







Copy of marking plate:

<b>kontron</b>		100-240V 3.5A max. 50-60Hz	<b>CE</b>						
Type: KISS 4U KT965 - A									
MN		SN		SIC	<input type="checkbox"/>	POT	<input type="checkbox"/>	BIT	<input type="checkbox"/>
2-A0E8-2xxx		123456789		FT1	<input type="checkbox"/>	checkout status		FT2	<input type="checkbox"/>

<b>kontron</b>		100-240V 3.5A max. 50-60Hz	<b>CE</b>						
Type: KISS 4U KT965 - B									
MN		SN		SIC	<input type="checkbox"/>	POT	<input type="checkbox"/>	BIT	<input type="checkbox"/>
2-A0E8-2xxx		123456789		FT1	<input type="checkbox"/>	checkout status		FT2	<input type="checkbox"/>

<b>kontron</b>		100-240V 4.5A max. 50-60Hz	<b>CE</b>						
Type: KISS 4U KT965 - C									
MN		SN		SIC	<input type="checkbox"/>	POT	<input type="checkbox"/>	BIT	<input type="checkbox"/>
2-A0E8-2xxx		123456789		FT1	<input type="checkbox"/>	checkout status		FT2	<input type="checkbox"/>

<b>kontron</b>		24VDC 15A max.	<b>CE</b>						
Type: KISS 4U KT965 - D									
MN		SN		SIC	<input type="checkbox"/>	POT	<input type="checkbox"/>	BIT	<input type="checkbox"/>
2-A0E8-2xxx		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

**Particulars: test item vs. test requirements**

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 and Class III
Mass of equipment (kg) .....	Approx. 20 kg
Protection against ingress of water .....	Ordinary

**Test case verdicts**

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)

**Testing**

Date of receipt of test item .....	28.01.08
Date(s) of performance of test .....	28.01.08 – 08.02.08

**General remarks**

**"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 60950-1:2002".**

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.

"(see Enclosure #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

**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
- 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:**

All AC-Models 2-A0E8-2xxx have a 300W, 300W redundant or 460W PSU. The KONTRON KT965/ATXE CPU board with Intel® Core™ 2 Duo , Intel® Core™ 2 Extreme, Intel® Core™ 2 Quad Desktop based Embedded ATX with 2 x Gb LAN, S-ATA and up to 8GB DDR2/800. The DC-Model 2-A0E8-2xxx have a 250/300W 24VDC PSU.

.....  
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 300W:</u>	<b>KISS 4U KT965-A</b>  Input: 100 - 240 VAC 60 - 50 Hz max. 3,5 A
<u>KISS AC Model Type 460W:</u>	<b>KISS 4U KT965-B</b>  Input: 100 - 240 VAC 60 - 50 Hz max. 3,5 A
<u>KISS AC red. Model Type 300W:</u>	<b>KISS 4U KT965-C</b>  Input: 100 - 240 VAC 60 - 50 Hz max. 4,5 A
<u>KISS DC Model Type 250W:</u>	<b>KISS 4U KT965-D</b>  Input: 24 VDC max. 15 A

#### 4. Insulation system (Type: 2-A0E5-0000)

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.

- Inside the computer it is not possible to get in contact with hazardous live parts. But because of hazardous energy (chapter 1.2.8.7, hazardous energy) only authorised persons are allowed to open computer. Within operation manual safety hints point out that operator access to unit inner side is not allowed.

#### 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-A0E8-2xxx

a) CPU Board	---->	80 W
b) All Drives/Peripherals	---->	90 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-A0E8-2xxx in dependence of used PSU-Type:

PSU-Type A (300W) ----> X = 300 as a result P = 130 W

The available P additional power for the tests: 125 W (5xPCI).

Within operation manual it is defined:

- The power of each used PCI interface should not be higher than 25 W.
- The steady-state performance of each used USB interface should not be higher than 5 W.
- Maximum continuous total DC output power (+3.3V +5V &+12V) shall not exceed 280 W.
- The output load at +3,3V and +5V together must not exceed 130 W max.
- Always taking care that the cooling openings of the unit are free for unhindered stream of air.

PSU-Type B (460W) ----> X = 460 as a result P = 290 W

The available P additional power (315 W) limited for the tests on 125 W (5xPCI).

Within operation manual it is defined:

- The power of each used PCI interface should not be higher than 25 W.
- The steady-state performance of each used USB interface should not be higher than 5 W.
- Always taking care that the cooling openings of the unit are free for unhindered stream of air.

PSU-Type C (300W red.) ----> X = 300 as a result P = 130 W

The available P additional power for the tests: 125 W (5xPCI). The both power switches on the PSU were ON and both PSUs were working together.

Within operation manual it is defined:

- The power of each used PCI interface should not be higher than 25 W.
- The steady-state performance of each used USB interface should not be higher than 5 W.
- The output load at +3,3V and +5V together must not exceed 35 A.
- The output load at +3,3V , +5V and +12V together must not exceed 285 W.
- Always taking care that the cooling openings of the unit are free for unhindered stream of air.

<u>PSU-Type D</u>	---->	X = 250 (for volt. Range 20-23 VDC)	as a result	P = 80 W
	---->	X = 300 (for volt. Range 24-32 VDC)	as a result	P = 130 W

The available P additional power for the tests: 125 W (5xPCI).

Within operation manual it is defined:

- a. The DC KISS Version connects to the dc source by permanent wiring methods. 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.
- b. That the total power for the voltage range 19-23VDC, is not allowed to exceed down mentioned value of 250 W.
- c. That the total power for the voltage range 24-32VDC, is not allowed to exceed down mentioned value of 300 W.
- d. Derating and operating temperature: 300W at 30°C / 210W at 50°C / 150W at 70°C
- e. The output load at +3,3V and +5V together must not exceed 150 W.
- f. At load >100W (+3,3V and +5V), a minimum load of +12V / 1,2A is required. At load +12V / 15A a minimum load of +5V / 15A is required.
- g. The power of each used PCI interface should not be higher than 25 W.
- h. The steady-state performance of each used USB interface should not be higher than 5 W.
- i. 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 .....		N/A
	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 .....		P
	Type/model or type reference.....	KISS 4U KT965-x (see general product information)	P
	Symbol for Class II equipment only .....		N/A

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
	Other symbols .....		N/A
	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 .....	Within certified PSUs appliance inlet	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		N/A
1.7.8	Controls and indicators		N/A
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 .....		N/A
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
2.1.1	Protection in operator access areas	<p>However hazardous voltage circuits are only within certified PSUs. The PSU-Enclosures together with Kontron internal PSU-Enclosure modifications fulfils all requirements of this chapter.</p> <p>Operator access to SELV only</p>	P

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
2.1.1.1	Access to energized parts	Only qualified or authorize personal is allowed to has access to unit inner side because of hazardous energy level (>240 VA) supply of used PSUs. Within operation manual the user is informed that the access to unit inner side is not allowed!  No access to other hazardous or ELV parts.	P
	Test by inspection .....	Protection is established by insulation materials and barriers	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	No hazardous voltage wiring in the operator access area	N/A
2.1.1.5	Energy hazards .....	No energy hazard in operator access area. Operator has access only to SELV area.	P
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	Hazardous voltage circuits are only within certified PSU. The PSU enclosure fulfill all requirements of this chapter. Only qualified or authorize personal is allowed to has access to unit inner side.	P
2.1.3	Protection in restricted access locations		N/A

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

2.3	TNV circuits		N/A
2.3.1	Limits		N/A
	Type of TNV circuits .....	TNV-1	—

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
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 PSU)	P
2.6.1	Protective earthing	Applied in certified PSUs	P
2.6.2	Functional earthing		N/A
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

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
	Rated current (A), cross-sectional area (mm <sup>2</sup> ), AWG .....		—
2.6.3.3	Size of protective bonding conductors	Applied in certified PSUs	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) .....	0,06Ω / 30 A for 2 Minutes	P
2.6.3.5	Colour of insulation.....	Applied in certified PSUs	P
2.6.4	Terminals	Applied in certified PSUs	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	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		N/A
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	Appliance inlet used	P
2.6.5.4	Parts that can be removed by an operator	Fulfilled by the use of certified PSUs	P
2.6.5.5	Parts removed during servicing	Fulfilled by the use of certified PSUs	P
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		N/A

2.7	Overcurrent and earth fault protection in primary circuits		P
2.7.1	Basic requirements	Fulfilled by the use of certified PSUs	P
	Instructions when protection relies on building installation	Safety instructions sufficient explained in operation manual	P
2.7.2	Faults not covered in 5.3		N/A
2.7.3	Short-circuit backup protection	Building Installation	N/A
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		N/A
2.7.6	Warning to 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

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
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
2.10.2	Determination of working voltage	>90 Vac to < 254,4 Vac, 60/50 Hz for primary. For the DC-Variant Min. 20 VDC primary.	P
2.10.3	Clearances	Fulfilled by the use of certified PSUs	P
2.10.3.1	General		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		N/A
2.10.5.1	Minimum distance through insulation	(see appended table 2.10.5)	N/A
2.10.5.2	Thin sheet material		N/A
	Number of layers (pcs) .....		—
	Electric strength test	(see appended table 5.2)	—
2.10.5.3	Printed boards		N/A
	Distance through insulation		N/A

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

3	WIRING, CONNECTIONS AND SUPPLY		P
3.1	General		P
3.1.1	Current rating and overcurrent protection		P
3.1.2	Protection against mechanical damage		P
3.1.3	Securing of internal wiring		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	Appliance inlets	P
3.2.2	Multiple supply connections		N/A

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

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 PSUs refer to above	P

## IEC 60950-1 / EN 60950-1

Clause	Requirement – Test	Result – Remark	Verdict
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
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

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
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
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 are located in protected area.	P
4.4.2	Protection in operator access areas		P
4.4.3	Protection in restricted access locations		N/A

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
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
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: Removable rectangular air filter cover made of metal (area 14,6 x 10,2 cm filled out with 4,9 mm diameter holes). Air filter frame is mounted on unit metal enclosure (behind of filter area 14 x 10 filled out with 4,9 mm diameter holes).</li> <li>• Rear upper side: Air outflow openings. holes at a length of 21 cm (4 –5 rows) and at a length of 12 cm (6-7 rows), holes have a diameter of 4 mm.</li> <li>• Rear left side: Fan opening of certified PSUs</li> <li>• 7 Rear metal slots with air outflow 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 17,5 x 43 cm). The door has an opening (2,9 x 13,4 cm) for visual look on signalisation LED's and ventilation slits for air flow. Behind this door its unit metal cover and all unit drives like FDD, CD-ROM, DVD, e.g. and air filter cover are located. Under normal operating conditions this door is closed and locked up. Within operation manual the correct unit use is described with closed and locked door.</li> </ul>	P

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
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
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) .....	0,06	—
	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

IEC 60950-1 / EN 60950-1			
Clause	Requirement – Test	Result – Remark	Verdict
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) .....		—
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
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F	ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10)		P
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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
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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
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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	<p>C: NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR RELEVANT EUROPEAN PUBLICATIONS</p> <p>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).</p> <p>NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.</p>	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 (300W)</u>	SPI Electronic Co.,Ltd.	FSP300- 60GLC	100-240 VAC full range max.6A/115Vrms/60Hz; max.3,0A/230Vrms/50Hz Output: 5 / 3,3 / 12 / -12/ 5vsb / -5 VDC; 30 / 28 / 15 / 0,8/ 2,0 / 0,8 / 0,3A +5V & +3,3V output is short protected. PSU have not a over temperature protection.	EN/IEC 60950	TÜV; UL; CSA
<u>PSU-Type B (460W)</u>	Bicker	BEA646	90-264 VAC full range 7,5A/115Vrms/60Hz; 3,5A/230Vrms/50Hz over load protection 110-150% shot down; 105°C electrolytic; +55°C operating temp. Output: 3,3 / 5/ 12 / -12/ 5vsb / -5VDC; 30 / 40 / 32 / 1/ 2 / 0,8A on every output is short circuit protectetion. PSU have not a over temperature protection but the fan is tacho controlled.	EN/IEC 60950	TÜV; UL; CSA
<u>PSU-Type C (300W red.)</u>	Bicker	MRT-6300P	90-264 VAC full range 6A/115Vrms/60Hz; 3,0A/230Vrms/50Hz over load protection 110-160% +75°C operating temp. Output: 3,3 / 5 / 12 / -12/ 5vsb / -5 VDC; 18/ 25 / 16 / 0,5/ 2,0 / 0,8 / 0,5A on every output is short circuit protectetion. PSU have not a over temperature protection.	EN/IEC 60950	TÜV; UL; CSA
<u>PSU-Type D</u> <u>300 W for volt.</u> <u>Range 24-32VDC</u>  <u>255 W for volt.</u> <u>Range 19-23VDC</u>	Bicker	BES-630C	18-32 VAC 21A at 18 VDC; over load protection ; +45°C operating temp. Output: 3,3 / 5 / 12 / -12/ 5vsb / -5 VDC; 15/ 30 / 15 / 2/ 1,2 / 2 shot down short circuit protectetion. PSU have not a over temperature protection.	EN/IEC 60950	TÜV; UL; CSA

object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
Hard-Disk SATA	3,5" Seagate	ST3120023AS SATA, 120GB	5 / 12 VDC Idle max. 13,5W	IEC 60950	UL;
HD SCSI	3,5" HITACHI	Ultrastar 146Z10 SCSI, 73GB	5 / 12 VDC Idle max. 12,1W	IEC 60950	UL
Alternate SATA HD	3,5" Several	Several	5 / 12 VDC Idle max. 6W	IEC 60950	UL;
KISS Store	3,5" PATA/SATA Raid 0,5 KIT	Accusys Q00221761300 0015A001	+5V and +12V 40°C operating	IEC 60950	TÜV; UL; CSA
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	Teac	DV-516G-095	5 / 12 VDC, 26W max.	IEC/UL	TÜV; UL; CSA; NEMKO, CB
IDE CD/DVD Burner	SONY	DRU-810A	5 / 12 VDC; 2 / 1 A; Max.16W; operating tmp. 5 to 35°C;	IEC/UL	TÜV; UL; CSA
IDE CD/DVD Burner	Teac	DW224EB	5 VDC; max. 1,5A	IEC/UL	TÜV; UL; CSA
IDE CD/DVD-ROM	Teac	DV-516G-095	5 / 12 VDC, max.26W	IEC/UL	TÜV; UL; CSA
CPU-Board	KONTRON	KT965/ATXE	Intel® Core™ 2 Duo , Intel® Core™ 2 Extreme, Intel® Core™ 2 Quad, Intel® Pentium® 4 processor or Intel® Celeron® D processor	IEC/UL94	Compliance evaluated while testing
CPU-Fun	Intel	DA09025R12M P035	12,0VDC; max.0,42A; max.5W, 1,95 m <sup>3</sup> /Min.; 68,9 CFM	IEC/UL	TÜV; UL; CSA
PCB's	Several	Several	min. UL 94V-1	UL94	UL
Hot plugging 4U Chasis Fan 1 & 2	SUNON	KDE1209PTV1	12,0VDC; 0,18A; 2,2 W, 2x 49 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-A0E8-2xxx; PSU Type A and conditions as explained under chapter general description. Additional power (P) = 125W (5 x 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.3,5	90	284	3160	*	See upper mentioned comments
*	max.3,5	115	282	2450	*	See upper mentioned comments
*	max.3,5	125	282	2250	*	See upper mentioned comments
*	max.3,5	207	282	1360	*	See upper mentioned comments
*	max.3,5	230	283	1230	*	See upper mentioned comments
*	max.3,5	254,4	279	1100	*	See upper mentioned comments
60 Hz measurement:						
*	max.3,5	90	284	3150	*	See upper mentioned comments
*	max.3,5	115	281	2440	*	See upper mentioned comments
*	max.3,5	125	283	2260	*	See upper mentioned comments
*	max.3,5	207	282	1360	*	See upper mentioned comments
*	max.3,5	230	281	1220	*	See upper mentioned comments
*	max.3,5	254,4	279	1100	*	See upper mentioned comments

\* = Mains fuse located in certified PSUs

1.6.2b	TABLE: electrical data (in normal conditions) Test conducted with 2-A0E8-2xxx; PSU Type B and conditions as explained under chapter general description. Additional power (P) = 125W (5 x 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.3,5	90	282	3136	*	See upper mentioned comments
*	max.3,5	115	277	2406	*	See upper mentioned comments
*	max.3,5	125	277	2216	*	See upper mentioned comments
*	max.3,5	207	283	1367	*	See upper mentioned comments
*	max.3,5	230	286	1246	*	See upper mentioned comments
*	max.3,5	254,4	287	1131	*	See upper mentioned comments
60 Hz measurement:						
*	max.3,5	90	282	3138	*	See upper mentioned comments
*	max.3,5	115	282	2450	*	See upper mentioned comments
*	max.3,5	125	278	2227	*	See upper mentioned comments
*	max.3,5	207	292	1408	*	See upper mentioned comments
*	max.3,5	230	292	1270	*	See upper mentioned comments
*	max.3,5	254,4	292	1149	*	See upper mentioned comments

\* = Mains fuse located in certified PSUs

1.6.2c	TABLE: electrical data (in normal conditions) Test conducted with 2-A0E8-2xxx; PSU Type C and conditions as explained under chapter general description. Additional power (P) = 125W (5 x 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. 4,5	90	338	3763	*	See upper mentioned comments
*	max. 4,5	115	326	2841	*	See upper mentioned comments
*	max. 4,5	125	325	2602	*	See upper mentioned comments
*	max. 4,5	207	322	1554	*	See upper mentioned comments
*	max. 4,5	230	326	1420	*	See upper mentioned comments
*	max. 4,5	254,4	321	1261	*	See upper mentioned comments
60 Hz measurement:						
*	max. 4,5	90	337	3743	*	See upper mentioned comments
*	max. 4,5	115	327	2845	*	See upper mentioned comments
*	max. 4,5	125	325	2603	*	See upper mentioned comments
*	max. 4,5	207	322	1550	*	See upper mentioned comments
*	max. 4,5	230	326	1418	*	See upper mentioned comments
*	max. 4,5	254,4	327	1287	*	See upper mentioned comments

\* = Mains fuse located in certified PSUs

1.6.2c	TABLE: electrical data (in normal conditions) Test conducted with 2-A0E8-2xxx; PSU Type D and conditions as explained under chapter general description. Additional power (P) = 125W (5 x 25W) was simulated with special electronic load PCI- Interface boards inside the unit.					P
fuse #	Irated (A)	U (V)	P (W)	I (A)	Ifuse (mA)	condition/status
*	max. 15	20,3 min.	315	15,5	*	See upper mentioned comments
*	max. 15	22	304	13,8	*	See upper mentioned comments
*	max. 15	24	300	12,5	*	See upper mentioned comments
*	max. 15	28	292	10,4	*	See upper mentioned comments
*	max. 15	32	288	9,0	*	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)
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					
Note: Only applicable for certified PSUs. No further evaluation has been conducted.					

4.5	TABLE: maximum temperatures (2-A0E8-2xxx)					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.</p> <p>Unit allowed to be run at an ambient temperature of a max. 50°C. Temperatures at components and surrounding measured with thermocouples. Temperature resistance taken under consideration.</p> <p>3 fans cool the unit: 2 standard chasis fans (each 49 CFM) within computer frame and 1 fan within the certified PSU. These fans controlled the inside temperature. Each chasis fans has a temperature sensor which can be placed anywhere in the chassis. There is also a pin out for the tachometer signal.</p> <p>The CPU E6400/ 2x 2.13GHz (65 W TDP, TJunction-Max. 100°C = shut down) with active fan cooling. The airflow rate is approximately 68,9 CFM (Volumetric airflow rate in cubic feet per minute) or 1,95 m<sup>3</sup>/Min. The test specimen was checked for the surroundings conditions sufficiently. For details please see appended table 5.3 (fault condition tests 1-3)</p> <p>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>						
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) .....	23°C				—	
	model/type of power supply .....	Certified PSU				—	
	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</b>							
USB Interface X78	Short +5Vcc Pin & GND Pin	4,3	< 10 Min.	--	--	During test unit worked normal, max. available current: 2800mA	
USB Interface X78	Short +5Vcc Pin & GND Pin	4,8	> 10 Sec.	--	--	During test unit worked normal, max. available current: 3400mA	
USB Interface X79	Short +5Vcc Pin & GND Pin	4,3	< 10 Min.	--	--	During test unit worked normal, max. available current: 2700mA	
USB Interface X79	Short +5Vcc Pin & GND Pin	4,9	< 10 Sec.	--	--	During test unit worked normal, max. available current: 3600mA	
USB Interface X76	Short +5Vcc Pin & GND Pin	4,3	< 10 Min.	--	--	During test unit worked normal, max. available current: 2700mA	
USB Interface X76	Short +5Vcc Pin & GND Pin	4,9	< 10 Sec.	--	--	During test unit worked normal, max. available current: 3600mA	
USB Interface X77	Short +5Vcc Pin & GND Pin	4,3	< 10 Min.	--	--	During test unit worked normal, max. available current: 2800mA	
USB Interface X77	Short +5Vcc Pin & GND Pin	4,9	< 10 Sec.	--	--	During test unit worked normal, max. available current: 3600mA	
USB Interface X70	Short +5Vcc Pin & GND Pin	4,3	< 10 Min.	--	--	During test unit worked normal, max. available current: 2700mA	
USB Interface X70	Short +5Vcc Pin & GND Pin	4,9	< 10 Sec.	--	--	During test unit worked normal, max. available current: 3600mA	
USB Interface X72	Short +5Vcc Pin & GND Pin	4,3	< 10 Min.	--	--	During test unit worked normal, max. available current: 2800mA	
USB Interface X72	Short +5Vcc Pin & GND Pin	4,9	< 10 Sec.	--	--	During test unit worked normal, max. available current: 3600mA	
USB Interface X74	Short +5Vcc Pin & GND Pin	4,3	< 10 Min.	--	--	During test unit worked normal, max. available current: 2800mA	
USB Interface X74	Short +5Vcc Pin & GND Pin	4,9	< 10 Sec.	--	--	During test unit worked normal, max. available current: 3600mA	
USB Interface X75	Short +5Vcc Pin & GND Pin	4,4	< 10 Min.	--	--	During test unit worked normal, max. available current: 2800mA	
USB Interface X75	Short +5Vcc Pin & GND Pin	4,9	< 10 Sec.	--	--	During test unit worked normal, max. available current: 3600mA	
USB Interface X71	Short +5Vcc Pin & GND Pin	3,9	< 10 Min.	--	--	During test unit worked normal, max. available current: 2600mA	
USB Interface X71	Short +5Vcc Pin & GND Pin	4,8	< 10 Sec.	--	--	During test unit worked normal, max. available current: 3200mA	

component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result
USB Interface X73	Short +5Vcc Pin & GND Pin	3,9	< 10 Min.	--	--	During test unit worked normal, max. available current: 2600mA
USB Interface X73	Short +5Vcc Pin & GND Pin	4,8	< 10 Sec.	--	--	During test unit worked normal, max. available current: 3200mA
PS/2 Interface Mouse	Short +5Vcc Pin & GND Pin	3,1	< 10 Min.	--	--	During test unit worked normal, max. available current: 1900mA
PS/2 Interface Mouse	Short +5Vcc Pin & GND Pin	3,2	< 10 Sec.	--	--	During test unit worked normal, max. available current: 2000mA
PS/2 Interface Keyboard	Short +5Vcc Pin & GND Pin	3,1	< 10 Min.	--	--	During test unit worked normal, max. available current: 1900mA
PS/2 Interface Keyboard	Short +5Vcc Pin & GND Pin	3,2	< 10 Sec.	--	--	During test unit worked normal, max. available current: 2000mA
1	Hot plugging Chassis fan 1 & 2 removed	24,2 Vdc	10 Min.	--	--	Additional power (P) = 120W (6 x 20W) was simulated with special electronic load PCI- Interface boards inside the unit. Thermal shutdown TJunction-Max. 100°C = shut down.
2	PSU fan blocked	24,2 Vdc	2 Min.	--	--	Additional power (P) = 120W (6 x 20W) was simulated with special electronic load PCI- Interface boards inside the unit. Thermal shutdown TJunction-Max. 100°C = shut down.
3	CPU fan blocked	24,2 Vdc	4 Min.	--	--	Additional power (P) = 120W (6 x 20W) was simulated with special electronic load PCI- Interface boards inside the unit. Thermal shutdown TJunction-Max. 100°C = shut down.

#### Supplementary information

- = all Tests conducted with certified PSU-Type D (24 Vdc)

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 in USB hub or peripheral.** Individual or ganged port protection is required to limit current to a maximum of 5 A.. Because the power is supplied from an internal power supply in self-powered hub, the over-current protection is required on the output ports for safety reason. UL limits require ports to deliver no more than 5A (including short circuit currents). If there is an only one-output port of a self-powered hub, the maximum output current limit is 5A for this hub to supply maximum current 5A to ganging multiple downstream ports. In the same way, if a self-powered hub has two output ports, the maximum output current limit is  $5A/2=2.5A$  for each output port to supply maximum current 2.5A to downstream ports.

**Overcurrent protection PS2 Keyboard/Mouse:** Applications must meet UL 60950/IEC 60950 specifications for less than 8 A at the connector. Protects against short circuit arising from a crimped, crushed, or pinched cable or connector.

**The connected cables on USB & PS2:** 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
-------	---	-----

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:					