



TEST REPORT
IEC 61558-2-16

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 supply units and transformers for switch mode power supply units

Report Number: 70.410.14.1082.01-03

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Total number of pages94

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Applicant's name.....: Wandera GmbH

Address: Am Wellenbach 9, D-93149 Nittenau, GERMANY

Test specification:

Standard: IEC 61558-2-16:2009, AMD1:2013 used in conjunction with
IEC 61558-1:2005, AMD1:2009

Test procedure: TUV mark

Non-standard test method.....: N/A

Test Report Form No.....: IEC61558_2_16E

Test Report Form(s) Originator: VDE Testing and Certification Institute

Master TRF: Dated 2016-12

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General disclaimer:

The test results presented in this report relate only to the object tested.

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Test item description..... :	Switch Mode Power Supply Unit Safety light transformer	
Trade Mark..... :		
Manufacturer..... :	NINGBO KELI POWER CO.,LTD	
Model/Type reference..... :	999999-017-5	
Ratings..... :	Input: 230VAC, 50Hz; Output:3.5VDC, 1A	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/> Testing Laboratory:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch	
Testing location/ address..... :	No. 1999, Duhui Road, Shanghai, 201108, P. R. China	
<input type="checkbox"/> Associated Testing Laboratory:		
Testing location/ address..... :		
Tested by (name, function, signature)..... :	Jiaqi ZHANG	
Approved by (name, function, signature).... :	Yi ZHU	
Testing procedure: TMP/CTF Stage 1:		
Testing location/ address..... :		
<input type="checkbox"/> Tested by (name, function, signature)..... :		
Approved by (name, function, signature).... :		
Testing procedure: WMT/CTF Stage 2:		
Testing location/ address..... :		
<input type="checkbox"/> Tested by (name + signature)..... :		
Witnessed by (name, function, signature) .. :		
Approved by (name, function, signature).... :		
Testing procedure: SMT/CTF Stage 3 or 4:		
Testing location/ address..... :		
<input type="checkbox"/>		

Tested by (name, function, signature).....:		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature)...:		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment):

Test report EN 61558-2-16:2009/A1:2013 used in conjunction with EN 61558-1:2005/A1:2009 (94 pages)
 Test report for EN 50 075:1990 (for integral EU plug) (7 pages)
 Photo documentation (8 pages)
 Data form for electrical equipment and machinery (5 pages)
 Test report EN 61347-2-2:2012 used in conjunction with EN 61347-1:2015, and Test report EN 62493:2015 - attachment 1 (47 pages)

Summary of testing:
Tests performed (name of test and test clause)

1. Complete tests.
2. Requirements of EN 50075 are also taken into consideration.
3. Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods.
4. We conclude that the product presented in this test report comply with the standard according to the test results on the submitted samples.
5. These test results comply with the requirements of EN 61558-2-16:2009/A1:2013 and EN 61558-1:2005+A1:2009

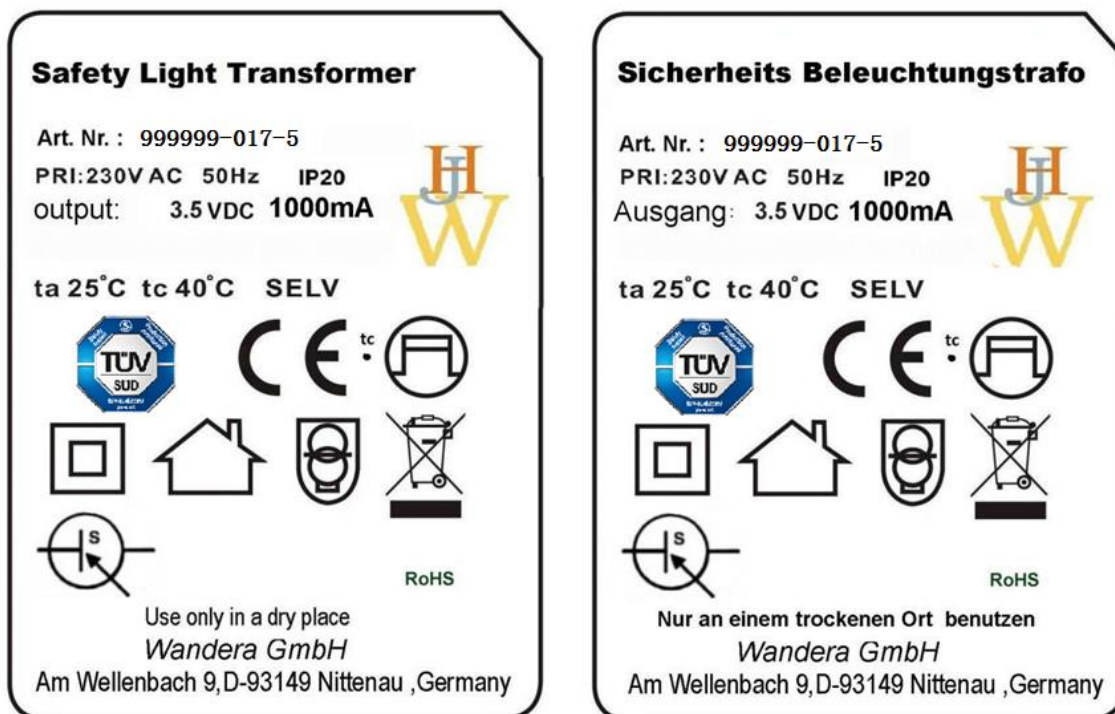
Testing location:

TÜV SÜD Certification and Testing (China) Co., Ltd.
 Shanghai Branch
 No. 1999, Duhui Road, Shanghai, 201108, P. R. China

Summary of compliance with National Differences:

- ☒ The product fulfils the requirements of European standard EN 61558-2-16:2009/A1:2013 and EN 61558-1:2005+A1:2009.
☒ The product fulfils the requirements of EN 50075:1990
☒

Copy of marking plate:










Remark: name and address of EU-based manufacturer, or authorized representative or importer must be affixed to the product when the product place on the EU market





















Test item particulars.....: Switch mode power supply	
Classification of installation and use.....: Direct plug-in	
Supply Connection.....: Pluggable equipment	
Possible test case verdicts: - test case does not apply to the test object.....: N/A - test object does meet the requirement.....: P (Pass) - test object does not meet the requirement.....: F (Fail)	
Testing.....: Date of receipt of test item :2015-06-29; 2016-09-28; 2017-09-07; 2018-11-19 Date (s) of performance of tests :2015-06-29 to 2015-09-18; 2016-09-28 to 2016-10-10 2017-09-07 to 2017-09-18; 2018-11-19 to 2018-11-23	
General remarks:	
"(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 <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator. This test report replace the previous version 70.410.14.1082.01-02 issued on 2017-09-18 due to the modifications mentioned as below: - Updating the standard.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided :	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies).....: Same as manufacturer 	













General product information:

This safety light transformer is used for filament lamp.

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) :	230V	P
	b) rated output voltage (V) :	3,5VDC	P
	c) rated output (VA, kVA or W) :		N/A
	d) rated output current (A) :	1000mA	P
	e) rated frequency (Hz) :	50Hz	P
	f) rated power factor (if not 1) :		N/A
	g) symbol AC for alternating current, or DC for direct current-output		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		P
	j) model or type reference	999999-017-5	P
	k) vector group according to IEC 60076 for three-phase transformer		N/A
	l) symbol for Class II		P
	m) symbol for Class III		N/A
	n) index IPXX if other than IP00	IP 20	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) :		P
	– short-circuit voltage (% rated supply voltage) for stationary transformers > 1000 VA		N/A
	– electrical function of the transformer	In literature	P

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:		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	F	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		N/A
	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		N/A
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.		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.		N/A
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
	Watts	W	N/A
	Hertz	Hz	P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Input	PRI	P
	Output	SEC	P
	Direct current	d.c. (DC) or 	P
	Neutral	N	N/A
	Single-phase a.c.		P
	Three-phase a.c.	3 	N/A
	Three-phase and neutral a.c.	3/N 	N/A
	Power factor	$\cos \varphi$	N/A
	Class II construction		P
	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	IP20	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	 ^F 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	 ^F 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		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		N/A
	Marking for terminals: no confusion between input and output		N/A
	Marking for interchangeable protective devices positioned adjacent to the base		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 cannot be reset or replaced		P

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 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 or 9.1.1.2 are fulfilled		P
9.1.1.1	The touch voltage is ≤ 35 V(peak) a.c. or ≤ 60 Vd.c.	output ≤ 60 Vd.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)	Max.0,388	P
	– for d.c. 2,0 mA (see Annex J)		N/A
	In addition, when a capacitor is connected to live parts:		—

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
9.1.1.2.1	discharge: $< 45 \mu\text{C}$ (between 60 V and 15 kV)		P
9.1.1.2.2	energy: $\leq 350 \text{ mJ}$ (voltage $> 15 \text{ kV}$)		N/A
9.1.2	Transformers shall have an adequate protection against accessibility to hazardous live parts:	Open frame. No enclosure	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.		P
	Hazardous live parts are not accessible after removal of detachable parts except for:		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:		P
	Shafts, handles, operating levers, knobs are not hazardous live 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		N/A
	hazardous live parts shall not be touchable with the test pin		N/A
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
	– The no load output voltage is $\leq 35 \text{ V}$ peak a.c. or $\leq 60 \text{ V}$ ripple free d.c., both poles are accessible		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. 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 :		P
	If the nominal capacitance is $\leq 0,1 \mu\text{F}$ – no test is conducted.		N/A
	– 10 times switch the supply source on and off, or use a special equipment for to switch off at the most unfavourable electrical angle	2,2V	P
	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 (120 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. $\leq 10\%$; d.c. $\leq 15\%$	(see appended table)	N/A
	b) inherently short-circuit proof transformers with one more than 1 rated output voltage for highest output voltage: a.c. $\leq 10\%$; d.c. $\leq 15\%$		N/A
	c) idem for other output voltages: a.c. $\leq 15\%$; d.c. $\leq 20\%$		N/A

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

	d) other transformers for output voltages: a.c. $\leq 5\%$; d.c. $\leq 10\%$		P
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12	NO-LOAD OUTPUT VOLTAGE (see supplementary requirements in Part 2)		P
	Remark: with rectifier measuring on both sides of the rectifier		P
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 $\leq 20\%$		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) to the connection windings		N/A
	Upri (V): 1,1 times rated supply voltage loaded with rated impedance – for independent transformers	1,1x230V=253V	—
	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) to the connection windings		N/A
	Max. temperature windings	(see appended table)	P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– Class A: $\leq 100\text{ }^{\circ}\text{C}$		N/A
	– Class E: $\leq 115\text{ }^{\circ}\text{C}$		N/A
	– Class B: $\leq 120\text{ }^{\circ}\text{C}$	Max.57,7	P
	– Class F: $\leq 140\text{ }^{\circ}\text{C}$		N/A
	– Class H: $\leq 165\text{ }^{\circ}\text{C}$		N/A
	– other classes		N/A
	Temperature of external enclosures of stationary transformers:		N/A
	– metal: $\leq 70\text{ }^{\circ}\text{C}$		N/A
	– other material: $\leq 80\text{ }^{\circ}\text{C}$		N/A
	Temperature of external enclosure of stationary transformer $\leq 85\text{ }^{\circ}\text{C}$ (not touchable with the IEC test finger)		N/A
	Temperature of external enclosures, handles, etc. of portable transformers:		P
	– continuously held parts of metal: $\leq 55\text{ }^{\circ}\text{C}$		N/A
	– continuously held parts of other material: $\leq 75\text{ }^{\circ}\text{C}$		N/A
	– not continuously held parts of metal: $\leq 60\text{ }^{\circ}\text{C}$		N/A
	– not continuously held parts of other material: $\leq 80\text{ }^{\circ}\text{C}$	Max.34,5	P
	Temperature of terminals for external conductors $\leq 70\text{ }^{\circ}\text{C}$	Max.41,3	P
	Temperature of terminals of switches $\leq 70\text{ }^{\circ}\text{C}$		N/A
	Temperature of internal and external wiring:		P
	– rubber: $\leq 65\text{ }^{\circ}\text{C}$		N/A
	– PVC: $\leq 70\text{ }^{\circ}\text{C}$	Max.41,3	P
	Temperature of parts where safety can be affected:		N/A
	– rubber: $\leq 75\text{ }^{\circ}\text{C}$		N/A
	– phenol-formaldehyde: $\leq 105\text{ }^{\circ}\text{C}$		N/A
	– urea-formaldehyde: $\leq 85\text{ }^{\circ}\text{C}$		N/A
	– impregnated paper and fabric: $\leq 85\text{ }^{\circ}\text{C}$		N/A
	– impregnated wood: $\leq 85\text{ }^{\circ}\text{C}$		N/A
	– PVC, polystyrene and similar thermoplastic material: $\leq 65\text{ }^{\circ}\text{C}$		N/A
	– varnished cambric: $\leq 75\text{ }^{\circ}\text{C}$		N/A
	Temperature rise of supports $\leq 85\text{ }^{\circ}\text{C}$	Max.28,4	P
	Temperature of printed boards:		P
	– bonded with phenol-formaldehyde: $\leq 105\text{ }^{\circ}\text{C}$	Max.53,0	P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– melamine-formaldehyde: $\leq 105^{\circ}\text{C}$		N/A
	– phenol-furfural: $\leq 105^{\circ}\text{C}$		N/A
	– polyester: $\leq 105^{\circ}\text{C}$		N/A
	– bonded with epoxy: $\leq 140^{\circ}\text{C}$		N/A
	Electric strength between input and output windings (18.3, 1 min); test voltage (V) :	3750V, 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 $> 1\text{kHz}$		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
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 $\leq 30\%$		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; Upri(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

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Tests direct after 14.1 at the same t_a and without changing position.	(see appended table)	P
	Supply voltage between 0,9 times and 1,1 times of the rated supply voltage		—
	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.		N/A
	Winding protected inherently (15.2)		N/A
	– Max. temperature of winding protected inherently (insulation class): $\leq 150\text{ °C}$ (A); $\leq 165\text{ °C}$ (E); $\leq 175\text{ °C}$ (B); $\leq 190\text{ °C}$ (F); $\leq 210\text{ °C}$ (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): $\leq 200\text{ °C}$ (A); $\leq 215\text{ °C}$ (E); $\leq 225\text{ °C}$ (B); $\leq 240\text{ °C}$ (F); $\leq 260\text{ °C}$ (H)		N/A
	– Test according 15.3.1: max. temperature of winding during the first hour, peak value (insulation class): $\leq 200\text{ °C}$ (A); $\leq 215\text{ °C}$ (E); $\leq 225\text{ °C}$ (B); $\leq 240\text{ °C}$ (F); $\leq 260\text{ °C}$ (H)	Max.32,4	P
	– Test according 15.3.1: max. temperature of winding after first hour, peak value (insulation class): $\leq 175\text{ °C}$ (A); $\leq 190\text{ °C}$ (E); $\leq 200\text{ °C}$ (B); $\leq 215\text{ °C}$ (F); $\leq 235\text{ °C}$ (H)	Max.32,4	P
	– Test according 15.3.1: max. temperature of winding after first hour, arithmetic mean value (insulation class): $\leq 150\text{ °C}$ (A); $\leq 165\text{ °C}$ (E); $\leq 175\text{ °C}$ (B); $\leq 190\text{ °C}$ (F); $\leq 210\text{ °C}$ (H)	Max.32,4	P
	Max. temperature of external enclosures (accessible by test finger) $\leq 105\text{ °C}$	Max.28,0	P
	Max. temperature of insulation of wiring (rubber and PVC) $\leq 85\text{ °C}$	Max.29,1	P
	Temperature rise of supports $\leq 105\text{ °C}$	Max.25,9	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 \leq values in table 3		N/A
15.3	For non-inherently short-circuit proof transformers and for transformers with rectifiers: temperature rises \leq values in table 3		P
15.3.1	Output terminals short-circuited: protection device operates, test at 0,9 ... 1,1 of the rated supply voltage	1,1x230=253V 0,9x230=207V	P

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Clause	Requirement + Test	Result - Remark	Verdict
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		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 \leq 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		—
	– 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): $\leq t1$; ≤ 5 h		N/A
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 break-down 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

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Clause	Requirement + Test	Result - Remark	Verdict

15.101	Electronic circuits of the SMPS fulfil 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
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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)		P
	For stationary and portable transformers: 3 blows, impact energy 0,5 Nm		P
16.3	Portable transformers (except of plug in transformers)		N/A
	For portable transformers: 100 falls, 25 mm		N/A
16.4	Transformers with integrated pins (plug in transformers), the following tests are carried out:		P
	a) plug-in transformers: tumbling barrel test: 50 x ≤ 250 g; 25 x ≤ 250 g	1000falls according to EK1 557-13	P
	b) torque test of the plug pins with 0,4 Nm		P
	c) pull force according to table 5 for each pin		P

17	PROTECTION AGAINST HARMFUL INGRESS OF WATER AND MOISTURE		P
17.1	Degree of protection (IP code marked on the transformer)	IP20	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		P
	– fixed transformer mounted as in normal use by the tests according to 17.1.1 A to L		P
	– 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:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	– dielectric strength test according to 18.3		P
	Inspection:		P
	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 \geq 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:	IP20	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		N/A
	- IP4X, wire 1 mm; force 1 N		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

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Clause	Requirement + Test	Result - Remark	Verdict
	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 \leq IP20, 168 h for other transformers):	48 h	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		P
	– input circuits and output circuits for basic insulation ≥ 2 M		P
	– 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		P
	– each output circuit and all other output circuits connected together ≥ 2 M		P
	– hazardous live parts and metal parts with basic insulation (Class II transformers) ≥ 2 M		P
	– body and metal parts with basic insulation (Class II transformers) ≥ 5 M		P
	– metal foil in contact with inner and outer surfaces of enclosures ≥ 2 M		P
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)	250V; 3750V	P
	3) basic or supplementary insulation between:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	4) Reinforced insulation between the body and live parts; working voltage (V); test voltage (V) :	250V; 3750V	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)		-
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
	– 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
18.102 (A1)	Partial discharge tests according to IEC 60664-1, if the working voltage is > 750 V peak		N/A
	Partial discharge is ≤ 10 pC at time P2 See Fig. 19.101		N/A
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.	Max.0,388mA Limit:0,5mA	P
	– switches n and e in on position		P
	– switch n: off and switch e: on		P
	– switch n: on and switch e: off		P
18.5.2	Protective earth conductor current		-

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Clause	Requirement + Test	Result - Remark	Verdict
	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
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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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
	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):		N/A
	– Insulation between input windings and body connected to earth consist of basic insulation rated to the working voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– Insulation between output windings and body, connected to earth consist of supplementary insulation rated for the working voltage		N/A
	Class II SMPS (IEC 61558-2-16:2009)		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		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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
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)		P
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)		P
19.1.3.9	No connection between output circuit and body except of associated transformers (allowed by equipment standard) (EN 61558-2-16:09)		P
19.1.3.10	Protective screening is not allowed for SMPS with plug connection to the mains (EN 61558-2-16:09)		P
19.2	Fiercely burning material 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		P
19.4	Class II transformers: contact between accessible metal parts and conduits or metal sheaths of supply wiring impossible		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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 $\leq 50\%$ specified values (Cl. 26)		P
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	<250V; one Y1 capacitor used	P
19.9	Insulation material input/output and supplementary insulation of rubber resistant to ageing	No rubber used as supplementary insulation.	N/A
	Creepage distances (if cracks) \geq 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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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
	– 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:	Approved TIW used	P
	<ul style="list-style-type: none"> Multi-layer extruded or spirally wrapped insulation, passed the tests of annex K 		N/A
	<ul style="list-style-type: none"> Basic insulation: two wrapped or one extruded wire 		N/A
	<ul style="list-style-type: none"> Supplementary insulation: two layers, wrapped or extruded 		N/A
	<ul style="list-style-type: none"> Reinforced insulation: three layers wrapped or extruded 		N/A
	Spirally wrapped insulation:		N/A
	<ul style="list-style-type: none"> creepage distances between wrapped layers > cl. 26 _ P1 values 		N/A
	<ul style="list-style-type: none"> path between wrapped layers sealed, the test voltage of K2 is multiplied with 1,35 		N/A
	<ul style="list-style-type: none"> test 26.2.3 – Test A, passed for wrapped layers 		N/A
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> comply with annex K 		N/A
	<ul style="list-style-type: none"> two layers for supplementary insulation 		N/A
	<ul style="list-style-type: none"> one layer for basic insulation 		N/A
	<ul style="list-style-type: none"> one layer for mechanical separation between the insulated wires of primary and secondary. This layer fulfils the requirement of basic insulation. 		N/A
b)	Insulated winding wire used for reinforced insulation in a wound part:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> comply with annex K 	Approved TIW used	P
	<ul style="list-style-type: none"> three layers 		P
	<ul style="list-style-type: none"> relevant dielectric strength test of 18.3 		P
	Where the insulated winding wire is wound:		N/A
	<ul style="list-style-type: none"> upon metal or ferrite cores 		N/A
	<ul style="list-style-type: none"> upon enamelled wire 		N/A
	<ul style="list-style-type: none"> under enamelled wire 		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
	100 % routine test of Annex K3 of part 1 is fulfilled		N/A
	no creepage distances and clearances for insulated winding wirers		N/A
	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		N/A
FIW	<u>Transformers which use FIW wire</u>		-
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
	<ul style="list-style-type: none"> 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:		—
	<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"> 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"> between FIW and enamelled wire, no requirements of creepage distances and clearances 		N/A
	<ul style="list-style-type: none"> no touch of FIW and enamelled wires (grad 1, or grad 2 ...) 		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	<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 with double or reinforced insulation according to 19.1.3 (basic/supplementary insulated FIW wire + enamelled wire + creepage distance and clearances for basic insulation)		–
	<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	Enclosure secured by ultrasonic	P
19.15	Transformer with pins for fixed socket-outlets: no strain on socket-outlet		P
	Additional torque $\leq 0,25$ Nm		P
19.16	Protection index for portable transformers:		P
	≤ 200 VA \geq IP20 and instructions for use	IP20	P
	> 200 VA $\leq 2,5$ kVA \geq IPX4 (single-phase)		N/A
	> 200 VA $\leq 6,3$ kVA \geq IPX4 (polyphase)		N/A
	$> 2,5$ VA (single-phase) \geq IP21		N/A
	$> 6,3$ VA (polyphase) \geq 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		N/A
19.18	Transformers \geq 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		N/A
	– SELV output circuits separated by double or reinforced insulation from all other than SELV or PELV circuits		N/A
	– SELV output circuits separated by basic insulation from other SELV or PELV circuits		N/A
19.20.1	SELV circuits and parts not connected to protective earth, to live parts, or protective conductors forming part of other circuits		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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		N/A
19.21	FELV-circuits: protection against contact fulfils the min. test voltage required for the primary circuit		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		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:		P
	– 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).		P
	– Components without markings tested under transformer conditions including inrush current.		N/A
	– If no IEC standard exists, the component is tested under transformer conditions.		P
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		N/A
	Disconnection from the supply:		N/A
	– by a switch, disconnecting all poles of the supply (full disconnection under the relevant overvoltage category		N/A
	– or a flexible supply cable and cord with plug		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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.		N/A
	Plugs and socket-outlets for SELV systems with both a rated current = 3A and a rated voltage =24 V shall comply with following:		N/A
	SELV plug and socket-outlets shall comply with IEC 60 884-2-4 and IEC 60 906-3		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
	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		N/A
	– 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		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
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:		-
	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
	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:		-
	– at least micro-interruption or micro-disconnection (IEC 60730-1)		N/A
	– 300 h aged at t_a (transformer) + 10°C		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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		-
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 ta min		N/A
	– 3 cycles at ta min for transformers with ta 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 ta min		N/A
	– 24 h at ta and 24 h at ta min for transformers with ta 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:		-
	5 cycles: transformer short-circuited for 48 h by 1,1 times of the input voltage and max. ta		N/A
	5 cycles: transformer short-circuited for 48 h by 0,9 times of the input voltage and min. ta (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.		-
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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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 ta + 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 $\geq 1,5$ mm) or bushings of insulating material		N/A
21.3	Bare conductors: distances adequately maintained		N/A
21.4	When external wires are connected to terminal, internal wiring shall not work loose		P
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		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		P
	Input and output wiring inlet and outlet openings for flexible cables or cords: insulating material or bushing of insulating material		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Bushings for external wiring: reliably fixed, not of rubber unless part of cord guard		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 between 2 m and 4 m; without 0,5 mm ²		N/A
22.5	Power supply cords for transformers IPX0 and transformers "for indoor use only" \geq IPX0:		N/A
	– for transformers with a mass \leq 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: \geq IPX0: 60245 IEC57 (H05RN-..)		N/A
22.6	Power supply cords for single-phase portable transformers with input current \leq 16A:		N/A
	– cord set fitted with an appliance coupler in accordance with IEC 60320		N/A
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 \leq 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		N/A
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:		N/A
	– no damage to power supply cord		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– reliably fixed		N/A
	– not removable without tool		N/A
	– not integral with power supply cord (for type X attachment)		N/A
	– 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:		P
	– cord guards, if any, of insulating material and fixed		P
	Compliance is tested by the oscillating test according to fig. 7:		P
	– loaded force during the test according to fig. 7		P
	– 10 N for a cross-sectional area > 0,75		N/A
	– 5 N for a cross-sectional area ≤ 0,75		P
	After the test according to fig. 7:		P
	– no short-circuit between the conductors		P
	– no breakage of more than 10% of strands of any conductor		P
	– no separation of the conductor from the terminal		P
	– no loosening of any cord guards		P
	– no damage of the cord or cord guard		P
	– no broken strands piercing the insulation and not becoming accessible		P
22.9.5	Cord anchorages for type X attachment:		N/A
	– 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

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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 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:		P
	– 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		P
	Cord anchorages for type X and Y attachments:		P
	– replacement of external flexible cable or cord does not impair compliance with standard		P
	– the entire flexible cable or cord with covering can be mounted into the cord anchorage		N/A
	– if tightened or loosened no damage		P
	– 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		P
	– labyrinths, if clearly how, permitted		N/A
	Tests for type X with special cords, type Y, type Z		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		N/A
	– 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); torque (Nm)	<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

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Clause	Requirement + Test	Result - Remark	Verdict
	– creepage distances and clearances \geq 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		N/A
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		N/A
	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 \geq 50% of specified value (Cl. 26)		N/A
	Transformer with type Y and Z attachments for external conductors: soldered, welded, crimped, etc. connections allowed		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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 $\geq 50\%$ of specified value (Cl. 26)		N/A
23.2	Terminals for type X with special cords Y and Z attachments shall be suitable for their purpose:		N/A
	– test by inspection according to 23.1 and 23.2		N/A
	– pull of 5 N to the connection before test according to 14.1		N/A
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
	– 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

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Clause	Requirement + Test	Result - Remark	Verdict

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		N/A
	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
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 $\leq 0,1$ 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

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Clause	Requirement + Test	Result - Remark	Verdict
	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 $\geq 3 \text{ mm} + 1/2$ 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
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 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	P2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specially specimens, with uninsulated 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		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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
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)		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

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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
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		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" is 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		P
	– The mandrel test according 26.3.3 is fulfilled on each layer with 50 N		P
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" is 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		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" is 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		P

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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:		P
	– rated output > 100 VA values in square brackets apply		N/A
	– rated output $\geq 25 \text{ VA} \leq 100 \text{ VA}$ 2/3 of the value in square brackets apply		N/A
	– rated output 25 VA 1/3 of the value in square brackets apply	> 0,09mm	P
26.3.3	Mandrel test of insulation in thin sheet form (specimen of 70 mm width are necessary):		P
	– If the layers are non-separable – at least 3 layers glued together fulfil the test:		N/A
	– pull force of 150 N		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.		P
	– pull force of 100 N		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 breakdowns.		P
	– If the layers are separable 1 of at least 2 layers fulfil the test:		N/A
	– pull force of 50 N		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
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	Max.370Vp, 250Vrms	P
	– rated supply frequency 50/60 Hz		P
	– rated internal frequency	66kHz	P
	1. Insulation between input and output circuits (basic insulation):		N/A
	a) measured values \geq specified values (mm)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2. Insulation between input and output circuits (double or reinforced insulation):		P
	a) measured values \geq specified values (mm)	see appended table	P
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)	3 layers insulation tape: 0,18mm>0,09mm	P
	3. Insulation between adjacent input circuits: measured values \geq specified values (mm) :		N/A
	Insulation between adjacent output circuits: measured values \geq specified values (mm) .:		N/A
	4. Insulation between terminals for external connection:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A
	5. Basic or supplementary insulation:		P
	a) measured values \geq specified values (mm)	see appended table	P
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A
	d) measured values \geq specified values (mm)		N/A
	e) measured values \geq specified values (mm)		
	6. Reinforced or double insulation: measured values \geq specified values (mm)	see appended table	P
	7. Distance through insulation:		P
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)	Enclosure: 2,6 mm>0,9mm Insulation tape: 0,18mm>0,09mm	P
26.102	Values of IEC 61558-2-16 applicable for frequency up to 3 MHz (EN 61558-2-16:09)	see appended table	P

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Clause	Requirement + Test	Result - Remark	Verdict
	For frequency above 3 MHz clause 7 of IEC 60664-4 is applicable (high frequency testing)		N/A
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	Max.360Vp	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)		P
	The minimum clearance is the greater of the two values.		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		N/A
	Peak working voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Pollution degree	P2	P
	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)		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		N/A
	– no voids or gaps are present in between the solid insulation		N/A
	–		N/A
	–		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 $d2 \leq 30 \mu\text{m}$ 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
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
	• 1 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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		-
	The Ball-pressure test -: diameter of impression ≤ 2 mm; heating cabinet temperature ($^{\circ}\text{C}$) at 70°C or the temperature T of 14.1 ($T + 15$) - is fulfilled.	Enclosure: 125°C , 1,0mm	N/A
27.1.2	Internal parts		-
	For insulating material retaining current carrying parts in position, the ball-pressure test -: diameter of impression ≤ 2 mm; heating cabinet temperature ($^{\circ}\text{C}$) at 125°C or the temperature T of 14.1 ($T + 15$) - is fulfilled	Bobbin of transformer: 125°C , 1,0mm; PCB: 125°C , 0,8mm	P
27.2	Resistance to abnormal heat under fault conditions		N/A
27.3	Resistance to fire		-
	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		-
27.3.1	External accessible parts (glow wire tests)		P
	– 650°C for enclosures	see appended table	P
	– 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	Enclosure	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	P
	– 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
	– 850 °C for parts retaining current carrying parts in position and terminals for external conductors with non-fixed wiring. Current > 0,2 A	PCB	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		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
IEC 61558-1			
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
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IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
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
			-
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
	– 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		P
	b) open circuit at the terminals of any component		N/A
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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:		N/A
	– if $I_2 < 2,1 \times I_1$ test of 15.8 is repeated with fuse-link short-circuited		N/A
	– if $I_2 > 2,75 \times I_1$, no other tests are necessary		N/A
	If $I_2 > 2,1 \times I_1$ and $I_2 < 2,75 \times I_1$ 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		P

H.3	CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH INSULATION		N/A
H.3.1	For live parts separated by basic insulation smaller cr and cl as in 26 are allowed, if H2 is fulfilled.		N/A
	In optocouplers no requirements of cr and cl		N/A
	For coatings annex W applies. Smaller distances as required in IEC 60664-3, clause 4 are applicable,		N/A
	For potted transformers cycling tests acc, 26.2. are applicable		N/A
H.3.2	The ma. surface temperature of optocouplers is 50 K		N/A

K (A1)	ANNEX K, INSULATED WINDING WIRES FOR USE AS MULTIPLE LAYER INSULATION		P
K.1	Wire construction:		P
	<ul style="list-style-type: none"> insulated winding wire for basic or supplementary insulation (see 19.12.3) 		N/A
	<ul style="list-style-type: none"> insulated winding wire for reinforced insulation (see 19.12.3) 	Approved TIW used	P
	<ul style="list-style-type: none"> solid circular winding wires and stranded winding wires with 0,05 to 5 mm diameter 		N/A
	<ul style="list-style-type: none"> spirally wrapped insulation – overlapping 		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
K.2	Type tests		N/A
K.2.1	General Tests between ambient temperature between 15° C and 35° C and at an humidity between 45% and 75 %		N/A
K.2.2	Electric strength test		N/A
K.2.2.1	Solid circular winding wires and stranded winding wires		N/A
	Test samples prepared according to clause 4.4.1 of IEC 60851-5:2008 (twisted pair)		N/A
	Dielectric strength test: 6 kV for reinforced insulation		N/A
	Dielectric strength test: 3 kV for basic or supplementary insulation		N/A
K.2.2.2	Square or rectangular wires .		N/A
	Test samples prepared according to clause 4.7.1 of IEC 60851-5:2008		N/A
	Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
K.2.3	Flexibility and adherence		N/A
	Claus 5.1 in Test 8 of IEC 60851-3:2009 shall be used		N/A
	Test samples prepared according to clause 5.1.1.4 of IEC 60851-3:2009		N/A
	Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
	Mandrel diameter according table K.1		N/A
	The tension to the wire during winding on mandrel is 118 N/mm ² (118 MPa)		N/A
K.2.4	Heat shock		N/A
	Test samples prepared according to 3.1.1 (in Test 9) of IEC 60851-6:1996		N/A
	• high voltage test immediately after this test		N/A
	• Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	• Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A


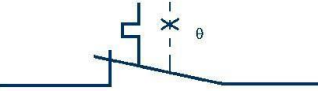


IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
K.2.5	Retention of dielectric strength after bending (test as specified under test 13 of 4.6.1 c) of IEC 60 851-5)		N/A
			-
	<ul style="list-style-type: none"> high voltage test immediately after this test Dielectric strength test: 5,5 kV for reinforced insulation Dielectric strength test: 2,75 kV for basic or supplementary insulation 		N/A
K.3.1	General Tests as subjected in K.3.2 and K.3.3		N/A
K.3.2	Routine test		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 4,2 kV for reinforced insulation 		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 2,1 kV for basic 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
	Test with a twisted pair, prepared according clause 4.4.1 of IEC 60851-5:2008		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 6 kV for reinforced insulation 		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 3 kV for basic or supplementary insulation 		N/A
K.3.3.2	Square rectangular wire		N/A
	Samples prepared according to clause 4.7.1 of IEC 60851-5:2008		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 5,5 kV for reinforced insulation 		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 3 kV for basic or supplementary insulation 		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

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Clause	Requirement + Test	Result - Remark	Verdict
	Test according U5 and measurements according 11.1		N/A
	Transformers tested as an 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
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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		-
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 L ₂ at temperature T ₂ according to U4		N/A
	Test 2, based on clause U.5.1 but at a calculated room temperature T ₂ (for 120 days).The test time with T ₂ exceeds L ₂ .		N/A
	If all transformers fail before L ₂ , the result is negative.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

V	ANNEX V, SYMBOLS TO BE USED FOR THERMAL CUT-OUTS		N/A
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

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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
999999-017-5 3,5V/1A	230	3,276	-6,4%	3,486	6,41%	50Hz

14	TABLE: HEATING							P
type/rated output	r-cold Ω	r-warm Ω	temp. °C	ext. encl. °C	support °C	int. + ext. wire	further information	
-	-	-	-	-	-	-	-	

Supplementary information: See below

14	TABLE: Heating Test			P
	Test voltage (V)	253V 50Hz	207V/ 50Hz	—
	Ambient ($^{\circ}\text{C}$)	25,0	25,0	—
Thermocouple Locations		max. temperature measured, ($^{\circ}\text{C}$)		max. temperature limit, ($^{\circ}\text{C}$)
Transformer Winding 1		57,7	55,9	110 (Class B)
Transformer Winding 2		57,4	55,6	110 (Class B)
L1 Winding1		34,5	34,7	110 (Class B)
L1 Winding 2		35,4	35,3	110 (Class B)
Bobbin (transformer)		58,5	56,4	For reference
Pulg – pin		27,7	28,4	70
Internal wire to L/N		30,1	30,6	70
Internal wire to output circuit		41,2	41,3	85
PCB		53,0	49,4	105
Capacitor CB3		45,5	44,1	105
Capacitor CX1		34,9	34,8	110
optocoupler		40,4	39,6	For reference
Plug enclosure (inside)		28,6	29,2	For reference
Enclosure (outside)		34,5	34,3	80
Support		27,6	28,4	85

15	TABLE: SHORT-CIRCUIT AND OVERLOAD PROTECTION		P
	ambient temperature ($^{\circ}\text{C}$)		

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Clause	Requirement + Test	Result - Remark	Verdict

type/rated output	r-cold Ω	r-warm Ω	temp. $^{\circ}\text{C}$	ext. encl. $^{\circ}\text{C}$	support $^{\circ}\text{C}$	int. + ext. wire	further information
-	-	-	--	-	-	--	-

15	TABLE: Short circuit and overload protection			P
	Test voltage (V) :	253V	207V	—
	Ambient ($^{\circ}\text{C}$) :	25 $^{\circ}\text{C}$	25 $^{\circ}\text{C}$	—
Thermocouple Locations		max. temperature measured, ($^{\circ}\text{C}$)		max. temperature limit, ($^{\circ}\text{C}$)
Transformer Winding 1		32,4	31,9	175 (Class B)
Transformer Winding 2		32,2	31,8	175 (Class B)
L1 winding 1		26,9	26,6	175 (Class B)
L1 winding 2		27,0	26,7	175 (Class B)
Internal wire to L/N		26,7	26,0	85
Internal wire to output		29,1	28,7	85
Enclosure outside		28,0	26,6	105
Support		25,9	25,5	105
Supplementary information: Output terminal short-circuit				

15	TABLE: Short circuit and overload protection			P
	Test voltage (V) :	230		—
	Ambient ($^{\circ}\text{C}$) :	25 $^{\circ}\text{C}$		—
Thermocouple Locations		max. temperature measured, ($^{\circ}\text{C}$)		max. temperature limit, ($^{\circ}\text{C}$)
Transformer Winding 1		63,0		175 (Class B)
Transformer Winding 2		62,5		175 (Class B)
L1 winding 1		37,9		175 (Class B)
L1 winding 2		38,7		175 (Class B)
Internal wire to L/N		32,9		85
Internal wire to output		45,8		85
Enclosure outside		35,6		105
Support		30,4		105
Supplementary information: Output overload				

18.2	TABLE: insulation resistance measurements		P
Insulation resistance R between:		R (MΩ)	Required R (MΩ)
Input-Output		1000	>5
Live part -- Body		1000	>7
Supplementary information:			

18.3	TABLE: Dielectric Strength		P
Test voltage applied between:		Test potential applied (V)	Breakdown / flashover (Yes/No)
Between live parts and output circuit		3750V	No
Between live parts and external enclosure		3750V	No
Between primary winding of transformer and secondary winding of transformer		3750V	No
L/N		2100V	No
Supplementary information:			

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Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Critical components information (see CDF)					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾	
- Description:						
- Description:						
- Description:						
Supplementary information:						
¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.						

25	TABLE: Threaded Part Torque Test				N/A
Threaded part identification	Diameter of thread (mm)	Column number (I, II, or III)	Applied torque (Nm)		
Supplementary information:					

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Clause	Requirement + Test	Result - Remark	Verdict

26	TABLE: Clearance And Creepage Distance Measurements					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
L to N before fusible resistor	370	250	2,5	4,0	2,54	4,0
Different pole of fusible resistor	370	250	2,5	4,0	2,54	4,0
Internal wire to external enclosure	370	250	2,5	3,0	2,54	3,0
Primary circuit to secondary circuit for tracks on PCB	370	250	4,7	7,0	5,0	7,0
Primary circuit (iron core of transformer T1) to output pin	370	250	4,7	>6,5	5,0	>6,5
Primary circuit to secondary circuit between pins of optocoupler	370	250	4,7	7,0	5,0	7,0
Primary circuit (iron core of transformer T1) to secondary component	370	250	4,7	>6,5	5,0	>6,5
Supplementary information:						

26	TABLE: Distance Through Insulation Measurements			P
Distance through insulation di at/of:	U r.m.s. (V)	Test voltage (V)	Required di (mm)	di (mm)
Enclosure	370	250	0,9	min.2,0
Insulation tape	370	250	0,05	min.0,18
Supplementary information:				

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		
1.						
2.						
3.						
4.						
5.						
6.						
7.						

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

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	
8.						
9.						
10.						

BB.26.2 TEST B	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
	Test with three specially prepared specimens with potted – P1 values are 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	
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

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	

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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	
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

26.107 61558-2- 16/A1	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
	Test for transformers, use FIW-wire					
	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	
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

27	TABLE: Resistance to heat and fire - Glow wire tests						P
Object/ Part No./ Material	Manufacturer / trademark	Glow wire test (GWT); (°C)					
		550	650		750		850
			te	ti	te	ti	Verdict

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Clause	Requirement + Test					Result - Remark		Verdict
Enclosure / ABS, D-180	CHI MEI	-	-	-	-	-	0	P
Bobbin / T375J	CHANG CHUN	--	0	0	-	-	-	P
PCB / SL	SONG LIN	-	-	-	-	-	0	P
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No) :								N/A
The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)? :								Yes
Ignition of the specified layer placed underneath the test specimen (Yes/No) :								No
Supplementary information: 550 °C GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF The GWIT pre-selection option, the 850 °C GWFI pre-selection option, and the 850 °C GWT are not relevant (or applicable) for attended appliances.								







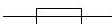




Annex U	U.5.1 THERMAL ENDURANCE TEST													
Type ref.														
Rated PRI-Voltage														
Rated SEC-Voltage														
Material of Winding														
Material of bobbin														
Material of resin														
Material of potting														
Material of foil													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

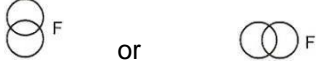



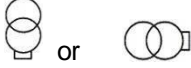

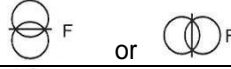

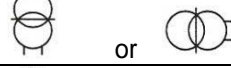

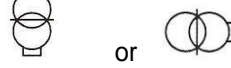





IEC 61558-2-16														
Clause	Requirement + Test								Result - Remark				Verdict	
temperature														
After 24 h - oven temperature														
Final test period (days)														
Output voltage (11.1) under load														
Insulating resistance														
High voltage test (35% of the values in Table 8.a														
Annex U	U.5.2 The use of another constant S other than 4500 in tw tests Test1:10 days													
Type ref.														
Rated PRI-Voltage														
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														

IEC 61558-2-16															
Clause	Requirement + Test										Result - Remark				Verdict
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)															
IEC 61558-2-16															
Annex U	U.5.2 The use of another constant S other than 4500 in tw tests Test2:120 days														
Type ref.															
Rated PRI-Voltage															
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															

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

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
			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	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		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	 or 	N/A
	Additional Symbols (IEC 61558-2-16:09)		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		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)		N/A
	SMPS (Switch mode power supply unit)		N/A

BB.9	PROTECTION AGAINST ELECTRIC SHOCK	N/A
BB.10	CHANGE OF INPUT VOLTAGE SETTING	N/A
BB.11	OUTPUT VOLTAGE AND OUTPUT CURRENT UNDER LOAD	N/A
BB.12	NO-LOAD OUTPUT VOLTAGE (see supplementary requirements in Part 2)	N/A
BB.13	SHORT-CIRCUIT VOLTAGE	N/A
BB.14	HEATING	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
BB.14.2	Application of 14.1 or 14.3 according to the insulation system		N/A
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 $\leq 30\%$		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; Upri(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

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Clause	Requirement + Test	Result - Remark	Verdict
	– live parts and body for basic insulation ≥ 2 M		N/A
	– live parts and body for reinforced insulation ≥ 7 M		N/A
	– 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
	4) Reinforced insulation between the body and live parts; working voltage (V); test voltage (V)		N/A
	5) 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

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Clause	Requirement + Test	Result - Remark	Verdict

18.102 (A1)	Partial discharge tests according IEC 60664-1 , if the working voltage is > 750 V peak		N/A
	Partial discharge is ≤ 10 pC at time P2 See Fig. 19.101		N/A

BB.19	CONSTRUCTION		N/A
BB.19.1	Separation of input and output circuits		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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
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
			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):		-

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Clause	Requirement + Test	Result - Remark	Verdict
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
	– 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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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
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 output circuit, and body 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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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 (A1)	Insulated windings wires providing basic, supplementary or reinforced insulation, meet the following requirements:		N/A
	<ul style="list-style-type: none"> Multi-layer extruded or spirally wrapped insulation, passed the tests of annex K 		N/A
	<ul style="list-style-type: none"> Basic insulation: two wrapped or one extruded wire 		N/A
	<ul style="list-style-type: none"> Supplementary insulation: two layers, wrapped or extruded 		N/A
	<ul style="list-style-type: none"> Reinforced insulation: three layers wrapped or extruded 		N/A
	Spirally wrapped insulation:		N/A
	<ul style="list-style-type: none"> creepage distances between wrapped layers > cl. 26 _ P1 values 		N/A
	<ul style="list-style-type: none"> path between wrapped layers sealed, the test voltage of K2 is multiplied with 1,35 		N/A
	<ul style="list-style-type: none"> test 26.2.3 – Test A, passed for wrapped layers 		N/A
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> comply with annex K 		N/A
	<ul style="list-style-type: none"> two layers for supplementary insulation 		N/A
	<ul style="list-style-type: none"> one layer for basic insulation 		N/A
	<ul style="list-style-type: none"> one layer for mechanical separation between the insulated wires of primary and secondary. This layer fulfils the requirement of basic insulation. 		N/A
b)	Insulated winding wire used for reinforced insulation in a wound part:		N/A
	<ul style="list-style-type: none"> comply with annex K 		N/A
	<ul style="list-style-type: none"> three layers 		N/A
	<ul style="list-style-type: none"> relevant dielectric strength test of 18.3 		N/A
	Where the insulated winding wire is wound:		N/A
	<ul style="list-style-type: none"> upon metal or ferrite cores 		N/A
	<ul style="list-style-type: none"> upon enamelled wire 		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> under enamelled wire 		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
	100 % routine test of Annex K3 of part 1 is fulfilled		N/A
	no creepage distances and clearances for insulated winding wirers		N/A
	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		N/A
FIW	<u>Transformers which use FIW wire</u>		-
BB 19.12.101 (A1)	Max. class F for transformers which use FIW-wire		N/A
BB 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
	<ul style="list-style-type: none"> 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:		—
	<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"> 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"> between FIW and enamelled wire, no requirements of creepage distances and clearances 		N/A
	<ul style="list-style-type: none"> 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
	<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

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Clause	Requirement + Test	Result - Remark	Verdict
	<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 with double or reinforced insulation according to 19.1.3 (basic/supplementary insulated FIW wire + enamelled wire + creepage distance and clearances for basic insulation)		—
	<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
	<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

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Clause	Requirement + Test	Result - Remark	Verdict
	<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
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
	– 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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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 uninsulated 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
	– 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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	– the isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	– the test of 14.3 is fulfilled		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" is 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		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" is 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		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" is 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:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– rated output > 100 VA values in square brackets apply		N/A
	– rated output $\geq 25 \text{ VA} \leq 100 \text{ VA}$ 2/3 of the value in square brackets apply		N/A
	– rated output $\leq 25 \text{ VA}$ 1/3 of the value in square brackets apply		N/A
BB.26.3.3	Mandrel test of insulation in thin sheet form (specimen of 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		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		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		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 \geq specified values (mm)		N/A
	2. Insulation between input and output circuits (double or reinforced insulation):		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A
	3. Insulation between adjacent input circuits: measured values \geq specified values (mm)		N/A
	Insulation between adjacent output circuits: measured values \geq specified values (mm)		N/A
	4. Insulation between terminals for external connection:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A
	5. Basic or supplementary insulation:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A
	d) measured values \geq specified values (mm)		N/A
	e) measured values \geq specified values (mm)		N/A
	6. Reinforced or double insulation: measured values \geq specified values (mm)		N/A
	7. Distance through insulation:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq 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

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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 $d2 \leq 30 \mu\text{m}$ 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.26.107 (A1)	For transformers with FIW wires the following test is required		N/A
	<ul style="list-style-type: none"> 10 cycles are required 		N/A
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 1 h at 25° C 		N/A
	<ul style="list-style-type: none"> 2 h at 0° C 		N/A
	<ul style="list-style-type: none"> 1 h at 25° C – (next cycle start again with 68 h max winding temp + 10) 		N/A
	<ul style="list-style-type: none"> during the 10 cycles test 2 x working voltage is connected between PRI and SEC 		N/A

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

	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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

BB.27	RESISTANCE TO HEAT, FIRE AND TRACKING		N/A
IEC 61558-2-16 Annex BB			
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
-------------	--	--	-----

BB.H	ANNEX H, ELECTRONIC CIRCUITS (IEC 61558-1)		N/A
-------------	---	--	-----

BB.K 61558-2-16/A1	ANNEX K, INSULATED WINDING WIRES FOR USE AS MULTIPLE LAYER INSULATION		N/A
BB.K.1	Wire construction:		N/A
	<ul style="list-style-type: none"> insulated winding wire for basic or supplementary insulation (see 19.12.3) 		N/A
	<ul style="list-style-type: none"> insulated winding wire for reinforced insulation (see 19.12.3) 		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> solid circular winding wires and stranded winding wires with 0,05 to 5 mm diameter 		N/A
	<ul style="list-style-type: none"> spirally wrapped insulation - overlapping 		N/A
BB.K.2	Type tests		N/A
BB.K.2.1	General Tests between ambient temperature between 15° C and 35° C and at an humidity between 45% and 75 %		N/A
BB K.2.2	Electric strength test		N/A
BB K.2.2.1	Solid circular winding wires and stranded winding wires		N/A
	Test samples prepared according to clause 4.4.1 of IEC 60851-5:2008 (twisted pair)		N/A
	Dielectric strength test: 6 kV for reinforced insulation		N/A
	Dielectric strength test: 3 kV for basic or supplementary insulation		N/A
BB K.2.2.2	Square or rectangular wires .		N/A
	Test samples prepared according to clause 4.7.1 of IEC 60851-5:2008		N/A
	Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
BB K.2.3	Flexibility and adherence		N/A
	Claus 5.1 in Test 8 of IEC 60851-3:2009 shall be used		N/A
	Test samples prepared according to clause 5.1.1.4 of IEC 60851-3:2009		N/A
	Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
	Mandrel diameter according table K.1		N/A
	The tension to the wire during winding on mandrel is 118 N/mm ² (118 MPa)		N/A
BB.K.2.4	Heat shock		N/A
	Test samples prepared according to 3.1.1 (in Test 9) of IEC 60851-6:1996		N/A
	<ul style="list-style-type: none"> high voltage test immediately after this test 		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 5,5 kV for reinforced insulation 		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> Dielectric strength test: 2,75 kV for basic or supplementary insulation 		N/A
BB.K.2.5	Retention of dielectric strength after bending (test as specified under test 13 of 4.6.1 c) of IEC 60 851-5)		N/A
	<ul style="list-style-type: none"> high voltage test immediately after this test Dielectric strength test: 5,5 kV for reinforced insulation Dielectric strength test: 2,75 kV for basic or supplementary insulation 		N/A
BB.K.3	Testing during manufacturing		N/A
BB.K.3.1	General Tests as subjected in K.3.2 and K.3.3		N/A
BB K.3.2	Routine test		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 4,2 kV for reinforced insulation 		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 2,1 kV for basic or supplementary insulation 		N/A
BB K.3.3	Sampling test		N/A
BB K.3.3.1	Solid circular winding wires and stranded winding wires		N/A
	Test with a twisted pair, prepared according clause 4.4.1 of IEC 60851-5:2008		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 6 kV for reinforced insulation 		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 3 kV for basic or supplementary insulation 		N/A
BB K.3.3.2	Square rectangular wire		N/A
	Samples prepared according to clause 4.7.1 of IEC 60851-5:2008		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 5,5 kV for reinforced insulation 		N/A
	<ul style="list-style-type: none"> Dielectric strength test: 3 kV for basic or supplementary insulation 		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		
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

BB.26.2 TEST B	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
	Test with three specially prepared specimens with potted – P1 values are 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		
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

BB.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		
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

BB.26.107 61558-2- 16/A1	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
	Test for transformers, use FIW-wire					
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		
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

	TABLE: Dielectric Strength		N/A
Test voltage applied between:	Test potential applied (V)	Breakdown / flashover (Yes/No)	
Supplementary information:			

BB 18.3	TABLE: insulation resistance measurements		N/A
Insulation resistance R between:	R (MΩ)	Required R (MΩ)	
Between mains poles (primary fuse disconnected)			
Between parts separated by basic or supplementary insulation			
Between parts separated by double or reinforced insulation			
Supplementary information:			

BB 26	TABLE: Clearance And Creepage Distance Measurements						N/A
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)	
Supplementary information:							

BB 26	TABLE: Distance Through Insulation Measurements				N/A
Distance through insulation di at/of:	U r.m.s. (V)	Test voltage (V)	Required di (mm)	di (mm)	
Supplementary information:					



TEST REPORT EN 50 075 Flat non-rewirable two-pole plugs, 2,5 A 250 V, with cord, for the connection of class II - equipment for household and similar purposes	
Report Reference No.....	70.410.14.1082.01-03
Tested by (+ signature)	Jiaqi ZHANG
Approved by (+ signature)	Yi ZHU
Date of issue.....	2018-11-23
Testing Laboratory	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
Address	No.151 Hengtong Rd., 200070 Shanghai, P. R. CHINA
Testing location / procedure	CCA/ENEC TL <input type="checkbox"/> SMT <input type="checkbox"/> WMT <input type="checkbox"/> TMP <input type="checkbox"/>
Address	No. 1999, Duhui Road, Shanghai, 201108, P. R. China
Applicant's name.....	Wandera GmbH
Address	Am Wellenbach 9, D-93149 Nittenau, GERMANY
Test specification:	
Standard	EN 50 075:1990
Test procedure	TUV product service regulation
Non-standard test method.....	N/A
Test Report Form No.....	EN50075B
TRF originator.....	OVE
Master TRF	dated 2004-10
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Test item description	Flat non-rewirable two-pole plug integrated in safety light transformer
Trade Mark	N/A
Manufacturer	NINGBO KELI POWER CO.,LTD Lishan Lucheng Miao Development Zone, Yuyao City, Zhejiang China
Model and/or type reference.....	N/A
Ratings	250V~ 50Hz; 2,5A; Class II; IP20

Copy of marking plate

N/A

Summary of testing:

Partly test to comply with end use appliance.

This report should be used in conjunction with report of end use appliance according to EN 61558-2-16.

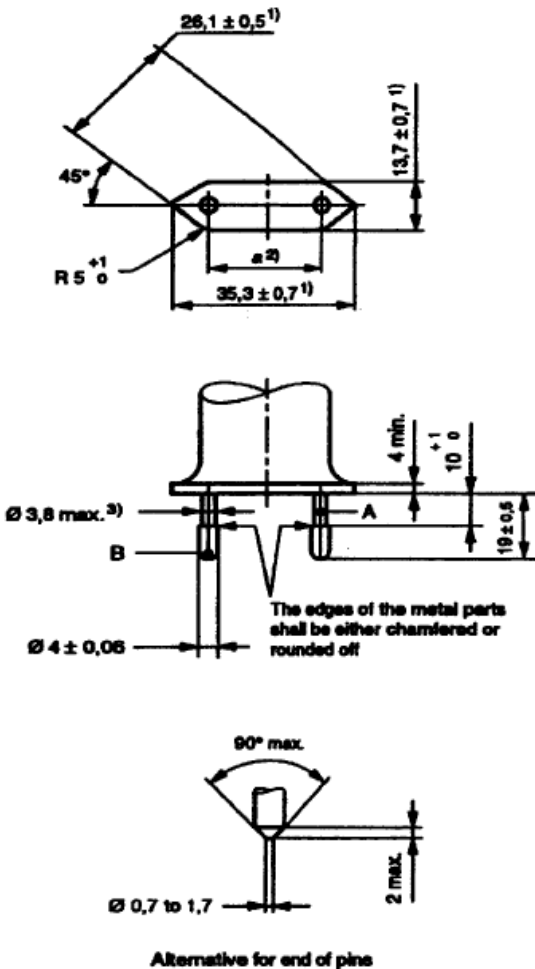
Test item particulars	
Classification of installation and use	Plug integrated in safety light transformer
Supply Connection.....	Plug in
.....	:
.....	:
Possible test case verdicts:	
- test case does not apply to the test object.....	N/A
- test object does meet the requirement	P(Pass)
- test object does not meet the requirement	F(Fail)
Testing	
Date of receipt of test item	2015-06-29; 2016-10-08; 2017-09-07; 2018-11-19
Date (s) of performance of tests	2015-06-29 to 2015-09-18;
	2016-10-08 to 2016-10-10;
	2017-09-07 to 2017-09-18;
	2018-11-19 to 2018-11-23
General remarks:	
<p>The present Test Report is not valid as a Test Report according to a Mutual Recognition Agreement (i.e. CCA, ENEC) unless signed by an approved Testing Laboratory and appended to a corresponding Certificate issued by a national Certification Body, signatory to the relevant Scheme.</p> <p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p> <p>"(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a comma is used as the decimal separator.</p>	
General product information:	
<p>Flat non-rewirable two-pole plug integrated in safety light transformer whose rating is 'input: 230V~ 50Hz; output: 3.5VDC, 1000mA;Class II; IP20'.</p>	


Clause	Requirement - Test	Result - Remark	Verdict
	First testing set: Sample No. 1, 2 and 3		
5	RATING		
	2,5 A AC 250 V	Tested with appliance	P
6	MARKING		
6.1/2	Rated current: 2,5 A	See end use appliance	N/A
	Rated voltage: 250 V	See end use appliance	N/A
	Nature of supply: AC or DC	~	P
	Name of manufacturer or responsible vendor	See end use appliance	P
	Type reference	See end use appliance	P
6.3	Symbol for Class II construction not allowed		P
6.4	Marking durable		P
	Easily legible		P
	Test: 15 s water and 15 s petroleum spirit		P
7	DIMENSIONS		P
	Compliance with Standard Sheet 1	See attached dimension check datum	P
	Gauges of figures 1 and 2		P
8	PROTECTION AGAINST ELECTRIC SHOCK		P
8.1	Test finger of fig. 3		P
	Ambient temperature	35°C	P
	Force: 75 N		P
8.2	Gauge of fig. 4		P
	Ambient temperature: 35 ± 2 °C	35°C	P
8.3	External parts of insulating material		P
9	CONSTRUCTION		P
9.1	Non-rewirable plug		P
9.2	Switches, fuses and lampholders not incorporated		P
9.3	Pins of plug solid		P
9.4	Pins of plug locked against rotation		P
9.5	Effective permanent connections:		
	- soldered, welded, crimped	soldered	P
	- screwed and snap-on connections not used		P
	- presoldered flexible conductor for crimping not permitted		P
9.6	Gripping operation:		P
	- length ≥ 55 mm		P


Clause	Requirement - Test	Result - Remark	Verdict
	- ball test		N/A
10	RESISTANCE TO HUMIDITY		
	No damage after 48 h	Tested with appliance	P
11	INSULATION RESISTANCE AND ELECTRIC STRENGTH		
11.1	Resistance $\geq 5 \text{ M}\Omega$ (500 V, 1 min)	Tested with appliance	P
11.2	Electric strength test (2000 V, 1 min): no flashover or breakdown	Tested with appliance	P
12	FLEXIBLE CORDS AND THEIR CONNECTION		N/A
12.1	Cords in compliance with HD 21.5 or HD 22.4		N/A
13	MECHANICAL STRENGTH		
13.1	Compression test (150 N, 5 min)		P
13.2	Tumbling barrel test: number of falls	Considered by end use appliance standard	N/A
	Torque test on pins (0,4 Nm, 1 min)		P
	Abrasion test (20 000 movements): no damage		P
14	RESISTANCE TO HEAT AND TO AGEING		
14.1.1	Heating test (100 °C, 1 h): no damage	Considered by end use appliance standard	N/A
14.1.2	Pressure test (80°C, 20 N, 1 h): no damage	Considered by end use appliance standard	N/A
15	CURRENT-CARRYING PARTS AND CONNECTIONS		
15.1	Connections withstand the mechanical stresses occurring in normal use		P
15.2	Contact pressure		P
15.3	Material of current-carrying parts	H62	P
16	CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH INSULATION		
	Creepage distances and clearances between live parts $\geq 3 \text{ mm}$	>4 by gauge	P
	Creepage distances and clearances between live parts and accessible external surfaces $\geq 3 \text{ mm}$		N/A
	Distance through insulation $\geq 1,5 \text{ mm}$	Min. 2,0	P
17	RESISTANCE OF INSULATING MATERIAL TO ABNORMAL HEAT AND TO FIRE		P
	Glow-wire test (750 °C): no visible flame, no sustained glowing or flames and glowing extinguish within 30 s after removal of glow-wire	Considered by end use appliance standard	N/A
	Glow-wire test (650 °C): no visible flame, no sustained glowing or flames and glowing extinguish within 30 s after removal of glow-wire		N/A

Clause	Requirement - Test	Result - Remark	Verdict
	Second testing set: Sample No. 4, 5 and 6		
12.2	Moulded-on plugs		N/A
	Pull test (100 times, 50 N, 1 s)		N/A
	Torque test (1 min):		N/A
	cross-sectional area $\leq 0,5 \text{ mm}^2$, 0,1 Nm: displacement $\leq 2 \text{ mm}$; no break in electrical connections		N/A
	cross-sectional area $\geq 0,75 \text{ mm}^2$, 0,15 Nm: displacement $\leq 2 \text{ mm}$; no break in electrical connections		N/A
13.4	Mechanical strength		P
	Pull test with steel plate on pin (40 N, 70 °C, 1 min): displacement of pin $\leq 1 \text{ mm}$		P
14	Resistance to heat and to ageing		N/A
14.2	Heating test (70 °C, 168 h): no damage, no cracks visible	Considered by end use appliance standard	N/A
	Pressure test (5 N): no traces		N/A
	Third testing set: Sample No. 7, 8 and 9		
12.3	Flexible cords and their connection		N/A
	Flexing test (10 000 flexings, 2,5 A, AC 250 V) - 10 N (cross-sectional area $\leq 0,75 \text{ mm}^2$) - 20 N (cross-sectional area $> 0,75 \text{ mm}^2$) no damage		N/A
	Voltage drop $\leq 10 \text{ mV}$ test current: - 1 A with H03 VH-Y - 2,5 A with other cords		N/A

Attachment: Dimension check of integral power supply plug

Required dim.	Measured dim.	Requirements of EN 50075: 1990
26.1±0.5	26,3	 <p>The top view shows a rectangular base with a width of $35,3 \pm 0,7$ mm and a height of $13,7 \pm 0,7$ mm. The front view shows a 45° chamfer on the top edge with a radius of $R 5$ mm. The side view shows a total height of $19 \pm 0,5$ mm, with a 4 mm minimum distance from the top edge to the start of the pin. The pin diameter is $\varnothing 3,8$ mm max. The pin length is 10 mm. The pin is labeled 'B. Metal pin' and the insulating collar is labeled 'A. Insulating collar'. The edges of the metal parts shall be either chamfered or rounded off. The alternative for end of pins shows a 90° max. angle and a pin diameter of $\varnothing 0,7$ to $1,7$ mm with a maximum length of 2 mm.</p> <p>3) This dimension may be increased to 4mm within a distance of 4mm</p>
13.7±0.7	13,4	
35.3±0.7	35,2	
R5 ⁺¹ ₀	/	
45°	45°	
Ø3.8 Max	3,6	
Ø4±0.06	4,0	
19±0.5	19,0	
10 ⁺¹ ₀	/	
4 Min	17,8	
90° Max	/	
Ø0.7 to 1.7	/	
2 Max	/	

	<p>Test Report issued under the responsibility of:</p> 
<p align="center"> TEST REPORT IEC 61347-2-2 Part 2: Particular requirements: Section 2 – d.c. or a.c. supplied electronic step-down convertors for filament lamps </p>	
<p> Report Number.....: 7041014108201-03 attachment 1 Date of issue 2018-11-22 Total number of pages..... 47 </p>	
<p> Name of Testing Laboratory preparing the Report.....: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch </p>	
<p> Applicant's name Wandera GmbH Address Am Wellenbach 9, D-93149 Nittenau, GERMANY </p>	
<p> Test specification: Standard.....: IEC 61347-2-2:2011 used in conjunction with IEC 61347-1:2015 Test procedure.....: TÜV mark & EU-directive Non-standard test method.....: N/A </p>	
<p> Test Report Form No.: IEC61347_2_2E Test Report Form(s) Originator: Intertek Semko AB Master TRF 2016-07 </p>	
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<p> General disclaimer: 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 CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report. </p>	

Test item description	Electronic transformer (Safety light transformer)	
Trade Mark.....		
Manufacturer	Same as applicant	
Model/Type reference	999999-017-5	
Ratings	PRI: 230Vac, 50Hz; SEC: 3,5V d.c., 1000mA; ta:25°C; tc:40°C; SELV output; Class II; IP20	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No.151 Heng Tong Road, Shanghai 200070, P.R. China
Testing location/ address		No.1999, Duhui Road, Shanghai, 201108, P. R. China
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address		N/A
Tested by (name, function, signature)		Jiani WANG
Approved by (name, function, signature) ..		Xiaohui YANG
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	N/A
Testing location/ address		
Tested by (name, function, signature)		N/A
Approved by (name, function, signature) ..		N/A
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	N/A
Testing location/ address		N/A
Tested by (name + signature).....		N/A
Witnessed by (name, function, signature) ..		N/A
Approved by (name, function, signature) ..		N/A
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	N/A
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	N/A
Testing location/ address		N/A

Tested by (name, function, signature) :	N/A	
Witnessed by (name, function, signature) .. :	N/A	
Approved by (name, function, signature) .. :	N/A	
Supervised by (name, function, signature) :	N/A	

List of Attachments (including a total number of pages in each attachment):

Requirement of dimensions of plug refers to report 7041014108201-03.

Summary of testing:**Tests performed (name of test and test clause):**

Complete tests are performed on model 999999-017-5 and it complies with the safety requirement.

Testing location:

TÜV SÜD Certification and Testing (China) Co., Ltd.
Shanghai Branch

No.1999, Duhui Road, Shanghai, 201108, P. R.
China

Summary of compliance with National Differences:**List of countries addressed:**

Requirements for European group difference and National difference for EN 61347-2-2:2012 used in conjunction with EN 61347-1:2015 are taken into consideration, please refer to Appendix 1 of this report.

Copy of marking plate

See Construction Data form for electrical equipment and machinery

Test item particulars	Electronic transformer (Safety light transformer)
Classification of installation and use	independent
Supply Connection	Terminal
.....	
Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement	P (Pass)
- test object does not meet the requirement	F (Fail)
Testing	
Date of receipt of test item	2018-11-20
Date (s) of performance of tests	2018-11-20 to 2018-11-22
General remarks:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</p> <p>Clause numbers between brackets refer to clauses in IEC 61347-1</p> <p>Remark 1: The following contents are included and as attachments of this test report: 1) Test report IEC 61347-2-2:2011 used in conjunction with IEC 61347-1:2015. 2) Appendix 1: Deviation of EN 61347-2-2:2012 used in conjunction with EN 61347-1:2015. 3) Appendix 2: Construction test and thermal test according to EN 60598-1:2015. 4) Appendix 3: Additional requirements of EN 61347-2-11:2001 for PCB of terminal 5) Appendix 4: Additional requirements of EN 62493:2015 6) Appendix 5: Photograph</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60060-2:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies)	NINGBO KELI POWER CO.,LTD Lishan Lucheng Miao Development Zone,Yuyao City ,Zhejiang China

General product information:

This independent safety light transformer is used for filament lamps. The product is tested with several 3.5Vd.c. filament lamps which cause maximum output. The lamps for electronic transformer are supplied by manufacturer.

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
4 (4)	GENERAL REQUIREMENTS		P
- (4)	<u>Insulation materials</u> according requirements in Annex N of IEC 61347-1	(see Annex N)	P
- (4)	Compliance of <u>independent controlgear enclosure</u> with IEC 60 598-1		P
- (4)	<u>Built-in electronic controlgear</u> with double or reinforced insulation comply with Annex O of IEC 61347-1	(see Annex O)	N/A
4 (4)	<u>SELV controlgear</u> comply with Annex I of this part 2 and Annex L of IEC 61347-1	(see Annex L)	P
4 (-)	<u>Auto-wound converters</u> comply with IEC 61558-2-13 and IEC 61558-2-16		N/A
4 (-)	<u>Separating converters</u> comply with IEC 61558-2-1 and IEC 61558-2-16		N/A

6 (6)	CLASSIFICATION		P
	Built-in controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Independent controlgear	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	Integral controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
6 (-)	Auto-wound controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Separating controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	SELV controlgear	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—

7 (7)	MARKING		P
7.1 (7.1)	Mandatory markings		P
	a) mark of origin		P
	b) model number or type reference		P
	c) symbol for independent controlgear, if applicable		P
	d) correlation between interchangeable parts and controlgear marked		N/A
	e) rated supply voltage (V)		P
	supply frequency (Hz)		P
	supply current (A)		N/A
	f) earthing symbol		N/A
	k) wiring diagram		N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
	l) value of t_c		P
	m) symbol for declared temperature		N/A
	s) symbol for SELV converter, if applicable		P
	t) LUM earthing symbol		N/A
7.1 (-)	- rated output voltage		P
7.1 (7.2)	Marking durable and legible		P
	Rubbing 15 s water, 15 s petroleum; marking legible		P
7.2 (7.1)	Information to be provided, if applicable		P
	h) declaration of protection against accidental contact		P
	i) cross-section of conductors (mm ²)		N/A
	j) number, type and wattage of lamp(s)		N/A
	s) SELV symbol		P
7.2 (-)	- declaration of mains connected windings		N/A
	- declaration of allowed length of output wire		N/A

8 (10)	PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS		P
- (10.1)	Controlgear protected against accidental contact with live parts		P
- (A2)	Voltage measured with 50 k Ω	(see Annex A)	N/A
- (A3)	Voltage > 35 V peak or > 60 V d.c. or protective impedance device	(see Annex A)	N/A
- (10.1)	Lacquer or enamel not used for protection or insulation		N/A
	Adequate mechanical strength on parts providing protection		P
- (10.2)	Capacitors > 0,5 μ F: voltage after 1 min (V): < 50 V	0,1	P
- (10.3)	Controlgear providing SELV		P
	Accessible conductive parts are insulated from live parts by double or reinforced insulation in SELV controlgear		N/A
	No connection between output circuit and the body or protective earthing circuit		P
	No possibility of connection between output circuit and the body or protective earthing circuit through other conductive parts		P

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
	SELV outputs separated by at least basic insulation		P
	ELV conductive parts insulated as live parts		N/A
	Tests according Annex L of IEC 61347-1	(see Annex L)	P
- (10.4)	Accessible conductive parts in SELV circuits		N/A
	Output voltage under load ≤ 25 V r.m.s. or ≤ 60 V d.c.		N/A
	If output voltage > 25 V r.m.s. or > 60 V d.c.; No load output ≤ 35 V peak or ≤ 60 V d.c and touch current does not exceed 0,7 mA (peak) or 2 mA d.c.:		N/A
	One conductive part is insulated if output voltage or current exceeding the values above and withstand test voltage 500 V		N/A
	Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor		P
	Y1 or Y2 capacitors comply with IEC 60384-14		P
	Resistors comply with test (a) in 14.1 of IEC 60065		N/A

9 (8)	TERMINALS		N/A
	Screw terminals according section 14 of IEC 60598-1:		N/A
	Separately approved; component list	(see Annex 1)	N/A
	Part of the controlgear	(see Annex 2)	N/A
	Screwless terminals according section 15 of IEC 60598-1:		N/A
	Separately approved; component list	(see Annex 1)	N/A
	Part of the controlgear	(see Annex 3)	N/A

10 (9)	PROVISION FOR PROTECTIVE EARTHING		N/A
- (9.1)	Provisions for protective earthing		N/A
	Terminal complying with clause 8		N/A
	Locked against loosening and not possible to loosen by hand		N/A
	Not possible to loosen clamping means unintentionally on screwless terminals		N/A
	All parts of material minimizing the danger of electrolytic corrosion		N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Made of brass or equivalent material		N/A
	Contact surface bare metal		N/A
	Test according 7.2.3 of IEC 60598-1		N/A
- (9.2)	Provision for functional earthing		N/A
	Comply with clause 8 and 9.1		N/A
	Functional earth insulated from live parts by double or reinforced insulation		N/A
- (9.3)	Lamp controlgear with conductors for protective earthing by tracks on printed circuit board		N/A
	Test with a current of 25 A between earthing terminal or earthing contact and each of the accessible metal parts; measured resistance (Ω) at ≥ 10 A according 7.2.3 of IEC 60598-1: $< 0,5 \Omega$		N/A
- (9.4)	Earthing of built-in lamp controlgear		N/A
	Earth by means of fixing to earthed metal of luminaire in compliance of 7.2 of IEC 60598-1		N/A
	Earthing terminal only for earthing the built-in controlgear		N/A
- (9.5)	Earthing via independent controlgear		N/A
- (9.5.1)	Earth connection to other equipment		N/A
	Looping or through connection, conductor min. $1,5 \text{ mm}^2$ and of copper or equivalent		N/A
	Protective earthing wires in line with 5.3.1.1 and clause 7 of IEC 60598-1		N/A
- (9.5.2)	Earthing of the lamp compartments powered via the independent lamp controlgear		N/A
	Test with a current of 25 A between input and output earth terminals; measured resistance (Ω) between earthing terminal or earthing contact and each of the accessible metal parts at ≥ 10 A according 7.2.3 of IEC 60598-1: $< 0,5 \Omega$		N/A
	Output earthing terminal marked as in 7.1 t) of IEC 61347-1		N/A

11 (11)	MOISTURE RESISTANCE AND INSULATION	P
- (11)	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance:	P
	For basic insulation $\geq 2 \text{ M}\Omega$	N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
	For double or reinforced insulation $\geq 4 \text{ M}\Omega$	>500	P
	Between primary and secondary circuits in controlgear providing SELV, values in Annex L in IEC 61347-1		P

12 (12)	ELECTRIC STRENGTH		P
- (12)	Immediately after clause 11 electric strength test for 1 min		P
	Basic insulation for SELV, test voltage 500 V	500	P
	Working voltage $\leq 50 \text{ V}$, test voltage 500 V		N/A
	Working voltage $> 50 \text{ V} \leq 1000 \text{ V}$, test voltage (V):		P
	Basic insulation, $2U + 1000 \text{ V}$		N/A
	Supplementary insulation, $2U + 1000 \text{ V}$		N/A
	Double or reinforced insulation, $4U + 2000 \text{ V}$	2920	P
	No flashover or breakdown		P
	Solid or thin sheet insulation for double or reinforced insulation fulfil the requirements in Annex N in IEC 61347-1		P

14 (14)	FAULT CONDITIONS		P
- (14.1)	When operated under fault conditions the controlgear:		P
	- does not emit flames or molten material		P
	- does not produce flammable gases		P
	- protection against accidental contact not impaired		P
	Thermally protected controlgear does not exceed the marked temperature value		N/A
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected	(see appended table)	P
- (14.2)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (after any reduction in 14.2 - 14.5)	(see appended table)	P
- (14.3)	Short-circuit or interruption of semiconductor devices	(see appended table)	P
- (14.4)	Short-circuit across insulation consisting of lacquer, enamel or textile	(see appended table)	P

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
- (14.5)	Short-circuit across electrolytic capacitors	(see appended table)	P
- (14.6)	After the tests has been carried out on three samples:		P
	The insulation resistance $\geq 1 \text{ M}\Omega$	>500	P
	No flammable gases		P
	No accessible parts have become live		P
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite		P
- (14.7)	Relevant fault condition tests with high-power a.c. supply		—
14 (-)	Temperature declared thermally protected lamp controlgear fulfil requirements in Annex C		N/A
	The output voltage not exceed 115% of the rated output under fault conditions		P

15 (-)	TRANSFORMER HEATING		P
15.1	General		P
	SELV and separating convertor fulfil requirements in Cl. L.6 and L.7 of IEC 61347-1		P
15.2 (-)	Normal operation		P
	Fulfil requirements in Cl. L.6 of IEC 61347-1		P
	Ambient temperature at t_c if built-in or integral convertor	N/A	—
	Length of output cable	20cm and 200cm	—
15.3 (-)	Abnormal operation		P
	Fulfil requirements in Cl. L.7 of IEC 61347-1		P
	Length of output cable	20cm and 200cm	—
	Double the number of lamps connected in parallel to the output terminals		P
	The output voltage not exceed 115% of the rated output under abnormal conditions		P
	The insulation resistance $\geq 1 \text{ M}\Omega$ after the tests ...	>500	P
	During and at the end of the tests no defect impairing safety, nor any smoke or flammable gases produced		P
	The temperature on components in non-totally enclosed convertor do not exceed their rated values		N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
16 (15)	CONSTRUCTION		P
- (15.1)	Wood, cotton, silk, paper and similar fibrous material		P
	Wood, cotton, silk, paper and similar fibrous material not used as insulation		P
- (15.2)	Printed circuits		P
	Printed circuits used as internal connections complies with clause 14		P
- (15.3)	Plugs and socket-outlets used in SELV or ELV circuits		N/A
	No dangerous compatibility between output socket-outlet and a plug for socket-outlets for input circuit in relation to installation rules, voltages and frequencies		N/A
	Plugs and socket-outlets for SELV comply with IEC 60906-3 and IEC 60884-2-4		N/A
	Plugs and socket-outlets for SELV ≤ 3 A, ≤ 25 V r.m.s. or ≤ 60 V d.c. and ≤ 72 W comply with IEC 60906-3 and IEC 60884-2-4 or:		N/A
	- plugs not able to enter socket-outlets of other standardised system		N/A
	- socket-outlets not admit plugs of other standardised system		N/A
	- socket-outlets without protective earth		N/A
- (15.4)	Insulation between circuits and accessible parts		P
- (15.4.2)	SELV circuits		P
	Source used to supply SELV circuits:		P
	- safety isolating transformer in accordance with relevant part 2 of IEC 61558		N/A
	- controlgear providing SELV in accordance with relevant part 2 of IEC 61347		P
	- another source		N/A
	Voltage in the circuit not higher than ELV		P
	SELV circuits insulated from LV by double or reinforced insulation		P
	SELV circuits insulated from non SELV circuits by double or reinforced insulation		N/A
	SELV circuits insulated from FELV circuits by supplementary insulation		N/A
	SELV circuits insulated from other SELV circuits by basic insulation		N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
	SELV circuits insulated from accessible conductive parts according Table 6 in 15.4.5		P
- (15.4.3)	FELV circuits		N/A
	Source used to supply FELV circuits:		N/A
	- separating transformer in accordance with relevant part 2 of IEC 61558		N/A
	- separating controlgear providing basic insulation between input and output circuits in accordance with relevant part 2 of IEC 61347		N/A
	- another source		N/A
	- source in circuits separated by the LV supply by basic insulation		N/A
	Voltage in the circuit not higher than ELV		N/A
	FELV circuits insulated from LV supply by at least basic insulation		N/A
	FELV circuits insulated from other FELV circuits if functional purpose		N/A
	FELV circuits insulated from accessible conductive parts according Table 6 in 15.4.5		N/A
	Plugs and socket-outlets for FELV system comply with:		N/A
	- plugs not able to enter socket-outlets of other voltage systems		N/A
	- socket-outlets not admit plugs of other voltage systems		N/A
	- socket-outlets have a protective conductor contact		N/A
- (15.4.4)	Other circuits		P
	Insulation between circuits other than SELV or FELV and accessible conductive parts in according Table 6 in 15.4.5.		P
- (15.4.5)	Insulation between circuits and accessible conductive parts		P
	Accessible conductive parts insulated from active parts of electric circuits by insulating according Table 6		P
	Requirements for Class II construction with equipotential bonding for protection against indirect contact with live parts:		N/A
	- all conductive parts are connected together		N/A
	- conductive parts are reliably connected together according test of IEC 60598-1 cl. 7.2.3		N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

	- conductive parts comply with requirements of Annex A in case of insulation fault		N/A
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17 (16)	CREEPAGE DISTANCES AND CLEARANCES		P
- (16)	Creepage distances and clearances according to 16.2 and 16.3		P
	Controlgears providing SELV comply with additional requirements in Annex L		P
	Insulating lining of metallic enclosures		P
	Controlgear protected against pollution comply with Annex P	(see Annex P)	N/A
- (16.2)	Creepage distances		P
- (16.2.2)	Minimum creepage distances for working voltages		P
	Creepage distances according to Table 7	(see appended table)	P
- (16.2.3)	Creepage distances for working voltages with frequencies above 30 kHz		N/A
	Creepage distances according to Table 8	(see appended table)	N/A
- (16.3)	Clearances		P
- (16.3.2)	Clearances for working voltages		P
	Clearances distances according to Table 9	(see appended table)	P
- (16.3.3)	Clearances for ignition voltages and working voltages with higher frequencies		N/A
	Clearances distances for basic or supplementary insulation according to Table 10	(see appended table)	N/A
	Clearances distances for reinforced insulation according to Table 11	(see appended table)	N/A

18 (17)	SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS		P
	Screws, current-carrying parts and connections in compliance with IEC 60598-1 (clause numbers between parentheses refer to IEC 60598-1)		P
(4.11)	Electrical connections		P
(4.11.1)	Contact pressure		P
(4.11.2)	Screws:		N/A
	- self-tapping screws		N/A
	- thread-cutting screws		N/A
(4.11.3)	Screw locking:		N/A
	- spring washer		N/A
	- rivets		N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
(4.11.4)	Material of current-carrying parts	PCB trace	P
(4.11.5)	No contact to wood or mounting surface		N/A
(4.11.6)	Electro-mechanical contact systems		N/A
(4.12)	Mechanical connections and glands		P
(4.12.1)	Screws not made of soft metal		N/A
	Screws of insulating material		N/A
	Torque test: torque (Nm); part :		N/A
	Torque test: torque (Nm); part :		N/A
	Torque test: torque (Nm); part :		N/A
(4.12.2)	Screws with diameter < 3 mm screwed into metal		N/A
(4.12.4)	Locked connections:		N/A
	- fixed arms; torque (Nm)..... :		N/A
	- lampholder; torque (Nm)..... :		N/A
	- push-button switches; torque 0,8 Nm..... :		N/A
(4.12.5)	Screwed glands; force (Nm) :		N/A

19 (18)	RESISTANCE TO HEAT, FIRE AND TRACKING		P
- (18.1)	Ball-pressure test :	See Test Table 19 (18.1)	P
- (18.2)	Test of printed boards :	See Test Table 19 (18.2)	P
- (18.3)	Glow-wire test :	See Test Table 19 (18.3)	P
- (18.4)	Needle flame test :	See Test Table 19 (18.4)	P
- (18.5)	Tracking test :	See Test Table 19 (18.5)	N/A

20 (19)	RESISTANCE TO CORROSION		N/A
	- test according 4.18.1 of IEC 60598-1		N/A
	- adequate varnish on the outer surface		N/A

14	TABLE: tests of fault conditions	
Part	Simulated fault	Hazard
CB4	Short-circuit, nothing impair safety	NO
CB3	Short-circuit, nothing impair safety	NO
CB2	Short-circuit, nothing impair safety	NO
Q1	Short-circuit, nothing impair safety	NO

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
Output of transformer	Short-circuit, nothing impair safety		NO
D7	Short-circuit, nothing impair safety		NO
CB5	Short-circuit, nothing impair safety		NO
CB6	Short-circuit, nothing impair safety		NO
DB1	Short-circuit, nothing impair safety		NO
IC1	Short-circuit, nothing impair safety		NO

17 (16)		TABLE: clearance and creepage distance measurements (mm)						P
Applicable part of IEC 61347-1 Table 7 – 11*								
Distances	Insulation type **	Measured clearance	Required		Measured creepage	Required		
			clearance	*Table		creepage	*Table	
Distance 1:	B	3,3	1,5	9	3,3	2,5	7	
Working voltage (V).....:					230V~		—	
Frequency if applicable (kHz)					N/A		—	
PTI.....:					< 600 ☒ ≥ 600 ☐		—	
Peak value of the working voltage \hat{U}_{out} if applicable (kV)					N/A		—	
Pulse voltage if applicable (kV)					N/A		—	
Supplementary information: L & N								
Distance 2:	R	6,6	3	9	6,6	5	7	
Working voltage (V).....:					230V~		—	
Frequency if applicable (kHz)					N/A		—	
PTI.....:					< 600 ☒ ≥ 600 ☐		—	
Peak value of the working voltage \hat{U}_{out} if applicable (kV)					N/A		—	
Pulse voltage if applicable (kV)					N/A		—	
Supplementary information: PRI & SEC								
Distance 3:	R	6,3	3	9	6,3	5	7	
Working voltage (V).....:					230V~		—	
Frequency if applicable (kHz)					N/A		—	
PTI.....:					< 600 ☒ ≥ 600 ☐		—	
Peak value of the working voltage \hat{U}_{out} if applicable (kV)					N/A		—	
Pulse voltage if applicable (kV)					N/A		—	
Supplementary information: Live parts & enclosure								

** Insulation type: B – Basic; S – Supplementary; R – Reinforced

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

19 (18.1)	TABLE: Ball Pressure Test			P
Allowed impression diameter (mm):		2		—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
Enclosure	See CDF	75	1,2	
PCB	See CDF	125	1,1	
Bobbin	See CDF	125	0,8	
Supplementary information:				

19 (18.2)	TABLE: Test of printed boards				P
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (s)	Ignition of specified layer Yes/No	Duration of burning (s)	Verdict
PCB	See CDF	10	No	No	P
Supplementary information:					

19 (18.3)	TABLE: Glow-wire test			P
Glow wire temperature.....		650°C	—	
Object/ Part No./ Material	Manufacturer/ trademark	Ignition of specified layer Yes/No	Duration of burning (s)	Verdict
Enclosure	See CDF	No	No burning	P
Lining	See CDF	No	No burning	P
Tape of transformer	See CDF	No	No burning	P
Supplementary information:				

19 (18.4)	TABLE: Needle-flame test				P
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (s)	Ignition of specified layer Yes/No	Duration of burning (s)	Verdict

IEC 61347-2-2					
Clause	Requirement + Test			Result - Remark	Verdict
bobbin	See CDF	10	No	No	P
Supplementary information:					

19 (18.5)	TABLE: Proof tracking test					N/A
Test voltage PTI				175 V		—
Object/ Part No./ Material	Manufacturer/ trademark	Withstand 50 drops without failure on three places or on three specimens			Verdict	
Supplementary information:						

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

(A)	ANNEX A - TEST TO ESTABLISH WHETHER A CONDUCTIVE PART IS A LIVE PART WHICH MAY CAUSE AN ELECTRIC SHOCK		N/A
(A.1)	Comply with A.2 or A.3		N/A
(A.2)	Voltage ≤ 35 V peak or ≤ 60 V d.c		N/A
(A.3)	If voltage measured according Clause A.2 exceeds the limit value; touch current does not exceed 0,7 mA (peak) or 2 mA d.c.		N/A
	Comply with Annex G.2 of IEC 60598-1		N/A

(C)	ANNEX C – PARTICULAR REQUIREMENTS FOR ELECTRONIC LAMP CONTROLGEAR WITH MEANS OF PROTECTION AGAINST OVERHEATING		N/A
(C3)	GENERAL REQUIREMENTS		N/A
(C3.1)	Thermal protection means integral with the convertor, protected against mechanical damage		N/A
	Renewable only by means of a tool		N/A
	If function depending on polarity, for cord-connected equipment protection means in both leads		N/A
	Thermal links comply with IEC 60691		N/A
	Electrical controls comply with IEC 60730-2-3		N/A
(C3.2)	No risk of fire by breaking (clause C7)		N/A
(C5)	CLASSIFICATION		N/A
	a) automatic resetting type		—
	b) manual resetting type		—
	c) non-renewable, non-resetting type		—
	d) renewable, non-resetting type		—
	e) other type of thermal protection; description ...:		—
(C6)	MARKING		N/A
(C6.1)	Symbol for temperature declared thermally protected ballasts		N/A
(C6.2)	Declaration of the type of protection provided		N/A
(C7)	LIMITATION OF HEATING		N/A
(C7.1)	Preselection test:		N/A
	Test sample placed for at least 12 h in an oven having temperature ($t_c - 5$) K		N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
	No operation of the protection device		N/A
(C7.2)	Functioning of protection means:		N/A
	Normal operation of the sample in a test enclosure according to Annex D at an ambient temperature such that ($t_c +0; -5$) °C is obtained		N/A
	No operation of the protection device		N/A
	Introducing of the most onerous test condition determined during test of clause 14.2 to 14.5		N/A
	Output of windings connected to the mains supply short-circuited, and other part of the controlgear operated under normal conditions		N/A
	Increasing of the current through the windings continuously until operation of the protection means		N/A
	Continuous measuring of the highest surface temperature		N/A
	Ballasts according to C5 a) or C5 e) operated until stable conditions are achieved		N/A
	Automatic-resetting thermal protectors working 3 times		N/A
	Ballasts according to C5 b) working 6 times		N/A
	Ballasts according to C5 c) and C5) d) working once		N/A
	Highest temperature does not exceed the marked value		N/A
	Any overshoot of 10% over the marked value within 15 min		N/A
	After 15 min value not exceed marked value		N/A

(D)	ANNEX D – REQUIREMENTS FOR CARRY OUT THE HEATING TESTS OF THERMALLY PROTECTED LAMP CONTROLGEAR		N/A
	Tests in C7 performed in accordance with Annex D, if applicable		N/A

(F)	ANNEX F – DRAUGHT-PROOF ENCLOSURE		P
	Draught-proof enclosure in accordance with the description		P
	Dimensions of the enclosure		P
	Other design; description		N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
(H)	ANNEX H - TESTS		P
	All tests performed in accordance with the advice given in Annex H, if applicable		P
I (L)	ANNEX I IN THIS PART 2 – PARTICULAR ADDITIONAL REQUIREMENTS FOR SELV D.C. OR A.C. SUPPLIED ELECTRONIC STEP-DOWN CONVERTORS FOR FILAMENT LAMPS		P
(L.3)	Classification		P
	Class I	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Class II	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	Class III	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	non-inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	inherently short circuit proof controlgear	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	fail safe controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	non-short-circuit proof controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
(L.4)	Marking		P
	Adequate symbols are used		P
(L.5)	Protection against electric shock		P
	Comply with clause 9.2 of IEC 61558-1		P
(L.6)	Heating		P
	No excessive temperatures in normal use		P
	Value if capacitor t_c marked	N/A	—
	Winding insulation classified as Class	Class B	—
	Comply with tests of clause 14 of IEC 61558-1 with adjustments		N/A
(L.7)	Short-circuit and overload protection		P
	Comply with tests of clause 15 of IEC 61558-1 with adjustments		P
(L.8)	Insulation resistance and electric strength		P
(L.8.1)	Conditioned 48 h between 91 % and 95 %		P
(L.8.2)	Insulation resistance		P
	Between input- and output circuits not less than 5 M Ω	>500	P

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Between metal parts of class II convertors which are separated from live parts by basic insulation only and the body not less than 5 MΩ		N/A
	Between metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 MΩ		N/A
(L.8.3)	Electric strength		P
	1) Between live parts of input circuits and live parts of output circuits	2920	P
	2) Over basic or supplementary insulation between:		P
	a) live parts having different polarity		N/A
	b) live parts and body if intended to be connected to protective earth		N/A
	c) accessible metal parts and a metal rod of the same diameter as the flexible cable or cord	1460	P
	d) live parts and an intermediate metal part		N/A
	e) intermediate metal parts and the body		N/A
	f) each input circuit and all other input circuits		N/A
	3) Over reinforced insulation between the body and live parts	2920	P
(L.9)	Construction		P
(L.9.1)	Transformer comply with 19.12 of IEC 61558-1 and 19 of IEC 61558-2-6		P
	HF transformer comply with 19 of IEC 61558-2-16		P
(L.10)	Components		P
	Protective devices comply with 20.6 – 20.11 of IEC 61558-1		P
(L.11)	Creepage distances, clearances and distances through insulation		P
	Creepage distances and clearances not less than in Clause 16		P
	Distance through insulation according Table L.5 in IEC 61347-1		P
	1) Basic distance through insulation		N/A
	Required distance (mm)		—
	Measured (mm)		N/A
	Supplementary information		—
	2) Supplementary distance through insulation		P
	Required distance (mm)	0,13	—

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Clause	Requirement + Test	Result - Remark	Verdict
	Measured (mm):	0,5	P
	Supplementary information		—
	3) Reinforced distance through insulation		P
	Required distance (mm):	0,8	—
	Measured (mm):	1,0	P
	Supplementary information		—

(N)	ANNEX N: REQUIREMENTS FOR INSULATION MATERIALS USED FOR DOUBLE OR REINFORCED INSULATION		P
(N.4)	General requirements		P
(N.4.1)	Material comply with IEC 60085 and IEC 60216 series		N/A
(N.4.2)	Solid insulation		N/A
	Electric strength test at least 5 kV or 1,35 x test voltage in Table N.1		N/A
	If not classified according IEC 60085 and IEC 60216 series: Electric strength test increased 10 % of 5,5 kV or 1,5 x test voltage in Table N.1		N/A
(N.4.3)	Thin sheet insulation		P
(N.4.3.1)	Thickness and composition of thin sheet insulation		P
	- Inside the ballast and not subjected to handling or abrasion during the production and during maintenance		P
	- Non-separated layers: Min. 3 layers and fulfil mandrel test of 150N		N/A
	- Separated layers: Min. 2 layers and each layer fulfil mandrel test of 50N		N/A
	- Separated layers (alternative): Min. 3 layers and 2/3 of the layers fulfil mandrel test of 100N		P
(N.4.3.2)	Mandrel test (electric strength test during mechanical stress)		P
	Electric strength test after mandrel test:		P
	- Non-separated layers: min. 5 kV or 1,35 x test voltage in Table N.1		N/A
	- 2/3 of min. 3 separated layers: min. 5 kV or 1,25 x test voltage in Table N.1		P
	- one of 2 separated layers: min. 5 kV or 1,25 x test voltage in Table N.1		N/A
	No flashover or breakdown occurred		P

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

(O)	ANNEX O: ADDITIONAL REQUIREMENTS FOR BUILT-IN ELECTRONIC CONTROLGEAR WITH DOUBLE OR REINFORCED INSULATION		N/A
(O.6)	Marking		N/A
	Marking according clause 7 (7)	See clause 7	N/A
	Special symbol		N/A
	Meaning of the special symbol explained in catalogue		N/A
(O.7)	Protection against accidental contact with live parts		N/A
	Requirements of clause 8 (10)	See clause 8	N/A
	Test finger not possible to make contact with basic insulated metal parts		N/A
(O.8)	Terminals		N/A
	Clause 9 (8)	See clause 9	N/A
(O.9)	Provision for earthing		N/A
	Functional earthing terminals comply with clause 9 of part 1		N/A
	No protective earthing terminal		N/A
(O.10)	Moisture resistance and insulation		N/A
	Clause 11 (11)	See clause 11	N/A
(O.11)	Electric strength		N/A
	Clause 12 (12)	See clause 12	N/A
(O.13)	Fault conditions		N/A
	Clause 14 (14)	See clause 14	N/A
	End of test, between live part and accessible metal parts or external parts of insulating material in contact with the supporting surface comply with dielectric strength test reduced to 35 % of values according Table 1 in part 1		N/A
	Insulation resistance according to O.10 between live part and accessible metal parts or external parts of insulating material in contact with the supporting surface not less than 4 MΩ		N/A
(O.14)	Construction		N/A
	Clause 17 (15)	See clause 17	N/A
	Accessible metal parts insulated from live parts by double or reinforced insulation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Live part insulated from supporting surface in contact with external faces by double or reinforced insulation		N/A
(O.15)	Creepage distances and clearances		N/A
	Clause 18 (16)	See clause 18	N/A
	Comply with corresponding values for luminaries in IEC 60598-1		N/A
(O.16)	Screws, current-carrying parts and connections		N/A
	Clause 19 (17)	See clause 19	N/A
(O.17)	Resistance to heat and fire		N/A
	Clause 20 (18)	See clause 20	N/A
(O.18)	Resistance to corrosion		N/A
	Clause 21 (19)	See clause 21	N/A

ANNEX 1 TABLE: Critical components information							
Object / part No.	Code	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾	
Refer to CDF of report 7041014108201-03							
Description:							
Supplementary information: ¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039. The codes above have the following meaning: <ul style="list-style-type: none"> A - The component is replaceable with another one, also certified, with equivalent characteristics B - The component is replaceable if authorised by the test house C - Integrated component tested together with the appliance D - Alternative component 							

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 2	Screw terminals (part of the luminaire)		N/A
(14)	SCREW TERMINALS		N/A
(14.2)	Type of terminal..... :		—
	Rated current (A)..... :		—
(14.3.2.1)	One or more conductors		N/A
(14.3.2.2)	Special preparation		N/A
(14.3.2.3)	Terminal size		N/A
	Cross-sectional area (mm ²)..... :		—
(14.3.3)	Conductor space (mm)		N/A
(14.4)	Mechanical tests		N/A
(14.4.1)	Minimum distance		N/A
(14.4.2)	Cannot slip out		N/A
(14.4.3)	Special preparation		N/A
(14.4.4)	Nominal diameter of thread (metric ISO thread) :	M	N/A
	External wiring		N/A
	No soft metal		N/A
(14.4.5)	Corrosion		N/A
(14.4.6)	Nominal diameter of thread (mm)..... :		N/A
	Torque (Nm)..... :		N/A
(14.4.7)	Between metal surfaces		N/A
	Lug terminal		N/A
	Mantle terminal		N/A
	Pull test; pull (N)		N/A
(14.4.8)	Without undue damage		N/A

IEC 61347-2-2			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 3	Screwless terminals (part of the luminaire)		P
(15)	SCREWLESS TERMINALS		P
(15.2)	Type of terminal..... :	Screwless	—
	Rated current (A) :		—
(15.3.1)	Material		P
(15.3.2)	Clamping		P
(15.3.3)	Stop		P
(15.3.4)	Unprepared conductors		P
(15.3.5)	Pressure on insulating material		P
(15.3.6)	Clear connection method		N/A
(15.3.7)	Clamping independently		N/A
(15.3.8)	Fixed in position		P
(15.3.10)	Conductor size		P
	Type of conductor		P
(15.5)	Terminals and connections for internal wiring		N/A
(15.5.1)	Mechanical tests		N/A
(15.5.1.1.1)	Pull test spring-type terminals (4 N, 4 samples)..... :		N/A
(15.5.1.1.2)	Pull test pin or tab terminals (4 N, 4 samples)..... :		N/A
	Insertion force not exceeding 50 N		N/A
(15.5.1.2)	Permanent connections: pull-off test (20 N)		N/A
(15.5.2)	Electrical tests		N/A
	Voltage drop (mV) after 1 h (4 samples)..... :		N/A
	Voltage drop of two inseparable joints		N/A
	Number of cycles:		—
	Voltage drop (mV) after 10th alt. 25th cycle (4 samples)..... :		N/A
	Voltage drop (mV) after 50th alt. 100th cycle (4 samples)..... :		N/A
	After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples) :		N/A
	After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples) :		N/A
(15.6)	Terminals and connections for external wiring		P
(15.6.1)	Conductors		P

IEC 61347-2-2										
Clause	Requirement + Test					Result - Remark				Verdict
	Terminal size and rating									P
15.6.2	Mechanical tests									P
(15.6.2.1)	Pull test spring-type terminals or welded connections (4 samples); pull (N) :									N/A
(15.6.2.2)	Pull test pin or tab terminals (4 samples); pull (N) :					8N, 1min				P
(15.6.3)	Electrical tests									P
	Tests according 15.6.3.1 + 15.6.3.2 in IEC 60598-1									P
(15.6.3.1) (15.6.3.2)	TABLE: Contact resistance test / Heating tests									P
	Voltage drop (mV) after 1 h									—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)	0,8	0,9	0,8	0,9	1,0	0,9	1,0	0,9	1,0	0,9
	Voltage drop of two inseparable joints									N/A
	Voltage drop after 10th alt. 25th cycle									P
	Max. allowed voltage drop (mV) :					15				—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)	1,0	1,1	1,0	1,1	1,1	1,2	1,0	1,0	1,1	1,2
	Voltage drop after 50th alt. 100th cycle									N/A
	Max. allowed voltage drop (mV) :					N/A				—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
	Continued ageing: voltage drop after 10th alt. 25th cycle									P
	Max. allowed voltage drop (mV) :					N/A				—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)	1,2	1,2	1,3	1,2	1,2	1,3	1,4	1,3	1,3	1,3
	Continued ageing: voltage drop after 50th alt. 100th cycle									N/A
	Max. allowed voltage drop (mV) :					N/A				—
terminal	1	2	3	4	5	6	7	8	9	10
voltage drop (mV)										
Supplementary information:										

IEC 61347-2-2 appendix 1			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 61347-2-2
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

Part 2: Particular requirements

Section Two – d.c. or a.c. supplied electronic step-down convertors for filament lamps

	CENELEC COMMON MODIFICATIONS (EN)	P
	No Common modifications	P

Appendix 2 – EN 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.13	Mechanical strength		P
4.13.1	Impact tests:		P
	- fragile parts; energy (Nm)		N/A
	- other parts; energy (Nm)	Enclosure; 0,5	P
	1) live parts		P
	2) linings		N/A
	3) protection		P
	4) covers		P
4.13.3	Straight test finger		P

1.10 (5)	EXTERNAL AND INTERNAL WIRING		P
1.10 (5.2)	Supply connection and external wiring		P
1.10 (5.2.1)	Means of connection	Terminal	P
	Outdoor luminaire has not PVC insulated external wiring if not class III or SELV ≤ 25 V a.c./60 V d.c. or protected from outdoor environment		N/A
1.10 (5.2.2)	Type of cable.....	PVC	P
	Nominal cross-sectional area (mm ²)	0,5	P
	Cables equal to IEC 60227 or IEC 60245		N/A
1.10 (5.2.3)	Type of attachment, X, Y or Z	Z	P
1.10 (5.2.5)	Type Z not connected to screws		P
1.10 (5.2.6)	Cable entries:		P
	- suitable for introduction		P
	- adequate degree of protection		P
1.10 (5.2.7)	Cable entries through rigid material have rounded edges		P
1.10 (5.2.8)	Insulating bushings:		N/A
	- suitably fixed		N/A
	- material in bushings		N/A
	- material not likely to deteriorate		N/A
	- tubes or guards made of insulating material		N/A
1.10 (5.2.9)	Locking of screwed bushings		N/A
1.10 (5.2.10)	Cord anchorage:		P
	- covering protected from abrasion		P
	- clear how to be effective		P

Appendix 2 – EN 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- no mechanical or thermal stress		P
	- no tying of cables into knots etc.		P
	- insulating material or lining		P
1.10 (5.2.10.1)	Cord anchorage for type X attachment:		N/A
	a) at least one part fixed		N/A
	b) types of cable		N/A
	c) no damaging of the cable		N/A
	d) whole cable can be mounted		N/A
	e) no touching of clamping screws		N/A
	f) metal screw not directly on cable		N/A
	g) replacement without special tool		N/A
	Glands not used as anchorage		N/A
	Labyrinth type anchorages		N/A
1.10 (5.2.10.2)	Adequate cord anchorage for type Y and type Z attachment		P
1.10 (5.2.10.3)	Tests:		P
	- impossible to push cable; unsafe		P
	- pull test: 25 times; pull (N)	60N	P
	- torque test: torque (Nm)	0,15Nm	P
	- displacement ≤ 2 mm		P
	- no movement of conductors		P
	- no damage of cable or cord		P
	- function independent of electrical connection		P
1.10 (5.2.11)	External wiring passing into luminaire		P
1.10 (5.2.12)	Looping-in terminals		N/A
1.10 (5.2.13)	Wire ends not tinned		P
	Wire ends tinned: no cold flow		N/A
1.10 (5.2.14)	Mains plug same protection		N/A
	Class III luminaire plug		N/A
	No unsafe compatibility		N/A
1.10 (5.2.16)	Appliance inlets (IEC 60320)		N/A
	Installation couplers (IEC 61535)		N/A
	Other appliance inlet or connector according relevant IEC standard		N/A

Appendix 2 – EN 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.10 (5.2.17)	No standardized interconnecting cables properly assembled		N/A
1.10 (5.2.18)	Used plug in accordance with		N/A
	- IEC 60083		N/A
	- other standard		N/A
1.10 (5.3)	Internal wiring		P
1.10 (5.3.1)	Internal wiring of suitable size and type		P
	Through wiring		N/A
	- not delivered/ mounting instruction		N/A
	- factory assembled		N/A
	- socket outlet loaded (A).....		N/A
	- temperatures..... (see Annex 2)		N/A
	Green-yellow for earth only		N/A
1.10 (5.3.1.1)	Internal wiring connected directly to fixed wiring		P
	Cross-sectional area (mm ²) 0,2		P
	Insulation thickness		P
	Extra insulation added where necessary		N/A
1.10 (5.3.1.2)	Internal wiring connected to fixed wiring via internal current-limiting device		P
	Adequate cross-sectional area and insulation thickness		P
1.10 (5.3.1.3)	Double or reinforced insulation for class II		N/A
1.10 (5.3.1.4)	Conductors without insulation		N/A
1.10 (5.3.1.5)	SELV current-carrying parts		P
1.10 (5.3.1.6)	Insulation thickness other than PVC or rubber		N/A
1.10 (5.3.2)	Sharp edges etc.		P
	No moving parts of switches etc.		N/A
	Joints, raising/lowering devices		N/A
	Telescopic tubes etc.		N/A
	No twisting over 360°		N/A
1.10 (5.3.3)	Insulating bushings:		N/A
	- suitable fixed		N/A
	- material in bushings		N/A
	- material not likely to deteriorate		N/A
	- cables with protective sheath		N/A

Appendix 2 – EN 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.10 (5.3.4)	Joints and junctions effectively insulated		N/A
1.10 (5.3.5)	Strain on internal wiring		P
1.10 (5.3.6)	Wire carriers		N/A
1.10 (5.3.7)	Wire ends not tinned		N/A
	Wire ends tinned: no cold flow		P

1.13 (9)	RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE		P
1.13 (-)	If IP > IP 20 the order of tests as specified in clause 1.12		N/A
1.13 (9.2)	Tests for ingress of dust, solid objects and moisture:		—
	- classification according to IP	IP20	—
	- mounting position during test.....	Normal mounting position	—
	- fixing screws tightened; torque (Nm).....	N/A	—
	- tests according to clauses	9.2.0	—
	- electric strength test afterwards	(see 10.2.2)	P
	a) no deposit in dust-proof luminaire		N/A
	b) no talcum in dust-tight luminaire		N/A
	c) no trace of water on current-carrying parts or on insulation where it could become a hazard		N/A
	d) i) For luminaires without drain holes – no water entry		N/A
	d) ii) For luminaires with drain holes – no hazardous water entry		N/A
	e) no water in watertight luminaire		N/A
	f) no contact with live parts (IP 2X)		P
	f) no entry into enclosure (IP 3X and IP 4X)		N/A
	f) no contact with live parts (IP3X and IP4X)		N/A
	g) no trace of water on part of lamp requiring protection from splashing water		N/A
	h) no damage of protective shield or glass envelope		N/A
1.13 (9.3)	Humidity test 48 h	25°C / 93% humidity	P

1.12 (12)	ENDURANCE TEST AND THERMAL TEST		P
1.12 (-)	If IP > IP 20 relevant test of (12.4), (12.5) and (12.6) after (9.2) before (9.3) specified in 4.13		—
1.12 (12.3)	Endurance test:		P

Appendix 2 – EN 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- mounting-position..... :	normal position	—
	- test temperature (°C)..... :	35	—
	- total duration (h)..... :	240	—
	- supply voltage: Un factor; calculated voltage (V) .. :	U=1,1Un	—
	- lamp used	filament lamps	—
1.12 (12.3.2)	After endurance test:		P
	- no part unserviceable		P
	- luminaire not unsafe		P
	- no damage to track system		N/A
	- marking legible		P
	- no cracks, deformation etc.		P
1.12 (12.4)	Thermal test (normal operation)	See below	P
1.12 (12.5)	Thermal test (abnormal operation)	See below	P

Appendix 2 – EN 60598-1

Appendix 2 – EN 60598-1							
Clause	Requirement + Test				Result - Remark		Verdict
	Type reference :				999999-017-5		—
	Lamp used..... :				3.5Vd.c. filament lamps		—
	Lamp control gear used :				N/A		—
	Mounting position of luminaire..... :				Normal position		—
	Supply wattage (W) :				5,0		—
	Supply current (A)..... :				0,03		—
	Calculated power factor :				0,70		—
	Table: measured temperatures corrected for ta = 25 °C:						
	- abnormal operating mode :				1. short-circuit output of controlgear 2. double load connected in parallel to the output		—
	- test 1: rated voltage :				230 V		—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage..... :				1,06 x 230V = 243,8V		—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage :				N/A		—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage..... :				1,1 x 230V = 253V		—
	Through wiring or looping-in wiring loaded by a current of A during the test :				N/A		—
temperature (°C) of part		Clause 12.4 – normal				Clause 12.5 – abnormal	
	test 1	test 2	test 3	limit	Test 4 Mode 1	Test 4 Mode 2	limit
enclosure(tc)	38,5	-	-	40	27,9	26,2	ref.
mounting surface	-	39,7	-	90	27,5	26,8	130
Plug interface	-	30,0	-	70	25,2	25,1	ref.
PCB(below transformer)	-	54,3	-	130	33,2	30,3	ref.
transformer	-	57,9	-	130	33,6	29,8	ref.
CX1	-	33,3	-	110	26,2	25,9	ref.
CB4	-	44,0	-	105	28,8	27,9	ref.
CB3	-	46,6	-	105	29,1	27,9	ref.
CB2	-	45,7	-	105	28,9	27,7	ref.
CY1	-	51,6	-	125	32,1	28,6	ref.

Appendix 2 – EN 60598-1							
Clause	Requirement + Test				Result - Remark		Verdict
Opto-coupler	-	45,0	-	110	30,6	28,4	ref.
CB5	-	54,6	-	105	34,5	29,1	ref.
CB6	-	46,5	-	105	31,4	27,9	ref.
input wiring	-	32,1	-	90	26,0	25,7	ref.
output wiring(near PCB)	-	45,6	-	90	30,8	27,9	ref.
PCB for connector	-	41,4	-	130	30,0	26,9	ref.
enclosure of connector	-	36,7	-	Refer to ball-pressure test	28,7	26,2	ref.
lining	-	47,8	-	Ref.	31,7	29,8	ref.

Appendix 3 – EN61347-2-11			
Clause	Requirement + Test	Result - Remark	Verdict
14 (14)	FAULT CONDITIONS		P
	When operated under fault conditions the controlgear:		P
	- does not emit flames or molten material		P
	- does not produce flammable gases		P
	- protection against accidental contact not impaired		P
	Thermally protected ballasts does not exceed the marked temperature value		N/A
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected	(see appended table)	P
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)	(see appended table)	N/A
	Creepage distances on printed boards less than specified in clause 16 in Part 1 provided with coating according to IEC 60664-3		N/A
- (14.2)	Short-circuit or interruption of semiconductor devices	(see appended table)	P
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile	(see appended table)	N/A
- (14.4)	Short-circuit across electrolytic capacitors	(see appended table)	N/A
- (14.5)	After the tests has been carried out on three samples:		P
	The insulation resistance $\geq 1 \text{ M}\Omega$		P
	No flammable gases		P
	No accessible parts have become live		P
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite		P
- (14.6)	Relevant fault condition tests with high-power supply		—

14	TABLE: tests of fault conditions	
Part	Simulated fault	Hazard
one bulb	Short-circuited, nothing impair safety	NO

Appendix 4 - EN 62493			
Clause	Requirement + Test	Result - Remark	Verdict
4	LIMITS		P
4.1	General		P
	Comply with Van der Hoofden test limit in 4.2.3 or inherently compliant in 4.2.2 and pass assessment procedure for intentional radiators in 4.3		P
4.2	Unintentional radiating part of lighting equipment		P
4.2.2	Lighting equipment deemed to comply with the Van der Hoofden test without testing		P
	1) electronic controlgear	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	2) incandescent-lamp technology	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	3) LED-light-source technology	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	4) OLED-light-source technology	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	5) high-pressure discharge lamp LED-light-source technologies	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	6) low-pressure discharge lamp technologies with exposure distance ≥ 50 cm	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	7) independent auxiliary	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Not fulfil any of 1-7 above subject to 4.2.3		—
4.2.3	Applications of limits		N/A
	Not fulfil any of 1-7 in 4.2.2 but the compliance factor F is ≤ 1		N/A
4.3	Intentional radiating part of lighting equipment		N/A
	Comply with one of methods in Clause 7 if intentional radiator		N/A

Appendix 5: Photograph



999999-017-5



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Appendix 5: Photograph



999999-017-5

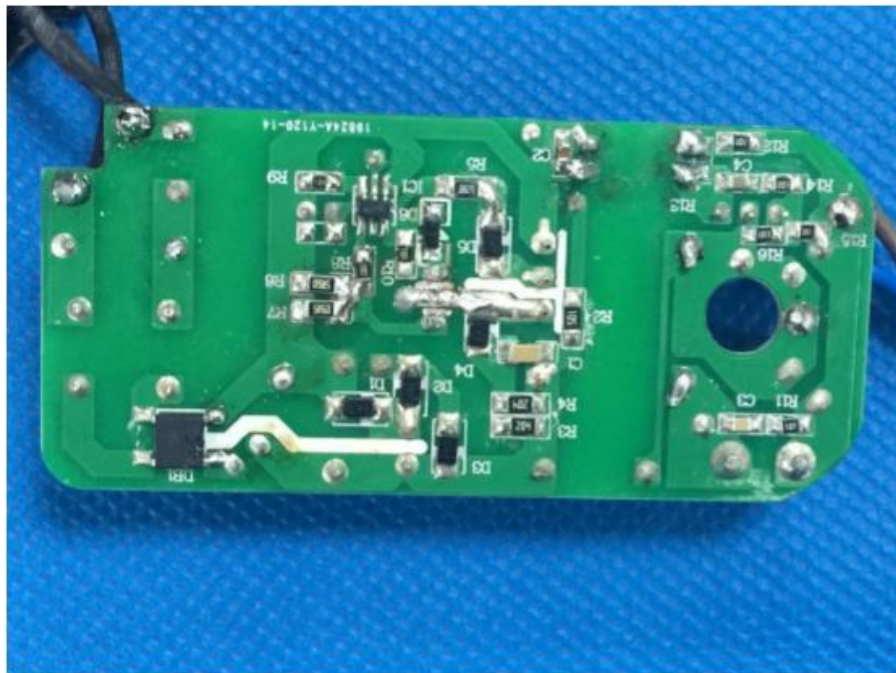


Inner construction

Appendix 5: Photograph



PCB



PCB

Appendix 5: Photograph



Transformer



Transformer

Appendix 5: Photograph



Transformer



Transformer

Appendix 5: Photograph



Core

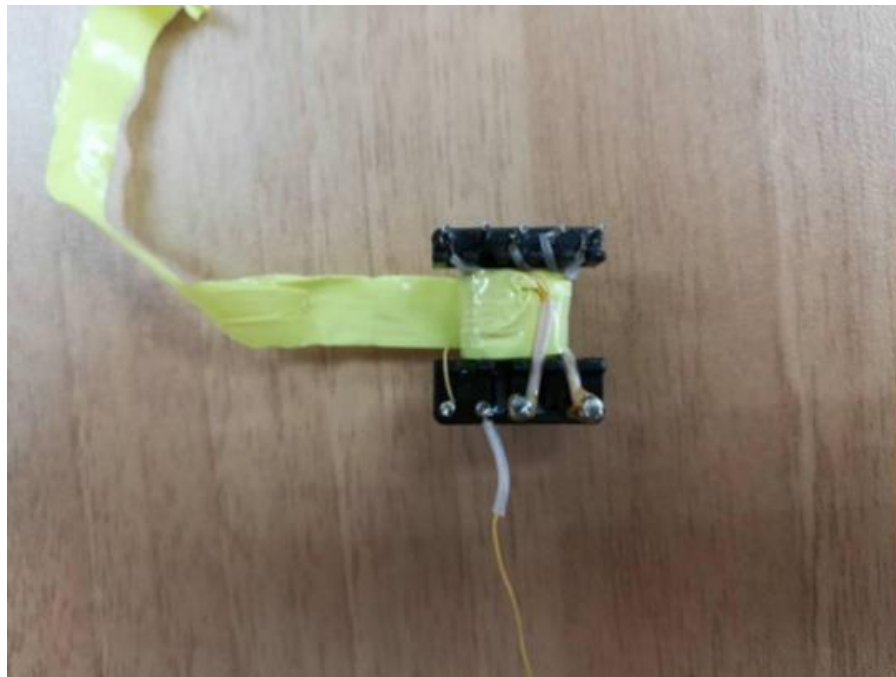


Triple-insulated secondary winding

Appendix 5: Photograph



Triple-insulated secondary winding



Triple-insulated secondary winding

Appendix 5: Photograph



Triple-insulated secondary winding



Primary winding