)

Extra-Low Voltage (SELV) circuits are ports that have maximum DC working voltage level less than 60 V (42.4 VAC). In addition, the ports must not be connected to telecommunication networks as defined in EN 60950 (see CEI/ IEC 60950-1:2006, standard clause 1.2.13.8).

In practice, the electrical cables do not exit the building. Electrical cables connect to equipment that meets one of the following requirements:

- Installed in the RAL (Restricted Access Location)
- Does not have electrical cables that exit the building unless those ports are TNV (Telecommunication Networks Voltage) circuits
- Has a written consent (or in other evidence) that its connecting port towards the SELV circuit port is not a telecommunication network


**After installation in a non-RAL location, all communication ports must be connected to SELV circuits, for example, a port on a personal computer or Ethernet hub/router or other information technology (IT) equipment.**

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict

1	GENERAL		P
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1.5	Components		P
1.5.1	General		P
	Comply with IEC 60950 or relevant component standard	(see appended table 1.5.1; list of critical components).	P
1.5.2	Evaluation and testing of components	All safety critical components are certified. Non-certified components were tested according to this standard.	P
1.5.3	Thermal controls	Only within certified PSU	P
1.5.4	Transformers	Only within certified PSU	P
1.5.5	Interconnecting cables	SELV interconnecting cables for the Ethernet connection.	P
1.5.6	Capacitors in primary circuits .....	Only within certified PSU	P
1.5.7	Double insulation or reinforced insulation bridged by components	Only within certified PSU	P
1.5.7.1	General	Refer to above	P
1.5.7.2	Bridging capacitors		N/A
1.5.7.3	Bridging resistors		N/A
1.5.7.4	Accessible parts		N/A
1.5.8	Components in equipment for IT power systems	Power supplies have been evaluated for IT power systems	N/A

1.6	Power interface		P
1.6.1	AC power distribution systems		P
1.6.2	Input current	(see appended table 1.6.2)	P
1.6.3	Voltage limit of hand-held equipment		N/A
1.6.4	Neutral conductor		P

1.7	Marking and instructions		P
1.7.1	Power rating		P
	Rated voltage(s) or voltage range(s) (V) .....	(see appended table 1.6.2)	P
	Symbol for nature of supply, for d.c. only .....	d.c. certified PSUs	P
	Rated frequency or rated frequency range (Hz) .....	60-50 Hz	P
	Rated current (mA or A) .....	(see appended table 1.6.2)	P
	Manufacturer's name or trademark or identification mark .....	 <b>kontron</b>	P
	Type/model or type reference.....	<b>KISS 1U PCI960-x</b> (see general product information)	P
	Symbol for Class II equipment only .....		N/A
	Other symbols .....		P

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
	Certification marks .....		N/A
1.7.2	Safety instructions	Safety instructions sufficient explained in operation manual	P
1.7.3	Short duty cycles		N/A
1.7.4	Supply voltage adjustment .....		N/A
1.7.5	Power outlets on the equipment .....		N/A
	Methods and means of adjustment; reference to installation instructions:		N/A
1.7.6	Fuse identification .....	<ul style="list-style-type: none"> <li>• Non operator replaceable fuse!</li> <li>• Non operator replaceable: PTC's on CPU-Boards and fuses within certified PSUs. Technical unit documentation provided with sufficient information</li> </ul>	P
1.7.7	Wiring terminals		P
1.7.7.1	Protective earthing and bonding terminals .....	<ul style="list-style-type: none"> <li>▪ Within certified AC PSU appliance inlet KISS 1U PCI960-A</li> <li>▪ KISS 1U PCI960-C</li> </ul>	P
1.7.7.2	Terminal for a.c. mains supply conductors		N/A
1.7.7.3	Terminals for d.c. mains supply conductors	KISS 1U PCI960-B and KISS 1U PCI960-C	P
1.7.8	Controls and indicators	Power ON - LED	P
1.7.8.1	Identification, location and marking .....		N/A
1.7.8.2	Colours .....		N/A
1.7.8.3	Symbols according to IEC 60417 .....	5009, 5019	P
1.7.8.4	Markings using figures .....		N/A
1.7.9	Isolation of multiple power sources .....		N/A
1.7.10	IT power distribution systems		N/A
1.7.11	Thermostats and other regulating devices		N/A
1.7.12	Language .....		—
1.7.13	Durability		P
1.7.14	Removable parts		N/A
1.7.15	Replaceable batteries	Only lithium battery on CPU boards	P
	Language .....		—
1.7.16	Operator access with a tool .....		N/A
1.7.17	Equipment for restricted access locations .....		N/A
2	PROTECTION FROM HAZARDS		P
2.1	Protection from electric shock and energy hazards		P

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
2.1.1	Protection in operator access areas	Only trained and qualified personnel should be allowed to install or replace this equipment. However hazardous voltage circuits are only within certified PSUs (see general product information). Operator access to SELV only.	P
2.1.1.1	Access to energized parts	Only trained and qualified personnel should be allowed to install or replace this equipment. The operational manual documentation provided with sufficient information.	P
	Test by inspection .....	Protection is established by insulation materials, barriers or guarded parts.	P
	Test with test finger .....	No access to above mentioned parts	P
	Test with test pin .....	No access to above mentioned parts	P
	Test with test probe .....	No access to TNV circuit	N/A
2.1.1.2	Battery compartments .....		N/A
2.1.1.3	Access to ELV wiring		N/A
	Working voltage (V); minimum distance (mm) through insulation	(see appended table 2.10.5)	—
2.1.1.4	Access to hazardous voltage circuit wiring	Only trained and qualified personnel should be allowed to install or replace this equipment. No hazardous voltage wiring in the operator access area.	P
2.1.1.5	Energy hazards .....	No energy hazard in operator access area. Operator has access only to SELV area.	N/A
2.1.1.6	Manual controls		N/A
2.1.1.7	Discharge of capacitors in equipment	Only within certified PSUs	P
	Time-constant (s); measured voltage (V) .....	< 1 sec.	—
2.1.2	Protection in service access areas	The disconnect devices for servicing are defined as the circuit breakers in all d.c. power supply conductors.	P
2.1.3	Protection in restricted access locations	Only KISS 1U PCI960-C	P

2.2	SELV circuits		P
2.2.1	General requirements	<42.4Vpk/60Vdc under normal and fault conditions	P
2.2.2	Voltages under normal conditions (V) .....	Below ELV circuit limits	P
2.2.3	Voltages under fault conditions (V) .....	Below ELV circuit limits	P
2.2.3.1	Separation by double insulation or reinforced insulation (method 1)	Applied in certified PSUs	P
2.2.3.2	Separation by earthed screen (method 2)	Applied in certified PSUs	N/A
2.2.3.3	Protection by earthing of the SELV circuit (method 3)		N/A
2.2.4	Connection of SELV circuits to other circuits .....	SELV-Circuits only connected with SELV-Circuits	P

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
2.3	TNV circuits		N/A
2.3.1	Limits		N/A
	Type of TNV circuits .....	TNV-1	—
2.3.2	Separation from other circuits and from accessible parts		N/A
	Insulation employed .....		—
2.3.3	Separation from hazardous voltages		N/A
	Insulation employed .....		—
2.3.4	Connection of TNV circuits to other circuits		N/A
	Insulation employed .....		—
2.3.5	Test for operating voltages generated externally		N/A
2.4	Limited current circuits		N/A
2.4.1	General requirements		N/A
2.4.2	Limit values		N/A
	Frequency (Hz).....		—
	Measured current (mA).....		—
	Measured voltage (V) .....		—
	Measured capacitance ( $\mu$ F).....		—
2.4.3	Connection of limited current circuits to other circuits		N/A
2.5	Limited power sources		P
	Inherently limited output		P
	Impedance limited output		N/A
	Overcurrent protective device limited output		N/A
	Regulating network limited output under normal operating and single fault condition	the following output has been evaluated and found to comply with the limited power sources: +3,3;+5 and +12 (of the PSU), USB and PS2 on CPU Board. For details please see appended table 5.3 (fault condition tests)	P
	Regulating network limited output under normal operating conditions and overcurrent protective device limited output under single fault condition	For details please see appended table 5.3 (fault condition tests)	P
	Output voltage (V), output current (A), apparent power (VA).....		—
	Current rating of overcurrent protective device (A)		—
2.6	Provisions for earthing and bonding	(already certified PSUs)	P
2.6.1	Protective earthing: a)	Applied in certified AC PSU and KISS with PSU Type -C	P
2.6.2	Functional earthing		N/A

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
2.6.3	Protective earthing and protective bonding conductors		N/A
2.6.3.1	General	Applied in certified PSUs	P
2.6.3.2	Size of protective earthing conductors	Applied in certified PSUs	P
	Rated current (A), cross-sectional area (mm <sup>2</sup> ), AWG .....		—
2.6.3.3	Size of protective bonding conductors	Minimum 0,75 mm <sup>2</sup> / 18 AWG for Type -C	P
	Rated current (A), cross-sectional area (mm <sup>2</sup> ), AWG .....		—
2.6.3.4	Resistance (Ω) of earthing conductors and their terminations, test current (A) .....	Only KISS Type-A, 0,062 Ω / 30 A for 2 Minutes	P
2.6.3.5	Colour of insulation .....	Applied in certified PSU	P
2.6.4	Terminals	Applied in certified PSU and KISS Type-C	P
2.6.4.1	General	Fulfilled by the use of certified PSUs	P
2.6.4.2	Protective earthing and bonding terminals	Applied in certified PSUs and KISS Type-C	P
	Rated current (A), type and nominal thread diameter (mm) .....		—
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N/A
2.6.5	Integrity of protective earthing	Fulfilled by the use of certified PSUs	P
2.6.5.1	Interconnection of equipment	SELV connections only	P
2.6.5.2	Components in protective earthing conductors and protective bonding conductors	No switches or fuses	P
2.6.5.3	Disconnection of protective earth	Inspected	P
2.6.5.4	Parts that can be removed by an operator	None	N/A
2.6.5.5	Parts removed during servicing	No protective earth connection needs to be removed for servicing	N/A
2.6.5.6	Corrosion resistance		P
2.6.5.7	Screws for protective bonding		N/A
2.6.5.8	Reliance on telecommunication network or cable distribution system	No TNV	N/A

2.7	Overcurrent and earth fault protection in primary circuits		P
2.7.1	Basic requirements	<ul style="list-style-type: none"> <li>▪ KISS-A is 'Pluggable Type A', building installation is regarded as providing adequate protection.</li> <li>▪ KISS-B and -C is "Pluggable Type B" relies on protective devices external to the equipment for protection, the equipment installation instructions shall so state and shall also specify the requirements for short-circuit protection or overcurrent protection or, where necessary, for both.</li> </ul>	P

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
	Instructions when protection relies on building installation	<ul style="list-style-type: none"> <li>▪ For 'pluggable equipment type A', isn't instruction necessary.</li> <li>▪ For 'pluggable equipment type B' is instruction necessary in own responsibility of the distributor.</li> </ul>	P
2.7.2	Faults not covered in 5.3		N/A
2.7.3	Short-circuit backup protection	Building Installation	P
2.7.4	Number and location of protective devices .....	Mains fuse within certified PSUs, not operator accessible	P
2.7.5	Protection by several devices	See clause 2.7.4 above	N/A
2.7.6	Warning to service personnel.....	No warning required for service personnel	N/A

2.8	Safety interlocks		N/A
2.8.1	General principles		N/A
2.8.2	Protection requirements		N/A
2.8.3	Inadvertent reactivation		N/A
2.8.4	Fail-safe operation		N/A
2.8.5	Moving parts		N/A
2.8.6	Overriding		N/A
2.8.7	Switches and relays		N/A
2.8.7.1	Contact gaps (mm) .....		N/A
2.8.7.2	Overload test		N/A
2.8.7.3	Endurance test		N/A
2.8.7.4	Electric strength test	(see appended table 5.2)	N/A
2.8.8	Mechanical actuators		N/A

2.9	Electrical insulation		P
2.9.1	Properties of insulating materials	Neutral rubber, asbestos or hygroscopic materials are not used	P
2.9.2	Humidity conditioning	(see separate test reports)	P
	Humidity (%) .....	Non condensing: Operating                    5% - 80% Non-Operating            0% - 95%	—
	Temperature (°C) .....	Operating:                    0°C to +50°C Non-Operating            -20°C to +70°C	—
2.9.3	Grade of insulation	* RI and BI: Requirements of this chapter fulfilled by the use of EN/IEC-Approved PSUs	P

2.10	Clearances, creepage distances and distances through insulation		P
2.10.1	General	Fulfilled by the use of certified PSUs (Based on pollution degree 2 and fully enclosed power supplies).	P

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
2.10.2	Determination of working voltage	The AC-Variant: >90 Vac to < 254,4 Vac, 60/50 Hz for primary. The 24VDC-Variant: >18 Vdc to < 36 Vdc for primary. The 48VDC-Variant: >36 Vdc to < 72 Vdc for primary.	P
2.10.3	Clearances	Fulfilled by the use of certified PSUs	P
2.10.3.1	General	See appended table 2.10.3 and 2.10.4, clearances according to table 2H and 2J	P
2.10.3.2	Clearances in primary circuit	(see appended table 2.10.3 and 2.10.4)	P
2.10.3.3	Clearances in secondary circuits	(see appended table 2.10.3 and 2.10.4)	P
2.10.3.4	Measurement of transient voltage levels		N/A
2.10.4	Creepage distances	(see appended table 2.10.3 and 2.10.4)	P
	CTI tests .....		—
2.10.5	Solid insulation	Pollution degrees 2 / CAT2	P
2.10.5.1	Minimum distance through insulation	(see appended table 2.10.5)	P
2.10.5.2	Thin sheet material		N/A
	Number of layers (pcs) .....		—
	Electric strength test	(see appended table 5.2)	P
2.10.5.3	Printed boards	Power distribution board	N/A
	Distance through insulation		N/A
	Electric strength test for thin sheet insulating material	(see appended table 5.2)	—
	Number of layers (pcs) .....		N/A
2.10.5.4	Wound components		N/A
	Number of layers (pcs) .....		N/A
	Two wires in contact inside wound component; angle between 45° and 90° .....		N/A
2.10.6	Coated printed boards		N/A
2.10.6.1	General		N/A
2.10.6.2	Sample preparation and preliminary inspection		N/A
2.10.6.3	Thermal cycling		N/A
2.10.6.4	Thermal ageing (°C) .....		N/A
2.10.6.5	Electric strength test	(see appended table 5.2)	—
2.10.6.6	Abrasion resistance test		N/A
	Electric strength test	(see appended table 5.2)	—
2.10.7	Enclosed and sealed parts .....		N/A
	Temperature $T_1=T_2 = T_{ma} - T_{amb} + 10K$ (°C) .....		N/A
2.10.8	Spacings filled by insulating compound .....		N/A
	Electric strength test	(see appended table 5.2)	—
2.10.9	Component external terminations		N/A
2.10.10	Insulation with varying dimensions		N/A

## IEC 60950-1 / EN 60950-1

Clause	Requirement – Test	Result – Remark	Verdict
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3	WIRING, CONNECTIONS AND SUPPLY		P
3.1	General		P
3.1.1	Current rating and overcurrent protection	Approved power supplies	P
3.1.2	Protection against mechanical damage		P
3.1.3	Securing of internal wiring	Internal wiring secure against loosening, excessive strain or insulation damage; secondary wires cannot touch hazardous parts.	P
3.1.4	Insulation of conductors	(see appended table 5.2)	N/A
3.1.5	Beads and ceramic insulators		N/A
3.1.6	Screws for electrical contact pressure		N/A
3.1.7	Insulating materials in electrical connections		N/A
3.1.8	Self-tapping and spaced thread screws		N/A
3.1.9	Termination of conductors		N/A
	10 N pull test		N/A
3.1.10	Sleeving on wiring		N/A

3.2	Connection to an a.c. mains supply or a d.c. mains supply		P
3.2.1	Means of connection .....	Appliance inlets	P
3.2.1.1	Connection to an a.c. mains supply	Appliance inlets	P
3.2.1.2	Connection to a d.c. mains supply		P
3.2.2	Multiple supply connections		N/A
3.2.3	Permanently connected equipment		N/A
	Number of conductors, diameter (mm) of cable and conduits .....		—
3.2.4	Appliance inlets	IEC approved appliance inlet	P
3.2.5	Power supply cords	Certified power cords	P
3.2.5.1	AC power supply cords	Certified power cords	P
	Type.....	(see append table 1.5.1)	—
	Rated current (A), cross-sectional area (mm <sup>2</sup> ), AWG.....		—
3.2.5.2	DC power supply cords		N/A
3.2.6	Cord anchorages and strain relief		N/A
	Mass of equipment (kg), pull (N) .....		—
	Longitudinal displacement (mm) .....		—
3.2.7	Protection against mechanical damage		P
3.2.8	Cord guards		N/A
	D (mm); test mass (g) .....		—
	Radius of curvature of cord (mm).....		—
3.2.9	Supply wiring space		N/A

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
3.3	Wiring terminals for connection of external conductors		N/A
3.3.1	Wiring terminals		N/A
3.3.2	Connection of non-detachable power supply cords	Only DC supply wirings	P
3.3.3	Screw terminals	Only for DC supply wirings	P
3.3.4	Conductor sizes to be connected		N/A
	Rated current (A), cord/cable type, cross-sectional area (mm <sup>2</sup> ).....		—
3.3.5	Wiring terminal sizes		N/A
	Rated current (A), type and nominal thread diameter (mm) .....		—
3.3.6	Wiring terminals design		N/A
3.3.7	Grouping of wiring terminals	Only for DC supply wirings	P
3.3.8	Stranded wire		N/A

3.4	Disconnection from the mains supply		P
3.4.1	General requirement	The AC appliance coupler is considered the disconnect device.	P
3.4.2	Disconnect devices	AC PSU refer to above	P
3.4.3	Permanently connected equipment	Only for DC equipment: Unless the equipment is accompanied by installation instructions in accordance with 1.7.2, stating that an appropriate disconnect device shall be provided as part of the building installation.	P
3.4.4	Parts which remain energized		N/A
3.4.5	Switches in flexible cords		N/A
3.4.6	Single-phase equipment and d.c. equipment	Disconnect ac variant, disconnects all poles simultaneously. The dc variant appropriate disconnect device as external device part.	P
3.4.7	Three-phase equipment		N/A
3.4.8	Switches as disconnect devices	Applied in certified PSUs	P
3.4.9	Plugs as disconnect devices	Appliance coupler is the regarded disconnected device	N/A
3.4.10	Interconnected equipment		N/A
3.4.11	Multiple power sources		N/A

3.5	Interconnection of equipment		P
3.5.1	General requirements		P
3.5.2	Types of interconnection circuits .....	SELV	P
3.5.3	ELV circuits as interconnection circuits		N/A

4	PHYSICAL REQUIREMENTS		P
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IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
4.1	Stability		P
	Angle of 10°		P
	Test: force (N).....		N/A

4.2	Mechanical strength		P
4.2.1	General		P
4.2.2	Steady force test, 10 N		P
4.2.3	Steady force test, 30 N		P
4.2.4	Steady force test, 250 N		P
4.2.5	Impact test		P
	Fall test	Tests conducted inside the computer at the enclosure of certified PSUs	P
	Swing test		N/A
4.2.6	Drop test		N/A
4.2.7	Stress relief test		N/A
4.2.8	Cathode ray tubes		N/A
	Picture tube separately certified .....	(see separate test report or attached certificate)	N/A
4.2.9	High pressure lamps		N/A
4.2.10	Wall or ceiling mounted equipment; force (N) .....		N/A

4.3	Design and construction		P
4.3.1	Edges and corners		P
4.3.2	Handles and manual controls; force (N).....		N/A
4.3.3	Adjustable controls		N/A
4.3.4	Securing of parts		P
4.3.5	Connection of plugs and sockets	Applied in certified PSUs	P
4.3.6	Direct plug-in equipment		N/A
	Dimensions (mm) of mains plug for direct plug-in ...		N/A
	Torque and pull test of mains plug for direct plug-in; torque (Nm); pull (N).....		N/A
4.3.7	Heating elements in earthed equipment		N/A
4.3.8	Batteries	Only the lithium battery on the CPU board.	P
4.3.9	Oil and grease		N/A
4.3.10	Dust, powders, liquids and gases		N/A
4.3.11	Containers for liquids or gases		N/A
4.3.12	Flammable liquids .....		N/A
	Quantity of liquid (l).....		N/A
	Flash point (°C) .....		N/A
4.3.13	Radiation; type of radiation .....		N/A
4.3.13.1	General		N/A

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
4.3.13.2	Ionizing radiation		N/A
	Measured radiation (pA/kg) .....		—
	Measured high-voltage (kV) .....		—
	Measured focus voltage (kV) .....		—
	CRT markings .....		—
4.3.13.3	Effect of ultraviolet (UV) radiation on materials		N/A
	Part, property, retention after test, flammability classification .....		N/A
4.3.13.4	Human exposure to ultraviolet (UV) radiation .....		N/A
4.3.13.5	Laser (including LEDs)	(see separate test report of IEC/EN 60825-1 / IEC/EN 60825-2)	N/A
	Laser class .....		—
4.3.13.6	Other types .....		N/A

4.4	Protection against hazardous moving parts		P
4.4.1	General	DC-fans located in protected area.	P
4.4.2	Protection in operator access areas		P
4.4.3	Protection in restricted access locations		N/A
4.4.4	Protection in service access areas		P

4.5	Thermal requirements		P
4.5.1	Maximum temperatures	(see appended table 4.5)	N/A
	Normal load condition per Annex L .....		N/A
4.5.2	Resistance to abnormal heat		N/A

4.6	Openings in enclosures		P
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IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
4.6.1	Top and side openings	<p>Only ventilation openings on the front-, rear-side of the enclosures:</p> <ul style="list-style-type: none"> <li>• Front side: 2 Removable rectangular air filter cover made of metal (area 10,5 x 3 cm filled out with 2-9 rows, 15 mm diagonal of square holes). Air filter frame is mounted on unit metal enclosure (behind of filter area at a length of 10 x 2,7 cm filled out with 6,8 mm diagonal square holes).</li> <li>• Rear upper side: Fan opening of certified PSUs, besides this an optional chassis fan air outflow opening. Square holes at a length of 3,5x3,5 cm (4 – 4 rows and 6,8 mm diagonal of square holes).</li> <li>• Rear middle side: Outflow opening oblong holes at a length of 10x2 mm (3x2 rows).</li> <li>• 2 Rear metal slots with air outflow round holes openings at a diameter of 4 mm.</li> </ul>	P
	Dimensions (mm) .....	Refer to above	—
4.6.2	Bottoms of fire enclosures	No openings in the bottom	P
	Construction of the bottom .....		—
4.6.3	Doors or covers in fire enclosures	<ul style="list-style-type: none"> <li>• By the operator removable enclosure part is the top cover. This part is only seldom (in case of changing the computer configuration) to be opened and sufficient hints are given in the operation manual how to remove and install top cover.</li> <li>• On the front side located its non removable front case door made of metal (below hinged to 43 x 4,4 cm). The door has an ventilation slits for air flow. Behind this door its unit metal cover and all unit drives like Floppy, CD-ROM, DVD, 4x USB, 1x LAN interface, power button and air filter covers are located. Under normal operating conditions this door is closed (screwed on) up. Within operation manual the correct unit use is described with locked door.</li> </ul>	P
4.6.4	Openings in transportable equipment		N/A
4.6.5	Adhesives for constructional purposes		N/A
	Conditioning temperature (°C)/time (weeks) .....		—
4.7	Resistance to fire		P

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
4.7.1	Reducing the risk of ignition and spread of flame	Appropriate use of components and suitable construction.	P
	Method 1, selection and application of components wiring and materials		P
	Method 2, application of all of simulated fault condition tests	(see appended table 5.3)	N/A
4.7.2	Conditions for a fire enclosure		P
4.7.2.1	Parts requiring a fire enclosure		P
4.7.2.2	Parts not requiring a fire enclosure		N/A
4.7.3	Materials		P
4.7.3.1	General		P
4.7.3.2	Materials for fire enclosures	Metal	P
4.7.3.3	Materials for components and other parts outside fire enclosures		P
4.7.3.4	Materials for components and other parts inside fire enclosures		P
4.7.3.5	Materials for air filter assemblies	(see append table 1.5.1) min. V2	P
4.7.3.6	Materials used in high-voltage components		N/A

5	ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS		P
5.1	Touch current and protective conductor current		P
5.1.1	General		P
5.1.2	Equipment under test (EUT)		P
5.1.3	Test circuit	5a	P
5.1.4	Application of measuring instrument	Annex D.1	P
5.1.5	Test procedure		P
5.1.6	Test measurements		P
	Test voltage (V) .....	254,4 VAC	—
	Measured touch current (mA) .....	50 Hz: < 0,4 mA 60 Hz: < 0,5 mA	—
	Max. allowed touch current (mA) .....	3,5 mA r.m.s.	—
	Measured protective conductor current (mA) .....	0,062	—
	Max. allowed protective conductor current (mA) .....		—
5.1.7	Equipment with touch current exceeding 3.5 mA ...		N/A
5.1.8	Touch currents to and from telecommunication networks and cable distribution systems and from telecommunication networks		N/A
5.1.8.1	Limitation of the touch current to a telecommunication network and a cable distribution system		N/A
	Test voltage (V) .....		—
	Measured touch current (mA) .....		—
	Max. allowed touch current (mA) .....		—

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
5.1.8.2	Summation of touch currents from telecommunication networks .....		N/A

5.2	Electric strength		P
5.2.1	General	(see appended table 5.2)	P
5.2.2	Test procedure	(see appended table 5.2)	P

5.3	Abnormal operating and fault conditions		P
5.3.1	Protection against overload and abnormal operation	(see appended table 5.3)	P
5.3.2	Motors	(see appended Annex B)	P
5.3.3	Transformers	(see appended Annex C)	N/A
5.3.4	Functional insulation.....	Method c) used	P
5.3.5	Electromechanical components	Not used	N/A
5.3.6	Simulation of faults		P
5.3.7	Unattended equipment		N/A
5.3.8	Compliance criteria for abnormal operating and fault conditions		P

6	CONNECTION TO TELECOMMUNICATION NETWORKS		N/A
6.1	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment		N/A
6.1.1	Protection from hazardous voltages		N/A
6.1.2	Separation of the telecommunication network from earth		N/A
6.1.2.1	Requirements	(see appended table 5.2)	N/A
	Test voltage (V) .....		—
	Current in the test circuit (mA) .....		—
6.1.2.2	Exclusions .....		N/A

6.2	Protection of equipment users from overvoltages on telecommunication networks		N/A
6.2.1	Separation requirements		N/A
6.2.2	Electric strength test procedure		N/A
6.2.2.1	Impulse test	(see appended table 5.2)	N/A
6.2.2.2	Steady-state test	(see appended table 5.2)	N/A
6.2.2.3	Compliance criteria		N/A

6.3	Protection of the telecommunication wiring system from overheating		N/A
	Max. output current (A).....		—
	Current limiting method .....		—

7	CONNECTION TO CABLE DISTRIBUTION SYSTEMS		N/A
7.1	Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment		N/A
7.2	Protection of equipment users from overvoltages on the cable distribution system		N/A
7.3	Insulation between primary circuits and cable distribution systems		N/A
7.3.1	General		N/A
7.3.2	Voltage surge test	(see appended table 5.2)	N/A
7.3.3	Impulse test	(see appended table 5.2)	N/A

A	ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE		N/A
A.1	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2)		N/A
A.1.1	Samples .....		—
	Wall thickness (mm).....		—
A.1.2	Conditioning of samples; temperature (°C).....		N/A
A.1.3	Mounting of samples .....		N/A
A.1.4	Test flame		N/A
A.1.5	Test procedure		N/A
A.1.6	Compliance criteria		N/A
	Sample 1 burning time (s) .....		—
	Sample 2 burning time (s) .....		—
	Sample 3 burning time (s) .....		—
A.2	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)		N/A
A.2.1	Samples, material .....		—
	Wall thickness (mm).....		—
A.2.2	Conditioning of samples		N/A
A.2.3	Mounting of samples		N/A
A.2.4	Test flame		N/A
A.2.5	Test procedure		N/A
A.2.6	Compliance criteria		N/A
	Sample 1 burning time (s) .....		—
	Sample 2 burning time (s) .....		—
	Sample 3 burning time (s) .....		—
A.2.7	Alternative test acc. to IEC 60695-2-2, cl. 4, 8		N/A
	Sample 1 burning time (s) .....		—
	Sample 2 burning time (s) .....		—
	Sample 3 burning time (s) .....		—
A.3	Hot flaming oil test (see 4.6.2)		N/A
A.3.1	Mounting of samples		N/A
A.3.2	Test procedure		N/A
A.3.3	Compliance criterion		N/A
B	ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS (see 4.7.2.2 and 5.3.2)		P
B.1	General requirements		P
	Position .....	Motors used within certified drives	—
	Manufacturer .....	please refer to the table “ list of critical components “	—
	Type .....		—
	Rated values .....		—
B.2	Test conditions		N/A
B.3	Maximum temperatures		(see appended table 5.3) N/A

B.4	Running overload test	(see appended table 5.3)	N/A
B.5	Locked-rotor overload test		N/A
	Test duration (days) .....		—
	Electric strength test: test voltage (V) .....		—
B.6	Running overload test for d.c. motors in secondary circuits		N/A
B.7	Locked-rotor overload test for d.c. motors in secondary circuits		N/A
B.7.1	Test procedure	(see appended table 5.3)	N/A
B.7.2	Alternative test procedure; test time (h) .....		N/A
B.7.3	Electric strength test	(see appended table 5.2)	N/A
B.8	Test for motors with capacitors	(see appended table 5.3)	N/A
B.9	Test for three-phase motors	(see appended table 5.3)	N/A
B.10	Test for series motors		N/A
	Operating voltage (V) .....		—

C	ANNEX C, TRANSFORMERS (see 1.5.4 and 5.3.3)		P
	Position .....	Transformer within certified PSU	—
	Manufacturer .....	please refer to the table “ list of critical components “	—
	Type .....		—
	Rated values .....		—
	Method of protection.....		—
C.1	Overload test	(see appended table 5.3)	P
C.2	Insulation	(see appended table 5.2)	P
	Protection from displacement of windings.....		N/A

D	ANNEX D, MEASURING INSTRUMENTS FOR TOUCH-CURRENT TESTS		P
D.1	Measuring instrument		P
D.2	Alternative measuring instrument		N/A
E	ANNEX E, TEMPERATURE RISE OF A WINDING		N/A
F	ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10)		P
G	ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES		N/A
G.1	Summary of the procedure for determining minimum clearances		N/A
G.2	Determination of mains transient voltage (V) .....		N/A
G.2.1	AC mains supply		N/A
G.2.2	DC mains supply		N/A
G.3	Determination of telecommunication network transient voltage (V) .....		N/A
G.4	Determination of required withstand voltage (V) .....		N/A
G.5	Measurement of transient levels (V).....		N/A
G.6	Determination of minimum clearances .....		N/A
H	ANNEX H, IONIZING RADIATION (see 4.3.13)		N/A
J	ANNEX J, TABLE OF ELECTROCHEMICAL POTENTIALS (see 2.6.5.6)		N/A
	Metal used .....		—
K	ANNEX K, THERMAL CONTROLS (see 1.5.3 and 5.3.7)		N/A
K.1	Making and breaking capacity		N/A
K.2	Thermostat reliability; operating voltage (V).....		N/A
K.3	Thermostat endurance test; operating voltage (V) ..		N/A
K.4	Temperature limiter endurance; operating voltage (V) .....		N/A
K.5	Thermal cut-out reliability		N/A
K.6	Stability of operation	(see appended table 5.3)	N/A

L	ANNEX L, NORMAL LOAD CONDITIONS FOR SOME TYPES OF ELECTRICAL BUSINESS EQUIPMENT (see 1.2.2.1 and 4.5.1)	N/A
L.1	Typewriters	N/A
L.2	Adding machines and cash registers	N/A
L.3	Erasers	N/A
L.4	Pencil sharpeners	N/A
L.5	Duplicators and copy machines	N/A
L.6	Motor-operated files	N/A
L.7	Other business equipment	N/A

M	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1)	N/A
M.1	Introduction	N/A
M.2	Method A	N/A
M.3	Method B	N/A
M.3.1	Ringling signal	N/A
M.3.1.1	Frequency (Hz) .....	—
M.3.1.2	Voltage (V) .....	—
M.3.1.3	Cadence; time (s), voltage (V) .....	—
M.3.1.4	Single fault current (mA) .....	—
M.3.2	Tripping device and monitoring voltage.....	N/A
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage	N/A
M.3.2.2	Tripping device	N/A
M.3.2.3	Monitoring voltage (V) .....	N/A

N	ANNEX N, IMPULSE TEST GENERATORS (see 2.10.3.4, 6.2.2.1, 7.3.2 and clause G.5)	N/A
N.1	ITU-T impulse test generators	N/A
N.2	IEC 60065 impulse test generator	N/A

P	ANNEX P, NORMATIVE REFERENCES	P
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Q	ANNEX Q, BIBLIOGRAPHY	P
R	ANNEX R, EXAMPLES OF REQUIREMENTS FOR QUALITY CONTROL PROGRAMMES	N/A
R.1	Minimum separation distances for unpopulated coated printed boards (see 2.10.6)	N/A
R.2	Reduced clearances (see 2.10.3)	N/A

S	ANNEX S, PROCEDURE FOR IMPULSE TESTING (see 6.2.2.3)	N/A
S.1	Test equipment	N/A
S.2	Test procedure	N/A
S.3	Examples of waveforms during impulse testing	N/A

T	ANNEX T, GUIDANCE ON PROTECTION AGAINST INGRESS OF WATER (see 1.1.2)	N/A
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		See separate test report	—
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U	ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION (see 2.10.5.4)		N/A
			—



IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
3.3.4	In table 3D, delete the fourth line: conductor sizes for 10 to 13A, and replace with the following: "Over 10 up to and including 16 1,5 to 2,5 1,5 to 4 Delete the fifth line: conductor sizes for 13 to 16 A.		N/A
4.3.13.6	Add the following note: NOTE Attention is drawn to 1999/519/EC: Council Recommendation on the limitation of exposure of the general public to electromagnetic fields 0 Hz to 300 GHz. Standards taking into account this recommendation are currently under development.		N/A
Annex H	Replace the last paragraph of this annex by: At any point 10 cm from the surface of the operator access area, the dose rate shall not exceed 1 $\mu$ Sv/h (0,1 mR/h) (see note). Account is taken of the background level. Replace the notes as follows: NOTE These values appear in Directive 96/29/Euratom. Delete Note 2.		N/A
Annex P	Replace the text of this annex by: See annex ZA.		N/A
Annex Q	Replace the title of IEC 61032 by "Protection of persons and equipment by enclosures – Probes for verification". Add the following notes for the standards indicated: IEC 60127 NOTE Harmonized as EN 60127 (Series) (not modified) IEC 60269-2-1 NOTE Harmonized as HD 630.2.1 S4:2000 (modified) IEC 60529 NOTE Harmonized as EN 60529:1991 (not modified) IEC 61032 NOTE Harmonized as EN 61032:1998 (not modified) IEC 61140 NOTE Harmonized as EN 61140:2001 (not modified) ITU-T Recommendation K.31 NOTE in Europe, the suggested document is EN 50083-1.		N/A

**Note: Before placing the products in the different countries, the manufacturer must ensure that:**

1. Operating Instructions, Ratings Labels and Warnings Labels are in an Accepted or Official Language of the country in question.
2. The equipment complies with the National Standards and/or Electrical Codes of the country, province or city or in question.

Annex ZA	C: NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR RELEVANT EUROPEAN PUBLICATIONS  This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies (including amendments).  NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.	P
—	IEC 60050-151	P
—	IEC 60050-195	P
EN 60065:1998 + corr. June 1999	IEC 60065 (mod):1998	P
EN 60073:1996	IEC 60073:1996	P
HD 566 S1:1990	IEC 60085:1984	P
HD 214 S2:1980	IEC 60112:1979	P
HD 611.4.1.S1:1992	IEC 60216-4-1:1990	P
HD 21 <sup>1)</sup> Series	IEC 60227 (mod) Series	P
HD 22 <sup>2)</sup> Series	IEC 60245 (mod) Series	P
EN 60309 Series	IEC 60309 Series	P
EN 60317-43:1997	IEC 60317-43:1997	P
EN 60320 Series	IEC 60320 (mod) Series	P
HD 384.3 S2:1995	IEC 60364-3 (mod):1993	P
HD 384.4.41 S2:1996	IEC 60364-4-41 (mod):1992 <sup>3)</sup>	P
EN 132400:1994 <sup>4)</sup> + A2:1998 + A3:1998 + A4:2001	IEC 60384-14:1993	P
EN 60417-1	IEC 60417-1	P
HD 625.1 S1:1996 + corr. Nov. 1996	IEC 60664-1 (mod):1992	P
EN 60695-2-2:1994	IEC 60695-2-2:1991	P
EN 60695-2-11:2001	IEC 60695-2-11:2000	P
—	IEC 60695-2-20:1995	P
—	IEC 60695-10-2:1995	P
—	IEC 60695-11-3:2000	P
—	IEC 60695-11-4:2000	P
EN 60695-11-10:1999	IEC 60695-11-10:1999	P
EN 60695-11-20:1999	IEC 60695-11-20:1999	P
EN 60730-1:2000	IEC 60730-1:1999 (mod)	P
EN 60825-1:1994 + corr. Febr. 1995 + A11:1996 + corr. July 1997	IEC 60825-1:1993	P
EN 60825-2:2000	IEC 60825-2:2000	P
—	IEC 60825-9:1999	P
EN 60851-3:1996	IEC 60851-3:1996	P
EN 60851-5:1996	IEC 60825-5:1996	P
EN 60851-6:1996	IEC 60851-6:1996	P
—	IEC 60885-1:1987	P
EN 60990:1999	IEC 60990:1999	P
—	IEC 61058-1:2000	P
EN 61965:2001	IEC 61965:2000	P
EN ISO 178:1996	ISO 178:1993	P
EN ISO 179 Series	ISO 179 Series	P
EN ISO 180:2000	ISO 180:1993	P
—	ISO 261:1998	P
—	ISO 262:1998	P
EN ISO 527 Series	ISO 527 Series	P
—	ISO 386:1984	P
EN ISO 4892 Series	ISO 4892 Series	P
—	ISO 7000:1989	P
EN ISO 8256:1996	ISO 8256:1990	P
—	ISO 9772:1994	P

	EN ISO 9773:1998	ISO 9773:1998	P
	—	ITU-T:1988 Recommendation K.17	P
	—	ITU-T:2000 Recommendation K.21	P
	1) The HD 21 series is related to, but not directly equivalent with the IEC 60227 series 2) The HD 22 series is related to, but not directly equivalent with the IEC 60245 series 3) IEC 60364-4-41:1992 is superseded by IEC 60364-4-41:2001 4) EN 132400, Sectional Specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains (Assessment level D), and its amendments are related to, but not directly equivalent to IEC 60384-14		P
<b>Remark:</b>  Only the applicable normative references/standards were taken into consideration even other standards verdict with P !			

1.5.1	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
<u>PSU-Type A (270W)</u>	SPI Electronic Co.,Ltd.	FSP270-60LE	100-240 VAC full range 115Vrms/60Hz; 230Vrms/50Hz Output: 5/ 3,3 / 12V1 / 12V2 / -12 / 5vsb 16/ 18 / 16 / 1/ 1 / 0 / 0 A +3,3V / +5V / +12V every output is short circuit and overload protected. PSU have not a over temperature protection.  Operating temperature range: 300W: 0 to +25 deg.C 200W: 0 to +50 deg.C	EN/IEC 60950	TÜV; UL; CSA
<u>PSU-Type B (200W)</u>	SPI Electronic Co.,Ltd.	FSP200-62DL	24 VDC Nominal  Output: 3,3 / 5/ 12 / -12/ 5vsb 12 / 12 / 16/ 0,5/ 2 A every output is short circuit, overvoltage and overcurrent protected. PSU have not a over temperature protection.  Operating temperature range: 0 to +50 deg.C	EN/IEC 60950	TÜV; UL; CSA
<u>PSU-Type C (200W )</u>	SPI Electronic Co.,Ltd.	FSP200-61DL	48 VDC Nominal  Output: 3,3 / 5/ 12 / -12/ 5vsb 12 / 12 / 15,4/ 0,5/ 2 A every output is short circuit, overvoltage and overcurrent protected. PSU have not a over temperature protection.  Operating temperature range: 0 to +50 deg.C	EN/IEC 60950	TÜV; UL; CSA
Hard-Disk SATA	HITACHI	3,5" Deskstar T7K250 250GB	5 / 12 VDC Idle max. 5,2 W	IEC 60950	UL;
Alternate SATA HD	Several	3,5" Several	5 / 12 VDC Idle max. 6W	IEC 60950	UL;
Floppy Drive	Teac	FD-235HF	5 VDC; 1,5 W	IEC 60950	TÜV; UL; CSA
Alternate	Several	Several	5 VDC; max. 2 W	IEC 60950	TÜV; UL; CSA
IDE CD/DVD-ROM Slim	Teac	ATAPI DW224ER	5 VDC, 6 W max.	IEC/UL	TÜV; UL; CSA; NEMKO, CB
IDE CD/DVD-ROM Slim	Several	ATAPI Several	5 VDC, 6 W max.	IEC/UL	TÜV; UL; CSA
CPU-Board	KONTRON	PCI-960/ 9-1301-3570 / R13F/ 186326007	Celeron 440 (1,86 GHz) T2500 (2 x 2,0 GHz) T7400 (2 x 2,16 GHz)	IEC/UL94	Compliance evaluated while testing
PCB's	Several	Several	min. UL 94V-1	UL94	UL

object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
Hot plugging 1U Chasis Fan 1 & 2	SUNON	KDE1204PK2	12,0 VDC; 0,05A; 0,6 W, 2x 7,7 CFM	EN/IEC 60950	UR, TÜV
Lithium battery	Maxell	CR2032	3.0 VDC; 0.18 Ah I <sub>max</sub> =3mA	UL	UL
Alternate lithium Batteries on CPU- Board	Several	Several	3.0 VDC; 0.2 Ah I <sub>rev.</sub> Max=5mA	UL	UL
Air Filter	--	--	--	UL94	--
Inner plastic parts	Several	Several	Min. UL 94-2	Basis material UL94	UL

<sup>1)</sup> an asterisk indicates a mark which assures the agreed level of surveillance

1.6.2a	TABLE: electrical data (in normal conditions) Test conducted with 2- A08R -2xxx; PSU Type A and conditions as explained under chapter general description. Additional power (P) = 150W (6x 25W) was simulated with special electronic load PCI- Interface boards inside the unit.					P
fuse #	Irated (A)	U (V)	P (W)	I (mA)	Ifuse (mA)	condition/status
50 Hz measurement:						
*	max. 1,5	90	107	1196	*	See upper mentioned comments
*	max. 1,5	115	107	932	*	See upper mentioned comments
*	max. 1,5	125	107	863	*	See upper mentioned comments
*	max. 1,5	207	110	535	*	See upper mentioned comments
*	max. 1,5	230	112	487	*	See upper mentioned comments
*	max. 1,5	254,4	114	449	*	See upper mentioned comments
60 Hz measurement:						
*	max. 1,5	90	108	1203	*	See upper mentioned comments
*	max. 1,5	115	108	940	*	See upper mentioned comments
*	max. 1,5	125	107	859	*	See upper mentioned comments
*	max. 1,5	207	111	540	*	See upper mentioned comments
*	max. 1,5	230	113	493	*	See upper mentioned comments
*	max. 1,5	254,4	116	459	*	See upper mentioned comments

\* = Mains fuse located in certified PSUs

1.6.2c	TABLE: electrical data (in normal conditions) Test conducted with 2- A08R -2xxx; PSU Type B and conditions as explained under chapter general description. Additional power (P) = 45 W					P
fuse #	Irated (A)	U (V)	P (W)	I (A)	Ifuse (mA)	condition/status
*	max. 7	18	93	5200	*	See upper mentioned comments
*	max. 7	19,2	96	5000	*	See upper mentioned comments
*	max. 7	24	96	4000	*	See upper mentioned comments
*	max. 7	28,8	95	3300	*	See upper mentioned comments
*	max. 7	32	93	2900	*	See upper mentioned comments

\* = Mains fuse located in certified PSUs

1.6.2c	TABLE: electrical data (in normal conditions) Test conducted with 2- A08R -2xxx; PSU Type C and conditions as explained under chapter general description. Additional power (P) = 150W					P
fuse #	Irated (A)	U (V)	P (W)	I (A)	Ifuse (mA)	condition/status
*	max. 3,5	36	108	3000	*	See upper mentioned comments
*	max. 3,5	38,4	100	2600	*	See upper mentioned comments
*	max. 3,5	48	100	2100	*	See upper mentioned comments
*	max. 3,5	57,6	98	1700	*	See upper mentioned comments
*	max. 3,5	72	100	1400	*	See upper mentioned comments

\* = Mains fuse located in certified PSUs

2.10.3 and 2.10.4	TABLE: clearance and creepage distance measurements					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
L/N and PE-GND on Power distribution board	254	240	2.0	2.5	2.5	2.5

The power supplies are already certified

Note: Only applicable for certified PSUs. No further evaluation has been conducted.

2.10.5	TABLE: distance through insulation measurements			P
distance through insulation di at/of:	Up (V)	test voltage (V)	required di (mm)	di (mm)
The power supplies are already certified.				

Insulation Resistance Testing only on the AC PSU (High voltage winding to low voltage winding and ground) with 533 VDC / 60 sec.

Note: Only applicable for certified PSUs. No further evaluation has been conducted.

4.5	TABLE: maximum temperatures (2- A08R -2xxx)						P
	test voltage (V) .....				VAC	--	—
	t <sub>amb1</sub> (°C) .....				°C	--	—
	t <sub>amb2</sub> (°C) .....				°C	--	—
maximum temperature T of part/at::		T (°C)				allowed T <sub>max</sub> (°C)	
				--	--		
				--	--		
				--	--		
				--	--		
				--	--		
<p>General : Additional power (P) was simulated with special electronic load PCI- Interface boards inside the unit.                      Unit allowed to be run at an ambient temperature of a max. 50°C. Temperatures at components and surrounding measured with thermocouples. Minimal temperature classes or temperature resistance taken under consideration.                      Purpose of testing shows also compliance with IEC 60068 PT2-1, PT2-2 and PT2-14 (see separate test reports). The view of done tests shows not critical operating temperatures.</p> <p>5 fans cool the unit: 4 standard chassis fans (each 7,7 CFM) within computer frame and 1 fan within the certified PSU. These fans controlled the inside temperature. The CPU T7400 (35W TDP, TJunction-Max. 100°C) passive heatsink gets the fresh air from the chassis fans. For a 40 °C external ambient and 34W TDP (Thermal Design Power.), the heatsink will meet the thermal performance needed to when the airflow rate is at least 10 CFM. If the external ambient is 55°C , the used heatsink will be suitable if the air flow rate is approximately 15 CFM (Volumetric airflow rate in cubic feet per minute). The test specimen was checked for the surroundings conditions sufficiently.</p> <p>The test specimen was checked for the surroundings conditions sufficiently. For details please see appended table 5.3 (fault condition tests 1-3)</p>							
temperature T of winding:		R <sub>1</sub> (Ω)	R <sub>2</sub> (Ω)	T (°C)	allowed T <sub>max</sub> (°C)	insulation class	
N/A							

4.5.2	TABLE: ball pressure test of thermoplastic parts		N/A
	allowed impression diameter (mm) .....	≤ 2 mm	—
part	test temperature (°C)	impression diameter (mm)	

4.7	TABLE: resistance to fire				P
part	manufacturer of material	type of material	thickness (mm)	flammability class	
All plastic materials fulfill fire enclosure requirements !					
For more information please refer to table list of critical components					

5.2	TABLE: electric strength tests, impulse tests and voltage surge tests		P
test voltage applied between:	test voltage (V) a.c. / d.c.	breakdown Yes / No	
Electrical strength test only on the AC PSU Input (60 sec.) still in a well-heated condition immediately following the heating test.	1500 V AC / 60 sec.	No	
supplementary information: The PSU are already EN/IEC/UL 60950-1 certified			

5.3	TABLE: fault condition tests						P
	ambient temperature (°C) .....	20°C				—	
	model/type of power supply .....	Certified PSU's				—	
	manufacturer of power supply .....	Please refer to list of critical components*.				—	
	rated markings of power supply .....	Please refer to list of critical components*.				—	
component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result	
<b>General SFC-Tests with the PSU Types</b>							
PSU Type A	Short circuit condition on +3.3V, +5V, +12V output. Output short circuit is defined to be a short circuit load of less than 0,1Ω.	254,4VAC	< 1 Sec.	--	--	<b>IP</b> The PSU switched without damage off. The PSU is return to normal operation after the short circuit has been removed and the power has been turned off after more than 2 seconds.	
PSU Type B	Short circuit condition on +3.3V, +5V, +12V output. Output short circuit is defined to be a short circuit load of less than 0,1Ω.	32 VDC	< 1 Sec.	--	--	<b>IP</b> The PSU switched without damage off. The PSU is return to normal operation after the short circuit has been removed and the power has been turned off after more than 2 seconds.	
PSU Type C	Short circuit condition on +3.3V, +5V, +12V output. Output short circuit is defined to be a short circuit load of less than 0,1Ω.	72 VDC	< 1 Sec.	--	--	<b>IP</b> The PSU switched without damage off. The PSU is return to normal operation after the short circuit has been removed and the power has been turned off after more than 2 seconds.	
PSU Type C	The plugging Chassis fans removed from the CPU area.	72 VDC	3 Hours	--	--	<b>CT</b> -- No critical behavior. The additional power (P) = 50W was simulated with special electronic load PCI- Interface boards inside the unit. The CPU working with 94% load.	
PSU Type C	All plugging Chassis fans removed.	72 VDC	3 Hours	--	--	<b>CT</b> -- No critical behavior. The additional power (P) = 50W was simulated with special electronic load PCI- Interface boards inside the unit. The CPU working with 94% load.	
PSU Type C	All plugging Chassis fans removed and the app. 97% of all ventilation openings of the enclosures is closed.	72 VDC	1 Hours	--	--	<b>CT</b> -- No critical behavior. The additional power (P) = 50W was simulated with special electronic load PCI- Interface boards inside the unit. The CPU working with 94% load.	

component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result
<b>General SFC-Tests with CPU PCI-960 Board</b>						
USB1 port front	Short +5Vcc Pin & GND Pin	32 VDC	< 1 Sec.	F5	0,75	<b>IP</b> SELV Circuit V_USB67. During test unit worked normal.
USB2 port front	Short +5Vcc Pin & GND Pin	32 VDC	< 1 Sec.	F5	0,75	<b>IP</b> SELV Circuit V_USB67. During test unit worked normal.
USB3 port front	Short +5Vcc Pin & GND Pin	32 VDC	< 1 Sec.	F4	0,75	<b>IP</b> SELV Circuit V_USB67. During test unit worked normal.
USB4 port front	Short +5Vcc Pin & GND Pin	32 VDC	< 1 Sec.	F4	0,75	<b>IP</b> SELV Circuit V_USB67. During test unit worked normal.
USB5 port rear	Short +5Vcc Pin & GND Pin	32 VDC	< 1 Sec.	F1	0,75	<b>IP</b> SELV Circuit V_USB45. During test unit worked normal.
USB6 port rear	Short +5Vcc Pin & GND Pin	32 VDC	< 1 Sec.	F1	0,75	<b>IP</b> SELV Circuit V_USB45. During test unit worked normal.
VGA D-Sub port	Short +5Vcc Pin & GND Pin	32 VDC	< 1 Sec.	F8	0,75	<b>IP</b> SELV Circuit V_5V0. During test unit worked normal.

## Supplementary information

**Results Key:**

**IP** = Internal protection operated (component indicated) **CT** = Constant temperatures were obtained **TW** = Transformer winding opened **CD** = Components damaged (damaged components indicated) **NB** = No indication of dielectric breakdown **YB** = Dielectric breakdown (time and location indicated) **NC** = Cheesecloth remained intact **YC** = Cheesecloth charred or flamed **NT** = Tissue paper remained intact **YT** = Tissue paper charred or flamed

**Overcurrent protection on output ports:** Applications must meet UL 60950/IEC 60950 specifications for less than 8 A / < 5 Sec. at the connector. Protects against short circuit arising from a crimped, crushed, or pinched cable or connector.

**The connected indoor cables:** Indoor cable ampacity is based on an assumed maximum allowable conductor temperature. The heat for cables installed indoors will flow from the conductor through the cable insulation (for inner conductor) and jacket to the cable surface where it is radiated away from the cable.

A.6.5	TABLE: flammability test for classifying materials V-0, V-1 or V-2		N/A
sample No. / ref.	afterflame time (s) $t_1$ or $t_2$	afterflame + afterglow (s) after 2nd flame application $t_2 + t_3$	
1/A			
2/A			
3/A			
4/A			
5/A			
6/B			
7/B			
8/B			
9/B			
10/B			
supplementary information:			
Total afterflame time (s) for any condition set $t_1 + t_2$ for five (5) specimens:			
Conditioning "A" designates 7 days at $70\text{ °C} \pm 1\text{ °C}$ followed by 4 h minimum in calcium chloride desiccator.			
Conditioning "B" designates 48 h at $23\text{ °C} \pm 2\text{ °C}$ and relative humidity between 45 % and 55 %.			

A.6.6	TABLE: flammability re-test for classifying materials V-0, V-1 or V-2		N/A
sample No.	afterflame time (s) $t_1$ or $t_2$	afterflame + afterglow (s) after 2nd flame application $t_2 + t_3$	
11			
12			
13			
14			
15			
supplementary information:			
Total afterflame time (s) for any condition set $t_1 + t_2$ for five (5) specimens:			

A.7.4, A.7.5, A.7.6 and A.7.7	TABLE: flammability test for classifying foam materials HF-1, HF-2 or HBF			N/A
sample No. / ref.	flame time (s)	glow time (s)	flaming/glowing distance from the end (mm)	comment (for A.7.7 burning rate mm/min)
1/A				
2/A				
3/A				
4/A				
5/A				
6/B				

sample No. / ref.	flame time (s)	glow time (s)	flaming/glowing distance from the end (mm)	comment (for A.7.7 burning rate mm/min)
7/B				
8/B				
9/B				
10/B				

supplementary information:

Conditioning "A" designates 7 days at  $70\text{ °C} \pm 1\text{ °C}$  followed by 4 h minimum in calcium chloride desiccator.

Conditioning "B" designates 48 h at  $23\text{ °C} \pm 2\text{ °C}$  and relative humidity between 45 % and 55 %.

A.7.8	TABLE: flammability re-test for classifying foam materials HF-1 or HF-2	N/A
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sample No.	flame time (s)	glow time (s)	flaming/glowing distance from the end (mm)	comment
11				
12				
13				
14				
15				

supplementary information:

A.7.9	TABLE: flammability re-test for classifying foam materials HBF	N/A
-------	--	-----

sample No.	flame time (s)	glow time (s)	flaming/glowing distance from the end (mm)	comment (for A.7.7 burning rate mm/min)
11				
12				
13				
14				
15				

supplementary information:

A.8.5	TABLE: flammability test for classifying materials HB	N/A
-------	---	-----

sample No.	flaming/glowing rate mm/min	flaming/glowing distance from reference mark (mm)
1		
2		
3		

supplementary information:

A.8.6	TABLE: flammability re-test for classifying materials HB		N/A
sample No.	flaming/glowing rate mm/min	flaming/glowing distance from reference mark (mm)	
4			
5			
6			
supplementary information:			

A.9.6	TABLE: flammability test for classifying materials 5V				N/A
sample No./ref.	test bars		test plaques		
	flaming + glowing time (s)	burning distance (mm)	position	flaming + glowing time (s)	burning distance (mm)
1/A			A		
2/A			B		
3/A			C		
4/A			D		
5/A			—	—	—
6/B			A		
7/B			B		
8/B			C		
9/B			D		
10/B			—	—	—
supplementary information:					
Conditioning "A" designates 7 days at 70 °C ± 1 °C followed by 4 h minimum in calcium chloride desiccator.					
Conditioning "B" designates 48 h at 23 °C ± 2 °C and relative humidity between 45 % and 55 %.					

A.9.7	TABLE: flammability re-test for classifying materials 5V				N/A
sample No.	test bars		test plaques		
	flaming + glowing time (s)	burning distance (mm)	position	flaming + glowing time (s)	burning distance (mm)
11			A		
12			B		
13			C		
14			D		
15			—	—	—
supplementary information:					