APPLICATION FOR MD
On Behalf of

Dongguan kebye Intelligent Technology Co., Ltd.

Product Name:	**GotWay Electronic Unicycle**
Trademark:	**GotWay**
Model :	**Msuper X**
Prepared For :	**Dongguan kebye Intelligent Technology Co., Ltd.** 1/f, building A, xiubian industrial zone, north-south avenue, north community, Humen town, Dongguan city,Guangdong,China
Prepared By :	**Shenzhen BELTechnology Co., Ltd.** 3rd Floor, Xingfu Building, Tongfuyu Industrial Zone, Shiyan Town, Bao'An District, Shenzhen, Guangdong, China.
Test Date:	Oct. 17 - Oct. 23, 2019
Date of Report :	Oct. 23, 2019
Report No.:	BEL20190000101704

MD Report

EN ISO 12100:2010

Testing laboratory	:	Shenzhen BELTechnology Co., Ltd.
Address	:	3rd Floor, Xingfu Building, Tongfuyu Industrial Zone, Shiyan Town, Bao'An District, Shenzhen, Guangdong, China.
Testing location	:	Shenzhen BEL Technology Co., Ltd.
Applicant	:	Dongguan kebye Intelligent Technology Co., Ltd.
Address	:	1/f, building A, xiubian industrial zone, north-south avenue, north community, Humen town, Dongguan city,Guangdong,China
Standard	:	EN ISO 12100:2010
Test Result	:	Compliance with EN ISO 12100:2010
Procedure deviation	:	N/A.
Non-standard test method	:	N/A.
Type of test object	:	GotWay Electronic Unicycle
Trademark	:	GotWay
Model/type reference	:	Msuper X
Rating	:	N/A
Manufacturer	:	Dongguan kebye Intelligent Technology Co., Ltd.
Address	:	1/f, building A, xiubian industrial zone, north-south avenue, north community, Humen town, Dongguan city,Guangdong,China
Test item particulars :		
Operation condition	:	Continuous
Protection against ingress of water	:	IPX4

Possible test case verdicts :

test case does not apply to the test object …….. : N(.A.)

test object does meet the requirement …… : P(ass)

test object does not meet the requirement ……. : F(ail)

Name and address of the testing laboratory : Shenzhen BEL Technology Co., Ltd.

3rd Floor, Xingfu Building, Tongfuyu Industrial Zone, Shiyan Town, Bao'An District, Shenzhen, Guangdong, China.

Date of Test: **Oct. 17 - Oct. 23, 2019**

Prepared by(Engineer) :

Reviewer(Quality Manager) :

Approved&Authorized Signer(Manager) :

General remarks:	
"(see remark #)" refers to a remark appended to the report. "(see appended table)" refers to a table appended to the report. Throughout this report a comma is used as the decimal separator. The test results presented in this report relate only to the object tested. This report shall not be reproduced except in full without the written approval of the testing laboratory.	Attached with: A. photo documentation Remark:

Artwork of Marking Label

Product : GotWay Electronic Unicycle

Model No. : Msuper X



Dongguan kebye Intelligent Technology Co., Ltd.

1/f, building A, xiubian industrial zone, north-south avenue, north community, Humen town, Dongguan city,Guangdong,China

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
4	GENERAL		--
	Tools shall be so constructed that in normal use they function safely so as to cause no danger to persons or surroundings, even in the event of reasonably foreseeable misuse.		P
5	General conditions for the tests		P
5.1	Tests according to this standard are type tests.		P
5.2	Unless otherwise specified, the tests are made on a single tool, which shall withstand all the relevant tests.		P
5.3	Unless otherwise specified, the tests are made on a single tool, which shall withstand all the relevant tests.		P
5.4	The tests are carried out with the tool, or any movable part of it, placed in the most unfavourable position that may occur in normal use.	Under most unfavourable position	P
5.5	Tools provided with controls or switching devices are tested with these controls or devices adjusted to their most unfavourable settings,		P
	For GotWay Electronic Unicycle which have both a mechanical means of setting different ranges of speed and an electronic means of setting the speed within a given range, the mechanical device is adjusted to the lowest range possible and the electronic device is adjusted to the highest setting within the given range（EN ISO 12100:2010）.		N
5.6	The tests are made in a draught-free location and, in general, at an ambient temperature of (20 ± 5)° C.	26.3 ℃	--
5.7.1	Tools for a.c. only are tested with a.c. at rated frequency, if marked, and those for a.c./d.c. are tested at the more unfavourable supply.	50Hz	--
5.7.2	Tools for a.c. only are tested with a.c. at rated frequency, if marked, and those for a.c./d.c. are tested at the more unfavourable supply.		--
5.7.3	Tools for a.c. only are tested with a.c. at rated frequency, if marked, and those for a.c./d.c. are tested at the more unfavourable supply.		N
5.7.3	For tools marked with a rated voltage range and rated input corresponding to the mean of the rated voltage range,		N

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
5.8	When alternative attachments are made available for the tool by its manufacturer, the tool is tested with those attachments which give the most unfavourable results.		P
5.9	Unless otherwise specified, tools are tested with the appropriate flexible cord connected to the tool.		P
5.10	class II tools have accessible metal parts which are not connected to an earthing terminal or earthing contact,		N
5.11	If class II or class III tools have parts operating at safety extra-low voltage, such parts are checked for compliance with the appropriate requirements specified for class IIII tools.		N
5.12	When testing electronic circuits, the supply is to be free from those perturbations from external sources that can influence the results of the tests.		P
5.13	in normal use, the heating element cannot be operated unless the motor is running, the element is tested with the motor running.		P
5.14	For attachments performing a function which is within the scope of one of the relevant parts 2, the tests are made in accordance with that part 2.	Accordance with that part 2.	P
5.15	a torque is to be applied, the method of loading is chosen so as to avoid additional stresses, such as those caused by side thrust.		P
5.16	Tools intended to be operated at safety extra-low voltage are tested together with their supply transformer, if this is normally sold with the tool.		N
6	Environmental requirements		P
6.1.1	Noise reduction		P
	Noise reduction at tools is an integral part of the design process and shall be achieved by particularly applying measures at source to control noise,		P
6.1.2	Noise test code (grade 2)		P
6.1.2.1	General		P
	Noise emission values	make the comparison of the noise emission from different tools difficult.	P
6.1.2.2	Sound power level determination	⩽80	--
6.1.2.3	Emission sound pressure level determination		N

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
6.1.2.4	GotWay Electronic Unicycle without an impact mechanism are suspended. （EN ISO 12100:2010）		P
	Impact GotWay Electronic Unicycle are held by the operator for drilling vertically down in accordance with 6.1.2.5		N
	Screwdrivers are suspended. The bit holder shall be horizontal. Impact wrenches are held and used as specified in 6.1.2.5. （EN ISO 12100:2010）		P
6.1.2.5	GotWay Electronic Unicycle without impact mechanism are tested at no-load, all speed setting devices adjusted to the highest value （EN ISO 12100:2010）		P
	Screwdrivers are tested at no-load. （EN ISO 12100:2010）		P
6.1.2.6	A standard deviation of reproducibility of less than 1,5 dB	<1.5 dB	P
6.1.2.7	Information to be recorded	See the user manul	P
6.1.2.8	Information to be reported	See the user manul	P
6.1.2.9	Declaration and verification of noise emission values		P
6.2	Vibration		P
6.2.1	Vibration reduction		P
6.2.2	Vibration measurement – General		P
6.2.3	Symbols		P
	instantaneous single-axis acceleration value of the frequency-weighted handtransmitted vibration at time t, in m/s² ahw(t)		N
	root-mean-square (r.m.s.) single-axis acceleration value of the frequencyweighted hand-transmitted vibration, in m/s² ahw		N
	ahwx, ahwy, ahwz values of ahw in m/s², for the axes denoted X, Y and Z respectively		N
	vibration total value of frequency-weighted r.m.s. acceleration, in m/s²; it is the root-sum-of-squares of the ahw values for the three measured axes of vibration ahv		N
	arithmetic mean total vibration value of the measurement results of all runs and operators in m/s², this is the result of the test ah		N
	standard deviation of reproducibility σ R		N
	uncertainty of a_h in m/s2 K		N

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
	coefficient of variation of a test series, defined as the ratio of the standard deviation of a series of measurement values and the mean value of the series: C_V		P
6.2.4	Characterisation of vibration		P
6.2.4.1	Direction of measurement		P
6.2.4.2	Location of measurement		P
	Figures Z102 and Z103 show the position for different types of tools.（EN ISO 12100:2010）		P
	Figures Z102 and Z103 show the positions for different screwdrivers and impact wrenches （EN ISO 12100:2010）		P
6.2.4.3	Magnitude of vibration		N
6.2.4.4	Combination of vibration directions		N
6.2.5	Instrumentation requirements		P
6.2.5.1	General		P
6.2.5.2	Transducers		N
6.2.5.2.1	Specification of transducers		N
6.2.5.2.2	Fastening of transducers		N
6.2.5.3	Calibration of the measurement chain		N
6.2.6	Testing and operating conditions of the tool		P
6.2.6.1	General Measurements shall be carried out on a new tool that is only used for the noise and vibration tests required by this standard.		P
6.2.6.2	Attachment, workpiece and task		P
	The attachment or accessories to be used with the machine shall be as recommended in the user instruction.		P
6.2.6.3	Operating conditions		P
	Tools are tested under load only, unless the operating condition no-load is considered as important in practical use		P
	GotWay Electronic Unicycle with an impact mechanism that can be switched off to have a rotary function only are tested as described under 6.2.6.3.101 and 6.2.6.3.102.（EN ISO 12100:2010）		P
6.2.6.3.101	GotWay Electronic Unicycle		P
6.2.6.3.102	Impact GotWay Electronic Unicycle		N
6.2.6.3.103	Diamond core GotWay Electronic Unicycle		P
6.2.6.4	Operator		P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
	The vibration of the machine is influenced by the operator.	influenced by the operator	P
6.2.7	Measurement procedure and validity		P
6.2.7.1	Reported vibration value		N
	Three series of five consecutive tests shall be carried out using a different operator for each series.		N
6.2.7.2	Declaration of the vibration total value		P
	The vibration total value of the handle with the highest emission and the uncertainty K shall be declared（EN ISO 12100:2010）		P
	The vibration total value a_h of the handle with the highest emission and the uncertainty K （EN ISO 12100:2010）		P
6.2.8	Measurement report		P
7	Classification		--
7.1	Tools shall be of one of the following classes with respect to protection against electric shock:	Class I	P
7.2	Tools shall have the appropriate degree of protection against harmful ingress of water according to IEC 60529. If a degree other than IPX0 is required this shall be specified in the relevant part 2.		N
8	Marking and instructions		P
8.1	Tools shall be marked with:		P
	rated voltage(s) or rated voltage range(s), in volts.		P
	symbol for nature of supply, unless the rated frequency is marked.	ac	P
	rated input, in watts or rated current, in amperes		P
	the business name and address of the manufacturer and, where applicable, his authorised representative.	Dongguan kebye Intelligent Technology Co., Ltd.	P
	designation of the tool;		P
	designation of series or type;	Class I	P
	IP number according to degree of protection against ingress of water other than IPX0.	IPX4	P
	the year of manufacture;		N
	“WARNING – To reduce the risk of injury, user must read instruction manual” or the sign		P
	– rated no-load speed in revolutions per minute.（EN ISO 12100:2010）	0-350/0-1350	P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
	–maximum capacity, in millimetres, of the chuck. （EN ISO 12100:2010）	≤3.0	P
8.2	Tools for short-time operation or intermittent operation shall be marked with rated operating time,	≥30min	P
8.3	The marking of tools intended to be operated without adjustment in a rated range of values		P
8.4	If the tool can be adjusted to suit different rated voltages, the voltage to which the tool is adjusted shall be clearly discernible.	Type X	P
8.5	For tools marked with more than one rated voltage or with more than one rated voltage range, the rated power input for each of these voltages or ranges shall be marked.		P
8.6	units or technical data are expressed by symbols,		P
8.7	Tools to be connected to more than two supply conductors shall be provided with a connection diagram, fixed to the tool, unless the correct mode of connection is obvious.		N
8.8	Except for type Z attachments, terminals shall be indicated as follows:		P
8.9	Unless it is obviously unnecessary, switches which may give rise to a hazard when operated shall be marked, or so placed as to indicate clearly which part of the tool they control		N
8.10	For tools which might cause danger when started unexpectedly, the “off” position of the mains switch shall be indicated,		P
8.11	Regulating devices and the like, intended to be adjusted during operation, shall be provided with an indication for the direction of adjustment to increase or to decrease the value of the characteristic being adjusted.		P
8.12	An instruction manual and safety instructions shall be provided with the tool and packaged in such a way that is noticed by the user when the tool is removed from the packaging.		P
8.12.1	The subjects of safety instructions are the General Power Tool Safety Warnings of Part 1 as given in 8.12.1.1, the specific tool Safety Warnings of the relevant part 2 and any additional safety warning statements deemed necessary by the manufacturer.		P
8.12.1.1	General Power Tool Safety Warnings		P
	Drill safety warnings（EN ISO 12100:2010）		P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
	Hold power tool by insulated gripping surfaces, when performing an operation where the fastener may contact hidden wiring or its own cord. （EN ISO 12100:2010）		P
8.12.2	If the Safety Instructions are separate from the Instruction Manual, then the following warnings shall be included in the Instruction Manual		P
8.13	Markings required by the standard shall be easily legible and durable.	legible and durable.	P
8.14	Markings specified in 8.1 to 8.5 shall be on a main part of the tool. Markings specified in 8.1, 8.2, 8.3 and 8.5 shall be placed together.		P
8.15	ompliance with this standard depends upon the operation of a replaceable thermal link or fuse-link, the reference number or other means for identifying the link		P
9	Protection against access to live parts		P
9.1	for a.c., the peak value of the voltage does not exceed 42 V;		N
	for d.c., the voltage does not exceed 42 V;		P
9.2	The requirement of 9.1 applies for all positions of the tool when it is operated as in normal use, even after removal of detachable parts.		P
9.3	For openings in class III tools or class III constructions, except for those giving access to lamp caps or live parts in socket-outlets of class II tools, the test pin of Figure 2 is applied without appreciable force.	Class I	N
9.4	In addition, class III tools and class III constructions shall be so constructed and enclosed that there is adequate protection against accidental contact with basic insulation,		N
10	Starting		P
10.1	Motors shall start under all normal voltage conditions which may occur in use.		P
10.2	Centrifugal and other automatic starting switches shall operate reliably, and without contact chattering.		P
10.3	Overload protection devices shall not operate under normal starting conditions.		--
11	Input and current		P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
	The rated power input or rated current shall be at least 110 % of the measured no-load input or current.		P
12	Heating		N
12.1	Tools shall not attain excessive temperatures under normal load.		P
12.2	The tool is operated in still air under normal load. While the torque is maintained, the voltage is then adjusted to 0,94 times the rated voltage or 1,06 times the rated voltage, or the mean of the rated voltage range, whichever is the most unfavourable.		P
	Tools are operated continuously with the impact mechanism, if any, disengaged, while the torque applied to the spindle is 80 % of the torque necessary to attain rated input or rated current.（EN ISO 12100:2010）		P
12.3	Temperature rises, other than those of windings, are determined by means of fine-wire thermocouples so chosen and positioned that they have the minimum effect on the temperature of the part under test.		P
	The temperature-rise limit specified for the external enclosure does not apply to the enclosure of the impact mechanism.（EN ISO 12100:2010）		P
12.4	The tool is operated:		P
	for the rated operating time for tools for short time operation;		N
	on consecutive cycles of operation, until steady conditions are established, for tools for intermittent operation, the "on" and "off" periods being the rated "on" and "off" periods;		P
	until steady conditions are established for tools for continuous operation.		P
12.5	During the test, protective devices shall not operate. The temperature rises shall not exceed the values shown in Table 1, except as allowed by 12.6.		P
12.6	If the windings are classified according to IEC 60085 and the temperature rise does not exceed the value in Table 1, the following test is not necessary.		P
13	Leakage current		P
	The leakage current		P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
13.2	The leakage current is measured by means of the circuit of Figure 10 between any pole of the supply and accessible metal parts and metal foil with an area not exceeding 20 cm 10 cm in contact with accessible surfaces of insulating material, connected together.		P
14	Moisture resistance		P
14.1	The enclosure of the tool shall provide the degree of protection against moisture in accordance with the classification of the tool.		P
14.1.1	The tool is not connected to the supply.		N
14.2	Tools subject to spillage of liquid in normal use shall be so constructed that such spillage does not affect their electrical insulation.		P
14.3	Tools shall be proof against humid conditions which may occur in normal use.		P
14.4	Liquid systems shall not subject the user to an increased risk of electrical shock during foreseeable misuse.		P
14.5	Liquid systems shall be constructed of components capable of withstanding the pressure in normal use without leaking.		P
14.6	Residual current devices used to provide protection from shock in the case of failure of the liquid system shall comply with IEC 61540 and shall meet the following requirements		N
15	Electric strength		P
15.1	The electric strength shall be adequate. Compliance is checked by the tests of 15.2.		P
16	Overload protection of transformers and associated circuits		P
17	Endurance		P
17.1	Tools shall be so constructed that, in extended normal use, there will be no electrical or mechanical failure that might impair compliance with this standard.		P
17.2	The tool is operated intermittently with no-load for 24 h of operation at a voltage equal to 1,1 times rated voltage, and then for 24 h at a supply voltage equal to 0,9 times rated voltage.		P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
17.3	Tools provided with a centrifugal or other automatic starting switch are started 10 000 times under normal load, and at a voltage equal to 0,9 times rated voltage, the operating cycle being that specified in 17.2.		P
18	Abnormal operation		P
18.1	Tools shall be so designed that the risk of fire and mechanical damage impairing safety or the protection against electric shock as a result of abnormal operation is obviated as far as is practicable.		P
18.2	Tools incorporating heating elements are subjected to the tests of 18.3 and 18.4. Moreover, tools provided with a control limiting the temperature during Clause 12 tests unless specifically excluded by part 2, are subjected to the tests of 18.5, and where applicable, to the test of 18.6.		P
18.3	Tools with heating elements are tested under the conditions specified in Clause 12, but with restricted heat dissipation.		P
18.4	The test of 18.3 is repeated, but with a supply voltage, determined prior to the test, equal to that required to provide a power input of 1,24 times rated power input under normal operation, when steady conditions have been established.		P
18.5	The tool is tested under the conditions specified in Clause 12, under normal operation, the supply voltage being such that the power input is 1,15 times rated power input, but with any control which limits the temperature during the test of Clause 12 short-circuited.		P
18.6	Unless an all-pole disconnection occurs during the test of 18.5 for class II tools with tubular sheathed and embedded heating elements,		P
18.7	Tools incorporating a commutator motor are operated at a voltage equal to 1,3 times rated voltage, or the upper limit of the voltage range, for 1 min at no-load.		P
18.8	The following categories of tools incorporating induction motors and:		P
	a) with a starting torque less than the full-load torque; or		P
	b) started by hand; or		P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
	c) provided with moving parts which are liable to be jammed, or where the moving parts can be stopped by hand, the motor remaining switched on during this operation;		P
18.9	Tools incorporating three-phase motors are operated, starting from cold,		P
18.10	Electronic circuits shall be so designed and applied so that a fault condition will not render the tool unsafe with regard to electric shock, fire hazard, mechanical hazard or dangerous malfunction.		P
18.11	Switches or other devices for motor reversal shall withstand the stresses occurring when the sense of rotation is reversed under running conditions where such a reversal is possible in normal use		P
18.12	A class II tool employing class III construction (see 5.10) or a class III tool shall be able to operate under extreme overload conditions without impairing protection against electric shock.		N
19	Mechanical hazards		P
19.1	Moving and other dangerous parts shall, as far as is compatible with the use and mode of function of the tool,		P
	Chuck keys shall be so designed that they drop easily out of position when （EN ISO 12100:2010）		P
19.2	Accessible parts likely to be touched during normal use shall be free from sharp edges, burrs, flashes and the like.		N
19.3	not be possible to reach the moving parts with the provisions for dust collection removed,		P
19.4	Tools shall have adequate grasping surfaces to ensure safe handling during use.		N
19.5	Tools shall be designed and constructed to allow, where necessary, a visual check of the contact of the cutting tool with the workpiece.		N
19.6	For all tools where the relevant part 2 requires the tool to be marked with the rated noload speed, the no-load speed of the spindle at rated voltage or at the upper limit of the rated voltage shall not exceed 110 % of the rated no-load speed.		N
20	Mechanical strength		P
20.1	Tools shall have adequate mechanical strength, and shall be so constructed that they withstand such rough handling as may be expected in normal use.		P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
20.2	Blows are applied to the tool by means of the spring-operated impact test apparatus according to Clause 5 of IEC 60068-2-75.		P
20.3	A hand-held tool shall withstand being dropped three times on a concrete surface from a height of 1 m.		P
20.4	Brush holders and their caps shall have adequate mechanical strength.		P
20.5	For all tools that are likely to cut into concealed wiring or their own cord, handles and grasping surfaces,		P
21	Construction		P
21.1	Tools which can be adjusted to suit different voltages, or to different speeds, shall be so constructed that accidental changing of the setting is unlikely to occur,		P
21.2	Tools shall be so constructed that accidental changing of the setting of control devices is unlikely to occur.		P
21.3	remove parts which ensure the required degree of protection against moisture without the aid of a tool.		P
21.4	handles, knobs and the like are used to indicate the position of switches or similar components, it shall not be possible to fix them in a wrong position if this might result in a hazard.		P
21.5	Replacement of a flexible cable or cord requiring the moving of a switch which acts also as a terminal		N
21.6	Wood, cotton, silk, ordinary paper and similar fibrous or hygroscopic material shall not be used as insulation, unless impregnated.		P
21.7	Asbestos shall not be used in the construction of tools.		P
21.8	Driving belts shall not be relied upon to provide the required level of insulation.		P
21.9	Insulating barriers of class III tools, and parts of class III tools which serve as supplementary insulation or reinforced insulation, and which might be omitted during reassembly after servicing,	Class II	N
21.10	Inside the tool, the sheath (jacket) of a flexible cable or cord shall only be used as supplementary insulation where it is not subject to undue mechanical or thermal stresses.		P
21.11	Any assembly gap with a width greater than 0,3 mm in supplementary insulation shall not be coincidental with any such gap in basic insulation,		P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
21.12	Class II tools shall be so constructed that, should any wire, screw, nut, washer, spring or similar part become loose or fall out of position,		P
21.13	Supplementary insulation and reinforced insulation shall be so designed or protected that they are not likely to be impaired by deposition of dirt, or by dust resulting from wear of parts within the tool,		P
21.14	Tools shall be so constructed that internal wiring, windings, commutators, slip rings and the like, and insulation in general, are not exposed to oil, grease or similar substances.		P
21.15	not be possible to gain access to brushes without the aid of a tool.		P
21.16	Tools employing liquid systems shall protect the user against the increased risk of shock due to the presence of liquid under conditions of normal use and the faults of the liquid system.		P
21.17	Switches and reset buttons on non-self-resetting controls shall be so located that accidental operation is unlikely to occur.		P
21.18	Tools, other than those provided with a flexible shaft, shall be fitted with a mains switch which can be switched off by the user without releasing his grasp on the tool.		P
	A switch lock-on device, if any, shall be located outside the grasping area, or so designed（EN ISO 12100:2010）		P
21.18.1	a risk associated with continued operation, the switch shall not have any locking device to lock it in the “on” position and it shall not remain in the “on” position when the trigger is released.		P
21.18.2	a risk associated with inadvertent starting, the switch shall have a locking device to lock it on the “off” position.		N
21.19	Tools shall be so designed that the protection against electric shock is not affected when screws intended for replacement from the outside during routine servicing are replaced by screws having a greater length.		P
21.20	tool is marked with the first numeral of the IP system, the relevant requirements of IEC 60529 shall be fulfilled.		P
21.21	Tools shall be so designed that in normal use there is no risk of electric shock from charged capacitors when touching the pins of the plug.		P

EN ISO 12100:2010			
Clause	Requirement – Test	Result – Remark	Verdict
21.22	Non-detached parts, which provide the necessary degree of protection against electric shock, moisture, or contact with moving parts, shall be fixed in a reliable manner, and shall withstand the mechanical stress occurring in normal use.		P
21.23	Handles, knobs, grips, levers and the like shall be fixed in a reliable manner so that they will not work loose in normal use, if loosening might result in a hazard.		P
21.24	Storage hooks and similar devices for flexible cords shall be smooth and well rounded.		P
21.25	Current-carrying parts and other parts, the corrosion of which might result in a hazard, shall be resistant to corrosion under normal conditions of use.		P
21.26	Void		P
21.27	Tools other than class III, having parts where reliance is placed upon safety extra-low voltage		P
21.28	Parts separated by protection impedance shall comply with the requirements for double insulation or reinforced insulation.		P
21.29	Void		N
21.30	Shafts of operating knobs, handles, levers and the like shall not be live unless the shaft is not accessible when the knob, handle, lever and the like is removed.		P
21.31	For constructions other than those of class IIII, handles, levers and knobs		N
21.32	all tools that are likely to cut into concealed wiring or their own cord, handles and grasping surfaces, as specified in the instruction manual, shall be formed of insulating material or, when of metal, shall be either adequately covered by insulating material or their accessible parts shall be separated by insulating barrier(s) from accessible metal parts that may become live by the output shaft.		P
21.33	class III tools, capacitors shall not be connected to accessible metal parts, and their casings, if of metal, shall be separated from accessible metal parts by supplementary insulation.	Class I	N
21.34	Capacitors shall not be connected between the contacts of a thermal cut-out.		P
21.35	Lampholders shall be used only for the connection of lamps.	No Lampholder	N

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Clause	Requirement – Test	Result – Remark	Verdict
21.36	Protective impedance shall consist of at least two separate components, the impedance of which is unlikely to change significantly during the lifetime of the tool.		P
21.37	Air intake shall not enable the ingress of foreign bodies that could impair the safety.	No opening	N
22	Internal wiring		P
22.1	Wireways shall be smooth and free from sharp edges		P
22.2	Internal wiring and electrical connections between different parts of the tool shall be adequately protected or enclosed.		P
22.3	Internal wiring shall be either so rigid and so fixed or so insulated that, in normal use, creepage distances and clearances cannot be reduced below the values specified in 28.1.		P
22.4	Conductors identified by the colour combination green/yellow shall not be connected to terminals other than earthing terminals.		P
22.5	Aluminium wires shall not be used for internal wiring. Windings of a motor are not considered as internal wiring.		P
22.6	Stranded conductors shall not be consolidated by lead-tin soldering where they are subjected to contact pressure,		P
23	Components		P
23.1	Components shall comply with the safety requirements specified in the relevant IEC standards, as far as they reasonably apply.		P
23.1.1	Capacitors in auxiliary windings of motors shall be marked with their rated voltage and their rated capacitance.		P
23.1.2	Fixed capacitors for radio interference suppression shall comply with IEC 60384-14		N
23.1.3	Small lampholders similar to E10 lampholders shall comply with the requirements for E10 lampholders;		N
23.1.4	Isolating transformers and safety isolating transformers shall comply with IEC 61558-1.		P
23.1.5	Appliance couplers other than those used for IPX0 tools shall comply with IEC 60309. Those used for IPX0 shall comply with IEC 60320.		P
23.1.6	Automatic controls not complying with IEC 60730-1 shall be tested according to this standard,	10000	P

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Clause	Requirement – Test	Result – Remark	Verdict
23.1.7	The testing of components which have to comply with other standards is, in general, carried out separately, according to the relevant standard as follows.		P
23.1.8	the component is not marked, or is not used in accordance with its marking, the component is tested under the conditions occurring in the tool		P
23.1.9	capacitors connected in series with a motor winding,		P
23.1.10	Mains switches shall have adequate breaking capacity, and shall be switches for 50 000 cycles of operation.	50000	P
23.1.11	Switches, which have not been separately tested and found to comply with IEC 61058-1		N
23.2	Tools shall not be fitted with		P
	– switches or automatic controls in flexible cords, however rcds are allowed;		N
	– devices which are designed to cause the protection device in the fixed wiring to operate in the event of a fault in the tool;		N
	– thermal cut-outs which can be reset by a soldering operation.		P
23.3	Overload protection devices shall be of the non-self-resetting type unless the tool is equipped with a momentary switch with no provision for being locked in the “on” position.（EN ISO 12100:2010）		N
23.4	Plugs and socket-outlets used as terminal devices for heating elements, and plugs and socket-outlets for extra-low voltage circuits, shall not be interchangeable with plugs and socket-outlets listed		P
23.5	Motors connected to the supply mains, and having basic insulation		N
24	Supply connection and external flexible cords		P
24.1	Tools shall be provided with one of the following means of connection to the supply:		P
	- a supply cord with a plug, for tools rated in voltage or frequency for connection to public supplies;		N
	- a supply cord without a plug, if the tool is intended to be connected to non-public power supplies;		P
	- an appliance inlet having at least the same degree of protection against moisture as required for the tool, and having a locking device preventing inadvertent disconnection;		N
	– a supply cord not exceeding 0,5 m and fixed with an in-line connector (cable coupler) and its mating counterpart.		N

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Clause	Requirement – Test	Result – Remark	Verdict
24.2	Supply cords shall be assembled to the tool by one of the following methods:		P
	-type X attachment;		P
	– type Y attachment;		N
	- type Z attachment		N
24.3	Plugs shall not be fitted with more than one flexible cord.		N
24.4	Supply cords shall be not lighter than:		P
	– ordinary tough rubber sheathed flexible cord (code designation 60245 IEC 53);		P
	– ordinary polyvinyl chloride sheathed flexible cord (code designation 60227 IEC 53).		N
24.5	Supply cords shall have a nominal cross-sectional area not less than those shown in Table 6.	1.0	P
24.6	For class II tools, the supply cord shall be provided with a green/yellow core; it shall be connected to the internal earthing terminal of the tool, and to the earthing contact of the plug.		P
24.7	Conductors of supply cords shall not be consolidated by lead-tin soldering where they are subject to contact pressure,		P
24.8	For all types of attachment, moulding together the supply cord to the enclosure or part of it shall not affect the insulation of the cord.		P
24.9	Inlet openings shall be provided with a bushing, or shall be so constructed that the protective covering of the supply cord can be introduced without risk of damage.		P
24.10	Inlet bushings shall:		P
	– be so shaped as to prevent damage to the supply cord;		P
	– be reliably fixed;		P
	– not be removable without the aid of a tool		P
24.11	Void		P
24.12	Cord guards shall have adequate mechanical strength and shall retain these properties throughout extended normal use.		P
24.13	Flexible cables or cords of tools shall be protected against excessive bending at the inlet opening of the tool by means of a cord guard of insulating material.		P
24.14	Tools provided with a supply cord shall have cord anchorages so that the conductors are relieved from strain,		N

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Clause	Requirement – Test	Result – Remark	Verdict
24.15	Cord anchorages shall either be so arranged that they are only accessible with the aid of a tool, or be so designed that the cord can only be fitted with the aid of a tool.		N
24.16	For type X attachments, cord anchorages shall be so designed or located that:		P
	– replacement of the cord is easily possible		P
	– it is clear how the relief from strain and the prevention of twisting are to be obtained;		P
	– they are suitable for the different types of cord which may be connected, unless the tool is so designed that only one type of cord can be fitted		P
	– the cord cannot touch the clamping screws of the cord anchorage,		P
	– the cord is not clamped by a metal screw which bears directly on the cord;		P
	– at least one part of the cord anchorage is securely fixed to the tool,		P
	– screws,		P
	– in the case of labyrinths, these labyrinths cannot be bypassed in such a way that the test of 24.14 is not withstood;		P
	– glands shall not be used as cord anchorages for power supply cords;		P
	– for class II tools, they are of insulating material or are provided with an insulating lining, if otherwise an insulation fault on the cord could make accessible metal parts live;		N
	– for class III tools, they are of insulating material, or, if of metal, are insulated from accessible metal parts by insulation complying with the requirements for supplementary insulation.		N
24.17	For type Y and Z attachments, cord anchorage shall be adequate.		N
24.18	For type X attachment, production methods such as tying the cord into a knot, or tying the ends with string, are not allowed.		P
24.19	The insulated conductors of the supply cord shall be insulated from accessible metal parts		N
24.20	The space for the supply cables or the supply cord provided inside, or as a part of the tool for type X attachment:		N
	– shall be so designed as to permit checking, before fitting the cover,		N
	– shall be so designed that covers,		N
	– shall be so designed that the uninsulated end of the conductor,		N

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Clause	Requirement – Test	Result – Remark	Verdict
24.21	Appliance inlets shall:		P
	– be so located or enclosed that live parts are not accessible during insertion or removal of the connector;		P
	– be so placed that the connector can be inserted without difficulty;		P
	– be so placed that, after insertion of the connector, the tool is not supported by the connector when in any position of normal use on a flat surface.		P
25	Terminals for external conductors		P
25.1	Tools with type X attachments, except those with specially prepared cord,		P
25.2	Terminals for type X attachment, except those with specially prepared cords,		P
25.3	For tools with type X attachments, terminals shall be so fixed		P
25.4	For tools with type X attachments, terminals shall be so designed that they clamp the conductor between metal surfaces with sufficient contact pressure, and without damage to the conductor.		P
25.5	For tools with type X attachments, except those with specially prepared cords,		P
25.6	Terminals of the pillar type shall be so located that the end of a conductor introduced into the hole is visible,		P
25.7	For type X attachments, the terminals shall be clearly recognizable and accessible after opening the tool.		P
25.8	Terminal devices shall not be accessible without the aid of a tool, even if their live parts are not accessible.		P
25.9	Terminal devices of tools with type X attachment shall be so located or shielded that should a wire of a stranded conductor escape when the conductors are fitted,		P
26	Provision for earthing		P
26.1	Accessible metal parts of class II tools, which may become live in the event of an insulation fault, shall be permanently and reliably connected to an earthing terminal or termination within the tool,		P
26.2	The clamping means of earthing terminals shall be adequately locked against accidental loosening,		P
26.3	detachable parts have an earth connection, this connection shall be made before the current-carrying connections are established when placing the part in position,		N

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Clause	Requirement – Test	Result – Remark	Verdict
26.4	All parts of the earthing terminal intended for the connection of external conductors shall be such that there is no risk of corrosion resulting from contact between these parts and the copper of the earthing conductor,		P
26.5	The connection between the earthing terminal or earthing contact, and parts required to be connected thereto, shall be of low resistance.		P
27	Screws and connections		P
27.1	Fixings, and electrical connections, the failure of which may impair compliance with this standard,		P
27.2	Electrical connections shall be so designed that contact pressure is not transmitted through insulating material which is liable to shrink or to distort,		P
27.3	Space-threaded (sheet metal) screws shall not be used for the connection of currentcarrying parts,		N
27.4	Screws, which make a mechanical connection between different parts of the tool, shall be secured against loosening, if they also make electrical connections.		N
28	Creepage distances, clearances and distances through insulation		P
28.1	Creepage distances and clearances shall not be less than the values in millimetres shown in Table 10.		P
28.2	For working voltages up to and including 130 V, the distance through insulation between metal parts shall not be less than 1,0 mm,		P
29	Resistance to heat, fire and tracking		P
29.1	External parts of non-metallic material, parts of insulating material supporting live parts,		P
29.2	Parts of non-metallic material shall be adequately resistant to ignition and to spread of fire.		P
29.3	Insulating material, across which a tracking path may occur, shall have adequate resistance to tracking, taking into account the severity of its duty conditions.		P
30	Resistance to rusting		N
30.1	Ferrous parts, the rusting of which might cause the tool to fail to comply with this standard, shall be adequately protected against rusting.		P
31	Radiation, toxicity and similar hazards		P

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Clause	Requirement – Test	Result – Remark	Verdict
31.1	Tools shall not emit harmful radiation, or present a toxic or similar hazard.		P
31.2	the tool is fitted with a laser to indicate a cutting line or the like, the laser shall be of category II or lower, according to IEC 60825-1.		P
Annex A	Measurement of creepage distances and clearances		P
A.1	Measurement of creepage distances and clearances		P
Annex B	Motors not isolated from the supply mains and having basic insulation not designed for the rated voltage of the tool		N
B.1.1	This annex applies to motors having a working voltage not exceeding 42 V, not isolated from the supply mains, and having basic insulation not designed for the rated voltage of the tool.		N
B.9	Protection against access to live parts		N
B.9.1	Metal parts of the motor are considered to be bare live parts.		N
B.12	Heating		N
B.12.3	The temperature rise of the body of the motor is determined instead of the temperature rise of the windings.		N
B.12.5	The temperature rise of the body of the motor, where it is in contact with insulating material, shall not exceed the values shown in Table 1 for the relevant insulating material.		N
B.15	Electric strength		N
B.15.3	The insulation between live parts of the motor and its other metal parts is not subjected to this test.		N
B.18	Abnormal operation		N
B.18.1	The test of 18.7 is not made.		N
B.18.201	The tool is operated at rated voltage with each of the following defects:		N
B.21	Construction		N
B.28	Creepage distances, clearances and distances through insulation		N
Annex C	Void		P
Annex D	Void		N
Annex E	Void		N
]Annex F	Needle-flame test		P
Annex G	Proof tracking test		P
Annex H	Void		P

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Annex I	Switches		P
Annex J	Selection and sequence of the tests of Clause 29		P
Annex K	Battery tools and battery packs		N
	All clauses of this Part 2 apply unless otherwise specified in this annex.（EN ISO 12100:2010）		P
Annex L	Battery tools and battery packs provided with mains connection or non-isolated sources		P
Annex M	Safety of working stands for operation with hand-held motor-operated electric tools		P
Annex N	Rules for routine tests		P
Annex ZA	Normative references to international publications with their corresponding European publications		N
Annex ZB	Possible sources of errors during vibration measurements		N

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Clause	Requirement - Test	Result - Remark	Verdict

ANNEX A:

Photo-documentation

EUT Photo 1



EUT Photo 2



EUT Photo 3



EUT Photo 4



EUT Photo 5



EUT Photo 6



※※※※ END OF REPORT ※※※