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检测
TESTING
CNAS L4062



TEST REPORT

Reference No. : WTX22X08157378S
Applicant : GlobTek, Inc.
Address : 186 Veterans Dr. Northvale, NJ 07647 USA
Manufacturer : The same as above
Address : The same as above
Product Name : ITE POWER SUPPLY
Model No. : GT*961200P****, GT*96900P****
(see general product information for model designation)
Test specification : IEC 61558-2-16:2009+A1:2013 used in conjunction with IEC 61558-1
2005 + A1:2009 Include deviations for Australia and New Zealand
Safety of power transformers, power supplies, reactors and similar
products for supply voltages up to 1100 V
Part 2: Particular requirements and tests for switch mode power sup-
ply units and transformers for switch mode power supply units
Date of Receipt sample : 2022-08-10
Date of Test : 2022-08-10 to 2022-08-26
Date of Issue : 2022-09-08
Test Report Form No. : WTX_IEC61558_2-16_2009B
Test Result : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:

Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road,
Block 70 Bao'an District, Shenzhen, Guangdong, China

Tel :+86-755-33663308 Fax:+86-755-33663309 Email: sem@waltek.com.cn

Tested by:

John Zhong


John Zhong

Approved by:

Harvid Wei

Harvid Wei



Test item description: ITE POWER SUPPLY	
Trademark: 	
Model and/or type reference: GT*961200P****, GT*96900P**** (see general product information for model designation)	
Serial number: /	
Rating(s): Input: 100-240V~ 50-60Hz 1.5A Output: (details see next page)	
Remark: Whether parts of tests for the product have been subcontracted to other labs: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, list the related test items and lab information: Test items: Lab information:	
Summary of testing:	
Tests performed (name of test and test clause): - IEC 61558-2-16:2009+A1:2013 - IEC 61558-1 2005 + A1:2009 - AS/NZS 61558.1:2008+A1:2009+A2:2015 - AS/NZS 61558.2.16:2010+A2:2012+A3:2014 The submitted samples were found to comply with the requirements of above specification.	Testing location: Waltek Testing Group (Shenzhen) Co., Ltd. Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China
Summary of compliance with National Differences: List of countries addressed: AU AU=Australia The product fulfils the requirements of Australia and New Zealand National Differences AS/NZS 61558.1:2008+A1:2009+A2:2015 and AS/NZS 61558.2.16:2010+A2:2012+A3:2014	



Copy of marking plate:

GlobTek, Inc.
www.globtek.com

Fuente de alimentación de ITE/адаптер питания
ITE / Medical Power Supply/ 电源供应器
PART NO/Parte/номер/料号:
MODEL/Modelo/модель/型号: GTM961200P11112-T3
INPUT/Entrada/вводить/输入: 100-240V~, 50-60Hz, 1.5A
OUTPUT/Salida/экспорт/输出: 12V 9.25A, 111W

Conforms to AAMI STD. ES60601-1
Certified to CAN/CSA STD.C22.2 NO.60601-1
Conforms to UL STD. 60950-1
Certified to CSA STD C22.2 NO.60950-1

GlobTek, Inc.

EFFICIENCY LEVEL VI

S/N: 000158101/07 RoHS

MADE IN CHINA / Китай Производство
中国制造 Hecho en China

GlobTek, Inc.
186 Veterans Dr.
Northvale, NJ 07647 USA
www.globtek.com 电源供应器

ITE / Medical Power Supply/Household Power Supply
Fuente de alimentación de ITE/адаптер питания

REF P/N/Parte/номер/料号:
MODEL/Modelo/модель/型号: GTM96900P9012-T3
INPUT/Entrada/вводить/输入: 100-240V~, 50-60Hz, 1.5A
OUTPUT/Salida/экспорт/输出: 12.0V 7.5A, 90.0W

Conforms to UL Std.62368-1
Cert. to CSA Std.C22.2 No.62368-1
Conforms to UL STD. 60950-1
Certified to CSA STD C22.2 NO.60950-1
Conforms to AAMI STD.ES60601-1
Certified to CAN/CSA STD.C22.2 NO.60601-1

GlobTek, Inc.

EFFICIENCY LEVEL VI

S/N: 000158101/07 RoHS

MADE IN CHINA/Китай Производство
中国制造/Hecho en China

**Test item particulars**

Type of transformers	Switching power supply incorporating safety isolating transformer
Application	ITE Power supply
Protection against electric shock	Class I (model: GTM961200P12015-T3, GTM96900P9015-T3) Class II (model: GTM961200P12054-T2, GTM96900P9054-T2)
Short-circuit protection	Yes
inherently short-circuit proof	No
non-inherently short-circuit proof	Yes
non short-circuit proof	No
fail safe	No
Protection index	IPX0
Other characteristics	Weight: 520g Max.
Rated ambient temperature t_a (°C)	40
Short-circuit voltage (V)	N/A

Possible test case verdicts:

- test case does not apply to the test object
- test object does meet the requirement
- test object does not meet the requirement

General remarks:

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 Enclosure #)" refers to additional information appended to the report.
 "(See appended table)" refers to a table appended to the report.
 Throughout this report a comma (point) is used as the decimal separator.



General product information:

Product covered by this report is ITE power supply module.

One type is power adapter, which can be used with detachable power supply cord. Different appliance inlets can be interchangeable on the device, which can provide earthing connection or not. Protective earthing connection to secondary circuit by internal wiring is optional, so it can be Class I or Class II construction or Class II with functional earth. Both two constructions are in consideration in this report. Two pieces of outer enclosure are enclosed with ultrasonic welding and screws.

The installation and use for the insulation construction shall be finally determined in the end product.

The unit is approved for TN mains star connections. The unit provides internally two fuse locations, the first fuse F1 is required, the second fuse F2 is optional.

All the types are designed for continuous operation.

The products are not intended to be used in maximum ambient temperature exceed of 40 °C

Model Differences :






GT*961200P****, GT*96900P****

1. The 1st “*” part can be ‘M’ or ‘-’ or ‘H’ for market identification and not related to safety.
2. The 2nd “*” denotes the rated output wattage designation, which can be “-01” to “-120”, with interval of 1 and “-” can be omitted.
3. The 3rd “*” denotes the standard rated output voltage designation, which can be “12” to “54” or “12.0” to “54.0” in 0.1V increments.
4. The 4th “*” = -T2 means desktop class II with C8 AC inlet
 = -T2A means desktop class II with C18 AC inlet
 = -T3 means desktop class I or class II with functional earth with C14 AC inlet
 = -T3A means desktop class I or class II with functional earth with C6 AC inlet
 = -T3TAB means desktop class I or class II with functional earth with C14 AC inlet and housing with a tab.
 = -TW means desktop class II with input wire without plug
 = -TW3 means desktop class I or class II with functional earth with input wire without plug
 = -TP means desktop class II with power supply cord with plug
 = -TP3 means desktop class I or class II with functional earth with power supply cord with plug
5. The last * denote any six character = 0-9 or A-Z or ()[] or – or blank for marketing purposes.


Model rating list:

Model	Rated output voltage range (Vdc)	Max. rated output current (A)	Max. rated output power (W)
GT*96900P**- T2/T2A/T3/T3A/T3TAB/ TW/TW3/TP/TP3	12-54Vdc	7.5	90
GT*961200P**- T2/T2A/T3/T3A/T3TAB/ TW/TW3/TP/TP3	12-14.9Vdc	9.2	111
GT*961200P**- T2/T2A/T3/T3A/T3TAB/ TW/TW3/TP/TP3	15-54 Vdc	8	120



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
8	MARKING AND OTHER INFORMATION		P
8.1	Transformer marked with:		P
	a) rated supply voltage or voltage range (V)	100-240V ~	P
	b) rated output voltage (V)	See marking label	P
	c) rated output (VA, kVA or W)		N/A
	d) rated output current (A)	See marking label	P
	e) rated frequency (Hz)	50-60Hz	P
	f) rated power factor (if not 1)		N/A
	g) symbol AC for alternating current, or DC for direct current-output	The symbol  for DC The symbol  for AC	P
	h) symbol for electrical function (according to one or more part's 2) in addition with the symbol for SMPS (IEC 61558-2-16:09)	For example:  	P
	i) manufacturer's name or trademark or name of the responsible vendor	See marking label	P
	j) model or type reference	See marking label	P
	k) vector group according to IEC 60076 for three-phase transformer	Single-phase	N/A
	l) symbol for Class II		P
	m) symbol for Class III		N/A
	n) index IPXX if other than IP00	IPX0	P
	o) rated max. ambient temperature t_a (if not 25 °C)		N/A
	p) rated minimum ambient temperature $t_{a \min}$, if <10° C and if a temperature sensitive device is used		N/A
	q) short-time duty cycle: operating time Intermittent duty cycle: operating and resting time (e.g. 5min/30min)		N/A
	r) for tw-marked transformers marked with the rated max. operating temperature, increased by multiples of 5 (e.g. tw 120; tw 125)		N/A
	s) transformers used with forced air cooling shall be marked with "AF" in m/s		N/A
	t) Information from the manufacturer to the purchaser (data sheet) :		N/A
	– short-circuit voltage (% rated supply voltage) for stationary transformers > 1000 VA		N/A
	– electrical function of the transformer		N/A















IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
8.2	Marking for transformers IP00 or for associated transformers: type and trademark, instruction sheets		N/A
8.3	Adjusted voltage easily and clearly discernible		N/A
8.4	For each tapping or winding: rated output voltage and rated output		N/A
	necessary connections clearly indicated		N/A
8.5	For short-circuit proof transformers or non-inherently short-circuit proof transformers:	Non-replaceable protective device only	N/A
	Rated current (A or mA) and symbol for time current characteristics of the fuses for non-inherently short-circuit proof transformer with incorporated fuses and non-short-circuit proof transformer		N/A
	Manufacturer's model or type reference and rating of the device for non-inherently short-circuit proof transformers with incorporated replaceable protective device (other than fuses)		N/A
	Construction sheet for transformers with replaceable protective device (other than fuses) information with information about the replacement.		N/A
8.6	Terminals for neutral: "N"		N/A
	Terminal for protective earth marked with earthing symbol		P
	Identification of input terminals: "PRI"		N/A
	Identification of output terminals: "SEC"		N/A
	Symbol for any point/terminal in connection with frame or core		N/A
8.7	Indication for correct connection	See marking label	P
8.8	Instruction sheet for type X, Y, Z attachments		N/A
8.9	Transformer for indoor use shall be marked with the relevant symbol.		P
8.10	Symbol for Class II construction not confused with maker's name or trademark.	See marking label	P
	Class II transformer with parts to be mounted – delivered with all parts for class II after mounting.		N/A
	Symbol for class II transformer placed on the part which provides class II.		P
8.11	Correct symbols:		P
	Volts	V	P
	Amperes	A (mA)	P
	Volt amperes (or volt-amperes reactive for reactors)	VA or (VAR)	N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Watts	W	P
	Hertz	Hz	P
	Input	PRI	N/A
	Output	SEC	N/A
	Direct current	d.c. (DC) or	P
	Neutral	N	P
	Single-phase a.c.		P
	Three-phase a.c.	3	N/A
	Three-phase and neutral a.c.	3/N	N/A
	Power factor	cos φ	N/A
	Class II construction		P
	Class III construction		N/A
	Fuse-link		N/A
	Rated max. ambient temperature		N/A
	Frame or core terminal		N/A
	Protective earth		P
	IP number	IPX0	P
	Earth (ground for functional earth)		N/A
	For indoor use only		P
	tw5 YYY		N/A
	tw10 YYY		N/A
	twx YYY		N/A
	Additional Symbols (IEC 61558-2-16:09)		P
	SMPS incorporating a Fail-safe separating transformer	or	N/A
	SMPS incorporating a Non-short-circuit-proof separating transformer	or	N/A
	SMPS incorporating a Short-circuit-proof separating transformer (inherently or non-inherently)	or	N/A
	SMPS incorporating a Fail-safe isolating transformer	or	N/A
	SMPS incorporating a Non-short-circuit-proof isolating transformer	or	N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	SMPS incorporating a Short-circuit-proof isolating transformer (inherently or non-inherently)	 or 	N/A
	SMPS incorporating a Fail-safe safety isolating transformer		N/A
	SMPS incorporating a Non-short-circuit-proof safety isolating transformer		N/A
	SMPS incorporating a Short-circuit-proof safety isolating transformer (inherently or non-inherently)		P
	SMPS incorporating a Fail-safe auto-transformer	 or 	N/A
	SMPS incorporating a Non-short-circuit proof auto-transformer	 or 	N/A
	SMPS incorporating a Short-circuit proof auto-transformer (inherently or non-inherently)	 or 	N/A
	SMPS (Switch mode power supply unit)		P
8.12	Figures, letters or other visual means for different positions of regulating devices and switches	No switch	N/A
	OFF position indicated by figure 0		N/A
	Greater output, input etc. indicated by higher figure		N/A
8.13	Marking not on screws or other easily removable parts		P
	Marking clearly discernible (transformer ready for use)		P
	Marking for terminals clearly discernible if necessary after removal of the cover	No such terminal	N/A
	Marking for terminals: no confusion between input and output	No such terminal	N/A
	Marking for interchangeable protective devices positioned adjacent to the base	No such interchangeable protective devices	N/A
	Marking for interchangeable protective devices clearly discernible after removal of cover and protective device		N/A
8.14	Special information for installation (in the catalogue, data sheet, or instruction sheet) if necessary:		P
	For non-inherently short-circuit proof transformers with non-self-resetting or non replaceable devices (weak-point, thermal link): The device can not be reseted or replaced		N/A



IEC 61558-2-16

Clause	Requirement + Test	Result - Remark	Verdict
	For transformers generating a protective earth conductor current of 10 mA (see also cl. 18.5.2): The installation shall be made according to the wiring rules.		N/A
	For associated- and IP00-transformers: At 10% over or under voltage in the supply voltage, the rated output of the transformer shall be selected accordingly.		N/A
	For stationary transformers exceeding 1000 VA: The short circuit voltage in % of the rated voltage		N/A
	For all transformers the electrical function: An information about the electrical function of the transformer (e.g. inherently short circuit proof safety isolating transformer)		P
	For associated- and IP00-transformers: The max. abnormal winding temperature		N/A
	For tw-transformers: The specific constant S is (e.g. S6 says S = 6000)		N/A
	For transformers with more than one output winding, not for series or parallel connection		N/A
	– an information in the in the instruction sheet: the transformer is not intended for series/parallel connection		N/A
	For IP00-transformers the test of 27.2 is not performed. The result may be affected by the enclosure in the final application.		N/A
8.15	Marking durable and easily legible		P

9	PROTECTION AGAINST ELECTRIC SHOCK		P
9.1	Protection against contact with hazardous live parts		P
9.1.1	A live part is not a hazardous live part if:		P
	– it is separated from the supply by double or reinforced insulation		P
	– the requirements of 9.1.1.1 and 9.1.1.2 are fulfilled		P
9.1.1.1	The touch voltage is ≤ 35 V(peak) a.c. or ≤ 60 Vd.c.	Measured maximum output voltage: Max. 54.34Vd.c.	P
9.1.1.2	If the touch voltage is > 35 V (peak)a.c. or > 60 V d.c., the following requirements shall be fulfilled:		N/A
	The touch current shall not exceed:		N/A
	– for a.c. 0,7 mA (peak)		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– for d.c. 2,0 mA (see Annex J)		N/A
	In addition, when a capacitor is connected to live parts:		—
9.1.1.2.1	discharge: < 45 °C (between 60 V and 15 kV)		N/A
9.1.1.2.2	energy: ≤ 350 mJ (voltage >15 kV)		N/A
9.1.2	Transformers shall have an adequate protection against accessibility to hazardous live parts:		P
	The enclosure of class I and class II transformers gives an adequate protection against accidental contact with hazardous live parts.		P
	Class I transformers: accessible parts are separated from hazardous live parts by at least basic insulation.		N/A
	Class II transformers: no accessibility to basic insulation, or conductive parts separated from hazardous live parts by basic insulation.		P
	Hazardous live parts are not accessible after removal of detachable parts.		N/A
	Hazardous live parts are not accessible after removal of detachable parts except for:	No lamp or fuse holder	N/A
	– lamps having caps larger B9 and E10		N/A
	– type D fuse holder		N/A
	Lacquers, enamel, paper, cotton, oxide film on metal parts not used for protection against accidental contact with hazardous live parts:	Such substance not used	N/A
	Shafts, handles, operating levers, knobs are not hazardous live parts.	No such parts	N/A
	Compliance is checked by inspection and by relevant tests according to IEC 60 529		P
	Class II transformers and Class II parts of Class I construction are tested with the test pin (fig. 3)		P
	Hazardous live parts shall not be touchable by test finger (fig. 2)		P
	for Class II transformers: metal parts separated by basic insulation from hazardous live parts not touchable by test finger		P
	hazardous live parts shall not be touchable with the test pin		P
9.1.3	Accessibility of non hazardous live parts		P
	Non hazardous live parts of the output circuit may be accessible if they are isolated from the input circuit by double or reinforced insulation and if the following conditions are fulfilled:		P



IEC 61558-2-16

Clause	Requirement + Test	Result - Remark	Verdict
	– The no load output voltage is ≤ 35 V peak a.c. or ≤ 60 V ripple free d.c., both poles are accessible		P
	– The no load output voltage is > 35 V peak a.c. or > 60 V ripple free d.c. and ≤ 250 V a.c., only one pole may be accessible		N/A
9.2	Transformers with primary supply plug: 1 s after the interruption of the supply the voltage between the pins do not exceed 35 V (peak) a.c. or 60 V ripple free d.c.		P
	Transformers without a primary supply plug: 5 s after the interruption of the supply the voltage between the input terminals do not exceed 35 V (peak) a.c. or 60 V ripple free d.c.		N/A
	The following tests are required :		N/A
	If the nominal capacitance is $\leq 0,1 \mu\text{F}$ – no test is conducted.	No such capacitor	P
	– 10 times switch the supply source on and off, or use a special equipment for to switch off at the most unfavourable electrical angle		N/A
	If the measured voltage is > 60 V ripple free d.c., the discharge must be $\leq 45 \mu\text{C}$.		N/A

10	CHANGE OF INPUT VOLTAGE SETTING		P
	Voltage setting not possible to change without a tool		N/A
	Different rated supply voltages:		N/A
	– indication of voltage for which the transformer is set, is discernible on the transformer.		N/A
10.101	A wide range of the input (100 V a. c. to 240 V a.c voltage is allowed (IEC 61558-2-16:09):		P
	– if the output voltages does not exceed the rated output voltage		P
	– if the no-load voltage does not exceed the limits of output voltage deviation		P

11	OUTPUT VOLTAGE AND OUTPUT CURRENT UNDER LOAD		P
11.1	Difference from rated value (without rectifier; with rectifier):		P
	a) inherently short-circuit proof transformers with one rated output voltage for output voltage: a.c. 10% ; d.c. 15%		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	b) inherently short-circuit proof transformers with one more than 1 rated output voltage for highest output voltage: a.c. 10%; d.c. 15%		N/A
	c) idem for other output voltages: a.c. 15%; d.c. 20%		N/A
	d) other transformers for output voltages: a.c. 5%; d.c. 10%	See appended table	P

12	NO-LOAD OUTPUT VOLTAGE (see supplementary requirements in Part 2)		P
	Remark: with rectifier measuring on both sides of the rectifier		N/A
12.101	The no load output voltage shall not exceed (IEC 61558-2-16:09):		P
	– For SMPS incorporating separating or auto-transformers: 1000V a.c. or 1415 V ripple free d.c.		N/A
	– For SMPS including isolating transformers: 500 V a.c. or 708 V ripple-free d.c.		N/A
	– For SMPS including safety isolating transformers: 50 V a.c. or 120 V ripple-free d.c.		P
	For independent transformers , this output voltage limitation applies even when output windings, not for interconnection, are connected in series		N/A
12.202	The difference between output voltage at no load and the output voltage measured in clause 11 does not exceed the values of table 101 (IEC 61558-2-16:2009), Rated output (VA) Rated value %		P

13	SHORT-CIRCUIT VOLTAGE		N/A
	Difference from marking for short-circuit voltage 20%		N/A

14	HEATING		P
14.1	General requirements		P
	No excessive temperature in normal use		P
	Room temperature: rated ambient temperature $t_a \pm 5^\circ\text{C}$		—
	Type X, Y, Z attachments: 1 pull (5 N/A) to the connection windings		N/A
	Upri (V): 1,1 times rated supply voltage loaded with rated impedance – for independent transformers	264V	—



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Upri (V): 1,1 times rated supply voltage: with I sec (A), measured with rated impedance and 1,0 times of the rated supply voltage for others than independent transformers		—
	Type X, Y, Z attachments: 1 pull (5 N/A) to the connection windings		N/A
	Max. temperature windings	(see appended table)	P
	– Class A: 100 °C		N/A
	– Class E: 115 °C		N/A
	– Class B: 120 °C		P
	– Class F: 140 °C		N/A
	– Class H: 165 °C		N/A
	– other classes		N/A
	Temperature of external enclosures of stationary transformers:		N/A
	– metal: 70 °C		N/A
	– other material: 80 °C		N/A
	Temperature of external enclosure of stationary transformer 85 °C (not touchable with the IEC test finger)		N/A
	Temperature of external enclosures, handles, etc. of portable transformers:		P
	– continuously held parts of metal: 55 °C		N/A
	– continuously held parts of other material: 75 °C		N/A
	– not continuously held parts of metal: 60 °C		N/A
	– not continuously held parts of other material: 80 °C		P
	Temperature of terminals for external conductors 70 °C		N/A
	Temperature of terminals of switches 70 °C		N/A
	Temperature of internal and external wiring:	(see appended table)	P
	– rubber: 65 °C		N/A
	– PVC: 70 °C		P
	Temperature of parts where safety can be affected:		N/A
	– rubber: 75 °C		N/A
	– phenol-formaldehyde: 105 °C		N/A
	– urea-formaldehyde: 85 °C		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– impregnated paper and fabric: 85 °C		N/A
	– impregnated wood: 85 °C		N/A
	– PVC, polystyrene and similar thermoplastic material: 65 °C		N/A
	– varnished cambric: 75 °C		N/A
	Temperature rise of supports 85 °C		P
	Temperature of printed boards:	UL approved PCB used, the limit is 130 °C	P
	– bonded with phenol-formaldehyde: 105 °C		N/A
	– melamine-formaldehyde: 105 °C		N/A
	– phenol-furfural: 105 °C		N/A
	– polyester: 105 °C		N/A
	– bonded with epoxy: 140 °C	PCB rating: 130°C	P
	Electric strength between input and output windings (18.3, 1 min); test voltage (V)	Test Voltage: 3000Vac 1min	P
14.101	Winding temperature measured by thermocouples at the surface of the winding(IEC 61558-2-16:09)		P
	– if the internal frequencies is > 1kHz		P
	– the values of Table 1 for windings temperatures are reduced by 10°C		P
14.2	Application of 14.1 or 14.3 according to the insulation system		P
14.2.1	Class of isolating system (classified materials according to IEC 60 085 and IEC 60 216)	Class B	P
14.2.2	No classified material, or system but the measured temperature does not exceed the value of Class A		N/A
14.2.3	No classified material or system but the measured temperature exceeds the value for Class A, the live parts of the transformers are submitted to the test of 14.3		N/A
14.3	Accelerated ageing test for undeclared class of isolating system		N/A
	Cycling test (10 cycles):		N/A
	– measuring of the no-load input current (mA)		N/A
14.3.1	– heat run (temperature in table 2)		N/A
14.3.2	– vibration test: 30 min; amplitude 0,35 mm; frequency range: 10 Hz, 55 Hz, 10 Hz		N/A
14.3.3	– moisture treatment (48 h, 17.2)		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
14.3.4	Measurements and tests at the beginning and after each test:		N/A
	– deviation of the no-load input current, measured at the beginning of the test is 30%		N/A
	– insulation resistance acc. cl.18.1 and 18.2		N/A
	– electric strength, no breakdown (18.3); 2 min; test voltage 35% of specified value (table VI)		N/A
	– Transformers (50 or 60 Hz version) are tested after the dielectric strength test as follows: under no load; duration: 5 min; Up-ri(V): 1,2 times rated supply voltage; frequency (Hz): 2 times rated frequency		N/A

15	SHORT-CIRCUIT AND OVERLOAD PROTECTION		P
15.1	General		P
	Tests direct after 14.1 at the same ta and without changing position.	(see appended table)	P
	Supply voltage between 0,9 times and 1,1 times of the rated supply voltage	1.1 times and 0.9 times had been considered	—
	Transformer with rectifier tests of 15.2 and 15.3 at the input and the output terminals of the rectifier.		P
	Transformers with more than one output winding or tapping, all windings tested with normal load, the winding with the highest temperature is short circuited.	Only one output winding	N/A
	Winding protected inherently (15.2)		N/A
	– Max. temperature of winding protected inherently (insulation class): 150 °C (A); 165 °C (E); 175 °C (B); 190 °C (F); 210 °C (H)		N/A
	Winding protected by protective device:		P
	– Test according 15.3.2 - 15.3.3 – 15.3.4: max. temperature of winding during the time required or the time T given in table 4 (a) (insulation class): 200 °C (A); 215 °C (E); 225 °C (B); 240 °C (F); 260 °C (H)		N/A
	– Test according 15.3.1: max. temperature of winding during the first hour, peak value (insulation class): 200 °C (A); 215 °C (E); 225 °C (B); 240 °C (F); 260 °C (H)	Protected, no high temperature	P
	– Test according 15.3.1: max. temperature of winding after first hour, peak value (insulation class): 175 °C (A); 190 °C (E); 200 °C (B); 215 °C (F); 235 °C (H)		P



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Clause	Requirement + Test	Result - Remark	Verdict
	– Test according 15.3.1: max. temperature of winding after first hour, arithmetic mean value (insulation class): 150 °C (A); 165 °C (E); 175 °C (B); 190 °C (F); 210 °C (H)		P
	Max. temperature of external enclosures (accessible by test finger) 105 °C		P
	Max. temperature of insulation of wiring (rubber and PVC) 85°C		P
	Temperature rise of supports 105 °C		P
15.2	For inherently short-circuit proof transformers and for transformers with rectifiers test by short circuit of the output winding at rated supply voltage x 1,1: temperature rises values in table 3		N/A
15.3	For non-inherently short-circuit proof transformers and for transformers with rectifiers: temperature rises values in table 3	See appended table	P
15.3.1	Output terminals short-circuited: protection device operates, test at 0,9 ... 1,1 of the rated supply voltage		P
15.3.2	If protected by a fuse accordance with either IEC 60 269-2 or IEC 60 269-3, or a technical equivalent fuse, the transformer is loaded as in table 4.		N/A
15.3.3	If protected by a fuse accordance with either IEC 60 127 or ISO 8820, or a technical equivalent fuse, the transformer is loaded with the current as specified for the longest pre arcing time. <i>If protected by a miniature fuses in accordance to IEC 60127, 1,5 times of the rated fuse, until steady state condition (in addition)</i>		N/A
15.3.4	If protected by a circuit-breaker according to IEC 60 898 the transformer is loaded with a current equal to 1,45 times the value of the circuit-breaker rated current		N/A
15.3.5	If other overload protection than a fuse (IEC 60 127) or a circuit-breaker (IEC 60 898) test with 0,95 times of operating current	Protected by electronic circuit	P
	If an internal weak point is used, the test must be repeated with two new samples. The two additional samples works similar to the first sample. Temperatures in the limit of table 3		N/A
15.4	For non-short-circuit proof transformers: temperature rises values in table 3, tests as indicated in 15.3		N/A
15.5	For fail-safe transformers:		N/A
15.5.1	Three additional new specimens are used		—



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Clause	Requirement + Test	Result - Remark	Verdict
	– Upri (V): 1,1 times rated supply voltage		—
	– Isec (A): 1,5 times rated output current		—
	– time until steady-state conditions t1 (h)		—
	– time until failure t2 (h): t1; 5 h		—
15.5.2	During the test:		N/A
	– no flames, molten material, etc.		N/A
	– temperature of enclosure 175 °C		N/A
	– temperature of plywood support 125 °C		N/A
	After the test:		N/A
	– electric strength (Cl. 18, 1 min, test voltage: 35% of specified value); no flashover or breakdown for primary-to-secondary only for safety isolating, isolating and separating transformer and for primary-to-body for all kinds of transformer		N/A
	– bare hazardous live parts not accessible by test finger through holes of enclosure		N/A
15.101	Electronic circuits of the SMPS fulfils the requirements of Annex H of part 1 . After a fault: no electric shock, no fire hazard and no unintentional operation.	(Details see Annex H)	P

16	MECHANICAL STRENGTH		P
16.1	General		P
	After tests of 16.2, 16.3 and 16.4		P
	– no damage		P
	– hazardous live parts not accessible by test pin according to 9.2		P
	– no damage for insulating barriers		P
	– handles, levers, etc. have not moved on shafts		N/A
16.2	Transformers (stationary and portable s. 16.1)		N/A
	For stationary and portable transformers: 3 blows, impact energy 0,5 Nm		N/A
16.3	Portable transformers (except of plug in transformers)		P
	For portable transformers: 100 falls, 25 mm		P
16.4	Transformers with integrated pins (plug in transformers), the following tests are carried out:		N/A
	a) plug-in transformers: tumbling barrel test: 50 x 250 g; 25 x 250 g		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
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	b) torque test of the plug pins with 0,4 Nm		N/A
	c) pull force according to table 5 for each pin		N/A

17	PROTECTION AGAINST HARMFUL INGRESS OF WATER AND MOISTURE		P
17.1	Degree of protection (IP code marked on the transformer)	IPX0	P
	Test according to 17.1.1 and for other IP ratings test according to IEC 60 529:		P
	– stable operating temperature before starting the test for < IPX8		N/A
	– transformer mounted and wired as in normal use		N/A
	– fixed transformer mounted as in normal use by the tests according to 17.1.1 A to L		N/A
	– portable transformers placed in the most unfavourable position and wired as in normal use		N/A
	– glands tightened with a torque equal to two-thirds of 25.6		N/A
	After the tests:		N/A
	– dielectric strength test according to 18.3		N/A
	Inspection:		N/A
	a) in dust-proof transformers no deposit of talcum powder		N/A
	b) no deposit of talcum powder inside dust-tight transformers		N/A
	c) no trace of water on live parts except SELV parts below 15 V ac or 25 V dc or insulation if hazard for the user or surroundings no reduction of creepage distances		N/A
	d) no accumulation of water in transformers IPX1 so as to impair safety		N/A
	e) no trace of water entered in any part of water-tight transformer		N/A
	f) no entry into the transformer by the relevant test probe		N/A
17.1.1	Tests on transformers with enclosure:		P
	A) Solid-object-proof transformers:		P
	– 2 IP2X test finger (IEC 60 529) and test pin (fig. 3)		P
	B) Solid-object-proof transformers:		N/A
	– wire 2,5 mm; force 3 N/A		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	- IP4X, wire 1 mm; force 1 N/A		N/A
	C) Dust-proof transformers, IP5X; dust chamber according to IEC 60 529, fig. 2:		N/A
	a) transformer has operating temperature		N/A
	b) transformer, still operating, is placed in the dust chamber		N/A
	c) the door of the dust chamber is closed		N/A
	d) fan/blower is switched on		N/A
	e) after 1 min transformer is switched off for cooling time of 3 h		N/A
	A) Dust-tight transformers (IP6X) test according to C)		N/A
	B) Drip-proof transformers (IPX1) test according to fig. 3 of IEC 60 529 for 10 min		N/A
	C) Rain-proof transformers (IPX2) test according to fig. 3 of IEC 60 529 for 10 min in operation, any angle up to 15°		N/A
	D) Spray proofed transformers (IPX3) test according to fig. 4 of IEC 60 529 for 10 min in operation and 10 min switched off, time for complete oscillation (2 x 120°) is 4 sec.		N/A
	E) Splash-proof transformers (IPX4) test according to fig. 4 of IEC 60 529 (see F) for 10 min in operation and 10 min switched off (the tube shall oscillate $\approx 360^\circ$)		N/A
	F) Jet-proof transformer (IPX5) test according to fig. 6 of IEC 60 529 (nozzle 6,3mm)		N/A
	G) Powerful Jet-proof transformer (IPX6) test according to fig. 6 of IEC 60 529 (nozzle 12 mm)		N/A
	H) Watertight transformers (IPX7)		N/A
	I) Pressure watertight transformers (IPX8)		N/A
17.2	After moisture test (48 h for IP20, 168 h for other transformers):		P
	- insulation resistance and electric strength (Cl. 18)		P

18	INSULATION RESISTANCE AND ELECTRIC STRENGTH		P
18.2	Insulation resistance between:		P
	- live parts and body for basic insulation 2 M		P
	- live parts and body for reinforced insulation 7 M		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– input circuits and output circuits for basic insulation 2 M		N/A
	– input circuits and output circuits for double or reinforced insulation 5 M		P
	– each input circuit and all other input circuits connected together 2 M		N/A
	– each output circuit and all other output circuits connected together 2 M		N/A
	– hazardous live parts and metal parts with basic insulation (Class II transformers) 2 M		N/A
	– body and metal parts with basic insulation (Class II transformers) 5 M		N/A
	– metal foil in contact with inner and outer surfaces of enclosures 7 M		N/A
18.3	Electric strength test (1 min): no flashover or breakdown:		P
	1) basic insulation between input circuits and output circuits; working voltage (V); test voltage (V)		N/A
	2) double or reinforced insulation between input circuits and output circuits; working voltage (V); test voltage (V)	(see table 18.3)	P
	3) basic or supplementary insulation between:		P
	a) live parts of different polarity; working voltage (V); test voltage (V)	(see table 18.3)	P
	b) live parts and the body if intended to be connected to protective earth	(see table 18.3)	P
	c) inlet bushings and cord guards and anchorages		N/A
	d) live parts and an intermediate conductive part	(see table 18.3)	P
	e) intermediate conductive parts and body		N/A
	4) Reinforced insulation between the body and live parts; working voltage (V); test voltage (V) :	(see table 18.3)	P
	5) Functional insulation for windings intended to be connected in series or parallel (test voltage = working voltage + 500 V) (IEC 61558-2-16:09)		N/A
18.4	Does not apply (IEC 61558-2-16:09)		P
18.101	Impulse test according Table F5 of IEC 60664-1 with 1,2/50 μ s (IEC 61558-2-16)		P
	– After the test of 18.3, 10 impulses of each polarity between input and output terminals		P



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Clause	Requirement + Test	Result - Remark	Verdict
	– During the tests no breakdown of the insulation between turns of a winding, between input and output circuits, or between windings and any conductive core		P
18.5	Touch current and protective earth current		P
18.5.1	Touch current		P
	Touch current measured after the clause 14 test (hot) for class I and class II transformers (class II transformers with metal foil at the plastic surface). The test circuit according figure 8. Measuring network according Figure J1 (Annex J). If the frequency is >30kHz, measuring across the 500 Ohm resistor of J1 (burn effects).		P
	Measurement of the touch current with switch p of picture 8 in both positions and in combination with switches e and n. The measured values are less than the required values of table 8b.	Limit: 0.5mA rms	P
	– switches n and e in on position	L, N to output terminals: 0.125mA rms Max. L, N to enclosure: 0.039mA rms max.	P
	– switch n: off and switch e: on	L, N to output terminals: 0.052mA rms Max. L, N to enclosure: 0.023mA rms max.	P
	– switch n: on and switch e: off	L, N to output terminals: 0.109mA rms Max. L, N to enclosure: 0.037mA rms max.	P
18.5.2	Protective earth conductor current		N/A
	The transformer is connected as in clause 14 Impedance of the ammeter < 0,5 Ohm, connected between earth terminal of the transformer and protective earth conductor		N/A
	The measured values are less than the required values of table 8b.		N/A

19	CONSTRUCTION		P
19.1	Separation of input and output circuits		P
19.1.1	SMPS incorporating auto-transformers (IEC 61558-2-16:2009)		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
19.1.1.1	For plug connected auto-transformers with rated input voltage > rated output voltage the potential to earth shall not exceed the rated output voltage. (IEC 61558-2-16:2009)		N/A
19.1.1.2	SMPS with polarised input and output plug and socket-outlet system: an instruction is given with the information, that the transformer shall not be used with non-polarised plug and socket outlet system. (IEC 61558-2-16:2009)		N/A
19.1.1.3	A polarity detecting device only energises the output in the case: output potential to earth \leq rated output voltage, also with reversed input plug. (IEC 61558-2-16:2009)		N/A
	– The contact separation of the device is \geq 3mm		N/A
	– A current to earth does not exceed 0,75 mA.		N/A
	– All tests are repeated under fault conditions of H.2.3 of annex H of part 1. The potential to earth does not exceed the max output voltage for more than 5 s.		N/A
19.1.2	SMPS incorporating separating transformers (IEC 61558-2-16:09)		N/A
19.1.2.1	Input and output circuits electrically separated. (IEC 61558-2-16:09)		N/A
19.1.2.2	The insulation between input and output winding(s) consist of basic insulation (IEC 61558-2-16:09)		N/A
	Class I SMPS		N/A
	– Insulation between input windings and body consist of basic insulation		N/A
	– Insulation between output windings and body consist of basic insulation		N/A
	Class II SMPS (IEC 61558-2-16:2009)		N/A
	– Insulation between input windings and body consist of double or reinforced insulation		N/A
	– Insulation between output windings and body consist of double or reinforced insulation		N/A
19.1.2.3	The insulation between input windings and intermediate conductive parts and the output windings and intermediate part consist of basic insulation (IEC 61558-2-16:09)		N/A
	For class I SMPS the insulation between input and output windings via the intermediate conductive parts consist of basic insulation (IEC 61558-2-16:2009)		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	For class II SMPS the insulation between input winding and the body and between the output windings and the body via the intermediate conductive parts consist of double or reinforced insulation. (IEC 61558-2-16:2009)		N/A
19.1.2.4	Parts of output circuits may be connected to protective earth (IEC 61558-2-16:09)		N/A
19.1.2.5	No direct contact between output circuits and the body, unless: (IEC 61558-2-16:2009)		N/A
	– Allowed for associated transformers by the equipment standard		N/A
	– Clause 19.8 of part 1 is fulfilled		N/A
19.1.3	SMPS incorporating isolating transformers and safety isolating transformers (IEC 61558-2-16:09)		P
19.1.3.1	Input and output circuits electrically separated (IEC 61558-2-16:09)		P
	No possibility of any connection between these circuits		P
19.1.3.2	The insulation between input and output winding(s) consist of double or reinforced insulation (exception see 19.1.3.4) (IEC 61558-2-16:09)		P
	Class I SMPS not intended for connection to the mains by a plug:		—
	– Insulation between input windings and body connected to earth consist of basic insulation rated to the input voltage		N/A
	– Insulation between output windings and body, connected to earth consist of basic insulation rated for the output voltage		N/A
	Class I SMPS intended for connection to the mains by a plug (EN 61558-2-16:09):		P
	– Insulation between input windings and body connected to earth consist of basic insulation rated to the working voltage		P
	– Insulation between output windings and body, connected to earth consist of supplementary insulation rated for the working voltage		P
	Class II SMPS (IEC 61558-2-16:2009)		P
	– Insulation between input windings and body consist of double or reinforced insulation rated to the input voltage		P
	– Insulation between output windings and body consist of double or reinforced insulation, rated to the output voltage		P



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Clause	Requirement + Test	Result - Remark	Verdict
19.1.3.3	SMPS with intermediate conductive parts not connected to the body (between input/output) (EN 61558-2-16:09):		N/A
19.1.3.3.1	For class I and class II SMPS the insulation between input and output windings, via intermediate conductive parts, consist of double or reinforced insulation, rated to the working voltage (EN 61558-2-16:09).		N/A
	– For class II SMPS the insulation between input winding and the body and between the output windings and the body via the intermediate conductive parts consist of double or reinforced insulation. (rated to the input voltage, for SELV circuits only basic insulation to the body)		N/A
	– For transformers, different from independent, the insulation between input and output windings, via intermediate conductive parts, consist of double or reinforced insulation, rated to the working voltage.		N/A
19.1.3.3.2	Class I transformers with earthed core, and not allowed for class II equipment (EN 61558-2-16:09)		N/A
	– Insulation from the input to the earthed core: basic insulation rated for the input voltage		N/A
	– Insulation from the output voltage to the earthed core: basic insulation rated for the output voltage		N/A
19.1.3.3.3	Insulation between : input to intermediate conductive parts and output and intermediate parts consist of at least basic insulation (EN 61558-2-16:09)		N/A
	– If the insulation from input or output to the intermediate metal part is less than basic insulation, the part is considered to be connected to input or output.		N/A
19.1.3.4	For class I SMPS, with protective screen, not connected to the mains by a plug the following conditions comply (EN 61558-2-16:09):		N/A
	– The insulation between input winding and protective screen consist of basic insulation (rated input voltage)		N/A
	– The insulation between output winding and protective screen consist of basic insulation (rated output voltage)		N/A
	– The protective screen consist of metal foil or a wire wound screen extending the full width of the windings and has no gaps or holes		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– Where the protective screen does not cover the entire width of the input winding, additional insulation to ensure double insulation in this area, is used.		N/A
	– If the screen is made by a foil, the turns are isolated, overlap at least 3 mm		N/A
	– The cross-section of the screen and the lead out wire is at least corresponding to the rated current of the overload device		N/A
	– The lead out wire is soldered or fixed to the protective screen.		N/A
	Protective screening is not allowed for SMPS with plug connection to the mains (EN 61558-2-16:09)		N/A
19.1.3.5	No connection between output circuit and protective earth, except of associated transformers (allowed by equipment standard) or 19.8 is fulfilled (EN 61558-2-16:09).		N/A
19.1.3.6	No connection between output circuit and body, except of associated transformers (allowed by equipment standard) (EN 61558-2-16:09)		N/A
19.1.3.7	The distance between input and output terminals for the connection of external wiring is 25 mm		N/A
19.1.3.8	Portable SMPS having an rated output ≤ 630 VA (EN 61558-2-16:09)	Fixed SMPS	P
19.1.3.9	No connection between input and output circuit, except of associated transformers (allowed by equipment standard) (EN 61558-2-16:09)	No connection	P
19.1.3.10	Protective screening is not allowed for SMPS with plug connection to the mains (EN 61558-2-16:09)		N/A
19.2	Fiercely burning material not used	Such substance not used	P
	Unimpregnated cotton, silk, paper and fibrous material not used as insulation		P
	Wax-impregnated, etc. not used		P
19.3	Portable transformer: short-circuit proof or fail-safe	Short-circuit proof	P
19.4	Class II transformers: contact between accessible metal parts and conduits or metal sheaths of supply wiring impossible		N/A
19.5	Class II transformers: part of supplementary or reinforced insulation, during reassembly after routine servicing not omitted		P
19.6	Class I and II transformers: creepage distances and clearances over supplementary or reinforced insulation if wire, screw, nut, etc. become loose or fall out of position not 50% specified values (Cl. 26)		P



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Clause	Requirement + Test	Result - Remark	Verdict
19.7	Conductive parts connected to accessible metal parts by resistors or capacitors shall be separated from hazardous live parts by double or reinforced insulation		N/A
19.8	Resistors or capacitors connected between hazardous live parts and the body (accessible metal parts) consist of:		P
	– components according to IEC 60 065, 14.1 or capacitor Y1 according to IEC 60 384-14		P
	– at least two separate components		N/A
	– if one component is short-circuited or opened, values specified in Cl. 9 shall not be exceeded		N/A
	– if the working voltage is ≤ 250 V, one Y1 capacitor according 60384-14 is allowed	Certified Y-capacitor according to IEC 60384-14	P
19.9	Insulation material input/output and supplementary insulation of rubber resistant to ageing		N/A
	Creepage distances (if cracks) specified values (Cl. 26)		N/A
19.10	Protection against accidental contact by insulating coating:		N/A
	a) ageing test (section I, IEC 60 068-2-2), test Ba: 168 h; 70 °C		N/A
	b) impact test (spring-operated impact hammer according to IEC 60 068-2-63; $0,5 \pm 0,05$ J)		N/A
	c) scratch test (hardened steel pin) electric strength test according to Cl. 18		N/A
19.11	Handles, levers, knobs, etc.:		N/A
	– insulating material		N/A
	– supplementary insulation covering		N/A
	– separated from shafts or fixing by supplementary insulation		N/A
19.12	Windings construction		P
19.12.1	Undue displacement in all types of transformers not allowed:		P
	– of input or output windings or turns thereof		P
	– of internal wiring or wires for external connection		P
	– of parts of windings or of internal wiring in case of rupture or loosening		P
19.12.2	Serrated tape:		N/A
	– distance through insulation according to table 13		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– one additional layer of serrated tape, and		N/A
	– one additional layer without serration		N/A
	– in case of cheekless bobbins the end turns of each layer shall be prevented from being displaced		N/A
19.12.3 (A1)	Insulated windings wires providing basic, supplementary or reinforced insulation, meet the following requirements:		P
	– Multi-layer extruded or spirally wrapped insulation, passed the tests of annex K		N/A
	– Basic insulation: two wrapped or one extruded wire		N/A
	– Supplementary insulation: two layers, wrapped or extruded		N/A
	– Reinforced insulation: three layers wrapped or extruded		P
	Spirally wrapped insulation:		N/A
	– creepage distances between wrapped layers > cl. 26 _ P1 values		N/A
	– path between wrapped layers sealed, the test voltage of K2 is multiplied with 1,35		N/A
	– test 26.2.3 – Test A, passed for wrapped layers		N/A
	– the finished component pass the electric strength test according to cl. 18.3		N/A
	a) Insulated winding wire used for basic or supplementary insulation in a wound part:		N/A
	– comply with Annex K		N/A
	– two layers for supplementary insulation		N/A
	– one layer for basic insulation		N/A
	– one layer for mechanical separation between the insulated wires of primary and secondary. This layer fulfils the requirement of basic insulation.		N/A
	b) Winding wire with double or reinforced insulation:		P
	– comply with Annex K		P
	– the insulation of the insulated winding wire: three layers		P
	– dielectric strength test with the values according 18.3 multiplied by 1,25		P
	Where the wire is wound:		P



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Clause	Requirement + Test	Result - Remark	Verdict
	– upon metal or ferrite cores		P
	– upon enamelled wire		P
	– under enamelled wire		P
	– one layer for mechanical separation between the insulated wires of primary and secondary. This layer fulfils the requirement of basic insulation.		P
	– both windings shall not touch each other and also not the core.		P
	100 % Routine test according to Annex K.3 for windings giving double or reinforced insulation		N/A
	no creepage distances and clearances for insulated winding wirers		P
	for TIW wires values of box 2) c) of table 13, table C.1 and table D.1 of part 1 and of clause 26.106 are not required		P
FIW	Transformers which use FIW wire		N/A
19.12.101 (A1)	Max. class F for transformers which use FIW-wire		N/A
19.12.102 (A1)	FIW wires comply with IEC 60851-5, Ed.4.1; IEC 60317-0-7 and IEC 60317-56, Ed.1.		N/A
	– other nominal diameter as mentioned in table 19.101 can be calculated with the formula after table 19.111		N/A
	FIW wire used for basic or supplementary insulation for transformers according 19.1.2 (separating transformers) of IEC 61558-2-16:		N/A
	– the test voltage of table 8a – part 1, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 19.111		N/A
	– one layer for mechanical separation is located between the insulated wires of primary and secondary. This layer fulfil the requirement of basic insulation		N/A
	– between FIW and enamelled wire, no requirements of creepage distances and clearances		N/A
	– no touch of FIW and enamelled wires (grad 1, or grad 2 ...)		N/A
	FIW wire used for double or reinforced insulation for transformers according 19.1.3 (isolating and safety isolating transformers) of IEC 61558-2-16 (PRI and SEC basic insulated FIW-wire):		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> the test voltage of table 8a – part 1, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 19.111 		N/A
	<ul style="list-style-type: none"> for primary and secondary winding FIW-wire for basic insulation is used 		N/A
	<ul style="list-style-type: none"> one layer for mechanical separation is located between the insulated wires of primary and secondary. This layer fulfil the requirement of basic insulation 		N/A
	<ul style="list-style-type: none"> no touch between the basic insulated PRI and SEC FIW-wires 		N/A
	<ul style="list-style-type: none"> between PRI- and SEC-FIW wires, no requirements of creepage distances and clearances 		N/A
	Alternative construction used for reinforced insulation (reinforced insulated FIW wire and enamelled wire)		N/A
	<ul style="list-style-type: none"> the test voltage of table 8a – part 1, based on the working voltage reinforced insulation, comply with the min. voltage strength of table 19.111 		N/A
	<ul style="list-style-type: none"> one layer for mechanical separation is located between the reinforced insulated FIW wire and the enamelled wire. This layer fulfil the requirement of basic insulation 		N/A
	<ul style="list-style-type: none"> no touch between the FIW wire and the enamelled wire 		N/A
	<ul style="list-style-type: none"> between the reinforced FIW wire and any other parts, no requirements of creepage distances and clearances exist 		N/A
	Alternative construction with FIW wires, basic or supplementary insulated for transformers double or reinforced insulation according to 19.1.3 (basic/ supplementary insulated FIW wire + enamelled wire + creepage distance and clearances for basic insulation)		N/A
	<ul style="list-style-type: none"> the test voltage of table 8a – part 1, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 19.111 		N/A
	<ul style="list-style-type: none"> PRI or SEC basic insulated FIW wire and to the other winding (enamelled wire) requirements of supplementary insulation 		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> creepage distances and clearances between the basic insulated FIW wire and the enamelled wire for basic or supplementary insulation are required. 		N/A
	Where the FIW wire is wound		N/A
	<ul style="list-style-type: none"> upon metal or ferrite cores 		N/A
	<ul style="list-style-type: none"> one layer for mechanical separation between the insulated wires and the core or the enamelled wires is required. This layer fulfils the requirement of basic insulation. 		N/A
	<ul style="list-style-type: none"> both windings shall not touch each other and also not the core. 		N/A
19.13	Handles, operating levers and the like shall be fixed		N/A
19.14	Protection against electric shock: covers securely fixed, 2 independent fixing means, one with tool	Rim and screws	P
19.15	Transformer with pins for fixed socket-outlets: no strain on socket-outlet		N/A
	Additional torque 0,25 Nm		N/A
19.16	Protection index for portable transformers:		P
	200 VA IP20 and instructions for use	IPX0	P
	> 200 VA 2,5 kVA IPX4 (single-phase)		N/A
	> 200 VA 6,3 kVA IPX4 (polyphase)		N/A
	> 2,5 VA (single-phase) IP21		N/A
	> 6,3 VA (polyphase) IP21		N/A
19.17	Transformers IPX1 - IPX6 totally enclosed, except for drain hole (diameter 5 mm or 20 mm ² with width 3 mm); drain hole not required for transformer completely filled with insulating materials	Only one SELV-circuit	N/A
19.18	Transformers IPX1 with a moulded, if any		N/A
19.19	Class I transformers with a non-detachable flexible cable or cord with earth conductor and a plug with earth contact		N/A
19.20	Live parts of SELV and PELV-circuits: separation not less than PRI/SEC of a safety isolating transformer		P
	<ul style="list-style-type: none"> SELV output circuits separated by double or reinforced insulation from all other than SELV or PELV circuits 		P
	<ul style="list-style-type: none"> SELV output circuits separated by basic insulation from other SELV or PELV circuits 		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
19.20.1	SELV circuits and parts not connected to protective earth, to live parts, or protective conductors forming part of other circuits	No protective earth	P
	Nominal voltage (V) > 25 V a.c. or 60 V d.c., the required insulation fulfils the high voltage test according to table 8 a		N/A
19.20.2	PELV-circuits double or reinforced insulation is necessary	No such circuit was used	N/A
19.21	FELV-circuits: protection against contact fulfils the min. test voltage required for the primary circuit	No such circuit was used	N/A
19.22	Class II transformers shall not be provided with means for protective earth		P
	For fixed transformers an earth conductor with double or reinforced insulation to accessible metal parts is allowed		N/A
19.23	Class III transformers shall not be provided with means for protective earth		N/A

20	COMPONENTS		P
	Components such as switches, plugs, fuses, lamp holders, flexible cables and cords, comply with relevant IEC standard	(see appended table 20)	P
	Components inside the transformer pass all tests of this standard together with the transformer tests		P
	Testing of components separately to the transformer according the relevant standard:		N/A
	– Ratings of the component in line with the transformer ratings, including inrush current. Component test according the component standard, based on the component marking (rating).		N/A
	– Components without markings tested under transformer conditions including inrush current.		N/A
	– If no IEC standard exist, the component is tested under transformer conditions.		N/A
20.1	Appliance couplers for main supply shall comply with:		N/A
	– IEC 60 320 for IPX0		N/A
	– IEC 60 309 for other		N/A
20.2	Automatic controls shall comply with IEC 60 730-1		N/A
20.3	Thermal-links comply with IEC 60691		N/A
20.4	Switches shall comply with annex F	Switch has approved	N/A
	Disconnection from the supply:		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– by a switch, disconnecting all poles of the supply (full disconnection under the relevant over-voltage category)		N/A
	– or a flexible supply cable and cord with plug		N/A
	– or an instruction sheet: disconnection by all-poles switches incorporated in fixed wiring		N/A
20.5	Socket-outlets of the output circuit shall be such that there is no unsafe compatibility to plugs complying with input circuit.		P
	Plugs and socket-outlets for SELV systems with both a rated current = 3A and a rated voltage =24 V shall comply with following:		P
	SELV plug and socket-outlets shall comply with IEC 60 884-2-4 and IEC 60 906-3		P
	– It is not possible for plugs to enter socket-outlets of other standardised voltage system		N/A
	– Socket outlets do not accommodate plugs of other standardised voltage systems		N/A
	– Socket outlets do not have a protective earth contact		N/A
	PELV plug and socket-outlets shall comply with following:		N/A
	– It is not possible for plugs to enter socket-outlets of other standardised voltage system		N/A
	– Socket outlets do not accommodate plugs of other standardised voltage systems		N/A
	– Socket outlets do not have a protective earth contact		N/A
	FELV plug and socket-outlets shall comply with following:		N/A
	– It is not possible for plugs to enter socket-outlets of other standardised voltage system		N/A
	– Socket outlets do not accommodate plugs of other standardised voltage systems		N/A
20.6	Thermal cut-outs, overload releases etc. have adequate breaking capacity		P
	– Thermal cut outs fulfil the relevant requirements of 20.7 and 20.8		N/A
	– Thermal links fulfil the relevant requirements of 20.8		N/A
	– The breaking capacity is in accordance with the relevant fuse standard		P



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Clause	Requirement + Test	Result - Remark	Verdict
20.6.1	For Fuses According IEC 60127 and IEC 60269, the fuse current does not exceed 1,1 times of the rated value		P
20.7	Thermal cut outs shall meet the requirements of 20.7.1.1 and 20.7.2, or 20.7.1.2 and 20.7.2.		N/A
20.7.1	Requirements according to IEC 60730-1		N/A
20.7.1.1	Thermal cut-out tested as component shall comply with IEC 60 730-1		N/A
20.7.1.2	Thermal cut-out tested as a part of the transformer		N/A
	a) Thermal cut outs type 1 or type 2 (IEC 60730-1)		N/A
	b) Thermal cut outs fulfil the requirements of micro-interruption (type 1C or 2 C) or micro-disconnection, (type 1B or 2B) (see IEC 60730-1)		N/A
	c) Thermal cut outs with manual reset have a trip free mechanism (type 1E and 2E) (see IEC 60730-1)		N/A
	d) The number of cycles of automatic action shall be:		N/A
	– 3000 cycles for self resetting thermal cut-outs		N/A
	– 300 cycles for non self resetting thermal cut-outs resetting by hand		N/A
	– 300 cycles for non self resetting thermal cut-outs resetting disconnecting		N/A
	– 30 cycles for non self resetting thermal cut-outs which are only resettable by a tool		N/A
	e) Thermal cut outs fulfil the electrical stress according IEC 60730-1, 6.14.2		N/A
	f) Characteristic of thermal cut-outs:		N/A
	– ratings according IEC 60730-1, cl. 5		N/A
	– classification according to:		N/A
	1) nature of supply to IEC 60730-1, cl. 6.1		N/A
	2) type of load controlled to IEC 60730-1, cl. 6.2		N/A
	3) degree of protection IPX0 to IEC 60730-1, cl. 6.5.1		N/A
	4) degree of protection IP0X to IEC 60730-1, cl. 6.5.2		N/A
	5) pollution degree to IEC 60730-1, cl. 6.5.3		N/A
	6) comparative tracking index to IEC 60730-1, cl. 6.13		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	7) max. ambient temperature to IEC 60730-1, cl. 6.7		N/A
20.7.1.2	Thermal cut-out tested as a part of the transformer, test with 3 samples:		N/A
	– at least micro-interruption or micro-disconnection (IEC 60730-1)		N/A
	– 300 h aged at t_a (transformer) + 10°C		N/A
	– subjected to a number of cycles for automatic operating according 20.7.1.1		N/A
	During the test no sustaining arcing shall occur, during and after the test no damage at the thermal cut out and the transformer in the sense of this standard		N/A
20.7.2	Thermal cut-outs shall have adequate breaking capacity		N/A
20.7.2.1	The output of the transformer with a non self resetting thermal cut out is short circuited at a supply voltage 1, 1 of rated supply voltage. After opening of the cut off, the supply voltage is switched of, until the transformer is cooling down.		N/A
	– 3 cycles at 25° C for transformers without t_a min		N/A
	– 3 cycles at t_a min for transformers with t_a min		N/A
	– after the 3 cycles short circuit of the output at 1,1 of rated supply voltage for 48 h.		N/A
	During the tests no sustaining arcing shall occur After the test: withstand the test of clause 18, show no damage in sense of this standard, and be operational.		N/A
20.7.2.2	The output of the transformer with a self resetting thermal cut out is short circuited at a supply voltage 1, 1 of rated supply voltage.		N/A
	– 48 h at 25° C for transformers without t_a min		N/A
	– 24 h at t_a and 24 h at t_a min for transformers with t_a min		N/A
	During the tests no sustaining arcing shall occur After the test: withstand the test of clause 18, show no damage in sense of this standard, and be operational.		N/A
20.7.3	Test of a PTC resistor:		N/A
	5 cycles: transformer short-circuited for 48 h by 1,1 times of the input voltage and max. t_a		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	5 cycles: transformer short-circuited for 48 h by 0,9 times of the input voltage and min. t_a (if declared)		N/A
	After the test: withstand the test of clause 18, show no damage in sense of this standard, and be operational.		N/A
20.8	Thermal links shall be tested in one of the following two ways.		N/A
20.8.1	Thermal-links shall comply with IEC 60 691 as a separate component.		N/A
	– electrical conditions to IEC 60691, cl. 6.1		N/A
	– thermal conditions to IEC 60691, cl. 6.2		N/A
	– ratings to IEC 60691, cl. 8 b		N/A
	– suitability of sealing components, impregnating fluids or cleaning solvents IEC 60691, cl. 8 c		N/A
20.8.2	Thermal-links tested as a part of the transformer:		N/A
	– ageing test 300 h by 35 °C or $t_a + 10$ °C		N/A
	– After transformer fault condition the thermal link operate without sustaining arcing		N/A
	– after opening the thermal-link shall have an insulation resistance of at least 0,2 M		N/A
	– 3 cycles for replaceable thermal-links		N/A
	– 3 new specimens for not replaceable thermal-links		N/A
20.9	Self-resetting devices not used if mechanical, electrical, etc. hazards		N/A
20.10	Thermal cut-outs which can be reset by soldering operation are not allowed		N/A
20.9	Overload protection devices do not operate during test (20 times switched on and off, at no load); Upri (V): 1,1 times rated supply voltage.		P

21	INTERNAL WIRING		P
21.1	Internal wiring and electrical connections protected or enclosed		P
	Wire-ways smooth and free from sharp edges		P
21.2	Openings in sheet metal: edges rounded (radius 1,5 mm) or bushings of insulating material		N/A
21.3	Bare conductors: distances adequately maintained		P
21.4	When external wires are connected to terminal, internal wiring shall not work loose		P



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Clause	Requirement + Test	Result - Remark	Verdict
21.5	Insulation of heat-resistant and non-hygroscopic material for insulated conductors subject to temperature rise > limiting values given in 14.1		P
22	SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CABLES AND CORDS		P
22.1	All cables, flexible cords etc. shall have appropriate current and voltage ratings	Output cord is suitably used within the current and voltage rating.	P
22.2	Input and output wiring inlet and outlet openings for external wiring: separate entries without damage to protective covering of cable or cord	Output cord with integral bushing	P
	Input and output wiring inlet and outlet openings for flexible cables or cords: insulating material or bushing of insulating material		P
	Bushings for external wiring: reliably fixed, not of rubber unless part of cord guard	Bushing for output cord.	P
22.3	Fixed transformer:		N/A
	– possible to connect after fixing		N/A
	– inside space for wires allow easy introduction and connection of conductors		N/A
	– fitting of cover without damage to conductors		N/A
	– contact between insulation of external supply wires and live parts of different polarity not allowed		N/A
22.4	Length of power supply cord for portable transformers mm ²		N/A
	- not exceed 2m for cross-sectional area of 0,5 mm ²		N/A
	- exceed 2m for cross-sectional area greater than 0,5 mm ²		N/A
22.5	Power supply cords for transformers IPX0 and transformers "for indoor use only" ≥ IPX0:		N/A
	– for transformers with a mass ≤ 3 kg: 60227 IEC52 (H03VV-..) (60245 IEC 53)		N/A
	– for transformers with a mass > 3 kg: 60227 IEC53 (H05VV-..) or 60245 IEC 53		N/A
	Power supply cords for transformers for outdoor use: ≥ IPX0: 60245 IEC57 (H05RN-..)		N/A
22.6	Power supply cords for single-phase portable transformers with input current ≤ 16A:		N/A
	– cord set fitted with an appliance coupler in accordance with IEC 60320		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
22.7	Nominal cross-sectional area (mm ²); input current (A) at rated output not less than shown in table 9		P
22.8	Class I transformer with power supply flexible cable: green/yellow core connected to earth terminal		N/A
	Plug for single-phase transformer with input current at rated output 16 A according to IEC 60 083, IEC 60 906-1 or IEC 60 309		N/A
22.9	Type X, Y or Z attachments: see relevant part 2		P
22.9.1	For type Z attachment: moulding enclosure and power supply cable do not affect insulation of cable		P
22.9.2	Inlet openings or inlet bushing: without risk of damage to protective covering of power supply cord		N/A
	Insulation between conductor and enclosure:		N/A
	– for Class I transformer: insulation of conductor plus separate basic insulation		N/A
	– for Class II transformer: insulation of conductor plus double or reinforced insulation		N/A
22.9.3	Inlet bushings:		P
	– no damage to power supply cord		P
	– reliably fixed		P
	– not removable without tool		P
	– not integral with power supply cord (for type X attachment)		P
	– not of natural rubber except for Class I transformer with type X, Y and Z attachments		N/A
22.9.4	For portable transformers which are moved while operating:		N/A
	– cord guards, if any, of insulating material and fixed		N/A
	Compliance is tested by the oscillating test according to fig. 7:		N/A
	– loaded force during the test according to fig. 7		N/A
	– 10 N/A for a cross-sectional area > 0,75		N/A
	– 5 N/A for a cross-sectional area 0,75		N/A
	After the test according to fig. 7:		N/A
	– no short-circuit between the conductors		N/A
	– no breakage of more than 10% of strands of any conductor		N/A
	– no separation of the conductor from the terminal		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– no loosening of any cord guards		N/A
	– no damage of the cord or cord guard		N/A
	– no broken strands piercing the insulation and not becoming accessible		N/A
22.9.5	Cord anchorages for type X attachment:		P
	– glands in portable transformers not used unless possibility for clamping all types and sizes of cable		N/A
	– moulded-on designs, tying the cable into a knot and tying the end with string not allowed		N/A
	– labyrinths, if clearly how, permitted		N/A
	– replacement of cable easily possible		N/A
	– protection against strain and twisting clearly how		N/A
	– suitable for different types of cable unless only one type of cable for transformer		N/A
	– the entire flexible cable or cord with covering can be mounted into the cord anchorage		N/A
	– if tightened or loosened no damage		N/A
	– no contact between cable or cord and accessible or electrically connected clamping screws		N/A
	– cord clamped by metal screw not allowed		N/A
	– one part securely fixed to transformer		N/A
	– for Class I transformer: insulating material or insulated from metal parts		N/A
	– for Class II transformers: insulating material or supplementary insulation from metal parts		N/A
	Cord anchorages for type X, Y, Z attachments: cores of power external flexible cable or cord insulated from accessible metal parts by:		N/A
	– basic insulation (Class I transformers), separate insulating barrier/cord anchorage		N/A
	– supplementary insulation (Class II transformers), special lining/cable or cord sheath of cable sheath of cable		N/A
	Cord anchorages for type X and Y attachments:		N/A
	– replacement of external flexible cable or cord does not impair compliance with standard		N/A
	– the entire flexible cable or cord with covering can be mounted into the cord anchorage		N/A
	– if tightened or loosened no damage		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– no contact between cable or cord and accessible or electrically connected clamping screws		N/A
	– cord clamped by metal screws not allowed		N/A
	– knots in cord not used		N/A
	– labyrinths, if clearly how, permitted		N/A
	Tests for type X with special cords, type Y, type Z	Output cord are type Z for all models.	P
	Test for type X attachments one test with a cord with smallest and one test with a cord with the largest cross-sectional area:		N/A
	– for the test with clamping screws or tightened with torque 2/3 of that specified in table 11		P
	– not possible to push cable into transformer		P
	– 25 pulls of 1 s		P
	– 1 min torque according to table 10		P
	– mass (kg); pull (N/A); torque (Nm)	Mass <1kg; 30N; 0.1Nm	—
	– during test: cable not damaged		P
	– after test: longitudinal displacement 2 mm for cable or cord and 1 mm for conductors in terminals		P
	– creepage distances and clearances values specified in Cl. 26		P
22.9.6	Space for external cords or cable for fixed wiring and for type X and Y attachments:		N/A
	– before fitting cover, possibility to check correct connection and position of conductors		N/A
	– cover fitted without damage to supply cords		N/A
	– for portable transformers: contact with accessible metal parts if conductor becomes loose not allowed unless for type X and Y attachments terminations of cords do not slip free of conductor		N/A
	Space for external cords or cable for type X attachment and for connection to fixed wiring, in addition:		N/A
	– conductor easily introduced and connected		N/A
	– possibility of access to terminal for external conductor after removal of covers without special purpose tool		N/A
23	TERMINALS FOR EXTERNAL CONDUCTORS		P



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Clause	Requirement + Test	Result - Remark	Verdict
23.1	Transformer for connection to fixed wiring and transformer without power supply cords with type Y and Z attachments: only connections by screws, nuts, terminals		P
	Terminals are integral part of the transformer:		N/A
	– comply with IEC 60 999-1 under transformer conditions		N/A
	Other terminals:		N/A
	– separately checked according to IEC 60 998-2-1, IEC 60 998-2-2 or IEC 60 947-7-1		N/A
	– used in accordance with their marking		N/A
	– checked according to IEC 60 999-1 under transformer conditions		N/A
	Transformer with type X attachments: soldered connection permitted if reliance not placed upon soldering, crimping or welding alone unless by barriers, creepage distances and clearances between hazardous live parts and metal parts should conductor break away 50% of specified value (Cl. 26)		N/A
	Transformer with type Y and Z attachments for external conductors: soldered, welded, crimped, etc. connections allowed		P
	For Class II transformer: reliance not placed upon soldering, crimping or welding alone unless by barriers, creepage distances and clearances between hazardous live parts and metal parts should conductor break away 50% of specified value (Cl. 26)		P
23.2	Terminals for type X with special cords Y and Z attachments shall be suitable for their purpose:		P
	– test by inspection according to 23.1 and 23.2		P
	– pull of 5 N/A to the connection before test according to 14.1		P
23.3	Other terminals than Y and Z attachments shall be so fixed that when the clamping means is tightened or loosened:		N/A
	– terminal does not work loose		N/A
	– internal wiring is not subjected to stress		N/A
	– creepage distances and clearance are not reduced below the values specified in Cl. 26		N/A
23.4	Other terminals than Y and Z attachments shall be so designed that:		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– they clamp the conductor between metallic surfaces with sufficient contact pressure		N/A
	– without damage to the conductor		N/A
	– test by inspection according to 23.3 and 23.4		N/A
	– 10 times fastening and loosening a conductor with the largest cross-sectional area with 2/3 of the torque specified in Cl. 25		N/A
23.5	Terminals for fixed wiring and for type X: located near their associated terminals of different polarities and the earth terminal if any		N/A
23.6	Terminal blocks not accessible without the aid of a tool		N/A
23.7	Transformer with type X attachments: stranded conductor test (8 mm removed):		N/A
	– Class I transformers: no connection between live parts and accessible metal parts		N/A
	– free wire of earth terminal: no touching of live parts		N/A
	– Class II transformers: no connection between live parts and accessible metal parts, no connection between live parts and metal parts separated from accessible metal parts by supplementary insulation		N/A
23.8	Terminals for a current > 25 A:		N/A
	– pressure plate, or		N/A
	– two clamping screws		N/A
23.9	When terminal, other than protective earth conductor, screws loosened as far as possible, no contact:		N/A
	– between terminal screws and accessible metal parts		N/A
	– between terminal screws and inaccessible metal parts for Class II transformers		N/A

24	PROVISION FOR PROTECTIVE EARTHING		P
24.1	Class I transformers: accessible conductive parts connected to earth terminal		P
	Class II transformers: no provision for earth		P
24.2	Protective earth terminal for connection to fixed wiring and for type X attachment transformers: comply with Cl. 23, adequately locked, not possible to loosen without a tool		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
24.3	No risk of corrosion from contact between metal of earth terminal and other terminal		N/A
	In case of earth terminal body of Al, no risk of corrosion from contact between Cu and Al		N/A
	Body of earth terminal or screws/nuts of brass or other metal resistant to corrosion		N/A
24.4	Resistance of connection between earth terminal and metal parts 0,1 with a min. 25 A or 1,5 rated input current at 1 min		N/A
24.5	Class I transformers with external flexible cables or cords:		N/A
	– current-carrying conductors becoming touch before the earth conductor		N/A

25	SCREWS AND CONNECTIONS		N/A
25.1	Screwed connections withstand mechanical stresses		N/A
	Screws transmitting contact pressure or likely to be tightened by the user or having a diameter < 2,8 mm, shall screw into metal		N/A
	Screws not of metal which is soft or liable to creep (Zn, Al)		N/A
	Screws of insulating material: not used for electrical connection		N/A
	Screws not of insulating material if their replacement by metal screws can impair supplementary or reinforced insulation		N/A
	Screws to be removed (replacement etc. of power supply cord) not of insulating material if their replacement by metal screws can impair basic insulation		N/A
	No damage after torque test: diameter (mm); torque (Nm); ten times		N/A
	No damage after torque test: diameter (mm); torque (Nm); five times		N/A
25.2	Screws in engagement with thread of insulating material:		N/A
	– length of engagement 3 mm + 1/2 screw diameter or 8 mm		N/A
	– correct introduction into screw hole		N/A
25.3	Electrical connections: contact pressure not transmitted through insulating material		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
25.4	In case of use of thread-forming (sheet metal) screws for connection of current-carrying parts: clamping and locking means provided		N/A
	Thread-cutting (self-tapping) screws used for the connection of current-carrying parts allowed if they generate a full form machine screw thread and if not operated by the user		N/A
	Thread-cutting screws and thread-forming screws used for earth continuity allowed if at least 2 screws for each connection are used and it is not necessary to disturb the connection in normal use		N/A
25.5	Screws for current-carrying mechanical connections locked against loosening		N/A
	Rivets for current-carrying connections subject to torsion locked against loosening		N/A
25.6	Test of screwed glands with a torque according to table 12. After the test no damage at the transformer and the gland.		N/A

26	CREEPAGE DISTANCES AND CLEARANCES		P
26.1	See 26.101		P
26.2	Creepage distances (cr) and clearances (cr)		P
26.2.1	Windings covered with adhesive tape		N/A
	– the values of pollution degree 1 are fulfilled		N/A
	– all isolating material are classified acc. to IEC 60085 and IEC 60216		N/A
	– test A of 26.2.3 is fulfilled		N/A
26.2.2	Uncemented insulating parts pollution degree P2 or P3	Pollution degree 2	P
	– all isolating material are classified acc. to IEC 60085 and IEC 60216		P
	– values of pollution degree 1 are not applicable		P
26.2.3	Cemented insulating parts		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	– values of distance through insulation (dti) are fulfilled		N/A
	– creepage distances and clearances are not required		N/A
	– test A of this sub clause is fulfilled		N/A
	Test A		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specially specimens, with un-insulated wires, without impregnation or potting	(see appended table)	N/A
	Two of the three specimens are subjected to:		N/A
	– the relevant humidity treatment according to 17.2 (48 h)		N/A
	– the relevant dielectric strength test of 18.3 multiplied with factor 1,35		N/A
	– One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,35 immediately at the end of the last cycle with high temperature		N/A
	Impulse dielectric test according to 4.1.1.2.1 of IEC 60 664-1 (1,2 / 50 s waveform) – see Annex R of IEC 61558-1		N/A
26.2.4	Enclosed parts, by impregnation or potting	Considered (test B) fulfilled by internal construction of approved opto-coupler.	P
26.2.4.1	– The requirements of reduced values as stated for pollution degree 1 (P1) are fulfilled		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	Test B		N/A
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specially specimens, potted or impregnated. The dielectric strength test is applied directly to the joint.	(see appended table)	N/A
	Two of the three specimens are subjected to:		N/A
	– the relevant humidity treatment according to 17.2 (48 h)		N/A
	– the relevant dielectric strength test of 18.3 multiplied with factor 1,25		N/A
	– One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,25 immediately at the end of the last cycle with high temperature		N/A
	The three spacemen pass the Impulse dielectric test according to 4.1.1.2.1 of IEC 60 664-1 (1,2 / 50 s waveform) – see Annex R of IEC 61558-1		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
26.2.4.2	– The requirements of distance through insulation (dti) are fulfilled. (P1 values are not required)		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	Test C		N/A
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specimens, potted or impregnated. (finished components)	(see appended table)	N/A
	– Neither cracks, nor voids in the insulating compounds		N/A
	Two of the three specimens are subjected to:		N/A
	– the relevant humidity treatment according to 17.2 (48 h)		N/A
	– the relevant dielectric strength test of 18.3 multiplied with factor 1,35		N/A
	– One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,35 immediately at the end of the last cycle with high temperature		N/A
	The three spacemen pass the Impulse dielectric test according to 4.1.1.2.1 of IEC 60 664-1 (1,2 / 50 s waveform) – see Annex R of IEC 61558-1		N/A
26.3	Distance through insulation		P
	For double or reinforced insulation, the required values of Tables 13, C1, and D1 – boxes 2b, 2c and 7 are fulfilled		P
	The insulation fulfil the material classification according IEC 60085 or 60216 or the test of 14.3		P
26.3.1	Reduced values of the thickness of insulation for supplementary or reinforced insulation are allowed if the following conditions are fulfilled:		N/A
	– the isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	– the test of 14.3 is fulfilled		N/A
	– If both requirements are fulfilled, the required values for solid insulation can be multiplied by 0,4		N/A
	– Minimum thickness of reinforced insulation $\geq 0,2$ mm		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– Minimum thickness of supplementary insulation $\geq 0,1$ mm		N/A
26.3.2	Insulation in thin sheet form		P
	– If the layers are non separable (glued together):		N/A
	– The requirement of 3 layers is fulfilled		N/A
	– The mandrel test according 26.3.3 is fulfilled with 150 N/A		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" are fulfilled.		N/A
	– If the layers are separated:		P
	– The requirement of 2 layers is fulfilled		P
	– If serrated tape is used, 1 additional layer (serrated) and one additional layer without serration is required		N/A
	– The mandrel test according 26.3.3 is fulfilled on each layer with 50 N/A		P
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" are fulfilled.		P
	– If the layers are separated (alternative:		N/A
	– The requirement of 3 layers is fulfilled		N/A
	– If serrated tape is used, 1 additional layer (serrated) and one additional layer without serration is required		N/A
	– The mandrel test according 26.3.3 is fulfilled on 2/3 of the layers with 100 N/A		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" are fulfilled.		N/A
	Test according to 14.3 and if the isolating materials are classified acc. to IEC 60085 and IEC 60216 no distances through insulation are required for insulation in thin sheet form		N/A
	The figures within square brackets in box 2 and 7 of table 13 (C.1/D.1) are used for insulation in thin sheet form as follows:		P
	– rated output > 100 VA values in square brackets apply		N/A
	– rated output ≥ 25 VA ≤ 100 VA 2/3 of the value in square brackets apply		P
	– rated output < 25 VA 1/3 of the value in square brackets apply		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
26.3.3	Mandrel test of insulation in thin sheet form (specimen Of 70 mm width are necessary):	All material listed in table 20 have been evaluated.	P
	– If the layers are non separable – at least 3 layers glued together fulfil the test:		N/A
	– pull force of 150 N/A		N/A
	– high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdown.		N/A
	– If the layers are separable and 2/3 of at least 3 layers fulfil the test.		N/A
	– pull force of 100 N/A		N/A
	– high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdowns.		N/A
	– If the layers are separable 1 of at least 2 layers fulfil the test:		P
	– pull force of 50 N/A		P
	– high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdown.		P
26.101	Creepage distances, clearances and distances through insulation, specified values according to (EN 61558-2-16:09):		P
	– table 13, material group IIIa (part 1)		P
	– table C, material group II (part 1)		N/A
	– table D, material group I (part 1)		N/A
	– working voltage	342Vrms max.	P
	– rated supply frequency 50/60 Hz	50 Hz	P
	– rated internal frequency		P
	1. Insulation between input and output circuits (basic insulation):		P
	a) measured values specified values (mm)		P
	2. Insulation between input and output circuits (double or reinforced insulation):		N/A
	a) measured values specified values (mm)	Input to output: CI/Cr: Min.8.0> 5.5mm	P
	b) measured values specified values (mm)		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	c) measured values specified values (mm)	TIW used as secondary winding and 2 layers of insulation tape between Pri. and Sec. windings	P
	3. Insulation between adjacent input circuits: measured values specified values (mm)		N/A
	Insulation between adjacent output circuits: measured values specified values (mm) :		N/A
	4. Insulation between terminals for external connection:		N/A
	a) measured values specified values (mm)		N/A
	b) measured values specified values (mm)		N/A
	c) measured values specified values (mm)		N/A
	5. Basic or supplementary insulation:		P
	a) measured values specified values (mm)	L/N before fuse: Cl/Cr: 4.1mm > 2.40mm Fuse: Cl/Cr: 3.2mm > 2.40mm	P
	b) measured values specified values (mm)		N/A
	c) measured values specified values (mm)		N/A
	d) measured values specified values (mm)		N/A
	e) measured values specified values (mm)		N/A
	6. Reinforced or double insulation: measured values specified values (mm)		N/A
	7. Distance through insulation:		P
	a) measured values specified values (mm)	2-layer insulating tape used	P
	b) measured values specified values (mm)		N/A
	c) measured values specified values (mm)		N/A
26.102	Values of IEC 61558-2-16 applicable for frequency up to 3 MHz (EN 61558-2-16:09)		P
	For frequency above 3 MHz clause 7 of IEC 60664-4 is applicable (high frequency testing)		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
26.103	Clearance (EN 61558-2-16:09)		P
	a) Clearance for frequency ≥ 30 kHz according figure 101 two determinations are necessary:		P
	– determination based on peak working voltage according Table 104 :		P
	Peak working voltage		P
	Basic insulation: required / measured		P
	Double or reinforced insulation: required / measured value		P
	– and alternative if applicable for approximately homogeneous field according to Table 102		N/A
	Peak working voltage		N/A
	Basic insulation: required / measured		N/A
	Double or reinforced insulation: required / measured value		N/A
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)	See 26.101	P
	The minimum clearance is the greater of the two values.	See 26.101	P
	b) Clearance for frequency ≤ 30 kHz according figure 101 two determinations are necessary:		N/A
	– determination based on peak working voltage with recurring peak voltages according Table 103 :		N/A
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		N/A
	The minimum clearance is the greater of the two values.		N/A
26.104	The working voltages of Table 102, 103 and 104 are peak voltages including μ sec peaks EN 61558-2-16:09)		P
	The working voltage according to Table 13 of part 1 are r.m.s. voltages		P
26.105	Creepage distances		P
	Two determinations of creepage distances are necessary (see Figure 102)		P
	– determination based on measured peak working voltage according Tables 105 to 110		P
	Peak working voltage		P



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Clause	Requirement + Test	Result - Remark	Verdict
	Pollution degree	2	P
	Basic or supplementary insulation: required / measured		P
	Double or reinforced insulation: required / measured value		P
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		P
	If the values based on table 105 to 110 are lower than the relevant values in Tables 13, C.1 or D.1, the higher values shall be applicable		P
26.106	Distance through insulation (EN 61558-2-16:09)		P
	Instead of partial discharge with high frequency voltage the test of the distance and the calculation of the electric field is applicable under the following conditions:		P
	– the max. frequency is < 10 MHz		P
	– the field strength approximately comply with Figure 103		P
	– no voids or gaps are present in between the solid insulation		P
	For thick layers $d1 \geq 0,75$ the peak value of the field strength is ≤ 2 kV/mm		P
	For thin layers $d2 \leq 30 \mu\text{m}$ the peak value of the field strength is ≤ 10 kV/mm		P
	For $d1 > d > d2$ equation (1) is used for calculation the field strength		P
26.107 (A1)	For transformers with FIW wires the following test is required		N/A
	– 10 cycles are required		N/A
	– 68 h test at max heating temperature +10°C or test at max. allowed winding temperature based on the insulation class (required in table 1) + 10°C		N/A
	– 1 h at 25° C		N/A
	– 2 h at 0° C		N/A
	– h at 25° C – (next cycle start again with 68 h max winding temp + 10)		N/A
	– during the 10 cycles test 2 x working voltage is connected between PRI and SEC		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– after 10 cycle test 2 transformers are subjected to the 17.2 test for 48 h and direct after the 48 h the dielectric strength test of 18.3 (100 % test voltage) is done		N/A
	– after the 10 cycle test the third sample is tested at the end of the last cycle in the hot position with the dielectric strength test of 18.3 (100 % test voltage)		N/A
	– the partial discharge test according to 18.101 is done after the cycling test and after the high voltage test, if the peak working voltage is >750 V		N/A

27	RESISTANCE TO HEAT, FIRE AND TRACKING		P
27.1	Resistance to heat		P
	All insulating parts are resistant to heat		P
	For parts of rubber, which passed the test of 19.9, no additional test is required.		N/A
	The tests are not required for cables and small connectors with a rated current ≤ 3 A, a rated voltage ≤ 24 V a.c. or 60 V d.c. and a power ≤ 72 W		P
27.1.1	External accessible parts		P
	The Ball-pressure test -: diameter of impression 2 mm; heating cabinet temperature (°C) at 70 °C or the temperature T of 14.1 (T + 15) - is fulfilled.		P
27.1.2	Internal parts		P
	For insulating material retaining current carrying parts in position , the ball-pressure test -: diameter of impression 2 mm; heating cabinet temperature (°C) at 125 °C or the temperature T of 14.1 (T + 15) - is fulfilled	(see appended table 27.2)	P
27.2	Resistance to abnormal heat under fault conditions		N/A
27.3	Resistance to fire		P
	All isolating parts of the transformer shall be resistant to ignition and spread of fire. The test according to IEC 60696-2-10 is required		P
27.3.1	External accessible parts (glow wire tests)		P
	– 650° C for enclosures		N/A
	– 650 ° C for parts retaining current carrying parts in position and terminals for external conductors Current $\leq 0,2$ A		N/A
	– 750° C for parts retaining current carrying parts in position and terminals for external conductors with fixed wiring. Current $> 0,2$ A		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– 850° C for parts retaining current carrying parts in position and terminals for external conductors with non fixed wiring. Current > 0,2 A		P
27.3.2	Internal parts		P
	– 550° C for internal insulating material – not retaining current carrying parts in position		N/A
	– 650° C for coil formers (bobbins)	T1 Bobbin (See appended table)	P
	– 650 ° C for parts retaining current carrying parts in position and terminals for external conductors. Current ≤ 0,2 A		N/A
	– 750° C for parts retaining current carrying parts in position and terminals for external conductors with fixed wiring. Current > 0,2 A		N/A
	– 850° C for parts retaining current carrying parts in position and terminals for external conductors with non fixed wiring. Current > 0,2 A	PCB Tested with all materials. (See appended table)	P
27.4	For IP other than IPX0: If insulating parts retaining current carrying parts in position and under P3 conditions, the material resistance to tracking is at least material of group IIIa	IPX0	N/A
	Test (175 V): no flashover or breakdown before 50 drops		N/A

28	RESISTANCE TO RUSTING		N/A
	Ferrous parts protected against rusting		N/A



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Clause	Requirement + Test	Result - Remark	Verdict

E	ANNEX E , GLOW WIRE TEST		P
	The test is required according to IEC 60695-2-10 and IEC 60695-2-11 with the following additions:		P
E.1	Clause 6, "Severities" of IEC 6095-2-11, apply with the temperature stated in 27.3 of IEC 61558-1		P
E2	Clause 8, "Conditioning", of IEC 60695-2-11 apply, preconditioning is required		P
E3	Clause 10, "Test Procedure", of IEC 60695-2-11 apply, The tip of the glow wire is applied to the flat side of the surface.		P

F	ANNEX F, REQUIREMENTS FOR MANUALLY OPERATED SWITCHES WHICH ARE PARTS OF THE TRANSFORMER		N/A
F.2	Manually operated mechanical switches, tested as separate component, shall comply with IEC 61058 under the conditions of F2.		N/A
F.§	Manually operated mechanical switches tested as part of the transformer shall comply with the conditions specified under F.3		N/A

H	ANNEX H, ELECTRONIC CIRCUITS (IEC 61558-1)		P
H1	General notes on tests (addition to clause 5)		P
			P
H.2	SHORT-CIRCUIT AND OVERLOAD PROTECTION (ADDITION TO CLAUSE 15)		P
H.2.1	Circuits designed and applied so that fault conditions do not render the appliance unsafe		P
	During and after each test:		P
	– temperatures do not exceed values specified in table 3 of Cl. 15.1		P
	– transformer complies with conditions specified in sub-clause 15.1		P
	If a conductor of a pcb becomes open circuited, the transformer is considered to have withstood the particular test, provided that all six conditions as specified are met		N/A
H.2.2	Fault conditions a) to f) of sub-clause H.2.3 are not tested if the following conditions are met:		N/A
	– electronic circuit is a low-power circuit as specified		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– safety of the appliance as specified does not rely on correct functioning of the electronic circuit		N/A
H.2.3	Fault conditions tested as specified when relevant:		P
	a) short-circuit of creepage distances and clearances, if less than specified in Cl. 26		N/A
	b) open circuit at the terminals of any component		P
	c) short-circuit of capacitors, unless they comply with IEC 60 384-14		P
	d) short-circuit of any two terminals of an electronic component as specified		P
	e) any failure of an integrated circuit as specified		P
	f) low-power circuit: low-power points are connected to the supply source		N/A
	Cl. 15 is repeated with a simulated fault as indicated in a) to e), if the transformer incorporates an electronic circuit to ensure compliance with Cl. 15		P
	Fault condition e) is applied for encapsulated and similar components		P
	PTC's and NTC's are not short-circuited if they are used as specified		N/A
H.2.4	If for a fuse-link complying with IEC 60 127-3 rated fuse current I1 is used, current I2 is measured as specified:		P
	– if $I2 < 2,1 \times I1$ test of 15.8 is repeated with fuse-link short-circuited		N/A
	– if $I2 > 2,75 \times I1$, no other tests are necessary		P
	If $I2 > 2,1 \times I1$ and $I2 < 2,75 \times I1$ test of 15.8 is repeated as specified		N/A
	For fuses other than those complying with IEC 60 127-3, the test is carried out as specified 15.3.2 to 15.3.5		N/A

H.3	CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH INSULATION		P
H.3.1	For live parts separated by basic insulation smaller cr and cl as in 26 are allowed, if H2 is fulfilled.		P
	In optocouplers no requirements of cr and cl		P
	For coatings annex W applies. Smaller distances as required in IEC 60664-3, clause 4 are applicable,		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	For potted transformers cycling tests acc, 26.2. are applicable		N/A
H.3.2	The ma. surface temperature of optocouplers is 50 K		P

K	ANNEX K, INSULATED WINDING WIRES FOR USE AS MULTIPLE LAYER INSULATION		P
K.1	Wire construction:		P
	– insulated winding wire with min. two layers for basic or supplementary insulation		N/A
	– insulated winding wire with min. three layers for reinforced insulation	VDE approved triple insulated wire	P
	– winding insulation material		P
K.2	Conformance test		N/A
K.2.1	Test 13 of IEC 60 851-5 nominal conductor diameter 0,018 mm 0,1 mm, test as specified in 4.2.1 and 4.2.2 of IEC 60 851-5		N/A
	Nominal conductor diameter > 0,1 mm, 2,5 mm, test as specified in 4.3.1 and 4.3.2 of IEC 60 851-5		N/A
	Nominal conductor diameter < 2,5 mm, test as specified in 4.4.1 and 4.4.2 of IEC 60 851-5		N/A
	High voltage test immediately after the above specified tests:		N/A
	– test voltage for two layers 3 kV		N/A
	– test voltage for three layers 5,5 kV		N/A
K.2.2	Adherence and flexibility, test as specified under 5.1.4 of IEC 60 851-3		N/A
	– high voltage test immediately after this test		N/A
	– test voltage for two layers 3 kV		N/A
	– test voltage for three layers 5,5 kV		N/A
K.2.3	Heat shock, test as specified under 3.1 or 3.2 of IEC 60 851-6:		N/A
	– high voltage test immediately after this test		N/A
	– test voltage for two layers 3 kV		N/A
	– test voltage for three layers 5,5 kV		N/A
K.2.4	Retention of dielectric strength after bending, test as specified under test 13 of 4.6.1 c) of IEC 60 851-5		N/A
	1. high voltage test immediately after this test		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	2. test voltage for two layers 3 kV		N/A
	3. test voltage for three layers 5,5 kV		N/A
K.2.5	Resistance to abrasion, test 11 of IEC 60851-3		N/A


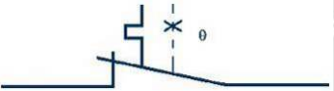
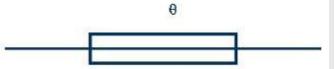
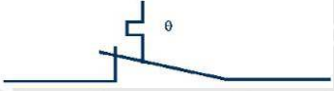
U	ANNEX U – INFORMATIVE – OPTIONAL TW – MARKING FOR TRANSFORMERS		N/A
	The tests of Annex U are based on constant S = 4500. Other constants are possible, if the test of U.5.2 is done with positive result.		N/A
U1	General notes and tests		N/A
	8 transformers of one type are necessary for the test. Tests according U5.		N/A
U.2	Heating (addition to clause 14)		N/A
14.4	Thermal endurance test		N/A
	Test according U5 and measurements according 11.1		N/A
	Transformers tested as a integral part of the equipment (option), assigned with tw		N/A
	The thermal conditions are so adjusted, that the duration of test is as indicated by the manufacturer.		N/A
	If no indications are given, the test period is 30 days		N/A
	After the test, when the transformers have returned to room temperature, they fulfil the following requirements:		N/A
	a) The output voltage has not changed from the measured value at the beginning by more than allowed value of clause 11.1		N/A
	b) The insulation resistance between input and output winding and between windings and body is, measured with 500 V d.c. , not less than 1 MOhm		N/A
	c) The transformer fulfil the dielectric strength test with 35% of the values in Clause 18, Table 8.a.		N/A
	The test result is positive, is min. 6 of the 7 samples have passed the test.		N/A
	The test result is negative, if 2 or more samples fail the test		N/A
	If the result is negative, the test can be repeated with 7 new samples		N/A
U.3	Short circuit and overload protection (addition to clause 15)		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	At short circuit and overload tests the winding temperature if less than the required value of table U.1		N/A
U.5	General requirements and information about thermal endurance test on windings		N/A
U.5.1	Thermal endurance test		N/A
	Transformers tested at rated output		N/A
	Loads outside of the oven		N/A
	7 transformers are placed in the oven		N/A
	The temperature of the hottest winding of each of the 7 transformers is-together with the oven temperature, at the applicable temperature of table U.2		N/A
	After 4 hours measuring of the actual winding temperatures. Regulation of the oven temperature if necessary		N/A
	After 24 hours again measuring of the winding temperature. The temperatures of the 7 samples are very near to the required temperature of the values of table U.2. The test time of the coldest winding is not longer than twice the theoretical test time based on table U.2		N/A
U.5.2	The use of constant S other than 4500 in tw tests		N/A
U.5.2.1	Procedure a)		N/A
	The manufacturer prepares test results with a minimum of samples of 30.		N/A
	T and log L are calculated from the dates		N/A
	The diagram according to Figure U.2 will be founded.		N/A
U.5.2.3	Procedure b)		N/A
	The testing authority shall test 14 new transformers		N/A
	Test 1, based on clause U.5.1 but at the calculated test room temperature for 10 days. The test is continued until all transformer fail.		N/A
	Calculation of the mean life L2 at temperature T2 according to U4		N/A
	Test 2, based on clause U.5.1 but at a calculated room temperature T2 (for 120 days). The test time with T2 exceeds L2.		N/A
	If all transformers fail before L2, the result is negative.		N/A
V	ANNEX V, SYMBOLS TO BE USED FOR THERMAL CUT-OUTS		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
V.2.1.1	Restored by manual operation  IEC 489/98		N/A
V.2.1.2	Restored by disconnection of the supply  IEC 490/98		N/A
V.2.1.3	Thermal link  IEC 491/98		N/A
V.2.2	Self-resetting thermal cut-out  IEC 492/98		N/A

WALTEK



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Clause	Requirement + Test			Result - Remark		Verdict
11 and 12	TABLE: OUTPUT VOLTAGE AND OUTPUT CURRENT UNDER LOAD; NO-LOAD OUTPUT VOLTAGE					P
Clause		11		12		
type/rated output/	rated voltage (V)	sec. voltage (V)	delta Usec (%)	Usec V no-load output	delta Usec no-load output %	further information
Model: GTM961200P1 2054-T2	54.0	54.03	0.056%	54.34	+0.57%	100V/50Hz
	54.0	54.02	0.037%	54.32	+0.56%	100V/60Hz
	54.0	54.00	0%	54.31	+0.57%	240V/50Hz
	54.0	54.02	0.037%	54.32	+0.56%	240V/60Hz
Model: GTM961200P1 2015-T3	15.0	14.95	-0.33%	15.28	+2.21%	100V/50Hz
	15.0	14.94	-0.4%	15.27	+2.21%	100V/60Hz
	15.0	14.95	-0.33%	15.28	+2.21%	240V/50Hz
	15.0	14.94	-0.4%	15.28	+2.28%	240V/60Hz
Model: GTM961200P1 1112-T3	12.0	11.99	-0.08%	12.3	2.59%	100V/50Hz
	12.0	12.00	0%	12.3	2.5%	100V/60Hz
	12.0	12.00	0%	12.3	2.5%	240V/50Hz
	12.0	12.00	0%	12.3	2.5%	240V/60Hz
Model: GTM96900P90 54-T2	54.0	54.15	0.28%	54.29	+0.26%	100V/50Hz
	54.0	54.15	0.28%	54.29	+0.26%	100V/60Hz
	54.0	54.15	0.28%	54.29	+0.26%	240V/50Hz
	54.0	54.15	0.28%	54.29	+0.26%	240V/60Hz
Model: GTM96900P90 15-T3	15.0	14.84	-1.07%	15.11	+1.82%	100V/50Hz
	15.0	14.84	-1.07%	15.10	+1.75%	100V/60Hz
	15.0	14.84	-1.07%	15.11	+1.82%	240V/50Hz
	15.0	14.84	-1.07%	15.11	+1.82%	240V/60Hz
Model: GTM96900P90 12-T2	12.0	12.01	0.08%	12.33	2.66%	100V/50Hz
	12.0	12.00	0%	12.33	2.75%	100V/60Hz
	12.0	12.00	0%	12.33	2.75%	240V/50Hz
	12.0	12.01	0.08%	12.33	2.66%	240V/60Hz
Limits	---	---	±10	---	±20	---



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Clause	Requirement + Test			Result - Remark		Verdict
14	TABLE: Heating Test					P
	Supply voltage (V)	110V/60 Hz	110V/60 Hz	264V/50 Hz	264V/50 Hz	—
	Ambient (°C)	See below	See below	See below	See below	—
Maximum measured temperature T of part/at.....:		T (°C)				max. temperature limit, (°C)
		Label up	Label down	Label up	Label down	--
Model: GTM961200P12054-T2						
Appliance inlet		65.2	65.1	56.4	57.7	70
Varistor MOV1		69.0	71.6	59.5	62.4	85
Choke winding (LF1)		79.8	81.5	67.4	69.9	130
X capacitor (CX1)		80.9	82.4	67.7	70.2	110
Choke winding (LF2)		91.7	92.7	73.2	75.5	130
PCB under BD1		89.3	90.9	71.8	74.9	130
Choke winding (L1)		97.2	97.3	77.5	79.3	130
Choke winding (L2)		97.2	96.3	77.7	78.3	130
PCB under Q1		92.9	92.7	78.2	79.9	130
PCB under Q3		93.6	93.3	80.9	82.6	130
E-Cap (C4)		86.4	85.6	80.2	81.5	105
Transformer (T1) core		104.0	103.2	93.4	94.0	110
Transformer (T1) winding		106.3	105.4	94.9	95.9	110
Choke winding (L3)		106.5	106.6	96.7	98.2	130
Y capacitor (CY1)		87.0	88.7	77.6	81.5	125
Y capacitor (CY2)		81.9	83.3	74.8	78.6	125
Optocoupler (U2)		96.9	96.6	87.7	89.4	100
Choke winding (L4)		81.5	81.7	75.1	77.5	130
E-Cap (C41)		88.4	87.6	81.2	82.5	105
PCB near D53		88.6	88.6	81.1	82.7	130
Output wire		66.1	64.9	61.9	63.0	80
Enclosure inside above T1		84.1	84.9	72.2	74.6	Ref.
Enclosure inside under T1		79.6	76.4	73.1	72.4	Ref.
Enclosure outside above T1		72.5	71.5	63.7	66.2	80
Enclosure outside under T1		72.8	68.8	67.5	66.0	80
Support near pin		62.6	69.3	49.3	49.8	85
Ambient		40.0	40.0	40.0	40.0	--
Model: GTM961200P12015-T3						
Appliance inlet		68.8	68.7	64.1	64.5	70



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Clause	Requirement + Test				Result - Remark	Verdict
PE wire	92.9	94.1	78.7	78.7	105	
Varistor MOV1	72.9	74.5	62.1	63.3	85	
Choke winding (LF1)	84.7	86.0	70.9	71.6	130	
X capacitor (CX1)	86.1	87.3	71.5	71.8	110	
Choke winding (LF2)	94.2	95.4	75.6	75.6	130	
PCB under BD1	90.5	92.0	73.1	74.1	130	
Choke winding (L1)	96.7	97.8	79.6	79.7	130	
Choke winding (L2)	96.2	97.5	82.4	82.7	130	
PCB under Q1	96.9	98.0	81.8	81.8	130	
PCB under Q3	94.7	95.7	81.1	81.2	130	
E-Cap (C4)	98.7	99.9	84.6	84.9	105	
Transformer (T1) core	104.1	103.9	100.3	100.2	110	
Transformer (T1) winding	107.3	106.6	101.2	101.3	110	
Choke winding (L3)	108.8	108.9	98.7	99.4	130	
Y capacitor (CY1)	90.1	92.2	79.5	81.1	125	
Y capacitor (CY2)	97.8	100.2	86.7	90.2	125	
Optocoupler (U2)	97.8	98.3	92.2	92.9	100	
Choke winding (L4)	98.0	99.9	89.0	91.3	130	
E-Cap (C41)	103.2	104.1	96.2	96.5	105	
PCB near D53	107.9	109.8	98.6	99.7	130	
Output wire	75.9	76.4	70.3	71.2	80	
Enclosure inside above T1	90.9	92.1	77.6	78.0	Ref.	
Enclosure inside under T1	89.9	91.2	81.4	81.8	Ref.	
Enclosure outside above T1	78.6	78.3	68.3	67.9	80	
Enclosure outside under T1	78.0	79.4	69.8	72.5	80	
Support near pin	46.1	46.1	44.8	46.4	85	
Ambient	40.0	40.0	40.0	40.0	--	
Model: GTM961200P11112-T3						
Appliance inlet	68.9	68.6	63.8	62.6	70	
PE wire	85.9	86.6	75.2	74.0	105	
Varistor MOV1	70.8	73.6	63.4	63.8	85	
Choke winding (LF1)	82.4	84.4	73.0	73.1	130	
X capacitor (CX1)	83.1	84.6	72.1	71.3	110	
Choke winding (LF2)	90.1	91.3	75.2	74.3	130	
PCB under BD1	87.2	90.5	74.0	74.4	130	
Choke winding (L1)	99.4	100.1	82.8	81.4	130	
Choke winding (L2)	96.3	97.0	87.2	86.3	130	
PCB under Q1	93.3	93.8	81.4	80.1	130	
PCB under Q3	93.0	93.2	82.3	81.1	130	



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Clause	Requirement + Test				Result - Remark	Verdict
E-Cap (C4)	95.2	95.9	84.7	83.4	105	
Transformer (T1) core	107.6	107.8	104.3	103.0	110	
Transformer (T1) winding	108.2	108.6	94.8	93.5	110	
Choke winding (L3)	106.6	107.0	98.3	97.5	130	
Y capacitor (CY1)	89.6	90.5	82.1	81.8	125	
Y capacitor (CY2)	93.7	95.7	88.5	89.5	125	
Optocoupler (U2)	98.5	99.0	96.3	95.7	100	
Choke winding (L4)	94.6	95.7	90.5	90.7	130	
E-Cap (C41)	103.0	102.5	98.1	97.0	105	
PCB under D53	104.9	106.0	99.3	99.8	130	
Output wire	79.7	78.6	76.8	75.5	80	
Enclosure inside above T1	95.3	83.3	75.6	74.9	Ref.	
Enclosure inside under T1	84.3	93.0	90.2	87.3	Ref.	
Enclosure outside above T1	78.8	77.5	71.5	73.2	80	
Enclosure outside under T1	76.2	78.6	77.5	78.4	80	
Support near pin	46.6	46.0	45.9	45.5	85	
Ambient	40.0	40.0	40.0	40.0	--	
Model: GTM96900P9054-T2						
Appliance inlet	59.4	57.4	53.7	51.9	70	
Varistor MOV1	66.3	67.2	60.2	60.0	85	
Choke winding (LF1)	72.8	72.6	65.0	64.9	130	
X capacitor (CX1)	75.1	74.7	66.0	65.8	110	
Choke winding (LF2)	81.1	80.2	68.6	68.2	130	
PCB under BD1	73.2	75.7	63.8	66.4	130	
Choke winding (L1)	86.2	84.9	72.7	72.5	130	
Choke winding (L2)	86.5	85.7	74.5	74.4	130	
PCB under Q1	86.4	85.1	76.3	76.2	130	
PCB under Q3	82.0	81.2	74.4	74.6	130	
E-Cap (C4)	81.2	80.1	73.4	72.7	105	
Transformer (T1) core	92.5	91.0	84.9	84.8	110	
Transformer (T1) winding	96.4	94.6	90.5	90.1	110	
Choke winding (L3)	90.0	89.8	84.5	85.1	130	
Y capacitor (CY1)	71.9	73.3	68.9	69.6	125	
Y capacitor (CY2)	75.9	77.3	73.9	74.9	125	
Optocoupler (U2)	89.6	88.3	84.2	84.2	100	
Choke winding (L4)	71.2	72.2	69.8	70.7	130	
E-Cap (C41)	84.6	83.2	80.5	80.3	105	
PCB near D53	82.0	81.0	77.7	77.7	130	
Output wire	66.8	67.0	65.4	65.9	80	



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Clause	Requirement + Test			Result - Remark	Verdict
Enclosure inside above T1	76.4	76.2	69.1	69.1	Ref.
Enclosure inside under T1	76.4	73.3	72.6	70.2	Ref.
Enclosure outside above T1	67.1	66.3	61.4	61.3	80
Enclosure outside under T1	67.0	64.2	63.9	62.0	80
Support near pin	61.7	57.2	59.2	56.5	85
Ambient	40.0	40.0	40.0	40.0	--
Model: GTM96900P9015-T3					
Appliance inlet	68.9	69.2	67.0	65.8	70
PE wire	90.8	92.0	80.0	79.9	105
Varistor MOV1	72.2	72.6	65.4	64.9	85
Choke winding (LF1)	83.9	84.7	75.2	74.7	130
X capacitor (CX1)	83.8	85.0	73.4	73.1	110
Choke winding (LF2)	90.2	90.7	76.6	76.1	130
PCB under BD1	81.2	82.7	82.3	80.1	130
Choke winding (L1)	99.6	100.7	73.3	82.2	130
Choke winding (L2)	87.5	88.4	75.8	75.8	130
PCB under Q1	81.1	81.7	72.6	72.7	130
PCB under Q3	81.3	81.7	73.2	73.0	130
E-Cap (C4)	87.1	88.5	79.8	78.6	105
Transformer (T1) core	88.9	90.6	81.2	81.2	110
Transformer (T1) winding	101.1	102.7	95.3	95.0	110
Choke winding (L3)	89.6	91.7	82.3	82.7	130
Y capacitor (CY1)	76.3	79.9	69.9	71.3	125
Y capacitor (CY2)	92.5	98.3	86.3	89.3	125
Optocoupler (U2)	92.8	94.7	86.7	87.1	100
Choke winding (L4)	84.1	87.2	79.3	81.0	130
E-Cap (C41)	91.5	92.9	86.3	86.3	105
PCB near D53	93.2	94.6	88.1	88.2	130
Output wire	68.9	71.3	65.1	67.0	80
Enclosure inside above T1	78.3	79.0	69.5	70.2	Ref.
Enclosure inside under T1	77.2	79.2	72.1	71.3	Ref.
Enclosure outside above T1	70.8	70.5	62.5	69.2	80
Enclosure outside under T1	72.3	74.0	66.1	67.3	80
Support near pin	70.9	69.2	63.1	65.5	85
Ambient	40.0	40.0	40.0	40.0	--
Model: GTM96900P9012-T2					
Appliance inlet	58.2	59.2	57.1	54.9	70
Varistor MOV1	66.2	65.7	61.3	60.2	85
Choke winding (LF1)	79.1	78.2	71.9	71.1	130



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Clause	Requirement + Test			Result - Remark		Verdict	
X capacitor (CX1)	80.8	79.7	72.6	71.7	110		
Choke winding (LF2)	86.5	84.8	75.4	74.5	130		
PCB under BD1	84.4	80.8	73.5	73.5	130		
Choke winding (L1)	93.0	91.2	80.0	79.3	130		
Choke winding (L2)	93.9	92.2	81.8	81.1	130		
PCB under Q1	86.3	84.4	77.8	77.4	130		
PCB under Q3	86.1	84.5	78.3	77.8	130		
E-Cap (C4)	93.3	91.5	85.2	84.6	105		
Transformer (T1) core	99.0	97.5	91.9	91.3	110		
Transformer (T1) winding	108.1	106.8	102.3	101.5	110		
Choke winding (L3)	99.8	97.9	92.6	92.6	130		
Y capacitor (CY1)	86.5	83.6	80.1	80.1	125		
Y capacitor (CY2)	94.0	90.2	88.1	88.2	125		
Optocoupler (U2)	100.3	98.8	94.6	94.1	100		
Choke winding (L4)	94.8	91.9	89.8	89.8	130		
E-Cap (C41)	100.2	99.0	95.1	94.4	105		
PCB under D53	101.9	100.6	97.1	96.6	130		
Output wire	79.7	78.3	76.6	75.7	80		
Enclosure inside above T1	85.3	82.7	76.7	76.5	Ref.		
Enclosure inside under T1	79.8	80.3	77.7	75.3	Ref.		
Enclosure outside above T1	73.1	70.9	67.1	66.6	80		
Enclosure outside under T1	70.6	70.2	68.4	66.8	80		
Support near pin	67.4	63.3	62.8	62.8	85		
Ambient	40.0	40.0	40.0	40.0	--		
Supplementary information:							
Temperature T of winding:	t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class
--	--	--	--	--	--	--	--
Supplementary information: The heating test performed at unit continuous operation.							

15	TABLE: SHORT-CIRCUIT AND OVERLOAD PROTECTION						P
	ambient temperature (°C)				24.6		
type/rated output	r-cold Ω	r-warm Ω	temp. °C	ext. encl. °C	support °C	int. + ext. wire	further information
GTM961200P12 054-T2 / 54.0Vdc, 120W	--	--	123.5	--	--	--	--



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Clause	Requirement + Test	Result - Remark	Verdict
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15	TABLE: SHORT-CIRCUIT AND OVERLOAD PROTECTION	P
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	ambient temperature (°C): 24.6						
type/rated output	r-cold Ω	r-warm Ω	temp. °C	ext. encl. °C	support °C	int. + ext. wire	further information
GTM961200P12 015-T3/ 15.0Vdc, 120W	--	--	129.9	--	--	--	--
GTM961200P11 112-T3/ 12.0Vdc, 111W	--	--	118.4	--	--	--	--
GTM96900P905 4-T2 / 54.0Vdc, 90W	--	--	118.9	--	--	--	--
GTM96900P901 5-T3/ 15.0Vdc, 90W	--	--	108.4	--	--	--	--
GTM96900P901 2-T2/ 12.0Vdc, 90W	--	--	151.7	--	--	--	--

Note:

1. The model of GTM961200P12054-T2 that output overload to 2.82A, the unit protected, T1 winding max. temp.: 118.1°C no hazards.
2. The model of GTM961200P12015-T3 that output overload to 10.9A, the unit protected, T1 winding max. temp.: 121.7°C no hazards.
3. The model of GTM961200P11112-T3 that output overload to 10.85A, the unit protected, T1 winding max. temp.: 121.7°C no hazards.
4. The model of GTM96900P9054-T2 that output overload to 2.1A, the unit protected, T1 winding max. temp.: 118.9°C no hazards.
5. The model of GTM96900P9015-T3 that output overload to 7.8A, the unit protected, T1 winding max. temp.: 108.4°C no hazards.
6. The model of GTM96900P9012-T2 that output overload to 10.2A, the unit protected, T1 winding max. temp.: 151.7°C no hazards.
7. Short circuit at the output terminal and secondary winding, the unit protected immediately, no temp. rising, no hazards.
8. Rated ambient temperature ta: 40°C

18.2	TABLE: insulation resistance measurements		P
Insulation resistance R between:		R (MΩ)	Required R (MΩ)
Between mains poles (primary F1 disconnected)		>100	2
Between primary and enclosure* (All type of enclosure were considered)		>100	7
Between input and output		>100	5
Between primary and secondary of T1 (All source of transformer were considered)		>100	5



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Clause	Requirement + Test	Result - Remark	Verdict
	Between core and secondary of T1 (All source of transformer were considered)	>100	5
	Between enclosure inside and outside* (All type of enclosure were considered)	>100	7
Supplementary information: *: All sources of materials were considered, tested according to the client's required.			

18.3	TABLE: Dielectric Strength		P
Test voltage applied between:		Test potential applied (V)	Breakdown / flashover (Yes/No)
Between mains poles (primary F1 disconnected)		2100 AC	No
Between primary and enclosure* (All type of enclosure were considered)		4200 AC	No
Between input and output		4200 AC	No
Between primary and secondary of T1 (All source of transformer were considered)		4200AC	No
Between core and secondary of T1(All source of transformer were considered)		4200 AC	No
Between enclosure inside and outside (All type of enclosure were considered)		4200 AC	No
Supplementary information:			

ANNEX H	Electronic circuits fault test					P
	ambient temperature (°C)				25.1	
	Test voltage(V)				264V	
Component No.	fault	Test voltage	Test time	Fuse No.	Fuse current(A)	Result
BD1	S-C	264V/ 50Hz	1s	F1,F2	0	Fuse (F1) opened immediately and repeat ten times, no hazard.
C2	S-C	264V/ 50Hz	1s	F1,F2	0	Fuse (F1) opened immediately and repeat ten times, no hazard.
Q1 (G-S)	S-C	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard. Output :
Q1 (D-S)	S-C	264V/ 50Hz	1s	F1,F2	0	Fuse (F1) opened immediately and repeat ten times, no hazard.
Q1 (D-G)	S-C	264V/ 50Hz	1s	F1,F2	0	Fuse (F1) opened immediately and repeat ten times, no hazard.



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Clause	Requirement + Test				Result - Remark		Verdict
ANNEX H	Electronic circuits fault test						P
	ambient temperature (°C)				25.1		
	Test voltage(V)				264V		
Component No.	fault	Test voltage	Test time	Fuse No.	Fuse current(A)	Result	
T1 Pin 1-2.	S-C	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard. Output :	
T1 Pin 5-6.	S-C	264V/ 50Hz	10min	F1,F2	0	Fuse (F1) opened immediately and repeat ten times, no hazard.	
T1 Pin 9-B.	S-C	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard. Output :	
T1 Pin 10-A.	S-C	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard. Output :	
U1 (pin3-4)	SC	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard. Output :	
U1 (pin1-2)	SC	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard. Output :	
U1 (pin1)	OC	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard. Output :	
U1 (pin3)	OC	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard. Output :	
R12	S-C	264V/ 50Hz	10min	F1,F2	0.514	Unit work normally, no hazard.	
D54	S-C	264V/ 50Hz	10min	F1,F2	0.514	Unit work normally, no hazard.	
C41	S-C	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard.	
GT*961200P series							
Output (12V series)	S-C	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard.	
Output (15V series)	S-C	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard.	
Output (54V series)	S-C	264V/ 50Hz	10min	F1,F2	0.01	Unit shut down, no damage, no hazard.	
GT*96900P series							
Output (12V series)	Output (12V series)	Output (12V series)	Output (12V series)	Output (12V series)	Output (12V series)	Output (12V series)	
Output (15V series)	Output (15V series)	Output (15V series)	Output (15V series)	Output (15V series)	Output (15V series)	Output (15V series)	



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Clause	Requirement + Test			Result - Remark		Verdict
ANNEX H	Electronic circuits fault test					P
	ambient temperature (°C)			25.1		
	Test voltage(V)			264V		
Component No.	fault	Test voltage	Test time	Fuse No.	Fuse current(A)	Result
Output (54V series)	Output (54V series)	Output (54V series)	Output (54V series)	Output (54V series)	Output (54V series)	Output (54V series)
Note: S-C: Shout circuit, O-C: Open circuit						

20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
PCB	WALEX ELECTRONIC (WUXI) CO LTD	T2, T2A, T2B T4	Min.V-0, Min. 130°C	UL 796	UL E154355	
-Alternative	GUANGDONG HETONG TECHNOLOGY CO LTD	CEM1, 2V0, FR4	Min.V-0, Min. 130°C	UL 796	UL E243157	
-Alternative	CHEERFUL PLASTIC ELECTRONIC PRODUCTS	02, 03, 03A	Min.V-0, Min. 130°C	UL 796	UL E199724	
-Alternative	DONGGUAN DAYSUN ELECTRONIC CO LTD	DS2	Min.V-0, Min. 130°C	UL 796	UL E251754	
-Alternative	DAFENG AREX ELECTRONICS TECHNOLOGY CO LTD	02V0, 03V0, 04V0	Min.V-0, Min. 130°C	UL 796	UL E186016	
-Alternative	KUOTIANG ENT LTD	C-2, C-2A	Min.V-0, Min. 130°C	UL 796	UL E227299	
-Alternative	SHENZHEN TONGCHUANGXI N ELECTRONICS CO LTD	TCX	Min. 1,6 mm thickness, min. V- 0, 130°C	UL 796	UL E250336	
-Alternative	YUANMAN PRINTED CIRCUIT CO LTD	1V0	Min. 1,6 mm thickness, min. V- 0, 130°C	UL 796	UL E74757	
-Alternative	SUZHOU XINKE ELECTRONICS CO LTD	XK-2, XK-3	Min. 1,6 mm thickness, min. V- 0, 130°C	UL 796	UL E231590	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	JIANGSU DIFEIDA ELECTRONICS CO LTD	DFD-1	Min. 1,6 mm thickness, min. V- 0, 130°C	UL 796	UL E213009	
-Alternative	SHANGHAI H- FAST ELECTRONIC CO LTD	211001, 211002	Min. 1,6 mm thickness, min. V- 0, 130°C	UL 796	UL E337862	
-Alternative	Interchangeable	Interchangea- ble	min. V-0, 130°C	UL 796	UL	
Enclosure	SABIC INNOVATIVE PLASTICS B V	HF500R	Min. V-0, Min. thickness: 1.5mm, 125°C	UL 94 UL 746	Tested with appliance UL E45329	
-Alternative	SABIC INNOVATIVE PLASTICS US L L C	940	Min. V-0, Min. thickness: 2.0mm, 120°C	UL 94 UL 746	Tested with appliance UL E121562	
-Alternative	SABIC JAPAN L L C	945(GG)	Min. V-0, Min. thickness: 2.0mm, 120°C	UL 94 UL 746	Tested with appliance UL E207780	
-Alternative (For GT*96900P se- ries)	SABIC INNOVATIVE PLASTICS B V	CX7211	ABS, Min. V-0, Min. thickness: 2.0mm, 90°C	UL 94 UL 746	Tested with appliance UL E45329	
-Alternative (For GT*96900P se- ries)	TEIJIN CHEMICALS LTD	LN-1250P LN-1250G	PC/ABS, Min. V- 0, Min. thickness: 2.0mm, 115°C	UL 94 UL 746	Tested with appliance UL E50075	
Appliance inlet (CN1 Class I) units(C6 type)	Zhejiang LECI Electronics Co., Ltd.	DB-6	2.5A, 250Vac	IEC60320-1	VDE 40032465	
-Alternative	Rich Bay Co., Ltd.	R-30790	2.5A, 250Vac	IEC60320-1	VDE 40030381	
-Alternative	Sun Fair Electric Wire & Cable (HK) Co. Ltd.	S-02	2.5A, 250Vac	IEC60320-1	VDE 40034448	
-Alternative	TECX-UNIONS Technology Corporation	TU-333	2.5A, 250Vac	IEC60320-1	ENEC-00633	
-Alternative	Rong Feng Industrial Co., Ltd.	RF- 190	2.5A, 250Vac	IEC/EN 60320- 1	VDE 40030379	
-Alternative	Inalways Corpora- tion	0724	2.5A, 250Vac	IEC60320-1	ENEC/FI 2010080	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	Zhe Jiang BeiErjia	ST-A04-002	2.5A, 250Vac	IEC60320-1	VDE 40016045	
Appliance inlet (CN1 Class II) units (C8 type)	Zhejiang LECI Electronics Co., Ltd.	DB-8	2.5A, 250Vac	IEC60320-1	VDE 40032028	
-Alternative	Rich Bay Co., Ltd.	R-201SN90	2.5A, 250Vac	IEC60320-1	VDE 40030384	
-Alternative	Sun Fair Electric Wire & Cable (HK) Co. Ltd.	S-01	2.5A, 250Vac	IEC60320-1	VDE 40034449	
-Alternative	Rong Feng Indus- trialCo., Ltd.	RF-180	2.5A, 250Vac	IEC60320-1	VDE 40030168	
-Alternative	Inalways Corpora- tion	0721	2.5A, 250Vac	IEC60320-1	ENEC/FI 2010087	
-Alternative	Zhe Jiang Bei Er Jia Electronic Co., Ltd.	ST-A03-005	2.5A, 250Vac	IEC60320-1	VDE 40014833	
-Alternative	Kunshan DLK Electronics Technology Co., Ltd	CDJ-8	2.5A, 250Vac	IEC60320-1	VDE 40025531	
Appliance inlet CN1 Class I units (C14 type)	Zhejiang LECI Electronics Co., Ltd.	DB-14	10A, 250Vac	IEC/EN 60320-1	VDE 40032137	
-Alternative	Rich Bay Co., Ltd.	R-301SN	10A, 250Vac	IEC/EN 60320-1	VDE 40030228	
-Alternative	Rong Feng Indus- trial Co., Ltd.	SS-120	10A, 250Vac	IEC/EN 60320-1	VDE 40028101	
-Alternative	Sun Fair Electric Wire & Cable (HK)Co. Ltd.	S-03	10A, 250Vac	IEC/EN 60320-1	VDE 40034447	
-Alternative	TECX-UNIONS Technology Corpo- ration	TU-301-S, TU-301-SP	10A, 250Vac	IEC/EN 60320-1	ENEC 00647	
-Alternative	Inalways Corpora- tion	0711	10A, 250Vac	IEC/EN 60320-1	ENEC 2010084	
-Alternative	Zhe Jiang Bei Er jia	ST-A01-003J	10A, 250Vac	IEC/EN 60320-1	VDE 40013388	
Appliance inlet CN1 Class II units (C18 type)	Rong Feng Indus- trial Co.,Ltd	SS-120	10A,250V	IEC/EN 60320-1	VDE 40028101	
-Alternative	HCR ELECTRONICS CO., LTD	SK05	10A,250V	IEC/EN 60320-1	CB:NO69247	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	Rich Bay Co., Ltd.	R-301SN	10A,250V	IEC/EN 60320-1	VDE 40030228	
Insulating tape wrapping around the heatsink (Use insulation tape will not use Insulating tube)	3M COMPANY ELECTRICAL MARKETS DIV (EMD)	1350F- 1 1350T- 1	Min. 130°C	IEC/EN 62368- 1 UL 510	UL E17385	
Alt.	BONDTEC PACIFIC CO LTD	370S	Min. 130°C	IEC/EN 62368- 1 UL 510	UL E175868	
Alt.	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD	PZ CT	Min. 130°C	IEC/EN 62368- 1 UL 510	UL E165111	
Alt.	JINGJIANG JINGYI ADHESIVE PRODUCT CO LTD	JY25-A	Min. 130°C	IEC/EN 62368- 1 UL 510	UL E246950	
Alt.	CHANG SHU LIANG YI TAPE INDUSTRY CO LTD	LY-XX	Min. 130°C	IEC/EN 62368- 1 UL 510	UL E246820	
Earthing wire (for Class I on- ly)	KUNSHAN NEW ZHICHENG ELECTRONICS TECHNOLOGIES CO LTD	1015, 1007, 1185	Min. 18AWG, Min. 300V, Min. 80°C	UL 758	Tested with appliance UL E237831	
-Alternative	ZHUANG SHAN CHUAN ELECTRICAL PRODUCTS (KUNSHAN) CO LTD	1015, 1007, 1185	Min. 18AWG, Min. 300V, Min. 80°C	UL 758	Tested with appliance UL E333601	
-Alternative	DONGGUAN CHUANTAI WIRE PRODUCTS CO LTD	1015, 1007, 1185	Min. 18AWG, Min. 300V, Min. 80°C	UL 758	Tested with appliance UL E315628	
-Alternative	YONG HAO ELECTRICAL INDUSTRY CO LTD	1015, 1007, 1185	Min. 18AWG, Min. 300V, Min. 80°C	UL 758	Tested with appliance UL E240426	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	DONGGUAN GUNEETAL WIRE & CABLE CO LTD	1015, 1007, 1185	Min. 18AWG, Min. 300V, Min. 80°C	UL 758	Tested with appliance UL E204204	
-Alternative	SHENG YU ENTERPRISE CO LTD	1015, 1007, 1185	Min. 18AWG, Min. 300V, Min. 80°C	UL 758	Tested with appliance UL E219726	
-Alternative	KUNSHAN XINGHONGMENG ELECTRONIC CO LTD	1015, 1007, 1185	Min. 18AWG, Min. 300V, Min. 80°C	UL 758	Tested with appliance UL E315421	
-Alternative	SUZHOU YEMAO ELECTRONIC CO LTD	1015, 1007, 1185	Min.18AWG, Min. 300V, Min. 80°C	UL 758	Tested with appliance UL E353532	
Insulating Tube used on heatsink and ground wire (Heatsink using insulating tube will not use in- sulation tape)	SHENZHEN WOER HEAT- SHRINKABLE MATERIAL CO LTD	RSFR RSFR-H RSFR-HPF	600V, 125°C	UL 224	Tested within appliance UL E203950	
-Alternative	QIFURUI ELECTRONICS CO	QFR-h	600V, 125°C	UL 224	Tested within appliance UL E225897	
-Alternative	DONGGUAN SALIPT CO LTD	SALIPT S- 901-300 SALIPT S- 901-600	Min. 300V, 125°C	UL 224	Tested within appliance UL E209436	
-Alternative	GUANGZHOU KAIHENG ENTERPRISE GROUP	K-2 (+) K-2 (CB)	Min. 300V, 125°C	UL 224	Tested within appliance UL E214175	
-Alternative	CHANGYUAN ELECTRONICS (SHENZHEN) CO LTD	CB-HFT	Min. 300V, 125°C	UL 224	Tested within appliance UL E180908	
Fuse (F1, F2)	Ever Island Electric Co., Ltd. And Wal- ter Electric	2010	T3.15A, 250V	IEC 60127- 1 IEC 60127-3 UL 248- 1 UL 248- 14	VDE 40018781 UL E220181	
-Alternative	Conquer Electron- ics Co., Ltd.	MST	T3.15A, 250V	IEC 60127- 1 IEC 60127-3 UL 248- 1 UL 248- 14	VDE 40017118 UL E82636	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	Bel Fuse Ltd.	RST-Serie(s)	T3.15A, 250V	IEC 60127- 1 IEC 60127-3 UL 248- 1 UL 248- 14	VDE 40011144 UL E20624	
-Alternative	Cooper Bussmann LLC	SS-5	T3.15A, 250V	IEC 60127- 1 IEC 60127-3 UL 248- 1 UL 248- 14	VDE 40015513 UL E19180	
-Alternative	Conquer Electron- ics Co., Ltd.	MET series	T3.15A, 250V	IEC 60127- 1 IEC 60127-3 UL 248- 1 UL 248- 14	VDE 40017157 UL E82636	
Varistor (MOV1) (op- tional)	Thinking Electronic Industrial Co., Ltd.	TVR10471K, TVR14471K	Max. Continuous voltage: min 300Vac(rms), 85°C, The coating is V-0	IEC 61051- 1 IEC 61051-2 IEC 61051-2-2	VDE 005944	
-Alternative	Centra Science Corp.	10D471K, 14D471K	Max. Continuous voltage: min 300Vac(rms), 85°C, The coating is V-0	IEC 61051- 1 IEC 61051-2 IEC 61051-2-2	VDE 40008220	
-Alternative	Success Electronics Co., Ltd.	SVR10D471K SVR14D471K	Max. Continuous voltage: min 300Vac(rms), 85°C, The coating is V-0	IEC 61051- 1 IEC 61051-2 IEC 61051-2-2	VDE 40030401	
-Alternative	Walsin Technology Co., Ltd.	10D471K 14D471K	Max. Continuous voltage: min 300Vac(rms), 85°C, The coating is V-0	IEC 61051- 1 IEC 61051-2 IEC 61051-2-2	VDE 40010090	
-Alternative	Best Bright Elec- tronics Co. Ltd	10D471K 14D471K	Max. Continuous voltage: min 300Vac(rms), 85°C, The coating is V-0	IEC 61051- 1 IEC 61051-2 IEC 61051-2-2	VDE 40005858 VDE 40027827	
-Alternative	Ceramate Techn. Co., Ltd.	GNR10D471K GNR14D471K	Max. Continuous voltage: min 300Vac(rms), 85°C, The coating is V-0	IEC 61051- 1 IEC 61051-2 IEC 61051-2-2	VDE 40031745	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	Joyin Co., Ltd.	10N471K 14N471K	Max. Continuous voltage: min 300Vac(rms), 85°C, The coating is V-0	IEC 61051- 1 IEC 61051-2 IEC 61051-2-2	VDE 005937	
Choke (LF1) (optional)	Glob- Tek/ZhongTon g/HEJIA/BOAM/EN G	LF001	130°C	IEC 61558-1 IEC 61558-2-16	Test with equipment	
Choke (LF2) (optional)	Glob- Tek/ZhongTon g/HEJIA/BOAM/EN G	LF026	130°C	IEC 61558-1 IEC 61558-2-16	Test with equipment	
Choke (L1) (op- tional)	Glob- Tek/ZhongTon g/HEJIA/BOAM/EN G	LF003	130°C	IEC 61558-1 IEC 61558-2-16	Test with equipment	
Choke (L2) (op- tional) (For GT*961200P series)	Glob- Tek/ZhongTon g/HEJIA/BOAM/EN G	LF029	130°C	IEC 61558-1 IEC 61558-2-16	Test with equipment	
Choke (L2) (op- tional) (For GT*96900P se- ries)	Glob- Tek/ZhongTon g/HEJIA/BOAM/EN G	LF028	130°C	IEC 61558-1 IEC 61558-2-16	Test with equipment	
X-Capacitor (CX1) (optional)	Cheng Tung Industrial Co., Ltd.	CTX	Min. 300VAC, 110°C, X1 or X2 Max. 0.22µF	IEC 60950- 1 UL 60384- 14 UL 1414	Tested with appliance UL E193049	
-Alternative	Tenta Electric Industrial Co. Ltd.	MEX	Min. 250VAC, 40/100/21/B, X1 or X2 Max. 0.22µF	IEC/EN 60384- 14 UL 60384- 14 UL 1414	VDE 119119 UL E222911	
-Alternative	Joey Electronics (Dong Guan) Co., Ltd.	MPX	Min. 250VAC, 40/105/21/B, X1 or X2 Max. 0.22µF	IEC/EN 60384- 14 UL 60384- 14 UL 1414	VDE 40032481 UL E216807	
-Alternative	Ultra Tech Xiphi Enterprise Co. Ltd.	HQX	Min. 250VAC, 40/100/21/C, X1 or X2 Max. 0.22µF	IEC/EN 60384- 14 UL 60384- 14 UL 1414	VDE 40015608 UL E183780	
-Alternative	Yuon Yu Electronics Co. Ltd.	MPX	Min. 250VAC, 40/100/21/C, X1 or X2 Max. 0.22µF	IEC/EN 60384- 14 UL 60384- 14 UL 1414	VDE 40032392 UL E200119	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	Sinhua Electronics (Huzhou) Co ., Ltd.	MPX	Min. 250VAC, 40/100/21/C, X1 or X2 Max. 0.22μF	IEC/EN 60384- 14 UL 60384- 14 UL 1414	VDE 40014686 UL E237560	
-Alternative	Jiangsu Xinghua Huayu Electronics Co., Ltd.	MPX - Series	Min. 250VAC, 40/100/21/C, X1 or X2 Max. 0.22μF	IEC/EN 60384- 14 UL 60384- 14 UL 1414	VDE 40022417 UL E311166	
-Alternative	Dain Electronics Co., Ltd.	MEX, MPX, NPX	Min. 250VAC, 40/100/21/C, X1 or X2 Max. 0.22μF	IEC/EN 60384- 14 UL 60384- 14 UL 1414	VDE 40018798 UL E147776	
-Alternative	Shenzhen Jinghao Capacitor Co ., Ltd.	CBB62B	Min. 250VAC, 40/110/56/B, X1 or X2 Max. 0.22μF	IEC/EN 60384- 14 UL 60384- 14 UL 1414	VDE 40018690 UL E252286	
-Alternative	Foshan Shunde Chuang Ge Electronic Industri- al Co., Ltd.	MKP-X2	Min. 250VAC, 40/105/21/B, X2 Max. 0.22μF	IEC/EN 60384- 14	VDE 40008922	
-Alternative	Winday Electronic Industrial Co., Ltd.	MPX series	Min. 250VAC, 40/100/21/C, X2 Max. 0.22μF	IEC/EN 60384- 14	VDE 40018071	
Resistor Be- tween (R1,R2)	Interchangeable	Interchangea- ble	Max. 2MΩ, 1/4W	IEC/EN 62368- 1	Tested with appliance	
Bleeder resistance (R1A, R2A)	Interchangeable	Interchangea- ble	Max. 4.7MΩ, 1/4W	IEC/EN 62368- 1	Tested with appliance	
Y-Capacitor (CY1,CY2)	TDK CORPORATION	CD	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	VDE 40029780 UL E37861	
-Alternative	Success Electron- ics Co., Ltd.	SE	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	VDE 40037211 VDE 40020002 UL E114280	
-Alternative	Success Electron- ics Co., Ltd.	SB	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	VDE 40037221 VDE 40020001 UL E114280	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	Murata Mfg. Co., Ltd.	KX	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	VDE 40002831 UL E37921	
-Alternative	Walsin Technology Corp.	AH	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	VDE 40001804 UL E146544	
-Alternative	JYA-NAY Co., Ltd.	JN	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	TUV 69242987 UL E201384	
-Alternative	Haohua Electronic Co.	CT 7	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	VDE 40003902 UL E233106	
-Alternative	Jyh Chung Electronic Co., Ltd.	JD	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	VDE 137027 UL E187963	
-Alternative	Jerro Electronics Corp.	JX-series	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	VDE 40032158 UL E333001	
-Alternative	WELSON INDUSTRIAL CO LT D	WD	Max.2200pF Min 250Vac Min.Y1 Min 125°C	IEC/EN 60384- 14 UL 60384-14 UL 1414	VDE 40016157	
Optocoupler (U2)	Everlight Electron- ics Co., Ltd.	EL817	Dti=0.5mm Int. , dcr=6.0mm EXT.dcr=7.7mm, thermal cycling test, 110°C	IEC 60747-5-5	VDE 132249	
-Alternative	COSMO Electronics Corporation	K1010/KP101 0	Dti=0.6mm Int, dcr=4.0mm, EXT.dcr=5.0mm, thermal cycling test, 115°C	DIN VDE 0603-2	VDE 101347	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	Fairchild Semicon- ductor Pte Ltd	H11A817B/F OD817B	Isulation volt- age : 850V; Transient over- voltage; 6000V; CTI175; Int.Cr/Ext.Cr: ≥7.0/7.0mm; 30/110/21;	IEC/EN 60747	VDE 40026857	
-Alternative	Toshiba Electronic Devices & Storage Corpo- ration	TLP781F	ti>0.4mm Int, EXT.ci> r8.0mm, Isolation 3000Vac min., 110°C;thermal cycling test	EN 60747	VDE 40021173	
-Alternative	Lite-On Technolo- gy Corporation	LTV-817	Dti=0.8mm Int. , EXT.dcr=7.8mm, thermal cycling test, 110°C	IEC/EN 60747- 5-2	VDE 40015248 UL E113898	
-Alternative	Sharp Corporation Electronic Compo- nents and Devices Group	PC817	Insulation volt- age: 890V; Tran- sient overvoltage: 9000V Int. Cr/ Ext. Cr: 7,62/ 7,62 mm; 30/100/21	IEC/EN 60747-5- 2	VDE 40008087	
-Alternative	Bright Led Elec- tronics Corp.	BPC-817 A/B/C/D/L BPC-817 M BPC-817 S	Dti=0.4mm EXT. dcr=7.0mm,therm al cycling test,100oC	IEC/EN 60747-5- 2	VDE 40007240	
Transformer (T1)	GlobTek / ENG / BOAM / HAOPUWEI	See attachment for details	Class B	IEC 61558-1 IEC 61558-2-16	Test with equipment	
--Magnet wire	PACIFIC ELECTRIC WIRE & CABLE (SHENZHEN) CO LTD	UEWN/U	MW28-C, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E201757	
-Alternative	PACIFIC ELECTRIC WIRE & CABLE (SHENZHEN) CO LTD	UEWS/U	MW75-C, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E201757	



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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alternative	JUNG SHING WIRE CO LTD	UEW-4	MW75C, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E174837	
-Alternative	JUNG SHING WIRE CO LTD	UEY-2	MW28-C, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E174837	
-Alternative	JIANGSU HONGLIU MAGNET WIRE TECHNOLOGY CO LTD	2UEW/130	MW75-C, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E335065	
-Alternative	CHANGZHOU DAYANG WIRE & CABLE CO LTD	2UEW/130	MW75-C, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E158909	
-Alternative	WUXI JUFENG COMPOUND LINE CO LTD	2UEWB	MW75#, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E206882	
-Alternative	JIANGSU DARTONG M & E CO LTD	UEW	MW 75-C, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E237377	
-Alternative	SHANDONG SAINT ELECTRIC CO LTD	UEW/130	MW75#, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E194410	
-Alternative	ZHEJIANG LANGLI ELECTRIC EQUIPMENTS CO LTD	UEW	MW 79#, 130oC	IEC/EN 60601-1 UL 1446	Tested with appliance UL E222214	
- Bobbin	Changchun Plas- tics	T375J T375HF	Phenolic,V- 0.150°C,min. thickness 0.45mm	UL94	UL E59481	
-Alternative	CHANG CHUN PLASTICS CO LTD	4130	V-0, 140°C, thickness 0,74 mm min.	IEC 62368- 1 UL 94 UL 746 A/B/C/D	Tested with appliance UL E59481	
-Alternative	Sumitomo	PM-9820	Phenolic,V- 0.150°C,min. thickness 0.45mm	UL94	UL E41429	
-Alternative	Hitachi	CP-J-8800	Phenolic,V- 0.150°C,min. thickness 0.45mm	UL94	UL E42956	



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Clause	Requirement + Test	Result - Remark	Verdict
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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
--Insulation tape	3M	1350F-1, 1350T-1, 44	130°C	UL 510	ULE17385	
-Alternative	Bondtec	370S	130°C	UL 510	UL E175868	
-Alternative	YAHUA	PZ CT WF	130°C	UL 510	UL E165111	
-Alternative	JINGJIANG JINGYI	JY25-A	130°C	UL 510	UL E246950	
-Alternative	CHANG SHU LIANG YI TAPE INDUSTRY CO LTD	LY-XX	130°C	UL 510	UL E246820	
--Triple winding	Great Leoflon	TRW(B)	130°C	UL 1446	VDE 136581 UL E211989	
-Alternative	Furukawa	TEX-E	130°C	UL 1446	VDE 006735 UL E206440	
-Alternative	Totoku	TIW-2	130°C	UL 1446	VDE 40005152 UL E249037	
-Alternative	COSMOLINK	TIW-M	130°C	UL 1446	VDE 138053 UL E213764	
-Alternative	E&B TECHNOLOGY CO LTD	E&B-XXXB E&B-XXXB-1	130°C	UL 1446	VDE 40023473 UL E315265	
-Alternative	CHANGYUAN ELECTRONICS (SHENZHEN) CO LTD	CB-TIW	130°C	UL 1446	VDE 40037495 UL E357999	
-Alternative	SHENZHEN JIUDING NEW MATERIAL CO LTD	DTIW-B	130°C	UL 1446	VDE 40037495 UL E357999	
-PTFE tubing	GREAT HOLDING INDUSTRIAL CO LTD	TFT / TFS	Min. 300V, 200°C	UL 224	Tested with appliance UL E156256	
-Alt. use	SHENZHEN WOER HEAT- SHRINKABLE MATERIAL CO LTD	WF	600V, 200°C	UL 224	Tested with appliance UL E203950	



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Clause	Requirement + Test	Result - Remark	Verdict
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20	TABLE: Components					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)	
-Alt. use	CHANGYUAN ELECTRONICS (SHENZHEN) CO LTD	CB-TT-T / CB- TT-S	Min. 300V, 200°C	UL 224	Tested with appliance UL E180908	
Output cord	KUNSHAN NEW ZHICHENG ELECTRONICS TECHNOLOGIES CO LTD	1185, 2464, 2468, 1015	Min. 20AWG, min. 300Vac, min. 80°C	UL 758	UL E237831	
-Alternative	Interchangeable	Interchange- able	Min.24AWG, Min.300V, 80°C or better	UL 758	UL	

1) An asterisk indicates a mark which assures the agreed level of surveillance

Supplementary information: N/A

Attachment for transformer as below:

Product Model	Voltage range	Transformer model
GT*961200P series and GT*96900P series	12-13.4V	TF047
	13.5-14.9V	TF075
	15-16.9V	TF048
	17-18.9V	TF076
	19-21.3V	TF072
	21.4-23.9V	TF077
	24-27.4V	TF049
	27.5-31.4V	TF078
	31.5-36V	TF073
	36.1-41.9V	TF079
	42-48V	TF050
	48.1-54V	TF074

26	TABLE: Working voltage measurement.			P
Location	RMS voltage (V)	Peak voltage (V)	Comments	
T1 Pin 1 to pin A	238	524		
T1 Pin 2 to pin A	128	214		
T1 Pin 5 to pin A	176	362		
T1 Pin 6 to pin A	205	250		
T1 Pin 1 to pin B	268	560	Max. RMS voltage , Max. Peak voltage	
T1 Pin 2 to pin B	170	300		
T1 Pin 5 to pin B	164	345		



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Clause	Requirement + Test	Result - Remark	Verdict
T1 Pin 6 to pin B	199	372	
T1 Pin 1 to pin 7,8,9	223	432	
T1 Pin 2 to pin 7,8,9	165	348	
T1 Pin 5 to pin 7,8,9	172	358	
T1 Pin 6 to pin 7,8,9	171	361	
CY1 & CY2	218	416	
U1 Pin 1 to Pin 3	196	376	
U1 Pin 1 to Pin 4	105	226	
U1 Pin 2 to Pin 3	195	360	
U1 Pin 2 to Pin 4	148	244	

Note(s):

Operating conditions: Input voltage: = AC 240V (rated voltage)

Used to determine the test voltage of dielectric strength and clearance, creepage distance and Dti.

26	Table: creepage distances and clearances and distances through insulation						P
Insulation	Required Insulation	Clearance		Creepage		Dti	
		Measured (mm)	Required (mm)	Measured (mm)	Required (mm)	Measured (mm)	Required (mm)
L & N trace before fuse	BI	3.6	2.4	3.6	2.5	--	--
Two terminals of fuse	BI	2.9	2.4	2.9	2.5	--	--
Between primary circuits to PE terminal	BI	6.2	2.4	6.2	2.5	--	--
CY1 primary pin to earth trace	BI	5.4	2.4	5.4	2.5	--	--
CY2 primary pin to earth trace	BI	4.4	2.4	4.4	2.5	--	--
Live parts to enclosure parts	RI	8.0	4.6	8.0	5.5		
Live parts to accessible parts	RI	6.9	4.6	6.9	5.5		
Primary circuit to secondary circuits (PCB trace under U2)	RI	8.0	4.6	8.0	5.5	--	--
Primary circuits to secondary circuits (PCB trace under T1)	RI	10.0	4.6	10.0	5.5	--	--
Transformer primary winding to secondary winding	RI	11.0	4.6	11.0	5.5	--	--
Transformer primary	RI	9.5	4.6	9.5	5.5	--	--



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Clause	Requirement + Test	Result - Remark	Verdict

winding to core							
Remark: B = basic insulation S = supplementary insulation R = reinforced insulation 1. The core of transformer (T1) is considered as primary. 2. CY1 consider supplement insulation.							

27.1	TABLE: BALL-PRESSURE TEST FOR ENCLOSURE			N/A
Material	Temperature (°C)	Result (mm)	Comments	
--	--	--	--	
Remark: --				

27.3	TABLE: GLOW-WIRE TEST FOR ENCLOSURE			N/A
Material	Temperature (°C)	Result (mm)	Comments	
--	--	--	--	
Remark: --				

27.1	TABLE: BALL-PRESSURE TEST FOR INSULATION MATERIAL RETAINING CURRENT CARRYING PART			P
Material	Temperature (°C)	Result (mm)	Comments	
T1 bobbin	125	1.1	See table 20	
PCB	125	0.9	See table 20	
Appliance inlet	125	1.2	See table 20	
Remark: --				

27.3	TABLE: GLOW-WIRE TEST FOR INSULATION MATERIAL RETAINING CURRENT CARRYING PART			P
Material	Temperature (°C)	Result (mm)	Comments	
PCB	750 / 850	No flame / No flame	See table 20	
T1 bobbin	650 / 750	No flame / No flame	See table 20	
Output socket material	850	No flame	See table 20	
Appliance inlet (CN1 Class I)	750	No flame	See table 20	
Appliance inlet (CN1 Class II)	750	No flame	See table 20	
Remark: --				

26.2 TEST A	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION			N/A
	Test with three special prepared specimens with uninsulated wires, without potting or impregnation			

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Clause	Requirement + Test			Result - Remark	Verdict
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	

26.2 TEST B	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
	Test with three specially prepared specimens with potting or impregnation (P1)					
	cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	

26.2 TEST C	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
	Test with three specially prepared specimens with potting (only dti is required)					
	cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	

Annex U	U.5.1 THERMAL ENDURANCE TEST
Type ref.	
Rated PRI-Voltage	
Rated SEC-Voltage	
Material of Winding	
Material of bobbin	
Material of resin	
Material of potting	
Material of foil	
Components re-moved for test	
tw	



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Clause	Requirement + Test	Result - Remark	Verdict

26.2 TEST C	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION													N/A	
	Test with three specially prepared specimens with potting (only dti is required)														
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)				1 hour 25 °C		2 hour 0 °C		1 hour 25 °C						
S															
Objective test dura- tion (days)															
Theoretical test temperature															
Sample	1		2		3		4		5		6		7		
Winding	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	
Start – Rk															
After 4 h – Rw															
After 4 h – winding temperature															
After 4 h - oven temperature															
After 24 h – Rw															
After 24 h – wind- ing temperature															
After 24 h - oven temperature															
Final test period (days)															
Output voltage (11.1) under load															
Insulating re- sistance															
High voltage test (35% of the values in Table 8.a															

Annex U	U.5.2 The use of an other constant S other than 4500 in tw tests Test1:10 days
Type ref.	
Rated PRI-Voltage	
Rated SEC- Voltage	



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Clause	Requirement + Test	Result - Remark	Verdict
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Material of Winding														
Material of bobbin														
Material of resin														
Material of potting														
Material of foil														
Components removed for test														
tw														
S														
Objective test duration (days)														
Theoretical test temperature														
Sample	1		2		3		4		5		6		7	
Winding	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC
Start – Rk														
After 4 h – Rw														
After 4 h – winding temperature														
After 4 h - oven temperature														
After 24 h – Rw														
After 24 h – winding temperature														
After 24 h - oven temperature														
Final test period (days)														
Output voltage (11.1) under load														
Insulating resistance														
High voltage test (35% of the values in Table 8.a)														

Annex U	U.5.2 The use of an other constant S other than 4500 in tw tests Test2:120 days
Type ref.	
Rated PRI-Voltage	














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Clause	Requirement + Test								Result - Remark				Verdict	
Rated SEC-Voltage														
Material of Winding														
Material of bobbin														
Material of resin														
Material of potting														
Material of foil														
Components removed for test														
tw														
S														
Objective test duration (days)														
Theoretical test temperature														
Sample	1		2		3		4		5		6		7	
Winding	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC
Start – Rk														
After 4 h – Rw														
After 4 h – winding temperature														
After 4 h - oven temperature														
After 24 h – Rw														
After 24 h – winding temperature														
After 24 h - oven temperature														
Final test period (days)														
Output voltage (11.1) under load														
Insulating resistance														
High voltage test (35% of the values in Table 8.a														



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Clause	Requirement + Test	Result - Remark	Verdict
AA	Annex AA		N/A
	Partial discharge (PD) test		N/A
BB	Annex BB		N/A
	Particular requirements for associated transformers for switch mode power supplies with internal frequencies > 500 Hz		N/A
	See separate test report-form for these Annex.		N/A
BB.8	MARKING AND OTHER INFORMATION		N/A
BB.8.2	Marking for transformers IP00 or for associated transformers: type and trademark, instruction sheets		N/A
BB.8.11	Correct symbols:		N/A
	Volts	V	N/A
	Amperes	A (mA)	N/A
	Volt amperes (or volt-amperes reactive for reactors)	VA or (VAR)	N/A
	Watts	W	N/A
	Hertz	Hz	N/A
	Input	PRI	N/A
	Output	SEC	N/A
	Direct current	d.c. (DC) or	N/A
	Neutral	N/A	N/A
	Single-phase a.c.		N/A
	Three-phase a.c.	3	N/A
	Three-phase and neutral a.c.	3N	N/A
	Power factor	cosφ	N/A
	Class II construction		N/A
	Class III construction		N/A
	Fuse-link	F	N/A
	Rated max. ambient temperature	t_a	N/A
	Frame or core terminal		N/A
	Protective earth		N/A
	IP number	IPXX	N/A
	Earth (ground for functional earth)		N/A
	For indoor use only		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	tw5 YYY		N/A
	tw10 YYY		N/A
	twx YYY		N/A
	Additional Symbols (IEC 61558-2-16:09)		N/A
	SMPS incorporating a Fail-safe separating transformer		N/A
BB.8.2	Marking for transformers IP00 or for associated transformers: type and trademark, instruction sheets		N/A
BB.8.11	Correct symbols:		N/A
	Volts	V	N/A
	Amperes	A (mA)	N/A
	Volt amperes (or volt-amperes reactive for reactors)	VA or (VAR)	N/A
	Watts	W	N/A
	Hertz	Hz	N/A
	Input	PRI	N/A
	Output	SEC	N/A
	Direct current	d.c. (DC) or 	N/A
	Neutral	N/A	N/A
	Single-phase a.c.		N/A
	Three-phase a.c.	3 	N/A
	Three-phase and neutral a.c.	3N 	N/A
	Power factor	cosφ	N/A
	Class II construction		N/A
	Class III construction		N/A
	Fuse-link	F	N/A
	Rated max. ambient temperature	t_a	N/A
	Frame or core terminal		N/A
	Protective earth		N/A
	IP number	IPXX	N/A
	Earth (ground for functional earth)		N/A
	For indoor use only		N/A
	tw5 YYY		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	tw10 YYY		N/A
	twx YYY		N/A
	Additional Symbols (IEC 61558-2-16:09)		N/A
	SMPS incorporating a Fail-safe separating transformer	or	N/A
	SMPS incorporating a Non-short-circuit-proof separating transformer	or	N/A
	SMPS incorporating a Short-circuit-proof separating transformer (inherently or non-inherently)	or	N/A
	SMPS incorporating a Fail-safe isolating transformer	or	N/A
	SMPS incorporating a Non-short-circuit-proof isolating transformer	or	N/A
	SMPS incorporating a Short-circuit-proof isolating transformer (inherently or non-inherently)	or	N/A
	SMPS incorporating a Fail-safe safety isolating transformer	or	N/A
	SMPS incorporating a Non-short-circuit-proof safety isolating transformer	or	N/A
	SMPS incorporating a Short-circuit-proof safety isolating transformer (inherently or non-inherently)	or	N/A
	SMPS (Switch mode power supply unit)	or	N/A

BB.9	PROTECTION AGAINST ELECTRIC SHOCK	N/A
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BB.10	CHANGE OF INPUT VOLTAGE SETTING	N/A
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BB.11	OUTPUT VOLTAGE AND OUTPUT CURRENT UNDER LOAD	N/A
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BB.12	NO-LOAD OUTPUT VOLTAGE (see supplementary requirements in Part 2)	N/A
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BB.13	SHORT-CIRCUIT VOLTAGE	N/A
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BB.14	HEATING	N/A
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BB.14.2	Application of 14.1 or 14.3 according to the insulation system	N/A
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Clause	Requirement + Test	Result - Remark	Verdict
BB.14.2.1	Class of isolating system (classified materials according to IEC 60 085 and IEC 60 216)		N/A
BB.14.2.2	No classified material, or system but the measured temperature does not exceed the value of Class A		N/A
BB.14.2.3	No classified material or system but the measured temperature exceeds the value for Class A, the live parts of the transformers are submitted to the test of 14.3		N/A
BB.14.3	Accelerated ageing test for undeclared class of isolating system		N/A
	Cycling test (10 cycles):		N/A
	– measuring of the no-load input current (mA)		N/A
BB.14.3.1	– heat run (temperature in table 2)		N/A
BB.14.3.2	– vibration test: 30 min; amplitude 0,35 mm; frequency range: 10 Hz, 55 Hz, 10 Hz		N/A
BB.14.3.3	– moisture treatment (48 h, 17.2)		N/A
BB.14.3.4	Measurements and tests at the beginning and after each test:		N/A
	– deviation of the no-load input current, measured at the beginning of the test is 30%		N/A
	– insulation resistance acc. cl.18.1 and 18.2		N/A
	– electric strength, no breakdown (18.3); 2 min; test voltage 35% of specified value (table VI)		N/A
	– Transformers (50 or 60 Hz version) are tested after the dielectric strength test as follows: under no load; duration: 5 min; Up-ri(V):1,2 times rated supply voltage; frequency (Hz): 2 times rated frequency		N/A
BB.15	SHORT-CIRCUIT AND OVERLOAD PROTECTION		N/A
BB.16	MECHANICAL STRENGTH		N/A
BB.17	PROTECTION AGAINST HARMFUL INGRESS OF WATER AND MOISTURE		N/A
BB.18	INSULATION RESISTANCE AND ELECTRIC STRENGTH		N/A
BB.18.2	Insulation resistance between:		N/A
	– live parts and body for basic insulation 2 M		N/A
	– live parts and body for reinforced insulation 7 M		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– input circuits and output circuits for basic insulation 2 M		N/A
	– input circuits and output circuits for double or reinforced insulation 5 M		N/A
	– each input circuit and all other input circuits connected together 2 M		N/A
	– each output circuit and all other output circuits connected together 2 M		N/A
	– hazardous live parts and metal parts with basic insulation (Class II transformers) 2 M		N/A
	– body and metal parts with basic insulation (Class II transformers) 5 M		N/A
	– metal foil in contact with inner and outer surfaces of enclosures 2 M		N/A
BB.18.3	Electric strength test (1 min): no flashover or breakdown:		N/A
	1) basic insulation between input circuits and output circuits; working voltage (V); test voltage (V)		N/A
	2) double or reinforced insulation between input circuits and output circuits; working voltage (V); test voltage (V)		N/A
	3) basic or supplementary insulation between:		N/A
	a) live parts of different polarity; working voltage (V); test voltage (V)		N/A
	b) live parts and the body if intended to be connected to protective earth		N/A
	c) inlet bushings and cord guards and anchorages		N/A
	d) live parts and an intermediate conductive part		N/A
	e) intermediate conductive parts and body		N/A
	1) Reinforced insulation between the body and live parts; working voltage (V); test voltage (V) ..		N/A
	2) Functional insulation for windings intended to be connected in series or parallel (test voltage = working voltage + 500 V) (IEC 61558-2-16:2009)		N/A
BB.19	CONSTRUCTION		N/A
BB.19.1	Separation of input and output circuits		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
BB.19.1.1	SMPS incorporating auto-transformers (IEC 61558-2-16:2009)		N/A
BB.19.1.2	SMPS incorporating separating transformers (IEC 61558-2-16:2009)		N/A
BB.19.1.2.1	Input and output circuits electrically separated. (IEC 61558-2-16:09)		N/A
BB.19.1.2.2	The insulation between input and output winding(s) consist of basic insulation (IEC 61558-2-16:09)		N/A
	Class I SMPS		N/A
	– Insulation between input windings and body consist of basic insulation		N/A
	– Insulation between output windings and body consist of basic insulation		N/A
	Class II SMPS (IEC 61558-2-16:09)		N/A
	– Insulation between input windings and body consist of double or reinforced insulation		N/A
	– Insulation between output windings and body consist of double or reinforced insulation		N/A
BB.19.1.2.3	The insulation between input windings and intermediate conductive parts and the output windings and intermediate part consist of basic insulation (IEC 61558-2-16:09)		N/A
	For class I SMPS the insulation between input and output windings via the intermediate conductive parts consist of basic insulation (IEC 61558-2-16:09)		N/A
	For class II SMPS the insulation between input winding and the body and between the output windings and the body via the intermediate conductive parts consist of double or reinforced insulation (IEC 61558-2-16:09)		N/A
BB.19.1.2.4	Parts of output circuits may be connected to protective earth (IEC 61558-2-16:09)		N/A
BB.19.1.2.5	No direct contact between output circuits and the body, unless: (IEC 61558-2-16:2009)		N/A
	– Allowed for associated transformers by the equipment standard		N/A
	– Clause 19.8 of part 1 is fulfilled		N/A
BB.19.1.3	SMPS incorporating isolating transformers and safety isolating transformers (IEC 61558-2-16:09)		N/A
BB.19.1.3.1	Input and output circuits electrically separated (IEC 61558-2-16:09)		N/A
	No possibility of any connection between these circuits		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
BB.19.1.3.2	The insulation between input and output winding(s) consist of double or reinforced insulation (exception see 19.1.3.4) (IEC 61558-2-16:09)		N/A
	Class I SMPS not intended for connection to the mains by a plug:		—
	– Insulation between input windings and body connected to earth consist of basic insulation rated to the input voltage		N/A
	– Insulation between output windings and body, connected to earth consist of basic insulation rated for the output voltage		N/A
	Class I SMPS intended for connection to the mains by a plug (EN 61558-2-16:09):		N/A
	– Insulation between input windings and body connected to earth consist of basic insulation rated to the working voltage		N/A
	– Insulation between output windings and body, connected to earth consist of supplementary insulation rated for the working voltage		N/A
	Class II SMPS (IEC 61558-2-16:09)		N/A
	– Insulation between input windings and body consist of double or reinforced insulation rated to the input voltage		N/A
	– Insulation between output windings and body consist of double or reinforced insulation, rated to the output voltage		N/A
BB.19.1.3.3	SMPS with intermediate conductive parts not connected to the body (between input/output) (EN 61558-2-16:09):		N/A
19.1.3.3.1	For class I and class II SMPS the insulation between input and output windings, via intermediate conductive parts, consist of double or reinforced insulation, rated to the working voltage (EN 61558-2-16:09)		N/A
	– For class II SMPS the insulation between input winding and the body and between the output windings and the body via the intermediate conductive parts consist of double or reinforced insulation. (rated to the input voltage, for SELV circuits only basic insulation to the body))		N/A
	– For transformers, different from independent, the insulation between input and output windings, via intermediate conductive parts, consist of double or reinforced insulation, rated to the working voltage.		N/A
BB.19.1.3.3.2	Class I transformers with earthed core, and not allowed for class II equipment (EN 61558-2-16:09)		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– Insulation from the input to the earthed core: basic insulation rated for the input voltage		N/A
	– Insulation from the output voltage to the earthed core: basic insulation rated for the output voltage		N/A
BB.19.1.3.3.3	Insulation between : input to intermediate conductive parts and output and intermediate parts consist of at least basic insulation (EN 61558-2-16:09)		N/A
	– If the insulation from input or output to the intermediate metal part is less than basic insulation, the part is considered to be connected to input or output.		N/A
BB.19.1.3.4	For class I SMPS, with protective screen, not connected to the mains by a plug the following conditions comply (EN 61558-2-16:09):		N/A
	– The insulation between input winding and protective screen consist of basic insulation (rated input voltage)		N/A
	– The insulation between output winding and protective screen consist of basic insulation (rated output voltage)		N/A
	– The protective screen consist of metal foil or a wire wound screen extending the full width of the windings and has no gaps or holes		N/A
	– Where the protective screen does not cover the entire width of the input winding, additional insulation to ensure double insulation in this area, is used.		N/A
	– If the screen is made by a foil, the turns are isolated, overlap at least 3 mm		N/A
	– The cross-section of the screen and the lead out wire is at least corresponding to the rated current of the overload device		N/A
	– The lead out wire is soldered or fixed to the protective screen.		N/A
	Protective screening is not allowed for SMPS with plug connection to the mains (EN 61558-2-16:09)		N/A
BB.19.1.3.5	No connection between output circuit and protective earth, except of associated transformers (allowed by equipment standard) or 19.8 is fulfilled (EN 61558-2-16:09)		N/A
BB.19.1.3.6	No connection between output circuit and body, except of associated transformers (allowed by equipment standard) (EN 61558-2-16:09)		N/A
BB.19.1.3.7	The distance between input and output terminals for the connection of external wiring is 25 mm		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
BB.19.1.3.8	Portable SMPS having an rated output ≤ 630 VA (EN 61558-2-16:09)		N/A
BB.19.1.3.9	No connection between input and output circuit, except of associated transformers (allowed by equipment standard) (EN 61558-2-16:09)		N/A
BB.19.1.3.10	Protective screening is not allowed for SMPS with plug connection to the mains (EN 61558-2-16:09)		N/A
BB.19.11	Handles, levers, knobs, etc.:		N/A
	– insulating material		N/A
	– supplementary insulation covering		N/A
	– separated from shafts or fixing by supplementary insulation		N/A
BB.19.12	Windings construction		N/A
BB.19.12.1	Undue displacement in all types of transformers not allowed:		N/A
	– of input or output windings or turns thereof		N/A
	– of internal wiring or wires for external connection		N/A
	– of parts of windings or of internal wiring in case of rupture or loosening		N/A
BB.19.12.2	Serrated tape:		N/A
	– distance through insulation according to table 13		N/A
	– one additional layer of serrated tape, and		N/A
	– one additional layer without serration		N/A
	– in case of cheek less bobbins the end turns of each layer shall be prevented from being displaced		N/A
BB.19.12.3	Insulated windings wires:		N/A
	– to all types of transformers for basic or supplementary insulation taken separately		N/A
	a) Winding wire with basic or supplementary insulation:		N/A
	– comply with Annex K		N/A
	– the insulation of the conductor: two layers		N/A
	b) Winding wire with double or reinforced insulation:		N/A
	– comply with Annex K		N/A
	– the insulation of the insulated winding wire: three layers		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– dielectric strength test with the values according 18.3 multiplied by 1,25		N/A
	Where the wire is wound:		N/A
	– upon metal or ferrite cores		N/A
	– upon enamelled wire		N/A
	– under enamelled wire		N/A
	An additional insulation with a dti of supplementary insulation provided between insulated an enamelled wires		N/A
	100 % Routine test according to Annex K.3 for windings giving double or reinforced insulation		N/A
	For windings providing reinforced insulation the values in table 13, table C.1 and table D1, box 2) c), are not required		N/A
BB.20	COMPONENTS		N/A
BB.21	INTERNAL WIRING		N/A
BB.22	SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CABLES AND CORDS		N/A
BB.23	TERMINALS FOR EXTERNAL CONDUCTORS		N/A
BB.24	PROVISION FOR PROTECTIVE EARTHING		N/A
BB.25	SCREWS AND CONNECTIONS		N/A
BB.26	CREEPAGE DISTANCES AND CLEARANCES		N/A
BB.26.1	See 26.101		N/A
BB.26.2	Creepage distances (cr) and clearances (cr)		N/A
BB.26.2.1	Windings covered with adhesive tape		N/A
	– the values of pollution degree 1 are fulfilled		N/A
	– all isolating material are classified acc. to IEC 60085 and IEC 60216		N/A
	– test A of 26.2.3 is fulfilled		N/A
BB.26.2.2	Uncemented insulating parts pollution degree P2 or P3		N/A
	– all isolating material are classified acc. to IEC 60085 and IEC 60216		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– values of pollution degree 1 are not applicable		N/A
BB.26.2.3	Cemented insulating parts		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	– values of distance through insulation (dti) are fulfilled		N/A
	– creepage distances and clearances are not required		N/A
	– test A of this sub clause is fulfilled		N/A
	Test A		N/A
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specially specimens, with un-insulated wires, without impregnation or potting	(see appended table)	N/A
	Two of the three specimens are subjected to:		N/A
	– the relevant humidity treatment according to 17.2 (48 h)		N/A
	– the relevant dielectric strength test of 18.3 multiplied with factor 1,35		N/A
	– One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,35 immediately at the end of the last cycle with high temperature		N/A
	Impulse dielectric test according to 4.1.1.2.1 of IEC 60 664-1 (1,2 / 50 s waveform) – see Annex R of IEC 61558-1		N/A
BB.26.2.4	Enclosed parts, by impregnation or potting		N/A
BB.26.2.4.1	– The requirements of reduced values as stated for pollution degree 1 (P1) are fulfilled		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	Test B		N/A
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specially specimens, potted or impregnated. The dielectric strength test is applied directly to the joint.	(see appended table)	N/A
	Two of the three specimens are subjected to:		N/A
	– the relevant humidity treatment according to 17.2 (48 h)		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– the relevant dielectric strength test of 18.3 multiplied with factor 1,25		N/A
	– One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,25 immediately at the end of the last cycle with high temperature		N/A
	The three spacemen pass the Impulse dielectric test according to 4.1.1.2.1 of IEC 60 664-1 (1,2 / 50 s waveform) – see Annex R of IEC 61558-1		N/A
BB.26.2.4.2	– The requirements of distance through insulation (dti) are fulfilled. (P1 values are not required)		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	Test C		N/A
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specimens, potted or impregnated. (finished components)	(see appended table)	N/A
	– Neither cracks, nor voids in the insulating compounds		N/A
	Two of the three specimens are subjected to:		N/A
	– the relevant humidity treatment according to 17.2 (48 h)		N/A
	– the relevant dielectric strength test of 18.3 multiplied with factor 1,35		N/A
	– One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,35 immediately at the end of the last cycle with high temperature		N/A
	The three spacemen pass the Impulse dielectric test according to 4.1.1.2.1 of IEC 60 664-1 (1,2 / 50 s waveform) – see Annex R of IEC 61558-1		N/A
BB.26.3	Distance through insulation		N/A
	For double or reinforced insulation, the required values of Tables 13, C1, and D1 – boxes 2b, 2c and 7 are fulfilled		N/A
	The insulation fulfil the material classification according IEC 60085 or 60216 or the test of 14.3		N/A
BB.26.3.1	Reduced values of the thickness of insulation for supplementary or reinforced insulation are allowed if the following conditions are fulfilled:		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– the isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	– the test of 14.3 is fulfilled		N/A
	– If both requirements are fulfilled, the required values for solid insulation can be multiplied by 0,4		N/A
	– Minimum thickness of reinforced insulation $\geq 0,2$ mm		N/A
	– Minimum thickness of supplementary insulation $\geq 0,1$ mm		N/A
BB.26.3.2	Insulation in thin sheet form		N/A
	– If the layers are non separable (glued together):		N/A
	– The requirement of 3 layers is fulfilled		N/A
	– The mandrel test according 26.3.3 is fulfilled with 150 N/A		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" are fulfilled.		N/A
	– If the layers are separated:		N/A
	– The requirement of 2 layers is fulfilled		N/A
	– If serrated tape is used, 1 additional layer (serrated) and one additional layer without serration is required		N/A
	– The mandrel test according 26.3.3 is fulfilled on each layer with 50 N/A		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" are fulfilled.		N/A
	– If the layers are separated (alternative:		N/A
	– The requirement of 3 layers is fulfilled		N/A
	– If serrated tape is used, 1 additional layer (serrated) and one additional layer without serration is required		N/A
	– The mandrel test according 26.3.3 is fulfilled on 2/3 of the layers with 100 N/A		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" are fulfilled.		N/A
	Test according to 14.3 and if the isolating materials are classified acc. to IEC 60085 and IEC 60216 no distances through insulation are required for insulation in thin sheet form		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	The figures within square brackets in box 2 and 7 of table 13 (C.1/D.1) are used for insulation in thin sheet form as follows:		N/A
	– rated output > 100 VA values in square brackets apply		N/A
	– rated output 25 VA 100 VA 2/3 of the value in square brackets apply		N/A
	– rated output ___ 25 VA 1/3 of the value in square brackets apply		N/A
BB.26.3.3	Mandrel test of insulation in thin sheet form (specimen 0f 70 mm width are necessary):		N/A
	– If the layers are non separable – at least 3 layers glued together fulfil the test:		N/A
	– pull force of 150 N/A		N/A
	– high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdown.		N/A
	– If the layers are separable and 2/3 of at least 3 layers fulfil the test.		N/A
	– pull force of 100 N/A		N/A
	– high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdowns.		N/A
	– If the layers are separable 1 of at least 2 layers fulfil the test:		N/A
	– pull force of 50 N/A		N/A
	– high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdown.		N/A
BB.26.101	Creepage distances, clearances and distances through insulation, specified values according to (EN 61558-2-16:09):		N/A
	– table 13, material group IIIa (part 1)		N/A
	– table C, material group II (part 1)		N/A
	– table D, material group I (part 1)		N/A
	– working voltage		N/A
	– rated supply frequency 50/60 Hz		N/A
	– rated internal frequency		N/A
	1. Insulation between input and output circuits (basic insulation):		N/A
	a) measured values specified values (mm)		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	2. Insulation between input and output circuits (double or reinforced insulation):		N/A
	a) measured values specified values (mm)		N/A
	b) measured values specified values (mm)		N/A
	c) measured values specified values (mm)		N/A
	3. Insulation between adjacent input circuits: measured values specified values (mm) :		N/A
	Insulation between adjacent output circuits: measured values specified values (mm) :		N/A
	4. Insulation between terminals for external connection:		N/A
	a) measured values specified values (mm)		N/A
	b) measured values specified values (mm)		N/A
	c) measured values specified values (mm)		N/A
	5. Basic or supplementary insulation:		N/A
	a) measured values specified values (mm)		N/A
	b) measured values specified values (mm)		N/A
	c) measured values specified values (mm)		N/A
	d) measured values specified values (mm)		N/A
	e) measured values specified values (mm)		N/A
	6. Reinforced or double insulation: measured values specified values (mm)		N/A
	7. Distance through insulation:		N/A
	a) measured values specified values (mm)		N/A
	b) measured values specified values (mm)		N/A
	c) measured values specified values (mm)		N/A
BB.26.102	Values of IEC 61558-2-16 applicable for frequency up to 3 MHz (EN 61558-2-16:09)		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	For frequency above 3 MHz clause 7 of IEC 60664-4 is applicable (high frequency testing)		N/A
BB.26.103	Clearance (EN 61558-2-16:09)		N/A
	a.) Clearance for frequency ≥ 30 kHz according figure 101 two determinations are necessary:		N/A
	– determination based on peak working voltage according Table 104 :		N/A
	Peak working voltage		N/A
	Basic insulation: required / measured		N/A
	Double or reinforced insulation: required / measured value		N/A
	– and alternative if applicable for approximately homogeneous field according to Table 102		N/A
	Peak working voltage		N/A
	Basic insulation: required / measured		N/A
	Double or reinforced insulation: required / measured value		N/A
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		N/A
	The minimum clearance is the greater of the two values.		N/A
	b.) Clearance for frequency ≤ 30 kHz according figure 101 two determinations are necessary:		N/A
	– determination based on peak working voltage with recurring peak voltages according Table 103 :		N/A
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		N/A
	The minimum clearance is the greater of the two values.		N/A
BB.26.104	The working voltages of Table 102, 103 and 104 are peak voltages including μ sec peaks EN 61558-2-16:09)		N/A
	The working voltage according to Table 13 of part 1 are r.m.s. voltages		N/A
BB.26.105	Creepage distances		N/A
	Two determinations of creepage distances are necessary (see Figure 102)		N/A
	– determination based on measured peak working voltage according Tables 105 to 110		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Peak working voltage		N/A
	Pollution degree		N/A
	Basic or supplementary insulation: required / measured		N/A
	Double or reinforced insulation: required / measured value		N/A
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		N/A
	If the values based on table 105 to 110 are lower than the relevant values in Tables 13, C.1 or D.1, the higher values shall be applicable		N/A
BB.26.106	Distance through insulation (EN 61558-2-16:09)		N/A
	Instead of partial discharge with high frequency voltage the test of the distance and the calculation of the electric field is applicable under the following conditions:		N/A
	– the max. frequency is < 10 MHz		N/A
	– the field strength approximately comply with Figure 103		N/A
	– no voids or gaps are present in between the solid insulation		N/A
	For thick layers $d1 \geq 0,75$ the peak value of the field strength is ≤ 2 kV/mm		N/A
	For thin layers $d2 \leq 30$ μ m the peak value of the field strength is ≤ 10 kV/mm		N/A
	For $d1 > d > d2$ equation (1) is used for calculation the field strength		N/A
BB.27	RESISTANCE TO HEAT, FIRE AND TRACKING		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

BB.E	ANNEX E , GLOW WIRE TEST		N/A
	The test is required according to IEC 60695-2-10 and IEC 60695-2-11 with the following additions:		N/A
BB.E.1	Clause 6, "Severities" of IEC 6095-2-11, apply with the temperature stated in 27.3 of IEC 61558-1		N/A
BB.E2	Clause 8, "Conditioning", of IEC 60695-2-11 apply, preconditioning is required		N/A
BB.E3	Clause 10, "Test Procedure", of IEC 60695-2-11 apply, The tip of the glow wire is applied to the flat side of the surface.		N/A

BB.F	ANNEX F, REQUIREMENTS FOR MANUALLY OPERATED SWITCHES WHICH ARE PARTS OF THE TRANSFORMER		N/A
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BB.H	ANNEX H, ELECTRONIC CIRCUITS (IEC 61558-1)		N/A
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BB.K	ANNEX K, INSULATED WINDING WIRES FOR USE AS MULTIPLE LAYER INSULATION		N/A
BB.K.1	Wire construction:		N/A
	– insulated winding wire with min. two layers for basic or supplementary insulation		N/A
	– insulated winding wire with min. three layers for reinforced insulation		N/A
	– winding insulation material		N/A
BB.K.2	Conformance test		N/A
BB.K.2.1	Test 13 of IEC 60 851-5 nominal conductor diameter 0,018 mm 0,1 mm, test as specified in 4.2.1 and 4.2.2 of IEC 60 851-5		N/A
	Nominal conductor diameter > 0,1 mm, 2,5 mm, test as specified in 4.3.1 and 4.3.2 of IEC 60 851-5		N/A
	Nominal conductor diameter < 2,5 mm, test as specified in 4.4.1 and 4.4.2 of IEC 60 851-5		N/A
	High voltage test immediately after the above specified tests:		N/A
	– test voltage for two layers 3 kV		N/A
	– test voltage for three layers 5,5 kV		N/A
BB.K.2.2	Adherence and flexibility, test as specified under 5.1.4 of IEC 60 851-3		N/A
	– high voltage test immediately after this test		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– test voltage for two layers 3 kV		N/A
	– test voltage for three layers 5,5 kV		N/A
BB.K.2.3	Heat shock, test as specified under 3.1 or 3.2 of IEC 60 851-6:		N/A
	– high voltage test immediately after this test		N/A
	– test voltage for two layers 3 kV		N/A
	– test voltage for three layers 5,5 kV		N/A
BB.K.2.4	Retention of dielectric strength after bending, test as specified under test 13 of 4.6.1 c) of IEC 60 851-5		N/A
	1. high voltage test immediately after this test		N/A
	2. test voltage for two layers 3 kV		N/A
	3. test voltage for three layers 5,5 kV		N/A
BB.K.2.5	Resistance to abrasion, test 11 of IEC 60851-3		N/A

BB.U	ANNEX U – INFORMATIVE – OPTIONAL TW – MARKING FOR TRANSFORMERS	N/A
V	ANNEX V, SYMBOLS TO BE USED FOR THERMAL CUT-OUTS	N/A

BB.26.2 TEST A	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
	Test with three special prepared specimens with uninsulated wires, without potting or impregnation					
	cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	

BB.26.2 TEST B	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
	Test with three specially prepared specimens with potting or impregnation (P1)					
	cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	

BB.26.2 TEST C	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
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IEC 61558-2-16						
Clause	Requirement + Test			Result - Remark		Verdict
	Test with three specially prepared specimens with potting (only dti is required)					
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C		

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**Appendix No. 1: IEC 61558-2-16 / A1: 2013**

Clause	Requirement + Test	Result -Remark	Verdict
18	Insulation resistance, dielectric strength and leakage current		P
18.3	Replacement of the text in footnote a of Table 8a: a For construction according to 26.2.4.1, test B the voltage is multiplied by the factor 1,25. For the construction according to 26.2.4.2 the voltage is multiplied by the factor 1,35.		N/A
18.102	A partial discharge test according to IEC 60664-1, (test description see below) shall be performed, if FIW wires are used and if the recurring peak working voltage U_t across the insulation is greater than 750 V. The relevant recurring peak voltage is the maximum measured voltage between the input and the output circuit of the SMPS, if the secondary side is earthed. The measuring shall be done at 1,0 of the maximum rated input voltage.		N/A
19	Construction		P
19.12.3	Replacement: Insulated winding wires, in an insulation system providing basic, supplementary or reinforced insulation, shall meet the following requirements.		P
	Wire that has multi-layer extruded or spirally wrapped insulation (where only the finished wire can be tested) and passes the tests of Annex K.	Certified triple insulation winding	N/A
	-BASIC INSULATION: two wrapped layers or one extruded layer;		N/A
	-SUPPLEMENTARY INSULATION: two layers, wrapped or extruded;		N/A
	-REINFORCED INSULATION: three layers wrapped or extruded.		P
	For spirally wrapped insulation where the CREEPAGE DISTANCES between layers, as wrapped, are less than those given in Clause 26		N/A
	The finished component shall pass ROUTINE TEST for electric strength using the appropriate value of test voltages in 18.3.		N/A
	a) Where the insulation on the winding wire is used to provide basic-or supplementary insulation in a wound part:		N/A
	b) Where the insulation on the winding wire is used to provide reinforced insulation in a wound part:	Certified triple insulation winding	P
	an insulation for mechanical separation which fulfil the electric strength test for basic insulation shall be provided between the insulated	Separate with tape	P

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Clause	Requirement + Test	Result -Remark	Verdict
	wires and the core or between the insulated wires and the enamelled wires. The both windings shall not touch each other and both wires shall not touch the core.		
19.12.101	The transformer which use fully insulated winding wires (FIW), shall only be used up and including insulation class F.		N/A
19.12.102	Fully insulated winding wires (FIW) shall comply with IEC 60851-5:2008, IEC 60317-0-7 and IEC 60317-56.		N/A
26	Creepage distances, clearances and distances through insulation		P
26.107	For transformers with FIW wires the following test is required:		N/A
	Three specimens shall be used. The specimens shall be subjected 10 times		N/A
	During each thermal cycling test, a voltage of twice the value of the working voltage at 50 Hz or 60 Hz shall be applied to the specimens between the windings where the reduced values apply.		N/A
	Two of the three specimens are then subjected to the humidity treatment of 17.2 (48 h treatment) and the relevant dielectric strength test of 18.3.		N/A
	One of the three specimens shall be subjected to the relevant dielectric strength test of 18.3 immediately at the end of the last period at highest temperature during the thermal cycling test.		N/A
	The partial discharge test shall be done at the end of the cycling test at normal room temperature as performed in 18.101.		N/A
Annex K	Insulated winding wires		N/A
K.1	General		N/A
K.2	Type tests		N/A
K.2.1	General Carried out at a temperature between 15 °C and 35 °C and a relative humidity between 25 % and 75 %, unless otherwise specified.		N/A
K.2.2	Electric strength		N/A
K.2.2.1	Solid circular winding wires and stranded winding wires		N/A
K.2.2.2	Square or rectangular wires		N/A
K.2.3	Flexibility and adherence		N/A

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Clause	Requirement + Test	Result -Remark	Verdict
K.2.4	Heat shock		N/A
K.2.5	Retention of electric strength after bending		N/A
K.3	Testing during manufacturing		N/A
K.3.2	Routine test		N/A
	– 4,2 kV r.m.s. for reinforced insulation, or – 2,1 kV r.m.s. for basic insulation or supplementary insulation.		N/A
K.3.3	Sampling test		N/A
K.3.3.1	Solid circular winding wires and stranded winding wires		N/A
K.3.3.2	Square or rectangular wire		N/A

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Appendix No. 2: National deviation for Australia and New Zealand

AS/NZS 61558.2.16:2010 + A1:2010 + A2:2012 + A3:2014

AS/NZS 61558.1:2008 + A1:2009 + A2:2015

Clause	Requirement + Test	Result -Remark	Verdict
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Australia and New Zealand National Difference

This annex sets out the variations between this standard and IEC 61558-1 Ed 2.1. For Australia and New Zealand tin.

5.5	For a.c., test voltages are of substantially sinusoidal wave form, and, if not otherwise specified, have a frequency of 50 Hz. (AS/NZS 61558.1:2008)	See marking plate	P
14	HEATING		N/A
Table 1	The temperature of insulated pins of transformers having integral pins for insertion into socket-outlets shall not exceed 70 °C: (AS/NZS 61558.1:2008)		N/A
	Temperature (°C).....:		N/A
19.15	Compliance is checked by inserting the transformer, as in normal use into a socket-outlet capable of accepting a 10 A plug complying with Figure 2.1(a) of AS/NZS 3112. The socket-outlet has a horizontal pivot at a distance of 8 mm behind the engagement face of the socket-outlet and in the plane of the lower intersection of the centre lines of the contact apertures. The additional torque which has to be applied to the socket-outlet to maintain the engagement face in the vertical plane shall not exceed 0,25 Nm. (AS/NZS 61558.1:2008)		N/A
	Additional torque (Nm).....:		N/A
19.201	Transformers having integral pins for insertion into socket outlets shall comply with the appropriate requirements of AS/NZS 3112. <i>Compliance is checked as specified in Appendix J of AS/NZS 3112</i> <i>NOTE 1 Clause J.2.2.3 (Internal connections for plug portions) of AS/NZS 3112 is covered by clause 19.6 and clause 21 of this standard.</i> <i>NOTE 2 Clause J.2.2.6.2 (High voltage test) of AS/NZS 3112, except for the test of the insulation of the insulated pins, is covered by clause 18 of this standard.</i> <i>NOTE 3 Clause J.2.2.6.4 (Temperature rise test) of AS/NZS 3112 is covered by clause 14 of this standard</i> <i>NOTE 4 Clause J.2.2.6.7 (Equipment with integral pins intended to be supported by the contacts of a socket-outlet) of AS/NZS 3112 is covered by clause 19.15 of this standard.</i> (AS/NZS 61558.1:2008)		N/A

**Appendix No. 2: National deviation for Australia and New Zealand**

AS/NZS 61558.2.16:2010 + A1:2010 + A2:2012 + A3:2014

AS/NZS 61558.1:2008 + A1:2009 + A2:2015

Clause	Requirement + Test	Result -Remark	Verdict
22	SUPPLY CONNECTION AND OTHER EXTERNAL FLEXIBLE CABLES OR CORDS		P
22.6	Rating of the transformer shall not exceed 10 A. (AS/NZS 61558.1:2008)		P
22.8	Power supply cords of portable transformers shall be fitted with an appropriately rated plug complying with AS/NZS 3112 or AS/NZS 3123 or IEC 60309. (AS/NZS 61558.1:2008)		N/A
Annex H	ELECTRONIC CIRCUITS		P
H.2.1	The no-load output voltage at an SELV appliance outlet or connector shall not increase by more than 10% of its no-load output voltage in normal use. (AS/NZS 61558.1:2008/A2:2015)		P
	The no-load output voltage of a USB outlet or connector shall not increase by more than 3 V or 10% of its no-load output voltage in normal use, whichever is higher. (AS/NZS 61558.1:2008/A2:2015)	Max. 0.57% (for model GTM961200P12054-T2) Max. 2.28% (for model GTM961200P12015-T3) Max.2.59% (for model GTM961200P11112-T3)	P
	SPECIAL NATIONAL CONDITIONS		N/A
	Australia		N/A
8	MARKING AND OTHER INFORMATION		N/A
8.1	The marking of rated voltage or rated voltage range of single-phase transformers shall cover 240V and 415 V for poly-phase transformers. (AS/NZS 61558.1:2008)		N/A
	New Zealand		N/A
8	MARKING AND OTHER INFORMATION		N/A
	The marking of rated voltage or rated voltage range of single-phase transformers shall cover 230V and 400 V for poly-phase transformers. (AS/NZS 61558.1:2008)		N/A



PHOTO:

Model: GTM961200P11112-T3



Photo 1



Photo 2

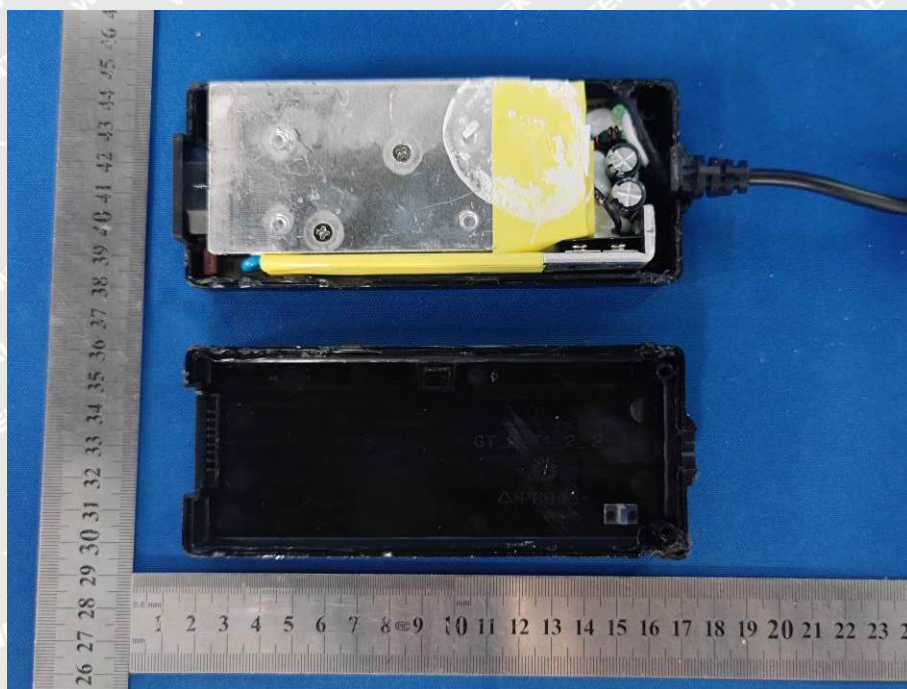


Photo 3

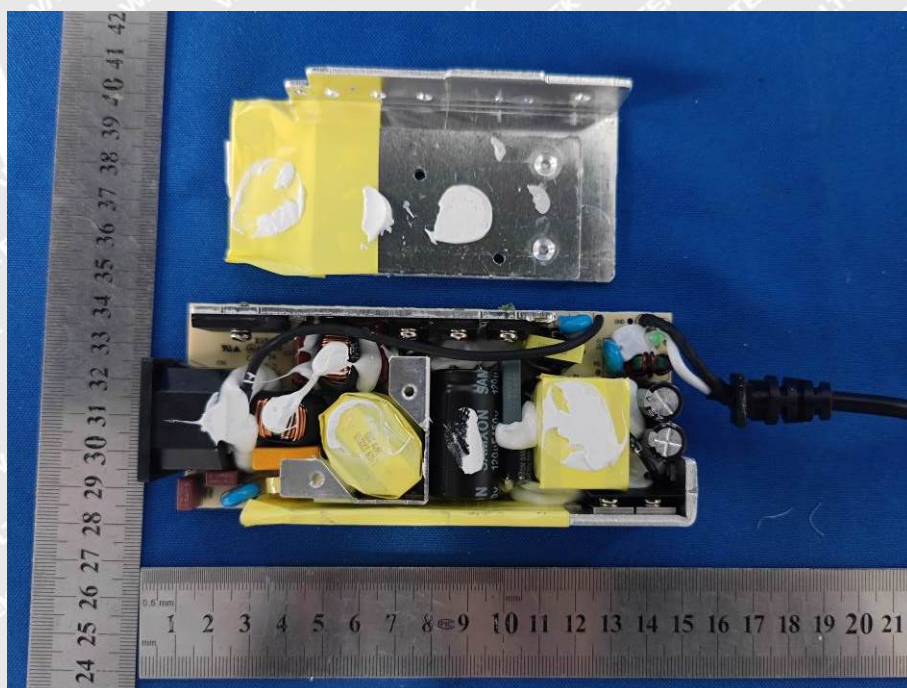


Photo 4

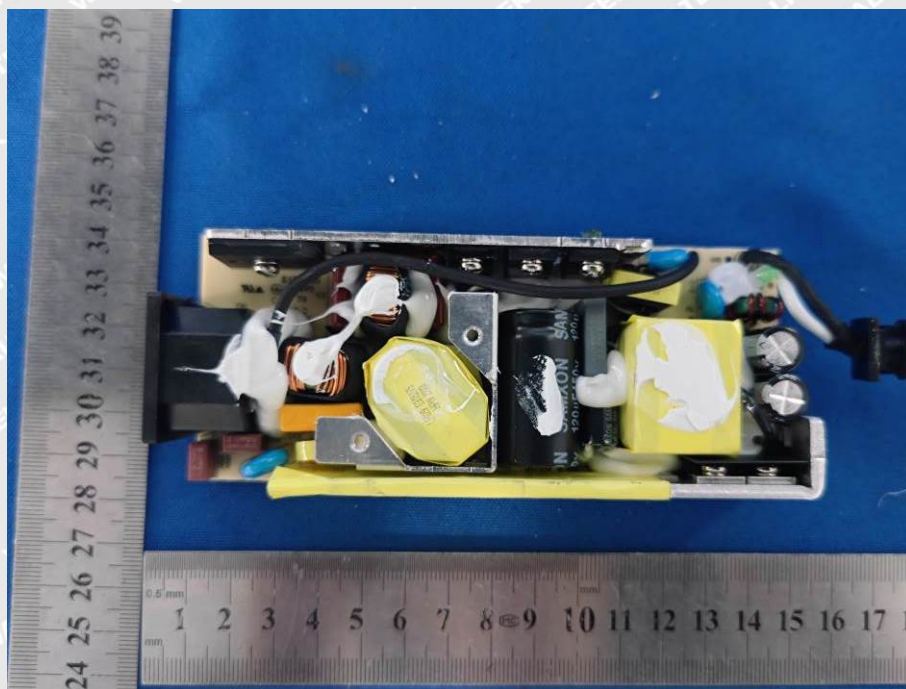


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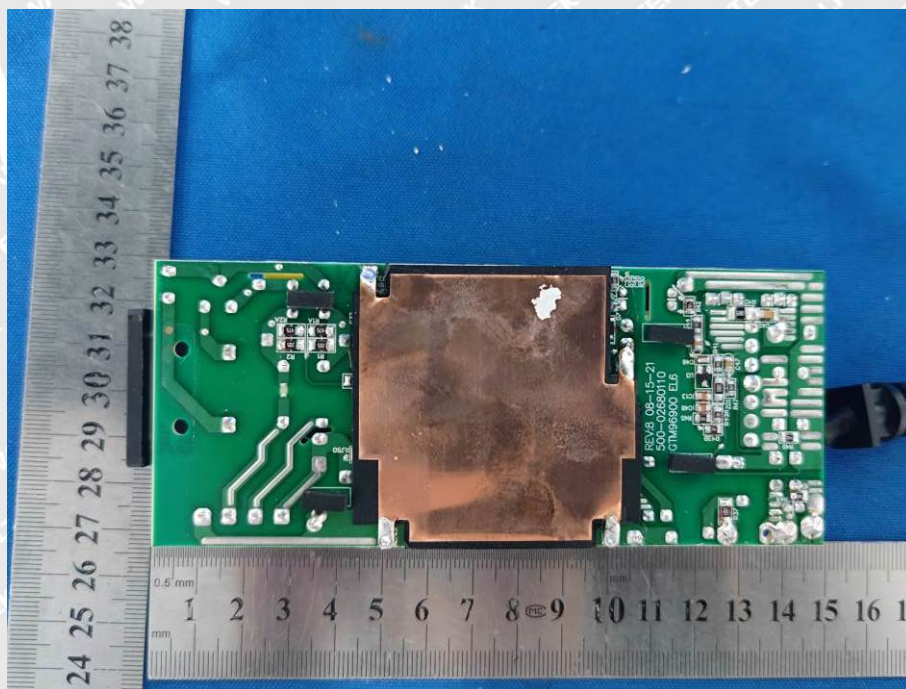


Photo 6



Model: GTM961200P12015-T3



Photo 7



Photo 8



Photo 9

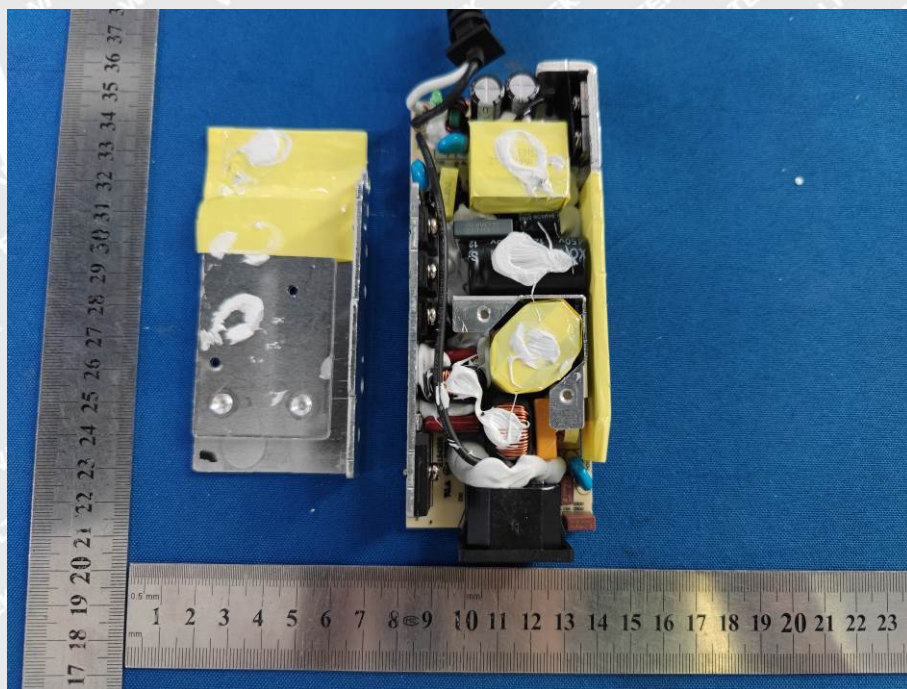


Photo 10

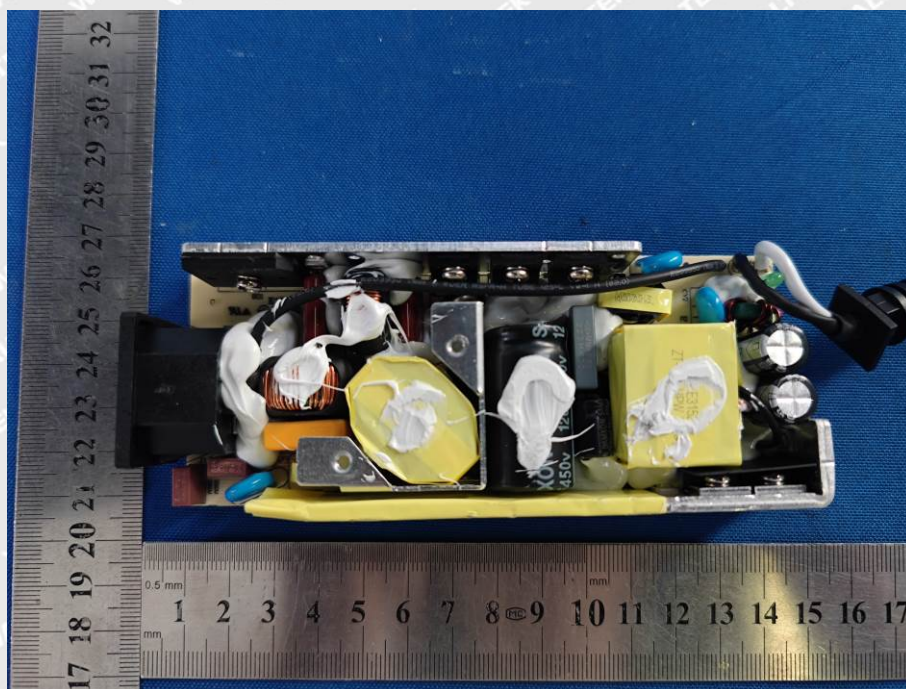


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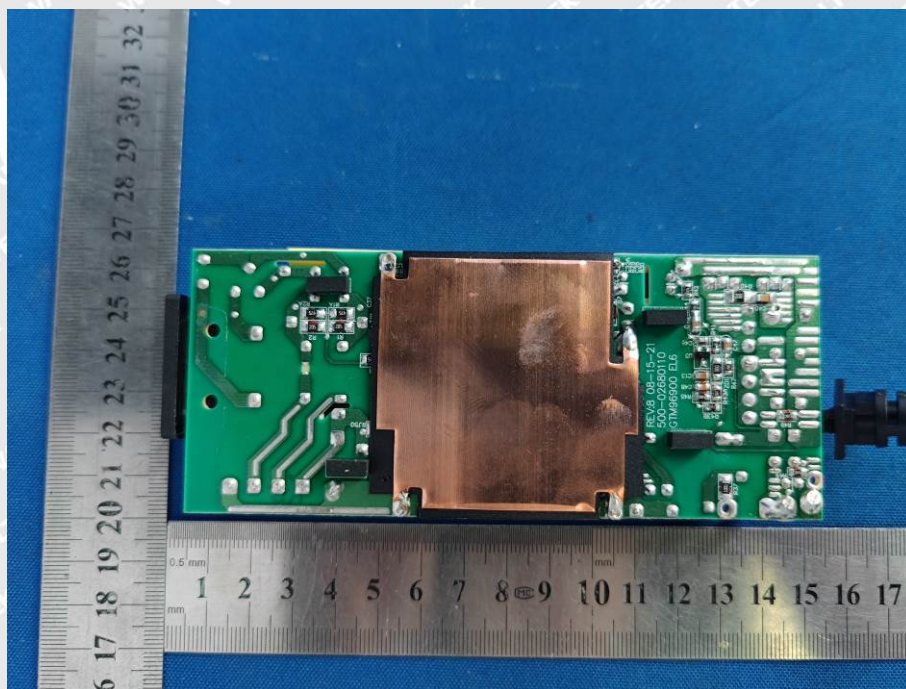


Photo 12



Model: GTM961200P12054-T2



Photo 13



Photo 14



Photo 15

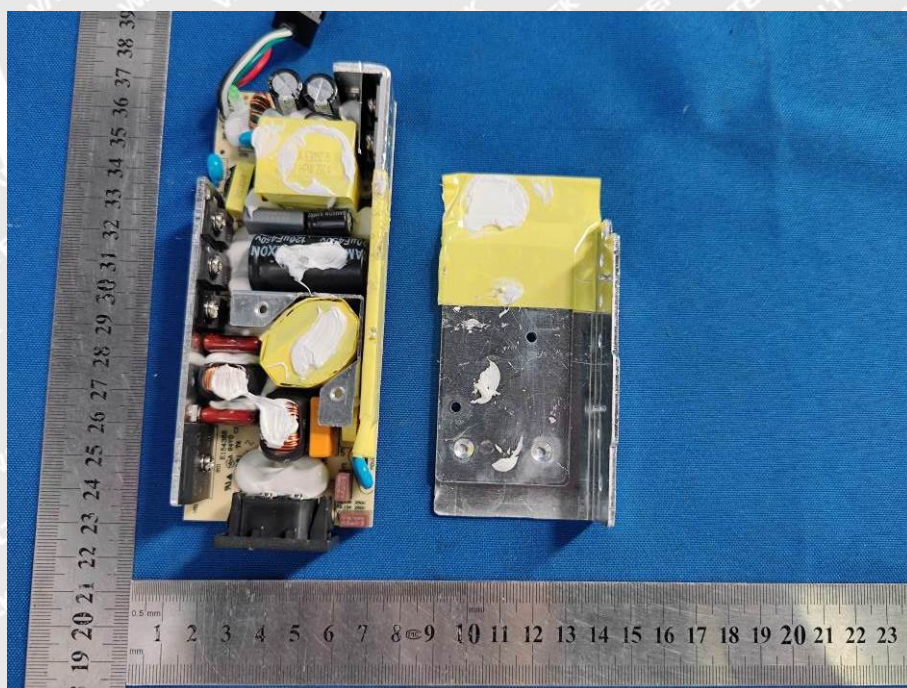


Photo 16

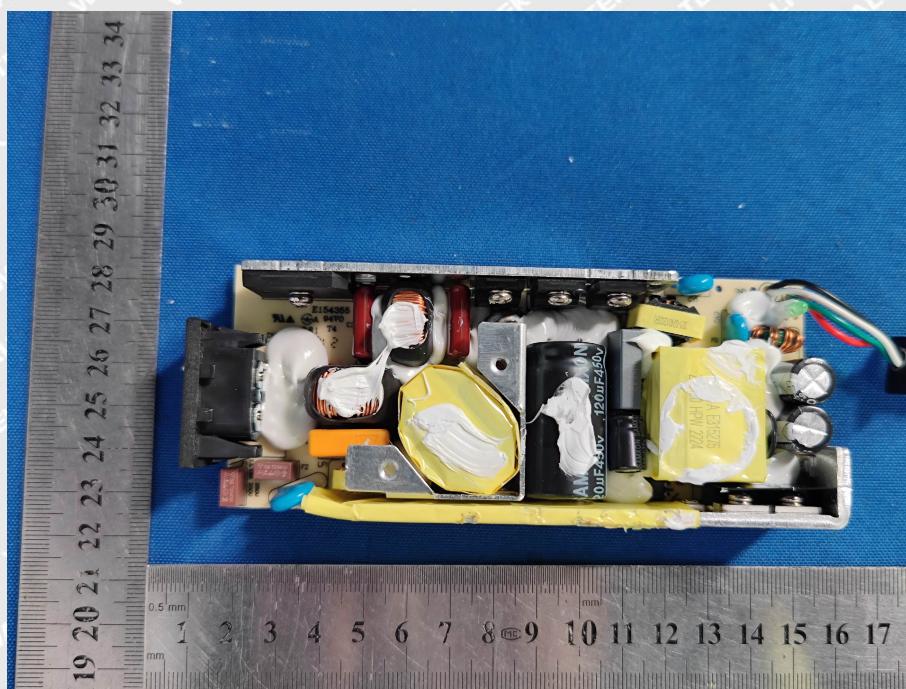


Photo 17

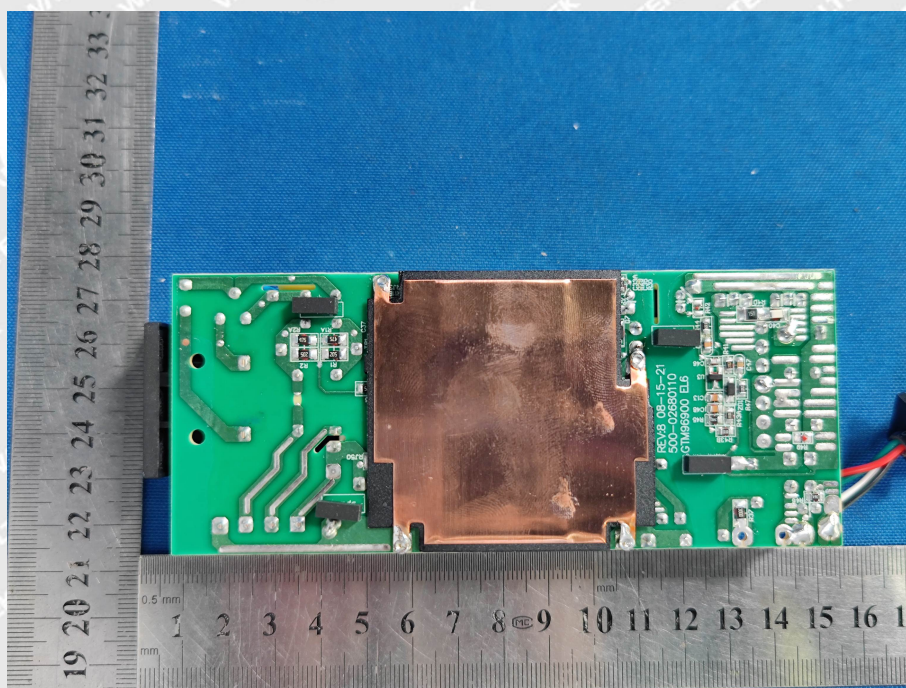


Photo 18

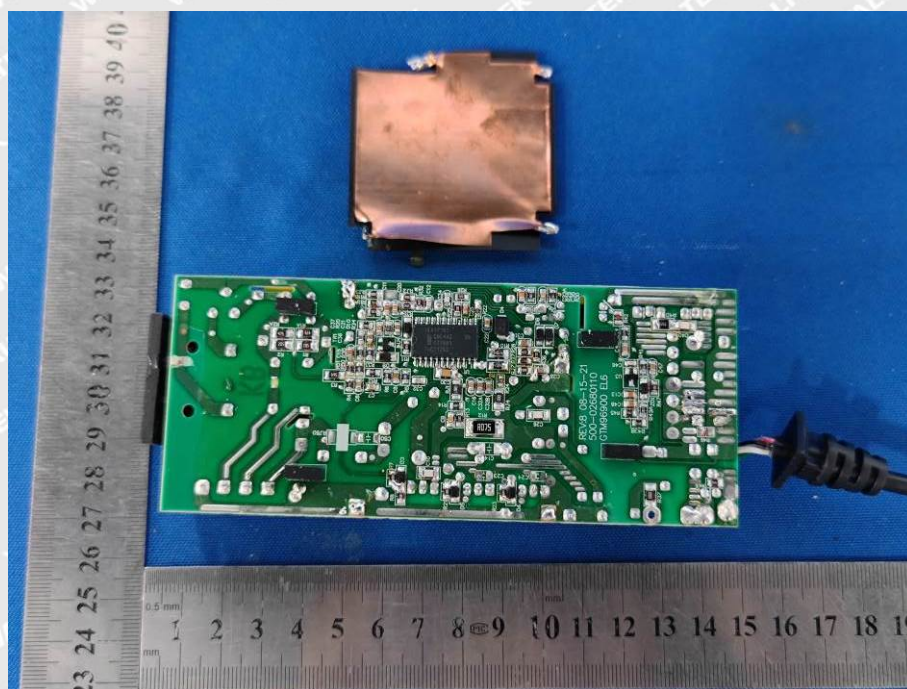


Photo 19

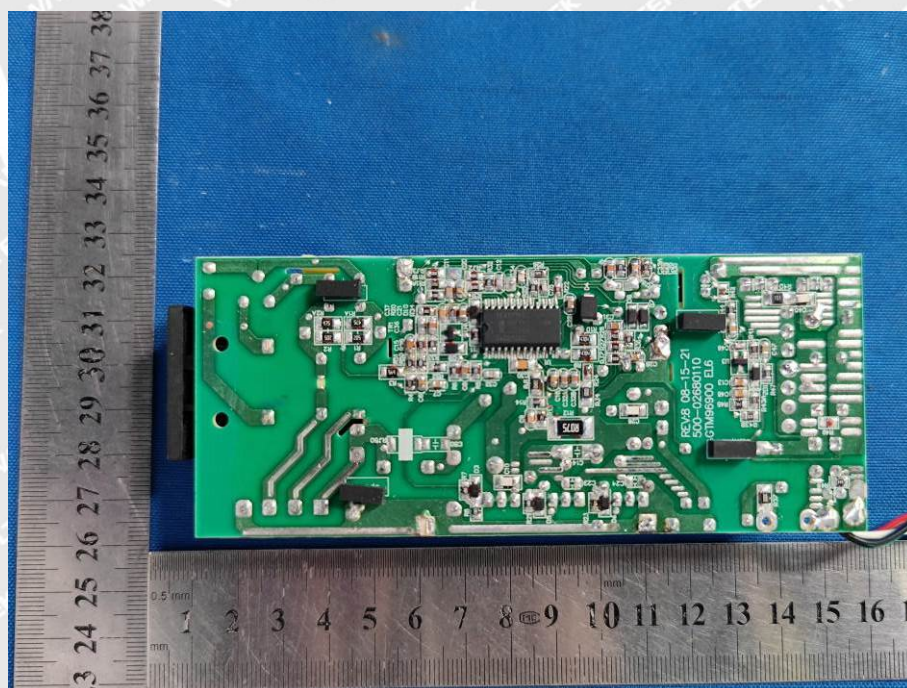


Photo 20

===== End of Report =====