



**TEST REPORT  
IEC 61010-1: 2010**

**Safety requirements for electrical equipment for measurement, control, and laboratory use  
Part 1: General requirements**

**Report Number** ..... : 02072255.013  
**Date of issue** ..... : 07/26/2013  
**Total number of pages** ..... : 123 Pages (including Attachments)

**Applicant's name**..... : SRI Instruments, Inc.  
**Address** ..... : 6440 Sunset Corporation Drive, Las Vegas, NV 89120, USA

**Test specification:**

**Standard**..... :  IEC 61010-1: 2010 (3<sup>rd</sup> Edition) /  EN 61010-1: 2010 (3<sup>rd</sup> Edition)  
 UL 61010-1:2012, CAN/CSA-C22.2 No. 61010-1-12  
**Test procedure** ..... : cTUVus  
**Non-standard test method**..... : N/A


**Test Report Form No.** ..... : IEC61010\_1H  
**TRF Originator** ..... : VDE Testing and Certification Institute  
**Master TRF** ..... : 2011-11

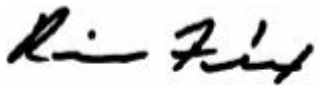
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**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

**Test item description** ..... : Gas Chromatography Systems  
**Trade Mark**..... :   
**Manufacturer** ..... : Same as Applicant  
**Model/Type Reference** ..... : 110, 310, 410, 8610C, 8610D, 8610V  
**Ratings** ..... : AC 115V, 50/60Hz, 1725VA

<b>Testing procedure and testing location:</b>	
<input checked="" type="checkbox"/> <b>CB Testing Laboratory:</b>	TÜV Rheinland of North America Inc.
Testing location / address .....	12 Commerce Road Newtown, CT 06470
<input type="checkbox"/> <b>Associated CB Laboratory:</b>	
Testing location/ address .....	
Tested by (name + signature).....:	Ricardo Felix 
Approved by (name + signature) .....	Uwe Meyer
<input type="checkbox"/> <b>Testing procedure: TMP</b>	
Testing location/ address .....	
Tested by (name + signature).....:	
Approved by (name + signature) .....	
<input type="checkbox"/> <b>Testing procedure: WMT</b>	
Testing location / address .....	
Tested by (name + signature).....:	
Witnessed by (name + signature)....:	
Approved by (name + signature) .....	
<input type="checkbox"/> <b>Testing procedure: SMT</b>	
Testing location / address .....	
Tested by (name + signature).....:	
Approved by (name + signature) .....	
Supervised by (name + signature)..:	
<input type="checkbox"/> <b>Testing procedure: RMT</b>	
Testing location / address .....	
Tested by (name + signature).....:	
Approved by (name + signature) .....	
Supervised by (name + signature)..:	

<b>List of Attachments (including a total number of pages in each attachment):</b>		
Document No.	Documents included / attached to this report (description)*	Page Numbers**
TABLE 1	List of safety relevant components	1
TABLE 2	List of test equipment used	1
ATTACHMENT 1	National Differences	22
ATTACHMENT 2	Photo-documentation	7
ATTACHMENT 3	Transformer Schematic and Specificatins	9
*Attachments located at the end of this report.		
**Number of pages for each document indicated instead		
<b>Summary of testing:</b>		
<input checked="" type="checkbox"/> The product fulfils the requirements of IEC 61010-1:2010 [3 <sup>rd</sup> Edition] and EN 61010-1: 2010 (3 <sup>rd</sup> Edition), as well as of UL 61010-1:2012 and CAN/CSA-C22.2 No. 61010-1-12		
<b>Test Report History:</b>		
This report may consist of more than one report and is valid only with additional or previous issued reports:		
Ref. No.: 02072255.011	Item	
<b>Tests performed (name of test and test clause):</b>		<b>Testing location:</b>
<p>All testing indicated below was performed as part of the original evaluation according to report number 02072255.011, no additional testing was performed for this upgrade of standard.</p> <p>4.4: Single Fault Condition            5.1.3 c): Inputs            5.3: Durability of Markings            6.3.1 Permissible Limits of Accessible Parts: Normal Condition            6.3.2 Permissible Limits of Accessible Parts: Single Fault Condition            6.5.2.3 Tighting torque test            6.5.2.4 Bonding Impedance            6.7.1 Clearance and Creepage Distances            6.8 Dielectric Strength            6.10.2 Cord anchorage test            6.10.3 Capacitance Discharge            10.1.3/3 Temperature Measurements</p>		TÜV Rheinland of North America Inc. 12 Commerce Road Newtown, CT 06470



**Summary of compliance with National Differences:**



List of countries addressed: All EC countries are covered by the report. National Differences for Canada and United States are addressed in Attachment 1.

**Copy of marking plate:**

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.


### Electrical Ratings and Agency Approvals

<input type="checkbox"/>	115 VAC +/-10% 1725 watts max. 50/60Hz operating temperature 5-40C	
<input type="checkbox"/>	230VAC +/-10% 1725 watts max. 50/60Hz operating temperature 5-40C	

[check box used for the actual rating and market]

Hydrogen gas is flammable. Install flow limiting device ( restrictor/snubber ) on hydrogen cylinder to limit flow to 100ml/minute. Install quick shut-off if cylinder is more than 2 meters from GC. Leak check daily.



Mount on left side above H2 inlet

#### POWER CORD

Plug into Earth Grounded GFCI protected outlet ONLY  
 Green wire= Earth Ground  
 Black/Brown=115/250VAC Hot  
 White/Blue=AC common

Position unit so it can easily and quickly be disconnected from mains power.

#### Vacuum Pump Interface

Controlled by data system output

100 VA ( watts ) maximum  
 Internal fuse  
 115VA 1 amp  
 230VA .5 amp

Mount on left side of GC

<b>Test item particulars</b> ..... :	
Type of item .....	<input type="checkbox"/> Measurement / <input type="checkbox"/> Control / <input checked="" type="checkbox"/> Laboratory
Description of equipment function .....	See 'General Product Description' below
Connection to MAINS supply.....	<input type="checkbox"/> Permanent / <input type="checkbox"/> Detachable Cord Set / <input type="checkbox"/> Non Detachable Cord Set / <input type="checkbox"/> None
Overvoltage category.....	II
POLLUTION DEGREE .....	2
Means of protection .....	<input checked="" type="checkbox"/> Class I (PE connected) / <input type="checkbox"/> Class II (isolated)
Environmental rating .....	<input checked="" type="checkbox"/> Normal / <input type="checkbox"/> Extended (Specify):
Equipment mobility.....	<input checked="" type="checkbox"/> Portable / <input type="checkbox"/> Hand-held / <input type="checkbox"/> Floor-standing / <input type="checkbox"/> Fixed / <input type="checkbox"/> Built in
Operating conditions .....	<input checked="" type="checkbox"/> Continuous / <input type="checkbox"/> Short-time / <input type="checkbox"/> Intermittent
Overall size of the equipment (W x D x H).....	110: 216mm x 343mm x 368 mm 410, 8610C, 8610D, 8610V: 200mm x 350mm x 430mm 310: 317mm x 343mm x 368 mm
Mass of the equipment (kg).....	<18
Marked degree of protection to IEC 60529 .....	IPX0
<b>Possible test case verdicts:</b>	
– test case does not apply to the test object .....	N/A
– test object does meet the requirement.....	P (Pass)
– test object does not meet the requirement.....	F (Fail)
<b>Testing</b>	
Date of receipt of test item.....	09/04/2012
Date (s) of performance of tests.....	09/07/2012 – 09/17/2012
<b>General remarks:</b>	
<p>The test results presented in this report relate only to the object tested.                  This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.                  "(See Attachment #)" refers to additional information appended to the report.                  "(See Form A.xx)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
<b>Manufacturer's Declaration per sub-clause 6.2.5 of IEC 60529:</b>	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not Applicable	
<b>When differences exist; they shall be identified in the General product information section.</b>	
<b>Name and address of factory (ies)</b> ..... : SRI Instruments, Inc. 6440 Sunset Corporation Drive, Las Vegas, NV 89120, USA	

**General product information:**

The Chromatography series consist of the following models: 110, 310, 410, 8610C, 8610D, 8610V. These Gas Chromatographs and data systems are used in laboratory environment to detect and analyze gases. The power rating is a maximum value based on the maximum amount of heaters installed.

Model number 8610C was selected for all testing herein as it represents the maximum configuration of models.

An optional vacuum pump can be connected to the Gas Chromatographs, however such pump was connected to the optional AC-outlet for testing purpose but it has not been part of the investigation.

The maximum operating ambient temperature is rated with 40°C.


There are no parts or materials that are frequently touched and held for a longer period of time. There-fore no parts or materials are relevant for PAH evaluation.

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
<b>4.4</b>	<b>TESTING IN SINGLE FAULT CONDITIONS</b>		P
4.4.1	Fault tests	See Form A.1 and A.2	P
4.4.2	Application of SINGLE FAULT CONDITIONS		P
4.4.2.1	SINGLE FAULT CONDITIONS not covered by 4.4.2.1 to 4.4.2.14	All covered by 4.4.2.1 to 4.4.2.12	N/A
4.4.2.2	PROTECTIVE IMPEDANCE	None relied upon for safety	N/A
4.4.2.3	PROTECTIVE CONDUCTOR	See 6.3.2	P
4.4.2.4	Equipment or parts for short-term or intermittent operation	Continuous operation	N/A
4.4.2.5	Motors	Certified fans used Motor was tested, refer to Form A.1	P
	– stopped while fully energized	See above	P
	– prevented from starting	See above	P
	– one phase interrupted (multi-phase)	See above	P
4.4.2.6	Capacitors	No capacitors provided within auxiliary windings or AC motor	N/A
4.4.2.7	MAINS transformers	Mains transformer has been tested within appliance. Same transformer is used for 115V and 230V-version but different wiring to accommodate voltage. Transformer is wired in production.	P
4.4.2.7.2	Short circuit	(see Forms A.39)	P
4.4.2.7.3	Overload	(see Forms A.40)	P
4.4.2.8	Outputs	AC outlet for Vacuum pump is protected by one fuse in phase and has been properly tested, Form A.1 and A.2	P
4.4.2.9	Equipment for more than one supply	Single supply per unit	N/A
4.4.2.10	Cooling	(see Form A.26A) Blocked vents and locked fan rotor	P
	– air holes closed		P
	– fans stopped		P
	– coolant stopped	No coolant	N/A
	– loss of cooling liquid	See above	N/A
4.4.2.11	Heating devices	Heating devices have been properly evaluated and tested within application, see Form A.1 and A.2	P
	– timer overridden	No timer	N/A


IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	– temperature controller overridden	No temperature control used where safety is relied upon <i>[Temperature control: 600W heater at top, thermocouple with feedback loop, 0-crossing triac, getting close to the set-up it flickers at 34Hz. -&gt; feels open save, fails close, supervisory circuit thermocouple 425degC]</i>	N/A
4.4.2.12	Insulation between circuits and parts	Circuits comply with par. 9.1	P
4.4.2.13	Interlocks	Interlock is used for functional purposes only, no further evaluation or testing deemed necessary	N/A
4.4.2.14	Voltage selectors	Two voltage settings possible, the transformer is wired internally for the correct voltage, the corresponding rating and certification mark for the actual setting is guaranteed at manufacturing site, no further testing deemed necessary.	N/A
4.4.3	Duration of tests	(see Form A.1)	—
4.4.4	Conformity after application of fault conditions	(see Form A.1; A.6, A.18)	P

<b>5</b>	<b>MARKING AND DOCUMENTATION</b>		P
5.1.1	General		P
	Required equipment markings		—
	- Visible from the exterior; or	Markings are visible from the exterior or when the lid / main cover is opened, see below	P
	- Visible after removing cover or opening door	Additional warning symbols are visible once enclosure to main compartments is opened (ISO 3864 No. B3.1) No doors	N/A
	- Visible after removal from a rack or panel	Not so mounted in intended use	N/A
	Not put on parts which can be removed by an operator	Safety related markings are not put on parts which can be removed by an OPERATOR	P
	Letter symbols (IEC 60027) used	V, HZ, VA	P
	Graphic symbols (IEC 61010-1: Table 1) used	Comply with Table 1	P
5.1.2	Identification		—
	Equipment is identified by:		P



IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	a) Manufacturer's or supplier's name or trademark		P
	b) Model number, name or other means	Chromatograph Family, specific model number clearly identified on units	P
	Manufacturing location identified	Single manufacturing location	N/A
5.1.3	MAINS supply	See below	P
	Equipment is marked as follows:		P
	a) Nature of supply:		—
	1) a.c. RATED MAINS frequency or range of frequencies .....	RATED MAINS frequency 50/60Hz is provided on label	P
	2) d.c. with symbol 1	AC powered equipment	N/A
	b) RATED supply voltage(s) or range .....	AC 115V (North America configuration) AC 230V (European configuration)	P
	c) Max. RATED power (W or VA) or input current ...	1725VA	P
	The marked value not less than 90 % of the maximum value	The measured power consumption value was less than rated power (see Form A.3)	P
	If more than one voltage range:		—
	Separate values marked; or	No voltage range but two voltage settings possible, transformer is wired internally for the correct voltage, the corresponding rating and certification mark for the actual setting is guaranteed.	P
	Values differ by less than 20 %	See above, requirement does not apply	N/A
	d) OPERATOR-set for different RATED supply voltages:		—
	Indicates the equipment set voltage	No such operator setting	N/A
	PORTABLE EQUIPMENT indication is visible from the exterior	No such operator setting	N/A
	Changing the setting changes the indication	No such operator setting	N/A
	e) Accessory MAINS socket-outlets accepting standard MAINS plugs are marked:		—
	With the voltage if it is different from the MAINS supply voltage .....	IEC60320 mains plug is referenced adjacent to the outlet, description of voltage and max. current rating provided	P
	For use only with specific equipment	Provided on label adjacent to outlet	P
	If not marked for specific equipment it is marked with:		P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	The maximum RATED current or power; or	See above	P
	Symbol 14 with full details in the documentation	No further symbol necessary	N/A
5.1.4	Fuses		N/A
	OPERATOR replaceable fuse marking (see also 5.4.5) .....	Non-operator-replaceable circuit breakers and fuses provided	N/A
5.1.5	TERMINALS, connections and operating devices	See below	P
5.1.5.1	General		—
	Where necessary for safety, indication of purpose of TERMINALS, connectors, controls and indicators marked	Connectors are marked with indication of purpose	P
	If insufficient space, symbol 14 used	Not required	N/A
	Push-buttons and actuators of emergency stop devices and indicators:	See above	—
	used only to indicate a warning of danger or	See above	N/A
	the need for urgent action	See above	N/A
	coloured red	See above	N/A
	coded as specified in IEC 60073	See above	N/A
	Supplementary means of coding provided, if meaning of colour relates (see IEC 60073):	See above	N/A
	to safety of persons; or	See above	N/A
	safety of the environment	See above	N/A
5.1.5.2	TERMINALS	See below	P
	MAINS supply TERMINALS identified	Non-detachable mains cord provided. Internal terminals provided as part of circuit breaker and EMI filter, used for the internal distribution of mains power. No further marking deemed necessary	P
	Other TERMINAL marking.....	See below	P
	a) FUNCTIONAL EARTH TERMINALS (symbol 5 used)	No functional earth	N/A
	b) PROTECTIVE CONDUCTOR TERMINALS:	See below	P
	Symbol 6 is placed close to or on the TERMINAL; or	Provided	P
	Part of appliance inlet	No appliance inlet	N/A
	c) TERMINALS of control circuits (symbol 7 used)	No measuring and control circuits which are in the scope of this standard	N/A
	d) HAZARDOUS LIVE TERMINALS supplied from the interior	Auxiliary AC outlet for the vacuum pump is properly marked	P
	Standard MAINS socket outlet; or	None provided	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	RATINGS marked; or	Auxiliary AC output for the vacuum pump is properly marked	P
	Symbol 14 used	See above	N/A
5.1.6	Switches and circuit breakers	See below	N/A
	If disconnecting device, off position clearly marked	Plug on power cord is regarded as disconnecting device. Nevertheless, mains switch is marked with symbols 9 and 10.	P
	If push-button used as power supply switch:	Push-button not used as power supply switch.	N/A
	Symbol 9 and 15 used for on-position	See above	N/A
	Symbol 10 and 16 used for off-position	See above	N/A
	Pair of symbols 9, 15 and 10, 16 close together	See above	N/A
5.1.7	Equipment protected by DOUBLE INSULATION or REINFORCED INSULATION	See below	P
	Protected throughout (symbol 11 used)	Not Class II equipment	N/A
	Only partially protected (symbol 11 not used)	Only partially protected for accessible conductive parts not connected to protective earth (symbol 11 not used)	P
5.1.8	Field-wiring TERMINAL boxes	No field wiring terminal boxes	N/A
	If TERMINAL or ENCLOSURE exceeds 60 °C:	See below	N/A
	Cable temperature RATING marked .....	See above	N/A
	Marking visible before and during connection or beside TERMINAL	See above	N/A
5.2	Warning markings	See above	P
	Visible when ready for NORMAL USE	 Symbol provided on cover. As well as hot surface symbol IEC 417 No. 5041 on the upper enclosure and other internal parts; all warning markings for hot surface were found adequate for the product and application in question	P
	Are near or on applicable parts	See above	P
	Symbols and text correct dimensions and colour:	See above	—
	a) symbols min 2,75 mm and text 1,5 mm high and contrasting in colour with background	Proper size used	P
	b) symbols and text moulded, stamped or engraved in material min. 2,0 mm high and	Separate labels used on the product	P
	0.5 mm depth or raised if not contrasting in colour	See above	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	If necessary marked with symbol 14	See above	P
	Statement to isolate or disconnect if access by using a tool to HAZARDOUS LIVE parts is permitted	No operator accessible parts at hazardous live	N/A
5.3	Durability of markings		P
	The required markings remain clear and legible in NORMAL USE	The required markings remain clear and legible in NORMAL USE (see Form A.3)	P
5.4	Documentation	See below	P
5.4.1	General	See below	P
	Equipment is accompanied by documentation for safety purposes for OPERATOR or RESPONSIBLE BODY	Operating instructions are all available online depending upon configuration of the actual gas chromatography system	P
	Safety documentation for service personnel authorized by the manufacturer	See above	P
	Documentation necessary for safe operation is provided in printed media or	See above	P
	in electronic media if available at any time		P
	Documentation includes:		—
	a) Intended use	Provided in user manual (operating instructions)	P
	b) Technical specification	Provided in user manual	P
	c) Name and address of manufacturer or supplier	Provided in user manual and on product	P
	d) Information specified in 5.4.2 to 5.4.6	See below clause 5.4.2	P
	e) Information to mitigate residual RISK (see also subclause 17)		P
	f) Accessories for safe operation of the equipment specified	Sufficient information provided in instructions	P
	g) Guidance provided to check correct function of the equipment, if incorrect reading may cause a HAZARD from harmful or corrosive substances or HAZARDOUS live parts	No such equipment which needs further instructions or guidance to check correction function the equipment	N/A
	h) Instructions for lifting and carrying	No handle or grips	N/A
	Warning statements and a clear explanation of warning symbols:		—
	Provided in the documentation; or	Not measuring equipment	N/A
	Information is marked on the equipment	Not measuring equipment	N/A
5.4.2	Equipment RATINGS	See below	P
	Documentation includes:		—

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	a) Supply voltage or voltage range .....	AC 115 (NRTL) AC 230 (GS)	P
	Frequency or frequency range .....	50/60Hz	P
	Power or current RATING .....	1725VA	P
	b) Description of all input and output connections in accordance to 6.6.1 a)	Description of all connections provided in user manual and on product	P
	c) RATING of insulation of external circuits in accordance to 6.6.1 b)	No special insulation is required: external circuits are SELV except for auxiliary AC outlet for vacuum pump which is not considered as such	N/A
	d) Statement of the range of environmental conditions (see 1.4)	<p>Provided in manual:</p> <p>Indoor use (defined as laboratory benchtop device)</p> <p>Altitude up to 2500m</p> <p>Temperature 10°C to 40°C</p> <p>Maximum relative humidity 80% (non-condensing)</p> <p>MAINS supply voltage fluctuations up to <math>\pm 10\%</math> of the nominal voltage</p> <p>Transient over voltages Over voltage Category II</p> <p>NOTE: The nominal level of transient over voltages is impulse withstand (over voltage) category II of IEC 60364-4-44</p> <p>Applicable Pollution Degree II</p>	P
	e) Degree of protection (IEC 60529)	Not required: IPX10	N/A
	f) If impact rating less than 5 J:	Metal enclosure, not less than 5 J	—
	IK code in accordance to IEC 62262 marked or		N/A
	symbol 14 of table 1 marked, with		N/A
	RATED energy level and test method stated		N/A
5.4.3	Equipment installation	See below	P
	Documentation includes instructions for:		—
	a) Assembly, location and mounting requirements	Provided in user manual	P
	b) Protective earthing	Instruction to connect equipment to earthed socket outlet only provided in manual	P
	c) Connections to supply	No special instructions required	N/A
	d) PERMANENTLY CONNECTED EQUIPMENT:	See below	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	1) Supply wiring requirements	Not PERMANENTLY CONNECTED EQUIPMENT	N/A
	2) If external switch or circuit-breaker, requirements and location recommendation	Not PERMANENTLY CONNECTED EQUIPMENT	N/A
	e) Ventilation requirements	No special requirements	N/A
	f) Special services (e.g. air, cooling liquid)	No special requirements	N/A
	g) Instructions relating to sound level	Not required: equipment does not produce considerable amount of sound.	N/A
5.4.4	Equipment operation	See below	P
	Instructions for use include:		
	a) Identification and description of operating controls	None affecting safety other than for ON/OFF switch marked “I/O” as evident	N/A
	b) Positioning for disconnection	Instruction not to position equipment so that it is difficult to operate the disconnecting device (appliance coupler) is provided on label, see page 4	P
	c) Instructions for interconnection	Connection of computer via standard signal cables (e.g. USB) is properly described in the manual	P
	d) Specification of intermittent operation limits	No such limits	N/A
	e) Explanation of symbols used	Provided in user manual	P
	f) Replacement of consumable materials	No consumable materials	P
	g) Cleaning and decontamination	Minimal cleaning required which has no safety relevant impact	P
	h) Listing of any poisonous or injurious gases and quantities	No poisonous or injurious gases	N/A
	i) RISK reduction procedures relating to flammable liquids (see 9.5)	No flammable liquids (hydrogen gas has been considered)	N/A
	j) RISK reduction procedures relating burn from surfaces permitted to exceed limits of 10.1	Proper warnings and labels are provided on the equipment, see photographs	P
	Additional precautions for IEC 60950 conforming equipment in regard to moistures and liquids	Product not considered ‘IEC60950 conforming equipment’	N/A
	A statement about protection impairment if used in a manner not specified by the manufacturer	Provided in user manual	P
5.4.5	Equipment maintenance and service	See below	P
	Instructions for RESPONSIBLE BODY include:		—
	Instructions sufficient in detail permitting safe maintenance and inspection and continued safety:	Provided in user manual	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	Instruction against the use of detachable MAINS supply cord with inadequate rating	No detachable power cord	N/A
	Specific battery type of user replaceable batteries	No batteries	N/A
	Any manufacturer specified parts	Instructions provided in the user manual	P
	Rating and characteristics of fuses	Replaceable fuse for power outlet is properly described on fuse holder, adjacent to AC-outlet	P
	Instructions include following subjects permitting safe servicing and continued safety:	Servicing of the product is done by the manufacturer	P
	a) Product specific RISKS may affect service personnel	No such additional risks which may affect service personnel	N/A
	b) Protective measures for these RISKS	See above	N/A
	c) Verification of the safe state after repair	See above, safe state after repair is guaranteed by hipot and ground continuity test.	P
5.4.6	Integration into systems or effects resulting from special conditions	No such integration into systems or other special conditions	N/A
	Aspects described in documentation	See above	N/A

<b>6</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		<b>P</b>
6.1	General	(see Form A.4 and A.5)	P
6.1.1	Requirements		—
	Protection against electric shock maintained in NORMAL CONDITION and SINGLE FAULT CONDITION	See clause 6.4 and 6.5	P
	ACCESSIBLE parts not HAZARDOUS LIVE	ACCESSIBLE parts not HAZARDOUS LIVE in NORMAL CONDITION and SINGLE FAULT CONDITION	P
	Voltage, current, charge or energy below the limits in NORMAL CONDITION and in SINGLE FAULT CONDITION between:	See clause 6.3.1 and 6.3.2	P
	ACCESSIBLE parts and earth	See above	P
	Two ACCESSIBLE parts on same piece of the equipment within a distance of 1,8 m	See above	P
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11	Considerations applied	P
6.1.2	Exceptions	No exceptions applied	N/A
	Following HAZARDOUS LIVE parts may be accessible to an OPERATOR:	See above	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	a) parts of lamps and lamp sockets after lamp removal	See above	N/A
	b) parts to be replaced by operator only by the use of tool and warning marking	See above	N/A
	Those parts not HAZARDOUS LIVE 10 s after interruption of supply	See above	N/A
	Capacitance test if charge is received from internal capacitor	See above	N/A
6.2	Determination of ACCESSIBLE parts	See below	P
6.2.1	General	No access to hazardous parts with jointed test finger applied with force 10N (see Form A.6)	P
	Unless obviously determination of accessible parts as specified in 6.2.2 to 6.2.4	See above	—
6.2.2	Examination		—
	- with jointed test finger (as specified B.2)	See below	P
	- with rigid test finger (as specified B.1) and a force of 10 N	No access to hazardous parts with jointed test finger applied with force 10N (see Form A.4)	P
6.2.3	Openings above parts that are HAZARDOUS LIVE	No such openings	N/A
	- test pin with length of 100 mm and 4 mm in diameter applied		
6.2.4	Openings for pre-set controls	No such openings	N/A
	- test pin with length of 100 mm and 3 mm in diameter applied		
6.3	Limit values for ACCESSIBLE parts	See below	P
6.3.1	Levels in NORMAL CONDITION	Values in NORMAL CONDITION NOT EXCEEDED (SEE FORM A.5)	P
	a) Voltage limits less than 33 V r.m.s. and 46,7 V peak or 70 V d.c.	See above	P
	for wet locations voltage limits less than 16 V r.m.s. and 22,6 V peak or 35 V d.c.	Not intended for wet locations	N/A
	Voltages are not HAZARDOUS LIVE the levels of:		—
	b) Current less than 0,5 mA r.m.s. for sinusoidal, 0,7 mA peak non sinusoidal or mixed frequencies or 2 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz	See 6.3.1 above	P
	for WET LOCATIONS measuring circuit A.4 used	Not intended for wet locations	N/A
	or		—



IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	c) Levels of capacitive charge or energy less:	No such energies or charges measured	N/A
	1) 45 µC for voltages up to 15 kV peak or d.c. or line A of Figure 3	See above	N/A
	2) 350 mJ stored energy for voltages above 15 kV peak or d.c.	See above	N/A
6.3.2	Levels in SINGLE FAULT CONDITION	Values in SINGLE FAULT CONDITION not exceeded (see Form A.6)	P
	a) Voltage limits less than 55 V r.m.s. and 78 V peak or 140 V d.c.	See above	P
	for WET LOCATIONS voltage limits less than 33 V r.m.s. and 46,7 V peak or 70 V d.c.	Not intended for wet locations	N/A
	Voltages are not HAZARDOUS LIVE the levels of:		—
	b) Current less than 3,5 mA r.m.s. for sinusoidal, 5 mA peak non sinusoidal or mixed frequencies or 15 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz	See 6.3.2 above	P
	for wet locations measuring circuit A.4 used	Not intended for wet locations	N/A
	500 mA r.m.s. when measured with circuit A.3 for higher frequencies	See above	N/A
	or		—
	c) Levels of capacitive charge or energy less line B of Figure 3	No such energies or charges measured	N/A
6.4	Primary means of protection (see 6.2, 6.3.1, 6.7, 6.8 and 8.1)		P
6.4.1	ACCESSIBLE parts prevented from being HAZARDOUS LIVE by one or more of following means:		P
	a) ENCLOSURES or PROTECTIVE BARRIERS (see 6.4.2)	Considerations of b) applied	N/A
	b) BASIC INSULATION (see 6.4.3)	Provided by Basic insulation between hazardous parts and accessible parts connected to protective earth	P
	c) Impedance (see 6.4.4)	Considerations of b) applied	N/A
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS	Metal enclosure used (see Form A.15)	P
	- meet rigidity requirements of 8.1	See clause 8.1	P
	- meet requirements for BASIC INSULATION, if protection is provided by insulation	Rigid metal enclosure provided	P
	- meet requirements of 6.7 for CREEPAGE and CLEARANCES between ACCESSIBLE parts and HAZARDOUS live parts, if protection is provided by limited access	See clause 6.7	P
6.4.3	BASIC INSULATION	(see Form A.15)	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	- meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7		P
6.4.4	Impedance	No protective impedance	N/A
	Impedance used as primary means of protection meets all of following requirements:		N/A
	a) limits current or voltage to level of 6.3.2	(see Form A.6)	N/A
	b) RATED for maximum WORKING VOLTAGE and the amount of power it will dissipate		N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of BASIC INSULATION of 6.7	(see Form A.15)	N/A
6.5	Additional means of protection in case of SINGLE FAULT CONDITION		P
6.5.1	ACCESSIBLE parts are prevented from becoming HAZARDOUS live by the primary means of protection and supplemented by one of:		—
	a) PROTECTIVE BONDING (see 6.5.2)	Connection to PE terminal relied upon	P
	b) SUPPLEMENTARY INSULATION (see 6.5.3)	Not Used	N/A
	c) automatic disconnection of the supply (see 6.5.5)	Not Used	N/A
	d) current- or voltage-limiting device (see 6.5.6)	Not Used	N/A
	Alternatively one of the single means of protection is used:		P
	e) REINFORCED INSULATION (see 6.5.3)	Double insulation or reinforced insulation between mains and SELV maintained within isolation transformer provided with UL Recognized insulation system (See Separate Construction Data Form)	P
	f) PROTECTIVE IMPEDANCE (see 6.5.4)	Double insulation or reinforced insulation between mains and SELV maintained within isolation transformer provided with UL Recognized insulation system (See Separate Construction Data Form)	P
6.5.2	PROTECTIVE BONDING	(see Forms A.7, A.8, A.9, A.10 or A.11)	—
6.5.2.1	ACCESSIBLE conductive parts, may become HAZARDOUS LIVE in SINGLE FAULT CONDITION:		—
	Bonded to the PROTECTIVE CONDUCTOR TERMINAL; or	ACCESSIBLE conductive parts bonded to the PROTECTIVE CONDUCTOR TERMINAL	P
	Separated by conductive screen or barrier bonded to PROTECTIVE CONDUCTOR TERMINAL	Not used	N/A
6.5.2.2	Integrity of PROTECTIVE BONDING	See below	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	a) PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses	PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses	P
	b) Soldered connections:	Soldered connections are not used for bonding	N/A
	Independently secured against loosening	See above	N/A
	Not used for other purposes	See above	N/A
	c) Screw connections are secured	See above	N/A
	d) PROTECTIVE BONDING not interrupted; or	No operator-removable parts providing ground continuity other than plug on power cord used as disconnect device, AC outlet for vacuum pump not considered as such	N/A
	exempted as removable part carries MAINS SUPPLY INPUT connection	See above	N/A
	e) Any moveable PROTECTIVE BONDING connection specifically designed, and meets 6.5.2.4	No moveable connections	N/A
	f) No external metal braid of cables used (not regarded as PROTECTIVE BONDING)	No external metal braid of cables used	P
	g) If MAINS supply passes through:	Mains is properly passing through the equipment and is reliably fixed on AC-outlet	P
	Means provided for passing protective conductor;	See above, protective conductor inspected and tested	P
	Impedance meets 6.5.2.4	See above	P
	h) Protective conductors bare or insulated, if insulated, green/yellow	Green/yellow used for protective conductors	P
	Exceptions:		—
	1) earthing braids;	No earthing braids used	N/A
	2) internal protective conductors etc.;	Terminal meets 6.5.2.3	P
	Green/yellow not used for other purposes	Green/yellow not used for purposes other than bonding	P
	TERMINAL suitable for connection of a PROTECTIVE CONDUCTOR, and meets 6.5.2.3	Terminal meets 6.5.2.3	P
6.5.2.3	PROTECTIVE CONDUCTOR TERMINAL	See below	P
	a) Contact surfaces are metal	Contact surfaces are metal	P
	b) Appliance inlet used	Non-detachable power cord used	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	c) For rewireable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL is close to MAINS supply TERMINALS	No rewireable cords and not PERMANENTLY CONNECTED EQUIPMENT	N/A
	d) If no MAINS supply is required, any PROTECTIVE CONDUCTOR TERMINAL:	Protective conductor terminal is required only for mains supply	N/A
	Is near TERMINALS of circuit for which protective earthing is necessary	See above	N/A
	External if other TERMINALS external	See above	N/A
	e) Equivalent current-carrying capacity to MAINS supply TERMINALS	By inspection of power cord related adequately for application	P
	f) If plug-in, makes first and breaks last	By inspection	P
	g) If also used for other bonding purposes, PROTECTIVE CONDUCTOR:	Not used for other bonding purposes	N/A
	Applied first;	See above	N/A
	Secured independently;	See above	N/A
	Unlikely to be removed by servicing	See above	N/A
	h) PROTECTIVE CONDUCTOR of measuring circuit:	No measuring circuit provided	N/A
	1) Current RATING equivalent to measuring circuit TERMINAL;	See above	N/A
	2) PROTECTIVE BONDING:	See above	N/A
	Not interrupted	See above	N/A
	i) FUNCTIONAL EARTH TERMINALS allow independent connection	No functional earth connection	N/A
	j) If a binding screw used for PROTECTIVE CONDUCTOR TERMINAL:	No binding screw	N/A
	Suitable size for bond wire	By inspection	P
	Not smaller than M 4 (No. 6)	By inspection	P
	At least 3 turns of screw engaged	By inspection	P
	Passes tightening torque test	See Form A.8	P
	k) Contact pressure not capable being reduced by deformation of materials	By inspection	P
6.5.2.4	Impedance of PROTECTIVE BONDING of plug-connected equipment	Impedance does not exceed 0.1 $\Omega$ (see Form A.9)	P
	Impedance between PROTECTIVE CONDUCTOR TERMINAL and each ACCESSIBLE part where PROTECTIVE BONDING is specified, is:		—
	less than 0,1 Ohm; or	See above	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	less than 0,2 Ohm if equipment is provided with non detachable cord	See above	P
6.5.2.5	Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT	No PERMANENTLY CONNECTED EQUIPMENT	N/A
6.5.2.6	Transformer PROTECTIVE BONDING screen	(see Form A.11)	N/A
	Transformer provided with screen for protective bonding:	No such screen provided	N/A
	screen bonding consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses (see 6.5.2.2 a)		N/A
	screen bonding with soldered connection (see 6.5.2.2 b) is:		N/A
	- Independently secured against loosening		N/A
	- Not used for other purposes		N/A
6.5.3	SUPPLEMENTARY and REINFORCED INSULATION	Double insulation or reinforced insulation between mains and SELV maintained within isolation transformer provided with UL Recognized insulation system (See Separate Construction Data Form)	P
	Meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7	(See table A.15)	P
6.5.4	PROTECTIVE IMPEDANCE	PROTECTIVE IMPEDANCE not used	N/A
	Limits current or voltage to level of 6.3.1 in NORMAL and to level of 6.3.2 in SINGLE FAULT CONDITION	See above	N/A
	CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of DOUBLE or REINFORCED INSULATION of 6.7	See above	N/A
	The protective impedance consists of one or more of the following:		—
	a) appropriate single component suitable for safety and reliability for protection, it is:	See above	N/A
	1) RATED twice the maximum WORKING VOLTAGE	See above	N/A
	2) resistor RATED for twice the power dissipation for maximum WORKING VOLTAGE	See above	N/A
	b) combination of components	See above	N/A
	Single electronic device not used as PROTECTIVE IMPEDANCE		N/A
6.5.5	Automatic disconnection of the supply	Automatic disconnection of the supply is not used	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	a) RATED to disconnect the load within time specified in Figure 2	See above	N/A
	b) RATED for the maximum load conditions of the equipment	See above	N/A
6.5.6	Current- or voltage-limiting devices	No such components used, input fuse is not considered as such (see Form A.13)	N/A
	Device complies with all of:	See above	N/A
	a) RATED to limit the current or voltage to the level of 6.3.2	See above, (see Form A.6)	N/A
	b) RATED for the maximum working voltage; and	See above	N/A
	RATED for the maximum operational current if applicable	See above	N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of SUPPLEMENTARY INSULATION of 6.7	(see Form A.14, A.15)	N/A
6.6	Connections to external circuits	Automatic disconnection of the supply is not used	N/A
6.6.1	Connections do not cause ACCESSIBLE parts of the following to become HAZARDOUS LIVE in NORMAL CONDITION or SINGLE FAULT CONDITION:	Inspected Signal on signal port to external computer is SELV	P
	- the external circuits	See above	P
	- the equipment	See above	P
	Protection achieved by separation of circuits; or	See above, separation guaranteed by isolation transformer and proper insulation on PCBs	P
	Short circuit of separation does not cause a HAZARD	See above	P
	Instructions or markings for each terminal include:	No further instructions or markings	N/A
	a) RATED conditions for TERMINAL	See above	N/A
	b) Required RATING of external circuit insulation	See above	N/A
6.6.2	TERMINALS for external circuits	No such terminals	N/A
	TERMINALS which receive a charge from an internal capacitor are not HAZARDOUS LIVE after 10 s of interrupting supply connection	See above	N/A
6.6.3	Circuits with TERMINALS which are HAZARDOUS LIVE	No such terminals provided, AC outlet is a standard outlet for a vacuum pump not considered as such	N/A
	These circuits are:		—
	Not connected to ACCESSIBLE conductive parts; or	See above	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	Connected to ACCESSIBLE conductive parts, but are not MAINS CIRCUITS and have one TERMINAL contact at earth potential	See above	N/A
	No ACCESSIBLE conductive parts are HAZARDOUS LIVE	See above	N/A
6.6.4	ACCESSIBLE TERMINALS for stranded conductors	No ACCESSIBLE TERMINALS for stranded conductors	N/A
	No risk of accidental contact because:	See above	N/A
	Located or shielded	See above	N/A
	Self-evident or marked whether or not connected to ACCESSIBLE conductive parts	See above	N/A
	ACCESSIBLE TERMINALS will not work loose	See above	N/A
6.7	Insulation requirements	(see Form A.14)	P
6.7.1	The nature of insulation	Creepage and clearance as well as solid insulation used throughout the equipment	P
6.7.1.1	Insulation between ACCESSIBLE parts or between separate circuits consist of CLEARANCES, CREEPAGE DISTANCES and solid insulation if provided as protection against a HAZARD	See above, accessible parts are properly separated (double or reinforced insulation is used within the transformer and on PCBs)	P
6.7.1.2	CLEARANCES		P
	Required CLEARANCES reflecting factors of 6.7.1.1	All factors considered as per clause, operating altitude of max. 2000m assumed (see Form A.14, A.15)	P
	Equipment rated for operating altitude greater than 2000 m correction factor of Table 3 of 61010-1 applied	See above	P
6.7.1.3	CREEPAGE DISTANCES	See above	P
	Required CREEPAGE reflecting factors of 6.7.1.1 a) to d)	(see Form A.14, A.15)	—
	CTI material group reflected by requirements	Material Group IIIb assumed	P
	CTI test performed	See above	N/A
6.7.1.4	Solid insulation		—
	Required CLEARANCES reflecting factors of 6.7.1. 1 a) to d)	Not relied upon (see Form A.14, A.15)	N/A
6.7.1.5	Requirements for insulation according to type of circuit	(see Form A.14, A.15)	P
	a) 6.7.2 MAINS circuits of OVERVOLTAGE CATEGORY II up to nominal supply voltage of 300 V	Considered, see 6.7.2 below	P



IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	b) 6.7.3 Secondary circuits separated from circuits defined in a) by transformer	Considered, see 6.7.3 below	P
	c) K.1 MAINS circuits of OVERVOLTAGE CATEGORY III and IV or OVERVOLTAGE CATEGORY II over 300 V	See above, OVIII/IV not considered	N/A
	d) K.2 Secondary circuits separated from circuits defined in a) by transformer	See above	N/A
	e) K.3 Circuits having one or more of:		N/A
	1) maximum TRANSIENT OVERVOLTAGE is limited to known level below the level of MAINS CIRCUIT	See above	N/A
	2) maximum TRANSIENT OVERVOLTAGE above the level of MAINS CIRCUIT	See above	N/A
	3) WORKING VOLTAGE is the sum of more than one circuit or a mixed voltage	See above	N/A
	4) WORKING VOLTAGE includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform	See above	N/A
	5) WORKING VOLTAGE with a frequency above 30 kHz	See above	N/A
6.7.2	Insulation for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300 V	Insulation guaranteed within isolation transformer (mains transformer) and between Primary to Secondary on AC Distribution Board and between Primary to Chassis GND on Heater Board	—
6.7.2.1	CLEARANCES and CREEPAGE DISTANCES	(see Form A.14, A.15)	P
	Values for MAINS CIRCUITS of table 4 are met	See above	P
	Coatings to achieve reduction to POLLUTION DEGREE I comply with requirements of Annex H	Not relied on coatings	N/A
6.7.2.2	Solid insulation	No solid insulation	N/A
6.7.2.2.1	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4	See Clause 6.8.3	P
	Equipment passed voltage tests of 6.8.3 with values of Table 5	(see Form A.18)	P
	Complies as applicable:		—
	a) ENCLOSURE or PROTECTIVE BARRIER of Clause 8	See clause 8	P
	b) moulded and potted parts requirements of 6.7.2.2.2	See clause 6.7.2.2.2	P
	c) inner layers of printed wiring boards requirements of 6.7.2.2.3	See clause 6.7.2.2.3	P
	d) thin-film insulation requirements of 6.7.2.2.4	See clause 6.7.2.2.4	P
6.7.2.2.2	Moulded and potted parts		—



IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	Conductors between same two layers are separated by at least 0,4 mm after moulding is completed	No moulded or potted parts	P
6.7.2.2.3	Inner insulation layers of printed wiring boards		—
	Separated by at least 0,4 mm between same two layers		P
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		P
	a) thickness at least 0,4 mm	Proper thickness of PCB guaranteed	P
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION	See above, one layer considered	N/A
	c) insulation is assembled of minimum two separate layers, where the combination is rated for test voltage of Table 5 for REINFORCED INSULATION	See above	N/A
6.7.2.2.4	Thin-film insulation		—
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCES of 6.7.2.1	No thin film insulation used, transformer is an approved component	N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:	See above	N/A
	a) thickness at least 0,4 mm		N/A
	b) insulation is assembled of min two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION		N/A
	c) insulation is assembled of min three separate layers, where the combination of two layers passed voltage tests of 6.8.3 with values of Table 5 for REINFORCED INSULATION	(see Form A.18)	N/A
6.7.3	Insulation for secondary circuits derived from MAINS of OVERVOLTAGE CATEGORY II up to 300 V	No such circuitries which require basic, double / reinforced insulation	—
6.7.3.1	Secondary circuits where separation from MAINS CIRCUITS is achieved by a transformer providing:	See above	—
	- REINFORCED INSULATION	See above	N/A
	- DOUBLE INSULATION	See above	N/A
	- screen connected to the PROTECTIVE CONDUCTOR TERMINAL	No screen used	N/A
6.7.3.2	CLEARANCES	See 6.7.3	N/A
	a) meet the values of Table 6 for BASIC INSULATION and SUPPLEMENTARY INSULATION; or	See above	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	twice the values of Table 6 for REINFORCED INSULATION		N/A
	or		—
	b) pass the voltage tests of 6.8 with values of Table 6; with following adjustments:	(see Form A.18)	N/A
	1) values for REINFORCED INSULATION are 1,6 times the values for BASIC INSULATION		N/A
	2) if operating altitude is greater than 2000 m values of CLEARANCES multiplied with factor of Table 3		N/A
	3) minimum CLEARANCE is 0,2 mm for POLLUTION DEGREE 2 and 0,8 mm for POLLUTION DEGREE 3		N/A
6.7.3.3	CREEPAGE DISTANCES	See above	N/A
	Based on WORKING VOLTAGE meets the values of Table 7 for BASIC and SUPPLEMENTARY INSULATION		N/A
	Values for REINFORCED INSULATION are twice the values of BASIC INSULATION		N/A
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A
6.7.3.4	Solid insulation	See above	N/A
6.7.3.4.1	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		N/A
	a) Equipment passed voltage test of 6.8.3.1 for 5 s with VALUES of Table 6 for BASIC and SUPPLEMENTARY INSULATION	(see Form A.18)	N/A
	values for REINFORCED INSULATION are 1,6 times the values of BASIC INSULATION		N/A
	b) if WORKING VOLTAGE exceeds 300 V, equipment passed voltage test of 6.8.3.1 for 1 min with a test voltage of 1,5 times working voltage for BASIC or SUPPLEMENTARY INSULATION	(see Form A.18)	N/A
	value for REINFORCED INSULATION are twice the WORKING VOLTAGE		N/A
	Complies as applicable:		N/A
	1) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	2) moulded and potted parts requirements of 6.7.3.4.2		N/A
	3) inner layers of printed wiring boards requirements of 6.7.3.4.3		N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	4) thin-film insulation requirements of 6.7.3.4.4		N/A
6.7.3.4.2	Moulded and potted parts		N/A
	Conductors between same two layers are separated by applicable distances of Table 8		N/A
6.7.3.4.3	Inner insulation layers of printed wiring boards		N/A
	Separated by at least by applicable distances of Table 8 between same two layers		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		N/A
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION		N/A
	c) insulation is assembled of min two separate layers, where the combination is rated for 1,6 times the test voltage of Table 6		N/A
6.7.3.4.4	Thin-film insulation		N/A
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCES of 6.7.3.2 and 6.7.3.3		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		N/A
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of min two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION		N/A
	c) insulation is assembled of min three separate layers, where the combination of two layers passed voltage tests with 1,6 time values of Table 6:	(see Form A.18)	N/A
	a.c. test of 6.8.3.1; or		N/A
	d.c. test of 6.8.3.2 for circuits stressed only by d.c. voltages		N/A
6.8	Procedure for dielectric strength tests	(see Forms A.14 and A.18)	P
6.9	Constructional requirements for protection against electric shock		P
6.9.1	If a failure could cause a HAZARD:		—
	a) Security of wiring connections	Wiring connections are reliably fixed and secured. No wiring connections subject to mechanical stresses	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	b) Screws securing removable covers	No screws securing removable covers for which length determines safety critical spacings	N/A
	c) Accidental loosening	Wiring connections are reliably fixed and secured so that accidental loosening will not cause accessible parts to become hazardous live	P
	d) CREEPAGE and CLEARANCES not reduced below the values of basic insulation by loosening of parts or wires	Wiring connections are reliably fixed and secured so that creepage and clearances are not reduced below values of basic insulation by loosening of parts or wires	P
6.9.2	Insulating materials		P
	Material not to be used for safety relevant insulation:		P
	a) Easily damaged materials not used	Easily damaged materials not used. Safety critical insulation is certified	P
	b) Non-impregnated hygroscopic materials not used	Non-impregnated hygroscopic material not used. Safety critical insulation is UL Recognized.	P
6.9.3	Colour coding		P
	Green-and-yellow insulation shall not be used except:	Green-yellow only used for PE or bonding throughout the equipment	–
	a) protective earth conductors;	See above	P
	b) PROTECTIVE BONDING conductors;	See above	P
	c) potential equalization conductors;	Not used	N/A
	d) functional earth conductors	Not used	N/A
6.10	Connection to MAINS supply source and connections between parts of equipment		P
6.10.1	MAINS supply cords	See below	P
	RATED for maximum equipment current (see 5.1.3 c)	See separate Construction Data Form	P
	Cable complies with IEC 60227 or IEC 60245	See above	P
	Heat-resistant if likely to contact hot parts	Not likely to contact hot parts	N/A
	Temperature RATING (cord and inlet) .....	Non-detachable power cord used	N/A
	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS	By inspection	P
	Detachable cords with IEC 60320 MAINS connectors:	Not used	—
	Conform to IEC 60799; or	See above	N/A
	Have the current RATING of the MAINS connector	See above	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
6.10.2	Fitting of non-detachable MAINS supply cords	See above	P
6.10.2.1	Cord entry		P
	a) Inlet or bushing with a smoothly rounded opening; or	By inspection	P
	b) Insulated cord guard protruding >5 D	No such cord guard provided	N/A
6.10.2.2	Cord anchorage	See below	P
	Protective earth conductor is the last to take the strain	By inspection	P
	a) Cord is not clamped by direct pressure from a screw	Bushing used	P
	b) Knots are not used	By inspection	P
	c) Cannot push the cord into the equipment to cause a HAZARD	By inspection	P
	d) No failure of cord insulation in anchorage with metal parts	Cord anchorage does not have metal	N/A
	e) Not to be loosened without a tool	Complies	P
	f) Cord replacement does not cause a HAZARD and method of strain relief is clear	By inspection, bushing fitted to cord size used	P
	Push-pull test	Tested 25 times per Table 11	P
6.10.3	Plugs and connectors	See below	P
	MAINS supply plugs, connectors etc., conform with relevant specifications	See separate Construction Data Form	P
	If equipment supplied at voltages below 6.3.2 a) or from a sole source:	AC mains connection required	—
	Plugs of supply cords do not fit MAINS sockets above RATED supply voltage	See above	N/A
	MAINS type plugs used only for connection to MAINS supply	See above	N/A
	Plug pins which receive a charge from an internal capacitor	Decays to 0V in 40ms	P
	Accessory MAINS socket outlets:	Standard AC outlet for vacuum pump is used	P
	a) Marking if accepts a standard MAINS plug (see 5.1.3 e)	See above, marking provided	P
	b) Input has a protective earth conductor if outlet has EARTH TERMINAL CONTACT	PE is feed through the equipment	P
6.11	Disconnection from supply source	Disconnect device required and provided. Plug on non-detachable power cord is considered disconnect device.	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
6.11.1	Disconnects all current carrying conductors	Removal of plug from mains outlet disconnects all conductors	P
6.11.2	Exceptions	No exceptions	N/A
6.11.3	Requirements according to type of equipment	See below	P
6.11.3.1	PERMANENTLY CONNECTED EQUIPMENT and multi-phase equipment:	Not PERMANENTLY CONNECTED or multi-phase equipment	N/A
	Employs switch or circuit-breaker	See above	N/A
	If switch or circuit-breaker is not part of the equipment, documentation specifies:		—
	a) Switch or circuit-breaker to be included in building installation	Not PERMANENTLY CONNECTED or multi-phase equipment	N/A
	b) Suitable location easily reached	See above	N/A
	c) Marking as disconnecting for the equipment	See above	N/A
6.11.3.2	Single-phase cord-connected equipment	Not regarding as disconnecting device	N/A
	Equipment is provided with one of the following:		—
	a) Switch or circuit-breaker	Not regarding as disconnecting device	N/A
	b) Appliance coupler (disconnectable without TOOL)	None provided	N/A
	c) Separable plug (without locking device)	By inspection	P
6.11.4	Disconnecting devices	By inspection	P
6.11.4.1	Disconnecting device part of equipment		P
	Electrically close to the SUPPLY	By inspection	P
	Power-consuming components not electrically located between the supply source and the disconnecting device	See above	P
	Except electromagnetic interference suppression circuits permitted to be located on the supply side of the disconnecting device	No such circuit exist in the equipment	N/A
6.11.4.2	Switches and circuit-breakers	Not regarded as disconnecting device	N/A
	When used as disconnection device:		—
	Meets IEC 60947-1 and IEC 60947-3	Not regarded as disconnecting device	N/A
	Marked to indicate function.....:	See above	N/A
	Not incorporated in MAINS cord	See above	N/A
	Does not interrupt PROTECTIVE EARTH CONDUCTOR	See above	N/A
6.11.4.3	Appliance couplers and plugs	By inspection	P
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.11.3.2):		P

## IEC 61010-1 and/or EN 61010-1

Clause	Requirement – Test	Result – Remark	Verdict
	Readily identifiable and easily reached by the OPERATOR	By inspection	P
	Single-phase PORTABLE EQUIPMENT cord length not more than 3 m	Not considered portable in intended	N/A
	PROTECTIVE EARTH CONDUCTOR connected first and disconnected last	By inspection	P

7	PROTECTION AGAINST MECHANICAL HAZARDS		P
7.1	Equipment does not cause a mechanical HAZARD in NORMAL nor in SINGLE FAULT CONDITION	No mechanical hazards	P
	Conformity is checked by 7.2 to 7.7	By inspection , fans are all properly guarded except for internal DC fan which is of low power and accessible by service personnel only when bottom part of enclosure is removed	P
7.2	Sharp edges		P
	Easily touched parts are smooth and rounded		P
	Do not cause injury during NORMAL USE and		P
	Do not cause injury during SINGLE FAULT CONDITION	Inspected	P
7.3	Moving parts	See below	P
7.3.1	HAZARDS from moving parts limited to a tolerable level with the conditions specified in 7.3.2 and 7.3.5	By inspection , fans are all properly guarded except for internal DC fan which is of low power and accessible by service personnel only when bottom part of enclosure is removed	P
	RISK assessment in accordance with 7.3.3 carried out	Risk assessment not required. See above	N/A
7.3.2	Exceptions	No exceptions. The OPERATOR is not allowed to remove the bottom of the enclosure.	N/A
	Access to HAZARDOUS moving parts permitted under following circumstances:	See above	N/A
	a) obviously intended to operate on parts or materials outside of the equipment	See above	N/A
	inadvertent touching of moving parts minimized by equipment design (e .g. guards or handles)	See above	N/A
	b) If operator access is unavoidable outside normal use following precautions have been taken:	See above	N/A
	1) Access requires TOOL	No such considerations required	N/A
	2) Statement about training in the instructions	No such considerations required	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	3) Warning markings on covers prohibiting access by untrained operators	See below	N/A
	or symbol 14 with full details in documentation	No such considerations required	N/A
7.3.3	RISK assessment for mechanical HAZARDS to body parts	Accessibility to fans evaluated: M, E1, P1 => no action required	P
	RISK is reduced to a tolerable level by protective measures as specified in Table 12	See above, no further measures required	N/A
	Minimum protective measures:	See above	—
	A. Low level measures	See above	N/A
	B. Moderate measures	See above	N/A
	C. Stringent measures	See above	N/A
7.3.4	Limitation of force and pressure	No such forces and pressures from the equipment	N/A
	Following levels are met in NORMAL and SINGLE FAULT CONDITION:	See above	N/A
	Continuous contact pressure below 50 N / cm <sup>2</sup> with force below 150 N		N/A
	Temporary force below 250 N for an area at least of 3 cm <sup>2</sup> for a maximum duration of 0,75 s		N/A
7.3.5	Gap limitations between moving parts	Fans are properly guarded (see Form A.20)	N/A
7.3.5.1	Access normally allowed	See above	N/A
	If levels of 7.3.4 exceeded and body part may be inserted minimum gap as specified in Table 13 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.3.5.2	Access normally prevented	See above	N/A
	Maximum gap as specified in Table 14 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.4	Stability	No such means required	P
	Equipment not secured to building structure is physical stable	No such means required	P
	Stability maintained after opening of drawers etc. by automatic means, or	No such means required	P
	warning marking requires the application of means	See above, no marking required	N/A
	Compliance checked by following tests as applicable:		—
	a) 10° tilt test for other than handheld equipment	No overbalance	P
	b) multi-directional force test for equipment exceeds height of 1 m and mass of 25 kg	Height less than 1m and mass less than 25kg and not floor-standing equipment	N/A



## IEC 61010-1 and/or EN 61010-1

Clause	Requirement – Test	Result – Remark	Verdict
	c) downward force test for floor-standing equipment	Equipment is not floor-standing	N/A
	d) overload test with 4 times maximum load for castor or support that supports greatest load	No such components to be evaluated	N/A
	e) castor or support that supports greatest load removed from equipment	See above	N/A
7.5	Provisions for lifting and carrying	No handle or grips	N/A
7.5.1	Equipment more than 18 kg :		—
	Has means for lifting or carrying; or	No direct means for lifting/carrying	N/A
	Directions in documentation	Equipment mass < 18kg	N/A
7.5.2	Handles or grips	See below	N/A
	Handles or grips withstand four times weight	No handle or grips	N/A
7.5.3	Lifting devices and supporting parts	No lifting devices	N/A
	RATED for maximum load; or	See above	N/A
	tested with four times maximum static load	See above	N/A
7.6	Wall mounting	No wall mounted equipment	N/A
	Mounting brackets withstand four times weight	See above	N/A
7.7	Expelled parts	There are no parts which can be expelled	N/A
	Equipment contains or limits the energy	See above	N/A
	Protection not removable without the aid of a TOOL	See above	N/A

<b>8</b>	<b>RESISTANCE TO MECHANICAL STRESSES</b>		P
8.1	Equipment does not cause a HAZARD when subjected to mechanical stresses in NORMAL USE	Mechanical resistance to shock and impact is adequate. Equipment has enclosure made of rigid metal with sufficient clearances and creepage distances between any hazardous live parts and enclosures. It was obvious due to construction that the tests of 8.1 and 8.2 would not affect safety due to these reasons. Based on the considerations above the tests were waived	P
	Normal protection level is 5 J	See above	N/A
	Levels below 5 J but not less than 1 J are acceptable if all of following criteria are met:	See above	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	a) lower level justified by RISK assessment of manufacturer	See above	N/A
	b) equipment installed in its intended application is not easily touched	See above	N/A
	c) only occasional access during NORMAL USE	See above	N/A
	d) IK code in accordance to IEC 62262 marked or symbol 14 used with full information in the documentation	See above	N/A
	For non-metallic ENCLOSURES rated below 2 °C ambient temperature value chosen for minimum RATED temperature	See above	N/A
	Impact energies between IK values, the IK code marked for nearest lower value	See above	N/A
	Conformity is checked by performing following tests:	See above	N/A
	1) static test of 8.2.1	See above	N/A
	2) impact test of 8.2.2 with 5 J except for HAND-HELD EQUIPMENT	See above	N/A
	if impact energy not selected to 5 J alternate method of IEC 62262 used	See above	N/A
	3) drop test of 8.3.1 or 8.3.2 except for FIXED and EQUIPMENT with mass over 100 kg	See above	N/A
	Equipment rated with an impact rating of IK 08 that obviously meets the criteria	See above	N/A
	After the tests inspection with following results:	See below	—
	- HAZARDOUS LIVE parts above the limits of 6.3.2 not ACCESSIBLE	See 8.1 above	N/A
	- insulation pass the voltage tests of 6.8	See above	N/A
	i) no leaks of corrosive and harmful substances	See above	N/A
	ii) ENCLOSURE shows no cracks resulting in a HAZARD	See above	N/A
	iii) CLEARANCES not less than their permitted values	See above	N/A
	iv) insulation of internal wiring remains undamaged	See above	N/A
	v) PROTECTIVE BARRIERS not damaged or loosened	See above	N/A
	vi) No moving parts exposed, except permitted by 7.3	See above	N/A
	vii) No damage which could cause spread of fire	See above	N/A
8.2	ENCLOSURE rigidity test	See above	N/A
8.2.1	Static test	See above	N/A
	- 30 N with 12 mm rod to each part of ENCLOSURE	See above	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	- in case of doubt test conducted at maximum RATED ambient temperature	See above	N/A
8.2.2	Impact test	See above	N/A
	Impact applied to any part of ENCLOSURE causing a HAZARD if damaged	See above	N/A
	Impact energy level and corresponding IK code .....	See above	N/A
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C	See above	N/A
8.3	Drop test	Test waived	N/A
8.3.1	Other than HAND-HELD and DIRECT-PLUG-IN EQUIPMENT	See above	N/A
	Tests conducted with a drop height or angle of .....	See above	N/A
8.3.2	HAND-HELD and DIRECT-PLUG-IN EQUIPMENT	See above	N/A
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C	See above	N/A
	Drop test conducted with an height of 1 m	See above	N/A

<b>9</b>	<b>PROTECTION AGAINST THE SPREAD OF FIRE</b>		P
9.1	No spread of fire in NORMAL and SINGLE FAULT CONDITION		P
	MAINS supplied equipment meets requirements of 9.6 additionally	See clause 9.6	P
	Conformity is checked by minimum one or a combination of the following (see Figure 11):	(see Form A.22)	P
	a) Fault test of 4.4; or	Transformer overload and short test performed, ventilation blocked or fans stalled	P
	b) Application of 9.2 (eliminating or reducing the sources of ignition); or	This method is applied	P
	c) Application of 9.3 (containment of fire within the equipment)	This method is applied	P
9.2	Eliminating or reducing the sources of ignition within the equipment		P
	a) 1) Limited-energy circuit (see 9.4); or	Not applied	N/A
	2) BASIC INSULATION provided for parts of different potential; OR	Minimum of basic insulation provided between parts of hazardous and non-hazardous potentials	P
	Bridging the insulation does not cause ignition	Not applied	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	b) Surface temperature of liquids and parts (see 9.5)	No liquids	N/A
	c) No ignition in circuits designed to produce heat	No ignition of material or components possible when they are coming into contact with the heaters	P
9.3	Containment of the fire within the equipment, should it occur		P
9.3.1	Spread of fire outside equipment reduced to a tolerable level if:	See below	P
	a) Energizing of the equipment is controlled by an OPERATOR held switch	Not used	N/A
	b) ENCLOSURE is conform with constructional requirements of 9.3.2; and	Enclosure is conform with constructional requirements of 9.3.2 (no liquids)	P
	Requirements of 9.5 are met	No flammable liquids	N/A
9.3.2	Constructional requirements	See below	P
	a) Connectors and insulating material have flammability classification V-2 or better	Connectors and insulating material are certified and have flammability classification V-2 min	P
	b) Insulated wires and cables are flame retardant (VW-1 or equivalent)	Insulated wires are certified and have flammability classification V-1 min.	P
	c) ENCLOSURE meets following requirements:	See below	P
	1) Bottom and sides in arc of 5 ° (see Figure 13) to non-limited circuits (9.4) meets:		---
	i) no openings; or	Bottom is metal and has no openings	P
	ii) perforated as specified in Table 16; or	No openings	N/A
	iii) metal screen with a mesh; or	No openings	N/A
	iv) baffles as specified in Figure 12	No openings	N/A
	2) Material of ENCLOSURE and any baffle or flame barrier is made of:	See below	P
	Metal (except magnesium); or	All fire enclosure is metal	P
	Non-metallic materials have flammability classification V-1 or better	All fire enclosure is metal	N/A
	3) ENCLOSURE and any baffle or flame barrier have adequate rigidity	Fire enclosure is made of rigid metal	P
9.4	Limited-energy circuit	No accessible limited-energy circuits	N/A
	a) Potential not more than 30 r.m.s. and 42.4 V peak, or 60 V dc	See above	N/A
	b) Current limited by one of following means:	See above	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	1) Inherently or by impedance (see Table 17); or	See above	N/A
	2) Over current protective device (see Table 18); or	See above	N/A
	3) A regulating network limits also in SINGLE FAULT CONDITION (see Table 17)	See above	N/A
	c) Is separated by at least BASIC INSULATION	See above	N/A
	Fuse or a nonadjustable electromechanical device is used	See above	N/A
9.5	Requirements for equipment containing or using flammable liquids		N/A
	Flammable liquids contained in or specified for use with equipment do not cause spread of fire	No flammable liquids	N/A
	Risk is reduced to a tolerable level:		N/A
	a) The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point	Not used	N/A
	b) The quantity of liquid is limited	Not used	N/A
	c) Flames are contained within the equipment	Not used	N/A
	Detailed instructions for RISK-reduction provided	Not used	N/A
9.6	Overcurrent protection	Overcurrent protection is part of the equipment: One circuit breaker in line and one in transformer primary. One additional fuse in line at AC outlet	P
9.6.1	MAINS supplied equipment protected		---
	BASIC INSULATION between MAINS parts of opposite polarity provided	(see Forms A.14 and A.15)	P
	Devices not in the protective conductor	Devices not in the protective conductor	P
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)	Single phase equipment	N/A
9.6.2	PERMANENTLY CONNECTED EQUIPMENT	Not PERMANENTLY CONNECTED EQUIPMENT	N/A
	Overcurrent protection device:	See above	N/A
	Fitted within the equipment; or	See above	N/A
	Specified in manufacturer's instructions	See above	N/A
9.6.3	Other equipment	No considered 'other equipment'	N/A
	Protection within the equipment	[Overcurrent protection is part of the equipment]	N/A
<b>10</b>	<b>EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT</b>		<b>P</b>

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
10.1	Surface temperature limits for protection against burns		P
	Easily touched surfaces within the limits in NORMAL and in SINGLE FAULT CONDITION:	Easily touched surfaces within the limits. There are no surfaces considerably hot except for the surfaces or parts of the heaters which are properly marked (see Form A.26A for temperatures)	P
	- at an specified ambient temperature of 40 °C	Considered, see 'general product information'	P
	- for equipment rated above 40 °C ambient temperature limits not exceeded raised by the difference to 40 °C	The equipment is not rated for above 40 °C ambient temperature limits, however measured temperatures are calculated for 40°C	N/A
	Heated surfaces necessary for functional reasons exceeding specified values:	Easily touched surfaces within the limits. There are no surfaces considerably hot except for the surfaces or parts of the heaters which are properly marked (see Form A.26A for temperatures)	P
	Are recognizable as such by appearance or function; or	Heated surface at upper compartment is accordingly marked	P
	Are marked with symbol 13	Symbol of IEC60417-5041 provided	P
	Guards are not removable without TOOL	Inspected	P
10.2	Temperatures of windings	No excessive temperatures produced in normal or single-fault conditions	P
	Limits not exceeded in:	(see Form A.26B)	P
	NORMAL CONDITION	See above	P
	SINGLE FAULT CONDITION	See above	P
10.3	Other temperature measurements	See above	P
	Following measurements conducted if applicable:	(see Form A.26A)	N/A
	a) Value of 60 °C of field-wiring TERMINAL box not exceeded	No field-wiring terminal box	N/A
	b) Surface of flammable liquids and parts in contact with this liquids	No flammable liquids	N/A
	c) Surface of non-metallic ENCLOSURES	No non-metallic enclosures	N/A
	d) Parts made of insulating material supporting parts connected to MAINS supply	Insulating materials of primary components are still all part of approved assemblies (e.g. power switch, relay, distribution terminal), or have appropriate UL approval	P
	e) TERMINALS carrying a current more than 0.5 A	Terminal do not exceed maximum specified temperatures	P
10.4	Conduct of temperature test	Considerations applied	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
10.4.1	Tests conducted under reference test conditions and manufacturer's instructions	(see Form A.26A)	P
10.4.2	Temperature measurement of heating equipment	Considered	P
	Tests conducted in test corner	(see Form A.26A)	P
10.4.3	Equipment intended for installation in a cabinet or wall	Equipment not intended for installation in a cabinet or wall	N/A
	Equipment built in as specified in installation instructions	(see Form A.26A)	P
10.5	Resistance to heat	Equipment has adequate resistance to heat	P
10.5.1	Integrity of CLEARANCE and CREEPAGE DISTANCES	No likelihood of reduction of safety critical clearances and creepage distances when equipment operates, see below	P
10.5.2	Non-metallic ENCLOSURES	Metal enclosure	N/A
	Within 10 min after treatment:		—
	Equipment subjected to suitable stresses of 8.2 and 8.3 complying with criteria of 8.1	Metal enclosure	N/A
10.5.3	Insulating material	All insulating materials are provided as part of certified components adequately rated for application	P
	a) Parts supporting parts connected to MAINS supply	Parts supporting parts connected to MAINS supply are certified and used in accordance with ratings	P
	b) TERMINALS carrying a current more than 0,5 A	Approved components, see above	P
	Examination of material data; or	See above	P
	in case of doubt:	See above	P
	1) Ball pressure test; or	See above, no further testing necessary	N/A
	2) Vicat softening test of ISO 306	See above	N/A

<b>11</b>	<b>PROTECTION AGAINST HAZARDS FROM FLUIDS</b>		N/A
11.1	Protection to OPERATORS and surrounding area provided by EQUIPMENT		N/A
	All fluids specified by manufacturer considered	Equipment does not contain fluids nor is used in measurements of processes on fluids	N/A
11.2	Cleaning	Cleaning has no safety relevant impact, no access to internal areas is required	N/A
11.3	Spillage	See above	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
11.4	Overflow	See above	N/A
11.5	Battery electrolyte	No batteries	N/A
	Battery electrolyte leakage presents no HAZARD	See above	N/A
11.6	Specially protected equipment	Equipment not defined as such	N/A
11.7	Fluid pressure and leakage	See above	N/A
11.7.1	Maximum pressure .....	See above	N/A
	Maximum pressure of any part does not exceed $P_{RATED}$	See above	N/A
11.7.2	Leakage and rupture at high pressure	See 11.1 and 14.2.1	N/A
	Fluid containing parts subjected to hydraulic test if:	Equipment not defined as such (see Form A.31)	N/A
	a) product of pressure and volume > 200 kPa; and	See above	N/A
	b) pressure > 50 kPa	See above	N/A
	Parts of refrigerating systems meets pressure-related requirements of IEC 60335-24 or IEC 60335-24	See above	N/A
11.7.3	Leakage from low-pressure parts	See 11.1 and 14.2.1	N/A
11.7.4	Overpressure safety device	See 11.1 and 14.2.1	N/A
	Does not operate in NORMAL USE	See above	N/A
	a) Connected as close as possible to parts intended to be protected	See above	N/A
	b) Easy access for inspection, maintenance and repair	See above	N/A
	c) Adjustment only with TOOL	See above	N/A
	d) No discharge towards person	See above	N/A
	e) No HAZARD from deposit of discharged material	See above	N/A
	f) Adequate discharge capacity	See above	N/A
	No shut-off valve between overpressure safety device and protected parts	See above	N/A
<b>12</b>	<b>PROTECTION AGAINST RADIATION, INCLUDING LASER SOURCES, AND AGAINST SONIC AND ULTRASONIC PRESSURE</b>		N/A



IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
12.1	Equipment provides protection	No laser sources, however an optional Nickel 63 radioactive source (ECD detector) may be used which is a sealed device. The ECD is not provided by the applicant and as such is not part of this investigation and not listed on the critical component list. A separate NRC license is available from the vendor which controls the labelling for this item. No further protection necessary	N/A
12.2	Equipment producing ionizing radiation	See above, ECD detector is fully contained and is an approved device	N/A
12.2.1	Ionizing radiation	See above	N/A
12.2.1.1	Equipment meets the following requirements:	See above	N/A
	a) if intended to emit radiation meets requirements of 12.2.1.2; or	See above	N/A
	tested, classified and marked in accordance to IEC 60405	See above	N/A
	b) if only emits stray radiation meets requirements of 12.2.1.3	See above	N/A
12.2.1.2	Equipment intended to emit radiation	See above	N/A
	Effective dose rate of radiation measured..... :	See above	N/A
	If dose rate exceeds 5 $\mu\text{Sv/h}$ marked with the following:	See above	N/A
	a) Symbol 17 (ISO 361)	See above	N/A
	b) Abbreviations of the radionuclides..... :	See above	N/A
	c) With maximum dose at 1 m; or .....	See above	N/A
	with dose rate value between 1 $\mu\text{Sv/h}$ and 5 $\mu\text{Sv/h}$ in m..... :	See above	N/A
12.2.1.3	Equipment not intended to emit radiation	See above, (see Form A.34)	N/A
	Limit for unintended stray radiation of 1 $\mu\text{Sv/h}$ at any easily reached point kept .....	See above	N/A
12.2.2	Accelerated electrons	No accelerated electrons	N/A
	Compartments opened only by the use of a TOOL	See above	N/A
12.3	Ultraviolet (UV) radiation	Conformity test under consideration	N/A
	No unintentional HAZARDOUS escape of UV radiation:	No UV radiation	N/A
	- checked by inspection; and	See above	N/A
	- evaluation of RISK assessment documentation		N/A
12.4	Microwave radiation	No micro-wave radiation	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	Power density does not exceed 10 W/m <sup>2</sup> .....	See above	N/A
12.5	Sonic and ultrasonic pressure	Equipment does not produce considerable amount of sound	N/A
12.5.1	Sound level	See above	N/A
	No HAZARDOUS sound emission	See above	N/A
	Maximum sound pressure level measured and calculated for maximum sound power level as specified in ISO 3746 or ISO 9614-1	See above	N/A
	Instruction describes measures for protection	See above	N/A
12.5.2	Ultrasonic pressure	Equipment does not produce considerable amount of sound	N/A
	Equipment not intended to emit ultrasound does not exceed limit of 110 dB between 20 kHz and 100 kHz	See above	N/A
	Equipment intended to emit ultrasound:	See above	N/A
	Outside useful beam does not exceed limit of 110 dB between 20 kHz and 100 kHz	See above	N/A
	If inside useful beam above values exceeded:	See above	N/A
	Marked with Symbol 14 of Table 1	See above	N/A
	and following information in the documentation:	See above	N/A
	a) dimensions of useful beam	See above	N/A
	b) area where ultrasonic pressure exceed 110 dB	See above	N/A
	c) maximum sound pressure inside beam area	See above	N/A
12.6	Laser sources	No laser sources	N/A
	Equipment meets requirements of IEC 60825-1	See above	N/A

<b>13</b>	<b>PROTECTION AGAINST LIBERATED GASES, EXPLOSION AND IMPLOSION</b>		N/A
13.1	Poisonous and injurious gases	Proper labelling for hydrogen gas is provided on the product.  However external connection with flow limiting device and quick shut-off is not part of this evaluation. Proper instructions need to be followed by trained personnel setting up the equipment.	N/A
	No poisonous or injurious gases or substances liberated in NORMAL CONDITION	See above	N/A
	Attached data/test reports demonstrate conformity	See above	N/A
13.2	Explosion and implosion	See above	N/A
13.2.1	Components	No such components	N/A

IEC 61010-1 and/or EN 61010-1

Clause	Requirement – Test	Result – Remark	Verdict
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	Components liable to explode:		—
	Pressure release device provided; or	See above	N/A
	Apparatus incorporates OPERATOR protection (see also 7.7)	See above	N/A
	Pressure release device:		—
	Discharge without danger	See above	N/A
	Cannot be obstructed	See above	N/A
13.2.2	Batteries and battery charging	No batteries	N/A
	If explosion or fire hazard could occur:		—
	Protection incorporated in the equipment; or	See above	N/A
	Instructions specify batteries with built-in protection	See above	N/A
	In case of wrong type of battery used:		—
	No HAZARD; or	See above	N/A
	Warning by marking and within instructions	See above	N/A
	Equipment with means to charge rechargeable batteries:		—
	Warning against the charging of non-rechargeable batteries; and	See above	N/A
	Type of rechargeable battery indicated; or	See above	N/A
	Symbol 14 used	See above	N/A
	Battery compartment design	See above	N/A
	Single component failure	See above	N/A
	Polarity reversal test	See above	N/A
13.2.3	Implosion of cathode ray tubes	No CRTs	N/A
	If maximum face dimensions > 160 mm .....		—
	Intrinsically protected and correctly mounted; or	See above	N/A
	ENCLOSURE provides protection:	See above	N/A
	If non-intrinsically protected:		—
	Screen not removable without TOOL	See above	N/A
	If glass screen, not in contact with surface of tube	See above	N/A

<b>14</b>	<b>COMPONENTS AND SUBASSEMBLIES</b>		<b>P</b>
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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
14.1	Where safety is involved, components and sub-assemblies meet relevant requirements	<p>Components required as such are certified types. Correct application in accordance with the component ratings.</p> <p>Components not certified are used in accordance with their ratings and they comply with applicable parts of IEC 61010 and the relevant component Standard.</p> <p>Components, for which no relevant IEC Standard exists, have been tested/evaluated under the conditions occurring in the equipment, using applicable parts of IEC 61010.</p> <p>See separate Construction Data Form</p>	P
14.2	Motors	See separate Construction Data Form	P
14.2.1	Motor temperatures	See below	P
	Does not present a HAZARD when stopped or prevented from starting; or	AC motor, no excessive heat generated under normal and locked rotor condition, temperatures are not exceeding unsafe limits, no hazards noted.	P
	Protected by over-temperature or thermal protection device conform with 14.3	See above	N/A
14.2.2	Series excitation motors	No such motors	N/A
	Connected direct to device, if over-speeding causes a HAZARD	See above	N/A
14.3	Overtemperature protection devices	None used	N/A
	Devices operating in a SINGLE FAULT CONDITION	See above	N/A
	a) Reliable function is ensured	See above	N/A
	b) RATED to interrupt maximum current and voltage	See above	N/A
	c) Does not operate in NORMAL USE	See above	N/A
	If self-resetting device used to prevent a HAZARD, protected part requires intervention before restarting	See above	N/A
14.4	Fuse holders	Separate fuse holder for optional AC outlet provided, accessible by service personnel only	P
	No access to HAZARDOUS LIVE parts	Inspected	P
14.5	MAINS voltage selecting devices	Equipment is wired at set voltage	N/A
	Accidental change not possible	See above	N/A
14.6	MAINS transformers tested outside equipment	Short circuit and overload conditions tested – see appended table.	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
14.7	Printed circuit boards	All PCBs are UL Recognized and flame rated 94V-1 min	P
	Data shows conformity with V-1 of IEC 60695-11-10 or better; or	See above	P
	Test shows conformity with V-1 of IEC 60695-11-10 or better	(see Form A.23)	P
	Not applicable for printed wiring boards with limited-energy circuits (9.4)	No limited-energy circuits considered	N/A
14.8	Circuits or components used as transient overvoltage limiting devices	No control of transient overvoltage employed within equipment	N/A
	Test conducted between each pair of MAINS SUPPLY TERMINALS	See above (see Form A.41)	N/A
	No HAZARD resulting from rupture or overheating of the component:	See above	N/A
	- no bridging of safety relevant insulation	See above	N/A
	- no heat to other parts above the self-ignition points	See above	N/A

<b>15</b>	<b>PROTECTION BY INTERLOCKS</b>		N/A
15.1	Interlocks are designed to remove a HAZARD before OPERATOR exposed	Provided for functional use only, other compartments underneath main cover which is operated by interlock have their own cover and are properly labelled for hot surface	N/A
15.2	Prevention of reactivation	See above	N/A
15.3	Reliability	See above	N/A
	Single fault unlikely to occur; or	See above	N/A
	Cannot cause a HAZARD	See above	N/A

<b>16</b>	<b>HAZARDS RESULTING FROM APPLICATION</b>		P
16.1	REASONABLY FORESEEABLE MISUSE	All REASONABLY FORESEEABLE MISUSES were considered in Clauses 6 to 15	P
	No HAZARDS arising from settings not intended and not described in the instructions	Any setting of the controls do not have an impact on the overall safety of the product	P
	Other cases of REASONABLY FORESEEABLE MISUSE addressed by RISK assessment	See above, no further risk assessment deemed necessary.	N/A
16.2	Ergonomic aspects	See below	P
	Factors giving rise to a HAZARD the RISK assessment is reflecting those aspects:	The factors below could not give rise to a HAZARD.	P

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
	a) limitation of body dimensions	See above	P
	b) displays and indicators	See above	P
	c) accessibility and conventions of controls	See above	P
	d) arrangement of TERMINALS	See above	P

17	RISK ASSESSMENT		N/A
	RISK assessment conducted, if HAZARD might arise and not covered by Clauses 6 to 16	ALL HAZARDS that could arise are sufficiently covered by Clauses 6 to 16, no further risk assessment deemed necessary for this type of product and application	N/A
	TOLERABLE RISK achieved by iterative documented process covering the following:	See above	N/A
	a) RISK analysis	See above	N/A
	Identifies HAZARDS and estimates RISK	See above	N/A
	b) RISK evaluation	See above	N/A
	Plan to judge acceptability of resulting RISK level based on the estimated severity and likelihood of a RISK	See above	N/A
	c) RISK reduction	See above	N/A
	Initial RISK reduced by counter measures;	See above	N/A
	Repeated RISK evaluation without new RISKS introduced	See above	N/A
	RISKS remaining after RISK assessment addressed in instructions to RESPONSIBLE BODY:	See above	N/A
	Information contained how to mitigate these RISKS	See above	N/A
	Following principles in methods of RISK reduction applied by manufacturer in given order:	See above	N/A
	1) RISKS eliminated or reduced as far as possible	See above	N/A
	2) Protective measures taken for RISKS that cannot be eliminated	See above	N/A
	3) User information about residual RISK due to any defect of the protective measures	See above	N/A
	Indication of particular training is required	See above	N/A
	Specification of the need for personal protective equipment	See above	N/A
	Conformity checked by evaluation of the RISK assessment documentation	See above	N/A

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict
<b>ANNEX F</b>	<b>ROUTINE TESTS</b>		P
	Manufacturer's declaration	Manufacturer's declaration in form of signed CDF to state that considerations for F.1 and F.2 to be applied to production units	P

IEC 61010-1 and/or EN 61010-1						
Clause	Requirement – Test			Result – Remark	Verdict	
<b>4.4</b>	<b>TABLE: Testing in single FAULT CONDITION – Results</b>				<b>Form A.1</b>	<b>P</b>
Test subclause	Fault No.	Fault description	Td 4.4.3 (NOTE)	How was test terminated Comments	Meets 4.4.4	
4.4.2.2	1	Protective conductor disconnected	---	Accessible current did not exceed the limits. See Form A.6. Hipot, permissible limits pass.	P	
4.4.2.4	2	230VAC motor rotor locked (European application) <i>[representative for US-model also]</i>	1h 0m	No hazards produced Hipot pass. See below.	P	
4.4.2.9	3	Fan rotor locked	1h 30m	No excessive temperatures, no hazards. Refer to Form A.26A Hipot, permissible limits pass	P	
4.4.2.6	4	Transformer Short Circuit and overload	4h 0m	No excessive temperatures, no hazards. Refer to Forms A.39 and A.40 Hipot pass.	P	
--	5	USB connector overload	1 min	2000 Ohm resistor, max. available current	P	
NOTE Td = Test duration in hh:mm:ss Record dielectric strength test on Form A.18 and temperature tests on Form A.20A. Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.						
Supplementary information:						

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ See individual forms



IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

5.1.3 c)	TABLE: MAINS supply		Form A.2	P
	Marked rating .....	AC 115 (US Models) V AC 230 (European models)		—
	Phase .....	Single phase		—
	Frequency .....	50/60 Hz		—
	Current .....	- A		—
	Power .....	- W		—
	Power .....	1725 VA		—

Test No.	Voltage V	Frequency Hz	Current A	Power in W	Power in VA	Comments
1	103.5	60	8.9	840	921	
2	115.0	60	8.2	890	943	
3	126.5	60	10.6*)	1290	1340	
4	207.0	50	4.5	870	950	
5	230.0	50	4.2	897	965	
6	253.0	50	4.3	1025	1090	
7	--	--	--	--	--	
8	--	--	--	--	--	

Note: Measurements are only required for marked ratings.

Supplementary information: Not rated for current, transformer re-wiring and change of motors for different voltage setting

\*) Average current during temperature measurements was found to be 7.5 to 8.0A when test sample was heated up

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: See original report, 02072255.011

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

5.3	TABLE: Durability of markings	Form A.3	P
Marking method (see NOTE)		Agent	
1)	silk screen into enclosure metal	A	Water
2)	warning labels at several areas, e.g. 'CAUTION – hot surface'	B	Isopropyl alcohol 70%
3)	AC outlet ratings, including fuse rating	C	(specify agent)
4)		D	(specify agent)
5)		E	(specify agent)

NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

Marking location	Marking method (see above)
Identification (5.1.2)	1
MAINS supply (5.1.3)	1
Fuses (5.1.4)	3
TERMINALS and operating devices (5.1.5.2)	N/A
Switches and circuit breakers (5.1.6)	Approved components
DOUBLE/REINFORCED equipment (5.1.7)	N/A
Field wiring TERMINAL boxes (5.1.8)	N/A
Warning marking (5.2)	2
Battery charging (13.2.2)	N/A

Method	Test agent	Remains legible	Label loose	Curled edges	Comments
		Verdict	Verdict	Verdict	
1	A, B	YES	N/A	N/A	Pass
2	A, B	YES	No	No	Pass
3	A, B	YES	No	No	Pass

Supplementary information:

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>6.2</b>	<b>TABLE: List of ACCESSIBLE parts</b>	<b>Form A.4</b>	---
6.1.2	Exceptions	None applied	—
6.2	Determination of accessible parts	See below	—

Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)
1	Earthed enclosure	Visual	
2	AC-plug	Test (form A.5)	
3	USB connector	Visual	

NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.2)  
 NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2)  
 NOTE 3 – Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see 6.4).  
 NOTE 4 – Capacitor test may be required (see Form A.5).  
 NOTE 5 – The determination methods are:  
 V = visual; R = rigid test finger; J = jointed test finger; P3 = pin 3 mm diameter; P4 = pin 4 mm diameter.

Supplementary information:

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

6	TABLE: Values in NORMAL CONDITION	Form A.5	---
6.1.2	Exceptions	11.2 Cleaning and decontamination	—
6.3.1	Values in NORMAL CONDITION (see NOTE 1)	11.3 Spillage	—
6.6.2	Terminals for external circuit	11.4 Overflow	—
6.10.3	Plugs and connections		—

Item (see Form A.4)	Voltage			Current			Capacitance		10 / 5 s test (NOTE)			Comments	
	V r.m.s.	V peak	V d.c.	Test circuit A1/ A2/ A3	mA r.m.s.	mA peak	mA d.c.	μC	mJ	V	μC		mJ
1	0	---	---	---	---	---	---	---	---	---	---	---	---
2	--	---	---	---	---	---	---	---	---	0	---	---	After 5 s
3	--	0	---	---	---	---	---	---	---	---	---	---	---

NOTE – A 10 s test is specified in 6.1.2 a) b). A 5 s test is specified in 6.10.3. The capacitance level versus voltage below the limits given from figure 3 of IEC 61010-1.

Supplementary information: Input voltage 253V, 60Hz

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

6.3.2		TABLE: Values in SINGLE FAULT CONDITION										Form A.6	---
Item	Subclause and	Voltage			Transient (see NOTE)		Current			Capacitance			
(see Form A.4)	Fault No. (see Form A.1)	V r.m.s.	V peak	V d.c.	V	s	Test circuit A1/ A2/ A3	mA r.m.s	mA peak	mA d.c.	μF (see NOTE)	Comments	
1	1	---	---	---	---	---	---	0.48	---	---	---	---	
3	7	---	---	0	---	---	---	0	---	---	---	Max available power	

NOTE – Transient voltages must be below the limits given from Figure 2 and the capacitance below the limits from figure 3 of IEC 61010-1.

Supplementary information: Input voltage 253V, 60Hz

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: See original report, 02072255.011

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

6.5.2.2	TABLE: Cross-sectional area of bonding conductors		Form A.7	P
Conductor location		Cross-sectional area mm <sup>2</sup>	Verdict	
PE Terminal to all protective bonding terminals		0.75 (18AWG) min.	P	

6.5.2.3	TABLE: Tighting torque test		Form A.8	P
Conductor location		Size of Screw	Tighting torque Nm	Verdict
PE Terminal in chassis		5 min	2.0	P

Supplementary information:

 TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: See original report, 02072255.011

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

6.5.2.4	TABLE: Bonding impedance of plug connected equipment			Form A.9	P
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min V	Calculated resistance (Maximum 0,1 or 0,2 Ω) Ω (NOTE 1)	Verdict	
PE-pin of AC cord to chassis	40	1.72	0.043	P	
PE-pin of AC cord to PE-pin of AC outlet	40	1.29	0.032	P	

NOTE 1 – For none-detachable power cord the impedance between protective conductor plug pin of MAINS cord and each ACCESSIBLE part shall not exceed 0,2 Ohm.

Supplementary information:

6.5.2.5	TABLE: Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT			Form A.10	N/A
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (maximum 10 V) V	Verdict		

Supplementary information:  
Not permanently connected

6.5.2.6	TABLE: Transformer PROTECTIVE BONDING screen			Form A.11	N/A
ACCESSIBLE part under test	Test current (see NOTE) A	Voltage attained after 1 min (maximum 10V) V	Calculated resistance (Maximum 0,1 Ω) Ω	Verdict	

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Clause	Requirement – Test	Result – Remark	Verdict

NOTE – Test current must be twice the value of the overcurrent protection means of the winding. Test is specified in 6.5.2.6 a) or b).

Supplementary information:

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<b>6.5.4</b>	<b>TABLE: protective impedance</b>	<b>Form A.12</b>	<b>N/A</b>
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A single component								
Component	Location	Measured		Calculated	Rated		Verdict	Comments
		Working voltage	Current	Power dissipation	Working voltage	Power dissipation		
		V	A	W	V	W		

A combination of components		
Component	Location	Comments

NOTE – A PROTECTIVE IMPEDANCE shall not be a single electronic device that employs electron conduction in a vacuum, gas or semiconductor.

Supplementary information: no such a device

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_

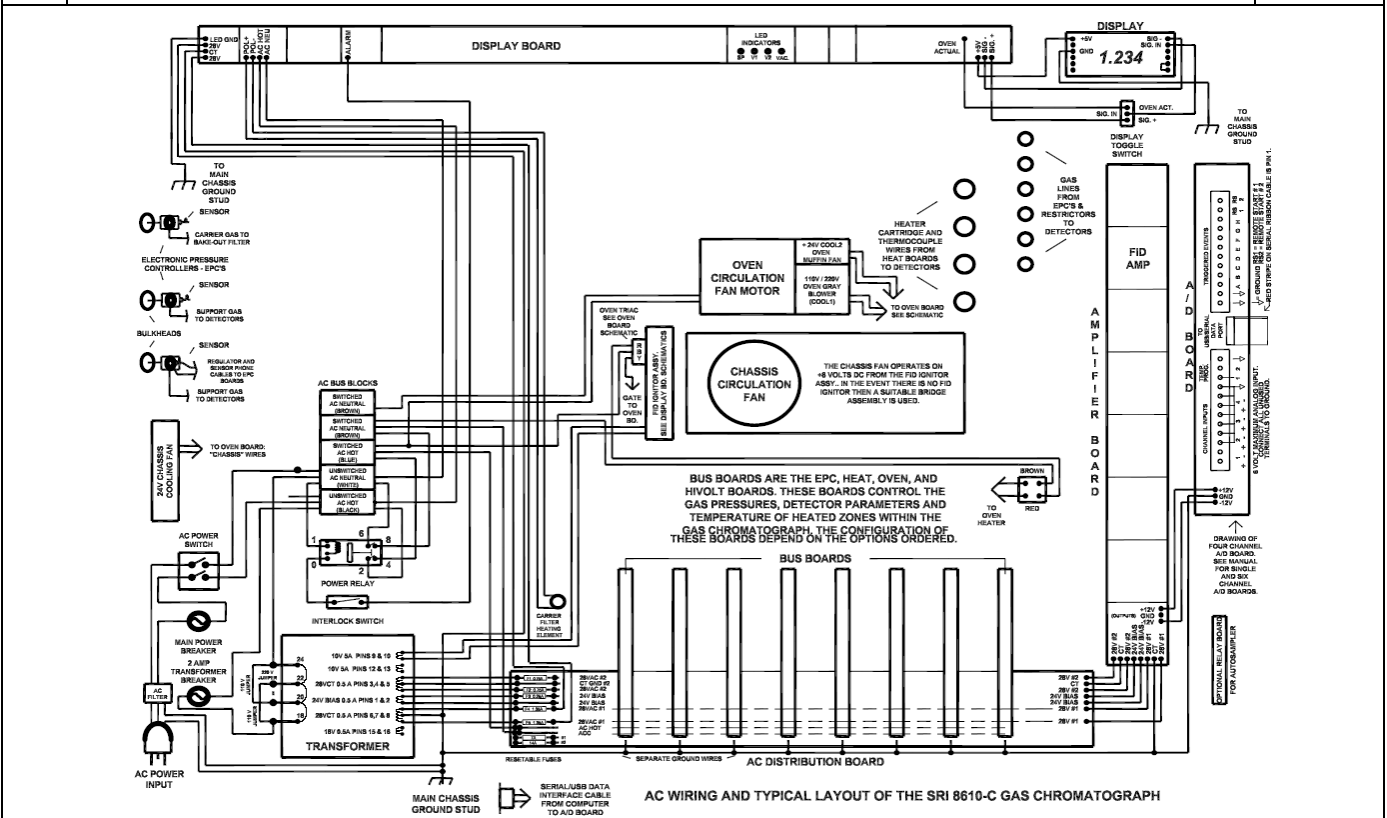


IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>6.5.6</b>	<b>TABLE: Current- or voltage-limiting device</b>	<b>Form A.13</b>	<b>N/A</b>				
Component	Location	Measured		Rated		Verdict	Comments
		Working voltage V	Current A	Working voltage V	Current A		
Supplementary information:							

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_

<b>6.7</b>	<b>TABLE: Insulation requirements - Block diagram of system</b>	<b>Form A.14</b>	<b>---</b>
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[representative block diagram, not showing AC outlet]

Pollution degree .....: 2		Overvoltage category .....: II			
Area	Location	Insulation type	WORKING VOLTAGE	Test voltage	Comments (NOTE 3)

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Clause	Requirement – Test	Result – Remark	Verdict

6.7	TABLE: Insulation requirements - Block diagram of system						Form A.14	---
		(NOTE 1)	RMS V	Peak V	Frequency kHz	(NOTE 2) V		
A	Primary to Gnd	BI	250Vrms *)			1390VAC/ 1970VDC		
B	Primary to Secondary	DI/RI	250Vrms			2210VAC/ 3135VDC		
C	Primary to Secondary on AC Distribution Board	DI/RI	250Vrms			2210VAC/ 3135VDC		
D	Primary to Chassis GND on Heater Board	BI	250Vrms			1390VAC/ 1970VDC		
E								
F								
NOTE 1 – Type of insulation: BI = BASIC INSULATION DI = DOUBLE INSULATION PI = PROTECTIVE IMPEDANCE RI = Reinforced INSULATION SI = Supplementary INSULATION see also Form A.15 for further details		NOTE 2 - Types of voltage Peak impulse test voltage (pulse) r.m.s. d.c. peak		NOTE 3 - OVERVOLTAGE CATEGORIES or POLLUTION DEGREES which differ from these should be shown under "Comments".				
Supplementary Information: See Attachment 3 for transformer details.								
*) based on input voltage rating of 230V (European application)								

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: See original report, 02072255.011

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

6.7		TABLE: Insulation requirements - CLEARANCES and CREEPAGES								Form A.15	P	
6.2.2	Examination	6.5.4	Protective impedance								—	
6.4.2	ENCLOSURES and protective barriers	6.5.6	Current- or voltage-limiting device								—	
6.4.4	Impedance										—	
Area	Location (see Form A.14)	Insulation type  (NOTE 1)	Working Voltage (NOTE 2)			CLEARANCE		CREEPAGES		CTI	Verdict	Comments
			RMS V	Peak V	Frequency kHz	Required mm	Measured mm	Required mm	Measured mm			
A	Pri - Gnd	BI	250V rms			1.5	6.0	3.0	4.0	>100	P	
B	Pri - Sec	DI/RI	250V rms			3.0	7.0	6.0	6.0	>100	P	
C	Pri – Sec on AC distribution board	DI/RI	250V rms			3.0	3.2	3.0	3.2	>100	P	
D	Pri – Sec on Heater Board	BI	250V rms			1.5	3.0	1.5	3.0	>100	P	
E	Pri – Chassis- GND on Heater Board	BI	250V rms			1.5	2.0	1.5	2.0	>100	P	
F												
NOTE 1 – refer to Form A.14 for type of insulation shown in the insulation diagram												
NOTE 2 - to be used for definition of required insulation (see Form A.14)												
Input supply voltage.....:		AC115 (North American configuration) V					50/60 Hz					
		AC 230 (European configuration)										
Supplementary information: All hazardous voltages contained within metal fire enclosure. No compromising of required creepages and clearances.												

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: See original report, 02072255.011

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

6.7	TABLE: Insulation requirements - CLEARANCES and CREEPAGES			Form A.16	P
8	Mechanical resistance to shock and impact	10.5.1	Integrity of CLEARANCES and CREEPAGE distances	—	
9.6.1	Overcurrent protection basic insulation between MAINS parts			—	

Area	Location (see Form A.14)	Insulation type	Mechanical tests (NOTE)					Test at max. RATED ambient (10.5.1)	Measured after test (if required)		Verdict	Comments
			Applied force	Rigidity (8.2)		Drop (8.3)			CREEPAGE DISTANCE	CLEARANCE		
				N	Static (8.2.1)	Impact (8.2.2)	Normal (8.3.1)					
A	Pri - Gnd	BI	--	--	--	--	--	--	--	--		
B	Pri - Sec	DI/RI	--	--	--	--	--	--	--	--		
C	Pri – Sec on AC distribution board	DI/RI	--	--	--	--	--	--	--	--		
D	Pri – Sec on Heater Board	BI	--	--	--	--	--	--	--	--		
E	Pri – Chassis-GND on Heater Board	BI	--	--	--	--	--	--	--	--		
F												

NOTE – Refer to Form A.19 for dielectric strength tests following the above tests.

Supplementary information: All hazardous voltages contained within metal fire enclosure. No compromising of required creepages and clearances. No further testing deemed necessary.

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ --

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>6.7.2.2.2</b>	<b>TABLE: Reliability of potted components</b>	<b>Form A.17</b>	<b>N/A</b>
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Temperature Cycling Test			
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Manufacturer .....	
Type.....	
Construction .....	
Potting compound.....	
CREEPAGE distances measured .....	
CLEARANCES measured .....	
Thickness through insulation .....	
Adhesive test Pass/Fail .....	
Test temperature T °C.....	

Cycles at U = AC 500 V	Leakage current (500 V) mA			
------------------------	-------------------------------	--	--	--

Number of cycles	Date		68 h / 125 °C	1 h / 25 °C	2 h / 0 °C	1 h / 25 °C
1. Cycle from		to				
2. Cycle from		to				
3. Cycle from		to				
4. Cycle from		to				
5. Cycle from		to				
6. Cycle from		to				
7. Cycle from		to				
8. Cycle from		to				
9. Cycle from		to				
10. Cycle from		to				

After Cycling Test :		
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Humidity conditioning:	48 h	
Requirements for dielectric strength (s. insulation diagram)	Test voltage V r.m.s	Verdict
Basic insulation _____ V r.m.s.		
Additional insulation _____ V r.m.s.		
Reinforced insulation _____ V r.m.s.		

Supplementary information:
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TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ --

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>6.8</b>	<b>TABLE: Dielectric strength tests</b>	<b>Form A.18</b>	<b>P</b>
4.4.4.1 b)	Conformity after application of SINGLE FAULT CONDITIONS <sup>1</sup>		P
6.4	Primary means of protection <sup>2</sup>		P
6.6	Connections to external circuits		P
6.7	Insulation requirements <sup>2</sup> (see Annex K)		P
6.10.2	Fitting of non-detachable MAINS supply cords <sup>1</sup>		N/A
9.2 a) 2)	Eliminating or reducing the sources of ignition within the equipment		N/A
9.4 c)	Limited-energy circuit		N/A
9.6.1	Overcurrent protection basic insulation between MAINS - parts		P

<sup>1</sup> Record the fault, test or treatment applied before the dielectric strength test. <sup>2</sup> Humidity preconditioning required.

	Test site altitude .....	Approx.. 100 m	—
	Test voltage correction factor (see Table 10) .....	N/A	—

Location or references from Forms A.1 and A.14	Clause or sub-clause	Humidity Yes/No	Working voltage V	Test voltage r.m.s./peak/d.c V	Comments (NOTE)	Verdict
Primary circuits to PE/chassis	6.4	No	250VAC	1690Vac	See below	P
Primary circuits to SELV	6.4	Yes	250Vac	2704Vac	Humidity preconditioning performed at 90% @ 35°C on the transformer (US and European model)	P

<sup>1</sup> Record the fault, test or treatment applied before the dielectric strength test. <sup>2</sup> Humidity preconditioning required.

NOTE: Test duration may be recorded.

Supplementary information:

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>6.10.2</b>	<b>TABLE: Cord anchorage</b>						<b>Form A.19</b>	<b>P</b>
Location	Mass kg	Pull N	Verdict	Torque Nm	Verdict	Comment		
Cord Entry	15	100	P	0.35	P			
Dielectric strength test for 1 min. (6.8.3.1) .....				V r.m.s.				
Supplementary information:								

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: See original report, 02072255.011

<b>7</b>	<b>TABLE: Protection against mechanical HAZARDS</b>												<b>Form A.20</b>	<b>N/A</b>	
7.3.4	Limitation of force and pressure												—		
7.3.5	Gap limitations between moving parts												—		
	Clause 7.3.4		Clause 7.3.5.1								Clause 7.3.5.2				
	Continuous	Temporary	Minimum gaps (mm)								Maximum gaps (mm)				
Part / Location	Contact pressure max. 50 N/cm² @ max. 150 N	max. 250N / 3cm² @ max. 0,75s	Torso 500	Head 300	Leg 180	Foot 120	Toes 50	Arm 120	Hand 100	Finger 25	Head 120	Foot 35	Finger 4	Verdict	Comments
Supplementary information:															

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: --

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>8.2</b>	<b>ENCLOSURE rigidity test</b>		<b>Form A.21</b>	<b>N/A</b>
<b>8.2.1</b>	<b>Static test</b>			N/A
	Material of enclosure..... :	<b>Metal</b> / non-metallic		—
	Preparation for the test:			—
	Operated at ambient temperature .....	° C	h	—
	Location	Comments		Verdict
	1)			N/A
	2)			N/A
<b>8.2.2</b>	<b>Impact test</b>			N/A
	Material of enclosure..... :	Metal / non-metallic		—
	Corresponding IK-code .....			—
	Preparation for the test:			—
	Cooled to (temperature) .....	° C		—
	Location	Comments		Verdict
	1) Top			N/A
	2) Side left / right			N/A
	3) Bottom			N/A
<b>8.3</b>	<b>Drop test</b>			N/A
<b>8.3.1</b>	<b>Other equipment</b>			N/A
	Location	Raised up to		—
		mm	30 °	—
	1)			N/A
	2)			N/A
	3)			N/A
	4)			N/A
<b>8.3.2</b>	<b>Hand-held EQUIPMENT and direct plug-in equipment</b>			N/A
	Material of enclosure..... :	Metal / non-metallic		—
	Preparation for the test:			—
	Cooled to (temperature) .....	° C		—
	Location	Comments		Verdict
	1) Side			N/A
	2) Edge			N/A



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Clause	Requirement – Test	Result – Remark	Verdict
3) Corner			N/A
Supplementary information:			

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9	TABLE: Protection against the spread of fire			Form A.22	P
Item	Source of HAZARD or area of the equipment considered (circuit, component, liquid etc.)	Protection Method (9a, 9b or 9c)	Protection details	Verdict	
1	Internal components	9c	Enclosure complies with constructional requirements, PCB are flame rated V-1 or better, insulated wiring is flame rated V-1 or better, connectors and insulating materials on which components are mounted are flame rated V-2 or better	P	
Supplementary information:					

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>9.3.2</b>	<b>TABLE: Constructional requirements</b>		<b>Form A.23</b>	<b>N/A</b>			
14.7	Printed circuit boards			N/A			
Material tested .....		No further testing required, approved PCBs	—				
Generic name .....			—				
Material manufacturer .....			—				
Type .....			—				
Colour .....			—				
Conditioning details .....			—				
		Sample					
		1	2	3	4	5	6
Thickness of specimen	mm						
Duration of flaming after first application	s						
Duration of flaming plus glowing after second application	s						
Specimen burns to holding clamp	Yes / No						
Cotton ignited	Yes / No						
Sample result	Pass / Fail						
Supplementary information:							
Enclosure complies with constructional requirements, PCB are flame rated V-1 or better, insulated wiring is flame rated V-1 or better, connectors and insulating materials on which components are mounted are flame rated V-2 or better.							

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ --

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

9.4	TABLE: Limited-energy circuit					Form A.24	N/A
Item	9.4 a)	9.4 b) Current limitation (NOTE)			9.4 c)	Decision	
or Location (see Form A.17)	Maximum potential in circuit voltage r.m.s./ d.c. V	Maximum available current A	Maximum available power VA	Overload protection after 120 s A	Circuit separation	Yes / No	Comments

NOTE – Maximum values see Tables 17 and 18.of 61010-1

Supplementary information: no limited energy circuits

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ --

9.5	TABLE: Requirements for equipment containing or using flammable liquids Form A.25			N/A
Type of Liquid	9.5 Flammable Liquids		Verdict	
	b) Quantity	c) Containment		

Supplementary information:

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Clause	Requirement – Test	Result – Remark	Verdict

10.5.2	TABLE: Resistance to heat of non-metallic enclosures		Form A.27	N/A
	Test method used .....			—
	Non operative treatment.....	[ ]		
	Empty ENCLOSURE .....	[ ]		
	Operative treatment .....	[ ]		
	Temperature during tests .....			—
Description	Material	Comments	Verdict	
	Dielectric strength test (6.8) .....	V	r.m.s./peak/d.c.	

NOTE – Within 10 minutes of the end of treatment suitable tests in acc. to 8.2 and 8.3 must be conducted and pass criteria of 8.1.

Supplementary information: Metal enclosure provided.

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ --

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>10.5.3</b>	<b>TABLE: Insulating Materials</b>		<b>Form A.28</b>	<b>P</b>
10.5.3 1)	Ball pressure test			
	Max. allowed impression diameter..... :	2 mm		—
	Part	Test temperature °C	Impression Diameter (mm)	Verdict

Supplementary information:

<b>10.5.3 2)</b>	<b>Vicat softening test (ISO 306)</b>		<b>Form A.29</b>	<b>N/A</b>
	Part	Vicat softening temperature °C	Thickness of sample (mm)	Verdict

Supplementary information:

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Clause	Requirement – Test	Result – Remark	Verdict

<b>8</b>	<b>TABLE: Mechanical resistance to shock and impact</b>	<b>Form A.30</b>	<b>P</b>
<b>11</b>	<b>Protection against HAZARDS from fluids</b>		<b>N/A</b>

Voltage tests can be carried out once after performing the tests of clause 8 and clause 11. However, if voltage tests are carried out separately after each set of tests, two forms can be used.

Location (see form A.14)	Clause 8 tests				Clause 11 tests				Working voltage V	Test voltage V	Verdict	Comments
	Static (8.2.1) 30 N	Dynamic (8.2.2)	Normal (8.3.1)	Handheld Plug-in	Cleaning (11.2)	Spillage (11.3)	Overflow (11.4)	IEC 60529 (11.6)				

NOTE – Use r.m.s., d.c. or peak to indicate the used test voltage.

Supplementary information:

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ --

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>11.7.2</b>	<b>TABLE: Leakage and rupture at high pressure</b>	<b>Form A.31</b>	<b>N/A</b>
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Part	Maximum permissible working pressure MPa	Test pressure MPa	Leakage Yes / No	Deformation Yes / No	Burst Yes / No	Comments

NOTE – see also Annex G with requirements for USA and Canada.

Supplementary information:

<b>11.7.3</b>	<b>Leakage from low-pressure parts</b>	<b>Form A.32</b>	<b>N/A</b>
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Part	Test pressure MPa	Leakage Yes / No	Comments

Supplementary information:

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Clause	Requirement – Test	Result – Remark	Verdict

<b>12.2.1</b>	<b>TABLE: Ionising radiation</b>		<b>Form A.33</b>	<b>N/A</b>
12.2.1.2	Equipment intended to emit radiation			
	Locations tested	Measured values μSv/h	Verdict	Comments
Supplementary information:				
<b>12.2.1.3</b>	<b>Equipment not intended to emit radiation</b>		<b>Form A.34</b>	<b>N/A</b>
	Max. allowed effective dose rate at 100 mm.....: 1 μSv/h			—
	Locations tested	Measured values μSv/h	Verdict	Comments
Supplementary information:				

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ --

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>12.5.1</b>	<b>TABLE: Sound level</b>	<b>Form A.35</b>	<b>N/A</b>
Locations tested		Measured values dBA	Calculated maximum sound pressure level
At operator's normal position and at bystanders' positions			
a)			
b)			
c)			
d)			
e)			
f)			
Supplementary information: product does not produce noticeable sound			

<b>12.5.2</b>	<b>Ultrasonic pressure</b>	<b>Form A.36</b>	<b>N/A</b>	
Locations tested		Measured values		Comments
		dB	kHz	
At OPERATOR'S normal position				
At 1 m from the ENCLOSURE				
a)				
b)				
c)				
d)				
e)				
NOTE – No limit is specified at present, but a limit of 110 dB above the reference pressure value of 20 µPa is under consideration for applicable frequencies between 20 kHz and 100 kHz.				
Supplementary information: product does not produce noticeable sound				

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ --

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>13.2.2</b>	<b>TABLE: Batteries</b>	<b>Form A.37</b>	<b>N/A</b>
	Battery load and charging circuit diagram:		
	Battery type .....		—
	Battery manufacturer/model/catalogue No. ....		—
	Battery ratings .....		—
	Reverse polarity instalment test .....		
Single component failures		Verdict	
Component	Open circuit	Short circuit	
Supplementary information:			

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Clause	Requirement – Test	Result – Remark	Verdict

<b>14.3</b>	<b>TABLE: Overtemperature protection devices</b>		<b>Form A.38</b>	<b>N/A</b>
Reliability test				
Component	Type (NOTE)	Verdict	Comments	
NOTE:				
NSR = non-self-resetting      (10 times)				
NR = non-resetting                (1 time)				
SR = self-resetting                (200 times)				
Supplementary information: no such devices				

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_ --

IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>4.4.2.7</b>	<b>TABLE: MAINS transformer</b>			<b>Form A.39</b>	<b>P</b>
4.4.2.7.2	Short circuit				P
14.6	MAINS transformers tested outside equipment				P
Type .....	See Separate Construction Data Form and Attachment 3				—
Manufacturer .....	See Separate Construction Data Form				—
Test in equipment					N/A
Test on bench					P
Test repeated inside equipment (see 14.6)					N/A
Optional – Insulation class (IEC 60085) of the lowest RATED winding .....				Class F	—
Winding identification (Secondary Terminals)		24V (1-2)	28Vct (3-5)	28Vct (6-8)	10V (9-10)
Type of Protector for winding (NOTE 1)		SF / 0.25A	SF / 0.75A	SF / 1.6A	SF / 5A
Elapsed time		0 sec	0 sec	0 sec	0 sec
Current, A	primary	--	--	--	--
	secondary	--	--	--	--
Winding temperature, °C (see NOTE 2)	primary	--	--	--	--
	secondary	--	--	--	--
Tissue paper / cheesecloth OK? (Pass / Fail)		Pass	Pass	Pass	Pass
Voltage tests (SEE NOTE 3)					
primary to secondary	1690 V rms	NB	NB	NB	NB
primary to core	_____ V _____	--	--	--	--
secondary to secondary	_____ V _____	--	--	--	--
secondary to core	_____ V _____	--	--	--	--
Verdict		Pass	Pass	Pass	Pass
NOTE 1:	Primary fuse	- PF / ( )	A		
	Secondary fuse	- SF / ( )	A		
	Overtemperature protection	- OP / ( )	°C		
	Impedance protection	- Z			
NOTE 2:	Indicate method of measurement	TC = with thermocouple			
		R = resistance method			
	If resistance method is used, record resistance in cold and warm condition in Form A.26B!				
NOTE 3:	Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use NB = no breakdown or B = breakdown				
Supplementary information:					
Tested at 253Vac/50Hz. Ambient = 23°C. PTCs opened instantaneously for all tests.					

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

4.4.2.7	TABLE: MAINS transformer			Form A.40	P
4.4.2.7.3	Overload tests (for MAINS transformers)				P
14.6	MAINS transformers tested outside equipment				P
Type .....	See Separate Construction Data Form and Attachment 3				—
Manufacturer .....	See Separate Construction Data Form				—
Test in equipment					N/A
Test on bench					P
Test repeated inside equipment (see 14.6)					N/A
Optional – Insulation class (IEC 60085) of the lowest RATED winding .....					—
Winding identification		24V (1-2)	28Vct (3-5)	28Vct (6-8)	10V (9-10)
Type of Protector for winding (NOTE 1)		SF / 0.25A	SF / 0.75A	SF / 1.6A	SF / 5A
Elapsed time		1 hour	1 hour	1 hour	1 hour
Current, A	primary	0.66	0.67	0.70	0.73
	secondary	0.37	1.1	2.2	7.5
Winding temperature, °C (see NOTE 2)	primary	55 (TC)	54 (TC)	50 (TC)	46 (TC)
	secondary	60 (TC)	62 (TC)	60 (TC)	55 (TC)
Tissue paper / cheesecloth OK? (Pass / Fail)		Pass	Pass	Pass	Pass
Voltage tests (SEE NOTE 3)					
primary to secondary	1690 V rms	NB	NB	NB	NB
primary to core	_____ V _____	--	--	--	--
secondary to secondary	_____ V _____	--	--	--	--
secondary to core	_____ V _____	--	--	--	--
Verdict		Pass	Pass	Pass	Pass
NOTE 1:	Primary fuse	- PF / ( )	A		
	Secondary fuse	- SF / ( )	A		
	Overtemperature protection	- OP / ( )	°C		
	Impedance protection	- Z			
NOTE 2:	Indicate method of measurement	TC = with thermocouple			
		R = resistance method			
	If resistance method is used, record resistance in cold and warm condition in Form A.26B!				
NOTE 3:	Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use NB = no breakdown or B = breakdown				
Supplementary information:					

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IEC 61010-1 and/or EN 61010-1			
Clause	Requirement – Test	Result – Remark	Verdict

<b>14.8</b>	<b>TABLE: Transient overvoltage limiting devices</b>								<b>Form A.41</b>	<b>N/A</b>
Component / Designation	Overvoltage Category	MAINS voltage V rms	Test voltage V	t <sub>m</sub> °C	t <sub>c</sub> °C	t <sub>max</sub> °C	Rupture Yes / No	Circuit breaker tripped	Verdict	Comments
Test room ambient temperature ....:			°C							
NOTE - t <sub>m</sub> = measured temperature t <sub>c</sub> = t <sub>m</sub> corrected (t <sub>m</sub> -t <sub>a</sub> + 40 °C or max. RATED ambient) t <sub>max</sub> = maximum permitted temperature Conformity is checked by applying 5 positive and 5 negative impulses with the applicable impulse withstand voltage, spaced up to 1 min apart, from a hybrid impulse generator (see IEC 61180-1).										
Supplementary information:										

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<b>Annex H</b>	<b>TABLE: Qualification of conformal coating for protection against pollution</b>								<b>Form A.42</b>	<b>N/A</b>	
Technical properties											
Manufacturer .....										—	
Type.....										—	
Meet requirements of ANSI / UL 746E .....										[yes / no]	
Manufacturer declaration of coating material :										[yes / no]	
Operating temperature of coating.....										[ ] °C	
Comparative tracking index (CTI).....										[ ]	
Insulation resistance.....										[ ] Ω	
Dielectric strength.....										[ ] V	
UV resistance (if required).....										[yes / no]	
Flammability rating .....											
Preparation of the test specimens conducted:										[yes / no]	
Item	Test conditioning	Parameter	Td	Samples						Verdict	Comments
				h	1	2	3	4	5		
1	Scratch resistance										

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Clause	Requirement – Test						Result – Remark				Verdict
	Visual inspection										
2	Cold		24								
3	Dry heat		48								
4	Rapid temp. change										
5	Damp heat		24								
6	Adhesion of coating	5 N									
	Visual inspection										
7	Humidity		48								
8	Insulation resistance	$\geq 100 \Omega$									
	Visual inspection										
Supplementary information:											

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Clause	Requirement – Test	Result – Remark	Verdict

<b>TABLE: Additional or special tests conducted</b>			<b>Form A.43</b>	<b>N/A</b>
Clause and name of test	Test type and condition	Observed results	—	
Supplementary information:				

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TEST EQUIPMENT LIST ITEM: \_\_\_\_\_





**ATTACHMENT 1**

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## National Differences

**Summary of Group & National Differences**

List of Countries:	Group Differences	National Differences	List of Countries:	Group Differences	National Differences
AT=Austria	--	YES <sup>1)</sup>	IL=Israel	--	--
BE=Belgium	--	--	IS=Iceland	--	--
BG=Bulgaria	--	--	IT=Italy	--	--
CA=Canada	--	YES <sup>2)</sup>	JP=Japan	--	YES <sup>6)</sup>
CH=Switzerland	--	YES <sup>3)</sup>	KR=Korea, Republic	--	--
CY=Cyprus	--	--	LT=Lithuania	--	--
CZ=Czech Republic	--	--	LU=Luxembourg	--	--
DK=Denmark	--	YES <sup>4)</sup>	LV=Latvia	--	--
DE=Germany	--	--	MT=Malta	--	--
EE=Estonia	--	--	NL=The Netherlands	--	--
ES=Spain	--	--	NO=Norway	--	--
FI=Finland	--	--	PL=Poland	--	--
FR=France	--	--	PT=Portugal	--	--
GB=United Kingdom	--	YES <sup>5)</sup>	RO=Romania	--	--
GR=Greece	--	--	SE=Sweden	--	YES <sup>7)</sup>
HU=Hungary	--	--	SK=Slovakia	--	--
HR=Croatia	--	--	SI=Slovenia	--	YES <sup>8)</sup>
IE=Ireland	--	--	US=United States	--	YES <sup>9)</sup>

## Notes:

- 1) Shown on IECEE website as national difference. Austria national standard (EN 61010-1:2010).
- 2) National differences from latest attachment to test report. Canada national standard (CSA C22.2 No. 61010-1:2012).
- 3) National differences from latest attachment to test report, and regulatory requirements of Switzerland.
- 4) Shown on IECEE website as national difference. Denmark national standard (DS/EN 61010-1:2010).
- 5) Shown on IECEE website as national difference. United Kingdom national standard (BS/EN 61010-1:2010).
- 6) National differences from attachment to test report. Japan national standard (IEC 61010-1:2010).
- 7) Shown on IECEE website as national difference. Sweden national standard (SS-EN 61010-1:2010).
- 8) Shown on IECEE website as national difference. Slovenia national standard (SIST EN 61010-1).
- 9) National differences from attachment to test report. United States of America national standard (UL 61010-1:2012).

National Differences

IEC 61010-1 and/or EN 61010-1

**ATTACHMENT TO TEST REPORT IEC61010-1  
CANADA / US NATIONAL DIFFERENCES**

(Safety requirements for electrical equipment for measurement, control, and laboratory use  
Part 1: General requirements)

**Differences according to** .....: National standard CSA C22.2 No. 61010-1-12 / UL 61010-1:2012

**Attachment Form No.** .....: CA\_ND\_IEC61010\_1I

**Attachment Originator**.....: TÜV SÜD Product Service GmbH (Modified by TRNA only to include additional national requirements and references)

**Master Attachment** .....: Date (2012-08)

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CA / US	National Differences		
	<p>NATIONAL DIFFERENCES of IEC Publication 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1:</p> <p><b>DR</b> – These are National Differences based on the <b>national regulatory requirements</b>.</p> <p><b>D1</b> – These are National Differences which are based on <b>basic safety principles and requirements</b>, elimination of which would compromise safety for consumers and users of products.</p> <p><b>D2</b> – These are national differences from IEC requirements based on existing <b>safety practices</b>. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.</p> <p><b>DC</b> – These are National Differences based on the <b>component standards</b> and will not be deleted until a particular component standard is harmonized with the IEC component standard.</p> <p><b>DE</b> – These are National Differences based on <b>editorial comments or corrections</b>.</p>		—
1 DV [DE]	Add the following to the end of the Foreword:  The numbering system in the standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.	Informative.	P
1.1.4 DV [DR]	This standard applies to equipment to be employed in accordance with ANSI/NFPA 70, National Electrical Code® (NEC); designed to be installed in accordance with the Canadian Electrical Code (CEC), Part I, CSA C22.1, and CSA C22.2 No. 0; or designed to comply with both the NEC and CEC.		P

## National Differences

## IEC 61010-1 and/or EN 61010-1

<p>2 DV [DC]</p>	<p>Addition of the following:</p> <p>ANSI/NFPA 70, National Electrical Code</p> <p>ANSI/UL 94, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances</p> <p>ANSI/UL 498, Attachment Plugs and Receptacles</p> <p>ANSI/UL 746C, Polymeric Materials – Use in Electrical Equipment Evaluations</p> <p>ANSI/UL 817, Cord Sets and Power Supply Cords</p> <p>ANSI/UL 1310, Class 2 Power Units</p> <p>ANSI/UL 60950-1, Information Technology Equipment - Safety - Part 1: General Requirements</p> <p>CSA C22.1, Canadian Electrical Code, Part I</p> <p>CSA C22.2 No. 0, General Requirements - Canadian Electrical Code, Part II</p> <p>CAN/CSA C22.2 No. 0.17, Evaluation of Properties of Polymeric Materials</p> <p>CAN/CSA C22.2 No. 0.4, Bonding of Electrical Equipment</p> <p>CSA C22.2 No. 21, Cord Sets and Power Supply Cords</p> <p>CSA C22.2 No. 42, General Use Receptacles, Attachment Plugs, and Similar Wiring Devices</p> <p>CSA C22.2 No. 182.1, Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type</p> <p>CSA C22.2 No. 182.2, Industrial Locking Type, Special Use Attachment Plugs, Receptacles, and Connectors</p> <p>CSA C22.2 No. 182.3, Special Use Attachment Plugs, Receptacles, and Connectors</p> <p>CAN/CSA C22.2 No. 223, Power Supplies With Extra-Low Voltage Class 2 Outputs</p> <p>CAN/CSA C22.2 No. 60950-1, Information Technology Equipment - Safety - Part 1: General Requirements</p>	<p>Added and considered</p>	<p>P</p>
<p>6.3.1 a) DV [D2]</p>	<p>Voltage levels are 30 V r.m.s. and 42,4 V peak or 60 V d.c. For equipment RATED for use in WET LOCATIONS, the voltage levels are 16 V r.m.s. and 22,6 V peak or 35 V d.c.</p>	<p>Added and considered</p>	<p>P</p>



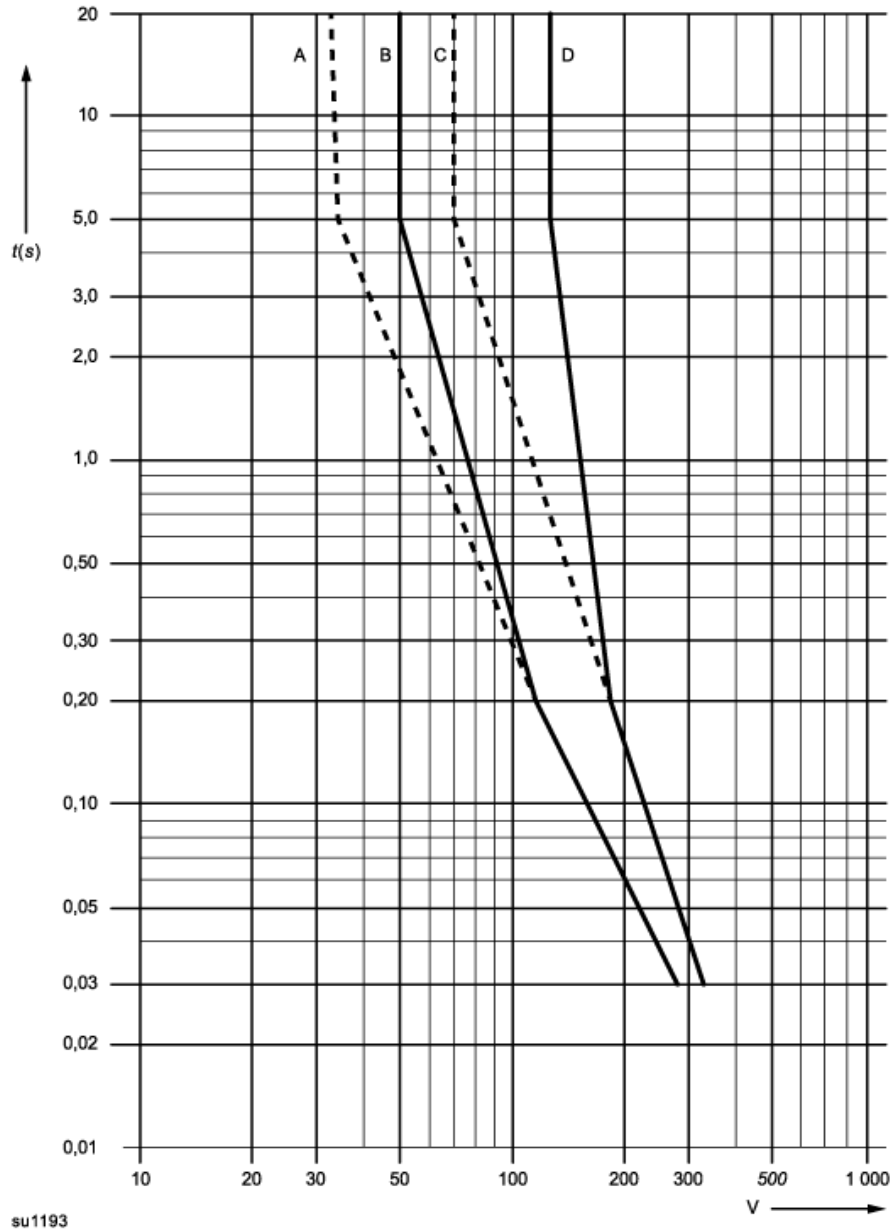
National Differences

IEC 61010-1 and/or EN 61010-1
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6.3.2 b) DV [D2]	Voltage levels are 50 V r.m.s. and 70 V peak or 120 V d.c. For equipment RATED for use in WET LOCATIONS, the voltage levels are 33 V r.m.s. and 46,7 V peak or 70 V d.c.	Added and considered	P
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Figure 2DV [D2]

Figure 2DV - Maximum duration of short-term ACCESSIBLE voltages in SINGLE FAULT CONDITION (see 6.3.2 a))



Key	
A a.c. voltage level in WET LOCATIONS	C d.c. voltage level in WET LOCATIONS
B a.c. voltage level in dry locations	D d.c. voltage level in dry locations

## National Differences

## IEC 61010-1 and/or EN 61010-1

6.5.2.4 DV [D2]	The impedance between the PROTECTIVE CONDUCTOR TERMINAL and each ACCESSIBLE part for which PROTECTIVE BONDING is specified shall not cause a potential drop of more than 4 V. Metal that is part of the protective bond shall not melt, and heating and burning shall not occur to the extent that could cause a fire HAZARD.  <i>Conformity is checked by inspection and by applying an a.c. test current for the duration specified in Table 6.5.2.4DV.1 and then measuring the voltage drop. See 4.4.4.3 for test conditions regarding the spread of fire.</i>	Considered	P
	Equipment contains all pole overcurrent protection of mains supply; wiring cannot become in contact with accessible parts, test current need not more than twice the rating of overcurrent protection	Single pole circuit breaker only	N/A
	Test current is twice the rating but not less than 40 A	40A applied	P
	Test current more than 500 A, see CAN/CSA-C22.2 No. 0.4		N/A
Table 6.5.2.4DV.1 [D2]	Duration of protective bonding test		—
	<b>Value of building MAINS supply overcurrent protection means (A)</b>	<b>Time (Min)</b>	
	<b>0 – 30</b>	<b>2</b>	
	<b>31 – 60</b>	<b>4</b>	
	<b>61 – 100</b>	<b>6</b>	
	<b>101 – 200</b>	<b>8</b>	
	<b>201 and over</b>	<b>10</b>	
6.5.2.5 DV [D2]	Modification: Permanently connected equipment only Replace “1 min” with “the duration specified in Table 6.5.2.4DV.1” and “10 V” with “4 V”	Not permanently connected	N/A
6.10.1 DV.1 [D2]	Delete the reference to the requirements of IEC 60227 or IEC 60245 for MAINS supply cords in the second paragraph.	Informative.	P
6.10.1 DV.2 [D2]	Green covered conductors (with or without yellow stripes) shall be used only for connection to PROTECTIVE CONDUCTOR TERMINALS.	Considered	P
6.10.1 DV.3 [D2]	Delete the reference to the requirements of IEC 60799 for detachable MAINS supply cords in the sixth paragraph.	Informative.	N/A
6.10.1 DV.4 [D2]	Requirements for MAINS cords or cord sets are contained in ANSI/UL 817 and CSA C22.2 No. 21.	Considered	P

## National Differences

## IEC 61010-1 and/or EN 61010-1

	<p>Requirements for general use receptacles, attachment plugs, and similar wiring devices are contained in ANSI/UL 498 and CSA C22.2 No. 42, CSA C22.2 No. 182.1, CSA C22.2 No. 182.2, and CSA C22.2 No. 182.3.</p> <p>NOTE This subclause only applies to cords connected to the external fixed MAINS socket-outlet and to external interconnecting mains cords. This subclause does not apply to cords fully contained within the equipment enclosure.</p>	Considered	P
6.10.3 DV [D2]	Plugs of MAINS cords are in accordance with ANSI/UL 498 and CSA C22.2 No. 42, CSA C22.2 No. 182.1, CSA C22.2 No. 182.2, and CSA C22.2 No. 182.3.	Considered	P
6.10.4 DV.1 [D2]	<p>PERMANENTLY CONNECTED EQUIPMENT</p> <p>Equipment intended for permanent connection to the MAINS shall meet the requirements of Annex DVD.</p> <p><i>Conformity is checked as specified in Annex DVD.</i></p>	Not permanently connected	—
6.11 DV [D2]	<p>Modification of the title:</p> <p>Add "and maintaining polarity" to the end of the subclause title.</p>		—
6.11.5 DV.1 [D2]	<p>Any line-connected single-pole switch, any center contact of a lampholder, and any automatic control with a marked off position shall be connected to a TERMINAL or lead intended for connection to the ungrounded conductor of the supply circuit.</p> <p>NOTE An "ungrounded" supply conductor is one that is not connected to protective earth at any point in the building installation.</p>	Single pole circuit breaker in line conductor	P
9.3.2 DV.1 [D2]	Flame RATINGS of ANSI/UL 94 V-0, V-1, and V-2 are equivalent to the flammability classifications of IEC 60695-11-10	Informative.	P
9.3.2 DV.2 [D2]	<p>Addition of the following to the end of Note 2:</p> <p>Flammability RATINGS FT-1 of CSA C22.2 No. 0.3 and VW-1 of ANSI/UL 1581 are also considered acceptable for insulated wire and cable.</p>	Informative.	P
9.6.1 ADV [D2]	Overcurrent protective devices		P
9.6.1 ADV.1 [D2]	<p>A single-pole circuit breaker used as an overcurrent protective device shall be connected in the ungrounded supply conductor.</p> <p>NOTE An "ungrounded" supply conductor is one that is not connected to protective earth at any point in the building installation. A "grounded" supply conductor is one that is connected to protective earth at some point in the building installation. It is sometimes called the "neutral conductor".</p>	See 6.11.5 above	P

## National Differences

## IEC 61010-1 and/or EN 61010-1

9.6.1 ADV.2 [D2]	A multiple-pole circuit breaker used as an overcurrent protective device or devices shall be so constructed as to interrupt all of the neutral (grounded) and ungrounded conductors of the MAINS supply simultaneously.	See above	N/A
9.6.1 ADV.3 [D2]	A single fuse used as an overcurrent protective device shall be connected in the ungrounded supply conductor.	Not used	N/A
9.6.1 ADV.4 [D2]	Where fuses are used as overcurrent protective devices in both the neutral (grounded) and ungrounded supply conductors, the fuseholders shall be mounted adjacent to each other.	Single pole circuit breaker in line conductor	N/A
	Fuses of same ratings and characteristics		N/A
9.6.1 ADV.5 [D2]	The screw shell of a plug fuseholder and the ACCESSIBLE contact of an extractor fuseholder connected to the ungrounded supply conductor shall be connected towards the load.	See above	N/A
	The ACCESSIBLE contact or screw shell of fuseholders connected in the neutral (grounded) conductor shall be located towards the grounded supply line.		N/A
11.7 DV [D2]	Annex G is normative		—
11.7.1 DV.1 [D2]	Laboratory equipment and testing and measurement equipment having both of the following characteristics shall meet the requirements of 11.7.2 and G.5:		—
	- a product of pressure and volume greater than 200 kPa·l, - a pressure greater than 50 kPa.	Not such an equipment	N/A
11.7.1 DV.2 [D2]	Laboratory equipment and testing and measurement equipment that do not have those characteristics shall meet the requirements of 11.7.3 and 11.7.4, as applicable.	See above	N/A
11.7.1 DV.3 [D2]	Other types of equipment shall meet the requirements of Annex G, as applicable.	See above	N/A
11.7.1 DV.4 [D2]	<i>Conformity is checked as specified in 11.7.2 to 11.7.4 and Annex G.</i>		N/A
11.7.2 DV [D2]	Modification by replacing the note with the following note:  NOTE National authorities may allow safety to be established by calculation, for example according to the ASME Boiler and Pressure Vessel Code.		—

## National Differences

## IEC 61010-1 and/or EN 61010-1

12.1 DV1 [D2]	Modification by adding a note referencing USA and Canadian radiation regulations:  NOTE 1A In the USA, x-ray equipment is within the scope of 21 CFR 1020 and laser equipment is within the scope of 21 CFR 1040. In Canada, both are within the scope of the Canadian Radiation Emitting Devices Act.		—
12.3 DV [DV2]	Add a new note:  NOTE 2A The ACIGH UV Guidelines, UL 746C, and CSA C22.2 No. 0.17 provide useful guidance to the RISK assessment.		—
14.1 DV [DV2]	Where safety is involved, components comply with applicable safety requirements specified in relevant ANSI, CAN, CSA, IEC, ISO, or UL standards, as appropriate.	Considered	P
14.7 DV [D2]	Addition of the following to the end of the first paragraph:  A flammability RATING of ANSI/UL 94 V-1 or CAN/CSA C22.2 No. 0.17 is considered equivalent to the same classification of IEC 60695-11-10.	Considered	P
14.9 DV.1 [D2]	Enclosures intended for outdoor use	Not such an equipment	N/A
	Nonmetallic enclosures intended for outdoor use shall meet the UV resistance requirements of ANSI/UL 746C or of CSA C22.2 No. 0.17, or both as appropriate.  NOTE ANSI/UL 746C, clause 25, requires a 1 000 hour UV/water exposure preconditioning using a xenon-arc or alternatively a 720 hour UV/water exposure preconditioning using twin carbon arcs. CSA C22.2 No. 0.17, subclause 5.9, permits only the 1 000 hour UV/water exposure preconditioning.	See above	N/A
14.10 DV.1 [D2]	Conductive coatings	Not used	N/A
14.10DV.1.1 [D2]	The bond of a conductive (metallic) coating applied to a polymeric part shall be evaluated.	See above	N/A
14.10DV.1.2 [D2]	<i>Conformity is checked by:</i>		N/A
	a) Evaluating the bond in accordance with the requirements for "Adhesives" in ANSI/UL 746C and/or CSA C22.2 No. 0.17, or		N/A
	b) Evaluating the product to determine that peeling or flaking of the coating would not reduce spacings or bridge live parts so as to introduce a risk of fire or electric shock.		N/A
14.10 DV.2.1 [D2]	If peeling of the conductive shield or tape could introduce a RISK of fire or electric shock, the bond between a conductive shield or tape and any other surface shall be investigated.		N/A

## National Differences

## IEC 61010-1 and/or EN 61010-1

14.10 DV.2.2 [D2]	<i>Conformity is checked by inspection.</i>		N/A
14.11 DV.1 [D2]	Direct plug-in transformer units are subject to additional requirements found in ANSI/UL 1310, CAN/CSA C22.2 No. 223, or in both standards.	Not used	N/A
Annex GDV [D2]	Modification by replacing "informative" with "normative" in the heading of Annex G, and add the following text:  See 11.7.1DV for cases in which Annex G applies.		—
Annex DVA [D2]	Addition of a new annex DVA as follows:  The following is a matrix that provides a cross-reference between CSA, UL, and IEC standards for components. This cross-reference is not meant to imply that the standards are equivalent. The CSA, UL, and IEC standards listed are used for evaluation of components and features of products covered by this standard. Components need only comply with the applicable component standard acceptable in the country where the product is to be used. These standards are considered to refer to the latest edition and all revisions published to that edition.		—

## National Differences

## IEC 61010-1 and/or EN 61010-1

Component	UL Standard	CSA Standard (C22.2)	IEC Standard
Enclosures for electrical equipment	50	No. 94.1 , No. 94.2	60529
Capacitors	810		60252
Capacitors, EMI		60384-14	60384-14
Circuit breakers <sup>1</sup>	489	No. 5	60947 Pt 2
Conformal coatings	746E		
Double insulation systems	2097	No. 0.1	
Flexible cords and cables	62	No. 21	60227-5
Fuse holders	512	No. 39	257
Fuses, low-voltage	248 Series	No. 248 Series	60127 Series
Lamp holders	496	No. 43	60238
Marking and labeling systems	969	No. 0.15	
Motors	1004 series	No. 100	60034-1
Motors, impedance protected	1004-2	No. 77	
Overheating protection for motors, thermal	2111	No. 235	60730 Pt 2-2
Polymeric materials - fabricated parts	746D	No. 0.17	
Polymeric materials - long-term property	746B	No. 0.17	60216
Polymeric materials - short-term property	746A	No. 0.17	60216
Power supplies	1012, 1310	No. 107.1	
Power supplies (ITE)	60950-1	No. 60950-1	60950-1
Printed wiring boards	796	DIR	
Supplementary protectors used in electrical equipment <sup>1</sup>	1077		
Switches, clock-operated <sup>1</sup>	917	No. 177	
Switches, enclosed <sup>1</sup>	98	No. 4	61020
Switches, snap, general use <sup>1</sup>	20	No. 111	61020 Pt 2
Switches, special use <sup>1</sup>	1054	No. 55	61058
Systems of insulating material	1446		60085
Tapes, insulating	510	No. 197	60454
Temperature indicating and regulating equipment	873	No. 24	
Terminal blocks	1059	No. 158	60947 Pt 7-1
Terminals, quick connect	310	No. 153	60760
Tests for sharpness of edges on equipment	1439		
Transformers, specialty	506	No. 66.1, 66.2	60742
Tubing, extruded insulating	224	No. 198.1	
Wire connectors and soldering lugs	486A	No. 65	60998 series
Wires and cables, thermoset insulated	44		60245
Wires and cables, thermoplastic insulated	83	No. 75	60227
<sup>1</sup> Can be used as a MAINS disconnect device			



National Differences

IEC 61010-1 and/or EN 61010-1

<p>Annex DVB [D2]</p>	<p>Addition of a new annex DVB as follows:</p> <table border="1"> <thead> <tr> <th data-bbox="313 344 483 373">Subclause</th> <th data-bbox="483 344 1318 373">Change</th> </tr> </thead> <tbody> <tr> <td data-bbox="313 373 483 403">Foreword</td> <td data-bbox="483 373 1318 403">Describe the numbering system</td> </tr> <tr> <td data-bbox="313 403 483 432">1.1.4DV</td> <td data-bbox="483 403 1318 432">Added reference to National Electrical Codes</td> </tr> <tr> <td data-bbox="313 432 483 462">2</td> <td data-bbox="483 432 1318 462">Added applicable North American standards</td> </tr> <tr> <td data-bbox="313 462 483 491">6.3.1 a)</td> <td data-bbox="483 462 1318 491">Revised hazardous voltage levels to IEC 61010-1 Edition 1 values</td> </tr> <tr> <td data-bbox="313 491 483 520">6.3.2 a)</td> <td data-bbox="483 491 1318 520">Revised hazardous voltage levels to IEC 61010-1 Edition 1 values</td> </tr> <tr> <td data-bbox="313 520 483 550">6.3.2</td> <td data-bbox="483 520 1318 550">Replace Figure 2</td> </tr> <tr> <td data-bbox="313 550 483 621">6.5.2.4</td> <td data-bbox="483 550 1318 621">Added Canadian requirement for bonding voltage drop for cord-and-plug connected equipment</td> </tr> <tr> <td data-bbox="313 621 483 693">6.5.2.5</td> <td data-bbox="483 621 1318 693">Added Canadian requirement for bonding voltage drop for permanently-connected equipment</td> </tr> <tr> <td data-bbox="313 693 483 743">6.10.1</td> <td data-bbox="483 693 1318 743">Added alternate requirements for mains cords, mains connectors, and protective conductors</td> </tr> <tr> <td data-bbox="313 743 483 772">6.10.3</td> <td data-bbox="483 743 1318 772">Added alternate requirements for mains connectors</td> </tr> <tr> <td data-bbox="313 772 483 802">6.10.4DV</td> <td data-bbox="483 772 1318 802">Added requirements for permanent connection to mains</td> </tr> <tr> <td data-bbox="313 802 483 831">6.11</td> <td data-bbox="483 802 1318 831">Amended subclause title to address polarity of mains connections</td> </tr> <tr> <td data-bbox="313 831 483 861">6.11.5DV</td> <td data-bbox="483 831 1318 861">Added requirement for polarity of mains connections</td> </tr> <tr> <td data-bbox="313 861 483 890">9.3.2</td> <td data-bbox="483 861 1318 890">Added alternate flame rating designations</td> </tr> <tr> <td data-bbox="313 890 483 919">9.6.1</td> <td data-bbox="483 890 1318 919">Added requirement for connections to overcurrent device</td> </tr> <tr> <td data-bbox="313 919 483 949">11.7.1</td> <td data-bbox="483 919 1318 949">Added requirements making Annex G normative for some equipment</td> </tr> <tr> <td data-bbox="313 949 483 1020">11.7.2</td> <td data-bbox="483 949 1318 1020">Changed reference from Pressure Equipment Directive to ASME Boiler and Pressure Vessel Code</td> </tr> <tr> <td data-bbox="313 1020 483 1050">12.1</td> <td data-bbox="483 1020 1318 1050">Added references to USA and Canadian radiation regulations</td> </tr> <tr> <td data-bbox="313 1050 483 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1281 483 1310">Annex G</td> <td data-bbox="483 1281 1318 1310">Annex G is normative in some cases</td> </tr> <tr> <td data-bbox="313 1310 483 1339">Annex DVA</td> <td data-bbox="483 1310 1318 1339">Added list of North American component standards</td> </tr> <tr> <td data-bbox="313 1339 483 1369">Annex DVB</td> <td data-bbox="483 1339 1318 1369">List of revised subclauses</td> </tr> <tr> <td data-bbox="313 1369 483 1398">Annex DVC</td> <td data-bbox="483 1369 1318 1398">Added North American UV radiation limits</td> </tr> <tr> <td data-bbox="313 1398 483 1428">Annex DVD</td> <td data-bbox="483 1398 1318 1428">Added requirements for permanently connected equipment</td> </tr> <tr> <td data-bbox="313 1428 483 1457">Bibliography</td> <td data-bbox="483 1428 1318 1457">Added references to North American bibliographic entries</td> </tr> </tbody> </table>		Subclause	Change	Foreword	Describe the numbering system	1.1.4DV	Added reference to National Electrical Codes	2	Added applicable North American standards	6.3.1 a)	Revised hazardous voltage levels to IEC 61010-1 Edition 1 values	6.3.2 a)	Revised hazardous voltage levels to IEC 61010-1 Edition 1 values	6.3.2	Replace Figure 2	6.5.2.4	Added Canadian requirement for bonding voltage drop for cord-and-plug connected equipment	6.5.2.5	Added Canadian requirement for bonding voltage drop for permanently-connected equipment	6.10.1	Added alternate requirements for mains cords, mains connectors, and protective conductors	6.10.3	Added alternate requirements for mains connectors	6.10.4DV	Added requirements for permanent connection to mains	6.11	Amended subclause title to address polarity of mains connections	6.11.5DV	Added requirement for polarity of mains connections	9.3.2	Added alternate flame rating designations	9.6.1	Added requirement for connections to overcurrent device	11.7.1	Added requirements making Annex G normative for some equipment	11.7.2	Changed reference from Pressure Equipment Directive to ASME Boiler and Pressure Vessel Code	12.1	Added references to USA and Canadian radiation regulations	12.3	Added a note pertaining to UV evaluation of nonmetallic parts	14.1	Added requirements to comply with North American or IEC standards where safety is involved, and added a note that component standards are identified in Annex DVA	14.7	Added alternate flame rating designation	14.9DV	Added requirement for outdoor-use enclosure resistance to UV	14.10DV	Added requirements for EMC coatings, shield, and tape	14.11DV	Added requirements for direct plug-in transformers	Annex G	Annex G is normative in some cases	Annex DVA	Added list of North American component standards	Annex DVB	List of revised subclauses	Annex DVC	Added North American UV radiation limits	Annex DVD	Added requirements for permanently connected equipment	Bibliography	Added references to North American bibliographic entries	<p>—</p>
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6.10.3	Added alternate requirements for mains connectors																																																																
6.10.4DV	Added requirements for permanent connection to mains																																																																
6.11	Amended subclause title to address polarity of mains connections																																																																
6.11.5DV	Added requirement for polarity of mains connections																																																																
9.3.2	Added alternate flame rating designations																																																																
9.6.1	Added requirement for connections to overcurrent device																																																																
11.7.1	Added requirements making Annex G normative for some equipment																																																																
11.7.2	Changed reference from Pressure Equipment Directive to ASME Boiler and Pressure Vessel Code																																																																
12.1	Added references to USA and Canadian radiation regulations																																																																
12.3	Added a note pertaining to UV evaluation of nonmetallic parts																																																																
14.1	Added requirements to comply with North American or IEC standards where safety is involved, and added a note that component standards are identified in Annex DVA																																																																
14.7	Added alternate flame rating designation																																																																
14.9DV	Added requirement for outdoor-use enclosure resistance to UV																																																																
14.10DV	Added requirements for EMC coatings, shield, and tape																																																																
14.11DV	Added requirements for direct plug-in transformers																																																																
Annex G	Annex G is normative in some cases																																																																
Annex DVA	Added list of North American component standards																																																																
Annex DVB	List of revised subclauses																																																																
Annex DVC	Added North American UV radiation limits																																																																
Annex DVD	Added requirements for permanently connected equipment																																																																
Bibliography	Added references to North American bibliographic entries																																																																
<p>DVC.1 [D2]</p>	<p>General</p>		<p>P</p>																																																														
<p>DVC.1.1 [D2]</p>	<p>These threshold limit values (TLVs) refer to ultraviolet (UV) radiation in the spectral region between 180 and 400 nm and represent conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse health effects.</p>		<p>—</p>																																																														

## National Differences

## IEC 61010-1 and/or EN 61010-1

DVC.1.2 [D2]	These values for exposure of the eye or the skin apply to UV radiation from arc, gas, and vapor discharges, fluorescent and incandescent sources, and solar radiation, but they do not apply to UV lasers (see the TLV for lasers). These values do not apply to UV radiation exposure of photosensitive individuals or of individuals concomitantly exposed to photosensitizing agents. These exposures to the eye do not apply to aphakics. (See light and near-infrared TLV for radiation.) These values should be used as guides in the control of exposure to continuous sources where the duration of exposure is not less than 0,1 s. Likewise, these values should not be regarded as a fine line between safe and dangerous levels.		—
DVC.2.1 [D2]	The TLVs for occupational exposure to UV radiation incident upon skin or eye where irradiance values are known and exposure time is controlled are as follows:		—
	a) UV-A (315 to 400 nm) radiation to the unprotected eye:	No such radiation	N/A
	- For exposure times less than 1 000 seconds, the total energy should not exceed 1 J/cm <sup>2</sup> (1 000 mJ/cm <sup>2</sup> ).		N/A
	- For exposure times greater than 1 000 seconds, the average power level should not exceed 1 mW/cm <sup>2</sup> ; and no 1 000 second time period should present a total energy that exceeds 1 J/cm <sup>2</sup> (1 000 mJ/cm <sup>2</sup> ).		N/A
	b) For monochromatic sources, the TLV for exposure to the unprotected skin or eye is shown in Table DVC.2.1.1 (also represented in Figure DVC.2.1.1) and should not be exceeded within an 8-hour period.		N/A

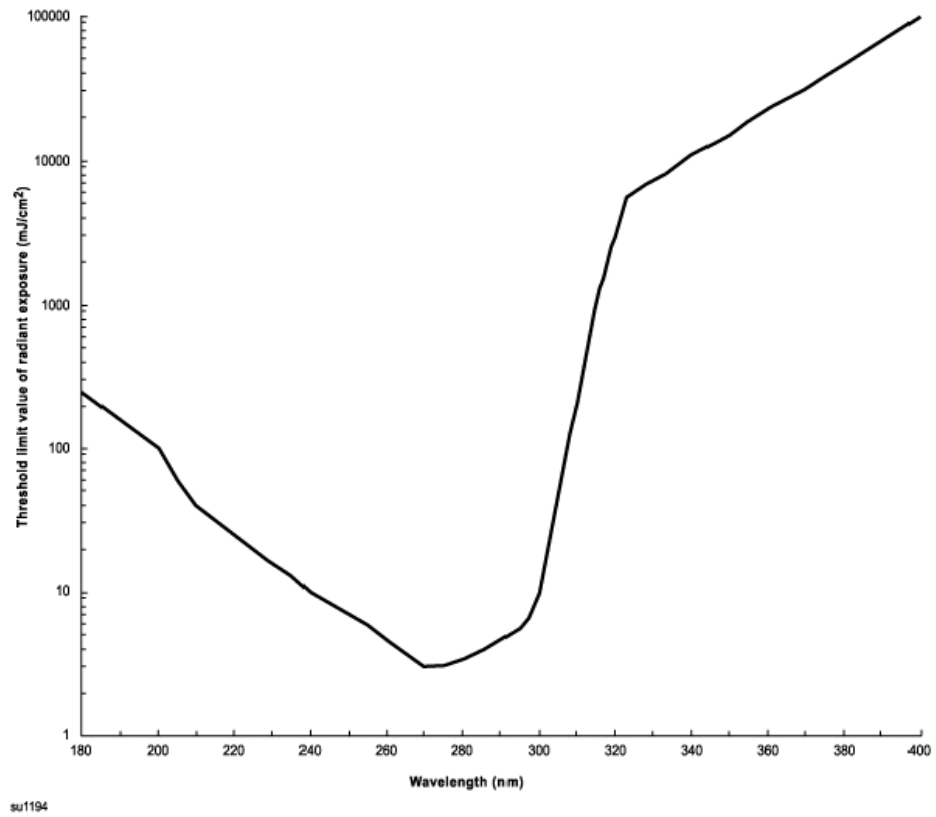
National Differences

IEC 61010-1 and/or EN 61010-1

Figure DVC.2.1.1  
[D2]

Figure DVC.2.1.1 – Threshold limit values (TLV) for ultraviolet radiation

N/A



## National Differences

## IEC 61010-1 and/or EN 61010-1

Table  
DVC.2.1.1  
[D2]

Table DVC.2.1.1 – Ultraviolet radiation exposure TLV and spectral weighting function

N/A

Wavelength (nm)	TLV (mJ/cm <sup>2</sup> )	Relative spectral effectiveness, S <sub>λ</sub>
180	250	0,012
190	160	0,019
200	100	0,030
205	59	0,051
210	40	0,075
215	32	0,095
220	25	0,120
225	20	0,150
230	16	0,190
235	13	0,240
240	10	0,300
245	8,3	0,360
250	7,0	0,430
254 †	6,0	0,500
255	5,8	0,520
260	4,6	0,650
265	3,7	0,810
270	3,0	1,000
275	3,1	0,960
280 †	3,4	0,880
285	3,9	0,770
290	4,7	0,640
295	5,6	0,540
297 †	6,5	0,460
300	10	0,300
303 †	25	0,120
305	50	0,060
308	120	0,026
310	200	0,015
313 †	500	0,006
315	1 000	0,003
316	1 300	0,0024
317	1 500	0,0020
318	1 900	0,0016
319	2 500	0,0012
320	2900	0,0010
322	4 500	0,00067
323	5 600	0,00054
325	6 000	0,00050
328	6 800	0,00044
330	7 300	0,00041
333	8 100	0,00037
335	8 800	0,00034
340	11 000	0,00028
345	13 000	0,00024
350	15 000	0,00020
355	19 000	0,00016
360	23 000	0,00013
365 †	27 000	0,00011
370	32 000	0,000093
375	39 000	0,000077
380	47 000	0,000064
385	57 000	0,000053
390	68 000	0,000044
395	83 000	0,000036
400	100 000	0,000030

† Emission lines of a mercury discharge spectrum.

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IEC 61010-1 and/or EN 61010-1

	<p>c) For broad-spectrum or multi-peak sources, the TLV for exposure of the unprotected skin or eye should be calculated based on an effective weighting formula:</p> $E_{\text{eff}} = \sum (E_{\lambda} S_{\lambda} \Delta\lambda)$ <p>Where</p> <p><math>E_{\text{eff}}</math> is the effective irradiance relative to a monochromatic source at 270nm in <math>\text{mW}/\text{cm}^2</math> [<math>\text{mJ}/(\text{s}\cdot\text{cm}^2)</math>];</p> <p><math>E_{\lambda}</math> is the spectral irradiance in <math>\text{W}/(\text{cm}^2\cdot\text{nm})</math>;</p> <p><math>S_{\lambda}</math> is the relative spectral effectiveness (unitless);</p> <p><math>\Delta\lambda</math> is the band width in nm.</p> <p>The result of the calculation, <math>E_{\text{eff}}</math>, should then be either applied to Table DVC.2.1.2 or should be used in the following calculation:</p> <p>Exposure time TLV = <math>3 (\text{mJ}/\text{cm}^2)/E_{\text{eff}}</math> (where <math>E_{\text{eff}}</math> is in <math>\text{mW}/\text{cm}^2</math>)</p>	See above	N/A																														
<p>Table DVC.2.1.2 [D2]</p>	<p>Table DVC.2.1.2 – Permissible ultraviolet exposures</p> <table border="1" data-bbox="391 995 1248 1457"> <thead> <tr> <th>Effective irradiance, <math>E_{\text{eff}}</math> (<math>\text{mW}/\text{cm}^2</math>)</th> <th>Duration of exposure per day</th> </tr> </thead> <tbody> <tr><td>0,0001</td><td>8 h</td></tr> <tr><td>0,0002</td><td>4 h</td></tr> <tr><td>0,0004</td><td>2 h</td></tr> <tr><td>0,0008</td><td>1 h</td></tr> <tr><td>0,0017</td><td>30 min</td></tr> <tr><td>0,0033</td><td>15 min</td></tr> <tr><td>0,005</td><td>10 min</td></tr> <tr><td>0,01</td><td>5 min</td></tr> <tr><td>0,05</td><td>1 min</td></tr> <tr><td>0,1</td><td>30 s</td></tr> <tr><td>0,3</td><td>10 s</td></tr> <tr><td>3</td><td>1 s</td></tr> <tr><td>6</td><td>0,5 s</td></tr> <tr><td>30</td><td>0,1 s</td></tr> </tbody> </table>		Effective irradiance, $E_{\text{eff}}$ ( $\text{mW}/\text{cm}^2$ )	Duration of exposure per day	0,0001	8 h	0,0002	4 h	0,0004	2 h	0,0008	1 h	0,0017	30 min	0,0033	15 min	0,005	10 min	0,01	5 min	0,05	1 min	0,1	30 s	0,3	10 s	3	1 s	6	0,5 s	30	0,1 s	N/A
Effective irradiance, $E_{\text{eff}}$ ( $\text{mW}/\text{cm}^2$ )	Duration of exposure per day																																
0,0001	8 h																																
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0,1	30 s																																
0,3	10 s																																
3	1 s																																
6	0,5 s																																
30	0,1 s																																
	<p>d) For most white-light sources and all open arcs, the weighting of spectral irradiance between 200 and 315 nm should suffice to determine the effective irradiance.</p>	See above	N/A																														
	<p>- specialized UV sources designed to emit UV-A radiation would normally require spectral weighting from 315 to 400 nm.</p>		N/A																														
	<p>All of the preceding TLVs for UV energy apply to sources which subtend an angle less than 80°.</p>	See above	N/A																														
	<p>Sources which subtend a greater angle need to be measured only over an angle of 80°.</p>	See above	N/A																														

## National Differences

## IEC 61010-1 and/or EN 61010-1

	NOTE 1 Conditioned (tanned) individuals can tolerate skin exposure in excess of the TLV without erythral effects. However, such conditioning may not protect persons against skin cancer.  NOTE 2 Ozone (O <sub>3</sub> ) is produced in air by sources emitting UV radiation at wavelengths below 250 nm. Refer to the chemical substances TLV for ozone.		N/A
Annex DVD [D2]	Equipment intended for permanent connection	Not such an equipment	N/A
DVD.1.1 [D2]	Equipment intended for permanent connection to the mains shall have provision for connection of a wiring system in accordance with ANSI/NFPA 70, NEC, with CSA C22.1, CEC, Part I, or with both as appropriate, and shall meet the requirements of DVD.2 to DVD.3, as applicable.	See above	N/A
DVD.1.2 [D2]	<i>Conformity is checked by inspection, and as specified in DVD.2 to DVD.3.</i>		N/A
DVD.2 [D2]	Wiring TERMINALS and leads		P
DVD.2.1.1 [D2]	PERMANENTLY CONNECTED EQUIPMENT shall be provided with TERMINALS or leads for the connection of conductors having an ampacity that, in accordance with the National Electrical Code and/or the Canadian Electrical Code, Part I, is acceptable for the equipment.	Not such an equipment	N/A
DVD.2.1.2 [D2]	A TERMINAL or splice compartment shall be complete.	No such compartment	N/A
	The top, all sides, and a complete bottom shall be provided when the equipment is shipped from the factory and shall enclose all field wiring TERMINALS and splices intended to be made in the field. Equipment with an ENCLOSURE that is complete need not be provided with a separate compartment.	Not such an equipment	N/A
DVD.2.1.3 [D2]	The TERMINAL or splice compartment in which mains connections to PERMANENTLY CONNECTED EQUIPMENT are made shall be located so that:	See above	—
	a) Internal wiring and electrical components are not exposed to mechanical damage or strain while connections are being made, and		N/A
	b) These connections may be readily inspected after the equipment is installed as intended.		N/A
DVD.2.1.4 [D2]	<i>Conformity is checked by inspection</i>		N/A
DVD.2.2 [D2]	Wiring TERMINALS		P

## National Differences

## IEC 61010-1 and/or EN 61010-1

DVD.2.2.1 [D2]	Wiring TERMINALS shall provide effective connections, by use of screws, nuts or equally effective devices.	Approved terminal block used	P
DVD.2.2.2 [D2]	Wire binding screws are permitted as follows: a) A No. 6 or M4 screw may be used to connect a 14 AWG (2,1 mm <sup>2</sup> ) or smaller wire. b) A No. 8 or M4.5 screw may be used to connect a 12 AWG (3,3 mm <sup>2</sup> ) or smaller wire. c) A No. 10 or M5 screw may be used to connect a 10 AWG (5,3 mm <sup>2</sup> ) or smaller wire.	See above	—
DVD.2.2.3 [D2]	<i>Conformity is checked by inspection.</i>		P
DVD.2.3.1 [D2]	The free length of a lead inside a wiring compartment shall be at least 150 mm (6 inches).	No field wiring compartment	N/A
DVD.2.3.2 [D2]	<i>Conformity is checked by inspection.</i>	See above	N/A
DVD.2.4 [D2]	TERMINAL and lead identification	Line, Neutral and GND are properly identified by color, terminals are marked	P
DVD.2.4.1 [D2]	TERMINALS and leads shall be identified in a manner that will permit the equipment to be connected as intended by the manufacturer.	See above	P
DVD.2.4.2 [D2]	An identified neutral (grounded) conductor for equipment with a mains-connected polarized convenience receptacle	See above	P
	An identified neutral (grounded) conductor for equipment with a mains-connected polarized lamp socket	No lamp socket	N/A
	NOTE A "grounded" supply conductor is one that is connected to protective earth at some point in the building installation. It is sometimes called the "neutral conductor".	See above	N/A
DVD.2.4.3 [D2]	A wiring TERMINAL that is intended solely for connection of the neutral (grounded) MAINS conductor shall be readily distinguishable from all other TERMINALS.	See DVD.2.4 above	P
	Constructed of, or plated with, metal that is substantially white in color or	Not used	N/A
	shall be clearly identified in some other manner, such as on a wiring diagram permanently attached to the equipment.	Clearly identified, wiring diagram at bottom of the enclosure	P
	Clearly identified in some other manner, such as on a wiring diagram permanently attached to the equipment	See above	P

## National Differences

## IEC 61010-1 and/or EN 61010-1

DVD.2.4.4 [D2]	A lead intended solely for field wiring connection to the neutral (grounded) MAINS conductor shall be readily distinguishable from all other leads by means of it being finished to show a white or gray color.	No field wiring connection	N/A
DVD.2.4.5 [D2]	The protective grounding (earthing) TERMINAL shall be marked in accordance with 5.1.5.2 (b)	PE Ground properly identified	P
	or marked "G," "GR," "GND," "GRD," "GROUND," or "GROUNDING" or	See above	N/A
	provided with a green colored screwhead that is hexagonal, slotted, or both.	See above	N/A
DVD.2.4.6 [D2]	A lead intended for field connection to the protective grounding conductor shall be readily distinguishable from all other leads by being finished to show a green color with or without yellow stripes.	No field wiring connection	N/A
DVD.2.4.7 [D2]	<i>Conformity is checked by inspection.</i>		N/A
DVD.3 [D2]	ENCLOSURE requirements for conduit entry		P
DVD.3.1 [D2]	An ENCLOSURE shall not pull apart or sustain damage such as cracking and breaking, and	Complies, metal enclosure with properly rated strain relief bushing	P
	knockouts shall remain in place when subjected to the pulling, torque, and bending that is likely to occur.	See above, no knock outs	N/A
DVD.3.2 [D2]	ENCLOSURES having sheet metal members	Stamped sheet metal is 1.0mm thick	P
	Uncoated sheet steel enclosure is 0,81 mm thick minimum	See above	P
	Galvanized sheet steel enclosure is 0,86 mm thick minimum	See above	P
	Aluminum sheet enclosure is 1,11 mm thick minimum	Not used	N/A
	Copper or brass sheet enclosure is 1,09 mm thick minimum	Not used	N/A
	NOTE ENCLOSURES complying with ANSI/UL 50 are deemed to comply with DVD.4.1 and DVD.4.2.		—
DVD.3.3 [D2]	An ENCLOSURE made either wholly or in part of insulating material shall have an acceptable bonding means to provide continuity of bonding between all metallic conduits entering the ENCLOSURE.	Not used	N/A
DVD.3.4 [D2]	<i>Conformity is checked by inspection and by performing the applicable tests of DVD.4.</i>		N/A



National Differences

IEC 61010-1 and/or EN 61010-1													
DVD.4 [D2]	Conduit ENCLOSURE entry tests	Complies, metal enclosure with properly rated strain relief bushing	P										
DVD.4.1 [D2]	Conduit pull-out test	See above	P										
DVD.4.1.1 [D2]	The ENCLOSURE shall be suspended by a length of rigid conduit installed in one wall of the ENCLOSURE or mounted as intended in service, and a pulling force of 890 N (200 lb) shall be applied for 5 min to a length of conduit installed in the opposite wall (or wall with conduit entry if ENCLOSURE is mounted rather than suspended).	Complies	P										
DVD.4.2 [D2]	Conduit torque test		P										
DVD.4.2.1 [D2]	The ENCLOSURE shall be securely mounted as intended in service. A torque in accordance with table DVD.4.2.1.1 shall be applied to a length of installed conduit in a direction tending to tighten the connection. The lever arm shall be measured from the center of the conduit.	Complies	P										
Table DVD.4.2.1.1 [D2]	<p style="text-align: center;">Table DVD.4.2.1.1 - Tightening torque for conduit</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Trade size of conduit, in</th> <th style="text-align: center;">Tightening torque, lb-in (N•m)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3/4 and smaller (end-of-line ENCLOSURE) 1</td> <td style="text-align: center;">200 (22,6)</td> </tr> <tr> <td style="text-align: center;">3/4 and smaller</td> <td style="text-align: center;">800 (90,4)</td> </tr> <tr> <td style="text-align: center;">1, 1-1/4, 1-1/2</td> <td style="text-align: center;">1 000 (113)</td> </tr> <tr> <td style="text-align: center;">2 and larger</td> <td style="text-align: center;">1 600 (181)</td> </tr> </tbody> </table> <p>1 An end-of-line ENCLOSURE is an ENCLOSURE that is intended to be connected at the end of a run of conduit and has only one 3/4-in maximum trade size opening for the connection of conduit.</p>		Trade size of conduit, in	Tightening torque, lb-in (N•m)	3/4 and smaller (end-of-line ENCLOSURE) 1	200 (22,6)	3/4 and smaller	800 (90,4)	1, 1-1/4, 1-1/2	1 000 (113)	2 and larger	1 600 (181)	—
Trade size of conduit, in	Tightening torque, lb-in (N•m)												
3/4 and smaller (end-of-line ENCLOSURE) 1	200 (22,6)												
3/4 and smaller	800 (90,4)												
1, 1-1/4, 1-1/2	1 000 (113)												
2 and larger	1 600 (181)												
DVD.4.3 [D2]	Bending		P										
DVD.4.3.1 [D2]	A length of conduit at least 300 mm (1 ft) long of the intended size shall be installed:	Complies	P										
	1) In the center of the largest unreinforced surface, or		P										
	2) In a hub or an opening if provided as part of the ENCLOSURE.	Not such an equipment	N/A										

National Differences

IEC 61010-1 and/or EN 61010-1

<p>DVD.4.3.2 [D2]</p>	<p>The ENCLOSURE shall be securely mounted as intended in service, but positioned so that the installed conduit extends in a horizontal plane. A weight shall be suspended from the end of the conduit to produce the bending moment specified in Table DVD.4.3.2.1. The magnitude of the weight shall be determined from the equation:</p> $W = (M - 0,5 \cdot C \cdot L) / L, \text{ In which}$ <p>W is the weight, in lb, to be hung at the end of the conduit;</p> <p>L is the length of the conduit, in inches, from the wall of the ENCLOSURE to the point at which the weight is suspended;</p> <p>C is the weight of the conduit, in lb; and</p> <p>M is the bending moment required in lb-in.</p> <p>For the SI system of units, the equation is:</p> $W = (0,1 \cdot M - 0,5 \cdot C \cdot L) / L, \text{ In which}$ <p>W and C are measured in kg;</p> <p>M is measured in N•m; and</p> <p>L is measured in m.</p>		<p>P</p>																												
<p>Table DVD.4.3.2.1 [D2]</p>	<p style="text-align: center;">Table DVD.4.3.2.1 - Bending moment for conduit openings</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Normal mounting plane of ENCLOSURE surface(a)</th> <th rowspan="2" style="text-align: center;">Conduit size, in</th> <th colspan="4" style="text-align: center;">Bending moment (b,c) N•m (lb-in)</th> </tr> <tr> <th colspan="2" style="text-align: center;">Metallic conduit</th> <th colspan="2" style="text-align: center;">Nonmetallic conduit</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Horizontal</td> <td style="text-align: center;">All</td> <td style="text-align: center;">34</td> <td style="text-align: center;">(300)</td> <td style="text-align: center;">34</td> <td style="text-align: center;">(300)</td> </tr> <tr> <td style="text-align: center;">Vertical</td> <td style="text-align: center;">1/2 – 3/4</td> <td style="text-align: center;">34</td> <td style="text-align: center;">(300)</td> <td style="text-align: center;">34</td> <td style="text-align: center;">(300)</td> </tr> <tr> <td></td> <td style="text-align: center;">1 and larger</td> <td style="text-align: center;">68</td> <td style="text-align: center;">(600)</td> <td style="text-align: center;">34</td> <td style="text-align: center;">(300)</td> </tr> </tbody> </table>	Normal mounting plane of ENCLOSURE surface(a)	Conduit size, in	Bending moment (b,c) N•m (lb-in)				Metallic conduit		Nonmetallic conduit		Horizontal	All	34	(300)	34	(300)	Vertical	1/2 – 3/4	34	(300)	34	(300)		1 and larger	68	(600)	34	(300)		<p>P</p>
Normal mounting plane of ENCLOSURE surface(a)	Conduit size, in			Bending moment (b,c) N•m (lb-in)																											
		Metallic conduit		Nonmetallic conduit																											
Horizontal	All	34	(300)	34	(300)																										
Vertical	1/2 – 3/4	34	(300)	34	(300)																										
	1 and larger	68	(600)	34	(300)																										
<p>DVD.4.3.3 [D2]</p>	<p>If the ENCLOSURE surface can be installed in either a horizontal or a vertical plane, the vertical bending moment value shall be used.</p>	<p>Only horizontal positioning</p>	<p>N/A</p>																												
<p>DVD.4.3.4 [D2]</p>	<p>The test procedure may be terminated prior to attaining the values specified if the deflection of the conduit exceeds 250 mm (10 in) for a 3,05 m (10 ft) length of conduit.</p>	<p>No deflection</p>	<p>N/A</p>																												
<p>DVD.4.3.5 [D2]</p>	<p>For an end-of-line ENCLOSURE as defined in Table DVD.4.2.1.1, the bending moment shall be 17,0 N•m (150 lb-in).</p>		<p>N/A</p>																												
<p>DVD.4.4 [D2]</p>	<p>Knockouts</p>	<p>Not used</p>	<p>N/A</p>																												
<p>DVD.4.4.1 [D2]</p>	<p>A knockout shall be subjected to a force of 89 N (20 lb) applied at right angles by means of a mandrel with a 6,4-mm (1/4-in) diameter flat end. The mandrel shall be applied at the point most likely to cause movement of the knockout.</p>	<p>See above</p>	<p>N/A</p>																												

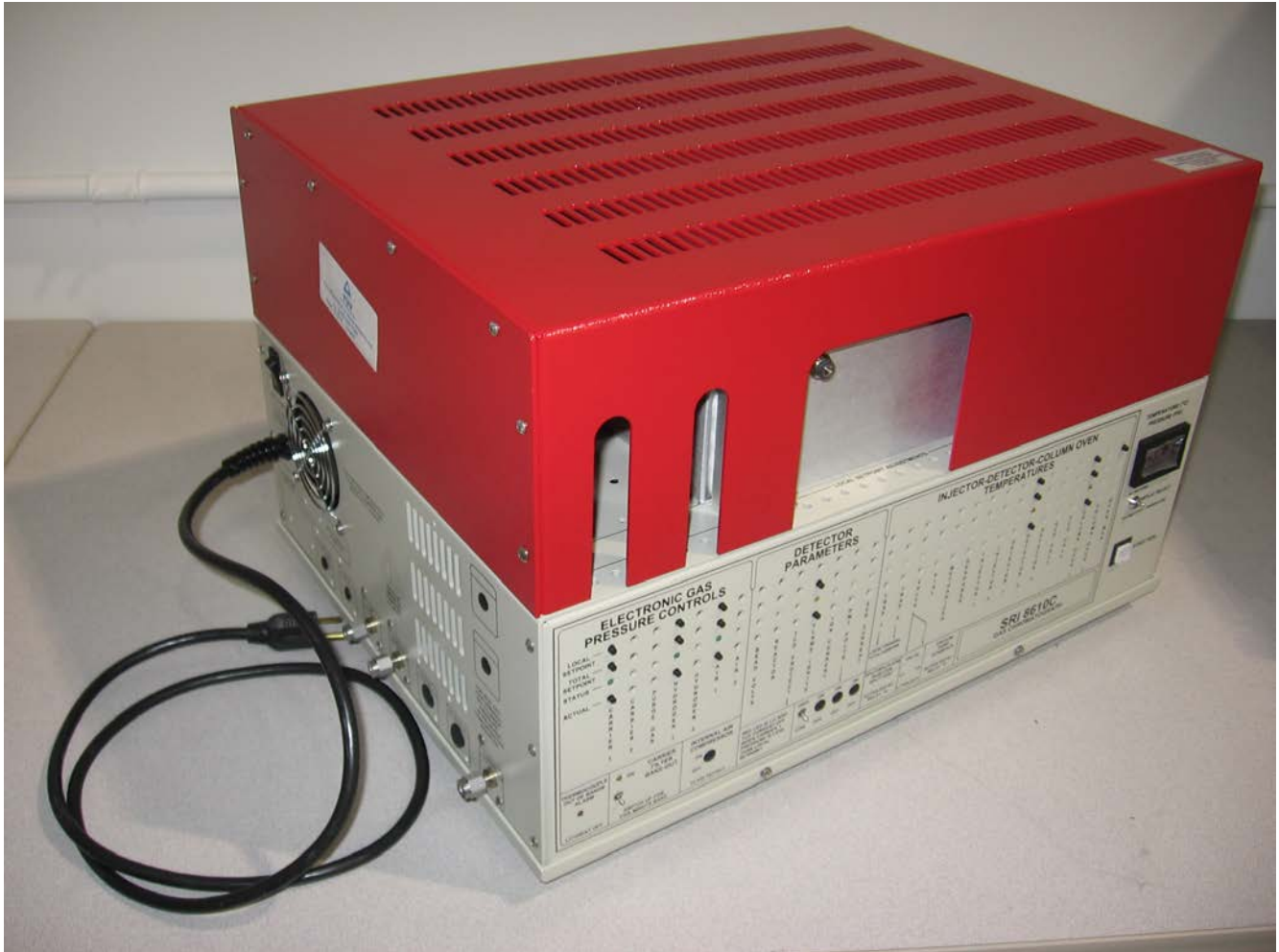
National Differences

IEC 61010-1 and/or EN 61010-1

<p>New Bibliography BIBDV [D2]</p>	<p>Add the following bibliographic references:</p> <p>ACIGH 7DOC-656, Ultraviolet Radiation: TLV - Physical Agents 7th Edition Documentation</p> <p>ASME-BPVC, ASME Boiler and Pressure Vessel Code</p> <p>ANSI/UL 1581 Reference Standard for Electrical Wires, Cables, and Flexible Cords</p> <p>CAN/CSA C22.2 No. 0.3, Test methods for electrical wires and cables</p> <p>R.S.C. 1985, Canadian Radiation Emitting Devices Act</p> <p>21 CFR 1020, USA Code of Federal Regulations, Title 21, Subpart J, Part 1020: Performance Standards for Ionizing Radiation Emitting Products</p> <p>21 CFR 1040, USA Code of Federal Regulations, Title 21, Subpart J, Part 1040: Performance Standards for Light-Emitting Products</p>		<p>INFORMATIVE</p>
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Photographs

IEC 61010-1 and/or EN 61010-1



Photographs

IEC 61010-1 and/or EN 61010-1



Photographs

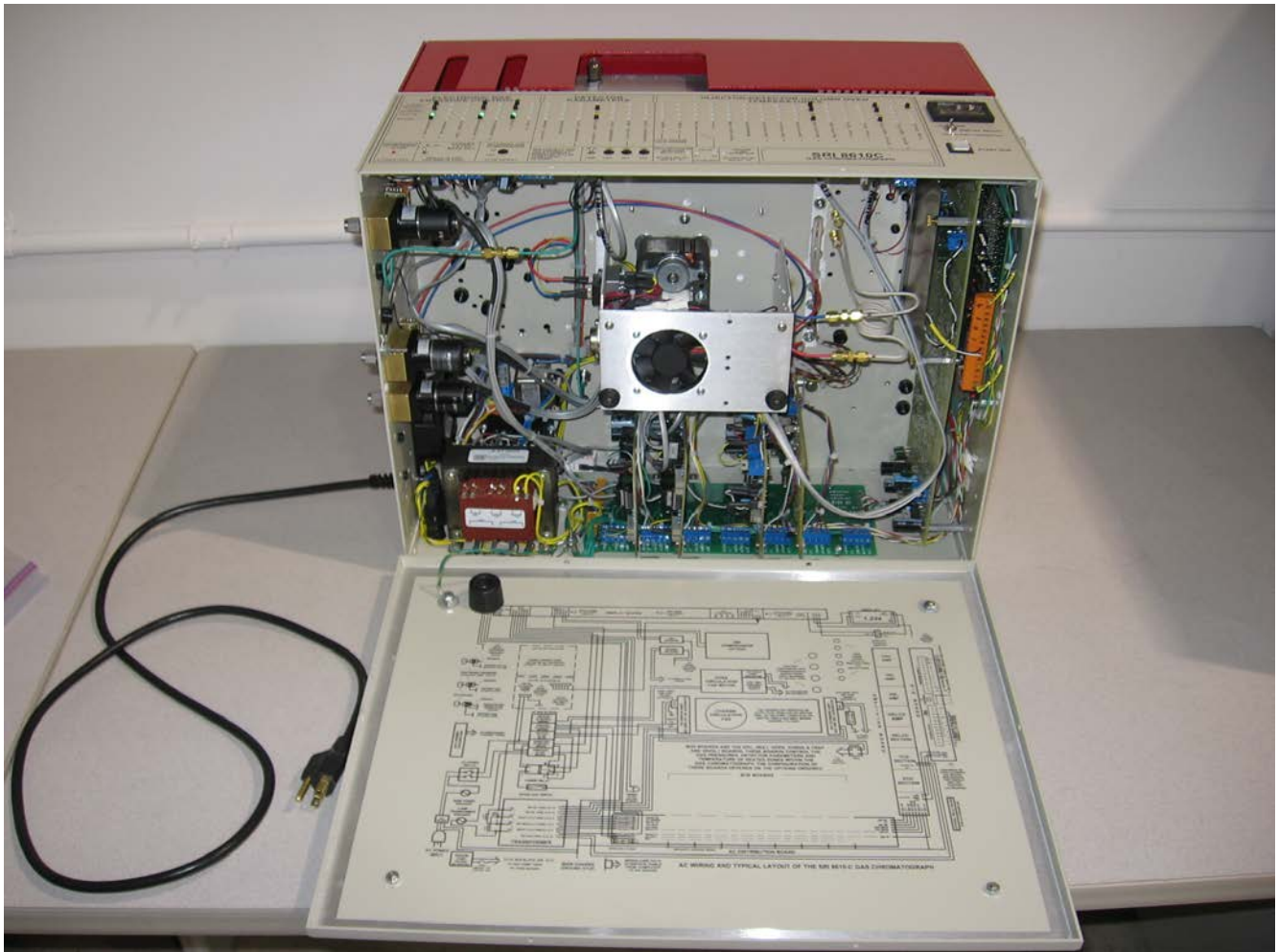
IEC 61010-1 and/or EN 61010-1





Photographs

IEC 61010-1 and/or EN 61010-1

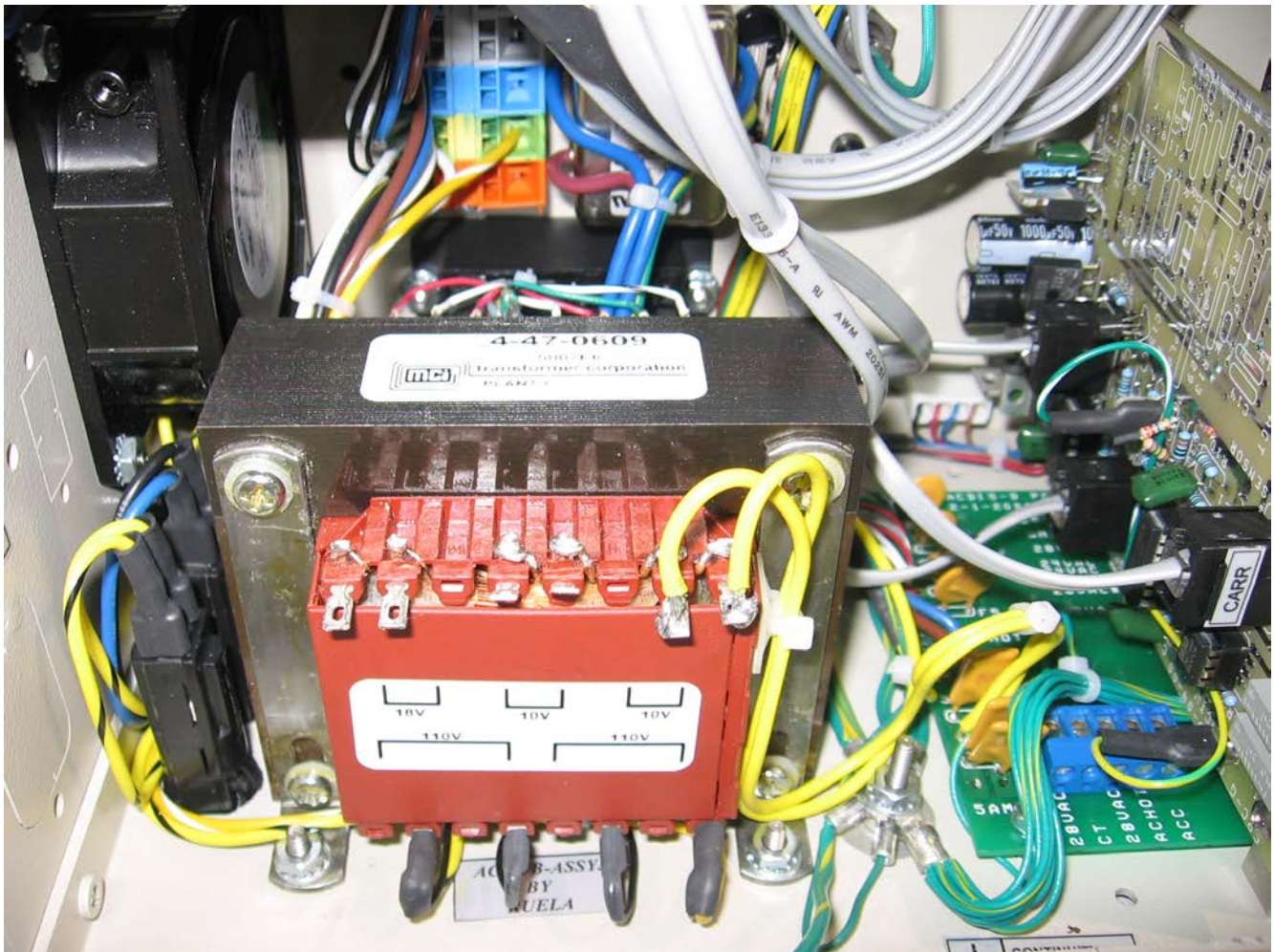


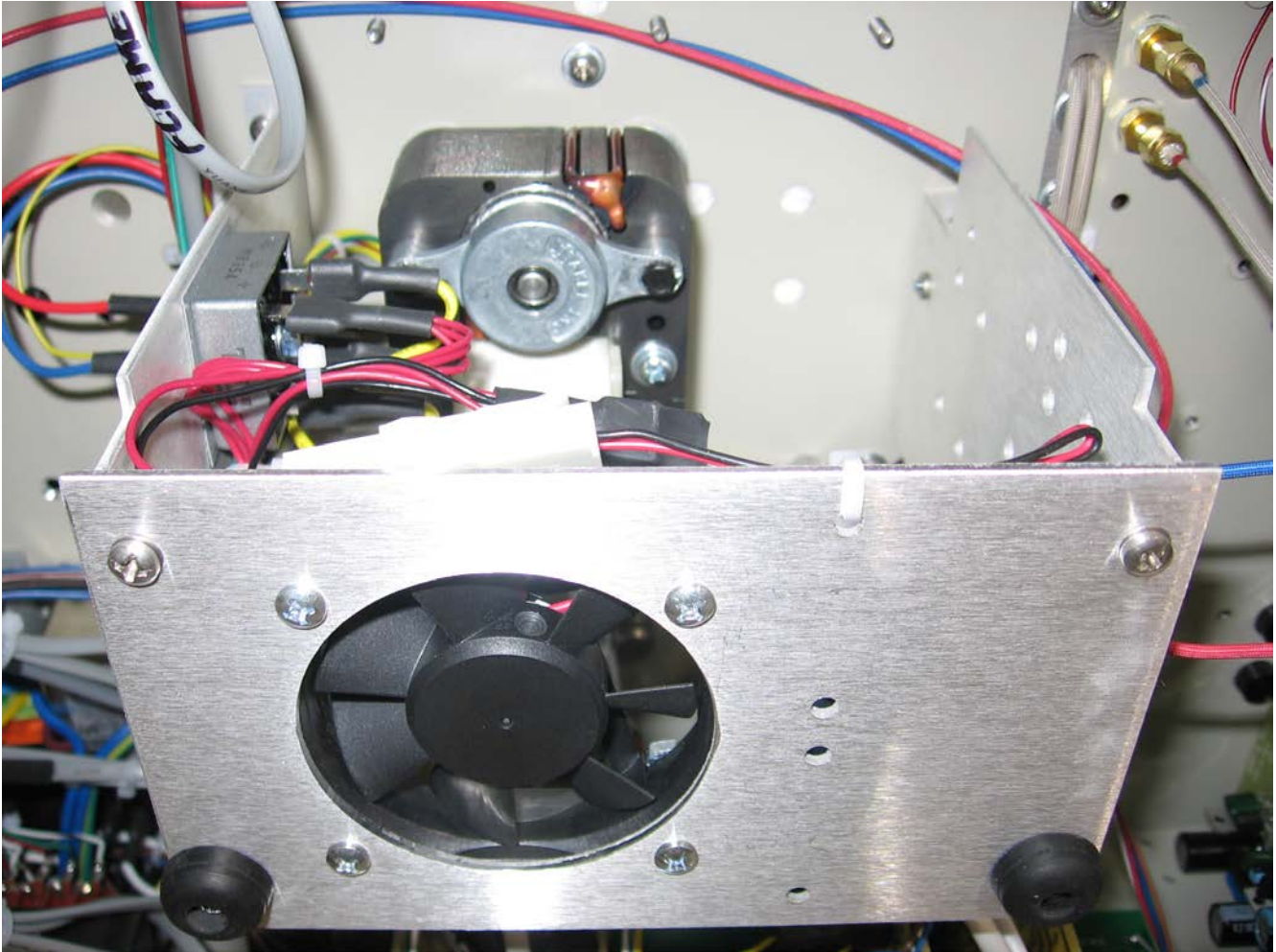




Photographs

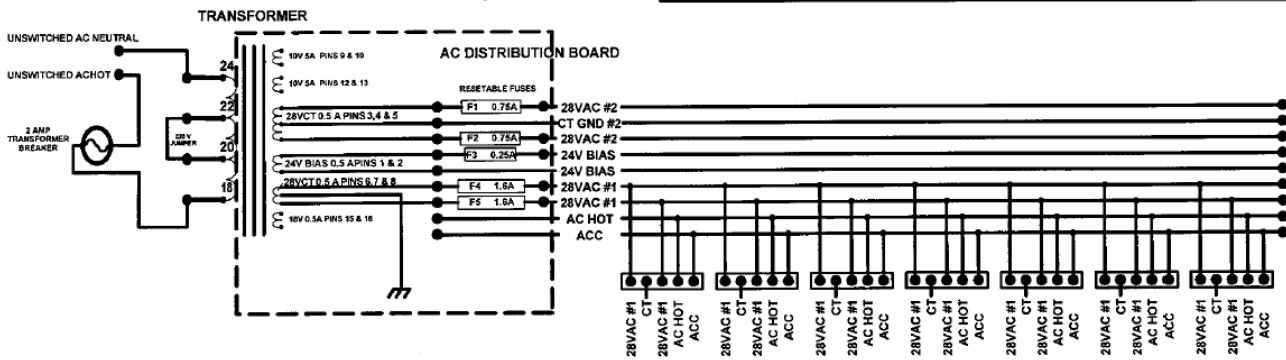
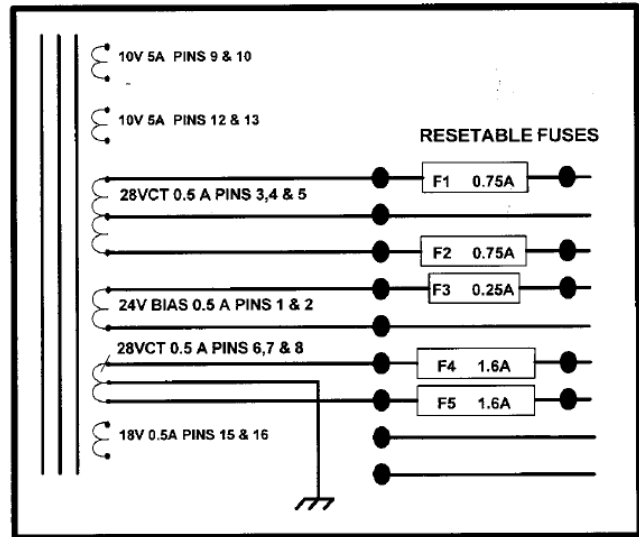
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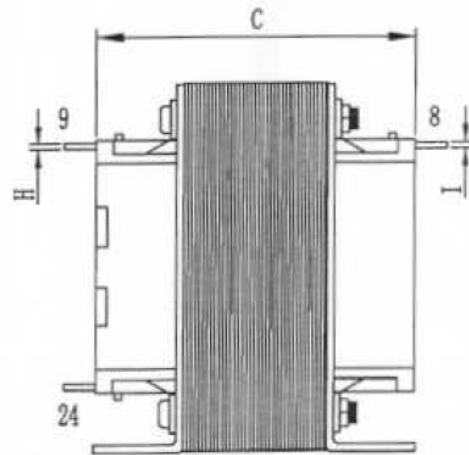
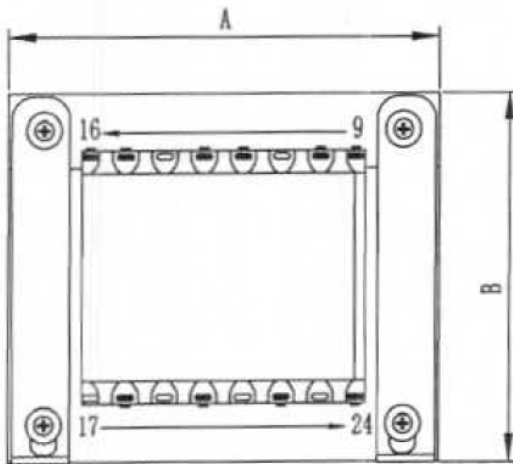
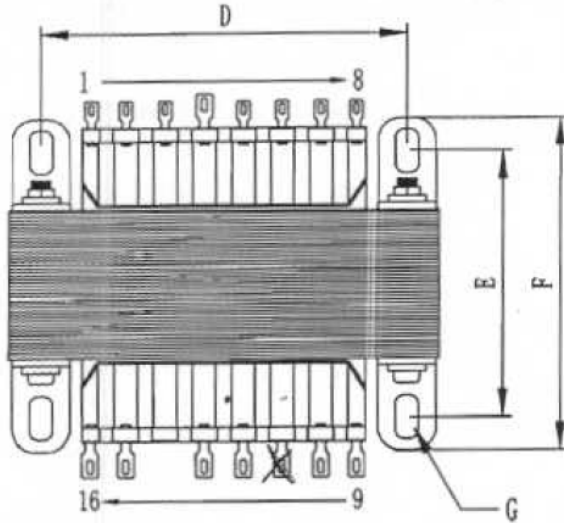
Transformer Schematic and Specifications

IEC 61010-1 and/or EN 61010-1



IEC 61010-1 and/or EN 61010-1

OUTLINE DIMENSION (UNIT:mm) :



NOTE: PIN 1, 2, 3, 5, 6, 7, 8 is TBS 902  
 PIN 4, 9, 10, 12, 13, 15, 16, 18, 20, 22, 24 is TBS 908  
 NO PIN 11, 14, 17, 19, 21, 23

DIMENSION:


A	B	C	D	E	F	G	H	I
96.0	82.0	73.0	80.0	57.0	71.5	9.53X5.16	0.6	0.5
±2.0	MAX	MAX	±1.5	±1.5	±2.0	±0.3	+0.2/-0.1	+0.2/-0.1

447-0609 1/6  
 MCI Transformer Corp. West  
 150 Sanhedrin Circle  
 Willits, CA 95490  
 T:707-459-5994 F:707-459-5998

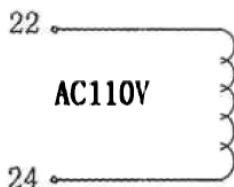
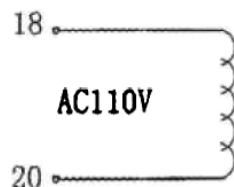


Transformer Schematic and Specifications

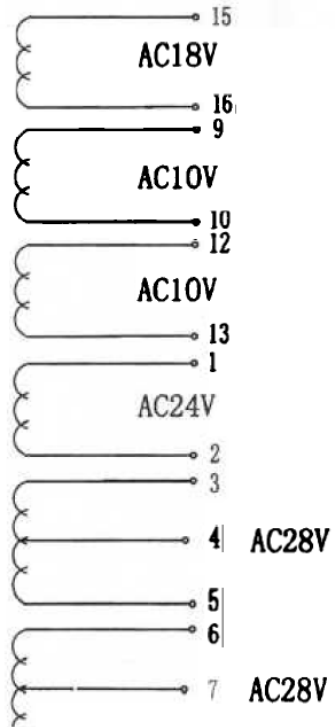
IEC 61010-1 and/or EN 61010-1

CUSTOMER		147		DESCRIPTION	DB9601-062
WINDING:					 <b>RoHS Compliant</b>
WDG	TERMINALS	WIRE SIZE	TURNS	TAPE	DC RESISTANCE
N1	18-20	24 AWG MW80C SINGLE	317	1L 44#	4.10 Ω ±20%
N2	22-24	24 AWG MW80C SINGLE	317		4.90 Ω ±20%
N3	9-10	16 AWG MW80C SINGLE	32	BIFILAR	0.069 Ω ±20%
N4	12-13	16 AWG MW80C SINGLE	32	1L 44#	0.069 Ω ±20%
N5	15-16	26 AWG MW80C SINGLE	58	1L 44#	1.44 Ω ±20%
N6	1-2	26 AWG MW80C SINGLE	78	1L 44#	2.0 Ω ±20%
N7	6-7	22 AWG MW80C SINGLE	45		0.96 Ω ±20%
N8	7-8	22 AWG MW80C SINGLE	45	1L 44#	(6-8)
N9	3-4	22 AWG MW80C SINGLE	45		1.03 Ω ±20%
N10	4-5	22 AWG MW80C SINGLE	45		(3-5)

**SCHEMATICS:**



4-97-0609 2/6  
**MCI Transformer Corp. West**  
**150 Sanhedrin Circle**  
**Willits, CA 95490**  
**T: 707-459-5994 F: 707-459-5998**



## Transformer Schematic and Specifications

IEC 61010-1 and/or EN 61010-1


## ELECTRICAL CHARACTERISTICS:



PRI	VOLTAGE (18, 22-20, 24)		AC110V 60Hz
	VOLTAGE (18-24, 20&22)		AC220V 50Hz
	EXCITING CURRENT		250mA MAX (WHEN INPUT AC 220V/50Hz)
SEC	TERMINALS	UNLOAD VOLTAGE (AT 400Hz)	LOAD VOLTAGE
	9-10	AC 11.10V±1%	AC 10.0±8% @ 5.0A
	12-13	AC 11.10V±1%	AC 10.0±8% @ 5.0A
	1-2	AC 27.06V±1%	AC 24.0±8% @ 0.15A
	3-4-5	AC 31.23V±1%	AC 28.0±8% @ 1.0A
	6-7-8	AC 31.23V±1%	AC 28.0±8% @ 0.5A
	15-16	AC 20.12V±1%	AC 18.0±8% @ 0.5A
HI-POT TEST	PRI-SEC		4.0KVAC/50Hz 2mA FOR 2S
	PRI-CORE		4.0KVAC/50Hz 2mA FOR 2S
	SEC-CORE		4.0KVAC/50Hz 2mA FOR 2S
INSULATION RESISTANCE	PRI-SEC		100 MΩ MIN @DC500V
	PRI-CORE		100 MΩ MIN @DC500V
	SEC-CORE		100 MΩ MIN @DC500V


Transformer Schematic and Specifications

IEC 61010-1 and/or EN 61010-1

CUSTOMER		147	DESCRIPTION	DB9601-062
MATERIAL LIST:		 <b>RoHS Compliant</b> MANUFACTURER/SUPPLIER		
NO.	DESCRIPTON			
1				
2		SI-STEEL EI96 H18 0.35A	DINGSHUN STEEL FACTORY	
3	PRIMARY WINDING	TYPE : MW80C SINGLE FILE NO. :E201757 THERMAL RATING : 155°C	PACIFIC ELECTRIC WIRE & CABLE CO., LTD	
4	SECONDARY WINDING	TYPE : MW80C SINGLE FILE NO. :E201757 THERMAL RATING : 155°C	PACIFIC ELECTRIC WIRE & CABLE CO., LTD	
5	TAPE	TYPE:44# FILE NO. :E17385	3M	
6	BRACKET	PLATE WITE ZINC 2.0mm THICKNESS	LIAN XIN	
7	VARNISH	AC-43 UL NO. :E76517	JOHN C DOLPH CO	

## Transformer Schematic and Specifications


IEC 61010-1 and/or EN 61010-1

CUSTOMER	147	DESCRIPTION	DB9601-062
ELECTRICAL CHARACTERISTICS:		 <b>RoHS Compliant</b>	
PRI	VOLTAGE (18, 22-20, 24)		AC110V 60Hz
	VOLTAGE (18-24, 20&22)		AC220V 50Hz
	EXCITING CURRENT		250mA MAX (WHEN INPUT AC 220V/50Hz)
SEC	TERMINALS	UNLOAD VOLTAGE (AT 400Hz)	LOAD VOLTAGE
	9-10	AC 11.10V±1%	AC 10.0±8% @ 5.0A
	12-13	AC 11.10V±1%	AC 10.0±8% @ 5.0A
	1-2	AC 27.06V±1%	AC 24.0±8% @ 0.15A
	3-4-5	AC 31.23V±1%	AC 28.0±8% @ 1.0A
	6-7-8	AC 31.23V±1%	AC 28.0±8% @ 0.5A
	15-16	AC 20.12V±1%	AC 18.0±8% @ 0.5A
HI-POT TEST		PRI-SEC	4.0KVAC/50Hz 2mA FOR 2S
		PRI-CORE	4.0KVAC/50Hz 2mA FOR 2S
		SEC-CORE	4.0KVAC/50Hz 2mA FOR 2S
INSULATION RESISTANCE		PRI-SEC	100 MΩ MIN @DC500V
		PRI-CORE	100 MΩ MIN @DC500V
		SEC-CORE	100 MΩ MIN @DC500V



## Transformer Schematic and Specifications

IEC 61010-1 and/or EN 61010-1

CUSTOMER		147	DESCRIPTION	DB9601-062
MATERIAL LIST:				 <b>RoHS Compliant</b>
NO.	DESCRIPTON	MATERIAL	MANUFACTURER/SUPPLIER	
1	BOBBIN	TYPE:EI96X32 A78123 MATERIAL: GFN UL NO. : E41938	DUPONT <i>70630L</i> MILES. PLATTS	
2	CORE	SI-STEEL EI96 H18 0.35A 4H	DINGSHUN STEEL FACTORY	
3	PRIMARY WINDING	TYPE : MW80C SINGLE FILE NO. :E201757 THERMAL RATING : 155°C	PACIFIC ELECTRIC WIRE & CABLE CO., LTD	
4	SECONDARY WINDING	TYPE : MW80C SINGLE FILE NO. :E201757 THERMAL RATING : 155°C	PACIFIC ELECTRIC WIRE & CABLE CO., LTD	
5	TAPE	TYPE:44# FILE NO. :E17385	3M	
6	BRACKET	PLATE WITE ZINC 2.0mm THICKNESS	LIAN XIN	
7	VARNISH	AC-43 UL NO. :E76517	JOHN C DOLPH CO	

Transformer Schematic and Specifications

IEC 61010-1 and/or EN 61010-1

VDE-Prutstelle  
D-6050 Offenbach

Appendix No:  
To Marks License No:  
File Ref:

(Filled in by the Institute)

**CONSTRUCTION DATA FOR ISOLATING TRANSFORMERS AND SAFETY  
ISOLATING TRANSFORMERS TO EN 60742 DIN VDE 0551 FORM 42 en**

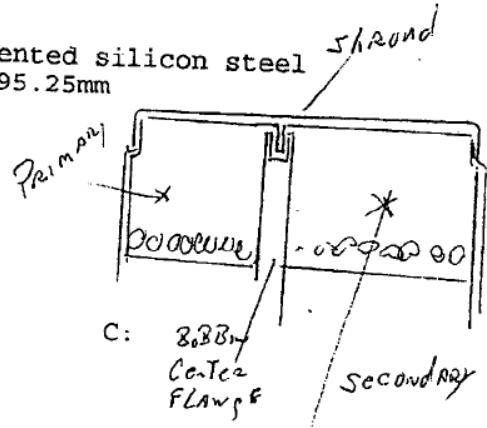
- 1.1 Applicant: SRI Instruments, Inc. Las Vegas Nevada USA
- 1.2 Place of manufacture: MCI Transformer Corp West; Willits, CA
- 1.3 Reference of type: Power Isolation EN60742
- 1.4 Trade Mark: MCI Transformer Corp
- 1.5 Other markings: P/N 4-47-0606; Date ie; 0997 (week 9 1997)
- 1.6 Reference number:4-47-0606
  
- 2.1 Protection against electric shock:
- 2.2 Class of production to IEC 529:IP
- 2.3 Type of construction ;Isolating transformer
- 2.4 Stationary Transformer: Mounted in appliance  
Portable Transformer:
- 2.5 Protection against short-circuit according to Sub-clause 6.2:  
inherently short-circuit proof:  
non-inherently short-circuit proof:  
non short-circuit proof: XXXXXX  
fail safe  
(rated current of the output)
- 2.6 Rated maximum ambient temperature:ta 130 C
- 2.7 Class:B Insulation: Declaration of insulation  
see VDE-Vd 187  
UL Recognized system in MCI UL file E86543
  
- 3. Electrical values

	Input:	Output				
3.1 Rated voltage(s)	V:115/230	10 10 24 28ct 28ct 18				
3.2 Rated frequency	Hz:50/60					
3.3 Rated current	A:1.52/.76	5A 5A .15A 1A .5A .5A				
3.4 Rated output	VA:			175 total		
3.5 Rated power factor cos	:					

  
- 4. Windings
- 4.1 Coil base, number: Miles Platts S09200  
material: Glass filled Nylon
- 4.2 Material of layer insulation: n/a
- 4.3 Windings, number: 2x346 32 32 78 90 90 58  
material:copper
- 4.4 Taps, number: 45 45
- 4.5 Diameter of wire (mm): .511 1.3 1.3 .404 .643 .643 .404
- 4.6 Windings insulation, material: Poly/Nylon overcoat (MW-80C)
- 4.7 Cord insulation material  
internal: Glass filled Nylon  
external: Blass filled Nylon
- 4.8 Cold ohms at:22C 4.6+5.6 .065 .071 1.86 .90 .911 .34
- 4.9 Circuit diagram (with terminal markings, color of wires, etc.):

IEC 61010-1 and/or EN 61010-1

- 5. Iron core
- 5.1 Sheet metal, material: .014 grain oriented silicon steel
- 5.2 Cross-sectional drawing:
  - main dimensions: 79.4mm X 95.25mm



- 6.1 Open-covered-in case protection: open
- 6.2 Impregnated-undrowned-drowned:
- 6.3 Soaking (lacquer): Dupont Dolph AC43
- 6.4 Underpressure-Overpressure-Soaking at
- 6.5 Drown material:
- 6.6 Material of the cover:
  - of the case:
  - of the socket (support):
- 7. Other data (special construction feature, etc):