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Garden machinery - Hand-held chain-saws with lithium-ion battery as power source

园林机械 以锂离子电池为动力源的手持式链锯

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Garden machinery - Hand-held chain-saws with lithium-ion battery as power source

1 Scope

This standard specifies the terms and definitions, model preparation methods, basic parameters, technical requirements, test methods, signs, instruction manuals, packaging, transport, storage, handling of hand-held chain-saws with lithium-ion battery as power source (hereinafter referred to as chain-saws with lithium-ion battery).

This standard applies to hand-held chain-saws, which are operated by a single person, for sawing branches, wood and similar materials; are powered by a rechargeable lithium-ion battery pack (battery pack) with a nominal voltage not greater than DC 75V, under normal environmental conditions.

This standard does not apply to:

- Lithium-ion chain-saws for one-handed operation and/or for use at heights, such as in trees;

- Hand-held chain-saws, which are powered by user-installed universal battery packs or battery packs;

- Other hand-held chain-saws, which are powered by non-lithium-ion batteries.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 191 Packaging - Pictorial marking for handling of goods

GB/T 755 Rotating electrical machines - Rating and performance

GB/T 3883.1-2014 Safety of handheld motor operated electric tools - Part 2: Particular requirements for spray guns for non-flammable liquids

GB/T 3883.14-2007 Safety of hand-held power tools - Part 2: Special requirements for chain-saws

GB 4343.1 Electromagnetic compatibility - Requirements for household appliances electric tools and similar apparatus - Part 1: Emission

GB/T 9480 Tractors machinery for agriculture and forestry, powered lawn and garden equipment - Operators manuals - Content and presentation

GB/T 13384 General specifications for packing of mechanical and electrical product

GB/T 18516 Portable chain saws - Measurement of cutting rate and fuel consumption - Engineering method

GB/T 18960 Machinery for forestry - Portable chain-saws - Vocabulary

GB 19726.1 Machinery for forestry - Portable chain-saw safety requirements and testing - Part 1: Chain-saws for forest service

GB/T 21418 General specification for permanent magnet brushless motor system

GB/T 26572 Requirements of concentration limits for certain restricted substances in electrical and electronic products

GB/T 34570.1 Safety for rechargeable battery packs and chargers for electric tools - Part 1: Safety for rechargeable battery packs

LY/T 1187 Forestry machinery - Chain saw - Saw chains

LY/T 1188 Forestry machinery - Chain saw - Guide bars

SJ/T 11364 Marking for controlled uses of hazardous substance from electronic information products

IEC 60335-2-29 Household and similar electrical appliances - Safety - Part 2-29: Particular requirements for battery chargers

IEC 61960-3 Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 3: Prismatic and cylindrical lithium secondary cells and batteries made from them

IEC 62841-1:2014 Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery - Safety - Part 1: General requirements

IEC 62841-4-1 Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery - Safety - Part 4-1: Particular requirements for chain saws

3 Terms and definitions

The terms and definitions, which are defined in GB/T 18960, as well as the following terms and definitions, apply to this document.

3.1

Nominal voltage

The product of the nominal voltage of a single cell and the number of cells in series.

Note: The unit is volts.

3.2

Cutting efficiency

Under the load of the rated output state, the area of the standard test material, which is cut by the lithium-ion chain-saw per unit time.

Note: The unit is square centimeters per second.

3.3

Net mass of the machine

In the working state, the mass of the lithium-ion chain-saw, including the guide plate and saw chain as specified in the installation instructions, the pluggable adaptable battery pack (except for the split battery pack, which is connected to the whole machine by a flexible cord), without the knife cover and lubricating oil.

4 Model preparation method

4.1 The model preparation method of lithium-ion chain-saw shall be carried out, in accordance with the provisions of LY/T 1621.

4.2 The lithium-ion chain saw takes the nominal voltage of the battery pack as the main power parameter, takes the effective length of the longest guide plate as the main parameter of the product. The model preparation method is as shown in Figure 1:

h) Maximum linear speed of saw chain, m/s;

i) Cutting efficiency, cm^2/s;

j) Noise value (A-weighted sound pressure level and A-weighted sound power level), dB;

k) Vibration value, m/s^2;

l) Product dimensions (length × width × height), mm;

m) Net mass of the machine, kg.

6 Technical requirements and test methods

6.1 General requirements

6.1.1 The lithium-ion chain saw shall be able to run continuously, under the rated working conditions under the following environmental conditions:

a) The altitude does not exceed 1000 m;

b) The ambient temperature is -15 °C ~ 40 °C, or in accordance with the provisions of the instruction manual;

c) The relative humidity of the air does not exceed 90%;

d) The air does not contain flammable, explosive, corrosive gas and dust.

6.1.2 During inspection, the precision of the measured value shall be within the following range:

a) Speed: ±0.1%;

b) Temperature: ±1 °C;

c) Time: ±0.01 s;

d) Humidity: ±6%;

e) Size: ±1 mm;

f) Noise: ±0.5 dB;

g) Voltage: ±1%;

h) Current: ±1%;

i) Push-pull force: ±6%;

j) Torque: ±10%;

k) Angle: ±1°.

6.2 Matching motor performance

6.2.1 Requirements

If a permanent magnet brushless motor is used, its motor performance shall comply with the provisions of GB/T 21418.

The performance of other motors shall comply with the relevant requirements in GB/T 755.

6.2.2 Inspection

The inspection of the permanent magnet brushless motor is carried out, according to the provisions of GB/T 21418.

The performance inspections of other motors shall be carried out, in accordance with the provisions of GB/T 755.

6.3 Overall performance

6.3.1 Starting performance

6.3.1.1 Requirements

The lithium-ion chain saw shall be able to start normally, under the environmental conditions specified in 6.1.1 (or the environmental conditions specified in the instruction manual). There shall be no sticking or failure to start, during the starting process.

6.3.1.2 Inspection

6.3.1.2.1 Install the guide plate and saw chain on the main machine. Apply an appropriate amount of lubricating oil. Place it in an environment of -15 °C ± 2 °C (or the lowest temperature specified in the instruction manual) for 24 hours, before starting with no load. Carry out 10 consecutive starts. The time interval between two adjacent starts is not more than 10 s. Observe whether the start is successful each time.

6.3.1.2.2 Install the guide plate and saw chain on the main machine. Apply an appropriate amount of lubricating oil. Place it at a temperature of 40 °C ± 2 °C (or the highest temperature specified in the instruction manual) for 24 hours, before starting

6.4.6.1 Requirements

The lithium-ion chain saw shall be equipped with a saw chain adjuster, through which the tension of the saw chain can be adjusted. When adjusting the tension of the saw chain, there shall be no jamming.

6.4.6.2 Inspection

Check visually that the saw chain adjuster is equipped on the machine. By adjusting the adjusting device of the saw chain, observe and measure whether the tension of the saw chain meets the following requirements: When a weight of 1 kg is hung on the center of the cutting length at the lower part of the chain, the gap between the side link of the saw chain and the guide plate is not more than 0.017 mm per millimeter length of guide plate. During the adjustment process, check whether the tensioning and loosening process of the saw chain is light and reliable, AND whether there is any jamming.

6.4.7 Oil supply device

6.4.7.1 Requirements

The lithium-ion chain saw shall be equipped with an oil supply device, that can provide lubrication to the saw chain and the guide plate. After the machine starts and reaches the running speed of the saw chain, the oil supply device shall be able to deliver the lubricating oil to the lubricant groove of guide plate, as needed within a specified time, to achieve the purpose of lubricating the saw chain and guide plate.

The fuel tank cap shall have a connecting chain. There shall be clear and firm oil drop marks, around the fuel tank filling port or on the fuel tank cap.

The inner diameter of the oil filling port of the fuel tank shall not be less than 19 mm.

The structural design of the oil supply device shall ensure that the lithium-ion chain saw has no oil leakage, under normal working temperature, various working positions and during transportation. Oil seepage from the ventilation system of the oil supply device is not regarded as oil leakage.

There shall be no other parts around the tank filler opening, that would interfere with refueling. It shall be possible to use a funnel to refuel.

For the oil supply device, which is equipped with the oil quantity adjustment function, its adjustment function shall ensure that the lubrication required for the normal sawing of the lithium-ion chain saw can be met, even in the state of the minimum oil supply quantity.

The volume of the fuel tank shall be such, that in the maximum fuel supply state, after a fully charged battery pack is discharged, the remaining fuel volume in the fuel tank is not less than 10% of the total volume of the fuel tank.

6.4.7.2 Inspection

Verify fuel supply, fuel cap connecting chain, fuel filler port's size, identification, the ability to use a funnel for fueling, by inspection and measurement. Rotate the lithium-ion chain saw in any direction, to check the tightness of the cap of the oil supply device.

The inspection of oil supply performance of the oil supply device shall be carried out, under normal temperature conditions. Before the inspection, first inject a certain amount of lubricating oil (equivalent to about 50% of the oil tank volume) into the fuel tank of the lithium-ion chain saw. Put a clean and dirt-free white cardboard, under the installed saw chain and guide plate. Turn on the trigger or switch, to make the machine speed reach the maximum no-load stable speed. Observe whether there is lubricating oil thrown out within 10 s, AND whether a coherent "oil line" can be formed on the cardboard within 30 s. For the oil supply device, which is equipped with the oil volume adjustment function, the inspection of the adjustment function and the oil volume is carried out, by visually inspecting the change of the thickness of the "oil line", when the oil supply device is at the maximum and minimum extreme positions.

Fill the fuel tank with oil. Configure the lithium-ion chain saw with an adaptable battery pack, which has the longest battery life. Start the lithium-ion chain saw. Make it run at the highest no-load stable speed. Adjust the oil supply device, to make it reach the maximum fuel supply state. Run the lithium-ion chain saw, until the battery pack is discharged. Measure the remaining oil in the fuel tank at this time.

6.4.8 Straps (if applicable)

6.4.8.1 Requirements

The split battery pack, which is carried by the operator, shall be provided with a carrying device or accessories, the method of use of which shall be described in the manual. The device or accessory can be a shoulder strap, harness or other.

Shoulder straps and harnesses shall meet the following requirements:

a) The size of the strap shall be adjustable by the operator; the use, tightness adjustment and removal of the strap shall be described in the instructions;

b) It shall be designed for easy removal, OR equipped with a quick release mechanism to ensure that the battery pack can be quickly released or separated from the operator.

If equipped with a quick release mechanism, the quick release mechanism can be located at the junction of the battery pack and the harness OR between the harness and the operator, to ensure that the person can be quickly separated from the battery pack, in the event of an emergency. The quick release mechanism shall also be openable, by one hand under the gravity of the battery pack itself, AND shall not have more than two release points.

6.4.12.1.2 The adaptable battery pack shall be able to be fixed reliably and firmly.

6.4.12.1.3 The connection, between the adaptable battery pack, the adaptable charger and the whole machine, shall be reliable and effective.

6.4.12.2 Inspection

6.4.12.2.1 Check by plugging and unplugging the battery pack 5 times.

6.4.12.2.2 After installing the adaptable battery pack, apply a pulling force of 3 times the weight of the whole machine to the adaptable battery pack. Check whether the adaptable battery pack comes out of the installation position.

6.4.12.2.3 Connect the plug of the adaptable charger to the rated power supply. After the adaptable charger works normally, put the discharged adaptable battery pack in AND pull out the charging interface of the adaptable charger. Check whether the connection is reliable and effective after 1000 cycles. Pull out the fully charged battery pack and install into the machine. Turn it on after each installation. Observe whether the machine can normally and whether the fixing of the battery pack is reliable and firm, after 1000 cycles of installation and pullout.

6.5 Safety

6.5.1 Stop running time

6.5.1.1 Requirements

The requirements for stop running time of lithium-ion chain-saws shall comply with the provisions of GB/T 3883.14.

6.5.1.2 Inspection

The inspection of stop running time shall be carried out, in accordance with the provisions of GB/T 3883.14.

6.5.2 Noise

6.5.2.1 Requirements

The noise limit of the lithium-ion chain saw shall meet the following requirements: The A-weighted sound pressure level is not greater than 88 dB, the A-weighted sound power level is not greater than 108 dB.

6.5.2.2 Inspection

The noise measurement method is carried out, in accordance with the provisions of IEC 62841-4-1.

6.5.3 Vibration

6.5.3.1 Requirements

When the lithium-ion chain saw is running at rated power, the vibration values of the front and rear handles, which are measured according to IEC 62841-4-1, shall be indicated in the instruction manual.

6.5.3.2 Inspection

Visually inspect the instruction manual.

6.5.4 Management system for battery and battery packs

6.5.4.1 Requirements

The adaptable battery pack shall be equipped with a battery and battery pack management system, which shall comply with the provisions of GB/T 34570.1.

6.5.4.2 Inspection

The inspection of the management system of batteries and battery packs shall be carried out, in accordance with the provisions of GB/T 34570.1.

6.5.5 Electromagnetic compatibility

6.5.5.1 Requirements

The electromagnetic compatibility of lithium-ion chain-saw shall comply with the provisions of GB 4343.1.

6.5.5.2 Inspection

The inspection of electromagnetic compatibility shall be carried out, according to the provisions of GB 4343.1.

6.5.6 Adaptable battery pack

6.5.6.1 Requirements

The adaptable battery pack shall comply with the provisions of Appendix K in IEC 62841-1:2014.

6.5.6.2 Inspection

The inspection of the adaptable battery pack shall be carried out, in accordance with the provisions of Appendix K in IEC 62841-1:2014.

6.5.7 Adaptable charger

the maximum vibration value on the cover;

d) Maintenance time and frequency;

e) Failure phenomenon and replaced parts;

f) Accumulated effective running time.

6.6.2 Durability of working conditions

6.6.2.1 Requirements

The durability time of the lithium-ion chain saw, which has a brush motor, shall not be less than 45 h. The durability time of the lithium-ion chain saw, which has a brushless motor, shall not be less than 90 h.

Note: Durability time does not include downtime rest, repair and maintenance, troubleshooting time.

During and after the working condition durability test, the main machine shall be able to be used normally; the switch, gear box, bearing of the machine shall not fail or be damaged; the braking time of the saw chain shall be within the specified range.

The durability test of working conditions and the bench durability test of 6.6.1 shall be carried out on different machines.

6.6.2.2 Inspection

Use a fully charged lithium-ion chain saw, to continuously cut wet round pine, which has a diameter not less than 75% of the maximum cutting length as specified in Table 1. The working condition test of the lithium-ion chain saw is carried out continuously, by the intermittent cycle working condition method, in which the sum of the cutting time is the working condition durability time.

The test method for intermittent cycle conditions is as follows: Each cycle consists of two parts: cutting time and downtime rest time. The cutting time is the time -- FROM when the lithium-ion chain saw equipped with a fully charged battery pack is started to sawing wood TO when it is automatically shut down by its self-equipped control system, after its voltage reaches the lower limit under normal operation. The shutdown rest time is the rest time, after each fully charged battery pack is discharged (not more than 15 min). After a cycle is completed, the next cycle starts, AND the cycle repeats.

During the test, each fully charged battery pack is allowed to rest interstitially after discharge, BUT the rest time is not more than 15 min. The interstitial rest time is not included in the durability test time, under working conditions.

During the test, it is allowed to carry out maintenance and service of the machine, in accordance with the requirements of the instruction manual.

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