

Prüfbericht-Nr.: <i>Test report no.:</i>	CN247M1D 001	Auftrags-Nr.: <i>Order no.:</i>	326003566 010	Seite 1 von 156 <i>Page 1 of 156</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2024-02-29	
Auftraggeber: <i>Client:</i>	Shenzhen Mammotion Innovation Co., Limited 9th Floor, Building A3, Nanshan Zhiyuan, No. 1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen Guangdong P.R. China			
Prüfgegenstand: <i>Test item:</i>	Robotic Lawnmower, powered by battery(YUKA)			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	600, 1000, 1500, 2000			
Auftrags-Inhalt: <i>Order content:</i>	Type Test			
Prüfgrundlage: <i>Test specification:</i>	EN 60335-1:2012+A11+A13+A1+A14+A2+A15 EN 50636-2-107: 2015+A1+A2+A3			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-03-02			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003662566-001-002; A003656395-001-008			
Prüfzeitraum: <i>Testing period:</i>	2024-03-02 - 2024-04-02			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	<input checked="" type="checkbox"/> <u>Jason Yan</u>	genehmigt von: <i>authorized by:</i>	<input checked="" type="checkbox"/> <u>Bingwen Zhang</u>	
Datum: <i>Date:</i>	2024-05-09 <small>Signed by: Jason Yan</small>	Ausstellungsdatum: <i>Issue date:</i>	2024-05-09 <small>Signed by: Bingwen Zhang</small>	
Stellung / Position:	PE	Stellung / Position:	Authorizer	
Sonstiges / <i>Other:</i>	Foreseeable use was considered. Currently neither a safeguard clause procedure has been invoked nor is an increase in accidents known for this/these product(s). Client Contact: Mail.: tao.zeng@agilex.ai			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
<small>* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet * Legend: P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested</small>				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be</i> <small>v05 plicated in extracts. This test report does not entitle to carry any test mark.</small>				



TEST REPORT IEC 60335-1 Safety of household and similar electrical appliances	
Report Number	CN247M1D 001
Date of issue	25-04-2024
Total number of pages.....	156
Name of Testing Laboratory preparing the Report.....	TÜV Rheinland (Shanghai) Co., Ltd.
Applicant's name.....	See cover page
Address	See cover page
Test specification:	
Standard	IEC 60335-1:2010, COR1:2010, COR2:2011, AMD1:2013, COR1:2014, AMD2:2016, COR1:2016
Test procedure	CE
Non-standard test method.....	N/A
Test Report Form No.....	IEC60335_1X
Test Report Form(s) Originator.....	Nemko AS
Master TRF	Dated 2016-10
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Test item description	Robotic Lawnmower, powered by battery(YUKA)	
Trade Mark		
Manufacturer	Shenzhen Mammotion Innovation Co., Limited	
Model/Type reference	600, 1000, 1500, 2000	
Ratings	21.6V --- , 32cm , Class III	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input type="checkbox"/> CB Testing Laboratory:	TÜV Rheinland (Shanghai) Co., Ltd.	
Testing location/ address	No.177, 178, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, P. R. China	
Tested by (name, function, signature)	See cover page	
Approved by (name, function, signature) ..	See cover page	
<input type="checkbox"/> Testing procedure: CTF Stage 1:		
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ..		
<input type="checkbox"/> Testing procedure: CTF Stage 2:		
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature) .		
Approved by (name, function, signature) ..		
<input type="checkbox"/> Testing procedure: CTF Stage 3:		
<input type="checkbox"/> Testing procedure: CTF Stage 4:		
Testing location/ address		
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): Attachment 1: Components list (3 pages) Attachment 2: Test report CN243LRR 002 Functional safety evaluation according to annex R of EN 60335-1 for control unit (19 Pages)	
Summary of testing:	
Tests performed (name of test and test clause): Full tests were performed on model 2000.	Testing location: TÜV Rheinland (Shanghai) Co., Ltd.
Summary of compliance with National Differences (List of countries addressed): N/A	

Copy of marking plate:

Machine

<p>MAMMOTION Made in China</p> <p>Product Name: YUKA Model: 600</p> <p>Battery: 21.6 V d.c., 4.5Ah, 97.2Wh Rating: 21.6V \approx 180W</p> <p>Product Weight: xx.x kg Cutting width: 32 cm</p> <p>Manufacturer: Shenzhen Mammotion Innovation Co., Limited Address: 9th Floor, Building A3, Nanshan Zhiyuan, No. 1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen Guangdong R.R.China</p> <p>Device Name: YUKA-XXXXXXXX SN: XXXXXXXXXXXX</p> <p>CE IPX6</p>	<p>MAMMOTION Made in China</p> <p>Product Name: YUKA Model: 1000</p> <p>Battery: 21.6 V d.c., 4.5Ah, 97.2Wh Rating: 21.6V \approx 180W</p> <p>Product Weight: xx.x kg Cutting width: 32 cm</p> <p>Manufacturer: Shenzhen Mammotion Innovation Co., Limited Address: 9th Floor, Building A3, Nanshan Zhiyuan, No. 1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen Guangdong R.R.China</p> <p>Device Name: YUKA-XXXXXXXX SN: XXXXXXXXXXXX</p> <p>CE IPX6</p>
<p>MAMMOTION Made in China</p> <p>Product Name: YUKA Model: 1500</p> <p>Battery: 21.6 V d.c., 4.5Ah, 97.2Wh Rating: 21.6V \approx 180W</p> <p>Product Weight: xx.x kg Cutting width: 32 cm</p> <p>Manufacturer: Shenzhen Mammotion Innovation Co., Limited Address: 9th Floor, Building A3, Nanshan Zhiyuan, No. 1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen Guangdong R.R.China</p> <p>Device Name: YUKA-XXXXXXXX SN: XXXXXXXXXXXX</p> <p>CE IPX6</p>	<p>MAMMOTION Made in China</p> <p>Product Name: YUKA Model: 2000</p> <p>Battery: 21.6 V d.c., 4.5Ah, 97.2Wh Rating: 21.6V \approx 180W</p> <p>Product Weight: xx.x kg Cutting width: 32 cm</p> <p>Manufacturer: Shenzhen Mammotion Innovation Co., Limited Address: 9th Floor, Building A3, Nanshan Zhiyuan, No. 1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen Guangdong P.R.China</p> <p>Device Name: YUKA-XXXXXXXX SN: XXXXXXXXXXXX</p> <p>CE IPX6</p>

Station:

MAMMOTION Made in China

Product name: Charging Station **Model:** CHG0004

Input: 20V \approx 90W **Product weight:** X.X kg

Output: 30V \approx 3A

Manufacturer: Shenzhen Mammotion Innovation Co., Limited
Address: 9th Floor, Building A3, Nanshan Zhiyuan, No. 1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen

SN: XXXXXXXXXXXX

CE **IPX6**

RTK reference station:

MAMMOTION Made in China

Product name: RTK Reference Station **Model:** RTK0003

Input: 12-25.2V \approx 2.3W **IC:** 29582-RTK0002 **FCC ID:** 2ABQJ-RTK0002

Manufacturer: Shenzhen Mammotion Innovation Co., Limited
Address: 9th Floor, Building A3, Nanshan Zhiyuan, No. 1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen Guangdong R.R.China

Lot# No. 31E03

Device Name: YUKA-XXXXXXXX

CE **IPX7**

Warning Label:



Test item particulars :	
Classification of installation and use : Battery operate	
Supply Connection : Battery operate	
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 : Refer to cover page	
Date (s) of performance of tests : Refer to cover page	
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 type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
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) : Huizhou BYD Electronic Co., Ltd. Xiangshui River, Daya Bay Economic and Technological Development Zone, Huizhou City	
General product information:	
The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2023, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. Decision rule is the rule that describes how measurement uncertainty is accounted for when stating conformity with a specified requirement. When decision rule is applicable, please refer to the current version announced in our website https://www.tuv.com/landingpage/en/qm-gcn/ .	
The test report is for use overseas. Robotic Lawnmower is intended for cutting domestic lawn with two circular drive unit and assembled with four metal pivoting cutting elements respectively, powered by battery (Lion-battery). Key used as the disable device.	
All models have the similar construction except the followings:	

Model	Mowing size	Cutting height	Battery Pack
2000	2000 m ²	20-90mm	21.6Vdc,4.5Ah
1500	1500 m ²		
1000	1000 m ²		
600	600 m ²		

Label, manual were checked and met the requirement of the standards.

Full tests were performed on model 2000.

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
5	GENERAL CONDITIONS FOR THE TESTS		P
	Tests performed according to clause 5, e.g. nature of supply, sequence of testing, etc.		P
6	CLASSIFICATION		P
6.1	Protection against electric shock: Class 0, 0I, I, II, III	Class III , battery-powered robotic lawnmower	P
	For a class III construction with a detachable power supply part the appliance is classified according to the detachable power supply part		N/A
6.2	Protection against harmful ingress of water	IPX6 for machine and docking station, IPX7 for RTK reference station	P
7	MARKING AND INSTRUCTIONS		P
7.1	Rated voltage or voltage range (V)	DC 21.6V	P
	Symbol for nature of supply, or	---	P
	Rated frequency (Hz)		N/A
	Rated power input (W), or		P
	Rated current (A)		P
	Manufacturer's or responsible vendor's name, trademark or identification mark	See rating labels	P
	Model or type reference	See rating labels	P
	Symbol IEC 60417-5172, for class II appliances		N/A
	IP number, other than IPX0.....	Refer to label	P
	Symbol IEC 60417-5180, for class III appliances, unless		P
	the appliance is operated by batteries only, or		P
	for appliances powered by rechargeable batteries recharged in the appliance		P
	Symbol IEC 60417-5018, for class II and class III appliances incorporating a functional earth		N/A
	Symbol IEC 60417-5036, for the enclosure of electrically-operated water valves in external hose-sets for connection of an appliance to the water mains, if the working voltage exceeds extra-low voltage		N/A
7.2	Warning for stationary appliances for multiple supply		N/A
	Warning placed in vicinity of terminal cover		N/A
7.3	Range of rated values marked with the lower and upper limits separated by a hyphen		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Different rated values marked with the values separated by an oblique stroke		N/A
7.4	Appliances adjustable for different rated voltages or rated frequencies, the voltage or the frequency setting is clearly discernible		N/A
	Requirement met if frequent changes are not required and the rated voltage or rated frequency to which the appliance is to be adjusted is determined from a wiring diagram		N/A
7.5	Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless		N/A
	the power input or current are related to the arithmetic mean value of the rated voltage range		N/A
	Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear		N/A
7.6	Correct symbols used		P
	Symbol for nature of supply placed next to rated voltage		P
	Symbol for class II appliances placed unlikely to be confused with other marking		N/A
	Units of physical quantities and their symbols according to international standardized system		N/A
7.7	Connection diagram fixed to appliances to be connected to more than two supply conductors and appliances for multiple supply, unless		N/A
	correct mode of connection is obvious		N/A
7.8	Except for type Z attachment, terminals for connection to the supply mains indicated as follows:		N/A
	- marking of terminals exclusively for the neutral conductor (letter N)		N/A
	- marking of protective earthing terminals (symbol IEC 60417-5019)		N/A
	- marking of functional earthing terminals (symbol IEC 60417-5018)		N/A
	- marking not placed on removable parts		N/A
7.9	Marking or placing of switches which may cause a hazard		P
7.10	Indications of switches on stationary appliances and controls on all appliances by use of figures, letters or other visual means		P

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	This applies also to switches which are part of a control		N/A
	If figures are used, the off position indicated by the figure 0		N/A
	The figure 0 indicates only OFF position, unless no confusion with the OFF position		P
7.11	Indication for direction of adjustment of controls	For the cutting height adjustment and control panel.	P
7.12	Instructions for safe use provided		P
	Details concerning precautions during user maintenance		P
	The instructions state that:		P
	- the appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction	Replacement by EN group difference	N/A
	- children being supervised not to play with the appliance	Replacement by EN group difference	N/A
	For a part of class III construction supplied from a detachable power supply unit, the instructions state that the appliance is only to be used with the unit provided		N/A
	Instructions for class III appliances state that it must only be supplied at SELV, unless		N/A
	it is a battery-operated appliance, the battery being charged outside the appliance		P
	For appliances for altitudes exceeding 2000 m, the maximum altitude is stated..... :		N/A
	The instructions for appliances incorporating a functional earth states that the appliance incorporates an earth connection for functional purposes only		N/A
7.12.1	Sufficient details for installation supplied		N/A
	For an appliance intended to be permanently connected to the water mains and not connected by a hose-set, this is stated		N/A
	If different rated voltages or different rated frequencies are marked, the instructions state what action to be taken to adjust the appliance		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
7.12.2	Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules		N/A
7.12.3	Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions state that the fixed wiring must be protected		N/A
7.12.4	Instructions for built-in appliances:		N/A
	- dimensions of space		N/A
	- dimensions and position of supporting and fixing		N/A
	- minimum distances between parts and surrounding structure		N/A
	- minimum dimensions of ventilating openings and arrangement		N/A
	- connection to supply mains and interconnection of separate components		N/A
	- allow disconnection of the appliance after installation, by accessible plug or a switch in the fixed wiring, unless		N/A
	a switch complying with 24.3		N/A
7.12.5	Replacement cord instructions, type X attachment with a specially prepared cord		N/A
	Replacement cord instructions, type Y attachment		N/A
	Replacement cord instructions, type Z attachment		N/A
7.12.6	Caution in the instructions for appliances incorporating a non-self-resetting thermal cut-out that is reset by disconnection of the supply mains, if this cut-out is required to comply with the standard		N/A
7.12.7	Instructions for fixed appliances stating how the appliance is to be fixed		N/A
7.12.8	Instructions for appliances connected to the water mains:		N/A
	- max. inlet water pressure (Pa) :		N/A
	- min. inlet water pressure, if necessary (Pa) :		N/A
	Instructions concerning new and old hose-sets for appliances connected to the water mains by detachable hose-sets		N/A
7.12.9	Instructions specified in 7.12 and from 7.12.1 to 7.12.8 appear together before any other instructions supplied with the appliance		P

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	These instructions may be supplied with the appliance separately from any functional use booklet		P
	They may follow the description of the appliance that identifies parts, or follow the drawings/sketches		P
	In addition, instructions are also available in an alternative format such as on a website or on request from the user in a format such as a DVD		N/A
	In addition, instructions are also available in an alternative format such as on a website or in a format such as a DVD		N/A
7.13	Instructions and other texts in an official language	ENG manual checked.	P
7.14	Markings clearly legible and durable:		P
	Signal words WARNING, CAUTION, DANGER in uppercase having a height as specified		P
	Uppercase letter of the text explaining the signal word not smaller than 1,6 mm		P
	Moulded in, engraved, or stamped markings either raised above or have a depth below the surface of at least 0,25 mm, unless		N/A
	contrasting colours are used		P
	Markings checked by inspection, measurement and rubbing test as specified		P
7.15	Markings on a main part		P
	Marking clearly discernible from the outside, if necessary after removal of a cover		P
	For portable appliances, cover can be removed or opened without a tool		N/A
	For stationary appliances, name, trademark or identification mark and model or type reference visible after installation		N/A
	For fixed appliances, name, trademark or identification mark and model or type reference visible after installation according to the instructions		N/A
	Indications for switches and controls placed on or near the components. Marking not on parts which can be positioned or repositioned in such a way that the marking is misleading		P
	The symbol IEC 60417-5018 placed next to the symbol IEC 60417-5172 or IEC 60417-5180		N/A
7.16	Marking of a possible replaceable thermal link or fuse link clearly visible with regard to replacing the link		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
8	PROTECTION AGAINST ACCESS TO LIVE PARTS		P
8.1	Adequate protection against accidental contact with live parts	Class III, battery-powered robotic lawnmower	N/A
8.1.1	Requirement applies for all positions, detachable parts removed		N/A
	Lamps behind a detachable cover not removed, if conditions met	No such device	N/A
	Insertion or removal of lamps, protection against contact with live parts of the lamp cap		N/A
	Use of test probe B of IEC 61032, with a force not exceeding 1 N: no contact with live parts		N/A
	Use of test probe B of IEC 61032 through openings, with a force of 20N: no contact with live parts		N/A
8.1.2	Use of test probe 13 of IEC 61032, with a force not exceeding 1 N, through openings in class 0 appliances and class II appliances/constructions: no contact with live parts		N/A
	Test probe 13 also applied through openings in earthed metal enclosures having a non-conductive coating: no contact with live parts		N/A
8.1.3	For appliances other than class II, use of test probe 41 of IEC 61032, with a force not exceeding 1 N: no contact with live parts of visible glowing heating elements or supporting parts		N/A
	For a single switching action obtained by a switching device, requirements as specified		N/A
	For appliances with a supply cord and without a switching device, the single switching action may be obtained by the withdrawal of the plug		N/A
8.1.4	Accessible part not considered live if:		P
	- safety extra-low a.c. voltage: peak value not exceeding 42.4 V		N/A
	- safety extra-low d.c. voltage: not exceeding 42.4 V		P
	- or separated from live parts by protective impedance		N/A
	If protective impedance: d.c. current not exceeding 2 mA, and		N/A
	a.c. peak value not exceeding 0.7 mA		N/A
	- for peak values over 42.4 V up to and including 450 V, capacitance not exceeding 0,1 μ F		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- for peak values over 450 V up to and including 15 kV, discharge not exceeding 45 μ C		N/A
	- for peak values over 15kV, the energy in the discharge not exceeding 350 mJ		N/A
8.1.5	Live parts protected at least by basic insulation before installation or assembly:		N/A
	- built-in appliances		N/A
	- fixed appliances		N/A
	- appliances delivered in separate units		N/A
8.2	Class II appliances and constructions constructed so that there is adequate protection against accidental contact with basic insulation and metal parts separated from live parts by basic insulation only		N/A
	Only possible to touch parts separated from live parts by double or reinforced insulation		N/A
9	STARTING OF MOTOR-OPERATED APPLIANCES		N/A
	Requirements and tests are specified in part 2 when necessary		N/A
10	POWER INPUT AND CURRENT		N/A
10.1	Power input at normal operating temperature, rated voltage and normal operation not deviating from rated power input by more than shown in table 1 :	(see appended table)	N/A
	If the power input varies throughout the operating cycle and the maximum value of the power input exceeds, by a factor greater than two, the arithmetic mean value of the power input occurring during a representative period, the power input is the maximum value that is exceeded for more than 10 % of the representative period		N/A
	Otherwise the power input is the arithmetic mean value		N/A
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N/A
	the rated power input is related to the arithmetic mean value		N/A
10.2	Current at normal operating temperature, rated voltage and normal operation not deviating from rated current by more than shown in table 2..... :	(see appended table)	N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If the current varies throughout the operating cycle and the maximum value of the current exceeds, by a factor greater than two, the arithmetic mean value of the current occurring during a representative period, the current is the maximum value that is exceeded for more than 10 % of the representative period		N/A
	Otherwise the current is the arithmetic mean value		N/A
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N/A
	the rated current is related to the arithmetic mean value of the range		N/A
11	HEATING		P
11.1	No excessive temperatures in normal use		P
11.2	The appliance is held, placed or fixed in position as described		P
11.3	Temperature rises, other than of windings, determined by thermocouples		P
	Temperature rises of windings determined by resistance method, unless		N/A
	the windings are non-uniform or it is difficult to make the necessary connections		P
11.4	Heating appliances operated under normal operation at 1.15 times rated power input (W) :		N/A
11.5	Motor-operated appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage (V)		N/A
11.6	Combined appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage (V)		N/A
11.7	Operation duration corresponding to the most unfavourable conditions of normal use		P
11.8	Temperature rises monitored continuously and not exceeding the values in table 3	(see appended table)	P
	If the temperature rise of a motor winding exceeds the value of table 3, or		N/A
	if there is doubt with regard to classification of insulation,		N/A
	tests of Annex C are carried out		N/A
	Sealing compound does not flow out		P
	Protective devices do not operate, except		P

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	components in protective electronic circuits tested for the number of cycles specified in 24.1.4		N/A
13	LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE		N/A
13.1	Leakage current not excessive and electric strength adequate	Not applicable for battery operate appliance.	N/A
	Heating appliances operated at 1.15 times the rated power input (W)..... :		N/A
	Motor-operated appliances and combined appliances supplied at 1.06 times the rated voltage (V)..... :		N/A
	Protective impedance and radio interference filters disconnected before carrying out the tests		N/A
13.2	The leakage current is measured by means of the circuit described in Figure 4 of IEC 60990:1999		N/A
	For class 0I appliances and class I appliances, except parts of class II construction, C may be replaced by a low impedance ammeter		N/A
	Leakage current measurements :	(see appended table)	N/A
13.3	The appliance is disconnected from the supply		N/A
	Electric strength tests according to table 4 :	(see appended table)	N/A
	No breakdown during the tests		N/A
14	TRANSIENT OVERVOLTAGES		N/A
	Appliances withstand the transient over-voltages to which they may be subjected		N/A
	Clearances having a value less than specified in table 16 subjected to an impulse voltage test, the test voltage specified in table 6 :	(see appended table)	N/A
	No flashover during the test, unless		N/A
	of functional insulation if the appliance complies with clause 19 with the clearance short-circuited		N/A
15	MOISTURE RESISTANCE		P
15.1	Enclosure provides the degree of moisture protection according to classification of the appliance		P
	Compliance checked as specified in 15.1.1, taking into account 15.1.2, followed by the electric strength test of 16.3		P
	No trace of water on insulation which can result in a reduction of clearances or creepage distances below values specified in clause 29		P

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Clause	Requirement + Test	Result - Remark	Verdict
15.1.1	Appliances, other than IPX0, subjected to tests as specified in IEC 60529	IPX6 and IPX7 according to IEC 60529 tested.	P
	Water valves containing live parts in external hoses for connection of an appliance to the water mains tested as specified for IPX7 appliances		N/A
15.1.2	Hand-held appliance turned continuously through the most unfavourable positions during the test	IPX6 and IPX7 according to IEC 60529 tested.	N/A
	Built-in appliances installed according to the instructions		N/A
	Appliances placed or used on the floor or table placed on a horizontal unperforated support		N/A
	Appliances normally fixed to a wall and appliances with pins for insertion into socket-outlets are mounted on a wooden board		N/A
	For IPX3 appliances, the base of wall mounted appliances is placed at the same level as the pivot axis of the oscillating tube		N/A
	For IPX4 appliances, the horizontal centre line of the appliance is aligned with the pivot axis of the oscillating tube, and		N/A
	for appliances normally used on the floor or table, the movement is limited to two times 90° for a period of 5 min, the support being placed at the level of the pivot axis of the oscillating tube		N/A
	Wall-mounted appliances, take into account the distance to the floor stated in the instructions		N/A
	Appliances normally fixed to a ceiling are mounted underneath a horizontal unperforated support, the pivot axis of the oscillating tube located at the level of the underside of the support, and		N/A
	for IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min		N/A
	Appliances with type X attachment fitted with a flexible cord as described		N/A
	Detachable parts subjected to the relevant treatment with the main part		P
	However, if a part has to be removed for user maintenance and a tool is needed, this part is not removed		N/A
15.2	Spillage of liquid does not affect the electrical insulation		N/A
	Spillage solution comprising water containing approximately 1 % NaCl and 0,6 % rinsing agent		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Appliances with type X attachment fitted with a flexible cord as described		N/A
	Appliances incorporating an appliance inlet tested with or without an connector, whichever is most unfavourable		N/A
	Detachable parts are removed		N/A
	Overfilling test with additional amount of the solution, over a period of 1 min (l) :		N/A
	The appliance withstands the electric strength test of 16.3		N/A
	No trace of water on insulation that can result in a reduction of clearances or creepage distances below values specified in clause 29		N/A
15.3	Appliances proof against humid conditions	25°C, 93%	P
	Checked by test Cab: Damp heat steady state in IEC 60068-2-78		P
	Detachable parts removed and subjected, if necessary, to the humidity test with the main part		P
	Humidity test for 48 h in a humidity cabinet		P
	Reassembly of those parts that may have been removed		N/A
	The appliance withstands the tests of clause 16		N/A
16	LEAKAGE CURRENT AND ELECTRIC STRENGTH		N/A
16.1	Leakage current not excessive and electric strength adequate	Not applicable for class III appliance	N/A
	Protective impedance disconnected from live parts before carrying out the tests		N/A
	Tests carried out at room temperature and not connected to the supply		N/A
16.2	Single-phase appliances: test voltage 1.06 times rated voltage (V) :		N/A
	Three-phase appliances: test voltage 1.06 times rated voltage divided by $\sqrt{3}$ (V) :		N/A
	Leakage current measurements :	(see appended table)	N/A
	Limit values doubled if:		N/A
	- all controls have an off position in all poles, or		N/A
	- the appliance has no control other than a thermal cut-out, or		N/A
	- all thermostats, temperature limiters and energy regulators do not have an off position, or		N/A
	- the appliance has radio interference filters		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	With the radio interference filters disconnected, the leakage current do not exceed limits specified:	(see appended table)	N/A
16.3	Electric strength tests according to table 7 :	(see appended table)	N/A
	Test voltage applied between the supply cord and inlet bushing and cord guard and cord anchorage as specified..... :	(see appended table)	N/A
	No breakdown during the tests		N/A
17	OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS		N/A
	No excessive temperatures in transformer or associated circuits in event of short-circuits likely to occur in normal use :	(see appended table)	N/A
	Appliance supplied with 1.06 or 0.94 times rated voltage under the most unfavourable short-circuit or overload likely to occur in normal use (V) :		N/A
	Basic insulation is not short-circuited		N/A
	Temperature rise of insulation of the conductors of safety extra-low voltage circuits not exceeding the relevant value specified in table 3 by more than 15 K		N/A
	Temperature of the winding not exceeding the value specified in table 8		N/A
	However, limits do not apply to fail-safe transformers complying with sub-clause 15.5 of IEC 61558-1		N/A
18	ENDURANCE		N/A
	Requirements and tests are specified in part 2 when necessary	Not applicable in EN 50636-2-107 for class III battery-lawnmower	N/A
19	ABNORMAL OPERATION		P
19.1	The risk of fire, mechanical damage or electric shock under abnormal or careless operation obviated		P
	Electronic circuits so designed and applied that a fault will not render the appliance unsafe :	(see appended table)	P
	Appliances incorporating heating elements subjected to the tests of 19.2 and 19.3, and	No such device.	N/A
	if the appliance also has a control that limit the temperature during clause 11 it is subjected to the test of 19.4, and		N/A
	if applicable, to the test of 19.5		N/A
	Appliances incorporating PTC heating elements are also subjected to the test of 19.6		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Appliances incorporating motors subjected to the tests of 19.7 to 19.10, as applicable	Test according to 19.7.	P
	Appliances incorporating electronic circuits subjected to the tests of 19.11 and 19.12, as applicable		P
	Appliances incorporating contactors or relays subjected to the test of 19.14, being carried out before the tests of 19.11		N/A
	Appliances incorporating voltage selector switches subjected to the test of 19.15		N/A
	Unless otherwise specified, the tests are continued until a non-self-resetting thermal cut-out operates, or		N/A
	until steady conditions are established		N/A
	If a heating element or intentionally weak part becomes open-circuited, the relevant test is repeated on a second sample		N/A
19.2	Test of appliances with heating elements with restricted heat dissipation; test voltage (V), power input of 0.85 times rated power input (W)		N/A
19.3	Test of 19.2 repeated; test voltage (V), power input of 1.24 times rated power input (W)		N/A
19.4	Test conditions as in clause 11, any control limiting the temperature during tests of clause 11 short-circuited		N/A
19.5	Test of 19.4 repeated on Class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the sheath		N/A
	The test repeated with reversed polarity and the other end of the heating element connected to the sheath		N/A
	The test is not carried out on appliances intended to be permanently connected to fixed wiring and on appliances where an all-pole disconnection occurs during the test of 19.4		N/A
19.6	Appliances with PTC heating elements tested at rated voltage, establishing steady conditions		N/A
	The working voltage of the PTC heating element is increased by 5% and the appliance is operated until steady conditions are re-established. The voltage is then increased in similar steps until 1.5 times working voltage or until the PTC heating element ruptures (V).....		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
19.7	Stalling test by locking the rotor if the locked rotor torque is smaller than the full load torque, or		P
	locking moving parts of other appliances		P
	Locked rotor, capacitors open-circuited one at a time		N/A
	Test repeated with capacitors short-circuited one at a time, unless		N/A
	the capacitor is of class S2 or S3 of IEC 60252-1		N/A
	Appliances with timer or programmer supplied with rated voltage for each of the tests, for a period equal to the maximum period allowed..... :		N/A
	An electronic timer or programmer that operates to ensure compliance with the test before the maximum period under the conditions of Clause 11 is reached, is a protective electronic circuit		N/A
	Other appliances supplied with rated voltage for a period as specified		N/A
	Winding temperatures not exceeding values specified in table 8..... :	(see appended table)	P
19.8	Multi-phase motors operated at rated voltage with one phase disconnected		N/A
19.9	Running overload test on appliances incorporating motors intended to be remotely or automatically controlled or liable to be operated continuously		N/A
	Motor-operated and combined appliances for which 30.2.3 is applicable and that use overload protective devices relying on electronic circuits to protect the motor windings, are also subjected to the test		N/A
	Winding temperatures not exceeding values as specified	(see appended table)	N/A
19.10	Series motor operated at 1.3 times rated voltage for 1 min (V)		N/A
	During the test, parts not being ejected from the appliance		N/A
19.11	Electronic circuits, compliance checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless		P
	they comply with the conditions specified in 19.11.1		N/A
	Appliances incorporating an electronic circuit that relies upon a programmable component to function correctly, subjected to the test of 19.11.4.8, unless		N/A
	restarting does not result in a hazard		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Appliances having a device with an off position obtained by electronic disconnection, or a device placing the appliance in a stand-by mode, subjected to the tests of 19.11.4		N/A
	If the safety of the appliance under any of the fault conditions depends on the operation of a miniature fuse-link complying with IEC 60127, the test of 19.12 is carried out		N/A
	During and after each test the following is checked:		P
	- the temperature of the windings do not exceed the values specified in table 8		N/A
	- the appliance complies with the conditions specified in 19.13		P
	- any current flowing through protective impedance not exceeding the limits specified in 8.1.4		N/A
	If a conductor of a printed board becomes open-circuited, the appliance is considered to have withstood the particular test, provided both of the following conditions are met:		N/A
	- the base material of the printed circuit board withstands the test of Annex E		N/A
	- any loosened conductor does not reduce clearance or creepage distances between live parts and accessible metal parts below the values specified in clause 29		N/A
19.11.1	Fault conditions a) to g) in 19.11.2 are not applied to circuits or parts of circuits meeting both of the following conditions:		N/A
	- the electronic circuit is a low-power circuit, that is, the maximum power at low-power points does not exceed 15 W according to the tests specified	19.11.2 tested	N/A
	- the protection against electric shock, fire hazard, mechanical hazard or dangerous malfunction of other parts of the appliance does not rely on the correct functioning of the electronic circuit	19.11.2 tested and the functional safety of protective electronic circuit has been evaluated.	N/A
19.11.2	Fault conditions applied one at a time, the appliance operating under conditions specified in clause 11, but supplied at rated voltage, duration of the tests as specified:		P
	a) short circuit of functional insulation if clearances or creepage distances are less than the values specified in clause 29	The functional insulation fulfil the requirements of 29	N/A
	b) open circuit at the terminals of any component		P
	c) short circuit of capacitors, unless		P
	they comply with IEC 60384-14		N/A
	d) short circuit of any two terminals of an electronic component, other than integrated circuits		P

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Clause	Requirement + Test	Result - Remark	Verdict
	This fault condition is not applied between the two circuits of an optocoupler		P
	e) failure of triacs in the diode mode		P
	f) failure of microprocessors and integrated circuits		P
	g) failure of an electronic power switching device		N/A
	Each low power circuit is short-circuited by connecting the low-power point to the pole of the supply source from which the measurements were made		N/A
19.11.3	If the appliance incorporates a protective electronic circuit that operates to ensure compliance with clause 19, the appliance is tested as specified	Refer to 19.7	P
19.11.4	Appliances having a device with an off position obtained by electronic disconnection, or		P
	a device that can be placed in the stand-by mode,		P
	subjected to the tests of 19.11.4.1 to 19.11.4.7, the device being set in the off position or in the stand-by mode		P
	Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 to 19.11.4.7, the tests being carried out after the protective electronic circuit has operated, except that		P
	appliances operated for 30 s or 5 min during the test of 19.7 are not subjected to the tests for electromagnetic phenomena.		N/A
	Surge protective devices disconnected, unless		N/A
	They incorporate spark gaps		N/A
19.11.4.1	The appliance is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4	Tested and OK	P
19.11.4.2	The appliance is subjected to radiated fields in accordance with IEC 61000-4-3, at frequency ranges specified	Tested and OK	P
19.11.4.3	The appliance is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 or 4 as specified		N/A
19.11.4.4	The power supply terminals of the appliance subjected to voltage surges in accordance with IEC 61000-4-5, test level 3 or 4 as specified		N/A
	An open circuit test voltage of 2 kV is applicable for the line-to-line coupling mode		N/A
	An open circuit test voltage of 4 kV is applicable for the line-to-earth coupling		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Earthed heating elements in class I appliances disconnected		N/A
19.11.4.5	The appliance is subjected to injected currents in accordance with IEC 61000-4-6, test level 3		N/A
19.11.4.6	Appliances having a rated current not exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-11		N/A
	Appliances having a rated current exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-34		N/A
19.11.4.7	The appliance is subjected to mains signals in accordance with IEC 61000-4-13, test level class 2		N/A
19.11.4.8	The appliance is supplied at rated voltage and operated under normal operation. After 60s the power supply is reduced to a level such that the appliance ceases to respond or parts controlled by the programmable component cease to operate		N/A
	The appliance continues to operate normally, or		N/A
	requires a manual operation to restart		N/A
19.12	If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); rated current of the fuse-link (A)..... :		N/A
19.13	During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts		P
	Temperature rises not exceeding the values shown in table 9..... :	(see appended table)	N/A
	Compliance with clause 8 not impaired		N/A
	If the appliance can still be operated it complies with 20.2		P
	Insulation, other than of class III appliances or class III constructions that do not contain live parts, withstands the electric strength test of 16.3, the test voltage as specified in table 4:		N/A
	- basic insulation (V)..... :		N/A
	- supplementary insulation (V)..... :		N/A
	- reinforced insulation (V)..... :		N/A
	After operation or interruption of a control, clearances and creepage distances across the functional insulation withstand the electric strength test of 16.3, the test voltage being twice the working voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The appliance does not undergo a dangerous malfunction, and		P
	no failure of protective electronic circuits, if the appliance is still operable		P
	Appliances tested with an electronic switch in the off position, or in the stand-by mode:		P
	- do not become operational, or		P
	- if they become operational, do not result in a dangerous malfunction during or after the tests of 19.11.4		P
	If the appliance contains lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that:		N/A
	- the lid or door does not move automatically to an open position when the interlock is released, and		N/A
	- the appliance does not start after the cycle in which the interlock was released		N/A
19.14	Appliances operated under the conditions of clause 11, any contactor or relay contact operating under the conditions of clause 11 being short-circuited	No such device	N/A
	For a relay or contactor with more than one contact, all contacts are short-circuited at the same time		N/A
	A relay or contactor operating only to ensure the appliance is energized for normal use is not short-circuited		N/A
	If more than one relay or contactor operates in clause 11, they are short-circuited in turn		N/A
19.15	For appliances with a mains voltage selector switch, the switch is set to the lowest rated voltage position and the highest value of rated voltage is applied	No such device	N/A
20	STABILITY AND MECHANICAL HAZARDS		P
20.1	Appliances having adequate stability		P
	Tilting test through an angle of 10°, appliance placed on an inclined plane/horizontal support, not connected to the supply mains; appliance does not overturn	Tested and OK.	P
	Tilting test repeated on appliances with heating elements, angle of inclination increased to 15°		N/A
	Possible heating test in overturned position; temperature rise does not exceed values shown in table 9		N/A
20.2	Moving parts adequately arranged or enclosed as to provide protection against personal injury	Replaced by EN 50636-2-107	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Protective enclosures, guards and similar parts are non-detachable, and		N/A
	have adequate mechanical strength		N/A
	Enclosures that can be opened by overriding an interlock are considered to be detachable parts		N/A
	Self-resetting thermal cut-outs and overcurrent protective devices not causing a hazard by unexpected closure		N/A
	Not possible to touch dangerous moving parts with the test probe described		N/A
21	MECHANICAL STRENGTH		P
21.1	Appliance has adequate mechanical strength and is constructed as to withstand rough handling		P
	Checked by applying 3 blows to every point of the enclosure like to be weak, in accordance with test Ehb of IEC 60068-2-75, spring hammer test, with an impact energy of 0,5 J	Refer to part 2. The enclosure, manual stop & guard were tested with 1J	P
	The appliance shows no damage impairing compliance with this standard, and		P
	compliance with 8.1, 15.1 and clause 29 not impaired		P
	If doubt, supplementary or reinforced insulation subjected to the electric strength test of 16.3		N/A
	If necessary, repetition of groups of three blows on a new sample		N/A
21.2	Accessible parts of solid insulation having strength to prevent penetration by sharp implements		N/A
	Test not applicable if the thickness of supplementary insulation is at least 1 mm and reinforced insulation at least 2 mm		N/A
	The insulation is tested as specified, and does withstand the electric strength test of 16.3		N/A
22	CONSTRUCTION		P
22.1	Appliance marked with the first numeral of the IP system, relevant requirements of IEC 60529 are fulfilled		P
22.2	Stationary appliance: means to ensure all-pole disconnection from the supply being provided:		N/A
	- a supply cord fitted with a plug, or		N/A
	- a switch complying with 24.3, or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- a statement in the instruction sheet that a disconnection incorporated in the fixed wiring is to be provided, or		N/A
	- an appliance inlet		N/A
	Single-pole switches and single-pole protective devices for the disconnection of heating elements in single-phase, permanently connected class 01 and class I appliances, connected to the phase conductor		N/A
22.3	Appliance provided with pins: no undue strain on socket-outlets		N/A
	Applied torque not exceeding 0.25 Nm		N/A
	Pull force of 50N to each pin after the appliance has being placed in the heating cabinet; when cooled to room temperature the pins are not displaced by more than 1mm		N/A
	Each pin subjected to a torque of 0.4Nm; the pins are not rotating, unless		N/A
	rotating does not impair compliance with this standard		N/A
22.4	Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets		N/A
22.5	No risk of electric shock when touching pins, for appliances having a capacitor with rated capacitance equal to or greater than 0,1 μ F, the appliance being disconnected from the supply at the instant of voltage peak		N/A
	Voltage not exceeding 34 V (V)..... :		N/A
	If compliance relies on the operation of an electronic circuit, the electromagnetic phenomena tests of 19.11.4.3 and 19.11.4.4 are applied		N/A
	The discharge test is then repeated three times, voltage not exceeding 34 V (V) :		N/A
22.6	Electrical insulation not affected by condensing water or leaking liquid		N/A
	Electrical insulation of Class II appliances not affected if a hose ruptures or seal leaks		N/A
	In case of doubt, test as described		N/A
22.7	Adequate safeguards against the risk of excessive pressure in appliances containing liquid or gases or having steam-producing devices		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
22.8	Electrical connections not subject to pulling during cleaning of compartments to which access can be gained without the aid of a tool, and that are likely to be cleaned in normal use		N/A
22.9	Insulation, internal wiring, windings, commutators and slip rings not exposed to oil, grease or similar substances, unless		N/A
	the substance has adequate insulating properties		N/A
22.10	Not possible to reset voltage-maintained non-self-resetting thermal cut-outs by the operation of an automatic switching device incorporated within the appliance, if:		N/A
	- a non-self-resetting thermal cut-out is required by the standard, and		N/A
	- a voltage maintained non-self-resetting thermal cut-out is used to meet it		N/A
	Non-self-resetting thermal motor protectors have a trip-free action, unless		N/A
	they are voltage maintained		N/A
	Reset buttons of non-self-resetting controls so located or protected that accidental resetting is unlikely		N/A
22.11	Reliable fixing of non-detachable parts that provide the necessary degree of protection against electric shock, moisture or contact with moving parts		N/A
	Obvious locked position of snap-in devices used for fixing such parts		N/A
	No deterioration of the fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing		N/A
	Tests as described		N/A
22.12	Handles, knobs etc. fixed in a reliable manner, if loosening result in a hazard		P
	Removing or fixing in wrong position of handles, knobs etc. indicating position of switches or similar components not possible, if resulting in a hazard		P
	A choking hazard does not apply to appliances for commercial use		N/A
	Axial force 15 N applied to parts, the shape being so that an axial pull is unlikely to be applied		P
	Axial force 30 N applied to parts, the shape being so that an axial pull is likely to be applied		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If the part is removed and can be contained within the small parts cylinder, it is considered to be a choking hazard		N/A
22.13	Unlikely that handles, when gripped as in normal use, make the operator's hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only		P
22.14	No ragged or sharp edges creating a hazard for the user in normal use, or during user maintenance		P
	No exposed pointed ends of self-tapping screws or other fasteners, likely to be touched by the user in normal use or during user maintenance		P
22.15	Storage hooks and the like for flexible cords smooth and well rounded		P
22.16	Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductors strands and no undue wear of contacts	No such cord reels.	N/A
	Cord reel tested with 6000 operations, as specified		N/A
	Electric strength test of 16.3, voltage of 1000 V applied		N/A
22.17	Spacers not removable from the outside by hand or by means of a screwdriver or a spanner		N/A
22.18	Current-carrying parts and other metal parts resistant to corrosion		P
22.19	Driving belts not relied upon to provide the required level of insulation, unless		N/A
	constructed to prevent inappropriate replacement		N/A
22.20	Direct contact between live parts and thermal insulation effectively prevented, unless		N/A
	material used is non-corrosive, non-hygroscopic and non-combustible		N/A
22.21	Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless		P
	impregnated		N/A
	This requirement does not apply to magnesium oxide and mineral ceramic fibres used for the electrical insulation of heating elements		N/A
22.22	Appliances not containing asbestos	No such material	P
22.23	Oils containing polychlorinated biphenyl (PCB) not used		P

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Clause	Requirement + Test	Result - Remark	Verdict
22.24	Bare heating elements, except in class III appliances or class III constructions that do not contain live parts, adequately supported		N/A
	In case of rupture, the heating conductor is unlikely to come in contact with accessible metal parts		N/A
22.25	Sagging heating conductors, except in class III appliances or class III constructions that do not contain live parts, cannot come into contact with accessible metal parts		N/A
22.26	For class III constructions the insulation between parts operating at safety extra-low voltage and other live parts complies with the requirements for double or reinforced insulation		N/A
22.27	Parts connected by protective impedance separated by double or reinforced insulation	No such components	N/A
22.28	Metal parts of Class II appliances conductively connected to gas pipes or in contact with water, separated from live parts by double or reinforced insulation	No such metal parts	N/A
22.29	Class II appliances permanently connected to fixed wiring so constructed that the required degree of access to live parts is maintained after installation		N/A
22.30	Parts serving as supplementary or reinforced insulation fixed so that they cannot be removed without being seriously damaged, or		N/A
	so constructed that they cannot be replaced in an incorrect position, and so that if they are omitted, the appliance is rendered inoperable or manifestly incomplete		N/A
22.31	Neither clearances nor creepage distances over supplementary and reinforced insulation reduced below values specified in clause 29 as a result of wear		N/A
	Neither clearances nor creepage distances between live parts and accessible parts reduced below values for supplementary insulation if wires, screws etc. become loose		N/A
22.32	Supplementary and reinforced insulation constructed or protected against pollution so that clearances or creepage distances are not reduced below the values in clause 29		N/A
	Supplementary insulation of natural or synthetic rubber resistant to ageing, or arranged and dimensioned so that creepage distances are not reduced below values specified in 29.2		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Ceramic material not tightly sintered, similar materials or beads alone not used as supplementary or reinforced insulation		N/A
	Ceramic and similar porous material in which heating conductors are embedded is considered to be basic insulation, not reinforced insulation		N/A
	Oxygen bomb test at 70 °C for 96 h and 16 h at room temperature		N/A
22.33	Conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts are not in direct contact with live parts, or	Class III, battery-powered lawnmower	N/A
	unearthed metal parts separated from live parts by basic insulation only		N/A
	Electrodes not used for heating liquids		N/A
	For class II constructions, conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts, not in direct contact with basic or reinforced insulation, unless		N/A
	the reinforced insulation consists of at least 3 layers		N/A
	For class II constructions, conductive liquids which are in contact with live parts, not in direct contact with reinforced insulation, unless		N/A
	the reinforced insulation consists of at least 3 layers		N/A
	An air layer not used as basic or supplementary insulation in a double insulation system if likely to be bridged by leaking liquid		N/A
22.34	Shafts of operating knobs, handles, levers etc. not live, unless		N/A
	the shaft is not accessible when the part is removed		N/A
22.35	For other than class III constructions, handles, levers and knobs, held or actuated in normal use, not becoming live in the event of a failure of basic insulation		P
	Such parts being of metal, and their shafts or fixings are likely to become live in the event of a failure of basic insulation, are either adequately covered by insulation material or their accessible parts are separated from their shafts or fixings by supplementary insulation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	This requirement does not apply to handles, levers and knobs on stationary appliances and cordless appliances, other than those of electrical components, provided they are reliably connected to an earthing terminal or earthing contact, or separated from live parts by earthed metal		N/A
	Insulating material covering metal handles, levers and knobs withstand the electric strength test of 16.3 for supplementary insulation		N/A
22.36	For appliances other than class III, handles continuously held in the hand in normal use so constructed that when gripped as in normal use, the operators hand is not likely to touch metal parts, unless	Class III, battery-powered lawnmower	N/A
	they are separated from live parts by double or reinforced insulation		N/A
22.37	Capacitors in Class II appliances not connected to accessible metal parts and their casings, if of metal, separated from accessible metal parts by supplementary insulation, unless	Class III, battery-powered lawnmower	N/A
	the capacitors comply with 22.42		N/A
22.38	Capacitors not connected between the contacts of a thermal cut-out		N/A
22.39	Lamp holders used only for the connection of lamps		N/A
22.40	Motor-operated appliances and combined appliances intended to be moved while in operation, or having accessible moving parts, fitted with a switch to control the motor. The actuating member of the switch being easily visible and accessible		P
	If the appliance cannot operate continuously, automatically or remotely without giving rise to a hazard, appliances for remote operation being fitted with a switch for stopping the operation. The actuating member of the switch being easily visible and accessible		N/A
22.41	No components, other than lamps, containing mercury		P
22.42	Protective impedance consisting of at least two separate components	In power supply.	P
	Values specified in 8.1.4 not exceeded if any one of the components are short-circuited or open-circuited		N/A
	Resistors checked by the test of 14.1 a) in IEC 60065		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Capacitors checked by the tests for class Y capacitors in IEC 60384-14		N/A
22.43	Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur		N/A
22.44	Appliances not having an enclosure that is shaped or decorated like a toy	Not like a toy.	P
22.45	When air is used as reinforced insulation, clearances not reduced below the values specified in 29.1.3 due to deformation as a result of an external force applied to the enclosure	Class III, battery-powered lawnmower	N/A
22.46	For programmable protective electronic circuits used to ensure compliance with the standard, the software contains measures to control the fault/error conditions in table R.1	The functional safety of programmable protective electronic circuits has been evaluated.	P
	Software that contains measures to control the fault/error conditions specified in table R.2 is to be specified in parts 2 for particular constructions or to address specific hazards		P
	These requirements are not applicable to software used for functional purpose or compliance with clause 11		N/A
22.47	Appliances connected to the water mains withstand the water pressure expected in normal use		N/A
	No leakage from any part, including any inlet water hose		N/A
22.48	Appliances connected to the water mains constructed to prevent backsiphonage of non-potable water		N/A
22.49	For remote operation, the duration of operation is to be set before the appliance can be started, unless	Refer to part 2.	P
	the appliance switches off automatically or can operate continuously without hazard		P
22.50	Controls incorporated in the appliance take priority over controls actuated by remote operation		P
22.51	There is a control on the appliance manually adjusted to the setting for remote operation before the appliance can be operated in this mode		N/A
	There is a visual indication showing that the appliance is adjusted for remote operation		N/A
	These requirements not necessary on appliances that can operate as follows, without giving rise to a hazard:		N/A
	- continuously, or		N/A
	- automatically, or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- remotely		N/A
22.52	Socket-outlets on appliances accessible to the user in accordance with the socket-outlet system used in the country in which the appliance is sold		N/A
22.53	Class II appliances and class III appliances that incorporate functionally earthed parts have at least double insulation or reinforced insulation between live parts and the functionally earthed parts		N/A
22.54	Button cells and batteries designated R1 not accessible without the aid of a tool, unless	No button cells.	N/A
	the cover of their compartment can only be opened after at least two independent movements have been applied simultaneously		N/A
22.55	Devices operated to stop the intended function of the appliance, if any, are distinguished from other manual devices by means of shape, size, surface texture or position	Details refer to 20.101.4	P
	The requirement concerning position does not preclude use of a push on push off switch		N/A
	An indication when the device has been operated is given by:		N/A
	– tactile feedback from the actuator or from the appliance, or		N/A
	– reduction in heat output; or		N/A
	– audible and visible feedback		N/A
22.56	Detachable power supply part provided with the part of class III construction		P
22.57	The properties of non-metallic materials do not degrade from exposure to UV-C radiation, as specified in Annex T		N/A
	This requirement does not apply to glass, ceramics or similar materials		N/A
23	INTERNAL WIRING		P
23.1	Wireways smooth and free from sharp edges		P
	Wires protected against contact with burrs, cooling fins etc.		P
	Wire holes in metal well-rounded or provided with bushings		N/A
	Wiring effectively prevented from coming into contact with moving parts	No moving part contacting.	P
23.2	Beads etc. on live wires cannot change their position, and are not resting on sharp edges		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Beads inside flexible metal conduits contained within an insulating sleeve		N/A
23.3	Electrical connections and internal conductors movable relatively to each other not exposed to undue stress		N/A
	Flexible metallic tubes not causing damage to insulation of conductors		N/A
	Open-coil springs not used		N/A
	Adequate insulating lining provided inside a coiled spring, the turns of which touch one another		N/A
	No damage after 10 000 flexings for conductors flexed during normal use, or		N/A
	100 flexings for conductors flexed during user maintenance		N/A
	Electric strength test of 16.3, 1000 V between live parts and accessible metal parts		N/A
	Not more than 10% of the strands of any conductor broken, and		N/A
	not more than 30% for wiring supplying circuits that consume no more than 15W		N/A
23.4	Bare internal wiring sufficiently rigid and fixed		P
23.5	The insulation of internal wiring subjected to the supply mains voltage withstanding the electrical stress likely to occur in normal use	Battery operate lawnmower	N/A
	Basic insulation electrically equivalent to the basic insulation of cords complying with IEC 60227 or IEC 60245, or		N/A
	no breakdown when a voltage of 2000 V is applied for 15 min between the conductor and metal foil wrapped around the insulation		N/A
	For class II construction, the requirements for supplementary insulation and reinforced insulation apply,		N/A
	except that the sheath of a cord complying with IEC 60227 or IEC 60245 may provide supplementary insulation.		N/A
	A single layer of internal wiring insulation does not provide reinforced insulation		N/A
23.6	Sleeving used as supplementary insulation on internal wiring retained in position by clamping at both ends, or		N/A
	be such that it can only be removed by breaking or cutting		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
23.7	The colour combination green/yellow only used for earthing conductors		N/A
23.8	Aluminium wires not used for internal wiring		P
23.9	Stranded conductors not consolidated by soldering where they are subjected to contact pressure, unless		P
	the contact pressure is provided by spring terminals		N/A
23.10	The insulation and sheath of internal wiring, incorporated in external hoses for the connection of an appliance to the water mains, at least equivalent to that of light polyvinyl chloride sheathed flexible cord (60227 IEC 52)		N/A
24	COMPONENTS		P
24.1	Components comply with safety requirements in relevant IEC standards		P
	List of components :	(see appended table)	P
	Motors not required to comply with IEC 60034-1, they are tested as part of the appliance		P
	Relays tested as part of the appliance, or	No such relays.	N/A
	alternatively acc. to IEC 60730-1, and meeting the additional requirements in IEC 60335-1		N/A
	The requirements of Clause 29 apply between live parts of components and accessible parts of the appliance		N/A
	Components can comply with the requirements for clearances and creepage distances for functional insulation in the relevant component standard		P
	30.2 of this standard apply to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections		P
	Components that have not been previously tested to comply with the IEC standard for the relevant component are tested according to the requirements of 30.2		N/A
	Components that have been previously tested to comply with the resistance to fire requirements in the IEC standard for the relevant component need not be retested provided the specified conditions are met		P
	If these conditions are not satisfied, the component is tested as part of the appliance.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Power electronic converter circuits not required to comply with IEC 62477-1, they are tested as part of the appliance		N/A
	If components have not been tested and found to comply with relevant IEC standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9		N/A
	For components mentioned in 24.1.1 to 24.1.9 no additional tests specified in the relevant component standard are necessary other than those specified in 24.1.1 to 24.1.9		N/A
	Components not tested and found to comply with relevant IEC standard and components not marked or not used in accordance with its marking, tested under the conditions occurring in the appliance		N/A
	Lampholders and starterholders that have not being tested and found to comply with the relevant IEC standard, tested as a part of the appliance and additionally according to the gauging and interchangeability requirements of the relevant IEC standard		N/A
	No additional tests specified for nationally standardized plugs such as those detailed in IEC/TR 60083 or connectors complying with the standard sheets of IEC 60320-1 and IEC 60309		N/A
24.1.1	Capacitors likely to be permanently subjected to the supply voltage and used for radio interference suppression or for voltage dividing, comply with IEC 60384-14		N/A
	If the capacitors have to be tested, they are tested according to Annex F		N/A
24.1.2	Transformers in associated switch mode power supplies comply with Annex BB of IEC 61558-2-16		N/A
	Safety isolating transformers comply with IEC 61558-2-6		N/A
	If they have to be tested, they are tested according to Annex G		N/A
24.1.3	Switches comply with IEC 61058-1, the number of cycles of operation being at least 10 000		P
	If they have to be tested, they are tested according to Annex H		N/A
	If the switch operates a relay or contactor, the complete switching system is subjected to the test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If the switch only operates a motor starting relay complying with IEC 60730-2-10 with the number of cycles of a least 10 000 as specified, the complete switching system need not be tested		N/A
24.1.4	Automatic controls comply with IEC 60730-1 with the relevant part 2. The number of cycles of operation being at least:		N/A
	- thermostats:	10 000	N/A
	- temperature limiters:	1 000	N/A
	- self-resetting thermal cut-outs:	300	N/A
	- voltage maintained non-self-resetting thermal cut-outs:	1 000	N/A
	- other non-self-resetting thermal cut-outs:	30	N/A
	- timers:	3 000	N/A
	- energy regulators:	10 000	N/A
	The number of cycles for controls operating during clause 11 need not be declared, if the appliance meets the requirements of this standard when they are short-circuited		N/A
	Thermal motor protectors are tested in combination with their motor under the conditions specified in Annex D		N/A
	For water valves containing live parts and that are incorporated in external hoses for connection of an appliance to the water mains, the degree of protection declared for subclause 6.5.2 of IEC 60730-2-8 is IPX7		N/A
	Thermal cut-outs of the capillary type comply with the requirements for type 2.K controls in IEC 60730-2-9		N/A
24.1.5	Appliance couplers comply with IEC 60320-1		N/A
	However, for class II appliances classified higher than IPX0, the appliance couplers comply with IEC 60320-2-3		N/A
	Interconnection couplers comply with IEC 60320-2-2		N/A
24.1.6	Small lamp holders similar to E10 lampholders comply with IEC 60238, the requirements for E10 lampholders being applicable		N/A
24.1.7	For remote operation of the appliance via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is IEC 62151		N/A
24.1.8	The relevant standard for thermal links is IEC 60691		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Thermal links not complying with IEC 60691 are considered to be an intentionally weak part for the purposes of Clause 19		N/A
24.1.9	Contactors and relays, other than motor starting relays, tested as part of the appliance		N/A
	They are also tested in accordance with Clause 17 of IEC 60730-1, the number of cycles of operations in 24.1.4 selected according to the contactor or relay function in the appliance..... :		N/A
24.2	Appliances not fitted with:		P
	- switches, automatic controls or power supplies in flexible cords		P
	- devices causing the protective device in the fixed wiring to operate in the event of a fault in the appliance		N/A
	- thermal cut-outs that can be reset by soldering, unless		N/A
	the solder has a melting point of at least 230 °C		N/A
24.3	Switches intended for all-pole disconnection of stationary appliances are directly connected to the supply terminals and have a contact separation in all poles, providing full disconnection under overvoltage category III conditions		N/A
24.4	Plugs and socket-outlets for extra-low voltage circuits and heating elements, not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1 or with connectors and appliance inlets complying with the standard sheets of IEC 60320-1		N/A
24.5	Capacitors in auxiliary windings of motors marked with their rated voltage and capacitance, and used accordingly	No such capacitor.	N/A
	Voltage across capacitors in series with a motor winding does not exceed 1,1 times rated voltage, when the appliance is supplied at 1,1 times rated voltage under minimum load		N/A
24.6	Working voltage of motors connected to the supply mains and having basic insulation that is inadequate for the rated voltage of the appliance, not exceeding 42 V		N/A
	In addition, the motors comply with the requirements of Annex I		N/A
24.7	Detachable hose-sets for connection of appliances to the water mains comply with IEC 61770		N/A
	They are supplied with the appliance		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Appliances intended to be permanently connected to the water mains not connected by a detachable hose-set		N/A
24.8	Motor running capacitors in appliances for which 30.2.3 is applicable and that are permanently connected in series with a motor winding, not causing a hazard in event of a failure		N/A
	One or more of the following conditions are to be met:		N/A
	- the capacitors are of class S2 or S3 according to IEC 60252-1		N/A
	- the capacitors are housed within a metallic or ceramic enclosure		N/A
	- the distance of separation of the outer surface to adjacent non-metallic parts exceeds 50 mm		N/A
	- adjacent non-metallic parts within 50 mm withstand the needle-flame test of Annex E		N/A
	- adjacent non-metallic parts within 50 mm classified as at least V-1 according to IEC 60695-11-10		N/A
25	SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS		P
25.1	Appliance not intended for permanent connection to fixed wiring, means for connection to the supply:		N/A
	- supply cord fitted with a plug, the current rating and voltage rating of the plug being not less than the corresponding ratings of its associated appliance	Battery operate.	N/A
	- an appliance inlet having at least the same degree of protection against moisture as required for the appliance, or		N/A
	- pins for insertion into socket-outlets		N/A
25.2	Appliance not provided with more than one means of connection to the supply mains		P
	Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1250 V for 1 min between each means of connection causes no breakdown		N/A
25.3	Appliance intended to be permanently connected to fixed wiring provided with one of the following means for connection to the supply mains:		N/A
	- a set of terminals allowing the connection of a flexible cord		N/A
	- a fitted supply cord		N/A
	- a set of supply leads accommodated in a suitable compartment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- a set of terminals for the connection of cables of fixed wiring, cross-sectional areas specified in 26.6, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N/A
	- a set of terminals and cable entries, conduit entries, knock-outs or glands, allowing connection of appropriate types of cable or conduit, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N/A
	For a fixed appliance constructed so that parts can be removed to facilitate easy installation, this requirement is met if it is possible to connect the fixed wiring without difficulty after a part of the appliance has been fixed to its support		N/A
25.4	Cable and conduit entries, rated current of appliance not exceeding 16 A, dimension according to table 10 (mm)		N/A
	Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in clause 29		N/A
25.5	Method for assembling the supply cord to the appliance:		N/A
	- type X attachment		N/A
	- type Y attachment		N/A
	- type Z attachment, if allowed in relevant part 2		N/A
	Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords		N/A
	For multi-phase appliances supplied with a supply cord and that are intended to be permanently connected to fixed wiring, the supply cord is assembled to the appliance by type Y attachment		N/A
25.6	Plugs fitted with only one flexible cord		N/A
25.7	Supply cords, other than for class III appliances, being one of the following types:		N/A
	- rubber sheathed (at least 60245 IEC 53)		N/A
	- polychloroprene sheathed (at least 60245 IEC 57)		N/A
	- polyvinyl chloride sheathed. Not used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of clause 11		N/A
	<ul style="list-style-type: none"> light polyvinyl chloride sheathed cord (60227 IEC 52), for appliances not exceeding 3 kg 		N/A
	<ul style="list-style-type: none"> ordinary polyvinyl chloride sheathed cord (60227 IEC 53), for other appliances 		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- heat resistant polyvinyl chloride sheathed. Not used for type X attachment other than specially prepared cords		N/A
	<ul style="list-style-type: none"> heat-resistant light polyvinyl chloride sheathed cord (60227 IEC 56), for appliances not exceeding 3 kg 		N/A
	<ul style="list-style-type: none"> heat-resistant polyvinyl chloride sheathed cord (60227 IEC 57), for other appliances 		N/A
	- halogen-free, low smoke, thermoplastic insulated and sheathed		N/A
	<ul style="list-style-type: none"> light duty halogen-free low smoke flexible cable (62821 IEC 101) for circular cable and (62821 IEC 101f) for flat cable 		N/A
	<ul style="list-style-type: none"> Ordinary duty halogen-free low smoke flexible cable (62821 IEC 102) for circular cable and (62821 IEC 102f) for flat cable 		N/A
	Supply cords for class III appliances adequately insulated		N/A
	Test with 500 V for 2 min for supply cords of class III appliances that contain live parts		N/A
25.8	Nominal cross-sectional area of supply cords not less than table 11; rated current (A); cross-sectional area (mm ²)..... :		N/A
25.9	Supply cords not in contact with sharp points or edges		N/A
25.10	Supply cord of class I appliances have a green/yellow core for earthing		N/A
	In multi-phase appliances, the colour of the neutral conductor of the supply cord is blue		N/A
	Where additional neutral conductors are provided in the supply cord:		N/A
	– other colours may be used for these additional neutral conductors;		N/A
	– all of the neutral conductors and line conductors are identified by marking using the alpha numeric notation specified in IEC 60445		N/A
	– the supply cord is fitted to the appliance		N/A
25.11	Conductors of supply cords not consolidated by soldering where they are subject to contact pressure, unless		N/A
	the contact pressure is provided by spring terminals		N/A
25.12	Insulation of the supply cord not damaged when moulding the cord to part of the enclosure		N/A
25.13	Inlet openings so constructed as to prevent damage to the supply cord		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If it is not evident that the supply cord can be introduced without risk of damage, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided		N/A
	If unsheathed supply cord, a similar additional bushing or lining is required, unless the appliance is		N/A
	class 0, or		N/A
	a class III appliance not containing live parts		N/A
25.14	Supply cords moved while in operation adequately protected against excessive flexing		N/A
	Flexing test, as described:		N/A
	- applied force (N)..... :		N/A
	- number of flexings..... :		N/A
	The test does not result in:		N/A
	- short-circuit between the conductors, such that the current exceeds a value of twice the rated current		N/A
	- breakage of more than 10% of the strands of any conductor		N/A
	- separation of the conductor from its terminal		N/A
	- loosening of any cord guard		N/A
	- damage to the cord or the cord guard		N/A
	- broken strands piercing the insulation and becoming accessible		N/A
25.15	For appliances with supply cord and appliances to be permanently connected to fixed wiring by a flexible cord, conductors of the supply cord relieved from strain, twisting and abrasion by use of cord anchorage	No such construction.	N/A
	The cord cannot be pushed into the appliance to such an extent that the cord or internal parts of the appliance can be damaged		N/A
	Pull and torque test of supply cord:		N/A
	- fixed appliances: pull 100 N; torque (not on automatic cord reel) (Nm)..... :		N/A
	- other appliances: values shown in table 12: mass (kg); pull (N); torque (not on automatic cord reel) (Nm)..... :		N/A
	Cord not damaged and max. 2 mm displacement of the cord		N/A
25.16	Cord anchorages for type X attachments constructed and located so that:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- replacement of the cord is easily possible		N/A
	- it is clear how the relief from strain and the prevention of twisting are obtained		N/A
	- they are suitable for different types of supply cord		N/A
	- cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless		N/A
	they are separated from accessible metal parts by supplementary insulation		N/A
	- the cord is not clamped by a metal screw which bears directly on the cord		N/A
	- at least one part of the cord anchorage securely fixed to the appliance, unless		N/A
	it is part of a specially prepared cord		N/A
	- screws which have to be operated when replacing the cord do not fix any other component, unless		N/A
	the appliance becomes inoperative or incomplete or the parts cannot be removed without a tool		N/A
	- if labyrinths can be bypassed the test of 25.15 is nevertheless withstood		N/A
	- for class 0, 0I and I appliances they are of insulating material or are provided with an insulating lining, unless		N/A
	failure of the insulation of the cord does not make accessible metal parts live		N/A
	- for class II appliances they are of insulating material, or		N/A
	if of metal, they are insulated from accessible metal parts by supplementary insulation		N/A
	After the test of 25.15, under the conditions specified, the conductors have not moved by more than 1 mm in the terminals		N/A
25.17	Adequate cord anchorages for type Y and Z attachment, test with the cord supplied with the appliance		N/A
25.18	Cord anchorages only accessible with the aid of a tool, or		N/A
	Constructed so that the cord can only be fitted with the aid of a tool		N/A
25.19	Type X attachment, glands not used as cord anchorage in portable appliances		N/A
	Tying the cord into a knot or tying the cord with string not used		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
25.20	The conductors of the supply cord for type Y and Z attachment insulated from accessible metal parts		N/A
25.21	Space for supply cord for type X attachment or for connection of fixed wiring constructed:		N/A
	- to permit checking of conductors with respect to correct positioning and connection before fitting any cover		N/A
	- so there is no risk of damage to the conductors or their insulation when fitting the cover		N/A
	- for portable appliances, so that the uninsulated end of a conductor, if it becomes free from the terminal, prevented from contact with accessible metal parts		N/A
	2 N test to the conductor for portable appliances; no contact with accessible metal parts		N/A
25.22	Appliance inlets:		N/A
	- live parts not accessible during insertion or removal		N/A
	Requirement not applicable to appliance inlets complying with IEC 60320-1		N/A
	- connector can be inserted without difficulty		N/A
	- the appliance is not supported by the connector		N/A
	- not for cold conditions if temp. rise of external metal parts exceeds 75 K during clause 11, unless		N/A
	the supply cord is unlikely to touch such metal parts		N/A
25.23	Interconnection cords comply with the requirements for the supply cord, except that:		P
	- the cross-sectional area of the conductors is determined on the basis of the maximum current during clause 11		N/A
	- the thickness of the insulation may be reduced		N/A
	- for class I or class II appliance with class III construction, the cross sectional areas of the conductors need not comply with 25.8 if specified conditions are met		N/A
	If necessary, electric strength test of 16.3		N/A
25.24	Interconnection cords not detachable without the aid of a tool if compliance with this standard is impaired when they are disconnected		P
25.25	Dimensions of pins that are inserted into socket-outlets compatible with the dimensions of the relevant socket-outlet.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Dimensions of pins and engagement face in accordance with the dimensions of the relevant plug in IEC/TR 60083		N/A
26	TERMINALS FOR EXTERNAL CONDUCTORS		P
26.1	Appliances provided with terminals or equally effective devices for connection of external conductors		N/A
	Terminals only accessible after removal of a non-detachable cover, except		N/A
	for class III appliances that do not contain live parts		N/A
	Earthing terminals may be accessible if a tool is required to make the connections and means are provided to clamp the wire independently from its connection		N/A
26.2	Appliances with type X attachment and appliances for the connection of cables of fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless		N/A
	the connections are soldered		N/A
	Screws and nuts not used to fix any other component, except		N/A
	internal conductors, if so arranged that they are unlikely to be displaced when fitting the supply conductors		N/A
	If soldered connections used, the conductor so positioned or fixed that reliance is not placed on soldering alone, unless		N/A
	barriers provided so that neither clearances nor creepage distances between live parts and other metal parts reduced below the values for supplementary insulation if the conductor becomes free at the soldered joint		N/A
26.3	Terminals for type X attachment and for connection of cables of fixed wiring so constructed that the conductor is clamped between metal surfaces with sufficient contact pressure but without damaging the conductor		N/A
	Terminals fixed so that when the clamping means is tightened or loosened:		N/A
	- the terminal does not become loose		N/A
	- internal wiring is not subjected to stress		N/A
	- neither clearances nor creepage distances are reduced below the values in clause 29		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Compliance checked by inspection and by the test of subclause 9.6 of IEC 60999-1, the torque applied being equal to two-thirds of the torque specified (Nm)..... :		N/A
	No deep or sharp indentations of the conductors		N/A
26.4	Terminals for type X attachment, except those having a specially prepared cord and those for the connection of cables of fixed wiring, no special preparation of conductors such as by soldering, use of cable lugs, eyelets or similar, and		N/A
	so constructed or placed that conductors prevented from slipping out when clamping screws or nuts are tightened		N/A
26.5	Terminals for type X attachment so located or shielded that if a wire of a stranded conductor escapes, no risk of accidental connection to other parts that result in a hazard		N/A
	Stranded conductor test, 8 mm insulation removed		N/A
	No contact between live parts and accessible metal parts and,		N/A
	for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only		N/A
26.6	Terminals for type X attachment and for connection of cables of fixed wiring suitable for connection of conductors with cross-sectional area according to table 13; rated current (A); nominal cross-sectional area (mm ²)..... :		N/A
	If a specially prepared cord is used, terminals need only be suitable for that cord		N/A
26.7	Terminals for type X attachment, except in class III appliances not containing live parts, accessible after removal of a cover or part of the enclosure		N/A
26.8	Terminals for the connection of fixed wiring, including the earthing terminal, located close to each other		N/A
26.9	Terminals of the pillar type constructed and located as specified		N/A
26.10	Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless		N/A
	conductors ends fitted with means suitable for screw terminals		N/A
	Pull test of 5 N to the connection		N/A
26.11	For type Y and Z attachment, soldered, welded, crimped or similar connections may be used		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For Class II appliances, the conductor so positioned or fixed that reliance is not placed on soldering, welding or crimping alone		N/A
	If soldering, welding or crimping alone used, barriers provided so that clearances and creepage distances between live parts and other metal parts are not reduced below the values for supplementary insulation if the conductor becomes free		N/A
27	PROVISION FOR EARTHING		N/A
27.1	Accessible metal parts of Class 0I and I appliances permanently and reliably connected to an earthing terminal or earthing contact of the appliance inlet		N/A
	Earthing terminals and earthing contacts not connected to the neutral terminal		N/A
	Class 0, II and III appliances have no provision for protective earthing		N/A
	Class II appliances and class III appliances can incorporate an earth for functional purposes		N/A
	Safety extra-low voltage circuits not earthed, unless		N/A
	protective extra-low voltage circuits		N/A
27.2	Clamping means of earthing terminals adequately secured against accidental loosening		N/A
	Terminals for the connection of external equipotential bonding conductors allow connection of conductors of 2.5 to 6 mm ² , and		N/A
	- do not provide earthing continuity between different parts of the appliance, and		N/A
	- conductors cannot be loosened without the aid of a tool		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A
27.3	For a detachable part having an earth connection and being plugged into another part of the appliance, the earth connection is made before and separated after current-carrying connections when removing the part		N/A
	For appliances with supply cords, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
27.4	No risk of corrosion resulting from contact between parts of the earthing terminal and the copper of the earthing conductor or other metal		N/A
	Parts providing earthing continuity, other than parts of a metal frame or enclosure, have adequate resistance to corrosion		N/A
	If of steel, these parts provided with an electroplated coating with a thickness at least 5 μm		N/A
	Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure		N/A
	In the body of the earthing terminal is a part of a frame or enclosure of aluminium or aluminium alloys, precautions taken to avoid risk of corrosion		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A
27.5	Low resistance of connection between earthing terminal and earthed metal parts		N/A
	This requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit, provided the clearances of basic insulation are based on the rated voltage of the appliance		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A
	Resistance not exceeding 0,1 Ω at the specified low-resistance test (Ω)..... :		N/A
27.6	The printed conductors of printed circuit boards not used to provide earthing continuity in hand-held appliances.		N/A
	They may be used to provide earthing continuity in other appliances if at least two tracks are used with independent soldering points and the appliance complies with 27.5 for each circuit		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A
28	SCREWS AND CONNECTIONS		P
28.1	Fixings, electrical connections and connections providing earthing continuity withstand mechanical stresses		P
	Screws not of soft metal liable to creep, such as zinc or aluminium		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Diameter of screws of insulating material min. 3 mm		N/A
	Screws of insulating material not used for any electrical connections or connections providing earthing continuity		N/A
	Screws used for electrical connections or connections providing earthing continuity screwed into metal		N/A
	Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation		N/A
	For type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw impairs basic insulation		N/A
	For screws and nuts; torque-test as specified in table 14..... :	(see appended table)	N/A
28.2	Electrical connections and connections providing earthing continuity constructed so that contact pressure is not transmitted through non-ceramic insulating material liable to shrink or distort, unless		N/A
	there is resiliency in the metallic parts to compensate for shrinkage or distortion of the insulating material		N/A
	This requirement does not apply to electrical connections in circuits of appliances for which:		N/A
	<ul style="list-style-type: none"> 30.2.2 is applicable and that carry a current not exceeding 0,5 A 		N/A
	<ul style="list-style-type: none"> 30.2.3 is applicable and that carry a current not exceeding 0,2 A 		N/A
28.3	Space-threaded (sheet metal) screws only used for electrical connections if they clamp the parts together		N/A
	Thread-cutting (self-tapping) screws and thread rolling screws only used for electrical connections if they generate a full form standard machine screw thread		N/A
	Thread-cutting (self-tapping) screws not used if they are likely to be operated by the user or installer		N/A
	Thread-cutting, thread rolling and space threaded screws may be used in connections providing earthing continuity provided it is not necessary to disturb the connection:		N/A
	- in normal use,		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- during user maintenance,		N/A
	- when replacing a supply cord having a type X attachment, or		N/A
	- during installation		N/A
	At least two screws being used for each connection providing earthing continuity, unless		N/A
	the screw forms a thread having a length of at least half the diameter of the screw		N/A
28.4	Screws and nuts that make mechanical connection secured against loosening if they also make electrical connections or connections providing earthing continuity		N/A
	This requirement does not apply to screws in the earthing circuit if at least two screws are used, or		N/A
	if an alternative earthing circuit is provided		N/A
	Rivets for electrical connections or connections providing earthing continuity secured against loosening if the connections are subjected to torsion		N/A
29	CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION		P
	Clearances, creepage distances and solid insulation withstand electrical stress		P
	For coatings used on printed circuits boards to protect the microenvironment (Type 1) or to provide basic insulation (Type 2), Annex J applies:		N/A
	The microenvironment is pollution degree 1 under type 1 protection		N/A
	For type 2 protection, the spacing between the conductors before the protection is applied is not less than the values specified in Table 1 of IEC 60664-3		N/A
	These values apply to functional, basic, supplementary and reinforced insulation		N/A
29.1	Clearances not less than the values specified in table 16, taking into account the rated impulse voltage for the overvoltage categories of table 15, unless	(see appended table)	P
	for basic insulation and functional insulation they comply with the impulse voltage test of clause 14		P
	However, if the distances are affected by wear, distortion, movement of the parts or during assembly, the clearances for rated impulse voltages of 1500V and above are increased by 0,5 mm and the impulse voltage test is not applicable		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For appliances intended for use at altitudes exceeding 2 000 m, the clearances in Table 16 is increased according to the relevant multiplier values in Table A.2 of IEC 60664-1		N/A
	Impulse voltage test is not applicable:		N/A
	- when the microenvironment is pollution degree 3, or	pollution degree 3 is applicable.	P
	- for basic insulation of class 0 and class 01 appliances, or		N/A
	- to appliances intended for use at altitudes exceeding 2 000 m		N/A
	Appliances are in overvoltage category II		P
	A force of 2 N is applied to bare conductors, other than heating elements		P
	A force of 30 N is applied to accessible surfaces		P
29.1.1	Clearances of basic insulation withstand the overvoltages, taking into account the rated impulse voltage		P
	The values of table 16 or the impulse voltage test of clause 14 are applicable..... :	(see appended table)	P
	Clearance at the terminals of tubular sheathed heating elements may be reduced to 1,0 mm if the microenvironment is pollution degree 1		N/A
	Lacquered conductors of windings considered to be bare conductors		N/A
29.1.2	Clearances of supplementary insulation not less than those specified for basic insulation in table 16:	(see appended table)	N/A
29.1.3	Clearances of reinforced insulation not less than those specified for basic insulation in table 16, using the next higher step for rated impulse voltage :	(see appended table)	N/A
	For double insulation, with no intermediate conductive part between basic and supplementary insulation, clearances are measured between live parts and the accessible surface, and the insulation system is treated as reinforced insulation		N/A
29.1.4	Clearances for functional insulation are the largest values determined from:		P
	- table 16 based on the rated impulse voltage :	(see appended table)	P
	- table F.7a in IEC 60664-1, frequency not exceeding 30 kHz		N/A
	- clause 4 of IEC 60664-4, frequency exceeding 30 kHz		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If values of table 16 are largest, the impulse voltage test of clause 14 may be applied instead, unless		N/A
	the microenvironment is pollution degree 3, or		N/A
	the distances can be affected by wear, distortion, movement of the parts or during assembly		N/A
	However, clearances are not specified if the appliance complies with clause 19 with the functional insulation short-circuited		P
	Lacquered conductors of windings considered to be bare conductors		P
	However, clearances at crossover points are not measured		P
	Clearance between surfaces of PTC heating elements may be reduced to 1mm		N/A
29.1.5	Appliances having higher working voltages than rated voltage, clearances for basic insulation are the largest values determined from:		N/A
	- table 16 based on the rated impulse voltage :		N/A
	- table F.7a in IEC 60664-1, frequency not exceeding 30 kHz		N/A
	- clause 4 of IEC 60664-4, frequency exceeding 30 kHz		N/A
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1 or Clause 4 of IEC 60664-4, the clearances of supplementary insulation are not less than those specified for basic insulation		N/A
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1, the clearances of reinforced insulation dimensioned as specified in Table F.7a are to withstand 160% of the withstand voltage required for basic insulation		N/A
	If clearances for basic insulation are selected from Clause 4 of IEC 60664-4, the clearances of reinforced insulation are twice the value required for basic insulation		N/A
	If the secondary winding of a step-down transformer is earthed, or if there is an earthed screen between the primary and secondary windings, clearances of basic insulation on the secondary side not less than those specified in table 16, but using the next lower step for rated impulse voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Circuits supplied with a voltage lower than rated voltage, clearances of functional insulation are based on the working voltage used as the rated voltage in table 15		N/A
29.2	Creepage distances not less than those appropriate for the working voltage, taking into account the material group and the pollution degree..... :	(see appended table)	P
	Pollution degree 2 applies, unless		N/A
	- precautions taken to protect the insulation; pollution degree 1		N/A
	- insulation subjected to conductive pollution; pollution degree 3		P
	A force of 2 N is applied to bare conductors, other than heating elements		P
	A force of 30 N is applied to accessible surfaces		P
	In a double insulation system, the working voltage for both the basic and supplementary insulation is taken as the working voltage across the complete double insulation system		N/A
29.2.1	Creepage distances of basic insulation not less than specified in table 17..... :	(see appended table)	N/A
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 17		N/A
	Except for pollution degree 1, corresponding creepage distance not less than the minimum specified for the clearance in table 16, if the clearance has been checked according to the test of clause 14		N/A
29.2.2	Creepage distances of supplementary insulation at least those specified for basic insulation in table 17, or	(see appended table)	N/A
	Table 2 of IEC 60664-4, as applicable		N/A
29.2.3	Creepage distances of reinforced insulation at least double those specified for basic insulation in table 17, or	(see appended table)	N/A
	Table 2 of IEC 60664-4, as applicable		N/A
29.2.4	Creepage distances of functional insulation not less than specified in table 18..... :	(see appended table)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 18		N/A
	Creepage distances may be reduced if the appliance complies with clause 19 with the functional insulation short-circuited		P
29.3	Supplementary and reinforced insulation have adequate thickness, or a sufficient number of layers, to withstand the electrical stresses		N/A
	Compliance checked:		N/A
	- by measurement, in accordance with 29.3.1, or		N/A
	- by an electric strength test in accordance with 29.3.2, or		N/A
	- for insulation, other than single layer internal wiring insulation, by an assessment of the thermal quality of the material combined with an electric strength test, in accordance with 29.3.3, and		N/A
	for accessible parts of reinforced insulation consisting of a single layer, by measurement in accordance with 29.3.4, or		N/A
	- by an assessment of the thermal quality of the material according to 29.3.3 combined with an electric strength test in accordance with 23.5, for each single layer internal wiring insulation touching each other, or		N/A
	- as specified in subclause 6.3 of IEC 60664-4 for insulation that is subjected to any periodic voltage having a frequency exceeding 30 kHz		N/A
29.3.1	Supplementary insulation have a thickness of at least 1 mm		N/A
	Reinforced insulation have a thickness of at least 2 mm		N/A
29.3.2	Each layer of material withstand the electric strength test of 16.3 for supplementary insulation		N/A
	Supplementary insulation consist of at least 2 layers		N/A
	Reinforced insulation consist of at least 3 layers		N/A
29.3.3	The insulation is subjected to the dry heat test Bb of IEC 60068-2-2, followed by		N/A
	the electric strength test of 16.3		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If the temperature rise during the tests of clause 19 does not exceed the value specified in table 3, the test of IEC 60068-2-2 is not carried out		N/A
29.3.4	Thickness of accessible parts of reinforced insulation consisting of a single layer not less than specified in table 19..... :		N/A
30	RESISTANCE TO HEAT AND FIRE		P
30.1	External parts of non-metallic material,		P
	parts supporting live parts, and		N/A
	parts of thermoplastic material providing supplementary or reinforced insulation		N/A
	sufficiently resistant to heat		P
	Ball-pressure test according to IEC 60695-10-2		P
	External parts tested at 40 °C plus the maximum temperature rise determined during the test of clause 11, or at 75 °C, whichever is the higher; temperature (°C)..... :	(see appended table 30.1)	P
	Parts supporting live parts tested at 40°C plus the maximum temperature rise determined during the test of clause 11, or at 125 °C, whichever is the higher; temperature (°C)..... :	(see appended table 30.1)	N/A
	Parts of thermoplastic material providing supplementary or reinforced insulation tested at 25 °C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C) :	(see appended table 30.1)	N/A
30.2	Parts of non-metallic material resistant to ignition and spread of fire		P
	This requirement does not apply to:		N/A
	parts having a mass not exceeding 0,5 g, provided the cumulative effect is unlikely to propagate flames that originate inside the appliance by propagating flames from one part to another, or		N/A
	decorative trims, knobs and other parts unlikely to be ignited or to propagate flames that originate inside the appliance		N/A
	Compliance checked by the test of 30.2.1, and in addition:		P
	- for attended appliances, 30.2.2 applies		N/A
	- for unattended appliances, 30.2.3 applies		P
	For appliances for remote operation, 30.2.3 applies		N/A
	For base material of printed circuit boards, 30.2.4 applies		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
30.2.1	Parts of non-metallic material subjected to the glow-wire test of IEC 60695-2-11 at 550°C	(see appended table 30.2)	P
	However, test not carried out if the material is classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 550 °C, or		N/A
	the material is classified at least HB40 according to IEC 60695-11-10		N/A
	Parts for which the glow-wire test cannot be carried out need to meet the requirements in ISO 9772 for material classified HBF		N/A
30.2.2	Appliances operated while attended, parts of non-metallic material supporting current-carrying connections, and		N/A
	parts of non-metallic material within a distance of 3mm of such connections,		N/A
	subjected to the glow-wire test of IEC 60695-2-11 with appropriate severity level:	(see appended table 30.2)	N/A
	- 750 °C, for connections carrying a current exceeding 0,5 A during normal operation		N/A
	- 650 °C, for other connections		N/A
	Glow-wire applied to an interposed shielding material, if relevant		N/A
	The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least:		N/A
	- 750 °C, for connections carrying a current exceeding 0,5 A during normal operation		N/A
	- 650 °C, for other connections		N/A
	The glow-wire test is also not carried out on small parts. These parts are to:		N/A
	- comprise material having a glow-wire flammability index of at least 750 °C, or 650 °C as appropriate, or		N/A
	- comply with the needle-flame test of Annex E, or	(see appended table 30.2/30.2.4)	N/A
	- comprise material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
	Glow-wire test not applicable to conditions as specified		N/A
30.2.3	Appliances operated while unattended, tested as specified in 30.2.3.1 and 30.2.3.2	Unattended appliance	P
	The tests are not applicable to conditions as specified		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
30.2.3.1	Parts of non-metallic material supporting connections carrying a current exceeding 0,2 A during normal operation, and		P
	parts of non-metallic material, other than small parts, within a distance of 3 mm,		P
	subjected to the glow-wire test of IEC 60695-2-11 with a test severity of 850 °C	(see appended table 30.2)	P
	Glow-wire applied to an interposed shielding material, if relevant		N/A
	The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 850 °C		N/A
30.2.3.2	Parts of non-metallic material supporting connections, and		P
	parts of non-metallic material within a distance of 3mm,		P
	subjected to the glow-wire test of IEC 60695-2-11 with appropriate severity level:	(see appended table 30.2)	P
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation		P
	- 650 °C, for other connections		N/A
	Glow-wire applied to an interposed shielding material, if relevant		N/A
	However, the glow-wire test of 750 °C or 650 °C as appropriate, is not carried out on parts of material fulfilling both or either of the following classifications:		N/A
	- a glow-wire ignition temperature according to IEC 60695-2-13 of at least:		N/A
	<ul style="list-style-type: none"> • 775 °C, for connections carrying a current exceeding 0,2 A during normal operation 		N/A
	<ul style="list-style-type: none"> • 675 °C, for other connections 		N/A
	- a glow-wire flammability index according to IEC 60695-2-12 of at least:		N/A
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation		N/A
	- 650 °C, for other connections		N/A
	The glow-wire test is also not carried out on small parts. These parts are to:		N/A
	- comprise material having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- comprise material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- comply with the needle-flame test of Annex E, or		P
	- comprise material classified as V-0 or V-1 according to IEC 60695-11-10		P
	The consequential needle-flame test of Annex E applied to non-metallic parts that encroach within the vertical cylinder placed above the centre of the connection zone and on top of the non-metallic parts supporting current-carrying connections, and parts of non-metallic material within a distance of 3 mm of such connections if these parts are those:		P
	- parts that withstood the glow-wire test of IEC 60695-2-11 of 750 °C or 650 °C as appropriate, but produce a flame that persist longer than 2 s, or		P
	- parts that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- small parts, that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- small parts for which the needle-flame test of Annex E was applied, or		N/A
	- small parts for which a material classification of V-0 or V-1 was applied		N/A
	However, the consequential needle-flame test is not carried out on non-metallic parts, including small parts, within the cylinder that are:		N/A
	- parts having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N/A
	- parts comprising material classified as V-0 or V-1 according to IEC 60695-11-10, or		N/A
	- parts shielded by a flame barrier that meets the needle-flame test of Annex E or that comprises material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
30.2.4	Base material of printed circuit boards subjected to the needle-flame test of Annex E	(see appended table 30.2/30.2.4)	N/A
	Test not applicable to conditions as specified..... :		N/A
31	RESISTANCE TO RUSTING		P
	Relevant ferrous parts adequately protected against rusting		P
	Tests specified in part 2 when necessary		N/A
32	RADIATION, TOXICITY AND SIMILAR HAZARDS		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Appliance does not emit harmful radiation or present a toxic or similar hazard due to their operation in normal use		N/A
	Compliance is checked by the limits or tests specified in part 2, if relevant		N/A
A	ANNEX A (INFORMATIVE) ROUTINE TESTS		P
	Description of routine tests to be carried out by the manufacturer		P
B	ANNEX B (NORMATIVE) APPLIANCES POWERED BY RECHARGEABLE BATTERIES THAT ARE RECHARGED IN THE APPLIANCE		P
	The following modifications to this standard are applicable for appliances powered by batteries that are recharged in the appliance		P
	Three forms of construction covered:		P
	a) Appliance supplied directly from the supply mains or a renewable energy source, the battery charging circuitry and other supply unit circuitry incorporated within the appliance		P
	b) The part of the appliance incorporating the battery is supplied from the supply mains or a renewable energy source, via a detachable supply unit. The battery charging circuitry is incorporated within the part of the appliance containing the battery		P
	c) The part of the appliance incorporating the battery is supplied from the supply mains or a renewable energy source, via a detachable supply unit. The battery charging circuitry is incorporated within the detachable supply unit		N/A
3.1.9	Appliance operated under the following conditions:		P
	- the appliance, supplied by its fully charged battery, operated as specified in relevant part 2		P
	- the battery is charged, the battery being initially discharged to such an extent that the appliance cannot operate		P
	-if possible, the appliance is supplied from the supply mains through its battery charger, the battery being initially discharged to such an extent that the appliance cannot operate. The appliance is operated as specified in relevant part 2		P
	- if the appliance incorporates inductive coupling between two parts that are detachable from each other, the appliance is supplied from the supply mains with the detachable part removed		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
3.6.2	Part to be removed in order to discard the battery is not considered to be detachable		P
5.B.101	Appliances supplied from the supply mains tested as specified for motor-operated appliances		P
7.1	Battery compartment for batteries intended to be replaced by the user, marked with battery voltage (V) and polarity of the terminals : The positive terminal indicated by symbol IEC 60417-5005 and the negative terminal by symbol IEC 60417-5006		N/A
	Appliances intending to be supplied from a detachable supply unit marked with symbol IEC 60417-6181 and its type reference along with symbol ISO 7000-0790 (2004-01), or use only with <model designation> supply unit ... :	Refer to label	P
7.6	Additional symbols		N/A
7.12	The instructions give information regarding charging Instructions for appliances incorporating batteries intended to be replaced by the user include required information	No need to replaced by the user.	N/A
	Instructions for appliances containing non user-replaceable batteries state the substance of the following: This appliance contains batteries that are only replaceable by skilled persons		P
	Instructions for appliances containing non-replaceable batteries shall state the substance of the following: This appliance contains batteries that are non-replaceable		N/A
	For appliances intending to be supplied from a detachable supply unit for the purposes of recharging the battery, the type reference of the detachable supply unit is stated along with the following: WARNING: For the purposes of recharging the battery, only use the detachable supply unit provided with this appliance		P
	If the symbol for detachable supply unit is used, its meaning is explained		N/A
7.15	Markings placed on the part of the appliance connected to the supply mains The type reference of the detachable supply unit is placed in close proximity to the symbol		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.2	Appliances having batteries that according to the instruction may be replaced by the user need only have basic insulation between live parts and the inner surface of the battery compartment		N/A
	If the appliance can be operated without batteries, double or reinforced insulation required		N/A
11.7	The battery is charged for the period stated in the instructions or 24 h		P
11.8	Temperature rise of the battery surface does not exceed the limit in the battery manufacturer's specification; measured (K); limit (K)		N/A
	If no limit specified, the temperature rise does not exceed 20 K; measured (K)	10K	P
19.1	Appliances subjected to tests of 19.B.101, 19.B.102 and 19.B.103		P
19.10	Not applicable		P
19.B.101	Appliances supplied at rated voltage for 168 h, the battery being continually charged		P
19.B.102	For appliances having batteries that can be removed without the aid of a tool, short-circuit of the terminals of the battery, the battery being fully charged,	Battery pack should be removed with the aid of a tool.	N/A
19.B.103	Appliances having batteries replaceable by the user supplied at rated voltage under normal operation with the battery removed or in any position allowed by the construction		N/A
19.13	The battery does not rupture or ignite		P
21.B.101	Appliances having pins for insertion into socket-outlets have adequate mechanical strength		N/A
	Part of the appliance incorporating the pins subjected to the free fall test, procedure 2, of IEC 60068-2-31, the number of falls being:		N/A
	- 100, if the mass of the part does not exceed 250 g (g)		N/A
	- 50, if the mass of the part exceeds 250 g		N/A
	After the test, the requirements of 8.1, 15.1.1, 16.3 and clause 29 are met		N/A
22.3	Appliances having pins for insertion into socket-outlets tested as fully assembled as possible		N/A
25.13	An additional lining or bushing not required for interconnection cords in class III appliances or class III constructions operating at safety extra-low voltage not containing live parts		P
30.2	For parts of the appliance connected to the supply mains during the charging period, 30.2.3 applies		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For other parts, 30.2.2 applies		N/A
C	ANNEX C (NORMATIVE) AGEING TEST ON MOTORS		N/A
	Tests, as described, carried out when doubt with regard to the temperature classification of the insulation of a motor winding		N/A
	Test conditions as specified		N/A
D	ANNEX D (NORMATIVE) THERMAL MOTOR PROTECTORS		N/A
	Applicable to appliances having motors that incorporate thermal motor protectors necessary for compliance with the standard		N/A
	Test conditions as specified		N/A
E	ANNEX E (NORMATIVE) NEEDLE-FLAME TEST		N/A
	Needle-flame test carried out in accordance with IEC 60695-11-5, with the following modifications:		N/A
7	Severities		N/A
	The duration of application of the test flame is 30 s ± 1 s		N/A
9	Test procedure		N/A
9.1	The specimen so arranged that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 1		N/A
9.2	The first paragraph does not apply		N/A
	If possible, the flame is applied at least 10 mm from a corner		N/A
9.3	The test is carried out on one specimen		N/A
	If the specimen does not withstand the test, the test may be repeated on two additional specimens, both withstanding the test		N/A
11	Evaluation of test results		N/A
	The duration of burning not exceeding 30 s		N/A
	However, for printed circuit boards, the duration of burning not exceeding 15 s		N/A
F	ANNEX F (NORMATIVE) CAPACITORS		N/A
	Capacitors likely to be permanently subjected to the supply voltage, and used for radio interference suppression or voltage dividing, comply with the following clauses of IEC 60384-14, with the following modifications:		N/A
1.5	Terms and definitions		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.5.3	Class X capacitors tested according to subclass X2		N/A
1.5.4	This subclause is applicable		N/A
1.6	Marking		N/A
	Items a) and b) are applicable		N/A
3.4	Approval testing		N/A
3.4.3.2	Table 3 is applicable as described		N/A
4.1	Visual examination and check of dimensions		N/A
	This subclause is applicable		N/A
4.2	Electrical tests		N/A
4.2.1	This subclause is applicable		N/A
4.2.5	This subclause is applicable		N/A
4.2.5.2	Only table 11 is applicable		N/A
	Values for test A apply		N/A
	However, for capacitors in heating appliances the values for test B or C apply		N/A
4.12	Damp heat, steady state		N/A
	This subclause is applicable		N/A
	Only insulation resistance and voltage proof are checked		N/A
4.13	Impulse voltage		N/A
	This subclause is applicable		N/A
4.14	Endurance		N/A
	Subclauses 4.14.1, 4.14.3, 4.14.4 and 4.14.7 are applicable		N/A
4.14.7	Only insulation resistance and voltage proof are checked		N/A
	No visible damage		N/A
4.17	Passive flammability test		N/A
	This subclause is applicable		N/A
4.18	Active flammability test		N/A
	This subclause is applicable		N/A
G	ANNEX G (NORMATIVE) SAFETY ISOLATING TRANSFORMERS		N/A
	The following modifications to this standard are applicable for safety isolating transformers:		N/A
7	Marking and instructions		N/A
7.1	Transformers for specific use marked with:		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	-name, trademark or identification mark of the manufacturer or responsible vendor		N/A
	-model or type reference		N/A
17	Overload protection of transformers and associated circuits		N/A
	Fail-safe transformers comply with subclause 15.5 of IEC 61558-1		N/A
22	Construction		N/A
	Subclauses 19.1 and 19.1.2 of IEC 61558-2-6 are applicable		N/A
29	Clearances, creepage distances and solid insulation		N/A
29.1, 29.2, 29.3	The distances specified in items 2a, 2c and 3 in table 13 of IEC 61558-1 apply		N/A
	For insulated winding wires complying with subclause 19.12.3 of IEC 61558-1 there are no requirements for clearances or creepage distances		N/A
	For windings providing reinforced insulation, the distance specified in item 2c of table 13 of IEC 61558-1 is not assessed		N/A
	For safety isolating transformers subjected to periodic voltages with a frequency exceeding 30 kHz, the clearances, creepage distances and solid insulation values specified in IEC 60664-4 are applicable, if greater than the values specified in items 2a, 2c and 3 in table 13 of IEC 61558-1		N/A
H	ANNEX H (NORMATIVE) SWITCHES		N/A
	Switches comply with the following clauses of IEC 61058-1, as modified below:		N/A
	The tests of IEC 61058-1 carried out under the conditions occurring in the appliance		N/A
	Before being tested, switches are operated 20 times without load		N/A
8	Marking and documentation		N/A
	Switches are not required to be marked		N/A
	However, a switch that can be tested separately from the appliance marked with the manufacturer's name or trade mark and the type reference		N/A
13	Mechanism		N/A
	The tests may be carried out on a separate sample		N/A
15	Insulation resistance and dielectric strength		N/A
15.1	Not applicable		N/A
15.2	Not applicable		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
15.3	Applicable for full disconnection and micro-disconnection		N/A
17	Endurance		N/A
	Compliance is checked on three separate appliances or switches		N/A
	For 17.2.4.4, the number of cycles declared according to 7.1.4 is 10 000, unless		N/A
	otherwise specified in 24.1.3 of the relevant part 2 of IEC 60335..... :		N/A
	Switches for operation under no load and which can be operated only by a tool, and		N/A
	switches operated by hand that are interlocked so that they cannot be operated under load,		N/A
	are not subjected to the tests		N/A
	However, switches without this interlock are subjected to the test of 17.2.4.4 for 100 cycles of operation		N/A
	Subclauses 17.2.2 and 17.2.5.2 not applicable		N/A
	The ambient temperature during the test is that occurring in the appliance during the test of Clause 11 in IEC 60335-1		N/A
	The temperature rise of the terminals not more than 30 K above the temperature rise measured in clause 11 of IEC 60335-1 (K)		N/A
20	Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies		N/A
	Clause 20 is applicable to clearances across full disconnection and micro-disconnection		N/A
	It is also applicable to creepage distances for functional insulation, across full disconnection and micro-disconnection, as stated in Table 24		N/A
I	ANNEX I (NORMATIVE) MOTORS HAVING BASIC INSULATION THAT IS INADEQUATE FOR THE RATED VOLTAGE OF THE APPLIANCE		N/A
	The following modifications to this standard are applicable for motors having basic insulation that is inadequate for the rated voltage of the appliance:		N/A
8	Protection against access to live parts		N/A
8.1	Metal parts of the motor are considered to be bare live parts		N/A
11	Heating		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
11.3	The temperature rise of the body of the motor is determined instead of the temperature rise of the windings		N/A
11.8	The temperature rise of the body of the motor, where in contact with insulating material, not exceeding values in table 3 for the relevant insulating material		N/A
16	Leakage current and electric strength		N/A
16.3	Insulation between live parts of the motor and its other metal parts is not subjected to the test		N/A
19	Abnormal operation		N/A
19.1	The tests of 19.7 to 19.9 are not carried out		N/A
19.1.101	Appliance operated at rated voltage with each of the following fault conditions:		N/A
	- short circuit of the terminals of the motor, including any capacitor incorporated in the motor circuit		N/A
	- short circuit of each diode of the rectifier		N/A
	- open circuit of the supply to the motor		N/A
	- open circuit of any parallel resistor, the motor being in operation		N/A
	Only one fault simulated at a time, the tests carried out consecutively		N/A
22	Construction		N/A
22.1.101	For class I appliances incorporating a motor supplied by a rectifier circuit, the d.c. circuit being insulated from accessible parts of the appliance by double or reinforced insulation		N/A
	Compliance checked by the tests specified for double and reinforced insulation		N/A
J	ANNEX J (NORMATIVE) COATED PRINTED CIRCUIT BOARDS		N/A
	Testing of protective coatings of printed circuit boards carried out in accordance with IEC 60664-3 with the following modifications:		N/A
5.7	Conditioning of the test specimens		N/A
	When production samples are used, three samples of the printed circuit board are tested		N/A
5.7.1	Cold		N/A
	The test is carried out at -25 °C		N/A
5.7.3	Rapid change of temperature		N/A
	Severity 1 is specified		N/A
5.9	Additional tests		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	This subclause is not applicable		N/A
K	ANNEX K (NORMATIVE) OVERVOLTAGE CATEGORIES		N/A
	The information on overvoltage categories is extracted from IEC 60664-1		N/A
	Overvoltage category is a numeral defining a transient overvoltage condition		N/A
	Equipment of overvoltage category IV is for use at the origin of the installation		N/A
	Equipment of overvoltage category III is equipment in fixed installations and for cases where the reliability and the availability of the equipment is subject to special requirements		N/A
	Equipment of overvoltage category II is energy consuming equipment to be supplied from the fixed installation		N/A
	If such equipment is subjected to special requirements with regard to reliability and availability, overvoltage category III applies		N/A
	Equipment of overvoltage category I is equipment for connection to circuits in which measures are taken to limit transient overvoltages to an appropriate low level		N/A
L	ANNEX L (INFORMATIVE) GUIDANCE FOR THE MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES		P
	Information for the determination of clearances and creepage distances		P
M	ANNEX M (NORMATIVE) POLLUTION DEGREE		P
	The information on pollution degrees is extracted from IEC 60664-1		P
	Pollution		P
	The microenvironment determines the effect of pollution on the insulation, taking into account the macroenvironment		P
	Means may be provided to reduce pollution at the insulation by effective enclosures or similar		P
	Minimum clearances specified where pollution may be present in the microenvironment		P
	Degrees of pollution in the microenvironment		P
	For evaluating creepage distances, the following degrees of pollution in the microenvironment are established:		P

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- pollution degree 1: no pollution or only dry, non-conductive pollution occurs. The pollution has no influence		N/A
	- pollution degree 2: only non-conductive pollution occurs, except that occasionally a temporary conductivity caused by condensation is to be expected		N/A
	- pollution degree 3: conductive pollution occurs or dry non-conductive pollution occurs that becomes conductive due to condensation that is to be expected		P
	- pollution degree 4: the pollution generates persistent conductivity caused by conductive dust or by rain or snow		N/A
N	ANNEX N (NORMATIVE) PROOF TRACKING TEST		N/A
	The proof tracking test is carried out in accordance with IEC 60112 with the following modifications:		N/A
7	Test apparatus		N/A
7.3	Test solutions		N/A
	Test solution A is used		N/A
10	Determination of proof tracking index (PTI)		N/A
10.1	Procedure		N/A
	The proof voltage is 100V, 175V, 400V or 600V.. :		N/A
	The test is carried out on five specimens		N/A
	In case of doubt, additional test with proof voltage reduced by 25V, the number of drops increased to 100		N/A
10.2	Report		N/A
	The report states if the PTI value was based on a test using 100 drops with a test voltage of (PTI-25) V		N/A
O	ANNEX O (INFORMATIVE) SELECTION AND SEQUENCE OF THE TESTS OF CLAUSE 30		P
	Description of tests for determination of resistance to heat and fire		P
P	ANNEX P (INFORMATIVE) GUIDANCE FOR THE APPLICATION OF THIS STANDARD TO APPLIANCES USED IN TROPICAL CLIMATES		N/A
	Modifications applicable for class 0 and 01 appliances having a rated voltage exceeding 150V, intended to be used in countries having a tropical climate and that are marked with symbol IEC 60417-6332		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Modifications may also be applied to class 1 appliances having a rated voltage exceeding 150V, intended to be used in countries having a tropical climate and that are marked with symbol IEC 60417-6332, if liable to be connected to a supply mains that excludes the protective earthing conductor		N/A
5.7	The ambient temperature for the tests of clauses 11 and 13 is 40 +3/0 °C		N/A
7.1	The appliance marked with symbol IEC 60417-6332		N/A
7.12	The instructions state that the appliance is to be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA		N/A
	The instructions state that the appliance is considered to be suitable for use in countries having a tropical climate, but may also be used in other countries		N/A
	If symbol IEC 60417-6332 is used, its meaning is explained		N/A
11.8	The values of Table 3 are reduced by 15 K		N/A
13.2	The leakage current for class I appliances not exceeding 0,5 mA		N/A
15.3	The value of t is 37 °C		N/A
16.2	The leakage current for class I appliances not exceeding 0,5 mA (mA):		N/A
19.13	The leakage current test of 16.2 is applied in addition to the electric strength test of 16.3		N/A
Q	ANNEX Q (INFORMATIVE) SEQUENCE OF TESTS FOR THE EVALUATION OF ELECTRONIC CIRCUITS		N/A
	Description of tests for appliances incorporating electronic circuits		N/A
R	ANNEX R (NORMATIVE) SOFTWARE EVALUATION		N/A
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2 validated in accordance with the requirements of this annex	Details refer to test report CN2328KZ 001	N/A
R.1	Programmable electronic circuits using software		N/A
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2 constructed so that the software does not impair compliance with the requirements of this standard	Details refer to test report CN2328KZ 001	N/A
R.2	Requirements for the architecture		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2 use measures to control and avoid software-related faults/errors in safety-related data and safety-related segments of the software	Table R.1	N/A
R.2.1.1	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.2 have one of the following structures:		N/A
	- single channel with periodic self-test and monitoring		N/A
	- dual channel (homogenous) with comparison		N/A
	- dual channel (diverse) with comparison		N/A
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 have one of the following structures:		N/A
	- single channel with functional test		N/A
	- single channel with periodic self-test		N/A
	- dual channel without comparison		N/A
R.2.2	Measures to control faults/errors		N/A
R.2.2.1	When redundant memory with comparison is provided on two areas of the same component, the data in one area is stored in a different format from that in the other area		N/A
R.2.2.2	Programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.2 and that use dual channel structures with comparison, have additional fault/error detection means for any fault/errors not detected by the comparison		N/A
R.2.2.3	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, means are provided for the recognition and control of errors in transmissions to external safety-related data paths		N/A
R.2.2.4	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, the programmable electronic circuits incorporate measures to address the fault/errors in safety-related segments and data indicated in table R.1 and R.2 as appropriate		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
R.2.2.5	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, detection of a fault/error occur before compliance with clause 19 is impaired		N/A
R.2.2.6	The software is referenced to relevant parts of the operating sequence and the associated hardware functions		N/A
R.2.2.7	Labels used for memory locations are unique		N/A
R.2.2.8	The software is protected from user alteration of safety-related segments and data		N/A
R.2.2.9	Software and safety-related hardware under its control is initialized and terminates before compliance with clause 19 is impaired		N/A
R.3	Measures to avoid errors		N/A
R.3.1	General		N/A
	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, the following measures to avoid systematic fault in the software are applied		N/A
	Software that incorporates measures used to control the fault/error conditions specified in table R.2 is inherently acceptable for software required to control the fault/error conditions specified in table R.1		N/A
R.3.2	Specification		N/A
R.3.2.1	Software safety requirements:		N/A
	The specification of the software safety requirements includes the descriptions listed		N/A
R.3.2.2	Software architecture		N/A
R.3.2.2.1	The specification of the software architecture includes the aspects listed <ul style="list-style-type: none"> - techniques and measures to control software faults/errors (refer to R.2.2); - interactions between hardware and software; - partitioning into modules and their allocation to the specified safety functions; - hierarchy and call structure of the modules (control flow); - interrupt handling; - data flow and restrictions on data access; - architecture and storage of data; - time-based dependencies of sequences and data 		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
R.3.2.2.2	The architecture specification is validated against the specification of the software safety requirements by static analysis		N/A
R.3.2.3	Module design and coding		N/A
R.3.2.3.1	Based on the architecture design, software is suitably refined into modules		N/A
	Software module design and coding is implemented in a way that is traceable to the software architecture and requirements		N/A
R.3.2.3.2	Software code is structured		N/A
R.3.2.3.3	Coded software is validated against the module specification by static analysis		N/A
	The module specification is validated against the architecture specification by static analysis		N/A
R.3.3.3	Software validation		N/A
	The software is validated with reference to the requirements of the software safety requirements specification		N/A
	Compliance is checked by simulation of:		N/A
	- input signals present during normal operation		N/A
	- anticipated occurrences		N/A
	- undesired conditions requiring system action		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE R.1 ^e – GENERAL FAULT/ERROR CONDITIONS (See attachment 2 for details.)						
Component ^a	Fault/error	Acceptable measures ^{b, c}	Definitions	Document reference for applied measure	Document reference for applied test	Verdict
1 CPU						N/A
1.1 Registers	Stuck at	Functional test, or periodic self-test using either: - static memory test, or - word protection with single bit redundancy	H.2.16.5 H.2.16.6 H.2.19.6 H.2.19.8.2			
1.2 VOID						—
1.3 Programme counter	Stuck at	Functional test, or Periodic self-test, or Independent time-slot monitoring, or Logical monitoring of the programme sequence	H.2.16.5 H.2.16.6 H.2.18.10.4 H.2.18.10.2			N/A
2 Interrupt handling and execution	No interrupt or too frequent interrupt	Functional test, or time-slot monitoring	H.2.16.5 H.2.18.10.4			N/A
3 Clock	Wrong frequency (for quartz synchronized clock: harmonics/sub-harmonics only)	Frequency monitoring, or time slot monitoring	H.2.18.10.1 H.2.18.10.4			N/A
4. Memory						N/A
4.1 Invariable memory	All single bit faults	Periodic modified checksum, or multiple checksum, or word protection with single bit redundancy	H.2.19.3.1 H.2.19.3.2 H.2.19.8.2			

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Clause	Requirement + Test		Result - Remark			Verdict
4.2 Variable memory	DC fault	Periodic static memory test, or word protection with single bit redundancy	H.2.19.6 H.2.19.8.2			N/A
4.3 Addressing (relevant to variable and invariable memory)	Stuck at	Word protection with single bit redundancy including the address	H.2.19.8.2			N/A
5 Internal data path	Stuck at	Word protection with single bit redundancy	H.2.19.8.2			N/A
5.1 VOID						—
5.2 Addressing	Wrong address	Word protection with single bit redundancy including the address	H.2.19.8.2			N/A
6 External communicat ion	Hamming distance 3	Word protection with multi-bit redundancy, or CRC – single work, or Transfer redundancy, or Protocol test	H.2.19.8.1 H.2.19.4.1 H.2.18.2.2 H.2.18.14			N/A
6.1 VOID						—
6.2 VOID						—
6.3 Timing	Wrong point in time Wrong sequence	Time-slot monitoring, or scheduled transmission Time-slot and logical monitoring, or comparison of redundant communication channels by either: - reciprocal comparison - independent hardware comparator Logical monitoring, or time-slot monitoring, or Scheduled transmission	H.2.18.10.4 H.2.18.18 H.2.18.10.3 H.2.18.15 H.2.18.3 H.2.18.10.2 H.2.18.10.4 H.2.18.18			N/A
7 Input/output periphery	Fault conditions specified in 19.11.2	Plausibility check	H.2.18.13			N/A

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Clause	Requirement + Test			Result - Remark		Verdict
7.1 VOID						—
7.2 Analog I/O						N/A
7.2.1 A/D and D/A- converter	Fault conditions specified in 19.11.2	Plausibility check		H.2.18.13		
7.2.2 Analog multiplexer	Wrong addressing	Plausibility check		H.2.18.13		N/A
8 VOID						—
9 Custom chips ^d e.g. ASIC, GAL, gate array	Any output outside the static and dynamic functional specification	Periodic self-test		H.2.16.6		N/A
NOTE A Stuck-at fault model denotes a fault model representing an open circuit or a non-varying signal level. A DC fault model denotes a stuck-at fault model incorporating short circuit between signal lines.						
a) For fault/error assessment, some components are divided into their sub-functions. b) For each sub-function in the table, the Table R.2 measure will cover the software fault/error. c) Where more than one measure is given for a sub-function, these are alternatives. d) To be divided as necessary by the manufacturer into sub-functions. e) Table R.1 is applied according to the requirements of R.1 to R.2.2.9 inclusive.						

S	ANNEX S (NORMATIVE) BATTERY OPERATED APPLIANCES POWERED BY BATTERIES THAT ARE NON-RECHARGEABLE OR NOT RECHARGED IN THE APPLIANCE			N/A
	The following modifications to this standard are applicable for battery-operated appliances where the batteries are either non-rechargeable (primary batteries), or			N/A
	rechargeable batteries (secondary batteries) that are not recharged in the appliance			N/A
5.8.1	If the supply terminals for the connection of the battery have no indication of polarity, the more unfavourable polarity is applied			N/A
5.S.101	Appliances intended for use with a battery box are tested with the battery box supplied with the appliance or with the battery box recommended in the instructions			N/A
5.S.102	Appliances are tested as motor-operated appliances.			N/A
7.1	Appliances marked with the battery voltage (V) and the polarity of the terminals, unless.....:			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	the polarity is irrelevant		N/A
	Appliances also marked with:		N/A
	– name, trade mark or identification mark of the manufacturer or responsible vendor		N/A
	– model or type reference		N/A
	– IP number according to degree of protection against ingress of water, other than IPX0 ..		N/A
	– type reference of battery or batteries		N/A
	If relevant, the positive terminal is indicated by the symbol IEC 60417-5005 and the negative terminal by the symbol IEC 60417-5006		N/A
	If appliances use more than one battery, they are marked to indicate correct polarity connection of the batteries		N/A
7.6	Additional symbols		N/A
7.12	The instructions contain the following, as applicable:		N/A
	– the types of batteries that may be used ..		N/A
	– how to remove and insert the batteries		N/A
	– non-rechargeable batteries are not to be recharged		N/A
	– rechargeable batteries are to be removed from the appliance before being charged		N/A
	– different types of batteries or new and used batteries are not to be mixed		N/A
	– batteries are to be inserted with the correct polarity		N/A
	– exhausted batteries are to be removed from the appliance and safely disposed of		N/A
	– if the appliance is to be stored unused for a long period, the batteries are removed		N/A
	– the supply terminals are not to be short-circuited		N/A
11.5	Appliances are supplied with the most unfavourable supply voltage between		N/A
	– 0,55 and 1,0 times the battery voltage, if the appliance can be used with non-rechargeable batteries		N/A
	– 0,75 and 1,0 times battery voltage, if the appliance is designed for use with rechargeable batteries only		N/A
	The values specified in Table S.101 for the internal resistance per cell of the battery is taken into account		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
19.1	The tests are carried out with the battery fully charged unless otherwise specified		N/A
19.13	The battery does not rupture or ignite		N/A
19.S.101	Appliances are supplied with the voltage specified in 11.5. The supply terminals having an indication of polarity are connected to the opposite polarity, unless		N/A
	such a connection is unlikely to occur due to the construction of the appliance		N/A
19.S.102	For appliances with provision for multiple batteries, one or more of the batteries are reversed and the appliance is operated, if reversal of batteries is allowed by the construction		N/A
25.5	The flexible leads or flexible cord used to connect an external battery or battery box in is connected to the appliance by a type X attachment		N/A
25.13	This requirement is not applicable to the flexible leads or flexible cord connecting external batteries or a battery box with an appliance		N/A
25.S.101	Appliances have suitable means for connection of the battery. If the type of battery is marked on the appliance, the means of connection is suitable for this type of battery		N/A
26.5	Terminal devices in an appliance for the connection of the flexible leads or flexible cord connecting an external battery or battery box are so located or shielded that there is no risk of accidental connection between supply terminals		N/A
30.2.3.2	There is no battery in the area of the vertical cylinder used for the consequential needle flame test, unless		N/A
	the battery is shielded by a barrier that meets the needle flame test of Annex E, or		N/A
	that comprises material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
T	ANNEX T (NORMATIVE) UV-C RADIATION EFFECT ON NON-METALLIC MATERIALS		N/A
	Requirements for non-metallic materials subject to direct or reflected UV-C radiation exposure and whose mechanical and electrical properties are relied upon for compliance with the		N/A
	Does not apply to glass, ceramic and similar materials		N/A
	Tested as specified in ISO 4892-1 and ISO 4892-2, with the following modifications:		N/A
	Modifications to ISO 4892-1:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.6	The UV-C emitter is a low pressure mercury lamp with a quartz envelope having a continuous spectral irradiance of 10 W/m ² at 254 nm		N/A
	Subclause 5.1.6.1 and Table 1 are not applicable		N/A
5.2.4	The black-panel temperature shall be 63 °C +/- 3 °C		N/A
5.3.1	Humidification of the chamber air is specified in part 2 when necessary		N/A
9	This clause is not applicable		N/A
	Modifications to ISO 4892-2:		N/A
7.1	At least three test specimens are tested		N/A
	Ten samples of internal wiring is tested		N/A
7.2	The specimens are attached to the specimen holders such that they are not subject to any stress		N/A
7.3	Apparatus prepared as specified		N/A
	The test specimens and, if used, the irradiance-measuring instrument are exposed for 1 000 h		N/A
7.4	If used, a radiometer is mounted and calibrated such that it measures the irradiance at the exposed surface of the test specimen		N/A
7.5	Material properties and test methods for parts providing mechanical support or impact resistance as specified in Table T.1		N/A
	Material properties and test method for electrical insulation of internal wiring as specified in Table T.2		N/A
8	This clause is not applicable		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

10.1	TABLE: Power input deviation					N/A
Input deviation of/at:	P rated (W)	P measured (W)	ΔP	Required ΔP	Remark	

Supplementary information:

10.2	TABLE: Current deviation					N/A
Current deviation of/at:	I rated (A)	I measured (A)	ΔI	Required ΔI	Remark	

Supplementary information:

11.8	TABLE: Heating test			P
	Test voltage (V)..... :	21.6V		—
	Ambient ($^{\circ}\text{C}$)..... :	20.0		—
Thermocouple locations:		Max. temperature rise measured, ΔT (K)	Max. temperature rise limit, ΔT (K)	
Enclosure		3.2	74	
Switch button		2.1	60	
Internal wire		11.0	50	
Switch ambient		1.1	60	
Battery Enclosure		12.0	20	
Motor surface		15.3	--	

Supplementary information: none

11.8	TABLE: Heating test, resistance method					N/A
	Test voltage (V)..... :					—
	Ambient, t1 ($^{\circ}\text{C}$)					—
	Ambient, t2 ($^{\circ}\text{C}$)					—
Temperature rise of winding:	R1 (Ω)	R2 (Ω)	ΔT (K)	Max. ΔT (K)	Insulation class	

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:			
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13.2	TABLE: Leakage current		N/A
	Heating appliances: 1.15 x rated input (W):		—
	Motor-operated and combined appliances: 1.06 x rated voltage (V).....:		—
Leakage current between:		I (mA)	Max. allowed I (mA)
Supplementary information:			

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

14	TABLE: Transient overvoltages					N/A
Clearance between:		CI (mm)	Required CI (mm)	Rated impulse voltage (V)	Impulse test voltage (V)	Flashover (Yes/No)
Supplementary information:						

16.2	TABLE: Leakage current		N/A
	Single phase appliances: 1.06 x rated voltage (V).....:		—
	Three phase appliances 1.06 x rated voltage divided by $\sqrt{3}$ (V).....:		—
Leakage current between:		I (mA)	Max. allowed I (mA)
Supplementary information:			

16.3	TABLE: Dielectric strength		N/A
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Clause	Requirement + Test	Result - Remark	Verdict

Test voltage applied between:	Test potential applied (V)	Breakdown / flashover (Yes/No)

Supplementary information:

17	TABLE: Overload protection	N/A
Thermocouple locations:	Max. temperature rise measured, ΔT (K)	Max. temperature rise limit, ΔT (K)

Supplementary information:

17	TABLE: Overload protection, resistance method	N/A			
	Test voltage (V)..... :	—			
	Ambient, t1 (°C)	—			
	Ambient, t2 (°C)	—			
Temperature of winding:	R1 (Ω)	R2 (Ω)	ΔT (K)	T (°C)	Max. T (°C)

Supplementary information:

19	Abnormal operation conditions						P
Operational characteristics			YES/NO	Operational conditions			
Are there electronic circuits to control the appliance operation?			Yes	Until steady condition established			
Are there “off” or “stand-by” position?			No	--			
The unintended operation of the appliance results in dangerous malfunction?			No	--			
Sub-clause	Operating conditions description	Test results description	PEC description	EMP 19.11.4	Software type required	19.11.3 PEC	Final result
19.2	--	--	N/A	N/A	N/A	N/A	--
19.3	--	--	N/A	N/A	N/A	N/A	--
19.4	--	--	N/A	N/A	N/A	N/A	--
19.5	--	--	N/A	N/A	N/A	N/A	--

IEC 60335-1							
Clause	Requirement + Test			Result - Remark			Verdict
19.6	--	--	N/A	N/A	N/A	N/A	--
19.7	--	Protective electronic circuit operated.	YES	YES	YES	YES	P
19.8	--	--	N/A	N/A	N/A	N/A	--
19.9	--	--	N/A	N/A	N/A	N/A	--
19.10	--	--	N/A	N/A	N/A	N/A	--
19.11.2	See below.	No abnormal phenomena occurred.	YES	YES	YES	YES	P
19.11.4.8	--	--	N/A	N/A	N/A	N/A	-
19.10X	--	--	N/A	N/A	N/A	N/A	--
Supplementary information: HALL_COL11 to GND, HALL_LIFT11 to 3V3, HALL_LIFT12 to 3V3, C93, C95, C15, C22, C59, C18, C68 C268, C135, C136, C149, C515, C327, C13 to GND, C14 to GND short-circuited, R206, R214, R215, R100, R926, R927, R528, R2054, R2055, MA_CAN_TX, D915(MA_CAN_RX), Hall1 open-circuited.							

19.7	TABLE: Abnormal operation, locked rotor/moving parts					P
	Test voltage (V)..... :		Fully charged battery pack		—	
	Ambient, t1 (°C)		22.3		—	
	Ambient, t2 (°C)		--		—	
Temperature of winding:		R1 (Ω)	R2 (Ω)	Δ T (K)	T (°C)	Max. T (°C)
--						
--						
Supplementary information: see above table, protected device operated.						

19.9	TABLE: Abnormal operation, running overload					N/A
	Test voltage (V)..... :				—	
	Ambient, t1 (°C)				—	
	Ambient, t2 (°C)				—	
Temperature of winding:		R1 (Ω)	R2 (Ω)	Δ T (K)	T (°C)	Max. T (°C)
Supplementary information:						

19.13	TABLE: Abnormal operation, temperature rises					N/A
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Clause	Requirement + Test	Result - Remark	Verdict

Thermocouple locations:	Max. temperature rise measured, ΔT (K)	Max. temperature rise limit, ΔT (K)

Supplementary information:

21.1	TABLE: Impact resistance			P
Impacts per surface	Surface tested	Impact energy (Nm)	Comments	
3	Enclosure	1.0	No damage	
3	Manual Stop	1.0	No damage	

Supplementary information: None

24.1	TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾	

Supplementary information: refer to attachment 1.
¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.

28.1	TABLE: Threaded part torque test				P
Threaded part identification:	Diameter of thread (mm)	Column number (I, II, or III)	Applied torque (Nm)		
Screw for fixed blade	3.9	II	1.2		

Supplementary information:none

29.1	TABLE: Clearances						P
	Overvoltage category: II					—	
		Type of insulation:					
Rated impulse voltage (V):	Min. cl (mm)	Basic (mm)	Supplementary (mm)	Reinforced (mm)	Functional (mm)	Verdict / Remark	
330	0,2* / 0,5 / 0,8**	--	--	--	--	--	
500	0,2* / 0,5 / 0,8**	--	--	--	2mm	P	
800	0,2* / 0,5 / 0,8**	--	--	--	--	--	
1 500	0,5 / 0,8** / 1,0***	--	--	--	--	--	
2 500	1,5 / 2,0***	--	--	--	--	--	

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Clause	Requirement + Test	Result - Remark	Verdict

4 000	3,0 / 3,5***	--	--	--	--	--
6 000	5,5 / 6,0***	--	--	--	--	--
8 000	8,0 / 8,5***	--	--	--	--	--
10 000	11,0 / 11,5***	--	--	--	--	--

Supplementary information:

*) For tracks on printed circuit boards if pollution degree 1 and 2

**) For pollution degree 3

***) If the construction is affected by wear, distortion, movement of the parts or during assembly

29.2	TABLE: Creepage distances, basic, supplementary and reinforced insulation										N/A
Working voltage (V):	Creepage distance (mm) Pollution degree							Type of insulation			Verdict
	1	2			3						
	Material group			Material group							
	I	II	IIIa/IIIb	I	II	IIIa/IIIb*	B**	S**	R**		
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9		—	—	
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9	—		—	
≤50	0,36	1,2	1,7	2,4	3,0	3,4	3,8	—	—		
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4		—	—	
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4	—		—	
125	0,56	1,5	2,1	3,0	3,8	4,2	4,8	—	—		
250	0,56	1,25	1,8	2,5	3,2	3,6	4,0		—	—	
250	0,56	1,25	1,8	2,5	3,2	3,6	4,0	—		—	
250	1,12	2,5	3,6	5,0	6,4	7,2	8,0	—	—		
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3		—	—	
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3	—		—	
400	2,0	4,0	5,6	8,0	10,0	11,2	12,6	—	—		
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0		—	—	
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0	—		—	
500	2,6	5,0	7,2	10,0	12,6	14,2	16,0	—	—		
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0		—	—	
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	—		—	
>630 and ≤800	3,6	6,4	9,0	12,6	16,0	18,0	20,0	—	—		
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5		—	—	

IEC 60335-1											
Clause	Requirement + Test							Result - Remark			Verdict
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	—		—	
>800 and ≤1000	4,8	8,0	11,2	16,0	20,0	22,0	25,0	—	—		
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0		—	—	
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	—		—	
>1000 and ≤1250	6,4	10,0	14,2	20,0	25,0	28,0	32,0	—	—		
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0		—	—	
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	—		—	
>1250 and ≤1600	8,4	12,6	18,0	25,0	32,0	36,0	40,0	—	—		
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0		—	—	
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	—		—	
>1600 and ≤2000	11,2	16,0	22,0	32,0	40,0	44,0	50,0	—	—		
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0		—	—	
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	—		—	
>2000 and ≤2500	15,0	20,0	28,0	40,0	50,0	56,0	64,0	—	—		
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0		—	—	
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	—		—	
>2500 and ≤3200	20,0	25,0	36,0	50,0	64,0	72,0	80,0	—	—		
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0		—	—	
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	—		—	
>3200 and ≤4000	25,0	32,0	44,0	64,0	80,0	90,0	100,0	—	—		
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0		—	—	
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	—		—	
>4000 and ≤5000	32,0	40,0	56,0	80,0	100,0	112,0	126,0	—	—		
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0		—	—	
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	—		—	
>5000 and ≤6300	40,0	50,0	72,0	100,0	126,0	142,0	160,0	—	—		
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0		—	—	
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	—		—	
>6300 and ≤8000	50,0	64,0	90,0	126,0	160,0	180,0	200,0	—	—		
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0		—	—	
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	—		—	
>8000 and ≤10000	64,0	80,0	112,0	160,0	200,0	220,0	250,0	—	—		
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0		—	—	

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Clause	Requirement + Test							Result - Remark			Verdict
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	—		—	
>10000 and ≤12500	80,0	100,0	142,0	200,0	250,0	280,0	320,0	—	—		
Supplementary information:											
*) Material group IIIb is allowed if the working voltage does not exceed 50 V											
**) B = Basic insulation, S = Supplementary insulation, R = Reinforced insulation											

29.2	TABLE: Creepage distances, functional insulation								P
Working voltage (V):	Creepage distance (mm)							Verdict / Remark	
	Pollution degree								
	1	2			3				
		Material group			Material group				
		I	II	IIIa/IIIb	I	II	IIIa/IIIb*		
≤10	0,08	0,4	0,4	0,4	1,0	1,0	1,0	--	
50	0,16	0,56	0,8	1,1	1,4	1,6	1,8	P	
125	0,25	0,71	1,0	1,4	1,8	2,0	2,2	--	
250	0,42	1,0	1,4	2,0	2,5	2,8	3,2	--	
400	0,75	1,6	2,2	3,2	4,0	4,5	5,0	--	
500	1,0	2,0	2,8	4,0	5,0	5,6	6,3	--	
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	--	
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	--	
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	--	
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	--	
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	--	
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	--	
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	--	
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	--	
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	--	
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	--	
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	--	
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	--	
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	--	
Supplementary information:									
*) Material group IIIb is allowed if the working voltage does not exceed 50 V									

30.1	TABLE: Ball Pressure Test of Thermoplastics							P
------	---	--	--	--	--	--	--	---

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Clause	Requirement + Test	Result - Remark	Verdict

Allowed impression diameter (mm)		2.0	—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)
Enclosure for mower	--	75	1.0
Polo plate for mower	--	75	1.4
Polo plate for charging station	--	75	0.9
Battery pack	--	75	1.2
Polo plate of battery pack	--	75	1.2
Supplementary information: none			

30.2	TABLE: Resistance to heat and fire - Glow wire tests							P
Object/ Part No./ Material	Manufacturer / trademark	Glow wire test (GWT); (°C)						Verdict
		550	650		750		850	
			te	ti	te	ti		
Enclosure for mower	--	X	-	--	--	--	--	P
Polo plate for mower	--	--	--	--	--	--	X	P
Polo plate for charging station	--	--	--	--	0	0	X	P
Battery pack	--	--	--	--	0	0	X	P
Polo plate of battery pack	--	--	--	--	0	0	X	P
Terminal	--	--	--	--	0	0	X	P
Object/ Part No./ Material	Manufacturer / trademark	Glow-wire flammability index (GWFI), °C				GW ignition temp. (GWIT), °C		Verdict
		550	650	750	850	675	775	
--								
The test specimen passed the glow wire test (GWT) with no ignition [(te – ti) ≤ 2s] (Yes/No):								Yes
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

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Clause	Requirement + Test	Result - Remark	Verdict

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

30.2/30.2.4	TABLE: Needle- flame test (NFT)				N/A
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict

Supplementary information:

- NFT not relevant (or applicable) for Parts of material classified as V-0 or V-1
- NFT not relevant (or applicable) for Base material of PCBs classified as V-0 or if relevant VTM-0

IEC 60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 60335-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY – PART 1: GENERAL REQUIREMENTS			
Differences according to		EN 60335-1:2012 + AC:2014 + A11:2014 + A13:2017 + A1:2019 + A14:2019 + A2:2019 EN 62233:2008 + AC:2008	
Attachment Form No.		EU_GD_IEC60335_1X	
Attachment Originator		Nemko AS	
Master Attachment.....		2019-09-24	
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	CENELEC COMMON MODIFICATIONS (EN)		P
6.1	Delete “class 0” and “class 01”		N/A
7.1	Single-phase appliances to be connected to the supply mains: 230 V covered		N/A
	Multi-phase appliances to be connected to the supply mains: 400 V covered		N/A
7.12	The instructions include the substance of the following:		N/A
	- this appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved		N/A
	- children shall not play with the appliance		N/A
	- cleaning and user maintenance shall not be made by children without supervision		N/A
8.1.1	Also test probe 18 of EN 61032 is applied		N/A
	The appliance being in every possible position during the test, except that		N/A
	appliances normally used on the floor and having a mass exceeding 40 kg are not tilted		N/A
	The force on the probe in the straight position is increased to 10 N when probe 18 is used		N/A
	When using test probe 18 the appliance is fully assembled as in normal use without any parts removed, and		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	parts intended to be removed for user maintenance are also not removed		N/A
8.1.3	Instead of test probe B, test probe 18 and test probe 13, for appliances other than those of class II, test probe 41 of IEC 61032 is applied with a force not exceeding 1 N to live parts of visibly glowing heating elements, all poles of which can be disconnected by a single switching action		N/A
8.2	Compliance is checked by inspection and by applying the test probes of EN 61032 in accordance with the conditions specified in 8.1.1		N/A
	Test probe B and probe 18 of EN 61032 are applied to built-in appliances and fixed appliances only after installation		N/A
15.1.2	Appliances with an automatic cord reel tested with the cord in the most unfavourable position so that the reeling of the wet cord may affect electrical insulation during operation, the cord not being dried before reeling		N/A
20.2	For appliances having dangerous moving parts, due to their working function, e.g. the needle of a sewing machine, tools of kitchen machines or the blade of an electrical knife, full protection is not possible for performing their intended use		N/A
	When using a test probe similar to test probe B of EN 61032, having a circular stop face and applied with a force of 5N, the accessories and detachable covers are removed		N/A
	When using test probe 18 it is applied with a force of 2,5N on the appliance fully assembled		N/A
22.12	Other parts intended to be detached during use, maintenance or cleaning (e.g. batteries, battery covers, lids, attachments, steam nozzles) are not considered as parts providing a similar function as handles, knobs, grips, levers		P
22.17	The requirement is not applicable to built-in appliances		N/A
24.1	Components comply with the safety requirements specified in the relevant EN standards as far as they reasonably apply		P
	Motors are not required to comply with EN 60034-1, but tested as part of the appliance according to this standard		P
	Relays are tested as part of the appliance according to this standard		N/A
	Relays may be alternatively tested to EN 60730-1 and the additional requirements in EN 60335-1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The requirements of Clause 29 of this standard apply between live parts of components and accessible parts of the appliance		N/A
	Components may comply with the requirements for clearances and creepage distances for functional insulation as specified in the relevant component standard		P
	The requirements of 30.2 of this standard apply to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections inside components		P
	Components that have not been tested and shown to comply with the EN standard for the relevant component are tested according to the requirements of 30.2 of this standard		N/A
	Components that have been tested and shown to comply with the resistance to fire requirements in the EN standard for the relevant component need not be retested provided that:		P
	- the severity specified in the component standard is not less than the severity specified in 30.2, and		P
	- the test report for the component states the values of t_e and t_i acc. to EN 60695-2-11		N/A
	If the above two conditions are not satisfied, the component is tested as part of the appliance		P
	Power electronic converter circuits are not required to comply with EN 62477-1, but tested as part of the appliance according to this standard		N/A
	Unless components have been tested and found to comply with the relevant EN standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9		N/A
	For components mentioned in 24.1.1 to 24.1.9, no additional tests specified in the relevant EN standard for the component are necessary other than those specified in 24.1.1 to 24.1.9		N/A
	Components that have not been tested and found to comply with the relevant EN standard, and		N/A
	components that are not marked or not used in accordance with their marking,		N/A
	are tested in accordance with the conditions occurring in the appliance, the number of samples being that required by the relevant standard		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Lamp-holders and starter-holders that have not been tested and found to comply with the relevant EN standard are tested as a part of the appliance and additionally comply with the gauging and interchangeability requirements of the relevant EN standard under the conditions occurring in the appliance		N/A
	Where the relevant EN standard specifies these gauging and interchangeability requirements at elevated temperatures, the temperatures measured during the tests of Clause 11 are used		N/A
	There are no additional tests specified for nationally standardized plugs such as those detailed in IEC/TR 60083 or connectors complying with the standard sheets of EN 60320-1 and EN 60309, unless they are specifically mentioned in the text of this standard		N/A
	Plugs and socket-outlets and other connecting devices of interconnection cords are not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1, or		N/A
	with connectors and appliance inlets complying with the standard sheets of EN 60320-1, if		N/A
	direct supply to these parts from the supply mains gives rise to a hazard		N/A
	For plugs used in CENELEC countries Annex ZH applies		N/A
24.1.7	When the remote operation of the appliance is via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is EN 41003		N/A
	Compliance with Clause 8 of this standard is not impaired by connecting the appliance to a device covered by EN 41003		N/A
24.Z1	Type S2 and S3 capacitors according to EN 60252-1 are not required to undergo the testing as required by 30.2.2 and 30.2.3.1		N/A
25.1	Plugs and pins for insertion into socket outlets follow the relevant standards sheets in Annex ZH		N/A
25.7	Rubber sheathed cords (60245 IEC 53) are not suitable for appliances intended to be used outdoors, or		N/A
	when they are liable to be exposed to significant amount of ultraviolet radiation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
25.25	Instead of IEC/TR 60083, dimensions of the pins and engagement face of plugs of appliances that are inserted into socket-outlets are in accordance with the dimensions of the relevant plug standard		N/A
	Common plugs and socket-outlets types in CENELEC countries as shown in Annex ZH		N/A
26.11	Conductors connected by soldering are not considered to be positioned or fixed so that reliance is not placed upon the soldering alone to maintain them in position,		N/A
	unless they are held in place near the terminals independently of the solder		N/A
29.3.Z1	Appliance constructed so that if there is a possibility of damaging the insulation during installation, the insulation withstands the scratch and penetration test of 21.2		N/A
32	Compliance regarding electromagnetic fields is checked according to EN 62233		P
Annex I, 19.1.101	The appliance is supplied at rated voltage and operated under normal operation with each of the fault conditions specified		N/A
	The duration of any of the tests is as specified in 19.7		N/A
ZA	ANNEX ZA (NORMATIVE) SPECIAL NATIONAL CONDITIONS (EN)		N/A
	Denmark, Sweden, Norway and Finland		N/A
7.12.8	The maximum inlet water pressure is at least 1,0 MPa		N/A
	Norway		N/A
19.5	The test is also applicable to appliances intended to be permanently connected to fixed wiring		N/A
	Norway		N/A
22.2	The second paragraph of this subclause, dealing with single-phase, permanently connected class I appliances having heating elements, is not applicable due to the supply system		N/A
	Denmark		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
22.47	The maximum inlet water pressure is at least 1,0 MPa		N/A
	Ireland and United Kingdom		N/A
25.8	In the table, the line >10 A and ≤16 A is replaced with:		N/A
	> 10 and ≤ 13 1,25 (1,0) ^b		N/A
	> 13 and ≤ 16 1,5 (1,0) ^b		N/A
ZB	ANNEX ZB (INFORMATIVE) A-DEVIATIONS		N/A
	Ireland		N/A
25.1 and 25.25	These regulations apply to all plugs for domestic use at a voltage of not less than 200 V and in general allow only plugs complying with I.S. 401:1997, or equivalent, to be fitted to domestic appliances		N/A
	United Kingdom		N/A
25.1 and 25.25	These regulations apply to all plugs for domestic use at a voltage of not less than 200 V and in general allow only plugs to BS 1363 to be fitted to domestic appliances.		N/A
	It also allows plugs to BS 4573 and EN 50075 to be fitted to shavers and toothbrushes		N/A
ZC	ANNEX ZC (NORMATIVE) NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS		N/A
	A list of documents referred to in the text of this standard in such a way that some or all of their content constitutes requirements of this document		N/A
ZD	ANNEX ZD (INFORMATIVE) IEC and CENELEC CODE DESIGNATIONS FOR FLEXIBLE CORDS		N/A
	List of IEC and CENELEC code designations for flexible cords		N/A
ZE	ANNEX ZE (INFORMATIVE) SPECIFIC ADDITIONAL REQUIREMENTS FOR APPLIANCES AND MACHINES INTENDED FOR COMMERCIAL USE		N/A

IEC 60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
7.1	Business name and full address of the manufacturer and, where applicable, his authorized representative		N/A
	Model or type reference		N/A
	Serial number, if any		N/A
	Production year		N/A
	Designation of the appliance.....		N/A
7.12	Instructions provided with the appliance so that the appliance can be used safely		N/A
	The instructions contain at least the following information:		N/A
	- the business name and full address of the manufacturer and, where applicable, his authorized representative		N/A
	- model or type reference of the appliance as marked on the appliance itself, except for the serial number		N/A
	- the designation of the appliance together with its explanation in case it is given by a combination of letters and/or numbers		N/A
	- the general description of the appliance, when needed due to the complexity of the appliance		N/A
	- specific precautions required during installation, operation, adjusting, user maintenance, cleaning, repairing or moving		N/A
	- when needed drawings, diagrams, descriptions and explanations necessary for the safe use and user maintenance of the appliance		N/A
	- the possible reasonably foreseeable misuse and, whenever relevant, a warning against the effects it may have on the safe use of the appliance		N/A
	The words "Original instructions" appear on the language version(s) verified by the manufacturer or by the authorized representative		N/A
	When a translation of the original instructions has been provided by a person introducing the appliance on the market; the meaning of the sentence "Translation of the original instructions" appear in the relevant instructions delivered with the appliance		N/A
	The instructions for maintenance/service to be done by specialized personnel, mandated by the manufacturer or the authorized representative may be supplied in only one Community language which the specialized personnel understand		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The instructions indicate the type and frequency of inspections and maintenance required for safe operation including the preventive maintenance measures		N/A
7.12.ZE1	If needed for specific appliances, the following information to be given:		N/A
	- on use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns, if these operations have consequences on stability of the appliance in order to avoid overturning, falling or uncontrolled movements of the appliance or of its component parts		N/A
	- on how to maintain adequate mechanical stability when in use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance		N/A
	- on the protective measures to be taken by the user, including, where appropriate, the personal protective equipment to be provided		N/A
	- on the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur the operating method to safely unblock the appliance		N/A
	- on the specifications on the spare parts to be used, when these affect the health and safety of the operator		N/A
	- on airborne noise emissions, determined and declared in accordance with the relevant Part 2, which includes:		N/A
	- the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB(A)		N/A
	- where this level does not exceed 70 dB(A), this fact is indicated		N/A
	- the peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20 µPa).....:		N/A
	- the A-weighted sound power level emitted by the machinery, where the A-weighted emission sound pressure level at workstations exceeds 80 dB(A)		N/A
7.12.ZE2	The instructions include a warning to disconnect the appliance from its power source during service and when replacing parts		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If the removal of the plug is foreseen, it is clearly indicated that the removal of the plug is such that an operator can check from any of the points to which he has access that the plug remains removed		N/A
	If this is not possible, due to the construction of the appliance or its installation, a disconnection with a locking system in the isolated position is provided		N/A
19.11.4.8	The appliance continues to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage fluctuation occurred, or		N/A
	a manual operation is required to restart it		N/A
20.1	Appliances and their components and fittings have adequate mechanical stability during transportation, assembly, dismantling and any other action involving the appliance		N/A
20.2	Dangerous moving transmission parts safeguarded either by design or guards		N/A
	When guards are used, they are fixed guards, interlocking movable guards or protective devices		N/A
	Moving parts directly involved in the function of the appliance which cannot be made completely inaccessible fitted with:		N/A
	- fixed guards or interlocking movable guards preventing access to those sections of the parts that are not used in the work, and		N/A
	- adjustable guards restricting access to those sections of the moving parts where access is necessary		N/A
	Interlocking movable guards used where frequent access is required		N/A
21.1	Appliances and their components and fittings have adequate mechanical strength and is constructed to withstand such rough handling that may be expected in normal use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance		N/A
22.ZE.1	For appliances provided with a seat, the seat gives adequate stability		N/A
	The distance between the seat and the control devices capable of being adapted to the operator		N/A
22.ZE.2	For appliances provided with separate devices for the start and the stop functions, the stop function is unambiguously identifiable and does always override the start function		N/A

IEC 60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	For appliances provided with one device performing the start and the stop function, the stop function is unambiguously identifiable and does always override the start function		N/A
22.ZE.3	Appliances designed in such a way that incorrect mounting is avoided, if this can lead to an unsafe situation		N/A
	If this is not possible, information on the correct mounting is given directly on the part and/or the enclosure		N/A
22.ZE.4	Where the weight, size or shape prevents appliances from being moved manually, they are fitted with attachments for lifting gear, or		N/A
	so designed that they can be fitted with such attachments, or		N/A
	be shaped in such a way that standard lifting gear can easily be used		N/A
	Appliances to be moved manually are constructed or equipped so that they can be moved easily and safely		N/A
22.ZE.5	The fixing systems of fixed guards which prevent access to dangerous moving transmission parts only removable with the use of tools		N/A
	If such guards have to be removed by the user for routine cleaning or maintenance their fixing systems remain attached to the fixed guards or to the machine after removal		N/A
	Where possible, guards are incapable of remaining in place without their fixings		N/A
	This does not apply if, after removal of the screws, or if the component is incorrectly repositioned, the appliance becomes inoperative		N/A
	Movable guards are interlocked		N/A
	The interlocking devices prevent the start of hazardous appliance functions until the guards are fixed in their position, and give a stop command whenever they are no longer closed		N/A
	Where it is possible for an operator to reach the danger zone before the risk due to hazardous appliance functions has ceased, movable guards associated with a guard locking device in addition to an interlocking device that:		N/A
	- prevents the start of hazardous appliance functions until the guard is closed and locked, and		N/A
	- keeps the guard closed and locked until the risk of injury from the hazardous appliance functions has ceased		N/A

IEC 60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Interlocking movable guards remain attached to the appliance when open, and		N/A
	they are designed and constructed in such a way that they can be adjusted only by means of an intentional action		N/A
22.ZE.6	Interlocking movable guards designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous appliance functions		N/A
	The guard is opened to the extent needed to cause the interlocking to operate and is then closed, the number of operations being defined in the specific Part 2.....:		N/A
	After this test any defect that may be expected in normal use is applied to the interlock system, including interruption of the supply, only one defect being simulated at a time		N/A
	After these tests the interlock system is fit for further use		N/A
22.ZE.7	Adjustable guards restricting access to areas of the moving parts strictly necessary for the work are:		N/A
	- adjustable manually or automatically, depending on the type of work involved, and		N/A
	- readily adjustable without the use of tools		N/A
22.ZE.8	In case of interruption, re-establishment after an interruption or fluctuation in whatever manner of the power supply, the appliance does not restart		N/A
	However, automatic restarting of the operation is allowed if the appliance may continue to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage interruption or fluctuation occurred		N/A
22.ZE.9	Appliances fitted with means to isolate them from all energy sources		N/A
	Such isolators are clearly identified, and		N/A
	they are capable of being locked if reconnection endanger persons		N/A
	After the energy source is disconnected, it is possible to dissipate any energy remaining or stored in the circuits of the appliance without risk to persons		N/A
ZF	ANNEX ZF (INFORMATIVE) CRITERIA APPLIED FOR THE ALLOCATION OF PRODUCTS COVERED BY STANDARDS IN THE EN 60335 SERIES UNDER LVD OR MD		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	List of standards under CENELEC/TC61 with the allocation under the LVD (Low Voltage Directive) or the MD (Machinery Directive)		N/A
ZG	ANNEX ZG (NORMATIVE) UV APPLIANCES		N/A
	The following modifications to this standard apply to appliances having UV emitters		N/A
	This annex is not applicable to appliances covered by the scopes of IEC 60335-2-27, IEC 60335-2-59 or IEC 60335-2-109		N/A
7.12.ZG	The instructions for appliances incorporating UVC emitters include the substance of the following: WARNING — This appliance contains a UV emitter. Do not stare at the light source		N/A
32	For appliances incorporating UV emitters the manufacturer delivers a declaration providing evidence that the plastic material exposed to the radiation is UV resistant		N/A
ZH	ANNEX ZH (INFORMATIVE) Common plug and socket-outlet types in CENELEC countries		N/A
	In general, supply cords of single-phase appliances having a rated current not exceeding 16 A are fitted with a plug complying with the following standard sheets:		N/A
	- for class I appliances or class II appliances with functional earth, standard sheet EU2, EU3 or EU4:		N/A
	- for class II appliances, standard sheet EU5, EU6 or EU7		N/A
	There are exemptions or differences in certain CENELEC countries		N/A
ZI	ANNEX ZI (INFORMATIVE) Information on the application of A11:2014 to EN 60335-1:2012 CENELEC CLC/TC 61(SEC)2096A		P
	Clarification of the application of parts 2 in conjunction with the 2002 or 2012 version of EN 60335-1		P
ZZA	ANNEX ZZA (INFORMATIVE) RELATIONSHIP BETWEEN THIS EUROPEAN STANDARD AND THE SAFETY OBJECTIVES OF DIRECTIVE 2014/35/EU [2014 OJ L96] AIMED TO BE COVERED		P
	This standard provides one means of conforming to safety objectives of Directive 2014/35/EU		P

IEC 60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	When cited in the Official Journal under that Directive, compliance with the normative clauses of this standard given in Table ZZA.1 confers a presumption of conformity with the safety objectives of that Directive and associated EFTA regulations		P
	Compliance with this Part 1 when used together with the relevant Part 2 provides one means of conformity with the safety objectives		P
ZZB	ANNEX ZZB (INFORMATIVE) RELATIONSHIP BETWEEN THIS EUROPEAN STANDARD AND THE ESSENTIAL REQUIREMENTS OF DIRECTIVE 2006/42/EC AIMED TO BE COVERED		P
	This standard provides one means of conforming to essential requirements of EU Directive 2006/42/EC		P
	When cited in the Official Journal under that Directive, compliance with the normative clauses of this standard given in Table ZZB.1 confers a presumption of conformity with the essential requirements of that Directive and associated EFTA regulations		P
	Compliance with this Part 1 when used together with the relevant Part 2 provides one means of conformity with the essential health and safety requirements		P
	ANNEX EN 62233:2008 + AC:2008 EMF- ELECTROMAGNETICS FIELDS		N/A
	The tested product also complies with the requirements of EN 62233:2008		N/A
	Limit100%		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 60335-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY – PART 1: GENERAL REQUIREMENTS			
Differences according to : EN 60335-1:2012/A15: 2021			
Attachment Form No. : EU_GD_IEC60335_1X			
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	Stability and mechanical hazards		P
20.2	<i>Replace “dangerous” with “hazardous” (twice).</i>		N/A
22.44	<i>In sub Clause 22.44, replace the text by the following:</i>		N/A
	An appliance is child-appealing if one of the following criteria is present: — appliance decorated using faces, cartoon like characters, or similar images; — appliance using shapes representing animals, characters, persons or scale models.		N/A
	An appliance is child-appealing if more than one of the following criteria are present: — using non-functional light (functional light is e.g. illumination of an object or area, signal indicating status of an appliance); — using non-functional sound (e.g. music); — using non-functional movement.		N/A
	If the appliance is child-appealing, has a mass less than 4 kg or is mounted or normally intended for use at a height less than 850 mm, the following conditions shall be met:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict								
	<p>— No surface (both functional surfaces and non-functional) that are accessible by means of test probe 19 of IEC 61032 located at a height less than 850 mm shall exceed the temperature rises stated below:</p> <p><i>Temperature rise</i></p> <table> <tr> <td>– of bare metal</td> <td>38K</td> </tr> <tr> <td>– of coated metal</td> <td>42K</td> </tr> <tr> <td>– of glass and ceramic</td> <td>51K</td> </tr> <tr> <td>– of plastic having a thickness exceeding 0,4 mm</td> <td>58K</td> </tr> </table>	– of bare metal	38K	– of coated metal	42K	– of glass and ceramic	51K	– of plastic having a thickness exceeding 0,4 mm	58K		N/A
– of bare metal	38K										
– of coated metal	42K										
– of glass and ceramic	51K										
– of plastic having a thickness exceeding 0,4 mm	58K										
	— Hazardous moving parts shall not be accessible by means of test probe 19 of IEC 61032 under the conditions specified for test probe 18 in Clause 20.2.		N/A								
	— Live parts shall not be accessible by means of test probe 19 of IEC 61032 under the conditions specified for test probe 18 in Clause 8.1.1.		N/A								
	— Liquid in the appliance shall not exceed 38 °C in normal use when it is accessible by means of test probe 19 under the conditions specified for test probe 18 in Clause 20.2 or can get out of the appliance when positioned in different positions. Vessels in which two independent and sequential actions are needed to access the liquid are considered to meet the requirement.		N/A								
	— The requirement of 22.12 is applicable for all accessible parts of the appliance.		N/A								
	The requirement is not applicable to appliances where there is a toy shaped like the appliance.		N/A								
24.1	<i>In the note, replace the word “NOTE Z3” with “NOTE Z1”</i>		N/A								
24.1.7	<i>Replace the sub clause with the following:</i>										
	If the remote operation of the appliance is via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is IEC 62151.	By bluetooth	N/A								
ZA	ANNEX ZA (NORMATIVE) SPECIAL NATIONAL CONDITIONS (EN)		N/A								
	<i>Modify the reference for Clause 25.8 by adding Cyprus to the countries listed</i>		N/A								
ZB	Annex ZB (informative) A-deviations		N/A								

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Clause	Requirement + Test	Result - Remark	Verdict
	<i>Delete the second paragraph, including the note, starting with: "This European Standard/ Harmonization Document"</i>		N/A
ZC	ANNEX ZC (NORMATIVE) NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS		N/A
	The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.		N/A
ZF	ANNEX ZF (INFORMATIVE) CRITERIA APPLIED FOR THE ALLOCATION OF PRODUCTS COVERED BY STANDARDS IN THE EN 60335 SERIES UNDER LVD OR MD		N/A
ZH	ANNEX ZH (INFORMATIVE) Common plug and socket-outlet types in CENELEC countries		N/A

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
5	GENERAL CONDITIONS FOR THE TESTS This clause of part 1 is applicable except as follows:		P
5.1	Addition: Where an electronic speed control device can be adjusted, it is set for the highest speed.	No such device	N/A
5.2	Replacement: A new machine shall be used for each of the tests of Clause 21, unless otherwise agreed by the manufacturer.		P
5.8.1	Replacement: Unless otherwise specified, a fully charged battery shall be used for each test. Where for consecutive tests the same battery is specified there shall be a minimum of 1 minute rest time between tests.		P
6	CLASSIFICATION This clause of part 1 is applicable except as follows:		P
6.1	Replacement: Appliances shall be of one of the following classes with respect to protection against electric shock: – machines and charging stations with a rated voltage above 42 V shall be class II; – parts of machines with an integrated mains powered charger shall be class II; other parts complying with SELV shall be at least class III; – charging stations supplied with SELV shall be at least class III; – other machines shall be at least class III. – Battery powered machines incorporating battery chargers shall be class II. Other battery-powered machines shall be class III Compliance is checked by inspection and by the relevant tests.	Class III appliance	P
6.2	Addition: Class II parts of appliances shall be at least IPX4. Class III appliances shall be at least IPX1	See label	P
7	MARKING This clause of part 1 is applicable except as follows:		P
7.1	Additions:		P
	Add the following indents:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- business name and full address of the manufacturer and, where applicable, his authorized representative;	See label	P
	- year of construction	See label	P
	- mass in kilograms	See label	P
	- designation of machinery. This may be achieved by a combination of letters and/or numbers	See label	P
	- designation of series or type, allowing the technical identification of the product. This may be achieved by a combination of letters and/or numbers and may be combined with the designation of machinery	See label	P
	- rated power in kilowatts or rated current in amperes for mains supplied chargers	See label	P
	- cutting width in centimeters.	See label	P
	Controls which may give rise to a hazard when operated shall be marked or so placed as to indicate clearly which part of the machine they control.		P
	The following warnings shall be located in easily visible positions, indicating:		P
	On the machine:		P
	WARNING – Read instruction manual before operating the machine		P
	WARNING – Keep a safe distance from the machine when operating		P
	WARNING – Do not ride on the machine		P
	WARNING – Remove (or operate) the disabling device before working on or lifting the machine	Remove the disabling device before working on or lifting the machine	P
	CAUTION – Do not touch rotating blade.		P
	For machines equipped with a manual controller, the manual controller shall be marked with:	Device not supplied by the manufacturer	N/A
	WARNING – Read instruction manual before operating the machine		N/A
	WARNING – Keep a safe distance from the machine when operating		N/A
	Marking giving cautionary information shall be located as close as practicable to the relevant hazard		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Such marking shall be in one of the official languages of the country in which the machine is to be sold. Instead of written markings, symbols according to Annex EE are allowed. Symbols according to EN ISO 3767-1, EN ISO 3767-3, EN ISO 11684 and EN ISO 7010 may also be used as appropriate.		P
	Contrasting colours shall be used unless the symbols are cast, embossed or stamped when colours are not required. If symbols are used, their significance shall be described in the instruction manual		P
	A label intended to be exposed to the weather shall be suitable for outdoor exposure. Labels shall form a durable bond with the base material surface and shall show no appreciable loss of adhesion or legibility during weathering exposure. Labels shall not curl at the edges.		P
	Also:		P
	- the cutting means shall be marked for identification;	Mammotion LOGO	P
	- if a grass catcher adapter is used, instructions shall be affixed to the machine near the discharge opening and to the catcher adapter stating that the machine shall not be operated without either the entire grass catcher or guard in place.		P
7.6	Addition: Additional symbols are shown in Annex EE.		P
7.8	Addition: If a cell or battery is intended to be replaced by the user and it is possible for it to be put in a reverse polarity then the correct location and polarity shall be marked at its intended location.	Not replaced by the user.	N/A
7.9	Modification: Replace the first paragraph by the following: Operator controls shall have the function, direction and/or method of operation clearly identified by a durable label or mark.	"STOP" is marked durably and clearly	P
	The manual stop shall be marked with the word "STOP" and be coloured red, no other externally visible controls shall be coloured red.	Coloured red.	P
7.12	Replacement: An instruction sheet shall be supplied with the machine.		P
	The instructions shall include where appropriate the following:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	a) a repeat of those warnings required to be marked on the machine together with further explanation, where appropriate. Where safety signs are used in the marking on the machine, their function shall be explained		P
	b) a warning to never allow children, persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge or people unfamiliar with these instructions to use the machine, local regulations may restrict the age of the operator		P
	c) a warning, not to allow children to be in the vicinity or play with the machine when it is operating		P
	d) a general description of the machine and its peripherals, the intended use, instructions for the proper use of the machine including advice on what the machine and its peripherals should be used for, how to use it for the intended purpose(s) and any reasonably foreseeable misuse thereof;		P
	e) warnings concerning ways - that experience has shown might occur - in which the machinery shall not be used;		P
	f) instructions for the proper assembly and disassembly of the machine and its peripherals for use, if the machine and/or its peripherals are not supplied in a completely assembled form		P
	g) instructions for proper adjustment and any necessary user maintenance of the machine and its peripherals, including timescales and a warning of the danger of moving hazardous parts;		P
	h) instructions for the proper setting out the perimeter of the working area		P
	i) instructions for the recommended replacement or repair of, or service attention to, critical components. Where parts are consumable, the spare part shall be clearly identified, e.g. by the use of a part number or other means;		P
	j) instructions on the operation of all controls		P
	k) information how to start and operate the machine safely		P

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Clause	Requirement + Test	Result - Remark	Verdict
	l) instructions for the operating position and the correct and safe operation of the machine and its peripherals such as moving, safe positioning, handling, clearing blockages, and if a collecting facility is provided keeping the discharge chute clear of processed material, for use, preparation, maintenance and storage of the machine		P
	m) an advice to not overreach and to keep the balance at all times, to always be sure of the footing on slopes and to walk, never run while operating the machine or its peripherals		P
	n) a warning not to touch moving hazardous parts before these have come to a complete stop		P
	o) details of the battery charger to be used and advice on the safe disposal of batteries at the end of their life;		P
	p) if designed for use with an extension cord, an advice on the use, length and type of extension cords to be used (not lighter than required by Clause 25.7)		P
	q) if a collecting facility is provided with the machine, instructions for when and how to attach and detach the collection device to and from the machine		P
	r) instructions for fitting and use of attachments, if any		P
	s) information about the residual risks that remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted		P
	t) instructions to always wear substantial footwear and long trousers while operating the machine		P
	u) instructions to disconnect the supply (e.g. remove the plug from the mains or remove the disabling device) - before clearing a blockage; - before checking, cleaning or working on the machine; - after striking a foreign object to inspect the machine for damage; - if the machine starts to vibrate abnormally, and to check for damage before restarting;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	v) instructions when, where and how to inspect the machine and its peripherals, the supply and extension cord for signs of damage or ageing and, if permitted, how to make repairs		P
	w) a warning never to operate the machine and/or its peripherals with defective guards or shields, or without safety devices, or if the cord is damaged or worn		P
	x) an advice not to connect a damaged cord to the supply or touch a damaged cord before it is disconnected from the supply for the reason that damaged cords can lead to contact with live parts		P
	y) an advice to keep extension cords away from moving hazardous parts to avoid damage to the cords which can lead to contact with live parts		P
	z) instructions on the action to take in the event of accident or breakdown		P
	aa) instructions on the action to take in the event of leakage of electrolyte		P
	bb) instructions how to disconnect the machine or its peripherals from the mains, if the cord becomes damaged or entangled during use		P
	cc) recommendations - to connect the machine and/or its peripherals only to a supply circuit protected by a residual current device (RCD) with a tripping current of not more than 30 mA, - to avoid using the machine and its peripherals in bad weather conditions especially when there is a risk of lightning;		P
	dd) information about airborne noise emissions of the machine according to Annex FF, this includes: - the A-weighted emission sound pressure level at the operator position as determined according to Annex FF, where this exceeds 70 dB(A); where this level does not exceed 70 dB(A), this fact shall be indicated; - the A-weighted sound power level emitted by the machinery as determined according to Annex FF; - the uncertainties surrounding the determined noise emission values according to Annex FF	Max sound pressure level L _{PA} =58dB(A), K=3dB(A) Max sound power level L _{WA} =66dB(A), K=3dB(A)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	ee) instructions how to proceed in case of abnormal vibrations		N/A
	ff) mass in kilograms		P
	gg) Information for machines used in public areas, that warning signs shall be placed around the working area of the machine. They shall show the substance of the following text: Warning! Automatic lawnmower! Keep away from the machine! Supervise children!"		P
8	PROTECTION AGAINST ACCESSIBILITY TO LIVE PARTS		P
	This clause of part 1 is applicable.		P
9	STARTING OF MOTOR-OPERATED APPLIANCES		N/A
	This clause of Part 1 is not applicable.		N/A
10	POWER INPUT AND CURRENT		N/A
	This clause of Part 1 is only applicable for class II charging stations and machines with an integrated mains powered charger.	Class III	N/A
11	HEATING		N/A
	This clause of Part 1 is only applicable for class II charging stations and machines with an integrated mains powered charger.	Class III	N/A
13	LEAKAGE CURRENT and ELECTRIC STRENGTH AT OPERATING TEMPERATURE		N/A
	This clause of Part 1 is only applicable for class II charging stations and machines with an integrated mains powered charger.	Class III	N/A
14	TRANSIENT OVERVOLTAGES		N/A
	This clause of part 1 is applicable.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
15	MOISTURE RESISTANCE This clause of Part 1 is applicable except as follows.		P
15.1	Addition: The machine shall be tested according to its IP rating both separately and while in its charging station.	Condidered.	P
	The charging station shall be tested according to its IP rating both separately and while the machine is in its charging position.		P
	Compliance for the machine and charging station is assessed individually according to its IP rating.		P
15.1.2	Modification:		P
	Machines or charging stations classified as IPX4 shall be rotated during the test along its vertical axis. The rate of rotation shall be 12 ± 2 r/min.	IPX6 and IPX7 according to IEC 60529 tested.	N/A
15.2	Addition:		P
	Machines or peripherals fitted with an appliance inlet or cable coupler shall be tested with the appropriate mating connector in place.		P
	Air filters are not removed.	None	N/A
16	LEAKAGE CURRENT AND ELECTRIC STRENGTH		N/A
	This clause of Part 1 is only applicable for class II parts of machines or charging stations.		N/A
17	OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS		N/A
	This clause of part 1 is applicable.		N/A
18	ENDURANCE		N/A
	This clause of part 1 is applicable.		N/A
19	ABNORMAL OPERATION This clause of part 1 is applicable except as follows:		P
19.1	Addition to paragraph 1: This includes leakage of electrolyte from the battery.		P
19.7	Modification: During the test, the temperature of the windings are not measured but the machine shall not emit flames, molten metal or liquids, or poisonous or ignitable gas in hazardous amounts.	Tested and OK	P

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Clause	Requirement + Test	Result - Remark	Verdict
19.9	<p>Modification:</p> <p>Replacement of last paragraph:</p> <p>During the test, the temperature of the windings are not measured but the machine shall not emit flames, molten metal or liquids, or poisonous or ignitable gas in hazardous amounts.</p>	Tested and OK.	P
19.10	Not applicable.		N/A
19.11	<p>Modification:</p> <p>Addition after last paragraph: The first fault may be applied at any time. The additional fault in a protective electronic circuit may be applied not before a new operating cycle of the appliance.</p>	MCU (Micro-Controller Unit) electronic circuits used, for MCU, the functional safety evaluation has been carried out, meanwhile 19.11.2 tested.	P
19.11.3	<p>Modification:</p> <p>Addition after last paragraph:</p> <p>However the test is not repeated, if the protective electronic circuit provides a non-self-resetting interruption of the supply of the machine's part that would render the machine unsafe during the relevant test.</p>	Considered	P
20	<p>STABILITY AND MECHANICAL HAZARDS</p> <p>This clause of part 1 is applicable except as follows:</p>		P
20.2	<p>Replacement:</p> <p>To prevent unexpected operation which may result in a hazard, the cutting means shall not start until either,</p> <p>a) the machine is restarted as described in the restart procedure in 20.102.6; or</p> <p>b) the cutting means start-up indication procedure as described in 22.110 is completed; or</p> <p>c) for manual control, as described in 20.101.1.</p>	The enclosure is used as the fixed guard and meets the requirements	P
	All power driven components except the cutting means and the ground contacting parts shall be guarded to prevent inadvertent contact. Any apertures or safety distances shall comply with 4.2.4 of EN ISO 13857:2008.	Check and OK.	P
	To prevent inadvertent access to the cutting means these are guarded by the cutting means enclosure. The cutting means enclosure shall comply with the requirements of Clauses 20.102.1 and 20.102.4.		P
	Where a guard is designed to be opened or removed and which exposes a hazard, a safety sign warning of the hazard shall be located on the guard or adjacent to the guard.	No such guard used	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	All guards shall be permanently attached to the machine and shall not be detachable without the use of tools. The opening of guards shall require the use of a tool. Exceptions to this are the opening of or removing interlocked guards which disable the protected moving parts.	The guard cannot be detached without the aid of the tools	P
	Fixed guards that the user is instructed to remove for regular maintenance shall have their fixing means retained on either the guard or the body of the machine.	Fixing means of battery cover retained on the guard.	P
20.101	Control		P
20.101.1	Operator presence control		N/A
	Manual controllers, if supplied by the manufacturer, shall be fitted with an operator presence control on the manual controller which will automatically stop rotation of the cutting means when the operator's hands are removed. This may be accomplished either by stopping the drive motor or by an intermediate clutch/brake mechanism. For starting rotation of the cutting means, the operator presence control shall require two separate and dissimilar actions. If these actions can be carried out by using the same hand then the actions shall be totally distinct thus to prevent accidental "switch on".		N/A
	Any manual control for the traction drive shall automatically stop or disengage the traction drive when the operator releases the control.		N/A
	During manual operation, the obstruction sensor and the sensor detecting when the machine is outside the perimeter delimiter may be deactivated, the lift sensors and tilt sensors shall remain functional.		N/A
20.101.2	Remote setting device		P
	If a remote setting device is provided it may only be used to carry out off-machine adjustments of the settings as well as starting and stopping the normal operation when the machine is operating in automatic mode.		P
	Compliance is checked by inspection and practical test.		P
20.101.3	Manual controller		P
	If a manual controller is supplied by the manufacturer, it shall meet the requirements of 22.107.	Device not supplied by the manufacturer, the user need download APP on phone and only for created for working area.	P
	Compliance is checked by inspection and by the tests of 22.107 and 21.101.5.		P

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Clause	Requirement + Test	Result - Remark	Verdict
20.101.4	Manual stop		P
	A single action clearly identifiable manual stop shall be provided on the machine in a prominent position on the top surface.		P
	The actuator of the manual stop shall have at least 20% of its surface raised at least 5 mm above the immediate surrounding area.		P
	Minimum width not less than 15 mm		P
	Actuator of manual stop not less than 35 mm		P
	The operating force of the actuator of the manual stop shall not exceed 30 N on any part of its surface that is raised at least 5 mm above the immediate surrounding area.	Max, 18N	P
	The manual stop shall override all other controls and cause all moving parts to stop.		P
	Restarting of the mower following a manual stop shall only be possible following either: a) two separate actions; or b) the introduction of an alpha-numeric code of at least four characters; or c) multiple key strokes in response to prompts.	Two separate actions	P
	Compliance is checked by inspection, practical and if the compliance relies on the operation of an electronic circuit, it is checked under the following conditions applied separately: 1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit; 2)the electromagnetic phenomena tests of 19.11.4.1 to 19.11.4.7 applied to the machine. If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.		P
20.102	Safety Requirements		P
20.102.1	Cutting means enclosure		P
20.102.1.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Except as allowed below, the cutting means enclosure shall extend at least 3 mm below the plane of the cutting means tip circle. The bolt heads of cutting means securing screws may extend below the cutting means enclosure providing these are located within the inner 50% cutting means tip circle diameter.		P
	Openings may be provided in the cutting means enclosure.		P
	Compliance is checked by inspection, measurement and by the tests of 20.102.3, 20.102.4 and 21.1.		P
	This requirement shall not apply to machines where the cutting means is a generally circular drive unit on which is mounted one or more pivoting cutting elements or filament lines. These cutting elements shall rely on centrifugal force to achieve cutting and have a kinetic energy not exceeding 2 J per cutting element not exceeding 2 J per cutting element	The kinetic energy of one cutting means is less than 1.6 J.	P
	For the purposes of this clause, the kinetic energy of a pivoting cutting element shall be calculated according to Annex AA.	Annex AA used	P
20.102.1.2	Guards and grass catchers		P
	Guards which have to be displaced in order to fit the grass catcher shall be interlocked or shall automatically return to the full guard position when the grass catcher is removed. The guards shall be considered as forming part of the cutting means enclosure.		P
20.102.2	Cutting means stopping time		P

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>The cutting means shall stop from their maximum rotational speed within 2 s if a tilt sensor, lift sensor, obstruction sensor (when activated for more than 3 s according to 22.105.2), or manual stop is activated, after the operator releases the cutting means operator presence control, or the opening of or removing interlocked guards, which disable the protected moving parts.</p> <p>If compliance relies on the operation of an electronic circuit, the compliance is checked under the following conditions:</p> <p>1) the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>The total stopping time, as a result of condition 1), shall either</p> <ul style="list-style-type: none"> — not exceed twice of the value given above. Under this condition, a manual operation shall be required to restart the cutting means, such a restart shall only be allowed for one attempt; — not exceed 0,1 J of rotational energy at the end of an interval of twice of the value given above. In this case, the test is repeated and either the cutting means stopping command shall comply with the stopping time limit value above or the cutting means shall be permanently disabled such that the cutting means cannot be reactivated by the operator and requires repair by qualified service personnel. 	Checked on all conditions and OK.	P
	<p>The calculation of rotational energy shall be made using Annex AA or, as appropriate, the following: $E = \frac{1}{2}I\omega^2$</p>		P
	<p>where</p> <p>E is the rotational energy</p> <p>I is the moment of inertia around the axis of rotation</p> <p>ω is the angular velocity</p>		P
20.102.2.1	<p>Prior to the test, the machine shall be assembled and adjusted according to the manufacturer's instructions for use. The machine shall be started and stopped 10 times before commencing the test. If possible, machines shall be powered from an external source of power to simulate a fully charged battery.</p>	The cutting means stopping time is monitored by the electronic circuit, which the functional safety of protective electronic circuit has been evaluated.	N/A
	<p>The time recording measurement system shall have a total accuracy of 25 ms and any tachometers used shall have an accuracy of $\pm 2,5\%$. The ambient test temperature shall be $20\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$. The machine shall be mounted and instrumented in such a manner that the results of the test are not affected.</p>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>Devices shall be provided to detect:</p> <ul style="list-style-type: none"> – the moment of release of the cutting means operator presence control; – the moment of activation of the obstruction sensor according to 22.105.2; – the moment of activation of the tilt sensor; – the movement of the cutting means; – the moment of actuation of the manual stop; – the direction and speed of traction wheels or elements; – the moment a lifting action is completed. 		N/A
	Stopping time is measured from the moment of actuation of a sensor until the last time a cutting means passes the sensing device of the test equipment.		N/A
	The means of initiating the cutting means stopping procedure during the test shall be such that:		N/A
	<ul style="list-style-type: none"> – for the operator presence control for the cutting means – the control shall be released abruptly from the full "on" position so that it returns to the "idle" or "off" position by itself; – for the obstruction sensors – each sensor shall be contacted by a solid object approaching the sensor at the normal speed of travel of the machine when operating under normal conditions; – for tilt sensors – the machine shall be tilted to activate and deactivate the sensor in the directions as required in 22.105.1; – for lift sensors – the machine shall be lifted to activate and deactivate the sensor as required in 22.105.3; – for manual stops – the manual stop shall be activated. 		N/A
	Individual stopping times shall be measured five times from the moment of each of the following:		N/A
	<ul style="list-style-type: none"> – release of the cutting means operator presence control, – activation of the obstruction sensor by contact with the solid object according to 22.105.2, – operation of the tilt sensor. The primary direction giving the longest average value shall be the orientation used for measuring the cutting means stopping time of the machine, – actuation of the manual stop, and – lift sensor is actuated. 		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The sensor or manual action giving the longest average value from these options shall be the method used for measuring the cutting means stopping time of the machine according to 20.102.2.2.		N/A
20.102.2.2	Cutting means stopping time test – Method		N/A
	The machine shall be subjected to a sequence of 5 000 stop/start cycles. The 5 000 test cycles are not required to be continuous and the machine shall be maintained and adjusted during the test in accordance with the manufacturers published instructions for use. There shall be no maintenance or adjustment after 4 500 cycles have been completed		N/A
20.102.2.3	Cutting means stopping time test – Verification		N/A
	The cutting means stopping time shall be measured for the following: – each of the first five cycles of the 5 000 cycle test sequence (i.e. not including the preparatory operations nor the trial stops used to determine which stop initiator to test); – each of the last five cycles prior to any brake maintenance or adjustment carried out during the test; – each of the last five cycles of the 5 000 test cycles. No other stopping times shall be recorded.		N/A
	Each of the measured stopping times (tb) shall comply with the requirement of 20.102.2. If the test sample fails to complete the full number of cycles but otherwise meets the requirements of this test, either: – the machinery may be repaired, if the brake mechanism is not affected and the test continued; – if the machine cannot be repaired, one further sample may be tested which shall then comply fully with the requirements.		N/A
20.103.3	Thrown object hazard		P
	Robotic lawnmowers shall be so constructed to provide, in intended use, adequate protection against risk of injury to persons from foreign objects that may be thrown out by the rotating cutting means.		P
	When conducting this test, personnel should either be kept out of the test area or otherwise protected from the hazard of thrown objects.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The machine is placed in the test enclosure described in Annex BB with the base of the enclosure being as described in Annex CC. The target panel construction used shall be checked by the tests contained in Clause BB.3 of Annex BB immediately before and after this test. The target panels shall be divided into elevation zones by horizontal lines as indicated in Figure BB.1 and described in Annex DD.		P
	The projectiles used in the test shall be 6,35 mm diameter balls of hardened steel 45 HRC minimum (e.g. balls used as ball bearings).		P
	The injection tube outlets shall be fixed and flush with the upper surface of the coconut mat see Annex CC (Figure CC.1) and the system shall be so arranged that the ball may be ejected with variable velocity.		P
	Where necessary, the machine may be elastically restrained to prevent horizontal movement.		P
	During the tests, the machine shall be operated at maximum operating motor speed (as defined by 3.120) and supplied, if possible, by an external power supply having the same characteristics as a fully charged battery.		
	Tests are conducted for each cutting means assembly.		P
	The machine shall be tested in all operational configurations (e.g. both with and without attachments and accessories such as grass collectors or mulching parts).		P
	The cutting means shall be adjusted to a 30 mm cut height or the next higher cutting position when set on a hard level surface. Machines with a maximum height setting of 30 mm or less shall be set at their maximum height setting.	adjusted to a 30 mm cut height	P
	Before the test, adjust the velocity with which the ball is ejected so that the ball rises not less than 30 mm above the surface of the coconut matting and within an angle of 10° of the vertical axis. Then with the machine in place, allow balls one at a time into the machine. Increase the velocity of the balls in small increments until each ball is hit by the machine cutting means. Start the test when this minimum velocity is established. Chipped or damaged balls shall be replaced.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Inject 500 steel balls into each injection point for each test. On multi-spindle machines, the test shall be run for each spindle with the results evaluated for each test. A new set of cutting means shall be used for each test.		P
	During any of the tests, in the event of excessive hits in a localized area, it may be necessary to repair or replace a target panel before continuing with the tests. Replace the target panels if hits from previous tests leave holes that cannot be covered by a 40 mm square gummed label. Not more than one thickness of gummed labels (patch) shall be placed over any one area		P
	Balls remaining within the test enclosure (on test surface) may be removed at the option of the tester to minimize ricochet hits. Balls passing over the top of the test enclosure shall be ignored.		P
	Count and record hits on data sheet shown in Annex DD. A test projectile passing completely through all layers of the target material is counted as a hit. Steel balls that hit and damage the centerline of the target area height line shall be scored with the target area below that line.		P
	For each test (500 steel balls), there shall be no hits above the 300 mm line (top elevation area) and not more than 2 hits in each target panel between the base and the 300 mm line.	No hit in all area.	P
	The test does not require that the machine shall be suitable for use after test.		P
	In the event of a test failure, two additional machines may be tested both of which must then pass the test.		N/A
20.102.4	Inadvertent access to the cutting means		P
20.102.4.1	Inadvertent foot access to the cutting means		P
	Inadvertent access to the cutting means by the feet during operation shall be prevented, so far as reasonably practicable by the cutting means enclosure. Compliance is checked by the tests of 20.102.4.1.2, 20.102.4.1.3 and 20.102.4.1.4.	Tested and OK	P
	The tests are made with the cutting means in the most unfavourable cutting position. If the cutting means path height is different at different cutting means speeds, the test is conducted so as to include the extremes of cutting means height. Replace the existing subclause 20.102.4.1.1 with the following:		P

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Clause	Requirement + Test	Result - Remark	Verdict
20.102.4.1.2	Adult foot probe test		P
	The machine shall be placed on a hard, flat surface. The guards shall be in the normal operating position on the cutting means enclosure and the machine support members in contact with the supporting surface. Components of machines, such as wheels and frames, are where relevant considered as part of the cutting means enclosure for the purpose of these tests. The tests are conducted under static conditions."	Foot probe tested on any cutting height positions and passed.	P
	The foot probe of Figure 102 shall be inserted towards the cutting means around the machine's external enclosure. The base of the probe is held horizontally at any height and then inclined up to 15° forward or backward from the horizontal. The probe is applied around the entire machine as described in Figure 102 until a horizontal force of 20 N maximum is reached, or until the machine's enclosure lifts or moves from the original position, or until contact is made with the cutting means path, whichever occurs first.		P
	The test probe shall not enter the path of the cutting means assembly."		P
20.102.4.1.3	Foot probe test for standing child		P
	The machine shall be placed on a hard, flat surface. The guards shall be in the normal operating position on the cutting means enclosure and the machine support members in contact with the supporting surface. Components of machines, such as wheels and frames, are where relevant considered as part of the cutting means enclosure for the purpose of these tests. The tests are conducted under static conditions.	Checked on any cutting height positions and passed.	P
	The foot probe of Figure 107 shall be inserted towards the cutting means around the machine's external enclosure. The base of the probe is held horizontally at any height and then inclined up to 15° forward or backward from the horizontal. The probe is applied around the entire machine as described in Figure 102 until a horizontal force of 20 N maximum is reached, or until the machine's enclosure lifts or moves from the original position, or until contact is made with the cutting means path, whichever occurs first.		P
	The test probe shall not enter the path of the cutting means assembly		P

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Clause	Requirement + Test	Result - Remark	Verdict
20.102.4.1.4	Foot probe test for kneeling child		P
	The machine is tested by means of the foot probe shown in Figure 108. The sole of the foot probe shall be constructed of a material with a 70 Shore A hardness (nominal) and a thickness of $(3 \pm 0,5)$ mm. The sole of the foot probe shall be free from dust and grease. Prior to the series of tests, the sole of the foot probe in Figure 108 shall be checked to ensure a dynamic coefficient of friction of $(0,6 \pm 0,06)$ with respect to the same material surface in accordance with EN ISO 8295:2004.		P
	The machine is operated in automatic mode with the cutting means operating. While the machine is operating, the foot probe of Figure 108 is placed in each of the ten test positions shown in Figure 109, as applicable to the anticipated movement of the machine, such that		P
	the foot probe is aligned with the direction of the machine's movement with the toe pointing toward the machine; and		P
	the foot probe is placed on the test surface and care is taken that foot probe movement is minimized if the machine comes into contact with the foot probe;		P
	an injection tube, if any, in the coconut matting does not influence the test result.		P
	If, in automatic mode, it is not possible for the machine to move in accordance with any of the test positions shown in Figure 109, then it is not necessary to conduct the test for those test positions. The foot probe remains in place at each test position until		P
	the machine has moved completely away from the foot probe; or		P
	the foot probe has been in place for 20 s; or		P
	the machine stops such that a manual reset is required;		N/A
	whichever occurs first.		P
	For each test position, the foot probe shall not contact the cutting means whilst the cutting means is rotating. If the sole of the foot probe is damaged during the test, it shall be repaired or replaced as necessary."		P
20.102.4.2	Inadvertent hand access to cutting means		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Inadvertent access to the cutting means by the hand during operation shall be prevented, so far as reasonably practicable by means of guards or barriers as described in Clause 20.2.		P
	Compliance is checked by the tests of 20.102.4.2.1 and 20.102.4.2.2.		P
20.102.4.2.1	General		P
	Guarding to reduce the possibility of inadvertent contact with the cutting means when reaching under shall be provided.		P
	Compliance is checked by the following tests.		P
20.102.4.2.1.1	Hand probe test		P
	The mechanical test probe of 20.2 of EN 60335-1 shall be used. The joints shall be locked firmly into their straight positions or replaced by a solid portion	Hand probe tested on any cutting height positions and passed.	P
	The machine shall be placed on a hard flat surface. The guards and deflectors shall be in the normal operating position on the cutting means enclosure and the machine support members in contact with the supporting surface. Components of machines, such as wheels and frames, are where relevant considered as part of the cutting means enclosure for the purpose of this test. The test is conducted under static conditions.		P
	The test is made with the cutting means in the most unfavourable cutting position. If the cutting means path height is different at different cutting means speeds, the test is conducted so as to include the extremes of cutting means height.		P
	The probe shall be inserted towards the cutting means around and under the machine's external enclosure. The axis of the probe is held horizontally at any height and then inclined up to $\pm 15^\circ$ from the horizontal. The vertical height of the probe is maintained when the probe is inserted under the machine. The probe is applied with a force not exceeding 5 N until contact is made by any part of the probe with the external enclosure of the machine or until the external enclosure lifts or moves from the original position, or until contact is made with the cutting means path, whichever occurs first		P
	No vertical force shall be applied to the probe, except as necessary to maintain the horizontal movement.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The finger part of the test probe shall not enter the path of the cutting means. Contact with parts of the cutting means that are circular, smooth and unbroken is allowed	The finger part of the test probe cannot enter the path of the cutting means and cannot contact the cutting means.	P
20.102.4.2.1.2	Child arm probe test		P
	Test probe 18 (Figure 12) of EN 61032 shall be used but with the extension handle attached throughout the test. The joints shall be allowed to articulate		P
	The machine shall be placed on a hard flat surface. The guards and deflectors shall be in the normal operating position on the cutting means enclosure and the machine support members in contact with the supporting surface. Components of machines, such as wheels and frames, are where relevant considered as part of the cutting means enclosure for the purpose of this test. The test is conducted under static conditions.		P
	The test is made with the cutting means in the most unfavourable cutting position. If the cutting means path height is different at different cutting means speeds, the test is conducted so as to include the extremes of cutting means height.		P
	The probe shall be inserted towards the cutting means around and under the machine's external enclosure. The axis of the probe is inclined $45^\circ \pm 1^\circ$ from the horizontal. The probe is applied with a force not exceeding 5 N until contact is made by any part of the probe with the machine external enclosure or until the external enclosure lifts or moves from the original position, or until contact is made with the cutting means path, whichever occurs first. The articulated finger joints shall be moved through their full range of angular movements when under the machine enclosure.		P
	No vertical force shall be applied to the probe, except as necessary to maintain the horizontal movement.		P
	The finger part of the test probe shall not enter the path of the cutting means. Contact with parts of the cutting means that are circular, smooth and unbroken is allowed	The finger part of the child arm cannot enter the path of the cutting means and cannot contact the cutting means.	P
20.102.4.2.1.3	Finger probe test		P
	Guarding to reduce the possibility of contact with the cutting means during an attempted lift shall be provided.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The mechanical test probe of 20.2 of EN 60335-1 shall be used.		P
	The machine shall be placed on a hard flat surface. The guards and deflectors shall be in the normal operating position on the cutting means enclosure and the machine support members in contact with the supporting surface. Components of machines, such as wheels and frames, are where relevant considered as part of the cutting means enclosure for the purpose of this test. The test is conducted under static conditions.		P
	The test is made with the cutting means in the most unfavourable cutting position. If the cutting means path height is different at different cutting means speeds, the test is conducted so as to include the extremes of cutting means height.		P
	The finger portion of the probe shall be inserted towards the cutting means around and under the edge of the machine's external enclosure until the 50 mm stop face contacts the machine external enclosure in any area where the machine can be lifted. For test purposes, the machine may be supported in its normal orientation above the hard flat supporting surface so that the insertion of the probe is not limited by the hard flat surface. The axis of the probe is held horizontally. The articulated finger joints shall be moved through their full range of angular movements. The probe is applied with a force not exceeding 5 N until contact is made by the 50 mm stop face of the probe with the machine external enclosure or until the external enclosure lifts or moves from the original position, or until contact is made with the cutting means path, whichever occurs first. For examples of the intended application of the probe, see Figure 105.		P
	No vertical force shall be applied to the probe, except as necessary to maintain the horizontal position.		P
	The finger part of the test probe shall not enter the path of the cutting means. Contact with parts of the cutting means that are circular, smooth and unbroken is allowed.		P
20.102.5	Stopping distance		P
	The machine shall come to a halt within 200 mm after the initiation of any stopping command.		P
	Use each available means of initiating a stop in turn. The test stops shall be conducted on a substantially level (not to exceed 1 % gradient) dry, smooth, hard surface of concrete (or equivalent test surface). The test shall be carried out in both forward and reverse directions at the maximum ground speed attainable.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>If compliance relies on the operation of an electronic circuit, the test is repeated under the following conditions:</p> <p>1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>The total stopping distance, as a result of condition 1), shall not exceed twice of the value given above. Under this condition, a manual operation shall be required to restart the cutting means, such a restart shall only be allowed for one attempt.</p> <p>If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.</p>		P
20.102.6	Starting after stop caused by activation of lift and/or tilt sensor		P
	<p>When a tilt sensor and/or lift sensor is activated, the cutting means shall stop within 2 s. If the machine attempts to recover from the condition that caused the activation of the sensor(s) the machine shall move away in a different direction (with the cutting means static).</p> <p>If within 10 s the sensor(s) have become deactivated, the drive to the cutting means may be restarted providing the start-up procedure in 22.110 is completed.</p>	<p>When a tilt sensor is activated, the cutting means stop within 2s.</p> <p>When a lift sensor is activated, the cutting means will stop with 2s.</p> <p>The drive of the cutting means restarted according to the start-up procedure in 22.110.</p>	P
	<i>Compliance is checked by inspection and practical tests.</i>		P
	<p>If after 10 s the sensor(s) have not become deactivated the cutting means may only be restarted following either:</p> <p>a) two separate actions; or</p> <p>b) the introduction of an alpha-numeric code of at least four characters; or</p> <p>c) multiple key strokes in response to prompts.</p>	Two separate actions	P

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>Compliance is checked by inspection, practical tests and if the compliance of a) to c) relies on the operation of an electronic circuit, it is checked under the following conditions applied separately:</p> <p>1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>2)the electromagnetic phenomena tests of 19.11.4.2 applied to the machine.</p> <p>If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.</p>		P
20.102.7	Noise		P
20.102.7.1	Noise reduction as a safety requirement		P
20.102.7.1.1	Noise reduction at source by design and by protective measures		P
	<p>The machine shall be designed to generate a noise level as low as practicable. The main sources causing noise are:</p> <ul style="list-style-type: none"> – air intake system; – cutting system; – vibrating surfaces. 	Tested according to Annex FF	P
	EN ISO 11688-1 gives general technical information on widely recognized technical rules and means to be followed in the design of machines with low-noise emission.		P
20.102.7.1.2	Noise reduction by information		P
	<p>If, after taking all possible technical measures for reducing noise at the design stage, a manufacturer considers that further protection is necessary, then the instruction manual shall:</p> <ul style="list-style-type: none"> – recommend the use of low-noise operating modes, and/or limited time of operation; – give a warning of noise level and recommend the use of hearing protection. 		P
20.102.7.1.3	Verification of requirements on noise – Noise measurement		P
	For the determination of the sound power level and of the emission sound pressure level the measurement methods given in Annex FF shall be used.		P

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Clause	Requirement + Test	Result - Remark	Verdict
21	MECHANICAL STRENGTH This clause of part 1 is applicable except as follows:		P
	Modification: The impact energy applied to all enclosures (including the peripherals) shall be (1,0 ± 0,05) J. This subclause does not apply to — remote setting device(s); and — peripherals that are covered by a separate end product standard, such as power supplies or battery chargers.”	Tested on enclosure, manual stop, 1.0J for three times	P
21.101	General. For the tests of this sub-clause the appliance is operated at maximum speed and may be elastically restrained to prevent horizontal movement.		P
21.101.1	Strength of cutting means and cutting means mountings Cutting means and their mountings shall have adequate strength to withstand impact with solid objects.		P
	Compliance is checked by the following test:		P
	The machine shall be placed in the test enclosure described in Annex BB using an impact test fixture such as the one shown in Figure 103. The machine shall be positioned over a 25 mm (nominal) steel rod that has been placed in the test fixture (see Figure 103). The cutting means of the test machine shall be adjusted to the cutting height closest to 50 mm and so positioned that when the rod is inserted into the path of the rotating cutting means, the cutting means will strike the exposed portion of the rod within 10 mm to 15 mm of the cutting means tip (see Figure 103). The rod shall be inserted once into the path of each cutting means assembly. A new piece of rod shall be used for each test.		P
	The machine shall be run for 15 s, or until the cutter stops or the rod is severed		P
	Where it is not possible to insert the rod due to machine design, the machine shall be moved the minimum distance necessary to permit the rod to be inserted.		P
	During the test, no complete cutting means, arm or disc to which it is mounted shall become detached nor shall any part of the machine pass through all layers of the wall of the fiberboard enclosure. Also, any breakage of the cutting means or cutting means retaining device shall be considered failure of the test. Breakage of the drive shearing device or chipping of the cutting means cutting edge are not considered a test failure.		P

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Clause	Requirement + Test	Result - Remark	Verdict
21.101.2	Imbalance		P
	Robotic lawnmowers shall withstand the out of balance forces that may occur due to wear etc. of the cutting means or its assembly.		P
	The machine shall be placed in the test enclosure described in Annex BB. The test shall be conducted on a smooth hard level surface.		P
	For machines using rigid cutting means, the cutting means imbalance, in kilogram metres is first determined by the formula $0,024 L^3$	Metal freely pivoting cutting means	N/A
	The calculated imbalance is created by removing material from, or adding it to, the cutting means until the desired imbalance is obtained.		N/A
	For machines using freely pivoting cutting means on a generally circular disc, the imbalance shall be created by removing a cutting means	Removing one cutting means	P
	The test is run for 1 h in the test enclosure for each cutting means assembly if possible the machine being operated from an external power supply having the same characteristics as a fully charged battery.		P
	All cutting means assemblies of a multi-spindle machine are tested singly. It is permissible to test all cutting means assemblies of a multi-spindle machine simultaneously at the discretion of the manufacturer. At the discretion of the manufacturer, a new machine may be used for each test.		P
	During the test, the machine shall not lose any component necessary for compliance with the requirements of this standard nor shall any component or part of the machine pass through all layers of the wall of the test enclosure. The test does not require that the machine shall suitable for use after test.	Meet the requirements	P
21.101.3	Structural integrity		P
	Cutting means enclosures, discharge chutes, guards and grass catchers of robotic lawnmowers shall have sufficient strength to withstand the impact from foreign objects which may be thrown out by the cutting means.		P
	During the tests, personnel should stand behind a shield for protection against possible thrown objects.		P
21.101.3.1	Test equipment		P
21.101.3.1.1	Test fixture (see Figure 104)		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The test fixture base shall consist of a steel plate of at least 1,5 mm thickness backed by a 19 mm plywood panel. The steel plate shall be large enough to extend at least 25 mm beyond the cutting means enclosure of the machine		P
	An air inlet hole shall be provided that is concentric with each cutting means tip circle with an approximate diameter, as given in Table 1.		P
	The machine shall be constrained in a suitable manner such that its specified position relative to the injection point is maintained throughout the test. The constraint(s) shall not obstruct free passage of the balls from under the machine.		P
21.101.3.1.2	Injection points		P
	The location of one injection point B shall be:		P
	– for mulching machines, at the 12 o'clock position and located midway along the cutting means cutting edge as detailed in Figure BB.2. – for non-mulching machines, the injection point shall be located midway along the cutting means cutting edge on a line BC which is 45° from a line AC, in a direction counter to the direction of cutting means rotation, where A is the centre of the discharge chute exit and C is the centre of the cutting means tip circle.		P
	Ten injection points shall be equally spaced apart starting from point B on the circle centre C. The injection points of approximately 15 mm diameter shall be used for the introduction of balls (see 21.101.3.2).		P
	Alternatively, instead of using ten injection points the machine may be rotated in 36° increments from injection point B.		P
	The injection tubes shall not protrude above the steel plate.		P
21.101.3.1.3	Test balls		P
	One hundred hardened (12,75 ± 0,25) mm diameter balls of steel, 45 HRC minimum (e.g. balls used as ball bearings) shall be used.		P
21.101.3.1.4	Injection method		P
	Means shall be provided to inject the steel balls with variable velocity. Adjust the velocity with which the ball is injected so that the ball rises a minimum of 13 mm and a maximum of 300 mm above the cutting plane of the cutting means.		P

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Clause	Requirement + Test	Result - Remark	Verdict
21.101.3.2	Test method		P
	The machine to be tested shall be positioned on the steel plate with the cutting means axis C over the centre of the test fixture base. The cutting means shall be set at the lowest adjustable cutting height but not less than 30 mm. If the maximum height of cut is less than 30 mm, then the machine shall be tested when adjusted to its maximum height.		P
	The 100 balls shall be divided into 10 lots of 10. One lot shall be injected through each of the 10 injection points.		P
	The test shall be conducted once for each cutting means.		P
	A new machine housing may be used for each test of a multi-spindle machine. A full set of new cutting means shall be fitted before each spindle is tested.		P
21.101.3.3	Test acceptance		P
	The cutting means enclosure, guard or grass catcher shall be considered to have failed the test if any of the following occurs:	The following phenomena did not occur.	P
	a) a hole in the cutting means enclosure, guard(s) or grass catcher(s) which has allowed the ball to pass through. A hole in a secondary enclosure, such as an internal baffle, shall not be considered a failure;		P
	b) deformation of any part of the cutting means enclosure, guard(s) or grass catcher into the path of the cutting means;		P
	c) the dislodging of the grass catcher or guard from its adapter;		P
	d) the grass catcher or guard falling from its normal operating position		P
	In the event of a test failure, two additional identical machines shall be tested. If either of the additional machines fails a test, the model shall have failed the test.	Passed	N/A
21.101.4	The cutting means enclosure and ground support system shall be able to withstand possible extra loading		P
	Compliance is checked by the following test:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	A weight of 20 kg shall be placed on top of any accessible part of the top of the machine. The machine shall be on a smooth level hard surface and the load shall be evenly distributed over an area of 10 cm x 5 cm applied through a layer of foam with a thickness of 50 mm ± 5 mm having a density of 32 kg/m ³ backed by a rigid flat 12 mm thick plywood backing plate for a period of 30 s. The machine shall be considered to have passed the test if either of the following occurs:		P
	a) there is no visible damage to the machine and it continues to function correctly after the test, or b) if there is visible damage, the cutting means shall not function, or the guarding of the cutting means shall be sufficient to pass all the tests of 21.101.2 and 21.101.3.		P
21.101.5	Drop test – Manual controller		N/A
	A manual controller shall be dropped three times from a height of 1,0 m onto a smooth concrete floor in the position most likely to damage the controller, while powered on and communicating with the machine		N/A
	The manual controller shall have failed the test if one or more of the following occurs:		N/A
	– there is access to a voltage, exceeding SELV, using test probe 13 of EN 61032; – loss of operator presence control, either through mechanical or electrical damage; – unintended motion of the machine; or – any breakage that allows access to uninsulated parts that could short due to the loss of the enclosure		N/A
22	CONSTRUCTION This clause of part I is applicable except as follows:		P
22.6	Addition: Any drain holes provided to prevent accumulation of water in an enclosure shall be at least 5 mm in diameter or 20 mm ² area with a width of at least 3 mm.		N/A
22.12	Addition: If carrying means are provided for the machine or other lifted items, they shall have adequate strength.		P
	Compliance is checked by inspection and the following test.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Carrying means are subjected to a force corresponding to three times the weight of the machine or lifted item, e.g. battery. The force is applied in the direction of lifting uniformly over a 70 mm width at the centre of the carrying means. The force is steadily increased so that the test value is attained within 10 s and maintained for a period of 1 min.	Checked and ok.	P
	If more than one carrying means is provided or if a portion of the weight is distributed over a wheel, the force is distributed between the carrying means in the same proportion as in the normal transportation position. If the machine is provided with more than one carrying means, but so designed that it may readily be carried by only one carrying means, each carrying means shall be capable of sustaining the total force.		P
	The carrying means shall not break loose from the machine and there shall not be any permanent distortion, cracking or other evidence of failure.	Tested and ok.	P
22.36	This clause is not applicable.		P
22.40	This subclause is not applicable.		P
	NOTE 101 This requirement is covered by 20.101.1 and 20.101.4.		P
22.49	This subclause is not applicable.		P
	NOTE 101 This requirement is covered in 20.101.2 for remote setting devices.		P
22.50	This subclause is not applicable.		P
	NOTE This requirement is covered by 20.101.4.		P
22.51	This subclause is not applicable.		P
	NOTE 101 This requirement is covered in 22.107 for manual controllers.		P
22.101	Battery chargers		P
	Except for batteries charged by contactless means e.g. solar panels, it shall not be possible to operate the cutting means or the traction drive of the machine while the battery is being charged.	The cutting means and traction drive cannot operated during charging.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>Compliance is checked by inspection, practical and if the compliance relies on the operation of an electronic circuit, it is checked under the following conditions applied separately:</p> <p>1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>2)the electromagnetic phenomena tests of 19.11.4.1 to 19.11.4.7 applied to the machine.</p> <p>If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.</p>		P
22.102	Air filters	No such device used	N/A
	Air filters which are designed to be removed for cleaning purposes shall be so designed that they are unlikely to come off in intended use.		N/A
	<p>Compliance is checked by inspection and the following practical tests:</p> <ul style="list-style-type: none"> - the air filter can only be removed with the aid of a tool, or - is provided with a spring that prevents it from falling away in intended use due to vibration, or - needs a deliberate action by the user for its removal. 		N/A
22.103	Disabling device		P
	When the disabling device is removed, it shall not be possible for the machine to be operable. A removable disabling device may be fulfilled by removal of all detachable battery pack(s), provided — any individual battery pack does not have a mass exceeding 5,0 kg; and — the detachable battery pack(s) are removable without the use of tools.		P
	The machine is not considered to be operating when displaying, communicating, transmitting or storing data (e.g. error codes) whilst the removable disabling device is removed or operated.		P
	The disabling device shall be according to either 22.103.1 or 22.103.2		P
22.103.1	Removable disabling device		P
	When the disabling device is removed, it shall not be possible for the machine to be powered.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Compliance is checked by inspection and the following tests:		P
	With the disabling device removed and without undue force:		P
	a) the operator presence control is operated if possible, and b) an appropriately sized flat metal bar is used to try to override the disabling device.		N/A
	The machine shall not be powered. If compliance relies on the operation of an electronic circuit, the test is repeated under the following conditions applied separately: 1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit; 2)the electromagnetic phenomena tests of 19.11.4.1 and 19.11.4.2 applied to the machine. If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.		N/A
22.103.2	Code protected disabling device		N/A
	The machine is not considered to be operating when displaying, communicating, transmitting or storing data (e.g. error codes) whilst the machine is disabled by the code protected disabling device.		N/A
	It shall not be possible to de-activate the disabling device from the remote control unless the remote control is the only control.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>Compliance is checked by inspection and if the compliance relies on the operation of an electronic circuit, the compliance is checked under the following conditions applied separately:</p> <p>1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>2)the electromagnetic phenomena tests of 19.11.4.1 and 19.11.4.2 applied to the machine.</p> <p>If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.</p>		N/A
22.104	Working area		P
	When the machine is operating in automatic mode, the machine shall not be able to leave the working area. It shall not be possible for the machine to cross the boundary of the working area by a distance greater than one full length of the machine when operating in automatic mode.		P
	The boundary of the working area may be established by the use of a perimeter delimiter as specified in 22.104.2 or by a pre-programmed area.		P
	If the machine is placed outside the working area, it shall not be able to operate at a distance of more than 1 m from the boundary of the working area to the nearest part of the machine, unless under manual control.		P
	If the machine fails to receive any signal that is required to recognise the working area, the machine shall travel not more than 1 m and the cutting means shall stop within 5 s from the instant the machine fails to receive any signal that is required to recognise the working area to the time that the cutting means stops in accordance with 20.102.2.	Checked and OK.	P
	If the machine regains recognition of the working area, the machine may operate in automatic mode, providing the cutting means start-up indication procedure in 22.110 is completed.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If the working area is changed, it shall not be possible for the machine to operate in automatic mode unless the restart procedure in 20.102.6 is completed. This requirement is not applicable for perimeter delimiters.	No such function.	N/A
	<p>Compliance is checked by inspection, practical and if the compliance relies on the operation of an electronic circuit, it is checked under the following conditions applied separately:</p> <p>1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>The total travelling distance and/or the total stopping time, as a result of condition 1), shall not exceed twice of the values given above. Under this condition, a manual operation shall be required to restart the cutting means, such a restart shall only be allowed for one attempt.</p> <p>If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.</p>		P
22.104.1	Void		N/A
22.104.2	Perimeter delimiter		N/A
	If a perimeter delimiter is provided which uses a boundary wire that emits a signal to indicate the limit of the working area, the maximum voltage shall not exceed safety extra-low voltage.		N/A
22.105	Sensors		P
	The machine shall be fitted with a tilt sensor, lift sensor(s), an obstruction sensor(s) and a rollover sensor(s).		P
22.105.1	The machine shall be fitted with a tilt sensor. It shall activate at least 3° before the machine becomes unstable.		P
	Compliance is checked by inspection and by the following test.		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
	Place the machine on a variable single-slope, plane, tilt table with the machine supported on its wheels. Sufficient friction shall be provided such that the machine does not slide down the slope and the wheels shall be locked as necessary. Place a strip of steel 1 mm thick under each uphill wheel. Tilt the table until lift-off occurs. Lift-off is when the steel strip can be removed sideways from under any of the (uphill) wheels with a force of 1 N or less.		P
	Tests shall be conducted with the machine positioned in each of the following positions:		P
	<ul style="list-style-type: none"> • facing downhill; • facing uphill; • right hand side downhill; • left hand side downhill. 		P
	If there is likely to be a more unfavourable orientation than these then the test shall also be carried out in this position.		P
	The tilt sensor shall operate at least 3° before the angle at which lift-off occurs for each position		P
	<p>If compliance relies on the operation of an electronic circuit, the tests are repeated under the following conditions applied separately:</p> <p>1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>2)the electromagnetic phenomena tests of 19.11.4.2 applied to the machine when the tilt sensor has been activated for more than 10 s.</p> <p>If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.</p>		P
22.105.2	Obstruction sensors		P
	The machine shall be provided with an obstruction sensor(s).		P
	In automatic mode, the sensor(s) shall be active and capable of performing its intended function in all operating positions and in all directions of travel, except those directions of travel where		P
	– the cutting means is not operating and the distance travelled does not exceed 2,0 times the length of the machine; or		N/A

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
	– the cutting means is operating and the distance travelled does not exceed the distance from the edge of the machine in the direction of travel to the nearest cutting means tip circle.		P
	The maximum kinetic energy of a machine that could be imparted to an obstruction upon impact when travelling in automatic mode shall be 5 joules.		P
	The maximum force applied by the machine against an obstruction in automatic mode shall not be greater than		P
	– 260 N during the first 0,5 s after impact and a minimum of 50 N is exceeded; and	Less than 240N	P
	– 130 N thereafter.		P
	If an obstruction sensor is activated, the traction drive in the direction of travel shall stop within $t_{ts} = D/v$		P
	The machine shall then restart in a different direction to allow the machine to move away from the object such that the sensor is deactivated within 3 s of initial activation. If the sensor is not deactivated within 3 s of initial activation, the cutting means shall stop as required by 20.102.2.		P
	Compliance is checked by the following test and by 20.102.2.		P
	An additional non-contact sensor, if relied upon to reduce speed in order to fulfil the requirement for maximum force upon impact, is permitted providing that it responds to a rigid non-metallic target of:		P
	– cylindrical shape;		P
	– (70 ± 2) mm diameter by (400 ± 5)mm high, standing on end;		P
	– of a colour or shade that matches the background; and		P
	– normalized to the ambient temperature.		P
	Compliance is checked by inspection, practical and if the compliance relies on the operation of an electronic circuit, it is checked under the following conditions applied separately: 1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit; If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.	The mower relied upon ultrasonic device to reduce speed less then 0.2m/s.	P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
	If within 10 s of the machine stopping due to contact or avoidance of an object, the obstruction sensor(s) has become deactivated, the drive to the cutting means may be restarted providing the cutting means start-up indication procedure in 22.110 is completed.		P
	If after 10 s of initial activation the sensor(s) has/have not become deactivated, the cutting means may only be restarted following either: a) two separate actions; or b) entering an alpha-numeric code of at least four characters; or c) multiple key strokes in response to prompts.		P
22.105.3	Lift sensor		P
	The machine shall be provided with a lift sensor.		P
	The lift sensor shall detect when the machine is lifted both fully from the ground and when it is lifted from only a single point causing it to be tilted.		P
	If a lift sensor is operated, the cutting means shall stop as specified in 20.102.2 and the traction drive shall stop as specified in 20.102.5.		P
	Compliance is checked by inspection and by the following tests:		P
	a) The machine is placed on a hard, smooth horizontal surface. The machine is lifted by any parts of the external housing, except the ground contacting parts, in a uniformly horizontal manner, normal to the surface. The rate of lifting shall be (20 ± 10) mm/s. The lift sensor shall have activated after all the ground contacting parts lose contact with the surface and when the lowest ground contacting part is no more than 10 mm above the surface.		P
	b) The machine is placed on a hard, smooth horizontal surface. The machine is lifted from a single point on any part of the machine's external housing, except the ground contacting parts. The rate of lifting shall be (100 ± 20) mm/s. The lift sensor shall have activated after at least one of the ground contacting parts loses contact with the surface and the highest ground contacting part is no more than 300 mm above the surface.		P
	The operation of the lift sensor is verified by lifting the machine from different locations around the external housing that are likely to be grasped by users.		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>If compliance relies on the operation of an electronic circuit, the tests are repeated under the following conditions applied separately:</p> <p>1) the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>2) the electromagnetic phenomena tests of 19.11.4.2 applied to the machine, when the lift sensor has been activated for more than 10 s.</p>		P
	<p>If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.</p>		P
	<p>In automatic mode, if within 10 s of activation the sensor(s) have become deactivated, the drive to the cutting means may be restarted providing the start-up procedure in 22.110 is completed.</p>		P
	<p>In automatic mode, if after 10 s of activation the sensor(s) have not become deactivated, the traction drive shall be deactivated and both the traction drive and the drive to the cutting means may only be restarted following either:</p> <p>a) two separate actions; or</p> <p>b) entering an alpha-numeric code of at least four characters; or</p> <p>c) multiple key strokes in response to prompts.</p>		P
	<p>During manual control, the cutting means may only be restarted in accordance with 20.101.1 after the sensor(s) have become deactivated.</p>		P
22.105.4	Rollover sensor		P
	<p>A rollover sensor provided on all machines. The rollover sensor shall prevent the traction drive and cutting means starting when the machine is inverted.</p>		P
	<p>If a rollover sensor is operated, the cutting means shall stop as defined in 20.102.2 and the traction drive shall stop as specified in 20.102.5.</p>		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
	The machine shall be inverted and placed on a flat level surface, within 1 m either side of the programmed working area or perimeter delimiter. It shall not be possible to start either the traction drive and/or the cutting means. For the purposes of this test, the machine shall not be moved from its inverted resting position. For machines equipped with a manual controller, it shall not be possible to start the traction drive and/or the cutting means when the operator is able to use the manual controller.		P
	If compliance relies on the operation of an electronic circuit, the tests are repeated under the following conditions applied separately: 1) the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit; 2) the electromagnetic phenomena tests of 19.11.4.1 and 19.11.4.2 applied to the machine when the 291 rollover sensor has been activated for more than 10 s.		P
	If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R. If the machine is placed back in its correct orientation, the cutting means may only be restarted following either: a) two separate actions; or b) entering an alpha-numeric code of at least four characters; or c) multiple key strokes in response to prompts.		P
22.106	Void		N/A
22.107	Manual controller		P
	If the machine is equipped with a manual controller it shall require the operator to be close to the machine and be capable of withstanding intended use including foreseeable misuse	Only for creating the working area.	P
	The machine or the manual controller shall be provided with a means to select between manual mode and automatic mode. The mode of operation shall not change in case of an electronic component being rendered inoperative.	In APP.	P
	Compliance is checked by inspection and by the following test conditions applied separately		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>2)the electromagnetic phenomena tests of 19.11.4.1 and 19.11.4.2 applied to the appliance.</p> <p>If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.</p>		N/A
22.107.1	Wired manual controller		N/A
	If the manual controller is connected by wire, it shall be between 1,5 m and 3 m long.		N/A
	If during manual control the cable to the manual controller is disconnected or the manual controller loses power, the traction drive shall stop as required in 20.102.5 and the cutting means shall stop as required in 20.102.2.		N/A
	After the manual controller is reconnected or power is restored,		N/A
	– the traction drive may restart; and		N/A
	– the cutting means may only be restarted as specified in 20.101.1.		N/A
22.107.2	Wireless manual controller		P
	The selection of wireless manual control from automatic mode shall require the operator to either		P
	– initially activate the wireless manual controller within 6 m of the machine, or		P
	– complete an action on the machine itself.		N/A
	After selection, the wireless manual controller may be capable of operating the machine provided the wireless manual controller is within		P
	– 6 m of the machine when the cutting means is enabled; or		N/A
	– 20 m of the machine if the cutting means is disabled.		P
	The wireless manual controller shall not communicate with the machine through an intermediate retransmission means such as a repeater or internet connection.		P
	The wireless manual controller shall be paired or have an encrypted signal unique to the machine it is to be used with.		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
	If during manual control the wireless manual controller loses communication with the machine for more than 2 s, the traction drive shall stop as required in 20.102.5 and the cutting means shall stop as required in 20.102.2.	No such function.	N/A
	After communication between the wireless manual controller and the machine is restored,		P
	– the traction drive may restart; and		P
	– the cutting means may only be restarted as specified in 20.101.1.		P
22.108	Batteries and accumulators		P
22.108.1	Battery/accumulator type		P
	All batteries and accumulators used in robotic lawnmowers shall be fully sealed.		P
	Compliance shall checked by inspection.		P
22.108.2	Terminal protection		P
	Battery terminals and connections shall be so located or enclosed that they are not likely to be short circuited. Exposed terminals shall be separated by an insulating barrier that provides 6 mm minimum total distance between the parts of opposite polarity.	Checked and OK	P
	Compliance is checked by inspection and the following test:		P
	It shall not be possible for the terminals to be bridged by a 6 mm diameter test pin of any convenient length inserted through any opening in the enclosure.		P
22.109	Mounting of components		P
	Except as indicated below, any component that is handled by the user shall be mounted securely and shall be prevented from turning by means other than friction between surfaces.		P
	Exception No. 1: The requirement that a switch be prevented from turning is able to be waived if all three of the following conditions are met.		P
	a) The switch is of a plunger, slide, or other type that does not tend to rotate when operated. A toggle switch is considered to be subject to forces that tend to turn the switch during normal operation of the switch. b) Spacings are not reduced below the minimum acceptable values if the switch rotates. c) Normal operation of the switch is by mechanical means rather than by direct contact by persons		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
	Exception No. 2: A lamp-holder of the type in which the lamp is not able to be replaced, such as a neon pilot or indicator light in which the lamp is sealed in a non-removable jewel, need not be prevented from turning if rotation does not reduce spacing's below the minimum values.		N/A
22.110	Cutting means start-up indication		P
	Before the cutting means can begin automatic operation, unless the machine is restarted as described in the restart procedure in 20.102.6 or, for manual control, as described in 20.101.1, either		P
	a) a flashing light shall be provided. The light shall be visible when viewed from a distance of 3 m within a 360° circumference at a height of 1 m and shall operate for a minimum period of 2 s prior to cutting means starting; or	No flashing warning light used	N/A
	b) an audible indicator shall be provided. The audible warning indicator shall be either a single continuous tone, multiple tones or be intermittent at a rate of at least 2 cycles per second. The audible warning indicator shall operate for a minimum period of 2 s prior to cutting means starting. The sound pressure of audible warning indicators shall be at least 35 dB(A) at a minimum distance of 1,5 m in any direction from the centre of the machine and at a height of 1,75 m.; or	The warning indicator will operate for 2.5s then the cutting means starts.	P
	c) the machine shall move for at least 5 s before the cutting means starts.	See above	N/A
	<i>Compliance is checked by inspection and practical test.</i>	Checked and OK	N/A
22.111	Void		P
22.112	Obstruction sensor contact surfaces		P
	Potential contact surfaces of machines used as obstruction sensing devices shall be designed to minimize the risk of injury upon contact.		P
	– a surface area greater than 20 mm ² ; and		P
	– a minor dimension greater than 5 mm.		P
	All protrusions have rounded edges.		P
	The surface contacted when striking an obstruction shall be located to detect objects at a height not greater than 150 mm from the ground plane.		P
23	INTERNAL WIRING		P
	This clause of part I is applicable.		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
24	COMPONENTS		P
	This clause of Part 1 is applicable except as follows:		P
24.1.3	Switches shall comply with EN 61058-1:2002 under the load conditions experienced by the switch in the machine. The number of cycles of operation declared for EN 61058-1:2002, 7.1.4 shall be at least 10 000. Switches may be alternatively tested in the machine, with only functional performance required for acceptance at the conclusion of the test.		N/A
	If the switch operates a relay, contactor or electronic power device, the complete switching system is subjected to the test.		N/A
	For switches or switching systems that control motor loads for a drive, these may be tested in the machine with no additional mechanical load applied to the drive output.		N/A
	If the switch only operates a motor starting relay complying with IEC 60730-2-10:2006 with the number of cycles of operation declared for IEC 60730-1:1999+A1:2003+A2:2007, 6.10 and 6.11 of at least 10 000 cycles, the complete switching system need not be tested.		N/A
	If the switch or switching system controls a motor load, it shall also be tested for breaking capability by the test of 24.1.3.101.		N/A
24.1.3.101	The switch is subjected to 50 operation cycles of making and breaking the current that the switch would carry when the output mechanism is locked in the machine with a fully charged battery. Each "on" period having a duration of not more than 0,5 s and each "off" period having a duration of at least 10 s.		N/A
	After this test, the switch shall have no electrical or mechanical failure. If the switch operates properly in the "on" and "off" states at the end of the test, it is considered to have no mechanical or electrical failure.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
25	SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS This clause of part I is applicable except as follows:		N/A
25.1	Replacement: Machines provided with an integral appliance inlet for connecting to the power supply shall not allow the introduction of a connector complying with any of the standard sheets of EN 60320-1:2001 + A1:2007, EN 60320-2-1:2000, EN 60320-2-2:1998, EN 60320-2-4:2006 + A1:2009. Compliance is checked by inspection		N/A
26	TERMINALS FOR EXTERNAL CONDUCTORS		P
	This clause of part I is applicable.		N/A
27	PROVISION FOR EARTHING		P
	This clause of part I is applicable.		N/A
28	SCREWS AND CONNECTIONS		P
	This clause of part I is applicable.		P
29	CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH INSULATION		P
	This clause of part I is applicable.		P
29.2	Addition: Pollution degree 3 applies to this machine		P
30	RESISTANCE TO HEAT AND FIRE		P
	This clause of Part 1 is applicable except as follows:		P
30.2	Machines and peripherals are considered to be unattended appliances.		P
31	RESISTANCE TO RUSTING		P
	This clause of part I is applicable.		P
32	RADIATION, TOXICITY AND SIMILAR HAZARDS		P
	This clause of part 1 is not applicable.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>Annexes</p> <p>The annexes of Part 1 are applicable except as follows:</p>		P
Annex B (Normative)	Appliances powered by rechargeable batteries		P
3.1.9	<i>Replacement:</i>		P
	normal operation		P
	operation of the machine under the following conditions:		P
	<ul style="list-style-type: none"> – the machine, supplied by its fully charged battery, is operated at no load; – the battery is charged, the battery being initially discharged to such an extent that the machine cannot operate; Lithium-Ion batteries are discharged to the minimum voltage as specified by the battery and/or cell manufacturer – if possible, the machine is supplied from the supply mains through its battery charger, the battery being initially discharged to such an extent that the machine cannot operate. The machine is operated at no load; – if the machine incorporates inductive coupling between two parts that are detachable from each other, the machine is supplied from the supply mains with the detachable part removed 		P
19.B.101	Addition: This clause is not applicable for Lithium-Ion batteries and cells that comply with clause 22.B.101.		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
22	Construction		P
22.B.101	<p>Lithium-Ion batteries and cells shall be prevented from overheating, overvoltage, overcurrent and recharging after deep discharge as specified by the battery and/or cell manufacturer.</p> <p>Compliance is checked by measurement of temperature, voltage and current during normal operation, charging and if applicable discharging procedure.</p> <p>If compliance relies on the operation of an electronic circuit, it is checked under the following conditions applied separately:</p> <p>1)the fault conditions in a) to g) of 19.11.2 applied one at a time to the electronic circuit;</p> <p>2)the electromagnetic phenomena tests of 19.11.4.2 applied to the charging system during the charging phase and if applicable during the trickle charging phase.</p> <p>If the electronic circuit is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.</p>		P
24	Components		P
24.B.101	Batteries and cells shall comply with the requirements of the EN 62133.	Batteries comply with Annex KK of IEC 60335-2-107 and battery cell comply with IEC 62133-2.	P
24.B.102	Chargers that fulfill the requirements of EN 60335-2-29 and are foreseen for charging Lithium-Ion batteries and cells additionally shall fulfill the requirements of clause 22.B.101.		P
30	Resistance to heat and fire		P
30.2	<p>Addition:</p> <p>For robotic battery powered electric lawnmowers, 30.2.3 is applicable.</p>		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
Annex R (Normative)	Software evaluation		N/A
R.2.2.5	Modification: For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2, detection of a fault/error shall occur before compliance with Clauses 19, 20 and 22 is impaired.	Refer to attachment 2.	N/A
R.2.2.9	Modification: The software and safety-related hardware under its control shall be initialized and shall terminate before compliance with Clauses 19, 20 and 22 is impaired.		N/A
Annex AA (Normative)	Calculation of kinetic energy of pivoting cutting elements		P
Annex BB (Normative)	Test enclosure construction		P
Annex CC (Normative)	Base for thrown object test enclosure		P
Annex DD (Normative)	Target panel elevation zones and recommended test report for thrown object test		P
Annex FF (Normative)	Noise test code – Engineering method (grade 2)		P
Annex GG (informative)	Example of a material and construction fulfilling the requirements for an artificial surface		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
Annex HH (informative)	Safety instructions		P
HH.1	<p>General</p> <p>This annex presents an example of safe operating practices for all machine types covered by this standard. The instruction handbook should include, where appropriate, the substance of the following clauses of this annex.</p> <p>It should also include information concerning noise levels and any necessary warnings, together with the following</p> <p style="text-align: center;">IMPORTANT READ CAREFULLY BEFORE USE KEEP FOR FUTURE REFERENCE</p>		P
HH.2	Safe operating practices		P
HH.2.1	<p>Training</p> <p>a) Read the instructions carefully. Be familiar with the controls and the proper use of the machine.</p> <p>b) Never allow people unfamiliar with these instructions or children to use the machine. Local regulations may restrict the age of the operator.</p> <p>c) The operator or user is responsible for accidents or hazards occurring to other people or their property.</p>		P
HH.2.2	<p>Preparation</p> <p>d) Ensure the correct installation of the automatic perimeter delineation system as instructed.</p> <p>e) Periodically inspect the area where the machine is to be used and remove all stones, sticks, wires, bones, and other foreign objects.</p> <p>f) Periodically visually inspect to see that the blades, blade bolts and cutter assembly are not worn or damaged. Replace worn or damaged blades and bolts in sets to preserve balance.</p> <p>g) On multi-spindle machines, take care as rotating one blade can cause other blades to rotate.</p>		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
HH.3	Operation		P
HH.3.1	<p>General</p> <p>Never operate the machine with defective guards, or without safety devices, for example deflectors and/or grass catchers, in place.</p> <p>Do not put hands or feet near or under rotating parts. Keep clear of the discharge opening at all times.</p> <p>Never pick up or carry an machine while the motor is running.</p> <p>Remove (or Operate) the disabling device from the machine</p> <p>before clearing a blockage;</p> <p>before checking, cleaning or working on the machine</p>		P
HH.3.2	<p>Additionally when the machine is operating automatically</p> <p>Do not leave the machine to operate unattended if you know that there are pets, children or people in the vicinity.</p>		P
HH.3.3	<p>Additionally when using the manual controller</p> <p>a)Mow only in daylight or in good artificial light.</p> <p>b)Avoid operating the machine in wet grass.</p> <p>c)Do not operate the machine when barefoot or wearing open sandals. Always wear substantial footwear and long trousers.</p> <p>d)Always be sure of your footing on slopes</p> <p>e)Use extreme caution when reversing the machine towards you.</p> <p>f)Always switch on the motor according to instructions with feet well away from the blade(s).</p>		P

EN 50636-2-107: 2015+A1+A2+A3			
Clause	Requirement + Test	Result - Remark	Verdict
HH.4	<p>Maintenance and storage</p> <ul style="list-style-type: none"> a) Keep all nuts, bolts, and screws tight to be sure the machine is in safe working condition. b) Check the grass catcher frequently for wear or deterioration c) Replace worn or damaged parts for safety. d) Ensure that only replacement cutting means of the right type are used. e) Ensure that batteries are charged using the correct charger recommended by the manufacturer. Incorrect use may result in electric shock, overheating or leakage of corrosive liquid from the battery. f) In the event of leakage of electrolyte flush with water/neutralizing agent, seek medical help if it comes into contact with the eyes etc. g) Servicing of the machine should be according to manufacturer's instructions. 		P
Annex ZZ	Relationship between this European Standard and the essential requirements of Directive 2006/42/EC [2006 OJ L157] aimed to be covered		P

--End of Test Report--

Certificate No. AM 50627222 0001 **Our Reference** CN247M1D 001 **Appendix No.** N/A

Constructional Data Form (CDF) for Electrical Appliances

Page 1 of 3

License holder : Shenzhen Mammotion Innovation Co., Limited
 9th Floor, Building A3, Nanshan Zhiyuan, No. 1001 Xueyuan Avenue,
 Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen Guangdong
 P.R. China

Factory : Huizhou BYD Electronic Co., Ltd.
 Xiangshui River, Daya Bay Economic and Technological Development Zone,
 Huizhou City

Type of Appliance : YUKA Robot Lawn Mower

Type Designation : 600, 1000, 1500, 2000

Rated Voltage : DC 21.6V

Protection Class : Class III

Supply connection : fixed power cord
 permanent connection
 appliance inlet
 direct plug in
 battery operated

Please tick above box when applicable

Additional information :

IPX6 for Robot Mower and charger station, IPX7 for RTK station.

Remark: Refer to CN243LRR 002

Controller Type	Hardware Version (PCBA)	Software Version	Checksum
MN01_MC_V06	MN01_MC_V06	4.0.1.273_f7942f0	MD5:1A5321BEFF289538A61C39EE66015758
		1.0.0.127_f3e9bbf (for power)	MD5:9F53A35E8F25B66293368E09166E9C54
Drive Board	MN01_DC_G4_V06	2.0.0 (for cutting means)	MD5:F3DA1A2F418FDF4321424D989B516B51
		2.0.0 (for traction drive)	MD5:C4E71B9A42A6319E298A480EFEF2E5E0
MN01_X3_MC_V06	MN01_X3_MC_V06	YKX3Middleware_v4.1.1.118 6_5b68f78c	bsp.zip:053fc9235ba58b18c59c18f0e6d07f62 agl_midware_v3.0.0.800.img.tgz:95b307ec205e bfb7afe841dcce4858bf
MN01_KEY_HALL_V04	MN01_KEY_HALL_V04	1.1.2.28_906a279	MD5:3724AB8E2E750029E29B107B884174E6
SL-6S2P-BL	26AZ002(SL-BL-6S2P)-C	V1.13	MD5:18E092B2C875AEABF5D7C4594AD83462

Constructional Data Form (CDF) for Electrical Appliances

Critical Components

Material: e.g. external enclosure, PCB, closed-end connector, sleeves, cord anchorage etc

Components with winding: e.g. motor, transformer, magnetic coil etc.

Other components: e.g. switch, thermostat, heater, plug, internal wire, capacitor, relay, varistor etc.

Object/part No.	Manufacturer/ trademark	Type/ model	Technical data	Standard	Mark(s) of conformity
Motor for blade	Dong Xing Chang Technology (Shenzhen) Co., Ltd.	SL5868B024-001	24V DC,88W	EN 60335-1; EN 50636-2-107	Accept Test
(alternative)	Zhejiang Linix Motor Co.,LTD	57ZWN24-55-58	24V DC,55W	EN 60335-1; EN 50636-2-107	Accept Test
Motor for traction	Guangdong SigGear Drive Intelligent Technology Co., LTD.	SIG2195-84PG-9.8B	24V DC, 50W	EN 60335-1; EN 50636-2-107	Accept Test
Motor for Sweeper	Shenzhen YouShun Motor Co., Ltd	YS-16GRC130-120-1295	24V DC, 0.5W	EN 60335-1; EN 50636-2-107	Accept Test
Switching power supply for charging station	Shenzhen Transin Technologies Co., Ltd.	TS-A090-3003001	Input:100-240 ~50/60Hz,2A Max Output:30V, 3A	EN 60335-2-29 EN 60335-1	TUV RH S 50621626 0001
Switching power supply for RTK reference station	Shenzhen Transin Technologies Co., Ltd.	TS-A012-1201002	Input:100-240VAC 50/60Hz 0.4A Output:12.0VDC, 1.0A	EN 62368-1	TUV RH S 50622412 0001
Battery cell	EVE Energy Co., Ltd.	INR18650/25P	3.6V, 2500mAh	IEC 62133-2	TUV JPTUV- 113891
Battery pack	HUIZHOU BLUEWAY ELECTRONICS CO., LTD	YUKA	21.6Vdc, 4.5Ah 97.2Wh	EN/IEC 60335-1; EN 50636-2-107; IEC 60335-2-107	Accept Test
Internal wire	Hsieh-Yuh Electronics Technology (Zhong Shan)Co., Ltd.	2464	18, 24AWG 80 300V	EN 60335-1; EN 50636-2-107	UL E473397 and accept test
Power switch	Yuandi Electronics Co, Ltd	TS-1095PS-A3B3-C3D2	--	EN 60335-1; EN 50636-2-107	UL Approved
Obstruction switch	Shanghai Magntek Micro electronics Inc	MT8552AT	--	EN 60335-1; EN 50636-2-107	E351308 and accept test
Lift sensor	Shanghai Magntek Micro electronics Inc	MT8552AT	--	EN 60335-1; EN 50636-2-107	Accept Test
Tilt sensor	TDK invensense	ICM-42670-P	--	EN 60335-1; EN 50636-2-107	Accept Test

Certificate No. AM 50627222 0001 Our Reference CN247M1D 001 Appendix No. N/A

Constructional Data Form (CDF) for Electrical Appliances

Page 3 of 3

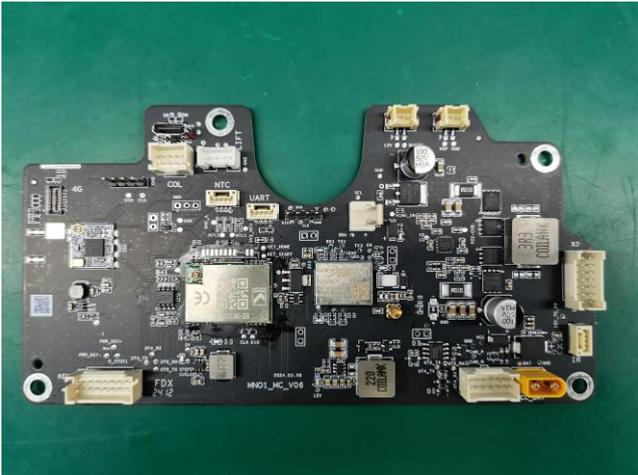
Critical Components

Material: e.g. external enclosure, PCB, closed-end connector, sleeves, cord anchorage etc

Components with winding: e.g. motor, transformer, magnetic coil etc.

Other components: e.g. switch, thermostat, heater, plug, internal wire, capacitor, relay, varistor etc.

Object/part No.	Manufacturer/ trademark	Type/ model	Technical data	Standard	Mark(s) of conformity
Overtum sensor	TDK invensense	ICM-42670-P	--	EN 60335-1; EN 50636-2-107	Accept Test
3D Camera	SHEN ZHEN WINTOP T IME OPTICAL CO., LTD	7018P-A1	--	EN 60335-1; EN 50636-2-107	Accept Test
PCB	SHENZHEN HOPESEARCH PCB MANUFACTURING CO LTD	D-M E-D	130°C, V-0	UL796 EN 50636-2-107; IEC 60335-2-107	Accept Test
Alternative	Interchangeable	--	V-0 ,130°C	UL796	Accept Test
Cutting blade	Shenzhen Neckly Knives Manufacture Co., Ltd	M (Mammotion)	36*19.5*1mm (420J2) or (CK5)	EN 60335-1; EN 50636-2-107	Accept Test
Docking station	Mammotion Technology Co., Limited	CHG0004	Input: 20V d.c., 90W Output: 30V d.c., 3.0A. Class III, IPX6	EN 60335-1; EN 50636-2-107	Accept Test
RTK reference station	Mammotion Technology Co., Limited	RTK0003	Input: 12-25.2V d.c., 2.3W Class III, IPX7	EN 60335-1; EN 50636-2-107	Accept Test
	Ningbo Yinxian Lihe Switch Factory	RL5-2	AC 125V, 10A, T105	EN 60335-1; EN 50636-2-107	Accept Test
Catcher	Dongguan Lianhui Hand bag Co. Ltd	PVC and NYLON	380*370*330mm	EN 60335-1; EN 50636-2-107	Accept Test

Prüfbericht-Nr.: <i>Test report no.:</i>	CN243LRR 002	Auftrags-Nr.: <i>Order no.:</i>	326020979	Seite 1 von 19 Page 1 of 19
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2024.05.08	
Auftraggeber: <i>Client:</i>	Shenzhen Mammotion Innovation Co., Limited 9th Floor, Building A3, Nanshan Zhiyuan, No. 1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen			
Prüfgegenstand: <i>Test item:</i>	Controllers of Robotic Lawnmower			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	MN01_MC_V06, Drive Board, MN01_X3_MC_V06, MN01_KEY_HALL_V04, SL-6S2P-BL			
Auftrags-Inhalt: <i>Order content:</i>	Software Evaluation			
Prüfgrundlage: <i>Test specification:</i>	IEC 60335-1:2010+A1+A2 Annex R EN 60335-1:2012+A11+A13+A14+A2+A15 Annex R UL 60335-1:2016 Annex R CAN/CSA-C22.2 NO. 60335-1:16 Annex R			
Wareneingangsdatum: <i>Date of sample receipt:</i>	N/A			
Prüfmuster-Nr.: <i>Test sample no.:</i>	N/A			
Prüfzeitraum: <i>Testing period:</i>	2024.05.09 – 2024.05.09			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shanghai) Co., Ltd			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	<u>X Cecilia Bao</u>			
Datum: <i>Date:</i> 2024.05.09	<small>Signed by: Cecilia Bao</small>	Ausstellungsdatum: <i>Issue date:</i> 2024.05.09	<small>Signed by: Patrick Wang</small>	
Stellung / Position:	Project Engineer	Stellung / Position:	Authorizer	
Sonstiges / Other:	For details, see page 3. Client contact: qun.zhan@mammotiontech.com Sample obtaining method: engineering prototype supplied from client			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

V05

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General Information

This report is based on CN243LRR 001. This report is for adding new product type, Yuka 2000. There is no software and hardware differences between Yuka 2000 and Yuka 600, Yuka 1000, Yuka 1500.

This report replaced previous report CN243LRR 001.

This report is for evaluating software function about safety for the controllers used in Robotic Lawnmower(product type Yuka 600, Yuka 1000, Yuka 1500, Yuka 2000).

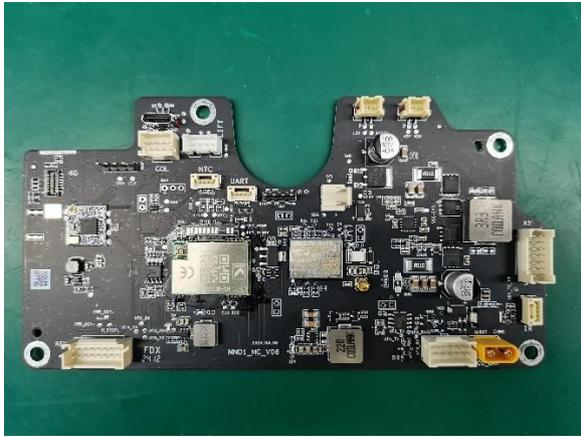
All products above share the same versions as table below.

This report is only valid for the conditions match information as below:

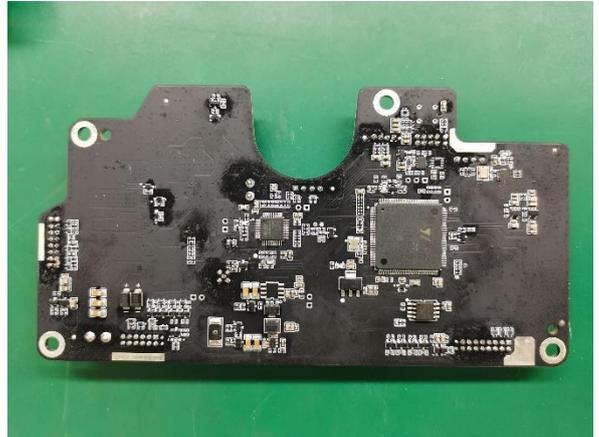
Controller Type	Hardware Version (PCBA)	Software Version	Checksum
MN01_MC_V06	MN01_MC_V06	4.0.1.273_f7942f0	MD5:1A5321BEFF289538A61C39EE66015758
		1.0.0.127_f3e9bbf (for power)	MD5:9F53A35E8F25B66293368E09166E9C54
Drive Board	MN01_DC_G4_V06	2.0.0 (for cutting means)	MD5:F3DA1A2F418FDF4321424D989B516B51
		2.0.0 (for traction drive)	MD5:C4E71B9A42A6319E298A480EFEF2E5E0
MN01_X3_MC_V06	MN01_X3_MC_V06	YKX3Middleware_v4.1.1.118 6_5b68f78c	bsp.zip:053fc9235ba58b18c59c18f0e6d07f62 agl_middleware_v3.0.0.800.img.tgz:95b307ec205e bfb7afe841dcce4858bf
MN01_KEY_HALL_V04	MN01_KEY_HALL_V04	1.1.2.28_906a279	MD5:3724AB8E2E750029E29B107B884174E6
SL-6S2P-BL	26AZ002(SL-BL-6S2P)-C	V1.13	MD5:18E092B2C875AEABF5D7C4594AD83462

Photo Document:

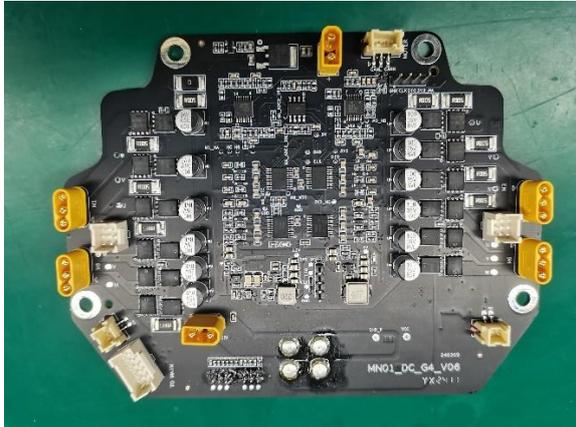
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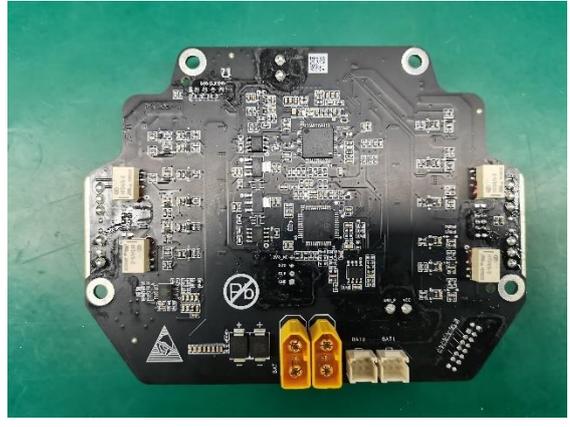
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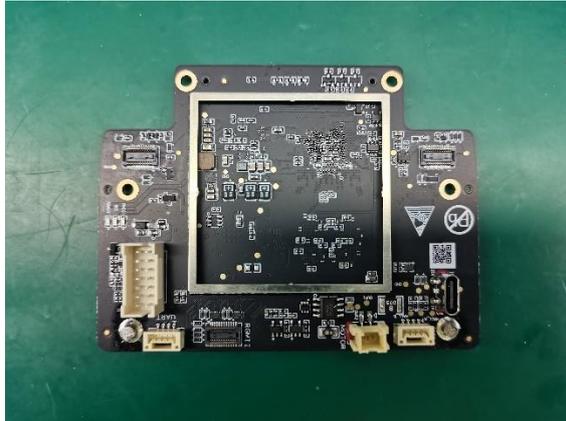
Drive Board



Drive Board



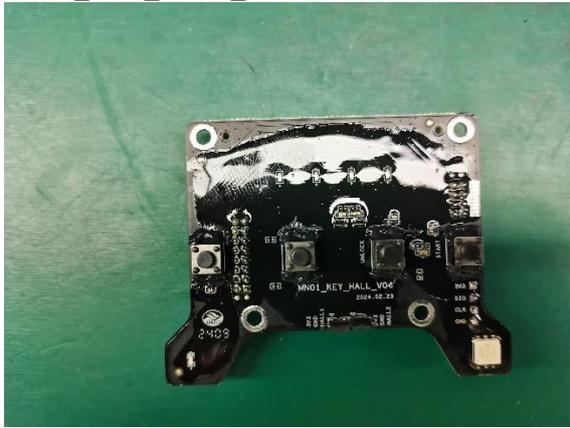
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MN01_X3_MC_V06



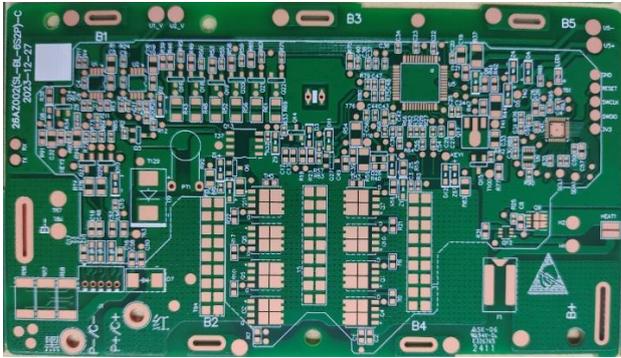
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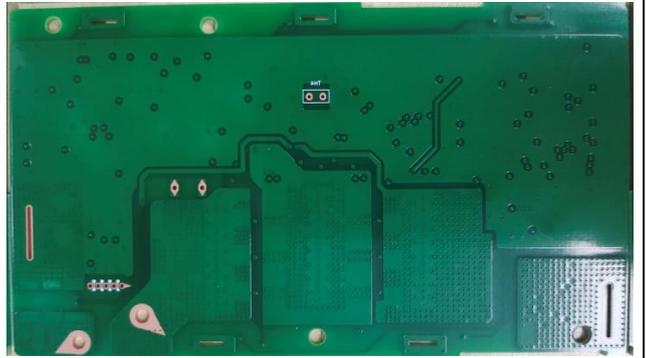
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SL-6S2P-BL



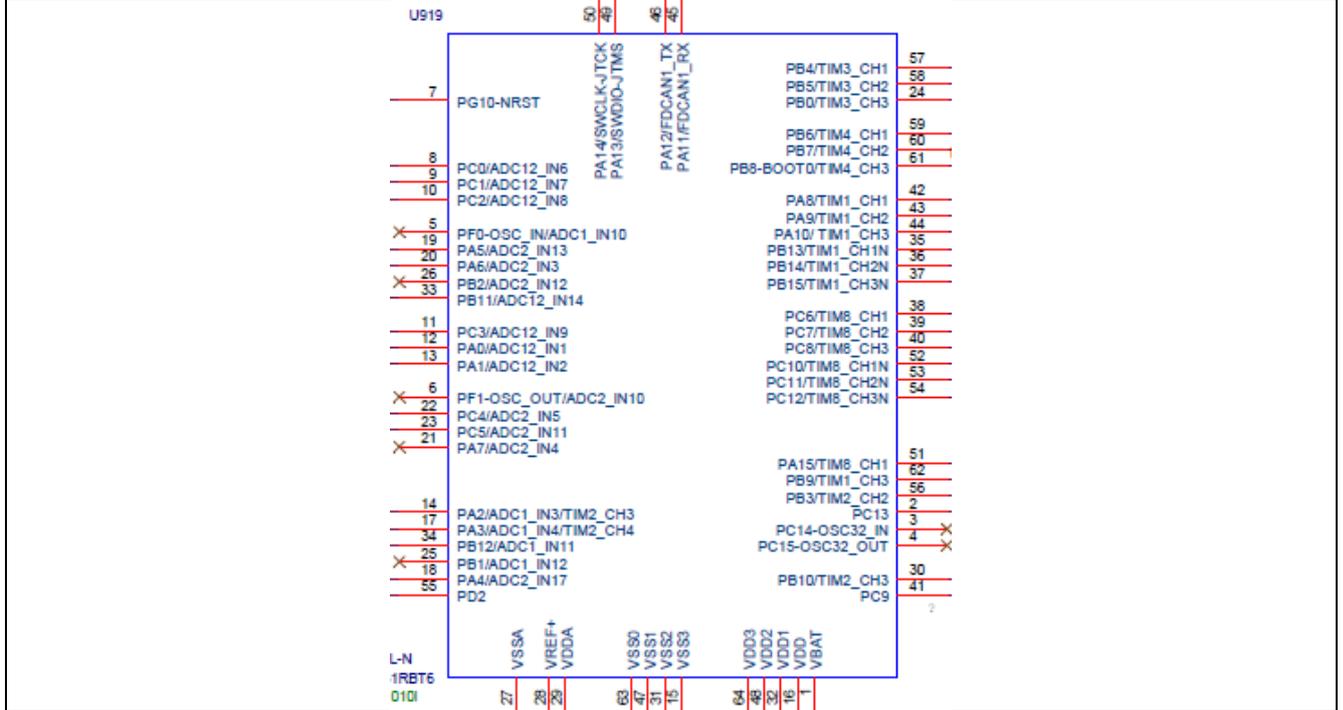
SL-6S2P-BL



MCU Information	
MN01_MC_V06	
MCU manufacturer	STmicrocontrollers
MCU type	STM32H562ZGT6
MN01_MC_V06(for power)	
MCU manufacturer	STmicrocontrollers
MCU type	STM32L071CBT6
drive board (for cutting means)	

MCU manufacturer	STmicrocontrollers
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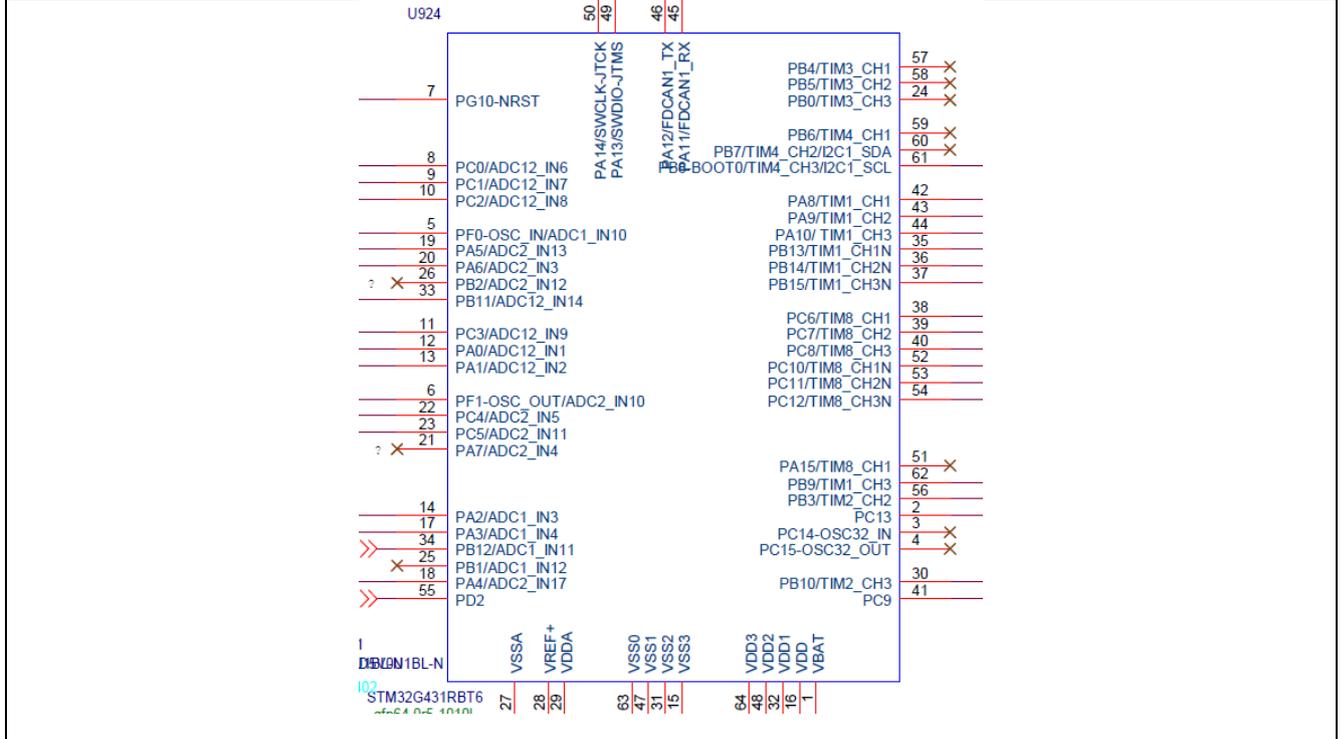
MCU type	STM32G431RBT6
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Drive Board (for traction drive)

MCU manufacturer	STmicrocontrollers
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MCU type	STM32G431RBT6
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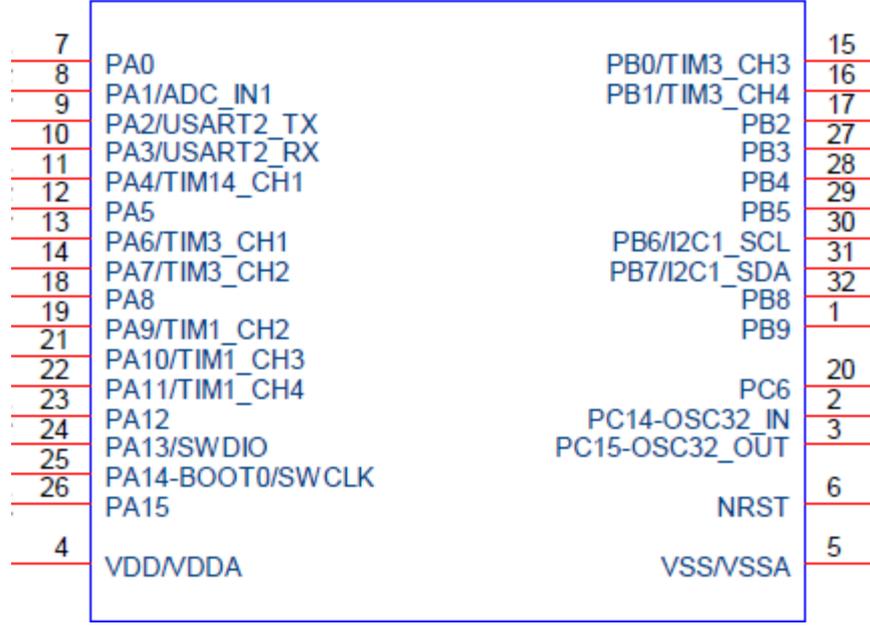
MN01_X3_MC_V06

MCU manufacturer	Horizon Robotics
MCU type	X3ME001BGTMB



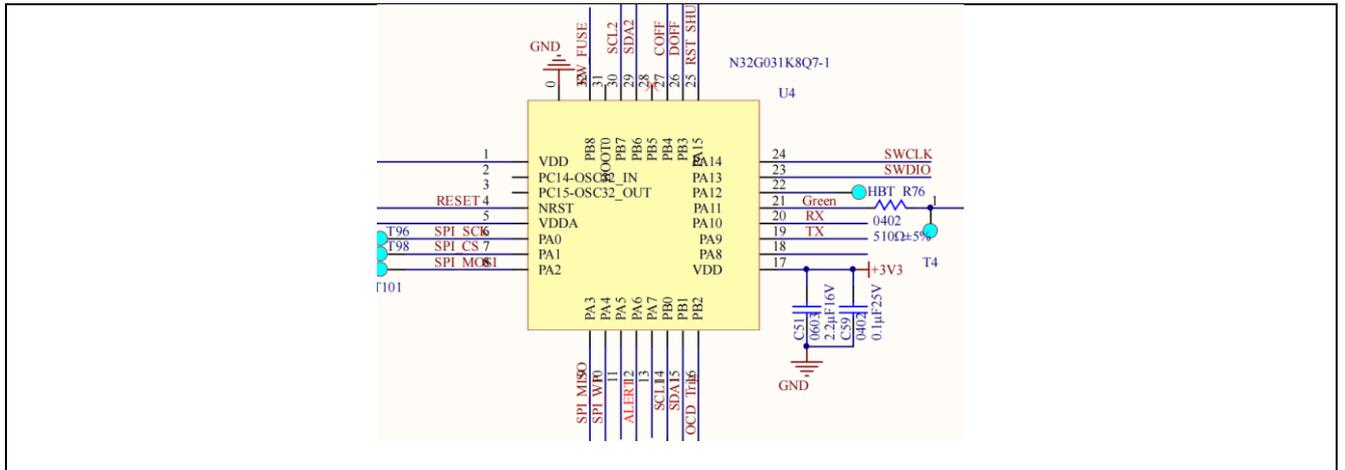
MN01_KEY_HALL_V04

MCU manufacturer	STmicrocontrollers
MCU type	STM32G070KBT6



SL-6S2P-BL

MCU manufacturer	Nations Technologies Inc.
MCU type	N32G031K8



IEC 60335-1:2010+A1+A2 / EN 60335-1:2012+A11+A13+A14+A2+A15 UL 60335-1:2016 / CAN/CSA-C22.2 NO. 60335-1:16 Annex R			
Clause	Requirement - Test	Result - Remark	Verdict
Annex R	Software evaluation		P
	<p>Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2 shall be validated in accordance with the requirements in this annex.</p> <p>NOTE Tables R.1 and R.2 are based on Table H.11.12.7 of IEC 60730-1 that is, for the purpose of this annex, divided in two tables, Table R.1 for general fault/error conditions and Table R.2 for specific fault/error conditions.</p>	Informative clause	P
R.1	Programmable electronic circuits using software		P
	<p>Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2 shall be constructed so that the software does not impair compliance with the requirements of this standard.</p> <p>Compliance is checked by the inspections and tests, according to the requirements of this annex, and by examination of the documentation as required by this annex.</p>	Informative clause	P
R.2	Requirements for the architecture		P
R.2.1	General		P
	<p>Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2 shall use measures to control and avoid software-related faults/errors in safety-related data and safety-related segments of the software.</p> <p>Compliance is checked by the inspections and tests in R.2.2 to R.3.3.3 inclusive.</p>	According to 22.46, Table R.1 shall be applied.	P
R.2.1.1	<p>Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.2 shall have one of the following structures:</p> <ul style="list-style-type: none"> – single channel with periodic self-test and monitoring (see IEC 60730-1, H.2.16.7); – dual channel (homogenous) with comparison (see IEC 60730-1, H.2.16.3); – dual channel (diverse) with comparison (see IEC 60730-1, H.2.16.2). <p>NOTE 1 Comparison between dual channel structures may be performed by:</p> <ul style="list-style-type: none"> • use of a comparator (see IEC 60730-1 H.2.18.3), or • reciprocal comparison (see IEC 60730-1 H.2.18.15). 	Table R.1 shall be applied. Single channel with functional test is found.	N/A

IEC 60335-1:2010+A1+A2 / EN 60335-1:2012+A11+A13+A1+A14+A2+A15 UL 60335-1:2016 / CAN/CSA-C22.2 NO. 60335-1:16 Annex R			
Clause	Requirement - Test	Result - Remark	Verdict
R.2.1.1	<p>Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in Table R.1 shall have one of the following structures:</p> <ul style="list-style-type: none"> – single channel with functional test (see IEC 60730-1, H.2.16.5); – single channel with periodic self-test (see IEC 60730-1, H.2.16.6); – dual channel without comparison (see IEC 60730-1, H.2.16.1). <p>NOTE 2 Software structures incorporating measures to control the fault/error conditions specified in Table R.2 are also acceptable for programmable electronic circuits with functions requiring software measures to control the fault/error conditions specified in Table R.1.</p> <p>Compliance is checked by the inspections and tests of the software architecture in R.3.2.2.</p>	<p>Table R.1 shall be applied.</p> <p>Single channel with functional test is found.</p>	P
R.2.2	Measures to control faults/errors		P
R.2.2.1	<p>When redundant memory with comparison is provided on two areas of the same component, the data in one area shall be stored in a different format from that in the other area (see software diversity, IEC 60730-1 H.2.18.19).</p> <p>Compliance is checked by inspection of the source code.</p>		N/A
R.2.2.2	<p>Programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.2 and that use dual channel structures with comparison shall have additional fault/error detection means (such as periodic functional tests, periodic self tests, or independent monitoring) for any fault/errors not detected by the comparison.</p> <p>Compliance is checked by inspection of the source code.</p>		N/A
R.2.2.3	<p>For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2, means shall be provided for the recognition and control of errors in transmissions to external safety-related data paths. Such means shall take into account errors in data, addressing, transmission timing and sequence of protocol.</p> <p>Compliance is checked by inspection of the source code.</p>		N/A

IEC 60335-1:2010+A1+A2 / EN 60335-1:2012+A11+A13+A14+A2+A15 UL 60335-1:2016 / CAN/CSA-C22.2 NO. 60335-1:16 Annex R			
Clause	Requirement - Test	Result - Remark	Verdict
R.2.2.4	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2, the programmable electronic circuits shall incorporate measures to address the fault/errors in safety-related segments and data indicated in Table R.1 or Table R.2 as appropriate. Compliance is checked by inspection of the source code.	Please refer to Part A.	P
Table R.1	General fault/error conditions		P
1	Central processing unit (CPU)	Please refer to Part A.	P
1.1	Registers	Please refer to Part A.	P
1.2	VOID		--
1.3	Programme counter	Please refer to Part A.	P
2	Interrupt handling and execution	Please refer to Part A.	P
3	Clock	Please refer to Part A.	P
4	Memory	Please refer to Part A.	P
4.1	Invariable memory	Please refer to Part A.	P
4.2	Variable memory	Please refer to Part A.	P
4.3	Addressing (relevant to including the address variable and invariable memory)	Please refer to Part A.	P
5	Internal data path		N/A
5.1	VOID		--
5.2	Addressing		N/A
6	External communication	Please refer to Part A.	P
6.1	VOID		--
6.2	VOID		--
6.3	Timing	Please refer to Part A.	P
7	Input/output periphery	Please refer to Part A.	P
7.1	VOID		--
7.2	Analog I/O	Please refer to Part A.	P
7.2.1	A/D and D/A convertor	Please refer to Part A.	P
7.2.2	Analog multiplexer		N/A
8	VOID		--
9	Custom chips e.g. ASIC, GAL, gate array		N/A
Table R.2	Specific fault/error conditions		N/A

IEC 60335-1:2010+A1+A2 / EN 60335-1:2012+A11+A13+A14+A2+A15 UL 60335-1:2016 / CAN/CSA-C22.2 NO. 60335-1:16 Annex R			
Clause	Requirement - Test	Result - Remark	Verdict
R.2.2.5	<p>For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2, detection of a fault/error shall occur before compliance with Clause 19 is impaired.</p> <p>Compliance is checked by inspection and testing of the source code.</p> <p>NOTE The loss of dual channel capability is deemed to be an error in a programmable electronic circuit using a dual channel structure required for software to control the fault/error conditions specified in Table R.2.</p>	Please refer to Part A.	P
R.2.2.6	<p>The software shall be referenced to relevant parts of the operating sequence and the associated hardware functions.</p> <p>Compliance is checked by inspection of the source code.</p>	Please refer to Part A.	P
R.2.2.7	<p>Where labels are used for memory locations, these labels shall be unique.</p> <p>Compliance is checked by inspection of the source code.</p>		P
R.2.2.8	<p>The software shall be protected from user alteration of safety-related segments and data.</p> <p>Compliance is checked by inspection of the source code.</p>	Please refer to Part A.	P
R.2.2.9	<p>The software and safety-related hardware under its control shall be initialized and shall terminate before compliance with Clause 19 is impaired.</p> <p>Compliance is checked by testing of the source code.</p>	Please refer to Part A.	P
R.3	Measures to avoid errors		P
R.3.1	General		P
	<p>For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2, the following measures to avoid systematic faults in the software shall be applied.</p> <p>Software that incorporates measures used to control the fault/error conditions specified in Table R.2 is inherently acceptable for software required to control the fault/error conditions specified in Table R.1.</p> <p>NOTE The content of these requirements is extracted from IEC 61508-3 and adapted to the needs of this Standard.</p>	Informative clause	P
R.3.2	Specification		P
R.3.2.1	Software safety requirements		P

IEC 60335-1:2010+A1+A2 / EN 60335-1:2012+A11+A13+A14+A2+A15 UL 60335-1:2016 / CAN/CSA-C22.2 NO. 60335-1:16 Annex R			
Clause	Requirement - Test	Result - Remark	Verdict
	<p>The specification of the software safety requirements shall include:</p> <ul style="list-style-type: none"> – a description of each safety related function to be implemented, including its response time(s): <ul style="list-style-type: none"> • functions related to the application including their related software faults required to be controlled; • functions related to the detection, annunciation and management of software or hardware faults; – a description of interfaces between software and hardware; – a description of interfaces between any safety and non-safety related functions; – a description of any compiler used to generate the object code from the source code, including details of any compiler switch settings used such as library function options, memory model, optimization, SRAM details, clock rate and chip details; – a description of any linker used to link the object code to executable library routines. Compliance is checked by inspection of the documentation and as specified in R.3.2.2.2. <p>NOTE Examples of some techniques/measures to meet these requirements can be found in Table R.3.</p>	Please refer to Part A.	P
R.3.2.2	Software architecture		P
R.3.2.2.1	<p>The specification of the software architecture shall include the following aspects:</p> <ul style="list-style-type: none"> – techniques and measures to control software faults/errors (refer to R.2.2); – interactions between hardware and software; – partitioning into modules and their allocation to the specified safety functions; – hierarchy and call structure of the modules (control flow); – interrupt handling; – data flow and restrictions on data access; – architecture and storage of data; – time-based dependencies of sequences and data. <p>Compliance is checked by inspection of the documentation and as specified in R.3.2.2.2.</p> <p>NOTE Examples of some techniques/measures to meet these requirements can be found in Table R.4.</p>		P

IEC 60335-1:2010+A1+A2 / EN 60335-1:2012+A11+A13+A14+A2+A15 UL 60335-1:2016 / CAN/CSA-C22.2 NO. 60335-1:16 Annex R			
Clause	Requirement - Test	Result - Remark	Verdict
R.3.2.2.2	<p>The architecture specification shall be validated against the specification of the software safety requirements by static analysis.</p> <p>NOTE Example methods for static analysis are:</p> <ul style="list-style-type: none"> • control flow analysis; (IEC 61508-7, C.5.9); • data flow analysis; (IEC 61508-7, C.5.10); • walk-throughs/design reviews. (IEC 61508-7, C.5.16). 		P
R.3.2.3	Module design and coding		P
R.3.2.3.1	<p>Based on the architecture design, software shall be suitably refined into modules. Software module design and coding shall be implemented in a way that is traceable to the software architecture and requirements.</p> <p>Compliance is checked by R.3.2.3.3 and by inspection of the documentation.</p> <p>NOTE 1 The use of computer aided design tools is accepted.</p> <p>NOTE 2 Defensive programming (IEC 61508-7, Subclause C.2.5) is recommended (e.g. range checks, check for division by 0, plausibility checks).</p> <p>NOTE 3 The module design shall specify:</p> <ul style="list-style-type: none"> • function(s), • interfaces to other modules, • data. <p>NOTE 4 Examples of some techniques/measures to meet these requirements can be found in Table R.5.</p>		P
R.3.2.3.2	<p>Software code shall be structured.</p> <p>Compliance is checked by R.3.2.3.3 and by inspection of the documentation.</p> <p>NOTE 1 Structural complexity can be minimized by applying the following principles:</p> <ul style="list-style-type: none"> • keep the number of possible paths through a software module small, and the relation between the input and output parameters as simple as possible; • avoid complicated branching and, in particular, avoid unconditional jumps (GOTO) in higher level languages; • where possible, relate loop constraints and branching to input parameters; • avoid using complex calculations as the basis of branching and loop decisions. <p>NOTE 2 Examples of some techniques/measures to meet these requirements can be found in Table R.6.</p>		P

IEC 60335-1:2010+A1+A2 / EN 60335-1:2012+A11+A13+A14+A2+A15 UL 60335-1:2016 / CAN/CSA-C22.2 NO. 60335-1:16 Annex R			
Clause	Requirement - Test	Result - Remark	Verdict
R.3.2.3.3	Coded software shall be validated against the module specification by static analysis. The module specification shall be validated against the architecture specification by static analysis.		P
R.3.3.3	Software validation		P
	<p>The software shall be validated with reference to the requirements of the software safety requirements specification.</p> <p>NOTE 1 Validation is confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled. Therefore, for example, software validation means confirming by examination and provision of objective evidence that the software satisfies the software safety requirements specification.</p> <p>Compliance is checked by simulation of</p> <ul style="list-style-type: none"> – input signals present during normal operation, – anticipated occurrences, – undesired conditions requiring system action. <p>Test cases, test data and test results shall be reported.</p> <p>NOTE 2 Examples of some techniques/measures to meet these requirements can be found in Table R.7.</p> <p>NOTE 3 Testing should be the main validation method for software; modelling may be used to supplement the validation activities.</p>		P

Part A Software about Safety Function

A.1 Overview

C language & assembly language are used in this project.

In order to avoid systematic failure, the left part of V-Model is applied in the software design, from requirement to coding. Proper diagnostics, cooperating with hardware, are provided to detect hardware random failures.

A.2 System safety requirements

All safety related function have been well implemented and evaluated by inspection. Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.1 Manual stop

The manual stop shall override controls and cause traction motor and blade motor to stop.

A.2.2 Cutting means stopping time

The cutting means shall stop from their maximum rotational speed within 2 s in normal operation.

A.2.3 Stopping distance

The machine shall come to a halt within 200 mm after the initiation of any stopping command in normal operation.

A.2.4 Restart procedure

Restarting of the traction drive and cutting means due to:

- activation of lift sensors, tilt sensors, obstruction sensors, rollover sensors
- activation of a manual stop
- changing of the working area

It shall following two separate actions on key pad.

A.2.5 Battery charger interlock

It shall not be possible to operate the cutting means or the traction drive of the machine while the battery is being charged.

A.2.6 Working area limit

It shall not be possible for the machine to cross the boundary of the working area by a distance greater than one full length of the machine in normal operation.

A.2.7 Signal received fault protection

If the machine fails to receive any signal that is required to recognize the working area, then the machine shall travel no more than 1 m and the cutting means shall stop within 5 s.

A.2.8 Tilt sensor

The machine shall be fitted with tilt sensor. It shall activate before the machine becomes unstable.

A.2.9 Obstruction sensor

The machine shall be fitted with obstruction sensor. It shall detect when there is an obstacle anywhere in the full width of the path of the machine when it is operating in automatic mode.

A.2.10 Lift sensor

Lift sensor shall be provided on the machine. It shall detect when the machine is lifted both fully from the ground.

A.2.11 Rollover sensor

Rollover sensor shall be provided on the machine. It shall prevent the traction drive and cutting means starting when the machine is inverted.

A.2.12 Battery management system

Lithium-Ion batteries and cells shall be prevented from overheating, overvoltage, overcurrent and recharging after deep discharge as specified by the battery and/or cell manufacturer.

A.2.13 Self-test requirement

The system will do periodic self-test, if error detected in self-test program, the system will set to a safe state.

A.2.13.1 Registers test

Register test has periodic self-test.

This test ensures that the bits in the registers are not stuck at a value '0' or '1'.

Test patterns are used in this test.

If the register is error, the system will set to a safe state.

Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.13.2 Programme counter test

PC test has periodic self-test.

This test ensures that when the bits in the PC are stuck at '0' or '1', the system will not result in a hazard condition.

If the PC is error, the system will set to a safe state.

The watchdog with independent clock is used to avoid PC fault stuck at.

Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.13.3 Interrupt handling and execution test

Interrupt test has periodic self-test.

This test ensures that interrupts occur and are handled as expectation.

If there is no interrupt, the system will set to a safety state.

The frequency is ensured by the clock test.

Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.13.4 Clock test

Clock test has periodic self-test.

This test ensures that the clock works at correct frequency.

Time slot monitoring is used in this test.

In this system, the CPU has 2 internal timers, user-trimmable high-speed used for system clock, lower speed used for the calibration. If the clock is error, the system will set to a safety state.

Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.13.5 Invariable memory test

Invariable memory test has periodic self-test.

This test ensures that all single bit faults can be detected.
If the result of calculation is incorrect, the system will set to a safety state.
Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.13.6 Variable memory test

Variable memory test has periodic self-test.
This test ensures that the DC fault in RAM can be detected.
Test patterns are used in this test.
If failure found in the RAM, the system will set to a safe state.
Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.13.7 Addressing (relevant to variable and invariable memory) test

This test ensures that the bits in the address bus are not stuck at a value '0' or '1'.
A step by step traversal test pattern is used.
Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.13.8 Input/output periphery test

This test ensures the plausibility of input/output peripheral.
Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.13.9 A/D and D/A convertor test

This test ensures the plausibility of A/D and D/A convertor.
Further test will be carried out to guarantee the compliance of intended action/operation.

A.2.13.10 External communication

The test ensures the valid communication data exchanged.
CRC method is used in this process.
Further test will be carried out to guarantee the compliance of intended action/operation.

---End of Test Report---