



---

**APPLICATION FOR MD DIRECTIVE**  
**On Behalf of**  
**Qidong nanwei electric tool co., ltd**  
**Electric drill**  
**48VF**  
**(Other models see list on page 3 of the report)**

**Prepared for :** Qidong nanwei electric tool co., ltd  
Tianfen Industrial Park, Qidong City, Nantong City,  
Jiangsu Province

**Prepared By :** Shenzhen HTT Technology Co., Ltd.  
1F, B Building, Huafeng International Robotics Industrial Park,  
Gushu, Xixiang Street, Bao'an District, Shenzhen

**Date of Test:** Jan.07,2021~Jan.13,2021

**Date of Report:** Jan.13,2021

**Report Number:** HTT202101103LR

***Note: This report shall not be reproduced except in full, without the written approval of Shenzhen HTT Technology Co., Ltd. This document may be altered or revised by Shenzhen HTT Technology Co., Ltd. personnel only, and shall be noted in the revision section of the document. The test results in the report only apply to the tested sample.***



TEST REPORT

EN 62841-1:2015

Electric Motor-Operated Hand-Held, Transportable Tools and Lawn and Garden Machinery - Safety - Part 1: General requirements

EN 62841-2-2:2014

Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery — Safety Part 2-2: Particular requirements for hand-held screwdrivers and impact wrenches

Report reference No .....: HTT202101103LR

Tested by (+ signature)..... Darek Wang

*Darek Wang*

Approved by (+ signature)..... Kevin Yang

*Kevin Yang*



Date of issue : Jan.13,2021

Testing Laboratory Name .....: Shenzhen HTT Technology Co., Ltd.

Address .....: 1F, B Building, Huafeng International Robotics Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen

Testing location .....: CBTL  CCATL  SMT  TMP

Address..... Same as above.

Applicant's Name .....: Qidong nanwei electric tool co., ltd

Address .....: Tianfen Industrial Park, Qidong City, Nantong City, Jiangsu Province

Standard.....: EN 62841-1:2015

EN 62841-2-2:2014

Test procedure .....: MD Approval

Procedure deviation .....: N/A

Test item Description.....: Electric drill

Manufacturer.....: Qidong nanwei electric tool co., ltd

address.....: Tianfen Industrial Park, Qidong City, Nantong City, Jiangsu Province

Trademark.....: N/A

Model and/or type reference.....: 48VF

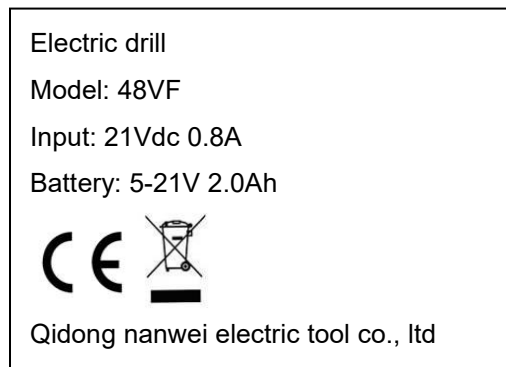
Rating(s) ..... Input: 21Vdc 0.8A(Via adapter input:100-240V~, 50/60Hz, Output: 21Vdc 0.8A)

Battery: 5-21V 2.0Ah



<b>Test item particulars :</b>	
Equipment mobility .....	Hand-hold equipment
Test case verdicts:	
Test case does not apply to the test object.....	N(/A.)
Test item does meet the requirement.....	P(ass)
Test item does not meet the requirement.....	F(ail)
Testing:	
Date of receipt of test item	Jan.07,2021
Date(s) of performance of test	Jan.07,2021~Jan.13,2021

**Label**



**Note:**

1. The height of graphical symbols shall not be less than 5 mm;
2. The height of letters and numerals shall not be less than 2 mm;
3. The main rating label was attached in enclosure.

**Model List:**

Test Model	48VF
Other model	12V, 16.8V, 18V, 20V, 21V, 25V, 25VF, 36VF, 42VF, 88VF, 298VF, 298TV, 398VF, 398TV, 398TV, 398VF, 528TV, 528VF, 2.0AH, 2.5AH, 4.0AH, 4.5AH, 5.0AH, 6.0AH, 7.0AH, 7.5AH
<ol style="list-style-type: none"> <li>1. All tests are carried out on 48VF</li> <li>2. All models have same diagram circuit, PCB layout, except different model names.</li> </ol>	




<p><b>General remarks:</b></p> <p>Clause number between brackets refer to clauses in Test report</p> <p>"(see remark #)" refers to a remark appended to the report.</p> <p>"(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a comma is used as the decimal separator.</p> <p>The test results presented in this report relate only to the object tested.</p> <p>This report shall not be reproduced except in full without the written approval of the testing laboratory.</p> <p>When determining the test conclusion, the Measurement Uncertainty of test has been considered.</p> <p>.</p> <p>Unless otherwise specified, test are made under normal conditions at an ambient temperature within the range of 15°C to 35°C, RH45% to 75% and an air pressure of 860mbar of 1060mbar</p>	<p>Attachment with:</p> <p>1) Photo documentation</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
<b>6</b>	<b>Radiation, toxicity and similar hazards</b>		N/A
6.1	Tools shall not emit harmful radiation, or present a toxic or similar hazard.		N/A
6.2	If the tool is fitted with a laser to indicate a cutting line or the like, the laser class shall be 2M or lower, according to IEC 60825-1.		N/A
6.3	If a tool is fitted with non-coherent light sources, users of tools shall be cautioned as to the risk of potential photo-biological harm, if such harm exists.		N/A
6.3.1	Visible light indicators and Infrared sources used for signalling and communication are considered to have no risk of photo-biological harm and require no marking.		N/A
6.3.2	Tools emitting visible light from electroluminescent, incandescent or LED sources are considered to be for short term, non-general light services use where exposure is both incidental and intermittent.		N/A
6.3.3	For light derived by sources other than those mentioned in 6.3.2, the product shall be evaluated by the methods of IEC 62471 and the markings shall be guided by 5.4 of IEC/TR 62471-2.		N/A
<b>7</b>	<b>Classification</b>		P
7.1	Tools shall be of one of the following classes with respect to protection against electric shock: <b>class I, class II, class III.</b>	Class III	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, 3 or 4.	IPX0	N/A
<b>8</b>	<b>Marking and instructions</b>		P
8.1	Tools shall be marked with rating information as follows:		P
	– <b>rated voltage(s)</b> or <b>rated voltage range</b> , in volts. Tools for star-delta connection shall be clearly marked with the two <b>rated voltages</b> (for example 230 / 400 V). A tool that complies with this standard for a voltage range, may also be marked with any single voltage or smaller voltage range within that range;	21Vdc	P
	– symbol for nature of supply, unless the <b>rated frequency(ies)</b> or <b>rated frequency range</b> is marked. The symbol for nature of supply shall be placed next to the marking for <b>rated voltage</b> ;	===	P
	– <b>rated input</b> , in watts or <b>rated current</b> , in amperes. The <b>rated input</b> or <b>rated current</b> to be marked on the tool is the total maximum input or current that can be drawn from external circuit at the same time. If a tool has alternative components which can be selected by a <b>control device</b> , the <b>rated input</b> or <b>rated current</b> is that corresponding to the highest loading possible;	0.8A	P
	– symbol for <b>class II construction</b> , for <b>class II tools</b> only;	Class III construction	N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	– IP number according to degree of protection against ingress of water other 834 than IPX0. If the first numeral for the IP numbering is omitted, the omitted numeral shall be replaced by the letter X, for example IPX5.		N/A
8.1.1	Tools having a range of rated values such as for voltage and frequency and which can be operated without adjustment throughout the range shall be marked with the lower and upper limits of the range separated by a hyphen.		N/A
8.1.2	For tools marked with more than one <b>rated voltage</b> , a <b>rated voltage range</b> or with more than one <b>rated voltage range</b> , the <b>rated input</b> for each of these voltages shall be marked.		N/A
	The upper and lower limits of the rated power input shall be marked on the tool so that the relation between input and voltage appears distinctly, unless the difference between the upper and lower limits of a <b>rated voltage range</b> does not exceed 20 % of the mean value of the range, in which case the marking for <b>rated input</b> may be related to the mean value of the range.		N/A
8.2	Tools shall be marked with a safety warning in one of the following versions:		P
	– “  WARNING – To reduce the risk of injury, user must read instruction manual”, or		P
	– symbol M002 of ISO 7010, or		N/A
	– the appropriate symbol stated in the relevant part 2, 3 or 4.		N/A
8.3	Tools shall be marked with additional information as follows:		P
	the business name and address of the manufacturer and, where applicable, 876 his authorised representative. Any address shall be sufficient to ensure contact . Country or state, city and postal code (if any) are deemed sufficient for this purpose;		P
	designation of the tool, designation of tool may be achieved by a combination of letters and/or numbers. The designation may be provided in the form of a code, providing that this code is explained by giving the explicit designation such as “drill”, “planer” etc. in the instructions supplied with the tool;		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 tool;		P
8.4	Markings specified in 8.1 to 8.3 shall not be on a <b>detachable part</b> or a power cord of the tool. Markings specified in 8.1 and its subclauses shall be placed together within a common identifiable area of the tool such as a nameplate.		N/A



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
	Markings specified in 8.2 shall be clearly discernible from the outside of the tool. For markings other than symbols, this may be achieved by the use of a fold-over label on power cords of tools with <b>type Y attachment</b> or <b>type Z attachment</b> . Other markings on the tool may be visible after removal of a cover, if necessary.		N/A
<b>8.5</b>	If the tool can be adjusted to suit different <b>rated voltages</b> , the voltage to which the tool is adjusted shall be clearly discernible.		N/A
	For tools where frequent changes in voltage setting are not required, this requirement is considered to be met if the <b>rated voltage</b> to which the tool is adjusted can be determined from a wiring diagram fixed to the tool. The wiring diagram may be on the inside of a cover which has to be removed to connect the supply conductors. It shall not be on a label loosely attached to the tool.		N/A
<b>8.6</b>	For units the following shall be used.		P
<b>8.7</b>	Tools to be connected to more than two supply conductors shall be provided with a connection diagram, fixed to the tool, unless the terminals are clearly identified.		N/A
	The earthing conductor is not considered to be a supply conductor. For tools for star -delta connection, the wiring diagram shall show how the windings are to be connected.		N/A
<b>8.8</b>	Except for <b>type Z attachment</b> , terminals shall be indicated as follows:		N/A
	– Terminals intended exclusively for the neutral conductor shall be indicated by the letter N.		N/A
	– Earthing terminals shall be indicated by the symbol 5019 of IEC 60417.		N/A
	These indications shall not be placed on screws, removable washers or other parts which might be removed when conductors are being connected.		N/A
<b>8.9</b>	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/A
<b>8.10</b>	The "off" position of a multi-stable <b>power switch</b> shall be indicated; the indication shall be the figure , as given by symbol 5008 of IEC 60417. A <b>momentary power switch</b> which can be locked in the "on" position is not considered as a multi -stable switch.		P
	Push-buttons used only for the "off" function shall be indicated by marking the button/position with the figure and the color of the button shall be red or black.		P
	The figure shall not be used for any other indication.		N/A
	For <b>transportable tools</b> , a power switch actuator or its cover shall not have a colour in a combination of yellow and red as specified for an emergency stop in accordance with ISO 13850.		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
8.11	<b>Control devices</b> 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. An indication of + and – is considered to be sufficient for this requirement.		P
8.12	Markings required by the standard shall be legible and durable. Signs shall be in contrast such as colour, texture, or relief, to their background such that the information or instructions provided by the signs are clearly legible when viewed with normal vision from a distance of (500 + 50) mm. Signs need not be in accordance with the blue colour requirements of ISO 3864-2.		P
	After the tests of this subclause, the marking shall be easily legible, it shall not be easily possible to remove markings.		P
8.13	If compliance with this standard depends upon the operation of a replaceable <b>thermal link</b> or fuse-link, the reference number or other means for identifying the link shall be marked on the link, or in a place that it is clearly visible after the link has failed, when the tool has been dismantled to the extent necessary for replacing the link.		N/A
8.14	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. An explanation of the symbols required by this standard and used on the tool shall be provided in either the instruction manual or the safety instructions.		N/A
8.14.1	The subjects of safety instructions are the “General Power Tool Safety Warnings” of Part 1 as given in 8.14.1.1, the specific tool safety warnings of the relevant part 2, 3 or 4 and any additional safety warning statements deemed necessary by the manufacturer. The “General Power Tool Safety Warnings” and the specific tool safety warnings, if in English, shall be verbatim and in any other official language to be equivalent. The numbering of the safety instructions, as given below, is not mandatory and may be omitted or replaced by other sorting means such as bullets. The “General Power Tool Safety Warnings” may be separate from the instruction manual.		N/A
8.14.1.1	<b>General Power Tool Safety Warnings</b>		P
	<b>WARNING Read all safety warnings, instructions, illustrations and specifications provided with this power tool.</b> Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury		P





EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	Hold the power tool by insulated gripping surfaces, when performing an operation where the fastener may contact hidden wiring or its own cord. Fasteners contacting a "live" wire may make exposed metal parts of the power tool "live" and could give the operator an electric shock. (EN 62841-2-2:2014)		N/A
8.14.1.2	The order of the safety warnings shall be in accordance with either item A) or B) and in accordance with item C):		P
8.14.1.3	If the safety instructions are separate from the instruction manual, then the following warnings shall be included in the instruction manual. These warnings, if in English, shall be verbatim and in any other official language to be equivalent.		N/A
8.14.2	The instruction manual shall be provided with the following, if appropriate.		P
8.14.3	If information about the mass or weight of the tool is provided, it shall be the mass specified in 5.17.		N/A

9	<b>Protection against access to live parts</b>	Class III equipment	P
9.1	Tools shall be so constructed and enclosed that there is adequate protection against accidental contact with live parts. The requirement applies for all positions of the tool when it is operated as in normal use, even after removal of detachable parts and soft materials (elastomers), such as soft grip coverings.		N/A
9.2	An <b>accessible part</b> is not considered to be live if: – the part is supplied with <b>safety extra-low voltage</b> or – the part is separated from <b>live parts</b> by <b>protective impedance</b> .		P
9.3	Lamps located behind a detachable cover are not removed, provided the tool can be isolated from the supply by means of a plug or an all -pole switch. However, during insertion or removal of lamps which are located behind a detachable cover, protection against contact with <b>live parts</b> of the lamp cap shall be ensured.		N/A
9.4	Test probe 13 of IEC 61032 is applied with a force not exceeding 5 N through openings in <b>class II tools</b> and <b>class II constructions</b> , except for those giving access to lamp caps and <b>live parts</b> in socket-outlets. It shall not be possible to touch <b>live parts</b> with the test probe.		N/A
9.5	<b>Class II tools</b> and <b>class II constructions</b> shall be so constructed and enclosed that there is adequate protection against accidental contact with <b>basic insulation</b> , and metal parts separated from <b>live parts</b> by <b>basic insulation</b> only.		N/A
	Parts which are not separated from <b>live parts</b> by <b>double insulation</b> or <b>reinforced insulation</b> shall not be accessible.		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	This requirement applies for all positions of the tool when it is operated as in <b>normal use</b> , even after removal of <b>detachable parts</b> .		N/A
<b>10</b>	<b>Starting</b>		P
<b>10.1</b>	Tools shall start under all normal voltage conditions which may occur in use.		P
	Compliance is checked by starting the tool 10 times at no-load in succession at a voltage equal to 0,85 times the lowest <b>rated voltage</b> or 0,85 times the lower limit of the <b>rated voltage range, control devices</b> other than speed controls, if any, being set as in <b>normal use</b> .		P
	The interval between consecutive starts is made sufficiently long enough to prevent undue heating.		P
<b>10.2</b>	Tools shall not draw excessive input current during starting that could lead to nuisance operation of facility mains over-current protection devices.		P
	Compliance is checked by starting the tool once at <b>rated voltage</b> and no-load with any speed controls set for maximum speed and all other <b>control devices</b> set as in <b>normal use</b> .		P
<b>11</b>	<b>Input and current</b>		P
	The <b>rated input</b> or <b>rated current</b> shall be at least 110 % of the measured no-load input or current.		P
<b>12</b>	<b>Heating</b>		P
<b>12.1</b>	Tools shall not attain excessive temperatures with <b>rated input</b> or <b>rated current</b> .		P
	The tool is operated intermittently for 30 cycles or until thermal equilibrium is reached, whichever is achieved first, each cycle comprising a period of continuous operation of 30 s and a rest period of 90 s with the tool switched off, the tool loaded during the periods of operation by means of a brake adjusted so as to attain rated input or rated current. (EN 62841-2-2:2014)		N/A
<b>12.2</b>	This subclause applies only to tools without an <b>inherent operating cycle</b> . For tools with one or more <b>rated voltages</b> : The tool is operated in still air at each <b>rated voltage</b> , a torque load applied such that <b>rated input</b> or <b>rated current</b> is drawn until thermal equilibrium is reached; the torque being applied is measured. While maintaining the previously measured torque, the voltage is then adjusted to 0,94 times the <b>rated voltage</b> and 1.06 times the <b>rated voltage</b> .		P
<b>12.3</b>	Heating elements, if any, are operated under the conditions specified in Clause 11 of IEC 60335-1, when the tool is operated at a voltage equal to 1,06 times the <b>rated voltage</b> .		P
<b>12.4</b>	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



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
12.5	During the test, <b>protective devices</b> shall not operate and sealing compound, if any, shall not flow out. The temperature rises shall not exceed the values shown in Tables 1a and 1b, except as allowed by 12.6		P
12.6	The following tests shall be conducted when the temperature rises of the armature and/or field windings exceed the values in Table 1a or when there is doubt with regards to the temperature classification of the insulation system.		P
<b>13</b>	<b>Resistance to heat and fire</b>		P
13.1	The following materials shall be sufficiently resistant to distortion due to heat, if this could cause the tool to fail to comply with this standard:		P
	– external parts of non-metallic material; – parts of thermoplastic material supporting current carrying parts; – parts of thermoplastic material providing <b>supplementary insulation</b> or <b>reinforced insulation</b> .	125 °C	P
13.2	Parts of non-metallic material shall be adequately resistant to ignition and to spread of fire.		P
<b>14</b>	<b>Moisture resistance</b>		P
14.1	Tools shall be proof against humid conditions which may occur.		P
	Electrical components, covers, and other parts which can be removed without the aid of a tool are removed and subjected, if necessary, to the humidity test with the main part.		N/A
14.2	The enclosure of the tool shall provide the degree of protection against moisture in accordance with the classification of the tool.		P
	Compliance is checked by the appropriate treatment specified in 14.2.2, with the tool conditions as in 14.2.1.		P
14.2.1	The tool is not connected to the supply.		P
	Tools are turned continuously through the most unfavourable positions during the test.		P
	Electrical components, covers and other parts which can be removed without the aid of a tool are removed and subjected, if necessary, to the relevant treatment with the main part.		P
14.3	<b>Liquid systems</b> or spillage of liquid shall not subject the user to an increased risk of electrical shock.		P
	The <b>residual current device</b> , if any, shall be disabled during the test. Electrical components, covers and other parts which can be removed without the aid of a tool are removed, except those fulfilling the test of 21.22.		P



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
	In each applicable mode, the tool is operated for 1 min in all positions consistent with the relevant part 2, 3 or 4 and the instructions according to 8.14.2 b) while monitoring the leakage current as in Annex C.3. During the test the leakage current shall not exceed: – 2 mA for a <b>class II tool</b> ; – 5 mA for a <b>class I tool</b> .		N/A
	Following this test, the tool shall meet the electric strength test of D.2 between <b>live parts</b> and <b>accessible parts</b> after being allowed to dry for 24 h at ambient temperature.		N/A
<b>14.4</b>	<b>Liquid systems</b> shall not subject the user to an increased risk of electrical shock by components not capable of withstanding the pressure during operation.		N/A
<b>14.5</b>	<b>Residual current devices</b> used to provide protection from shock in the case of failure of the <b>liquid system</b> shall comply with IEC 61540 and shall meet the following requirements a) to c):		N/A
<b>15</b>	<b>Resistance to rusting</b>		P
<b>15.1</b>	Ferrous parts used to conduct electricity and those mechanical parts specified in the relevant Part 2, 3 or 4 shall be adequately protected against rusting.		P
	All grease is removed from the parts to be tested by immersing them in a suitable degreasing agent for 10 min.		P
	The parts are then immersed for 10 min in a 10 % solution of ammonium chloride in water at a temperature of $(20 \pm 5) ^\circ\text{C}$ .		P
	After the parts have been dried for 10 min in a heating cabinet at a temperature of $(100 \pm 5) ^\circ\text{C}$ , their surfaces shall show no signs of rust when viewed with normal vision from a distance of $(500 \pm 50)$ mm.		P
<b>16</b>	<b>Overload protection of transformers and associated circuits</b>		N/A
	Tools incorporating circuits supplied from a transformer shall be so constructed that, in the event of short circuits which are likely to occur, excessive temperatures do not occur in the transformer, or in the circuits associated to the transformer.		N/A
	A failure of insulation complying with the requirements specified for <b>basic insulation</b> 1588 of class I or <b>class II construction</b> is not, for the purpose of this requirement, considered as likely to occur.		N/A
<b>17</b>	<b>Endurance</b>		N/A
<b>17.1</b>	Tools shall be so constructed that there will be no electrical or mechanical failure that might impair compliance with this standard. The insulation shall not be damaged and contacts and connections shall not work loose as a result of heating, vibrations, etc.		P
	Moreover, overload protection devices incorporated in the tool shall not activate under normal running conditions.		P



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
17.2	<b>Hand-held tools and transportable tools</b> are operated intermittently at no-load.		P
	Each cycle of operation comprises an "on" period of 100 s and an "off" period of 20 s, the "off" periods being included in the specified operating time. If the cycle of operation limited by the construction and/or marking is less than 100 s "on" and 20 s "off", then this cycle may be used.		P
	<b>Transportable tools</b> are operated for 12 h at a voltage equal to 1,1 times 1632 the highest <b>rated voltage</b> or 1,1 times the upper limit of the <b>rated voltage range</b> , and then for 12 h at a supply voltage equal to 0,9 times the lowest <b>rated voltage</b> or 0,9 times the lower limit of the <b>rated voltage range</b> . The 12 h of operation need not be continuous. During the test, the tool is placed in its normal operating position according to 8.14.2.		P
	An impact wrench is operated with no-load for 12 h at a voltage equal to 1,1 times the highest rated voltage or 1,1 times the upper limit of the rated voltage range and then for 12 h at a supply voltage equal to 0,9 times the lowest rated voltage or 0,9 times the lower limit of the rated voltage range. The 12 h of operation need not be continuous. If applicable, the tool is adjusted to the maximum attainable speed (EN 62841-2-2:2014)		N/A
	The tool may be switched on and off by means of a switch other than that incorporated in the tool. (EN 62841-2-2:2014)		N/A
	Each cycle of operation comprises an "on" period of 100 s and an "off" period of 20 s, the "off" periods being included in the specified operating time. (EN 62841-2-2:2014)		N/A
17.3	Tools provided with a centrifugal or other automatic starting switch are started 10 000 times at <b>rated input</b> or <b>rated current</b> , and at a voltage equal to 0,9 times <b>rated voltage</b> or 0,9 times the lower limit of the <b>rated voltage range</b> , the operating cycle being that specified in 17.2.		N/A
18	<b>Abnormal operation</b>		P
18.1	Tools shall be so designed that the risk of fire and mechanical damage impairing safety and the protection against electric shock as a result of abnormal operation is obviated as far as is practicable.		P
18.1.1	During the tests, the tool shall not emit flames or molten metal, checked by inspection.		P
	After the tests, and when the tool has cooled to approximately room temperature, compliance with Clause 9 shall be maintained and the tool shall withstand the electric strength test of Annex D between <b>live parts</b> and <b>accessible parts</b> .		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	If the tool can still operate at the conclusion of the test, it shall continue to comply with 19.1 but without repeating the tests of Clause 20.		N/A
18.2	Fuses, <b>non-self-resetting-thermal cut-outs</b> , overcurrent protection devices or the like incorporated into the tool, may be used to provide the necessary protection. Electronic circuits that are relied upon for protection shall be evaluated for this <b>safety critical function</b> as in 18.8.		N/A
18.3	Tools incorporating a series motor are operated without <b>accessories</b> 1676 at a voltage equal to 1,3 times <b>rated voltage</b> for 1 min at no-load.		N/A
	During the test, parts shall not be ejected from the tool. After this test, the tool need not be capable of further use.		N/A
18.4	Tools incorporating three-phase induction motors are operated, starting from cold,		N/A
	for 30 s, if they are kept switched on by hand or continuously loaded by hand; – or otherwise, for 5 min;		N/A
	with one phase disconnected, and under the torque produced while operated at <b>rated voltage</b> or the mean value of the <b>rated voltage range</b> with <b>rated input</b> or <b>rated current</b> .		N/A
	At the end of the test period specified, or at the instant of operation of fuses, <b>thermal cut-outs</b> , motor protection devices, and the like, the temperature of the windings shall not exceed the values shown in Table 2.		N/A
18.5	Protection against electric shock shall not be impaired when a <b>class II tool</b> or a <b>class I tool</b> employing <b>class II construction</b> (see 5.10) subjected to running overload conditions.		N/A
18.5.1	All fuses, <b>thermal cut-outs</b> , overload protectors and the like specified in 18.1 that are accessible to the user without the aid of a tool and any self-resetting <b>protective devices</b> shall be shorted.		N/A
18.5.2	A sample of the armature is connected to a minimum 12 kVA circuit.		N/A
	The leakage current between the commutator segments and the armature shaft, is measured with 1,06 times the tool's <b>rated voltage</b> applied between the commutator segments, located 180° apart, and the armature shaft (see Figure 3). The leakage current is monitored throughout the test and after the test until it has stabilized or decreases. The leakage current shall not exceed 2 mA.		N/A
18.5.3	The tool is operated under stalled conditions and under the conditions in 18.2 by – locking the rotor of tools for which the locked rotor torque is smaller than the full load torque; – locking moving parts of other tools.		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
18.6	<b>Electronic circuits</b> shall be so designed and applied so that a fault condition will not render the tool unsafe with regard to electric shock, fire hazard or accessibility to moving parts.		P
	Compliance is checked by evaluation of the fault conditions specified in 18.6.1 for all circuits or parts of circuits.		P
18.6.1	The following fault conditions are considered and, if necessary, applied one at a time, consequential faults being taken into consideration:		P
18.6.2	If the safety of the tool depends upon the operation of a miniature fuse-link complying with IEC 60127 during any of the fault conditions specified in 18.6.1, the test results of 18.6.1 are acceptable, provided the test is repeated but with the miniature fuse-link replaced by an ammeter. If the current measured		P
18.7	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.		P
	The tool is operated at a voltage equal to <b>rated voltage</b> at no-load; the device for reversing the sense of rotation being in such a position that the rotor rotates in one direction at full speed.		P
18.8	<b>Electronic circuits</b> that provide <b>safety critical functions</b> shall be – reliable and – not susceptible to loss of <b>safety critical function</b> due to exposure to electromagnetic environmental stresses encountered in anticipated environments.		P
18.8.1	The tool is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4 being applicable. Ten discharges having a positive polarity and ten discharges having a negative polarity are applied.		P
18.8.2	The tool is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 being applicable. The bursts are applied with a repetition frequency of 5 kHz for 2 min with a positive polarity and for 2 min with a negative polarity		P
18.8.3	The power supply terminals of the tool are subjected to voltage surges in accordance with IEC 61000-4-5, five positive impulses and five negative impulses being applied at the selected points. Test level 3 is applicable for the line-to-line coupling mode, a generator having a source impedance of 2 $\Omega$ being used. Test level 4 is applicable for the line-to-earth coupling mode, a generator having a source impedance of 12 $\Omega$ being used.		P
18.8.4	The tool is subjected to injected currents in accordance with IEC 61000-4-6, test level 3 being applicable. During the test, all frequencies between 0,15 MHz to 230 MHz are covered.		P





EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
18.8.5	The tool is subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-11. The values specified in Table 1 and Table 2 of IEC 61000-4-11 are applied at zero crossing of the supply voltage.		P
19	<b>Mechanical hazards</b>		P
19.1	Moving and other dangerous parts of the tool shall, as far as is compatible with the use and working of the tool, be so positioned or enclosed to provide adequate protection against personal injury.		P
	Protective enclosures, covers, <b>guards</b> and the like shall have adequate mechanical strength for their intended purpose. They shall not be removable without the aid of a tool.		P
19.2	<b>Accessible parts</b> likely to be touched shall be free from sharp edges, burrs, flashes and the like.		P
19.3	It shall not be possible to reach dangerous moving parts through dust collection openings with the <b>detachable parts</b> or provisions for dust collection removed, if any.		N/A
19.4	<b>Hand-held tools</b> shall have at least one handle or grasping surface to ensure safe handling during use.		P
	<b>Transportable tools</b> shall be provided with at least one handle, grasping surface or the like to ensure safe transportation.		N/A
	<b>Lawn and garden machinery</b> shall have adequate grasping surfaces to ensure safe handling during use.		N/A
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/A
19.6	For all tools where the relevant part 2, 3 or 4 requires the tool to be marked with the <b>rated no-load speed</b> , the no-load speed of the spindle at <b>rated voltage</b> shall not exceed 110 % of the <b>rated no-load speed</b> .		P
19.7	<b>Transportable tools</b> and <b>lawn and garden machinery</b> shall have adequate stability.		N/A
	Compliance is checked by the following test, tools provided with an appliance inlet being fitted with an appropriate connector and flexible cable or cord.		N/A
	Tools intended to be filled with liquid by the user in <b>normal use</b> are tested empty or filled with the most unfavourable quantity of water or the recommended liquid, up to the rated capacity.		N/A
19.8	<b>Transportable tools</b> provided with wheels identified in the relevant part 3 shall have adequate stability during transportation.		N/A
	The tool is held in its normal transportation position while traversing, in both directions, a plane inclined at an angle of 10° to the horizontal, the cable or the cord wrapped up and stored. The tool shall not tip over.		N/A





EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
19.9	If, in accordance with 8.14.2, the user is instructed to remove a <b>fixed guard</b> , such as for maintenance, to convert the tool or to change the <b>accessory</b> , then the fastenings shall remain attached to the <b>guard</b> or to the machinery. If a fastening need not be completely removed for removing the <b>guard</b> , it shall be considered as still attached.		N/A
20	<b>Mechanical strength</b>		P
20.1	Tools shall have adequate mechanical strength, and shall be so constructed that they withstand rough handling that may be expected.		P
	Immediately after the tests, the tool shall withstand the electric strength test as specified in Annex D between <b>live parts</b> and <b>accessible parts</b> , and <b>live parts</b> shall not have become accessible, as specified in Clause 9.		P
	Damage to the finish, small dents which do not reduce <b>creepage distances</b> or <b>clearances</b> below the values specified in 28.1, or small chips which do not adversely affect protection against shock or moisture are neglected.		P
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	For <b>hand-held tools</b> , 20.3.1 applies. For <b>transportable tools</b> , 20.3.2 applies. For <b>lawn and garden machinery</b> , requirements are given in the relevant part 4.		P
20.3.1	A <b>hand-held tool</b> is dropped three times in total on a concrete surface from a height of 1 m. For these three drops, the sample is tested in the three most unfavourable positions the lowest point of the tool being 1 m above the concrete surface. Separable <b>accessories</b> are not mounted.		P
20.3.2	A <b>transportable tool</b> , placed in its normal operating position, is impacted with a smooth steel sphere having a diameter of $(50 \pm 2)$ mm and weighing $(0,55 \pm 0,03)$ kg. If a part of the tool can be impacted from above, the sphere is dropped from a rest position to strike the component. Otherwise, the sphere is suspended by a cord and is allowed to fall from a rest position as a pendulum to strike the area of the tool to be tested. In either case, the vertical travel of the sphere is $(1,3 \pm 0,1)$ m.		N/A
20.4	Accessible caps of brush holders 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, as specified in the instruction manual in accordance with 8.14.2 b) 6), shall have adequate mechanical strength in order to provide insulation between the grasping area and the output shaft. The relevant Part 2, 3 or 4 specifies if this subclause does not apply.		N/A



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
	This subclause is not applicable for impact wrenches with a square drive greater than or equal to 13 mm.(EN 62841-2-2:2014)		N/A
<b>21</b>	<b>Construction</b>		P
<b>21.1</b>	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, if such a change might result in a hazard.		P
<b>21.2</b>	Tools shall be so constructed that accidental changing of the setting of <b>control devices</b> is unlikely to occur.		P
<b>21.3</b>	It shall not be possible to remove parts which ensure the required degree of protection against moisture without the aid of a tool.		P
<b>21.4</b>	If 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.		N/A
<b>21.5</b>	Replacement of a flexible cable or cord requiring the moving of a switch which acts also as a terminal for external conductors shall be possible without subjecting internal wiring to undue stress; after repositioning the switch, and before reassembling the tool, it shall be possible to verify whether the internal wiring is correctly positioned.		P
<b>21.6</b>	Wood, cotton, silk, ordinary paper and similar fibrous or hygroscopic material shall not be used as insulation, unless impregnated		P
	Insulating material is considered to be impregnated if the interstices between the fibres of the material are substantially filled with a suitable insulant.		N/A
<b>21.7</b>	Driving belts shall not be relied upon to provide the required level of insulation.		N/A
	This requirement does not apply if the tool incorporates a special design of belt which prevents inappropriate replacement.		N/A
<b>21.8</b>	Insulating barriers of <b>class II tools</b> , and parts of <b>class II tools</b> which serve as <b>supplementary insulation</b> or <b>reinforced insulation</b> , and which might be omitted during reassembly after <b>user maintenance</b> , shall either:		N/A
	be fixed in such a way that they cannot be removed without being seriously damaged; or – be so designed that they cannot be replaced in an incorrect position, and that, if they are omitted, the tool is rendered inoperable or manifestly incomplete.		N/A
<b>21.9</b>	The insulation of the inner conductors of a flexible cable or cord used as wiring within the tool is considered as <b>basic insulation</b> . No additional insulation is required in areas of class I construction. When these conductors are used in areas of <b>class II construction</b> , they shall be insulated from accessible metal parts by any of the following:		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
21.10	Air intake of motor enclosures shall not enable the ingress of foreign bodies that could impair safety		P
21.11	<b>Class I tools</b> shall be so constructed that, should any wire, screw, nut, washer, spring, brush, brush holder component or similar part become loose or fall out of position, it cannot become so disposed that accessible metal is made live.		N/A
21.12	<b>Supplementary insulation</b> and <b>reinforced insulation</b> 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, to such an extent that <b>creepage distances</b> or <b>clearances</b> are reduced below the values specified in 28.1.		N/A
21.13	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.		N/A
21.14	It shall not be possible to gain access to brushes without the aid of a tool.		N/A
	Screw-type brush-caps shall be so designed that, when tightening, two surfaces are clamped together.		N/A
21.15	Tools employing <b>liquid systems</b> shall protect the user against the increased risk of shock due to the presence of liquid under faults of the <b>liquid system</b> .		N/A
	Tools employing <b>liquid systems</b> shall be either: – of <b>class III construction</b> ; or – of <b>class I</b> or <b>class II construction</b> and be provided with a <b>residual current device</b> and comply with 14.3, 14.4 and 14.5; or – of <b>class I</b> or <b>class II construction</b> and be designed for use in combination with an isolating transformer and comply with 14.3 and 14.4.		N/A
21.16	For tools having compartments to which access can be gained without 2173 the aid of a tool and that are likely to be cleaned in <b>normal use</b> , the electrical connections shall be arranged so that they are not subject to pulling during cleaning.		N/A
21.17	Tools shall be fitted with a <b>power switch</b> to control the motor. The actuating member of this switch shall be easily visible and accessible.		P
21.17.1	For tools incorporating a switch with a lock-off device, whereby the switch trigger is operated with a squeezing action by closing the fingers towards the palm of the hand, the lock - off system shall be designed to ensure sufficient durability to withstand abuse and environmental conditions to prevent activation of the tool by the switch trigger alone.		N/A
21.17.1.1	A sample of the switch and its lock-off system assembled into the relevant tool housing is kept for 1 h in a heating cabinet at 80° C.		N/A
21.17.1.2	A sample of the switch and its lock-off system assembled into the relevant tool housing is operated for the number of cycles in accordance with 23.1.10.2, where one cycle is defined as follows:		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	The switch actuations shall be conducted at a rate of 10 – 20 per min. Following the operations as specified above, the sample shall then comply with the test of 21.17.1.3.		N/A
21.17.1.3	A push force as specified in Table 6 is applied to the most unfavourable point of the switch actuating member in the direction of the switch actuation for a period of 10 s without prior actuation of the lock-off button. The switch shall not actuate during the application of the specified force. The switch and its lock-off system shall operate as designed after the applied force is terminated.		N/A
21.18	Additional requirements for <b>power switches for hand-held tools</b> are given in 21.18.1. Additional requirements for <b>power switches for transportable tools</b> are given in 21.18.2. Additional requirements for <b>power switches for lawn and garden machinery</b> are given in the relevant part 4.		P
21.18.1	For <b>hand-held tools</b> , the <b>power switch</b> required by 21.17 shall be a <b>momentary power switch</b> , with or without a lock-on device, which can be switched on and off by the user without releasing any of the handle(s) or grasping surface(s) required by 19.4.		P
21.18.2	For <b>transportable tools</b> , the <b>power switch</b> required by 21.17 shall be able to be easily actuated “on” or “off” without any reasonably foreseeable hazard from the operator's position as specified in the instruction manual in accordance with 8.14.2.		N/A
21.19	Tools shall be so designed that the protection against electric shock is not affected when screws removed during <b>user maintenance</b> are incorrectly replaced during reassembly.		N/A
21.20	If the tool is marked with the first numeral of the IP system, the relevant requirements of IEC 60529 shall be fulfilled.		N/A
21.21	Tools shall be so designed that there is no risk of electric shock from charge capacitors when touching the pins of the plug. Capacitors, having a rated capacitance less than or equal to 0,1 F, are not considered to entail a risk of electric shock even if connected to the supply side of the switch. This requirement does not apply to capacitors complying with the requirements for <b>protective impedance</b> specified in 9.2 and 21.34.		N/A
21.22	<b>Non-detachable parts</b> , which provide the necessary degree of protection against electric shock, moisture, or contact with moving parts, shall be fixed in a reliable manner		N/A
	Snap-in devices used for fixing such parts shall have an obvious locked position. The fixing properties of snap-in devices used in parts which are likely to be removed shall not deteriorate.		N/A



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
21.23	Handles, knobs, grips, levers and the like shall be fixed in a reliable manner so that they will not work loose, if loosening might result in a hazard.		P
21.24	Storage hooks and similar devices for flexible cords shall be smooth and well rounded.		N/A
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.		N/A
21.26	Tools other than class II, having parts where reliance is placed upon <b>safety extra-low voltage</b> to provide the necessary degree of protection against electric shock, shall be so designed that the insulation between parts operating at <b>safety extra-low voltage</b> and other <b>live parts</b> complies with the requirements for <b>double insulation</b> or <b>reinforced insulation</b> .		N/A
21.27	Parts separated by <b>protective impedance</b> shall comply with the requirements for <b>double insulation</b> or <b>reinforced insulation</b> .		N/A
21.28	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.		N/A
21.29	For constructions other than those of class III, handles, levers and knobs which are held or actuated shall not become live in the event of an insulation fault.		N/A
	If these handles, levers or knobs are of metal, and if their shafts or fixings are likely to become live in the event of a <b>basic insulation</b> fault, they shall either be adequately covered by insulating material, or their <b>accessible parts</b> shall be separated from their shafts or fixings by insulation.		N/A
	For <b>transportable tools</b> and <b>lawn and garden machinery</b> of class I construction, this requirement does not apply to handles, levers and knobs, other than those of electrical components, if they are reliably connected to an earthing terminal or earthing contact or separated from <b>live parts</b> by earthed metal.		N/A
21.30	For all tools that are likely to cut into concealed wiring or their own cord, handles and grasping surfaces, as specified in the instruction manual in accordance with 8.14.2 b) 6), shall be formed of insulating material or, when of metal, shall be either adequately covered by insulating material or their <b>accessible parts</b> shall be separated by insulating barrier(s) from accessible metal parts that may become live by the output shaft. These insulating barriers are not to be regarded as basic, supplementary or <b>reinforced insulation</b> .		N/A
	This subclause is not applicable for impact wrenches with a square drive greater than or equal to 13 mm. (EN 62841-2-2:2014)		N/A
21.31	For <b>class II tools</b> , capacitors shall not be connected to accessible metal parts, and their casings, if of metal, shall be separated from accessible metal parts by <b>supplementary insulation</b> .		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
21.32	Capacitors shall not be connected between the contacts of a <b>thermal cut-out</b>		N/A
21.33	Lamp holders shall be used only for the connection of lamps.		N/A
21.34	<b>Protective impedance</b> shall consist of at least two separate components, the impedance of which is unlikely to change significantly during the lifetime of the tool. If any on of the components is short-circuited or open-circuited, the values specified in 9.2 shall not be exceeded.		N/A
21.35	<b>Dust collection</b>		N/A
	Tools as identified in the relevant part 2 or 3, which produce a considerable amount of dust, shall have either an integral dust collection/suction device or have dust outlet(s) designed which allow the mounting of external suction device(s) for evacuating the by-products of the working process. These dust outlets shall direct the discharge away from the operator and they along with any external suction device(s) for evacuating the by-products of the working process shall not impede the <b>normal use</b> of the tool.		N/A
22	<b>Internal wiring</b>		P
22.1	Wireways shall be smooth and free from sharp edges		P
	Wires shall be protected so that they do not come into contact with burrs, cooling fins, etc., which may cause damage to the insulation of conductors.		P
	Holes in metal through which insulated wires pass shall be provided with bushings or, unless required otherwise in the relevant part 2, 3 or 4, shall have smooth, well-rounded edges. A radius of 1,5 mm is considered to be well rounded.		P
	Wiring shall be effectively prevented from coming into contact with moving parts.		P
22.2	Internal wiring shall be either so rigid and so fixed or so insulated that <b>creepage distances</b> and <b>clearances</b> cannot be reduced below the values specified in 28.1.		P
22.3	Conductors identified by the colour combination green or green/yellow shall not be connected to terminals other than earthing terminals.		N/A
22.4	Aluminium wires shall not be used for internal wiring. Windings of a motor are not considered as internal wiring.		N/A
22.5	Stranded conductors shall not be consolidated by lead-tin soldering where they are subjected to contact pressure, unless the clamping means is so designed that there is no risk of bad contact due to cold flow of the solder.		N/A
22.6	Different parts of a tool that can move relative to each other a) in <b>normal use</b> , b) during adjustment operations, or c) during <b>user maintenance</b>		N/A





<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
<b>23</b>	<b>Components</b>		P
<b>23.1</b>	Components referenced in this standard shall comply with the safety requirements specified in the referenced IEC standards, as far as they reasonably apply.		P
	Batteries are not regarded as components, but as part of the tool. They shall comply with the applicable requirements as specified in Annexes K and L.		P
	If components are marked with their operating characteristics, the conditions under which they are used in the tool shall be in accordance with these markings, unless a specific exception is made.		P
<b>23.1.1</b>	Capacitors in auxiliary windings of motors shall be marked with their <b>rated voltage</b> and their rated capacitance.		N/A
<b>23.1.2</b>	Fixed capacitors for radio interference suppression shall comply with IEC 60384-14.		N/A
<b>23.1.3</b>	Small lampholders similar to E10 lampholders shall comply with the requirements for E10 lampholders; they need not accept a lamp with E10 cap complying with the current edition of Standard Sheet 7004-22 of IEC 60061-1.		N/A
<b>23.1.4</b>	Isolating transformers or <b>safety isolating transformers</b> , except incorporated transformers as defined in IEC 61558-1, shall comply with IEC 61558-2-4 or IEC 61558-2-6, respectively. Switch mode power supply units and transformers for switch mode power supply units shall comply with IEC 61558-2-16.		N/A
<b>23.1.5</b>	Appliance couplers shall either comply with IEC 60320 or the manufacturer shall inform the user in the instructions for use to connect the tool only by means of the appropriate connector specified by the manufacturer		N/A
<b>23.1.6</b>	Automatic temperature controls containing electromechanical contacts that cycle in <b>normal use</b> , shall have suitable endurance for their intended application.		N/A
<b>23.1.7</b>	The testing of components which have to comply with other standards is, in general, carried out separately, according to the relevant standard as follows.		N/A
	If the component is marked and used in accordance with its marking, it is tested in accordance with its marking, the number of samples being that required by the relevant standard.		N/A
<b>23.1.8</b>	Components that have not been separately tested and found to comply with the component standards as references in 23.1 or components that are not marked or not used in accordance with their marking, are tested in accordance with the references relevant standard under the conditions occurring in the tool.		N/A



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
<b>23.1.9</b>	For capacitors connected in series with a motor winding, the voltage across the capacitor shall not exceed 1,1 times the rated voltage of the capacitor , when the tool is operated at a voltage equal to 1,1 times <b>rated voltage</b> and under no-load.		N/A
<b>23.1.10</b>	Switches shall be so constructed that there will be no failure that might impair compliance with this standard.		N/A
<b>23.1.11</b>	Electronic <b>power switches</b> , without series mechanical contact separation (air gap), are allowed, provided the requirements of 18.6 and 18.8 are met.		N/A
<b>23.2</b>	Tools shall not be fitted with		N/A
	switches or automatic controls in flexible cords, however <b>protective devices</b> such as <b>RCDs</b> are allowed; – devices, except for earthing conductors, which are intended to cause the protection device in the fixed wiring to operate in the event of a fault in the tool; – <b>thermal cut-outs</b> which can be reset by a soldering operation.		N/A
<b>23.3</b>	Overload or over-temperature protection devices or circuits that switch off the tool shall be of the non-self-resetting type where there is a risk associated with inadvertent starting as specified in the relevant part 2 (by 21.18.1.2), 3 or 4.		P
<b>23.4</b>	Plugs and socket-outlets for <b>extra-low voltage</b> circuits, and those used as terminal devices for heating elements, shall not be interchangeable with plugs and socket -outlets listed in IEC 60884, IEC/TR 60083 or IEC 60906-1 or with connectors and appliance inlets complying with the standard sheets of IEC 60320-1.		N/A
<b>23.5</b>	Motors connected to the supply mains, and having <b>basic insulation</b> which is inadequate for the <b>rated voltage</b> of the tool, shall comply with the requirements of Annex B.		N/A
<b>24</b>	<b>Supply connection and external flexible cords</b>		N/A
<b>24.1</b>	Tools shall be provided with one of the following means of connection to the supply:		N/A
	– a <b>supply cord</b> with a minimum length of 1,8 m and with a plug; – a <b>supply cord</b> with a minimum length of 1,8 m and without a plug, the information for connection shall be given in the instructions in accordance with 8.14.2 a); – an appliance inlet having at least the same degree of protection against moisture as required for the tool;		N/A
<b>24.2</b>	<b>Supply cords</b> shall be assembled to the tool by one of the following methods: – <b>type X attachment</b> ; – <b>type Y attachment</b> ; – <b>type Z attachment</b> , if allowed in the relevant part 2, 3 or 4.		N/A





<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
	<b>Supply cords</b> with <b>type X attachment</b> shall be specially prepared cords only available from the manufacturer or his service agent. A specially prepared cord may also include a part of the tool.		N/A
<b>24.3</b>	Plugs shall not be fitted with more than one flexible cord.		N/A
<b>24.4</b>	<b>Supply cords</b> shall be not lighter than:		N/A
	– ordinary tough rubber sheathed flexible cord (code designation 60245 IEC 53); or – ordinary polyvinyl chloride sheathed flexible cord (code designation 60227 IEC 53).		N/A
	There are no additional requirements specified for nationally standardised plugs complying with the standard sheets of IEC 60309, unless they are specifically mentioned in the text of this standard		N/A
	For impact wrenches, the lightest cable which can be used is heavy polychloroprene sheathed flexible cable (60245 IEC 66) or equivalent. (EN 62841-2-2:2014)		N/A
<b>24.5</b>	<b>Supply cords</b> shall have a nominal cross-sectional area not less than those shown in Table 7.		N/A
<b>24.6</b>	For <b>class I tools</b> , the <b>supply cord</b> shall be provided with a green or green/yellow core; it shall be connected to the internal earthing terminal of the tool, and to the earthing contact of the plug.		N/A
<b>24.7</b>	Conductors of <b>supply cords</b> shall not be consolidated by lead-tin soldering where they are subject to contact pressure, unless the clamping means is so designed that there is no risk of a bad contact due to cold flow of the solder.		N/A
	The requirement may be met by using spring terminals. Securing the clamping screws alone is not considered adequate.		N/A
<b>24.8</b>	For all types of attachment, moulding together the <b>supply cord</b> to the enclosure or part of it shall not affect the insulation of the cord.		N/A
<b>24.9</b>	Inlet openings shall be provided with a bushing, or shall be so constructed that the protective covering of the <b>supply cord</b> can be introduced without risk of damage.		N/A
<b>24.10</b>	Inlet bushings shall:		N/A
	– be so shaped as to prevent damage to the <b>supply cord</b> ; – be reliably fixed; – not be removable without the aid of a tool.		N/A
<b>24.11</b>	Tools, other than <b>transportable tools</b> , provided with a <b>supply cord</b> and cord guard that are flexed while in operation shall be constructed so that the <b>supply cord</b> is adequately protected against excessive flexing where it enters the tool.		N/A



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
<b>24.12</b>	Flexible cables or cords of tools with a <b>supply cord</b> that are flexed while in operation shall be protected against excessive bending at the inlet opening of the tool by means of a cord guard of insulating material.		N/A
	The cord guards shall be fixed in a reliable manner, and shall be of such a design that they project outside the tool for a distance beyond the inlet opening of at least five times the overall diameter of the cable or cord delivered with the tool.		N/A
<b>24.13</b>	Tools provided with a <b>supply cord</b> shall have a cord anchorage. The cord anchorage shall relieve conductors from strain, including twisting, at the terminals and protect the insulation of the conductors from abrasion.		N/A
	During the tests, the cord shall not be damaged and shall show no appreciable strain at the terminals. The pull force is reapplied and the cord shall not be longitudinally displaced by more than 2 mm.		N/A
<b>24.14</b>	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/A
<b>24.15</b>	Cord anchorages shall be so designed or located that:		N/A
	the cord cannot touch the clamping screws of the cord anchorage, if these screws are accessible, or at least not separate from accessible metal parts by <b>supplementary insulation</b> ;		N/A
	the cord is not clamped by a metal screw which bears directly on the cord;		N/A
	glands are not used as cord anchorages;		N/A
	for <b>class I tools</b> , if an insulation fault on the cord could make accessible metal parts live, they are of insulating material or are provided with an insulating lining complying with the requirements for <b>basic insulation</b> . The sheath of the cord is considered adequate for this purpose;		N/A
	for <b>class II tools</b> , they are of insulating material or are insulated from accessible metal parts by insulation complying with the requirements for <b>supplementary insulation</b> . The sheath of the cord alone is not considered to fulfil this requirement.		N/A
<b>24.16</b>	For <b>type X attachments</b> , cord anchorages shall be designed or located that:		N/A



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
	<ul style="list-style-type: none"> <li>– replacement of the cord is easily possible;</li> <li>– it is clear how the relief from strain and the prevention of twisting are to be obtained;</li> <li>– screws, if any, which have to be operated when replacing the cord, do not serve to fix any other component, unless, when omitted or incorrectly mounted, they render the tool inoperative or clearly incomplete, or unless the parts intended to be fastened by them cannot be removed without the aid of a tool during the replacement of the cord;</li> </ul>		N/A
<b>24.17</b>	For <b>type X attachment</b> , production methods such as tying the cord into a knot, or tying the ends with string, are not allowed.		N/A
<b>24.18</b>	The space for the supply cables or the <b>supply cord</b> provided inside, or as a part of the tool for <b>type X attachment</b> :		N/A
<b>24.19</b>	Appliance inlets shall:		N/A
	<ul style="list-style-type: none"> <li>– be so located or enclosed that <b>live parts</b> are not accessible during insertion or removal of the connector;</li> <li>– be so placed that the connector can be inserted without difficulty;</li> <li>– be so placed that, after insertion of the connector, the tool is not supported by the connector when in any position of <b>normal use</b> on a horizontal flat surface.</li> </ul>		N/A
<b>24.20</b>	<b>Interconnection cords</b> shall comply with the requirements for the <b>supply cord</b> , except that		N/A
	<ul style="list-style-type: none"> <li>– the cross-sectional area of the conductors of the cord is determined on the basis of the maximum current carried by the conductor during the test of Clause 12;</li> <li>– the insulation of the conductor shall be adequate for its <b>working voltage</b>;</li> <li>– the test of 24.11 is restricted to the range of motion of the tool during <b>normal use</b>.</li> </ul>		N/A
<b>24.21</b>	<b>Interconnection cords</b> shall not be detachable without the aid of a tool if compliance with this standard is impaired when they are disconnected.		N/A
<b>25</b>	<b>Terminals for external conductors</b>		N/A
<b>25.1</b>	Tools shall be provided with terminals or equally effective devices for the connection of external conductors. The terminals shall only be accessible with the aid of a tool.		N/A
	Screws and nuts shall not serve to fix any other component, except that they may also clamp internal conductors, if these are so arranged that they are unlikely to be displaced when fitting the supply conductors.		N/A
<b>25.2</b>	Terminals for <b>supply cords</b> shall be suitable for their purpose.		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	After the test, the connections shall show no damage which could impair compliance with this standard.		N/A
25.3	For tools with <b>type X attachment</b> , terminals shall be so fixed that, when the clamping means is tightened or loosened, the terminal does not work loose, internal wiring is not subjected to stress, and <b>creepage distances</b> and <b>clearances</b> are not reduced below the values specified in 28.1.		N/A
25.4	For tools with <b>type X attachment</b> , terminals shall be so designed that they clamp the conductor between metal surfaces with sufficient contact pressure, and without damage to the conductor		N/A
25.5	Terminals of the pillar type shall be so constructed and located that the end of a conductor introduced into the hole is visible, or can pass beyond the threaded hole for a distance at least equal to half the nominal diameter of the screw but at least 2,5 mm.		N/A
25.6	For <b>type X attachment</b> , the terminals shall be clearly recognizable and accessible after opening the tool. All terminals shall be located behind one cover , or one part of the enclosure.		N/A
25.7	Terminal devices of tools with <b>type X attachment</b> shall be so located or shielded that should a wire of a stranded conductor escape when the conductors are fitted, there is no risk of accidental connection between <b>live parts</b> and accessible metal parts and, in the case of <b>class II tools</b> , between <b>live parts</b> and metal parts separated from accessible metal parts by <b>supplementary insulation</b> only.		N/A
	An 8 mm length of insulation is removed from the end of a flexible conductor having a nominal cross-sectional area as specified in 24.5.		N/A
	The free wire is bent, without tearing the insulation back, in every possible direction, but without making sharp bends around barriers.		N/A
26	<b>Provision for earthing</b>	Class III equipment	N/A
26.1	<b>Accessible parts of class I tools</b> , 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, or to the earthing contact of the tool inlet.		N/A
	Class II and <b>class III tools</b> shall have no provision for earthing.		P
26.2	The clamping means of earthing terminals shall be adequately locked against accidental loosening, and it shall not be possible to loosen them without the aid of a tool. Screw clamping terminals complying with Clause 25 or screwless terminals in accordance with IEC 60998-2-2 are considered to comply with the requirements of this clause.		N/A



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
<b>26.3</b>	If <b>detachable parts</b> have an earth connection, this connection shall be made before the current-carrying connections are established when placing the part in position, and the current - carrying connections shall be separated before the earth connection is broken when removing the part.		N/A
<b>26.4</b>	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, or any other metal in contact with these parts.		N/A
<b>26.5</b>	The connection between the earthing terminal or earthing contact, and earthed metal parts shall be of low resistance.		N/A
	The voltage drop between the earthing terminal of the tool or the earthing contact of the tool inlet, and the accessible metal part is measured, and the resistance calculated from the current and this voltage drop. In no case shall the resistance exceed 0,1 .		N/A
<b>27</b>	<b>Screws and connections</b>		P
<b>27.1</b>	Fixings, and electrical connections, the failure of which may impair compliance with this standard, and connections providing earthing continuity shall withstand mechanical stresses occurring.		N/A
	Screws used for this purpose shall not be of metal which is soft or liable to creep, such as zinc or aluminium.		P
<b>27.2</b>	Electrical connections shall be so designed that contact pressure is not transmitted through insulating material which is liable to shrink or to distort, unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage or distortion of the insulating material. Ceramic material is not liable to shrink or to distort.		N/A
<b>27.3</b>	Space-threaded (sheet metal) screws shall not be used for the connection 3054 of current - carrying parts, unless they clamp these parts directly in contact with each other, and are provided with a suitable means of locking.		N/A
<b>27.4</b>	Screws, which make a mechanical connection between different parts of the tool, shall be secured against loosening, if they also make electrical connections.		P
<b>27.5</b>	Screwless connectors, not intended for disconnection in <b>normal use</b> , shall prevent disconnection in <b>normal use</b> .		P
<b>27.5.1</b>	Conductors shall be secured by more than one means or shall not impair safety in the event of detachment.		N/A
<b>28</b>	<b>Creepage distances, clearances and distances through insulation</b>		P



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
<b>28.1</b>	<b>Creepage distances and clearances</b> shall not be less than the values in millimetres shown in Table 11. The values specified in the table do not apply to cross-over points of motor windings.		P
	If a resonance voltage occurs between the point where a winding and a capacitor are connected together, and metal parts which are separated from <b>live parts</b> by <b>basic insulation</b> only, the <b>creepage distance</b> and <b>clearance</b> shall not be less than the values specified for the value of the voltage imposed by the resonance, these values being increased by 4 mm in the case of <b>reinforced insulation</b> .		P
<b>28.2</b>	Depending on the <b>working voltage</b> , the distance through insulation shall be sufficient:		P
	– For <b>working voltages</b> up to and including 130 V, the distance through insulation between metal parts shall not be less than 1,0 mm, if they are separated by <b>supplementary insulation</b> , and not be less than 1,5 mm, if they are separated by <b>reinforced insulation</b> .		P
	– For <b>working voltages</b> over 130 V up to and including 280 V, the distance through insulation between metal parts shall not be less than 1,0 mm, if they are separated by <b>supplementary insulation</b> , and not be less than 2,0 mm, if they are separated by <b>reinforced insulation</b> .		N/A
	– For <b>working voltages</b> up to and including 280 V, the distance through <b>reinforced insulation</b> used between windings and accessible metal shall not be less than 1,0 mm.		N/A
	The required insulation distance may be achieved through several thicknesses of solid insulation layers that may have intervening air between the layers such that the sum of the thicknesses of the solid insulation equals the required thickness.		N/A
<b>Annex B</b>	<b>Motors not isolated from the supply mains and having basic insulation not designed for the rated voltage of the tool</b>		N/A
<b>Annex C</b>	<b>Leakage current</b>		N/A
<b>Annex D</b>	<b>Electric strength</b>		P
<b>Annex F</b>	<b>Rules for routine tests</b>		N/A
<b>F.1</b>	<b>General</b>		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	The tests specified in this annex are intended to reveal, as far as safety is concerned, unacceptable variations in material or manufacture. These production tests do not impair the properties and the reliability of the tool, and should be made by the manufacturer on each tool.		N/A
<b>F.2</b>	<b>Correct operation test</b>		N/A
	The safe operation shall be checked, for example, by electrical measurements, by verifying the functional devices, such as switches and manually-operated controls, and by verifying the direction of rotation of motors.		N/A
<b>F.3</b>	<b>Electric strength test</b>		N/A
	<i>A voltage of substantially sine-wave form, having a frequency of 50 Hz or 60 Hz and minimum the value shown in Table F.1, is immediately applied, for 3 s, or for 1 s with the voltage increased by 20 %, between <b>live parts</b> and:</i> <i>a) accessible metal parts which may become live in the event of an insulation fault or as a result of incorrect assembly;</i> <i>b) inaccessible metal parts.</i>		N/A
<b>F.4</b>	<b>Earthing continuity test</b>		N/A
	For <b>class I tools</b> , a current of at least 10 A, derived from an a.c. source having a no-load voltage not exceeding 12 V, is passed between the earthing terminal or the earthing contact and, in turn, each of the accessible metal parts which need to be earthed for safety reasons.		N/A

<b>Annex G</b>	<b>Void</b>		N/A
----------------	-------------	--	-----

<b>Annex H</b>	<b>Determination of a low-power circuit</b>		N/A
----------------	---------------------------------------------	--	-----

<b>Annex I</b>	<b>Measurement of noise and vibration emissions</b>		P
<b>I.1</b>	<b>Scope</b>		P
	The requirements of this annex apply, if the declaration of noise or vibration emissions is required by national laws or if the manufacturer wishes to declare such emissions.		P
<b>I.2</b>	<b>Noise test code (grade 2)</b>		P
<b>I.2.1</b>	<b>General</b>		P





<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
	Noise emission values like the emission sound pressure level $p_A L$ and the sound power level $W_A L$ shall be measured according to the test procedure described in I.2.1 to I.2.6.		P
	The noise emission may be determined by using the measurements from a machine which has design and technical specifications replicating the machine concerned.		P
	The overall noise can be divided into the pure machine noise and the noise of processing the workpiece. Both are influenced by the method of operation; however for percussive tools the noise emission of the workpiece can be dominant. The load conditions for particular tools are therefore specified in the relevant part 2, 3 or 4.		P
<b>I.2.2</b>	<b>Sound power level determination</b>		P
	The sound power level shall be measured according to ISO 3744, where the acoustic environment, instrumentation, quantities to be measured, quantities to be determined, and the measurement procedure are specified.		P
	The sound power level shall be given as A-weighted sound power level in dB reference 1 pW. The A-weighted sound pressure levels, from which the sound power is to be determined, shall be measured directly, and not calculated from frequency band data. Measurements shall be made in an essentially free field over a reflecting plane.		P
<b>I.2.2.1</b>	<b>Hand-held power tools</b>		P
	For all <b>hand-held tools</b> , the sound power level shall be determined by using a hemispherical / cylindrical measurement surface according to Figure I.2.	$L_{pa}=66\text{dB}$ , $L_{WA}= 74\text{dB}$	P
	The hemispherical / cylindrical measurement surface is described by a hemisphere standing on a cylindrical pedestal (see Figure I.2). Five microphone positions shall be located 1 m from the geometric centre of the power tool. Four positions shall be spaced at regular intervals on a plane defined as passing through the geometric centre of the power tool and parallel to the reflecting plane; the fifth position shall be located at a distance of 1 m above the geometric centre of the power tool.		P
<b>I.2.2.2</b>	<b>Transportable power tools</b>		N/A
	For all <b>transportable tools</b> , the sound power level shall be determined by using a cubic measurement surface according to Figure I.3.		N/A





EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	Five microphone positions shall be located in the centre of each lateral surface and the top surface of the measurement cubic surface which envelops the source.		N/A
<b>I.2.2.3</b>	<b>Lawn and garden machinery</b>		N/A
	The sound power level of <b>lawn and garden machinery</b> shall be determined as specified in the relevant part 4.		N/A
<b>I.2.3</b>	<b>Emission sound pressure level determination</b>		P
<b>I.2.3.1</b>	<b>Hand-held tools</b>		P
	The A-weighted emission sound pressure level at the work station, $L_{pA}$ , shall be determined in accordance with ISO 11203 as follows: $L_{pA} = L_{WA} - Q$ , in dB		P
	If required, the C-weighted peak emission sound pressure level $L_{pCpeak}$ shall be measured at each of the five measurement positions specified in I.2.2. The C-weighted peak emission sound pressure level at the work station is the highest C-weighted peak sound pressure level measured at any of the five microphone positions; no corrections are permitted.		P
<b>I.2.3.2</b>	<b>Transportable tools</b>		N/A
	The A-weighted emission sound pressure level at the work station, $L_{pA}$ , shall be determined according to ISO 11201, grade 2. It shall be determined under the same operating conditions as for the determination of the sound power level.		N/A
	For tools measured under load and run by an operator, the microphone shall be located $(0,2 \pm 0,02)$ m to the side of the centre plane of the operator's head, on a line with the eyes, with its axis parallel to the operator's line of view, and on the side where the higher value of the A-weighted sound pressure level is observed.		N/A
<b>I.2.3.3</b>	<b>Lawn and garden machinery</b>		N/A
	The emission sound pressure level of <b>lawn and garden machinery</b> shall be determined as specified in the relevant part 4.		N/A
<b>I.2.4</b>	<b>Installation and mounting conditions of the power tools during noise tests</b>		P
	The installation and mounting conditions shall be the same for the determination of both sound power level and emission sound pressure level at the work station.		P



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	The power tool under test shall be new and equipped with <b>accessories</b> which affect the acoustic properties, as recommended by the manufacturer. Prior to commencing testing, the power tool (including any required ancillary equipment) shall be set up in a stable condition in accordance with the manufacturer's instructions for safe use		P
	A <b>hand-held tool</b> is held by the operator or suspended in such a way as to correspond to <b>normal use</b> , as specified in the relevant part 2. If the <b>hand-held tool</b> is used horizontally, it shall be positioned so that its axis is at 45° between the microphone positions 1 - 4 and 2 - 3 (see Figure I.2); its geometrical centre shall be 1 m above the ground (reflecting plane). If these requirements are impracticable or the tool is not used horizontally, the adopted positions shall be recorded and described in the test report.		P
<b>I.2.5</b>	<b>Operating conditions</b>		P
	The operating conditions shall be identical for the determination of both sound power level and emission sound pressure level at the work station.		P
	Tools are tested under the two operating conditions "no-load" or "load" as appropriate for the type of tool and specified in the relevant part 2, 3 or 4. Before starting the test, the tool shall be operated under these conditions for a period of at least 1 min.		P
<b>I.2.6</b>	<b>Measurement uncertainties</b>		P
	The total measurement uncertainty of the noise emission values determined according to this standard is depending on the standard deviation $\sigma_{R0}$ given by the applied noise emission measurement method and the uncertainty associated with the instability of the operating and mounting conditions $\sigma_{omc}$ .		P
<b>I.2.7</b>	<b>Information to be recorded</b>		P
	The information to be recorded covers all of the technical requirements of this noise test code. Any deviations from this noise test code or from the basic standards upon which it is based are to be recorded together with the technical justification for such deviations.		P
<b>I.2.8</b>	<b>Information to be reported</b>		P



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	The information to be included in the test report is at least that which is required to prepare a noise declaration or to verify the declared values. Thus as a minimum the following information shall be included: <ul style="list-style-type: none"> <li>- reference to this noise test code and to the basic standards used;</li> <li>- description of the power tool;</li> <li>- description of the mounting and operating conditions;</li> <li>- the noise emission values obtained.</li> </ul>		P
	It shall be confirmed that all requirements of the noise test code have been fulfilled, or, if this is not the case, any unfulfilled requirements shall be identified. Deviations from the requirements shall be stated and technical justification for the deviations shall be given.		P
<b>I.2.9</b>	<b>Declaration and verification of noise emission values</b>		P
	The declaration of the noise emission values shall be a dual number according to ISO 4871. It shall declare the noise emission value $L$ ( $L_{pA}$ and $L_{WA}$ ) and the respective uncertainty $K$ ( $K_{pA}$ and $K_{WA}$ ). If required, the C-weighted emission peak sound pressure level $L_{pCpeak}$ shall be given.		P
	For a standard deviation of reproducibility of the method $\sigma_{R0}$ of 1,5 dB and for a typical standard deviation of production, the values for the uncertainties, $K_{pA}$ and $K_{WA}$ respectively, are expected to be 3 dB.	K=3dB	P
	The noise declaration shall state that the noise emission values have been obtained according to this noise test code. If this statement is not true, the noise declaration shall indicate clearly what the deviations from this standard, and from the basic standards, are.		P
<b>I.3</b>	<b>Vibration</b>		P
<b>I.3.1</b>	<b>Vibration measurement - General</b>		P
<b>I.3.2</b>	<b>Symbols</b>		P
<b>I.3.3</b>	<b>Characterisation of vibration</b>		P
<b>I.3.3.1</b>	<b>Direction of measurement</b>		P
	Vibration transmitted to the hand is related to the three orthogonal directions X, Y and Z as shown in Figure I.4. For particular types of tools, these directions may be defined in the relevant part 2, 3 or 4.		P
<b>I.3.3.2</b>	<b>Location of measurement</b>		P



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	Measurements shall be made in three directions at each hand position. All measurements shall be conducted simultaneously.		P
	Measurements shall be carried out as close as possible to the hand between the thumb and the index finger, where an operator normally holds the machine.		P
<b>I.3.3.3</b>	<b>Magnitude of vibration</b>		P
	The quantity used to describe the magnitude of vibration shall be the frequency-weighted acceleration $a_{hw}$ in $m/s^2$ . Frequency weighting in accordance with ISO 5349-1 shall be used.	$a_{hw}=3.35m/s^2$	P
<b>I.3.3.4</b>	<b>Combination of vibration directions</b>	$a_{hv}=3.46m/s^2$	P
<b>I.3.4</b>	<b>Instrumentation requirements</b>		P
<b>I.3.4.1</b>	<b>General</b>		P
	The vibration measurement equipment shall be in accordance with ISO 8041.		P
<b>I.3.4.2</b>	<b>Transducers</b>		P
<b>I.3.4.2.1</b>	<b>Specification of transducers</b>		P
	The vibration values as specified in I.3.3.3 shall be measured using transducers and other appropriate measurement equipment conforming to ISO 8041.		P
<b>I.3.4.2.2</b>	<b>Fastening of transducers</b>		P
	Guidance on mounting of transducers is given in ISO 5349-2. The transducer and the mechanical filter, if used, shall be mounted rigidly and on the vibrating surface.		P
	Mechanical filters or other appropriate means may be needed to minimize measurement errors likely to occur when measuring vibration containing impulsive elements, such as occur in percussive tools. For more details, see ISO 5349-2.		P
<b>I.3.4.3</b>	<b>Calibration of the measurement chain</b>		P
	The whole measurement system shall be checked both before and after a sequence of measurements using a calibrator which produces a known acceleration at a known frequency.		P
<b>I.3.5</b>	<b>Testing and operating conditions of the tool</b>		P
<b>I.3.5.1</b>	<b>General</b>		P
	Measurements shall be carried out on a new tool that is only used for the noise and vibration tests required by this standard.		P
	For battery-operated tools: Each operator shall start his series of tests with a fully charged battery.		P



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	During the measurements the hands of the operator shall guide the machine as is necessary by the design of the tool and as specified in the instructions supplied with the machine		P
<b>I.3.5.2</b>	<b>Attachment, workpiece and task</b>		P
	The <b>attachment</b> or <b>accessories</b> to be used with the machine shall be as recommended in the user instruction.		P
	Care shall be taken that the location of the workpiece on its support does not affect the results of the test. Details for task and workpiece are given in the relevant part 2, 3 or 4.		P
<b>I.3.5.3</b>	<b>Operating conditions</b>		P
	Tools are tested under load only, unless the operating condition no-load is considered as important in practical use (no-load accounts for more than 20 % of the time when tool is switched on). In this case the tool shall be tested under both load and no-load condition, or at a typical work cycle containing load and no-load. The relevant part 2, 3 or 4 describes the modes of operation and the calculation of the declared emission value.		P
<b>I.3.5.4</b>	<b>Operator</b>		P
	The vibration of the machine is influenced by the operator. The operator shall therefore be skilled and able to operate the machine properly, i.e. he shall be experienced in the use of the tool.		P
	The gripping force shall be as under long term working conditions and not be excessive.		P
<b>I.3.6</b>	<b>Measurement procedure and validity</b>		P
<b>I.3.6.1</b>	<b>Reported vibration values</b>		P
	Three series of five consecutive tests shall be carried out using a different operator for each series. If it can be shown that the vibration is not affected by operator characteristics, it is acceptable to perform all 15 measurements with one operator only. Details are specified in the relevant part 2, 3 or 4		P
	The measurements are made in three axes and the results of each direction shall be combined using equation (I.6) to obtain the vibration total value $a_{hv}$ .		P
<b>I.3.6.2</b>	<b>Declaration of the vibration total value</b>		P
	The result $a_h$ is the basis for the declared value. If values have been obtained for different hand positions, the greatest value shall be the basis for the declaration.	$K=0.5m/s^2$	P
<b>I.3.7</b>	<b>Measurement report</b>		P



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
<b>Annex J</b>	<b>Selection and sequence of the tests of Clause 13</b>		N/A

<b>Annex K</b> (normative)	<b>Battery tools and battery packs</b>		P
<b>K.1</b>	<b>Scope</b>		P
	This annex applies to rechargeable <b>battery</b> -powered motor-operated or magnetically driven <b>hand-held tools</b> (part 2); <b>transportable tools</b> (part 3); <b>lawn and garden machinery</b> (part 4);	<b>hand-held tools</b>	P
<b>K.5</b>	<b>General conditions for the tests</b>		P
<b>K.5.7</b>	Unless otherwise specified, tests to be done at <b>rated voltage</b> are done with a <b>fully charged battery</b> .		P
<b>K.5.201</b>	When measuring voltage, the peak value of any superimposed ripple exceeding 10 % of the average value shall be included. Transient voltages are ignored, such as a temporary increase of voltage, for example after the <b>battery</b> pack is removed from the <b>charger</b> .		P
<b>K.5.202</b>	Measurements of <b>cell</b> voltages during the tests of lithium-ion systems shall be made using a single pole resistive-capacitive low pass filter with a cut-off frequency of 5 KHz $\pm$ 500 Hz. To determine if maximum charging voltages have been exceeded, the peak value of the voltage measured after this network shall be used. The measurement shall have measurement tolerance within $\pm$ 1 %.		N/A
<b>K.5.203</b>	Some of the tests may result in <b>fire</b> or <b>explosion</b> . It is therefore important that personnel be protected from the flying fragments, explosive force, sudden release of heat, chemical burns, intense light and noise that may result from such <b>explosions</b> . The test area is to be well ventilated to protect personnel from possible harmful fumes or gases.		N/A
<b>K.5.204</b>	Unless otherwise specified, all <b>batteries</b> shall be fully conditioned as follows: <b>batteries</b> shall be <b>fully discharged</b> and then charged in accordance with the manufacturer's instructions. The sequence shall be repeated one more time with an interval of at least two hours after each discharge.		P
<b>K.5.205</b>	The location of thermocouples for lithium-ion <b>cell</b> temperature measurements shall be on the outer surface, half way along the longest dimension, of the <b>cell</b> that results in the highest temperature.		P



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
K.5.206	Currents measured during <b>battery</b> charging shall be average current with the averaging period of 1 – 5 s.		P
K.5.207	If not otherwise specified, a <b>fully charged battery</b> shall be used. Before starting a test, the <b>fully charged battery</b> shall be allowed to rest for at least 2 h but no more than 6 h at an ambient temperature of (20 ± 5) °C prior to use and after removal from the <b>charging system</b> .		P
K.5.208	When a <b>battery</b> comprising of a single <b>cell</b> is employed, instructions in this standard referring to special preparations of a <b>cell</b> in a series configuration shall be ignored.		N/A
K.5.209	For <b>battery</b> designs where there is a series arrangement of parallel clusters of <b>cells</b> , the cluster shall be treated as a single <b>cell</b> for those tests that require altering the amount of charge on a single <b>cell</b> prior to conducting the test.		P
K.5.210	The end-of-discharge voltages for common cell chemistries are: – 0,9 V/cell for nickel cadmium or nickel metal-hydride <b>batteries</b> ; – 1,75 V/cell for lead-acid <b>batteries</b> ; – 2,5 V/cell for lithium-ion <b>batteries</b> , unless the manufacturer specifies a different voltage.		P
K.8	<b>Marking and instructions</b>		P
K.8.3	Battery tools and detachable or <b>separable battery packs</b> shall be marked with additional information as follows:		P
	the business name and address of the manufacturer and, where applicable, his authorised representative. Any address shall be sufficient to ensure contact . Country or state, city and postal code (if any) are deemed sufficient for this purpose;		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 tool.		P
	Battery tools shall also be marked with additional information as follows:		P
	date (or manufacturer's date code) of manufacture identifying at least the year;		P
	designation of the tool, designation of tool may be achieved by a combination of letters and/or numbers. The designation may be provided in the form of a code, providing that this code is explained by giving the explicit designation such as "drill", "planer" etc. in the instructions supplied with the tool;		P





EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	for tools manufactured such that its parts are shipped separately for assembly by the end user each part shall be marked with a distinct identification on the part or the package.		P
<b>K.9</b>	<b>Protection against electric shock</b>		P
<b>K.9.1</b>	Battery tools and <b>battery</b> packs shall be so constructed and enclosed that there is adequate protection against electric shock.		P
<b>K.9.3</b>	It shall not be possible to have two conductive, simultaneously <b>accessible parts</b> where the voltage between them is hazardous unless they are provided with <b>protective impedance</b> .		P
	In the case of <b>protective impedance</b> the short circuit current between the parts shall not exceed 2 mA for d.c. or 0,7 mA peak for a.c. and there shall not be more than 0,1 F capacitance directly between the parts.		P
	Compliance for accessibility is checked by applying the test probe B of IEC 61032 to each conductive part.		N/A
	The test probe B of IEC 61032 is applied with a force not exceeding 5 N through openings to any depth that the test probe will permit, and it is rotated or angled before, during and after insertion to any position.		N/A
	If the opening does not allow entry of the test probe, the force on the test probe in the straight position is increased to 20 N and the test with the test probe bent repeated.		P
	Contact with the test probe is determined with all <b>detachable parts</b> removed and the battery tool operated in any possible position of <b>normal use</b> .		P
	Lamps located behind detachable covers are not removed, providing the lamp may be de-energized by means of a user operable plug, <b>battery</b> pack disconnection or a switch.		P
<b>K.9.5</b>	Materials providing insulation from electric shock shall be adequate.		P
	Compliance is checked by subjecting the insulating material to an electric strength test as specified in D.2 with 750 V. This provision does not exclude the testing of the material as situated within the tool, providing care is taken to ensure that materials not under consideration are not subjected to the test voltage.		P
	This test applies only to materials which, if they were to fail to insulate, would subject the user to a shock hazard from a <b>hazardous voltage</b> . This test does not apply to materials that provide only a physical barrier to contact. As such, an uninsulated energized part shall be within 1,0 mm of the material surface to be considered for this requirement.		P





EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
<b>K.12</b>	<b>Heating</b>		P
<b>K.12.1</b>	Battery tools and <b>battery</b> packs shall not attain excessive temperatures.		P
	The tool is operated at no-load – continuously; or – for tools with an <b>inherent operating cycle</b> : operation with consecutive operating cycles;		P
	until maximum temperature is reached or the tool no longer operates due to the <b>battery</b> pack being discharged.		P
	During the test, <b>thermal cut-outs</b> and overload releases shall not operate. The temperature rises shall not exceed the values shown in Table 1b.		P
<b>K.12.201</b>	<b>Normal charging of lithium-ion systems</b>		P
	Charging a lithium-ion <b>battery</b> under normal conditions shall not exceed the <b>specified operating region for charging</b> of the cell.		P
	The <b>battery</b> is charged in accordance with the <b>charging system</b> instructions starting with a <b>fully discharged battery</b> . Testing is carried out at an ambient temperature of $(20 \pm 5) \text{ }^\circ\text{C}$ and – if the tool is recommended to be operated at a minimum temperature lower than $4 \text{ }^\circ\text{C}$ , the test is also conducted at that minimum temperature + $0/- 5 \text{ }^\circ\text{C}$ ; – if the tool is recommended to be operated at a maximum temperature greater than $40 \text{ }^\circ\text{C}$ , the test is also conducted at that maximum temperature + $5/- 0 \text{ }^\circ\text{C}$ .		P
	For <b>batteries</b> employing series configurations, the test is repeated with a deliberately imbalanced <b>battery</b> . The imbalance is introduced into a <b>fully discharged battery</b> by charging one <b>cell</b> to approximately 50 % of full charge.		P
	it can be demonstrated through testing and/or design evaluation that an imbalance less than 50 % would actually occur in <b>normal use</b> , then this lower imbalance may be used.		P
<b>K.13</b>	<b>Resistance to heat, fire and tracking</b>		P
<b>K.13.1</b>	External parts of non-metallic material, the deterioration of which might cause the tool or <b>battery</b> pack to fail to comply with this annex, shall be sufficiently resistant to heat.		P
	Compliance is checked by subjecting of the relevant parts to a ball pressure test of IEC 60695-10-2. Any soft materials (elastomers), such as soft grip coverings, shall be removed.		P
	The required thickness may be obtained by using two or more sections of the part.		P



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	The test is made in a heating cabinet at a temperature of $(55 \pm 2)$ °C plus the maximum temperature rise determined during the test of K.12, but for external parts it shall be at least $(75 \pm 2)$ °C.		P
<b>K.13.2</b>	This subclause applies only to the external enclosure enclosing the current -carrying parts of the tool or <b>battery</b> pack.		P
	Non-metallic parts of a <b>detachable</b> or <b>separable battery pack</b> or non-metallic parts of a tool that contains an <b>integral battery</b> supporting connections that carry a current exceeding 0,2 A during charging within a distance of 3 mm of such connections, are subjected to the glow-wire test of IEC 60695-2-11, which is carried out at 850 °C.		P
<b>K.18</b>	<b>Abnormal operation</b>		P
<b>K.18.1</b>	All tools when operating under <b>battery</b> power and their <b>battery</b> packs shall be so designed that the risk of <b>fire</b> or electric shock as a result of abnormal operation is obviated as far as is practical.		P
	The abnormal conditions (a-f) below shall be applied. The cumulative stress resulting from successive tests on <b>electronic circuits</b> or the <b>battery</b> is to be avoided. Additional samples may be used as necessary.		P
	Charring is defined as a blackening of the gauze caused by combustion. Discolouration of the gauze caused by smoke is acceptable. The resistance for the short in items a), b), d), e) and f) shall not exceed 10 mΩ. Charring or igniting of the tissue paper or gauze from the shorting means is not considered a failure.		P
<b>K.18.8</b>	This subclause does not apply to lithium-ion <b>charging systems</b> , since they are covered by K.18.201.		N/A
<b>K.18.201</b>	<b>Lithium-ion charging systems - abnormal conditions</b>		P
	The <b>charging system</b> and <b>battery</b> of a lithium-ion system shall be so designed that the risk of <b>fire</b> and <b>explosion</b> as a result of abnormal operation during charging is obviated as far as is practical.		P
	During the tests, each <b>cell</b> voltage is continuously monitored to determine if it has exceeded the limit condition. <b>Venting</b> of the <b>cells</b> is permitted.		P
	The test is continued until the sample under test experiences a failure, returns to room temperature or, if neither of these, until at least 7 h or twice the normal charge period has elapsed, whichever is longer.		P
<b>K.18.202</b>	<b>Lithium-ion battery short circuit</b>		P



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	There shall be no risk of <b>fire</b> or <b>explosion</b> when the main discharge connections of a series configured <b>integral battery, detachable battery pack</b> or <b>separable battery pack</b> are shorted under conditions of extreme imbalance.		P
<b>K.18.203</b>	<b>Batteries other than lithium-ion - overcharging</b>		P
	<b>Batteries</b> comprised of <b>cells</b> other than the lithium-ion type shall withstand abusive overcharging without risk of <b>fire</b> or <b>explosion</b> .		P
<b>K.19</b>	<b>Mechanical hazards</b>		P
<b>K.19.6</b>	For all tools where the relevant part 2, 3 or 4 requires the tool to be marked with the <b>rated no-load speed</b> , the no-load speed of the spindle at <b>rated voltage</b> shall not exceed 110 % of the <b>rated no-load speed</b> .		P
	The tool is operated for 5 min at no-load. The <b>battery</b> is replaced with a <b>fully charged battery</b> . The speed of the spindle is then measured after the tool has been operating for 1 min at no-load.		P
<b>K.20</b>	<b>Mechanical strength</b>		P
<b>K.20.1</b>	Battery tools and <b>battery</b> packs shall have adequate mechanical strength, and shall be so constructed that they withstand rough handling that may be expected.		P
<b>K.20.3.1</b>	A hand-held battery tool with any <b>detachable battery pack</b> attached is dropped three times in total on a concrete surface from a height of 1 m. For these three drops, the sample is tested in the three most unfavourable positions the lowest point of the tool being 1 m above the concrete surface. For the test, separable <b>accessories</b> are not mounted.		P
	For battery tools with detachable or <b>separable battery packs</b> , the test is repeated three more times without the <b>battery</b> pack attached to the tool. New samples may be used for each series of three drops. For the test, separable <b>accessories</b> are not mounted.		P
<b>K.20.3.2</b>	A <b>battery-operated transportable tool</b> with any <b>detachable battery pack</b> attached, placed in its normal operating position, is impacted with a smooth steel sphere having a diameter of $(50 \pm 2)$ mm and weighing $(0,55 \pm 0,03)$ kg. If a part of the tool can be impacted from above, the sphere is dropped from a rest position to strike the component. Otherwise, the sphere is suspended by a cord and is allowed to fall from a rest position as a pendulum to strike the area of the tool to be tested. In either case, the vertical travel of the sphere is $(1,3 \pm 0,1)$ m.		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
K.21	<b>Construction</b>		P
K.22	<b>Internal wiring</b>		P
K.23	<b>Components</b>		P
K.23.1.10	<b>Power switches</b> shall have adequate breaking capacity		P
	Compliance is checked by subjecting a switch to 50 operation cycles of making and breaking the locked output mechanism current of the <b>fully charged</b> battery-operated tool. 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.		P
K.24	<b>Supply connection and external flexible cords</b>		N/A
K.25	<b>Terminals for external conductors</b>		N/A
K.26	<b>Provision for earthing</b>		N/A
K.27	<b>Screws and connections</b>		N/A
K.28	<b>Creepage distances, clearances and distances through insulation</b>		P
K.28.1	<b>Creepage distances</b> and <b>clearances</b> shall not be less than the values in millimetres shown in Table K.1. The <b>clearances</b> specified do not apply to the air gap between the contacts of thermal controls, overload protection devices, switches of micro-gap construction, and the like, or to the air gap between the current -carrying members of such devices where the <b>clearances</b> vary with the movement of the contacts. <b>Creepage distances</b> and <b>clearances</b> also do not apply to the construction of <b>battery cells</b> or the interconnections between <b>cells</b> in a <b>battery</b> pack. The values specified in Table K.1 do not apply to cross-over points of motor windings.		P
	For parts of different polarity, <b>clearance</b> and <b>creepage distances</b> less than those given in Table K.1 are acceptable if the shorting of the two parts does not result in the tool starting.		P

<b>Annex L</b>	<b>Battery tools and battery packs provided with mains connection or non-isolated sources</b>		N/A
L.5	<b>General conditions for the tests</b>		N/A
L.5.7.2	Unless otherwise specified, tests to be done at <b>rated voltage</b> are done with a <b>fully charged battery</b> .		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
L.5.201	When measuring voltage, the peak value of any superimposed ripple exceeding 10 % of the average value shall be included. Transient voltages are ignored, such as a temporary increase of voltage, for example after the <b>battery</b> pack is removed from the <b>charger</b> .		N/A
L.5.202	Measurements of <b>cell</b> voltages during the tests of lithium-ion systems shall be made using a single pole resistive-capacitive low pass filter with a cut-off frequency of 5 KHz $\pm$ 500 Hz. To determine if maximum charging voltages have been exceeded, the peak value of the voltage measured after this network shall be used. The measurement shall have measurement tolerance within $\pm$ 1 %.		N/A
L.5.203	Some of the tests may result in <b>fire</b> or <b>explosion</b> . It is therefore important that personnel be protected from the flying fragments, explosive force, sudden release of heat, chemical burns, intense light and noise that may result from such <b>explosions</b> . The test area is to be well ventilated to protect personnel from possible harmful fumes or gases.		N/A
L.5.204	Unless otherwise specified, all <b>batteries</b> shall be fully conditioned as follows: <b>batteries</b> shall be <b>fully discharged</b> and then charged in accordance with the manufacturer's instructions. The sequence shall be repeated one more time with an interval of at least two hours after each discharge.		N/A
L.5.205	The location of thermocouples for lithium-ion <b>cell</b> temperature measurements shall be on the outer surface, half way along the longest dimension, of the <b>cell</b> that results in the highest temperature.		N/A
L.5.206	Currents measured during <b>battery</b> charging shall be average current with the averaging period of 1 – 5 s.		N/A
L.5.207	If not otherwise specified, a <b>fully charged battery</b> shall be used. Before starting a test, the <b>fully charged battery</b> shall be allowed to rest for at least 2 h but no more than 6 h at an ambient temperature of (20 $\pm$ 5) °C prior to use and after removal from the <b>charging system</b> .		N/A
L.5.208	When a <b>battery</b> comprising of a single <b>cell</b> is employed, instructions in this standard referring to special preparations of a <b>cell</b> in a series configuration shall be ignored.		N/A
L.5.209	For <b>battery</b> designs where there is a series arrangement of parallel clusters of <b>cells</b> , the cluster shall be treated as a single <b>cell</b> for those tests that require altering the amount of charge on a single <b>cell</b> prior to conducting the test.		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
L.5.210	The end-of-discharge voltages for common cell chemistries are: – 0,9 V/cell for nickel cadmium or nickel metal -hydride <b>batteries</b> ; – 1,75 V/cell for lead-acid <b>batteries</b> ; – 2,5 V/cell for lithium-ion <b>batteries</b> , unless the manufacturer specifies a different voltage.		N/A
L.7	<b>Classification</b>		N/A
	This subclause applies except that <b>class III tools</b> are not considered in this annex.		N/A
L.8	<b>Marking and instructions</b>		N/A
L.8.1	<b>Non-isolated sources</b> that can supply a tool, or tools that can be supplied directly from the mains, shall be marked with the following: – <b>rated voltage(s)</b> or <b>rated voltage range(s)</b> , in volts; – symbol for nature of supply, unless the <b>rated frequency(ies)</b> or <b>rated frequency range</b> is marked. The symbol for nature of supply shall be placed next to the marking for <b>rated voltage</b> ; – <b>rated input</b> , in watts, or <b>rated current</b> in amperes; – symbol for <b>class II construction</b> , for <b>class II tools</b> only.		N/A
L.8.3	Tools and detachable or <b>separable battery packs</b> shall be marked with additional information as follows:		N/A
	the business name and address of the manufacturer and, where applicable, his authorised representative. Any address shall be sufficient to ensure contact. Country or state, city and postal code (if any) are deemed sufficient for this purpose;		N/A
	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 tool.		N/A
L.9	<b>Protection against electric shock</b>		N/A
	Tools covered by this annex and their <b>battery</b> packs shall be so constructed and enclosed that there is adequate protection against electric shock.		N/A
	The clause of the standard applies to tools when they are connected to the mains or are supplied by a <b>non-isolated source</b> . During the evaluation in this condition, <b>battery</b> packs are to be connected to the tool in the normal fashion. The tool is also evaluated with the <b>battery</b> pack removed if such removal can be accomplished without the use of a tool.		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
L.9.201	For <b>battery</b> packs which may be disconnected from the tool and tools operated under <b>battery</b> power it shall not be possible to have two conductive, simultaneously <b>accessible parts</b> where the voltage between them is hazardous, unless they are provided with <b>protective impedance</b> .		N/A
	In the case of <b>protective impedance</b> the short circuit current between the parts shall not exceed 2 mA for d.c. or 0,7 mA peak for a.c. and there shall not be more than 0,1 F capacitance directly between the parts.		N/A
L.10	<b>Starting</b>		N/A
	This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> .		N/A
L.11	<b>Input and current</b>		N/A
	This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> . In the case of tools that can also charge the <b>battery</b> while performing their intended function, the test is conducted while charging a previously discharged <b>battery</b> pack.		N/A
L.12	<b>Heating</b>		N/A
	This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> . In the case of tools that can also charge the <b>battery</b> pack while performing their intended function, they are tested with the <b>charger</b> connected and are operated at no-load until the tool stops operating due to the <b>battery</b> pack being discharged or until thermal stabilization is achieved, whichever occurs first. The test is repeated, allowing the <b>battery</b> pack to charge while the tool is not operating.		N/A
L.12.201	<b>Normal charging of lithium-ion systems</b>		N/A
	Charging a lithium-ion <b>battery</b> under normal conditions shall not exceed the <b>specified operating region for charging</b> of the <b>cell</b> .		N/A
	For <b>batteries</b> employing series configurations, the test is repeated with a deliberately imbalanced <b>battery</b> . The imbalance is introduced into a <b>fully discharged battery</b> by charging one <b>cell</b> to approximately 50 % of full charge.		N/A
L.13	<b>Resistance to heat, fire and tracking</b>		N/A
L.13.1	This subclause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> .		N/A





EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
	In the case of tools that can charge the <b>battery</b> while performing their intended function, the <b>battery</b> pack shall be evaluated with the <b>charger</b> connected to the mains and with a <b>battery</b> in a condition that results in the most unfavourable temperatures.		N/A
L.13.2	Non-metallic parts of a <b>detachable</b> or <b>separable battery pack</b> or non-metallic parts of a tool that contains an <b>integral battery</b> supporting connections that carry a current exceeding 0,2 A during charging within a distance of 3 mm of such connections, are subjected to the glow-wire test of IEC 60695-2-11, which is carried out at 850 °C.		N/A
L.14	<b>Moisture resistance</b>		N/A
	This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> .		N/A
L.16	<b>Overload protection of transformers and associated circuits</b>		N/A
	This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> .		N/A
L.17	<b>Endurance</b>		N/A
	This clause applies to tools capable of continuous operation when they are supplied directly from the mains or from a <b>non-isolated source</b> . Tools that are not capable of continuous operation shall be operated under <b>battery</b> power for the duration of the test but shall be evaluated for electric strength with their <b>charger</b> connected.		N/A
L.18	<b>Abnormal operation</b>		N/A
	This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> .		N/A
L.18.8	This subclause does not apply to lithium-ion <b>charging systems</b> , since they are covered by L.18.202.		N/A
L.18.201	All tools when operating only under <b>battery</b> power and their <b>battery</b> packs shall be so designed that the risk of <b>fire</b> or electric shock as a result of abnormal operation is obviated as far as is practical.		N/A
	Charring is defined as a blackening of the gauze caused by combustion. Discolouration of the gauze caused by smoke is acceptable. The resistance for the short in items a), b), d), e) and f) shall not exceed 10 mΩ. Charring or igniting of the tissue paper or gauze from the shorting means is not considered a failure.		N/A



EN 62841-2-2			
Clause	Requirement-Test	Result	Verdict
L.18.202	<b>Lithium-ion charging systems - abnormal conditions</b>		N/A
	The <b>charging system</b> and <b>battery</b> of a lithium-ion system shall be so designed that the risk of <b>fire</b> and <b>explosion</b> as a result of abnormal operation during charging is obviated as far as is practical.		N/A
	cumulative stress resulting from successive tests on <b>electronic circuits</b> or the <b>battery</b> is to be avoided. Additional samples may be used as necessary. There shall be no evidence of damage to the <b>cell</b> vent to impair L.21.202.		N/A
	During the tests, each <b>cell</b> voltage is continuously monitored to determine if it has exceeded the limit condition. <b>Venting</b> of the <b>cells</b> is permitted		N/A
L.18.203	<b>Lithium-ion battery short circuit</b>		N/A
	There shall be no risk of <b>fire</b> or <b>explosion</b> when the main discharge connections of a series configured <b>integral battery</b> , <b>detachable battery pack</b> or <b>separable battery pack</b> are shorted under conditions of extreme imbalance.		N/A
	The main discharge connections of the <b>battery</b> are shorted with a resistance not to exceed 10 mΩ. The test is conducted until the test sample experiences a failure or until the test sample returns to room temperature. There shall be no <b>explosion</b> during or after the test. As a result of the test, there shall be no charring or burning of the gauze or tissue paper. <b>Venting of cells</b> is acceptable.		N/A
L.18.204	<b>Batteries other than lithium-ion - overcharging</b>		N/A
	<b>Batteries</b> comprised of <b>cells</b> other than the lithium-ion type shall withstand abusive overcharging without risk of <b>fire</b> or <b>explosion</b> .		N/A
	The <b>battery</b> is charged at a rate of 10 times the <b>C5 rate</b> for the <b>battery</b> for 1,25 h. There shall be no <b>fire</b> or <b>explosion</b> . <b>Venting</b> of the <b>cells</b> is acceptable.		N/A
L.19	<b>Mechanical hazards</b>		N/A
L.19.201	It shall not be possible to install a <b>detachable</b> or <b>separable battery pack</b> in reverse polarity.		N/A
L.19.202	<b>Lithium-ion enclosure pressure test</b>		N/A
	An enclosure for lithium-ion <b>batteries</b> shall be designed such that it will safely release gasses that may be generated as a result of <b>venting</b> .		N/A
L.20	<b>Mechanical strength</b>		N/A
	This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> .		N/A



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
<b>L.20.201</b>	With the <b>battery</b> connected, battery tools and <b>battery</b> packs shall have adequate mechanical strength, and shall be so constructed that they withstand rough handling that may be expected.		N/A
<b>L.20.202</b>	For hand-held battery tools, L.20.202.1 applies. For transportable battery tools, L.20.202.2 applies.		N/A
<b>L.20.202.1</b>	A hand-held battery tool with any <b>detachable battery pack</b> attached, shall withstand being dropped three times on a concrete surface from a height of 1 m. For these three drops, the sample is tested in the three most unfavourable positions the lowest point of the tool being 1 m above the concrete surface. For the test, separable <b>accessories</b> are not mounted.		N/A
	For battery tools with detachable or <b>separable battery packs</b> , the test is repeated three more times without the <b>battery</b> pack attached to the tool. New samples may be used for each series of three drops. For the test, separable <b>accessories</b> are not mounted.		N/A
<b>L.21</b>	<b>Construction</b>		N/A
	This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> .		N/A
<b>L.21.201</b>	Tools shall not readily accept <b>general purpose batteries</b> (either primary or rechargeable).		N/A
<b>L.21.202</b>	Vents of lithium-ion <b>cells</b> shall not be obstructed in such a way as to defeat their operation if <b>venting</b> is relied upon for safety.		N/A
<b>L.21.203</b>	User accessible interfaces between elements of a lithium-ion <b>battery system</b> shall not employ connectors of the following types: – standard mains inlet connectors, except for mains supply connections; – barrel connectors with outside diameters of 6,5 mm or less; – phone plugs with a diameter of 3,5 mm or less.		N/A
<b>L.22</b>	<b>Internal wiring</b>		N/A
	This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> .		N/A
<b>L.23</b>	<b>Components</b>		N/A



<b>EN 62841-2-2</b>			
<b>Clause</b>	<b>Requirement-Test</b>	<b>Result</b>	<b>Verdict</b>
<b>L.23.1.10</b>	The subclause of the standard applies only to tools capable of performing their intended operation when connected to the mains or to a <b>non-isolated source</b> for those switches that control the primary operating means of the tool.		N/A
<b>L.24</b>	<b>Supply connection and external flexible cords</b>		N/A
<b>L.24.1</b>	This subclause also applies to a flexible cord between a non-isolated power source and the tool.		N/A
<b>L.24.3</b>	This subclause also applies to a flexible cord between a non-isolated power source and the tool.		N/A
<b>L.24.4</b>	This subclause applies, except a flexible cord provided between a non-isolated power source and the tool shall not be provided with a plug that can be connected directly to the mains.		N/A
<b>L.24.5</b>	This subclause does not apply to a flexible cord provided between a non-isolated power source and the tool.		N/A
<b>L.24.20</b>	This subclause applies, except a flexible cord provided between a non-isolated power source and the tool shall not be provided with an appliance inlet that can be connected directly to the mains.		N/A
<b>L.24.201</b>	For battery tools with <b>separable battery packs</b> , the external flexible cable or cord shall have anchorages such that the conductors are relieved from strain, including twisting, where they are connected within the tool, and protected from abrasion.		N/A
<b>L.25</b>	<b>Terminals for external conductors</b>		N/A
<b>L.26</b>	<b>Provision for earthing</b>		N/A
<b>L.28</b>	<b>Creepage distances, clearances and distances through insulation</b>		N/A
	This subclause only applies when the tool is in the configuration where it is directly connected to the mains or to a <b>non-isolated source</b> . During the evaluation in this condition, <b>battery packs</b> are to be connected to the tool. The tool is also evaluated with the <b>battery pack</b> removed if such removal can be accomplished without the use of a tool.		N/A



11	TABLE: Current deviation					P
Current deviation of/at:		I rated (A)	I measured (A)	dI	Required dI	Remark
21Vdc		0.8A	0.73	-8.75%	<+10%	Normal operation

12.1	TABLE: temperature rise measurements			P
	t1 (°C) .....		20.3	---
	t2 (°C) .....		21.5	---
	test voltage (V) .....		21Vdc	---
temperature rise dT of part/at:			dT (K)	required dT (K)
PCB			25.1	95
Motor			48.0	95
Switch			6.2	40
Enclosure shell			10.9	50

14.3	TABLE: leakage current measurements at operating temperature			N/A
	heating appliances: at 1,15 times rated input (W) ...:		--	---
	motor-operated and combined appliances: at 1,06 times rated voltage (V) .....		--	---
leakage current I between:			I (mA)	required I (mA)
--			--	--

23.1	TABLE: components					P
object/part No.	manufacturer/trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>	
Enclosure shell	Various	Various	V-0 class, 130°C	UL94	UL	
PCB	Various	Various	1.0-1.6mm,V-0, 130°C	UL94	UL	
Motor	Various	Various	21Vdc	--	CE	
Adapter	Various	DW-168-08	Input: 100-240V~ 50/60Hz, Output: 21V-98Vdc 0.8A	EN 60335-1	CE	
Battery	Various	48VF	5-21Vdc 2Ah	IEC 62133-2:20217	Test with appliance	

<b>29.1</b>	<b>TABLE: Creepage distances, clearances and distances through insulation</b>						<b>P</b>
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)	



**Report No.: HTT202101103LR**

+to -	--	21Vdc	1.0	>3.0	1.5	>3.0
-------	----	-------	-----	------	-----	------

test voltage applied between:	test voltage (V)	breakdown
DC Input to enclosure	500	No
Adapter input to output	3000	No

Annex D TABLE: electric strength measurements at operating temperature P

**Appendix 1**  
Photo documentation

**Photo 1**



**Photo 2**





Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8



Photo 9



**\*\*\*End of Test Report\*\*\***