Technical Construction File

EN 62841-1

Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety

Date of issue ..... : Mar. 26,2024

Total number of pages ..... : 128 page

Applicant's name ..... : Guangdong RGOOD Tools Co., Ltd

Address ..... : 1st Floor, No. 40 Building, (Qingyuan) Hongrun Valley Science and Technology, Industrial Park, Longtang Town, Qingcheng District, Qingyuan, Guangdong, P.R. China

Test specification:

Standard ..... : EN 62841-1:2015+A11:2022

Test procedure ..... : Test Report

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

Test Report Form No. ..... : IEC62841_1D

Test Report Form(s) Originator .... : DEKRA Certification B.V.

Master TRF ..... : 2019-12-06

Test item description ..... :	BATTERY SPRAYER
Trade Mark ..... :	N/A
Manufacturer ..... :	Guangdong RGOOD Tools Co., Ltd
Model/Type reference ..... :	SP-10L, SP-16L
Ratings ..... :	See marking plate

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

BATTERY SPRAYER
Model: SP-10L
Input: DC14.4V
Guangdong RGOOD Tools Co., Ltd

Made in China

Test item particulars.....:	
Category of equipment .....:	~~Hand held~~, Transportable, ~~Lawn / Garden~~
Protection Class of tool .....:	~~Class I, Class II,~~ Class III
Method of supply cord attachment .....:	~~Type X, Type Y, Type Z,~~ appliance inlet
Duty conditions .....:	Normal, ~~severe, extra-severe~~
Type of operation .....:	Normal, ~~short-time, intermittent~~
Degree of protection.....:	IPX0
Accessories and detachable parts included .....:	N/A
Other options included .....:	N/A
Classification of installation and use.....:	Class III equiment
Supply Connection .....:	Battery
.....:	
Possible test case verdicts:	
- test case does not apply to the test object .....:	N/A
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement .....:	F (Fail)
Testing .....:	
Date of receipt of test item .....:	Mar. 18,2024
Date (s) of performance of tests .....:	Mar. 18,2024 to Mar. 26,2024

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☐ point is used as the decimal separator.

When differences exist, they shall be identified in the General product information section.

General product information and other remarks:

1. All tests were carried out the model SP-10L

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Clause	Requirement + Test	Result - Remark	Verdict
5	**GENERAL CONDITIONS FOR THE TESTS**		P
5.1	General test conditions in this clause apply unless otherwise specified in this standard		P
5.2	Tests made on separate samples		P
	At manufacturer's discretion, fewer samples used		P
	Cumulative stress from successive tests on electronic circuits avoided		P
	Several tests conducted on a single sample, results not affected by previous tests.		P
5.3	Evident from construction of the tool that a particular test(s) not applicable, test(s) not made ..... :		P
5.4	Tests carried out with the tool and/or any movable part of it		P
	Tool placed in the most unfavourable position that may occur in normal use.		P
5.5	Tools provided with controls or switching devices and setting can be altered by the user, controls or devices adjusted to their most unfavourable settings		P
	Electronic speed control devices set at their highest speed ..... :		P
	Adjusting means accessible without the aid of a tool, this subclause applies whether the setting can be altered by hand or with the aid of a tool. Adjusting means not accessible without the aid of a tool and setting is not intended to be altered by the user, this subclause does not apply.		P
	Adequate sealing prevents alteration of setting by user		P
5.6	Tests conducted in a draught-free location, and unless otherwise specified, in (20 ± 5) °C		P
	Tests conducted at (23 ± 2) °C due to temperature limited temperature sensitive device		P
5.7.1	Tools for a.c. only, tested with a.c. at rated frequency, if marked		N/A
	Tools marked for a.c./d.c., tested with the most unfavourable supply ..... :	DC	P
	Tools for a.c. not marked with rated frequency, or marked 50-60 Hz or 50/60 Hz, tested with either 50 Hz or 60 Hz, whichever is the most unfavourable		N/A
	Tools with series motors only, either frequency may be used		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.7.2	Tool rated for more than one rated voltage or a voltage range, tested at the highest voltage (V) ..... :		N/A
5.7.3	Tools where there is no marked rated current , tests that require a value for rated current conducted at current measured rated input at the lowest rated voltage or the lower value of the rated voltage range		N/A
5.8	Alternative heating elements or attachments which are made available for the tool by manufacturer, tool is tested with those heating elements or attachments which give the most unfavourable results		N/A
5.9	Tools are tested with the specified flexible supply cord connected to the tool.		N/A
5.10	Parts of class I tool having accessible parts not connected to an earthing terminal or earthing contact, and not separated from live parts by an intermediate metal part connected to an earthing terminal/contact, were checked on class II construction requirements.		N/A
5.11	Class I tool or class II tool having parts operating at safety extra-low voltage, such parts on requirements specified for class III tools	CLASS III	P
5.12	When testing electronic circuits, supply is free from perturbations from external sources that can influence the results of the tests		P
5.13	Heating element, if any, cannot be operated unless the motor is running, element is tested with the motor running		P
	Heating element, if any, can be operated without the motor running, element is tested with or without the motor running, whichever is the more unfavourable		P
	Heating elements incorporated in the tool connected to a separate supply unless otherwise specified		P
5.14	For attachments performing a function within the scope of IEC 62841-2, IEC 62841-3 or IEC 62841-4, tests made in accordance with IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
5.15	Method of torque loading chosen so as to avoid additional stresses, such as by side thrust.		P
	Additional loads necessary for the correct operation of the tool considered ..... :		P
	Brake used for loading, load applied gradually		P
	Modification of output means for purpose of loading permitted to allow connection to brake		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.16	Tools intended for SELV tested using a supply transformer intended to be used with the tool.		P
5.17	For requirements based on the mass of the tool, the mass is determined without supply cord and without tool bits or accessories, but with all equipment and attachments needed for normal use		P
	Required accessories, equipment and attachments as given in the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
	If tool has more accessories, equipment or attachments heaviest configuration shall be used to determine mass.		P
5.18	For linear and angular dimensions, ISO 2768-1, class “c” applicable, unless tolerances are specified		P
5.19	All electrical measurements made with a maximum measurement error of 5 %.		P
	Instruments for measuring voltage have input resistance ≥ 1 MΩ and parallel capacitance ≤ 150 pF.		P
5.20	Thermal equilibrium considered achieved when the total deviation of three successive temperature readings, taken at 3 min intervals, is ≤ 4 K		P
	Induction motor, measurement time of 1 hour is considered sufficient.		P
6	**RADIATION, TOXICITY AND SIMILAR HAZARDS**		N/A
6.1	No harmful radiation, no toxic or similar hazard		N/A
6.2	For tool with laser to indicate a cutting line or the like laser class 2M or lower according to IEC 60825-1:2007.		N/A
	Tool marked with symbol(s) as in of IEC 60825-1: 2007 for the relevant laser class.		N/A
6.3	Tool fitted with non-coherent light sources, users of tools are cautioned as to the risk of potential photo-biological harm, if such harm exist ..... :		N/A
6.3.1	Visible light indicators (pilot lamps) and Infrared sources used for signalling and communication considered to have no risk of photo-biological harm, no marking required.		N/A
6.3.2	Tools emitting visible light from electroluminescent, incandescent or LED sources, considered to be for short term, non-general light services use where exposure is both incidental and intermittent		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Marked with either: – “CAUTION Do not stare at operating lamp”, or – symbol 60417-6041(2010-08)		N/A
	If no reasonable risk of harm, markings may be omitted		N/A
	No reasonable risk of harm considered, as either a) light emission at a distance of 200 mm along any direction of the tool < 500 Lux; or b) luminance light emission < 10 000 cd/m² in the range of visible light; or c) light source (if not focused by external optics) is in Risk Group 1 or lower evaluated by the methods of IEC 62471; or d) tool itself evaluated by the methods of IEC 62471 and found to be in Risk Group 1 or lower.		N/A
6.3.3	For light derived by sources other than those mentioned in 6.3.2, product evaluated by the methods of IEC 62471, markings guided by 5.4 of IEC/TR 62471-2:2009.		N/A
7	**CLASSIFICATION**		P
7.1	Tool is Class I, II, or III with respect to protection against electric shock ..... :	Class III	P
7.2	Degree of protection against harmful ingress of water per IEC 60529 ..... :		P
	Required degree of protection other than IPX0 specified in relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 ..... :		P
8	**MARKINGS AND INSTRUCTIONS**		P
8.1	Tool marked with rated voltage(s) or rated voltage range(s) (V) ..... :	See marking plate	P
	Tool for star-delta connection clearly marked with the two rated voltages (e.g. 230 Δ / 400 Y V) ..... :		N/A
	Tool complying with this standard for a voltage range, may be marked with any single voltage or smaller voltage range within that range (V) ..... :		P
	Symbol for nature of supply or rated frequency or frequency range. The symbol for nature of supply placed next to rated voltage (Hz) ..... :		N/A
	Rated input or current marked (W or A) ..... :	See marking plate	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Tool has alternative components to be selected by a control device, rated input or rated current is that corresponding to the highest rated input or rated current		N/A
	Class II symbol for class II tools ..... :		N/A
	IP number other than IPX0 ..... :	IPX0	N/A
8.1.1	Tools with range of rated values (e.g. voltage, frequency) can be operated without adjustment over the range, marked with the lower and upper limits of the range separated by a hyphen, e.g. 115-230 V . :		N/A
	Different rated values to be adjusted by the user / installer, tool marked with the these values separated by an oblique stroke, e.g. 115/230 V ..... :		N/A
8.1.2	Upper and lower limits of rated power input marked,		N/A
	unless difference between upper and lower limits of rated voltage range do not exceed 20 % of the mean value, in which case the rated input is related to mean value of voltage range.		N/A
8.2	Tool marked with - "WARNING – To reduce the risk of injury, user must read instruction manual", or - sign M002 of ISO 7010[8]), or - appropriate symbol, see relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4		P
	"WARNING" in capital letters not less than 2,4 mm high, not separated from either the cautionary statement or the symbol ISO 7000-0434A or ISO 7000-0434B		P
	Statement verbatim except that "operator's manual" or "user guide" may replace "instruction manual".		P
	Additional symbols in accordance with ISO 7010 or designed in accordance with ISO 3864-2/3864-3. . :		P
	Cautionary statements having the same signal word such as "WARNING" may be combined into one paragraph under one signal word		P
	Order of statements: markings required by Part 1, markings required by part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 and then any optional markings		P
8.3	Business name and address of manufacturer, at least country or state, city and postal code ..... :		P
	Business name and address of authorized representative, at least country or state, city and postal code ..... :		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Designation of the tool (may be coded) ..... :		P
	Designation coded, code explained in the instructions		P
	Designation of series or type ..... :		P
	Year of manufacture and a date code identifying at least the month of manufacture ..... :		P
	Tools parts shipped separately for assembly by the end user, each part marked for identification on the part or the package		P
	“> 25 kg” if the mass of the tool is over 25 kg		P
	No misunderstanding through additional markings		P
8.4	Markings of 8.1 to 8.3 not on detachable part of the tool		P
	Markings of 8.2 and 8.3 clearly discernible from outside the tool		P
	Markings other than symbols, fold-over label on power cords used (Y or Z attachments only)		P
	Other markings may be visible after removing cover		P
	Indications for switches and controls placed on or in vicinity of components		P
	Not placed on parts which can be repositioned		P
	Not positioned such that the marking is misleading		P
8.5	Tool can be adjusted to suit different rated voltages, change in voltage clearly discernible		N/A
	Correct Wiring diagram fixed to tool, may be on inside of a cover but not on a label loosely attached to the tool		N/A
8.6	Use of correct units		N/A
	Use of correct symbols		N/A
	Additional symbols explained in the instructions, no misunderstanding		N/A
	Other units and their symbols belong to the international standardized system.		N/A
	Other units and their symbols same as international standardised system ..... :		N/A
8.7	Connection diagram affixed to tool with more than two supply conductors, unless terminals clearly identified		P
	The earthing conductor not a supply conductor		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Wiring diagram indicates how the windings are to be connected for tools for star-delta connection		N/A
8.8	Terminals, except for type Z attachments, marked on non-removable part with specified symbols:		N/A
	- Terminal exclusively for neutral connection marked with “N”		N/A
	- Earthing terminal marked with symbol IEC 60417-5019 (2006-08)		N/A
	The markings not placed on screws, removable washers or other parts which might be removed		N/A
8.9	Switches which may result in a hazard marked or placed to indicate which part of tool they control .... :		P
8.10	“Off” position of multi stable power switch indicated by figure O (symbol of IEC 60417-5008 [2002-10])		P
	A momentary power switch which can be locked in the “on” position is not considered as a multi -stable switch.		P
	Push-buttons for "off" function only, figure O used, button coloured red or black ..... :		P
	Figure O not used for any other indication		P
	Transportable tools, power switch actuator or cover not coloured yellow and red as specified for emergency stop according to ISO 13850.		P
	Flap/cover covers only the start button, colour of the flap/cover not black, red or yellow ..... :		P
	Flap/cover covers only the stop button, colour of the flap/cover red or yellow ..... :		P
8.11	Control devices adjusted during operation and the like provided with markings as specified, unless…		P
	… fully “on” position opposite to “off” position		P
	Figures used for different positions with Ofor “off” position, and figures reflecting greater output for other positions ..... :		P
	Indication for different positions placed on the device itself, or adjacent to the operating means		P
8.12	Markings easily legible		P
	Markings withstood durability test: - 15 s with water soaked cloth - 15 s with petroleum spirit soaked cloth		P
	Signs are in contrast to their background, clearly legible from a distance of not less than 500 mm		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Effect of normal use taken into account		P
	Adhesive backing durable, meets requirements of UL 969 or…		P
	… withstands specified tests	See tables 8.12 A - D	P
8.13	Thermal link or fuse-link, reference number or other means for identifying the link marked		N/A
8.14	Instruction manual and safety instructions: - are provided together with the tool		P
	- are noticed by the user when the tool is removed from the packaging		P
	- include an explanation of the symbols		P
	- are written in the official language(s) of the country in which the tool is sold ..... :		P
	- are legible and contrast with the background.		P
	- include business name and address of the manufacturer and, where applicable, his authorised representative ..... :		P
	- include the designation of the tool and series or type as required by 8.3, including description of machine such as “drill”, “planer” etc. ..... :		P
8.14.1	Safety instructions in English are verbatim and in any other official language are equivalent ..... :		P
	The general power tool safety warnings may be separate from the instruction manual.		P
	Term “tool” or “power tool” not used for garden machinery; use term such as “machine”		P
	Format of all Safety Warnings differentiate the context of all clauses by font or similar means and as illustrated in 8.14.1.1		P
8.14.1.1	General Power Tool Safety Warnings		P
	1) Work Area Safety		P
	2) Electrical Safety		P
	3) Personal Safety		P
	4) Power Tool Use and Care		P
	5) Service		P
8.14.1.2	Order of the Safety Instructions in accordance with A): Part 1 warnings are followed by the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 warnings, or …		P

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Clause	Requirement + Test	Result - Remark	Verdict
	… order of the Safety Instructions in accordance with B): Part 1 and part 2, 3 or 4 warnings divided into the sections defined by the numbered subtitles and the associated warnings below the numbered subtitle		P
	Format of instruction manual section titles for IEC 62841-2, IEC 62841-3 or IEC 62841-4 warnings		P
	Order of the Safety Instructions in accordance with C): Any additional warnings deemed necessary by the manufacturer, not inserted within any of the IEC 62841-2, IEC 62841-3 or IEC 62841-4 warnings		P
8.14.1.3	Instruction manual and safety instructions in one common document, or		P
	Warning as specified included in manual		P
8.14.2	Additional instructions and information		P
	a) Instructions for putting into use		P
	b) Operating instructions		P
	c) Maintenance and servicing instructions		P
	d) Warnings and instructions for tools with a liquid system		P
8.14.3	Information about the mass or weight of the tool, if any, is the mass specified in 5.17.		P
9	**PROTECTION AGAINST ACCESS TO LIVE PARTS**		P
9.1	Tools so constructed and enclosed that there is adequate protection against accidental contact with live parts, even after removal of detachable parts and soft materials		P
9.2	Accessible part not considered live if it is:		P
	- supplied with SELV		P
	- or separated from live parts by protective impedance, d.c. current not exceeding 2 mA		P
	- or separated from live parts by protective impedance, a.c. peak value not exceeding 0.7 mA		N/A
	- for peak value 42.4 V up to and including 450 V capacitance not exceeding 0.1μF		N/A
	- for peak value 450 V up to and including 15 kV discharge not exceeding 45μF		N/A
9.3	Lamps located behind a detachable cover are not removed		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Protection against contact with live parts of the lamp cap ensured during insertion or removal of lamps located behind a detachable cover		N/A
	Test probe B of IEC 61032:1997 applied with a force of ≤5 N		N/A
	Opening does not allow entry of test probe B of IEC 61032:1997, rigid test probe applied with a force of 20 N		N/A
	Test with probe B of IEC 61032:1997 repeated		N/A
	Test probe does not touch live parts or live parts protected only by lacquer, enamel, ordinary paper, cotton, oxide film, beads or sealing compound		N/A
9.4	Test probe 13 of IEC 61032:1997 applied with a force ≤5 N through openings in class II tools and class II constructions		N/A
	Exception: openings giving access to lamp caps and live parts in socket-outlets		N/A
	Test probe is also applied through openings in earthed metal enclosures having a non-conductive coating such as enamel or lacquer.		N/A
	Not be possible to touch live parts with the test probe		N/A
9.5	Class II tools and class II constructions, adequate protection against accidental contact with basic insulation and metal parts separated from live parts by basic insulation only		N/A
	Parts not separated from live parts by double or reinforced insulation are not accessible		N/A
	Probe B of IEC 61032:1997 cannot contact basic insulation through openings in Class II tools or Class II constructions		N/A
10	**STARTING**		N/A
10.1	Motors start under normal voltage conditions		N/A
	Starting ten times at 0.85 times rated voltage without load (V)		N/A
	Starting ten times at 1.1 times rated voltage without load (V)		N/A
	Tool operated and overload protection devices incorporated in the tool did not activate.		N/A
	Centrifugal and other automatic starting switches operate reliably and without contact chattering		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.2	Input current drawn at (2,0 ±0,2) s after starting does not exceed 30 A…		N/A
	… or 4 times the rated current of the tool		N/A
11	**INPUT AND CURRENT**		P
	Marked power input or current is at least 110% of measured no-load input or current ..... :	See Table 11	P
	Tool marked with more than one rated voltage, test made at each rated voltage ..... :		P
	Tools marked with one or more rated voltage ranges, test made at both the upper and lower limits of the ranges ..... :		P
	Marking of the rated input is related to the mean value of the relevant voltage range, test is made at a voltage equal to the mean value of that range..... :		P
12	**HEATING**		P
12.1	No excessive temperatures attained at rated input or rated current ..... :		P
	Temperature rise determined according to Clauses 12.2 to 12.5		P
	Test of Clause C.3 at 1,06 times the rated voltage under heated conditions	See Table C.3A	P
12.2	Tool is operated at each rated voltage; load conditions as specified in 12.2.1; torque applied is measured and maintained; voltage is then adjusted to 0,94 times and 1,06 times the rated voltage		P
	Tool with a rated voltage range is operated at - the lower limit of the rated voltage range; conditions as specified in 12.2.1; torque applied is measured and maintained; voltage is then adjusted to 0,94 times the lower limit of the rated voltage range - the upper limit of the rated voltage range; conditions as specified in 12.2.1; torque applied is measured and maintained; voltage is then adjusted to 1,06 times the upper limit of the rated voltage range		P
	Temperatures are measured at the most unfavourable of the voltage settings used		P
	Temperatures measured by means of thermocouples are taken while the tool is operating		P
12.2.1	Loading conditions during temperature test ..... :		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Tool without inherent operating cycle is operated with a torque load to draw rated input or rated current until thermal equilibrium is reached		P
	Tool with an inherent operating cycle is operated with a torque load to draw rated input or rated current during each operating cycle; tool was cycled consecutively for 30 min		P
12.3.1	Heating elements, if any, are operated under the conditions specified in Clause 11 of IEC 60335-1:2010; tool was operated at 1,06 times the rated voltage		P
12.3.2	Tool provided with automatic cord reel, one third of the total length of the cord was unreeled		P
12.3.2	Temperature rise was determined near to the hub of the reel and between the two outermost layers of the cord on the reel		P
	Cord storage devices, other than automatic cord reels, intended to accommodate the supply cord partially while the tool is in operation, 50 cm of the cord is unwound		P
	The temperature rise of the stored part of the cord is determined at the most unfavourable place.		P
12.4	Temperature rises, other than those of windings, determined using thermocouples chosen and positioned to have the minimum effect on the temperature of the part tested		P
	Temperature rise of electrical insulation, other than windings, measured on surface of insulation		P
	When possible, temperature rises of windings determined by resistance method		P
	For handles, knobs, grips and the like, all parts considered which are gripped in normal use, and, if of insulating material, to those parts in contact with hot metal		P
12.5	Temperature rises did not exceed values in Tables 1a and 1b, except as allowed by 12.6		P
	Protective devices did not operate		P
	Sealing compounds did not flow		P
12.6	When winding temperatures exceeded values in Table 1, three additional samples successfully subjected to following tests:		P
	a) Heat treatment for 240 h at the specified cabinet temperature (°C): ..... :		P

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Clause	Requirement + Test	Result - Remark	Verdict
	b) No interturn short circuit after oven treatment		P
	c) Humidity treatment in accordance with 14.1		P
	d) Tests of Annex D ..... :	See Table D.2	P
13	Resistance to heat AND fire		P
13.1	Relevant parts sufficiently resistant to distortion due to heat		P
	Parts of thermoplastic material: - provided as enclosure to comply with Clause 9, - supporting current carrying parts, - providing supplementary or reinforced insulation, sufficiently resistant to distortion due to heat		P
	Relevant parts subjected to ball-pressure test acc. to IEC 60695-10-2	See Table 13.1	P
13.2	Part of non-metallic material, except as listed in this clause, resistant to ignition and spread of fire		P
	Parts of non-metallic material other than - material classified at least HB40 per IEC 60695-11-10:2013, provided test sample not thicker than relevant part, - material with a glow wire ignition temperature of at least 575 °C per IEC 60695-2-13:2010, provided that the test sample was no thicker than the relevant part, comply with glow-wire test of IEC 60695-2-11:2000 at 550 °C	See Table 13.2	P
	Soft, foamy, and similar materials which cannot be subjected to glow wire test complies with ISO 9772:2012 for category HBF material with test sample not thicker than relevant part		P
14	**MOISTURE RESISTANCE**		P
14.1	Tools are proof against likely humid conditions		P
	Tool subjected to humidity treatment test for 48 h		P
	Relative humidity (93± 2) % ..... :		P
	Temperature (20…30 °C) maintained at± 1K ..... :		P
	Samples pre-conditioned to between t and t + 4 °C:		P
	No excessive leakage after humidity treatment ..... :	See Table C.2A	P
	No flashover or breakdown occurred during test of Annex D after humidity treatment ..... :	See Table D.2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	No flashover or breakdown occurred during additional test of D.2 between accessible metal parts and supply cord wrapped with metal foil ..... :	See Table D.2	P
14.2	Degree of protection for tool enclosure according to tool classification (IP Code)	:	N/A
14.2.1	Tool not connected to the supply and turned continuously through most unfavourable positions		N/A
	Removable parts are removed and subjected to the relevant treatment with the main part.	:	N/A
14.2.2	Tool rated IPX1 through IPX7 subjected to applicable tests of IEC 60529:2013		N/A
	For IPX7 test, tool immersed in water containing 1,0 % NaCl		N/A
	Tool withstood electric strength test of Annex D after moisture treatment	See Table D.2	N/A
	No trace of water on insulation causing reduction of creepage and clearance below values in 28.1		N/A
14.3	No increased risk of electrical shock from liquid systems or spillage of liquid		N/A
	Residual current device is disabled		N/A
	Removable parts, except those fulfilling the test of 21.22., are removed		N/A
	Tool prepared as described in 8.14.2		N/A
	Liquid container filled, then 15% or 0,25 l added	:	N/A
	Detachable liquid container mounted and dismounted 10 times		N/A
	No excessive leakage ..... :	See Table C.3B	N/A
	No flashover or breakdown occurred during test of D.2 between live parts and accessible parts after drying for 24 h at ambient temperature ..... :	See Table D.2A	N/A
14.4	No increased risk of electrical shock from liquid systems under pressure during operation		N/A
	Residual current device is disabled		N/A
	Liquid system is subject to a hydrostatic pressure equal to twice the pressure stated in 8.14.2 d) 1) is applied for 1 h with 1,0 % NaCl solution		N/A
	Tool did not exceed maximum allowable leakage current during pressure application	See Table C.2B	N/A
	No flashover or breakdown occurred during test of D.2 between live parts and accessible parts after drying for 24 h at ambient temperature ..... :	See Table D.2	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
14.5	Residual current devices complied with IEC 61540:1999 and met requirements a) to c)		N/A
	a) RCD disconnected only both mains conductors when leakage exceeded 10 mA with a maximum response of 300 ms		N/A
	Test conducted according to 9.9.2 of IEC 61540:1999, and earthing conductor stayed connected		N/A
	b) RCD operated correctly for all 50 cycles		N/A
	c) RCD cannot be removed during use or routine normal maintenance (i.e., residual current device fixed to tool or power supply cord connected to tool)		N/A
	RCD fitted in supply cord provided with Type Y or Z attachment for connection to supply cord and interconnection cord		N/A
15	**RESISTANCE TO RUSTING**		P
15.1	Ferrous parts adequately protected against rusting		P
	Parts used to conduct electricity subjected to test .. :		—
	Mechanical parts mechanical parts specified in the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 subjected to test ..... :		—
	All grease removed from the parts to be tested by immersing them in a degreasing agent for 10 min		P
	Parts were immersed for 10 min in a 10 % solution of ammonium chloride in water at (20± 5) °C		P
	Without drying, all drops shaken off, and parts placed for 10 min in a box containing air saturated with moisture at (20± 5) °C		P
	After parts dried for 10 min in a heating cabinet at (100 ± 5) °C, no evidence of rust on surfaces		P
	Small helical springs and the like and parts exposed to abrasion covered by a layer of grease		P
16	**OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS**		N/A
16.1	No excessive temperatures occurred during short circuit in transformer or circuits associated with it for a tool supplied from a transformer..... :	See Table 16.1	N/A
	Insulation on conductors of SELV circuits was within 15 K of Table 1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Temperature of transformer windings did not exceed values in Table 3		N/A
	Transformer complies with IEC 61558-1		N/A
	Power limited by (short-circuit protective device) ... :		—
17	**ENDURANCE**		N/A
17.1	Construction prevents electrical or mechanical failures that might impair compliance with this standard.		N/A
	Insulation not damaged		N/A
	Connections did not work loose		N/A
	Overload protection devices did not activate		N/A
	No flashover or breakdown occurred during test of Annex D, test voltages reduced to 75 per cent, after tests of 17.2 and 17.3	See Table D.2	N/A
17.2	No load intermittent operation (2 x 24 h) for hand-held tools		N/A
	No load intermittent operation (2 x 12 h) for transportable tools		N/A
	Test voltage at each operation (V) ..... :		—
	Rate of operation (100s “on”, 20s “off”) ..... :		—
	Three test positions selected for hand-held tools ... :		—
	Normal working position(s) for transportable tools . :		—
	Operation time for each position ..... :		—
	Servicing of carbon brushes and lubricant ..... :		N/A
	Replacement of parts due to mechanical failure .... :		N/A
	Forced cooling or rest periods if temperature exceeded values in Table 1 ..... :		N/A
	No operation of overload protection devices		N/A
17.3	Tools with Centrifugal switches operated for 10,000 cycles		N/A
	Number of operations under normal load ..... :		N/A
	Rate of operations (s “on”, s “off”) ..... :		N/A
	Test voltage 0.9 x rated Voltage (V) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
18	**ABNORMAL OPERATION**		P
18.1	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	Tool did not emit flames or molten metal		P
	Compliance with Clause 9 maintained		P
	No flashover or breakdown occurred during test of Annex D between live parts and accessible parts after tests of clause 18	See Table D.2	P
	Tool still operable and continues to comply with 19.1 but without repeating the tests of Clause 20		P
18.2	Fuses, thermal cut-outs, overcurrent protection devices used to provide the necessary protection		P
	Electronic circuits relied upon for protection evaluated for this safety critical function as in clause 18.8.		P
18.3	Tool with series motor operated without accessories at no load for 1 min at 1,3 times rated voltage, or upper limit of voltage range (V) ..... :		—
	No parts were ejected from the tool		P
	Speed limiting device operated		—
18.4	Tools with multiphase motor tested, started from cold, with one phase disconnected, and under the torque produced while operated at rated voltage or the mean value of the rated voltage range with rated input or rated current - for 30 s tests for tool kept switched on by hand or continuously loaded by hand - for 5 min test for other tools ..... :		P
	30 s tests for tool kept switched on by hand or continuously loaded by hand		P
	5 min test for other tools ..... :		N/A
	After the test, or at the instant of operation of fuses, thermal cut-outs, motor protection devices and the like, the temperature of the windings complied with the limits in Table 3		P
	Max winding temperature recorded (°C) ..... :		—
18.5	Class I tool with class II construction and class II tool subjected to running overload conditions		N/A
	Tools with series motor, test of 18.5.1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Class I tool with class II armature test of 18.5.2 instead of 18.5.1		N/A
	Tool with electronically commutated stator windings, test 18.5.4		N/A
	Tool with other motor, test of 18.5.3		N/A
	Lawn and garden machinery, test as specified in relevant part of IEC 62841-4 ..... :		N/A
18.5.1	All fuses, thermal cut-outs, overload protectors and the like that are accessible or can be reset by the user without the aid of a tool and any self-resetting protective devices were shorted		N/A
	Functions of electronic circuits that prevent the tool from operating at 160 % rated current disabled .... :		N/A
	Functions of electronic circuits that prevent the tool from operating at 160 % rated evaluated as safety critical functions as in 18.8. ..... :		N/A
	Test circuit minimum 12 kVA ..... :		N/A
	Leakage current between live parts and accessible parts measured as in Clause C.3 did not exceed 2 mA throughout the test and until stabilization afterwards..... :	See Table C.3C	N/A
	Tool operated for 15 min, or until the tool open-circuited, or flame appeared ..... :		N/A
	160% rated test current (A) ..... :		—
	Tool operated at rated voltage (V) ..... :		—
	Overload condition existed for (_min, _sec) ..... :		—
	Condition continued until the tool open-circuited, or flame appeared or 15 minutes expired ..... :		N/A
	Elements that opened in case an open circuit occurred ..... :		N/A
	When flames appeared, extinguished by CO_2 extinguisher		N/A
	Tool did not operate after 15 min, cooled to ambient temperature and subjected to test of D.2 at 1500 V between live parts and accessible parts	See Table D.2	N/A
	Tool still operated after 15 min, cooled to ambient temperature and subjected to test of D.2 at 2500 V between live parts and accessible parts	See Table D.2	N/A
	Tool permanently open-circuited due to over temperature condition (except opening of a motor winding), test repeated.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Non-self-resetting thermal limit function of an electronic circuit bypassed or evaluated as a safety critical function in 18.8.		N/A
	Tool permanently open-circuited for reasons other than above, the cause is determined and bypassed in a new sample, test repeated		N/A
18.5.2	Test circuit minimum 12 kVA applied to armature .. :		N/A
	Leakage current between commutator segments and the armature shaft measured did not exceed 2 mA throughout the test and until stabilization afterwards..... :		N/A
	1,06 times rated voltage (V) applied between opposite commutator segments ..... :		—
	160% rated test current (A) ..... :		—
	Current applied for 15 min, or until the armature open-circuited, or flame appeared ..... :		N/A
	When flames appeared, extinguished by CO_2 extinguisher		N/A
	Armature cooled to ambient temperature and subjected to test of D.2 at 1500 V between commutator segments and the armature shaft	See Table D.2	N/A
18.5.3	Test circuit minimum 12 kVA ..... :		N/A
	Tool stalled, capacitors in circuit of auxiliary windings are open-circuited		N/A
	Test repeated with capacitors short-circuited one at a time unless they are of class P2 of IEC 60252-1		N/A
	Operated at rated voltage (V) ..... :		—
	Test duration (min, s) ..... :		—
	Temperature of the windings did not exceed the relevant value specified in Table 3		N/A
	Conditions of 18.1.1 fulfilled		N/A
18.5.4	Motors with electronically commutated stator windings, all possible static faults of the outputs of the motor drive circuitry considered		N/A
	Protective function prevent these faults evaluated as an SCF according to 18.8 with minimum PL = a .... :		N/A
	All fuses, thermal cut-outs, overload protectors and the like that are accessible or can be reset by the user without the aid of a tool and any self-resetting protective devices were shorted		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Leakage current between live parts and accessible parts measured as in Clause C.3 did not exceed 2 mA throughout the test and until stabilization afterwards..... :	See Table C.3D	N/A
	Voltage applied for 15 min, or until the armature open-circuited, or flame appeared ..... :		N/A
	Source voltage of the motor drive circuitry ..... :		N/A
	When flames appeared, extinguished by CO_2 extinguisher		N/A
	Any motor windings open-circuited after 15 min, motor cooled to ambient temperature and subjected to test of D.2 at 1500 V between live parts and accessible parts	See Table D.2	N/A
	No motor windings open-circuited after 15 min, motor cooled to ambient temperature and subjected to test of D.2 at 2500 V between live parts and accessible parts	See Table D.2	N/A
18.6	No hazards from electric shock, fire or accessible moving parts occurred under fault conditions of 18.6.1		N/A
	Tool operated at rated voltage (V) ..... :		—
	No charring or burning of the gauze or tissue paper occurred		N/A
	Protection against electric shock as in Clause 9 maintained		N/A
	Protection against accessibility to moving parts as in 19.1 maintained		N/A
	Evaluation not performed for low power circuits as in Annex H if no SCF can be lost ..... :		N/A
	Circuit encapsulated with an insulating material with a minimum thickness of 0,5 mm and no SCF can be lost, circuit evaluated by open-circuiting and short-circuiting within the encapsulated circuit ..... :		N/A
	Fuses, thermal cut-outs, thermal links, temperature limiters, electronic devices or any components or conductors operated, and		N/A
	– test repeated twice, using two more samples; or		N/A
	– tool withstands test of 18.6.1 with the fuse, thermal cut-out or thermal link bridged; or		N/A
	–miniature fuse link complying with IEC 60127 operates and tool withstands test of 18.6.2		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Tool withstood the particular test as a conductor of a PCB open-circuited, and		N/A
	– creepage or clearances between live parts and accessible metal parts not reduced below values in 28 due to loosened conductors, and		N/A
	– tool withstood repeated tests with the open-circuited conductor bridged, or		N/A
	– test repeated twice, using two more samples		N/A
18.6.1	Fault conditions a) to f) conducted as applicable	See Table 18.6.1	P
18.6.2	Tests repeated with fuse-link replaced by an ammeter when during fault conditions of 18.6.1, safety of the tool depended on operation of a miniature fuse-link complying with IEC 60127-3,		P
	– Circuit not considered to be adequately protected when current measured was ≤ 2.1 times the rated current of fuse-link, and test conducted with fuse-link short-circuited (A) ..... :		P
	– Circuit considered adequately protected when current measured was ≥ 2.75 times the rated current of fuse-link (A) ..... :		N/A
	– Fuse-link short-circuited when current measured was 2.1-2.75 times the rated current of fuse-link, and test conducted as follows (A)..... :		N/A
18.7	Switches and devices for motor reversal withstood stresses occurring when rotation reversed 25 times under running conditions at rated voltage at no-load (V) ..... :		P
18.8	**Electronic circuits providing safety critical functions (SCF)**		—
18.8.1	Electronic circuits providing SCF are reliable and not susceptible to loss of SCF due to electro-magnetic environmental stresses		N/A
	No SCF lost after tests of 18.8.2 to 18.8.6 for circuits with no internal clock frequency or oscillator frequency > 15 MHz		N/A
	No SCF lost after tests of 18.8.2 to 18.8.7 for other electronic circuits		N/A
	Test voltage was rated voltage or the mean value of the rated voltage range ..... :		N/A
	Difference between upper and lower limit of rated voltage range > 20 % of its mean value, test at both upper and lower limits of the rated voltage range ... :		N/A
	After evaluation using 18.6.1, no loss of any SCF or tool in a safe state under any present fault condition.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Concept of 18.6.1 not appropriate, reliability evaluated using ISO 13849-1.		N/A
	Required performance levels ..... :	See Table 18.8.1A	N/A
	If only $MTTF_d$ is applied to achieve the required PL: $MTTF_d$ is 5/20/50 years for PL = a/b/c		N/A
	Software used in circuits of programmable devices whose failure would create loss of safety critical function, complied with software class B requirements as in H.11.12.3 of IEC 60730-1:2010	See Table 18.8.1B	N/A
	In the case where software class B is realized by single channel with periodic self-test, an acceptable period is regarded as either after each activation of the power switch or a maximum of 5 min.		N/A
	Class B realized by single channel, periodic self-test either after each activation of the power switch or at least every maximum 5 min		N/A
	H.11.12.3.4.1 applicable for SCF with a PL ≥ c		N/A
18.8.2	Electrostatic discharges as in IEC 61000-4-2:2008 applied to tool, test level 4 used for air discharge and test level 3 for contact discharge, ten / ten discharges having a positive / negative polarity applied		N/A
18.8.3	Fast transient bursts as in IEC 61000-4-4:2012 applied to tool, test level 3 used. Repetition frequency 5 kHz for 2 min / 2 min with a positive / negative polarity		N/A
18.8.4	Voltage surges as in IEC 61000-4-5:2005 applied to power supply terminals, five positive impulses and five negative impulses applied at the selected points		N/A
	Test level 3 applied for line-to-line coupling mode, a generator with 2 Ω source impedance being		N/A
	Test level 4 applied for line-to-earth coupling mode, a generator with 12 Ω source impedance being		N/A
	Tools has surge arresters incorporating spark gaps, test was repeated at 95 % of the flashover voltage		N/A
18.8.5	Injected currents as in IEC 61000-4-6:2008 applied to tool, test level 3 applicable, all frequencies between 0,15 MHz to 230 MHz covered		N/A
18.8.6	Class 3 voltage dips and interruptions in accordance with IEC 61000-4-11:2004 applied to tool		N/A
	Values of Tables 1 and 2 of IEC 61000-4-11:2004 were applied at zero crossing of the supply voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
18.8.7	Radiated fields in accordance with IEC 61000-4-3:2010 applied to tool, test level 3 applicable		N/A
	Frequency ranges 80 MHz to 1 000 MHz tested		N/A
19	**MECHANICAL HAZARDS**		P
19.1	Adequate protection against injury provided against moving and other dangerous parts		P
	Protective enclosures, covers, and the like have adequate mechanical strength and cannot be removed without the aid of a tool		P
	Adjustable guard used as protection of the working element has easily accessible means of accurate adjustment		P
	No dangers from adjusting the guards		P
	No contact with dangerous moving parts using probe B of IEC 61032:1997, test force ≤ 5N		P
	Any soft materials removed prior to the test		P
19.2	No hazardous ragged or sharp edges, other than necessary for the functioning of the tool		P
19.3	No contact with dangerous moving parts through dust collection openings, using probe B of IEC 61032:1997, test force ≤5N		P
19.4	Hand-held tool has at least one handle or grasping surface for safe handling during use		N/A
	Transportable tools provided with at least one handle, grasping surface or the like for safe transportation		P
	Lawn and garden machinery has adequate grasping surfaces for safe handling during use		N/A
19.5	Tool allows visual check of the contact of cutting tool with workpiece		P
19.6	Marking with rated no-load speed required, measured no-load speed of the spindle did not exceed 110 % of the rated no-load speed		P
19.7	Transportable tool or lawn and garden machinery intended to be used on a surface such as the floor or a table has adequate stability		P
	10° tilting test, tool or machinery did not tip over		P
	Tested with doors open and closed		P
	Filled with most unfavourable quantity of water or the recommended liquid		P

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Clause	Requirement + Test	Result - Remark	Verdict
19.8	Transportable tool provided with wheels identified in the relevant part of IEC 62841-3 has adequate stability during transportation		P
	10° tilting test, tool did not tip over		P
19.9	Fixed guards to be removed to convert the tool or to change the accessory, fastenings remains attached to the guard or to the machinery		N/A
	Fastening not completely removed and considered as still attached		N/A
20	**MECHANICAL STRENGTH**		P
20.1	Adequate mechanical strength to withstand rough handling		P
	No flashover or breakdown occurred during test of Annex D between live parts and accessible parts after tests of clause 20.2-20.4	See Table D.2	P
	No live parts became accessible		P
	No creepage distances or clearances below the values of 28.1		P
	Mechanical safety of the tool as required by this standard not impaired		P
	Inner cover withstood test after removal of the decorative cover		P
20.2	Three blows applied to every weak point of enclosure by spring-operated impact test apparatus in Clause 5 of IEC 60068-2-75:1997		P
	Brush cap impact energy (Nm)..... :		—
	Other part impact energy (Nm) ..... :		—
	Blows applied each point of the enclosure likely to be weak ..... :		P
	Blows applied to guards, covers, handles, levers, knobs and the like as necessary ..... :		P
20.3	Test of 20.3.1, 20.3.2 or the relevant part of IEC 62841-4 applied, as applicable		P
20.3.1	Hand-held tool withstood impact of 3 varied drops on a concrete surface from 1 m		N/A
	Separable accessories were not mounted		N/A
	Any attachments provided as specified in instructions, test repeated with each attachment or combination of attachments mounted to a separate tool sample		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
20.3.2	Transportable tool withstood impact with Ø (50 ± 2) mm, (0,55 ± 0,03) kg steel sphere, travelling vertically by (1,3 ± 0,1) m.		P
	Drop test applied to part of the tool that can be impacted from above		P
	Pendulum test applied to part of the tool that cannot be impacted from above		P
	Guard became disassembled but could be reassembled to function properly.		P
	Guard became deformed but could be restored to its original shape		P
	Other damage, except to guard, accepted, as tool was incapable of normal operation		P
20.4	Adequate mechanical strength of brush holder and their caps		N/A
	Brush cap removed and replace 10 times applying specified tightening torque		N/A
	Tightening torque (Nm) ..... :		—
	No damage to brush holders impairing its further use, thread not damaged, cap shows no cracks		N/A
20.5	Handles and grasping surfaces have adequate mechanical strength to provide insulation between grasping area and output shaft		N/A
	A separate sample subjected to a single impact from 1m onto a concrete surface on each handle and each recommended grasping surface		N/A
	No flashover or breakdown occurred during test of D.2 at 1250 V a.c. between handles and grasping surfaces in contact with foil and the output shaft of the tool	See Table D.2	N/A
21	**CONSTRUCTION**		P
21.1	Hazardous accidental changing of settings to suit different voltages or speeds unlikely to occur		P
21.2	Accidental changing of settings of control devices unlikely to occur		P
21.3	Removal of parts ensuring required degree of protection against moisture not possible without aid of a tool		P
21.4	Fixing of handles, knobs and the like, used to indicate position of switches or similar components in a hazardous wrong position, was not possible		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
21.5	Replacement of a flexible cable or cord requiring displacement of a switch was possible without subjecting internal wiring to undue stress		N/A
	After repositioning of the switch and before reassembling the tool, verification of correct positioning of internal wiring was possible		N/A
21.6	Wood, cotton, silk, paper and similar fibrous or hygroscopic material not used as insulation, unless impregnated or chemically rendered non-fibrous		P
21.7	Ordinary driving belts not relied upon to provide required insulation		P
	Special belt design employed to allow use as electrical insulation		P
21.8	Insulating barriers of Class II tools, and parts of Class II tools serving as supplementary or reinforced insulation are:		N/A
	- fixed such that they cannot be removed without being seriously damaged; or		N/A
	- so designed that they cannot be replaced in an incorrect position, and when omitted, the tool will be inoperable or manifestly incomplete		N/A
21.9	Inner conductors of a flexible cable or cord are used as wiring within class II construction and insulated from accessible metal parts by:		N/A
	- the sheath of the supply cord itself, this sheath not being exposed to undue thermal stress, clamping against accessible metal or other mechanical stress that could cause damage to it; or		N/A
	- a sleeve, tubing or barrier complying with the requirements of supplementary insulation.		N/A
21.10	Air-intake of motor enclosures not excessively large		N/A
	6 mm steel ball test applied to air-intake openings other than those adjacent to fan		N/A
21.11	No hazards from parts of Class I tool such as wire, screw, nut, washer or spring becoming loose or falling out of position, and accessible metal not made live		N/A
	Clearance and creepage distances of Class II tool or class II construction not reduced to less than 50% of values shown specified in 28.1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Class II tool or Class II construction, other than those of the all-insulated type, provided with an insulating barrier between accessible metal and motor parts and other live parts		N/A
	Class I tool with adequately fixed parts, barriers, and sufficiently large creepage and clearances		N/A
	All wires secured in place independent of terminal connection or solder		N/A
21.12	Supplementary and reinforced insulation not impaired by deposition of dirt, or dust resulting from wear of parts within the tool to the extent that creepage and clearances would be reduced		N/A
	Ceramic material not tightly sintered and similar materials, and beads alone, not used as supplementary or reinforced insulation		N/A
	Parts of Elastomer, natural or synthetic rubber used as supplementary insulation are resistant to aging		N/A
	Rubber parts so arranged and dimensioned that creepage distances not reduced below values in 28.1, even when cracks occurred		N/A
	Insulated material for embedded heating conductors serves only as basic insulation		N/A
	Ageing test for Elastomer and rubber parts for 70 h at 100±2°C		N/A
	No flashover or breakdown occurred during test of D.2, test voltages reduced to 75 per cent ..... :	See Table D.2	N/A
	Rubber parts tested ..... :		—
	Immersion test for ceramic material on tight sintering in specified fuchsine solution under no less than 15 MPa		N/A
	Test pressure applied (MPa) ..... :		N/A
	Test duration (h) ..... :		N/A
	After the test, freshly broken surfaces did not show any trace of dye visible with normal vision		N/A
	Ceramic parts tested ..... :		—
21.13	Internal wiring, windings, commutators, slip rings and the like, and insulation in general, not exposed to oil, grease, and similar substances		P
	Adequate insulation properties of oil, grease, and similar substances used for lubrication of gears and the like with no effect on insulation		P
21.14	No access to brushes without aid of a tool		P

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Clause	Requirement + Test	Result - Remark	Verdict
	When tightening screw-type brush-caps, two surfaces clamped together		P
	Locking device retaining brushes in position do not depend upon brush spring tension		P
	Screw-type brush-caps accessible from the outside of the tool made of or covered with insulating material of adequate strength, and not projecting beyond surrounding surface of the tool		P
21.15	Tool employing a liquid system protects the user against increased risk of shock due to presence of liquid under normal use and faults of liquid system		P
	Tools employing liquid system constructed as Class III tools, or		P
	- class I or II and provided with a residual current device, and complying with 14.3-14.5, or		N/A
	- class I or class II and designed for use in combination with an isolating transformer and complying with 14.3 and 14.4		N/A
21.16	Tool with compartment accessible without the aid of a tool and likely to be cleaned in normal use, the electrical connections are not subject to pulling during cleaning		P
21.17	Tool is fitted with a power switch to control the motor		P
	Switch actuator easily visible and accessible		P
21.17.1	For tools incorporating a switch with a lock-off device, and switch trigger is operated by squeezing action closing the fingers towards the palm of the hand, lock-off system designed to ensure sufficient durability against abuse and environmental conditions to prevent start by the switch trigger alone		P
21.17.1.1	Relevant tool housing is kept for 1 h in a heating cabinet at 80 °C ..... :		P
21.17.1.2	Additional test of 21.17.1.2 for lock-off devices that are self-restoring to the lock-off position		P
	Number of cycles as per 23.1.10.2 ..... :		P
21.17.1.3	Push force of Table 7 applied to most unfavourable point of the switch actuating member..... :		P
	The switch did not actuate		P
	The switch and its lock-off system operated as designed after the applied force was terminated		P
21.18	Requirements of 21.18.1, 21.18.2 or the relevant part of IEC 62841-4 observed, as applicable		P

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Clause	Requirement + Test	Result - Remark	Verdict
21.18.1	Hand-held tool fitted with momentary power switch, unless without a relevant part of IEC 62841-2 and without a substantial risk from continued operation		N/A
	Switch can be switched on and off by the user without releasing any of the required handle(s) or grasping surface(s)		P
21.18.1.1	A momentary switch locking in “on” position unlocks automatically upon a single actuation motion without releasing the grasp on the tool		N/A
	More than one switch, the lock-on switch(es), if any, is (are) within the grasping zone necessary to control the tool		N/A
	Any one of these switches automatically unlocks or makes ineffective all remaining lock-on devices with a single actuation motion without releasing the grasp on the tool		N/A
	Switch cannot be locked in “on” position when a risk with continued operation is defined by the relevant part of IEC 62841-2		P
21.18.1.2	Power switch triggers and lock-off devices so located, designed or guarded that inadvertent operation is unlikely to occur		P
	Tool did not start when 100 mm sphere is applied to the power switch, or		N/A
	Two separate and dissimilar actions necessary before the motor is switched		N/A
21.18.2	Transportable tool fitted with power switch easily actuated “on” or “off” without any reasonably foreseeable hazard		P
21.18.2.1	Power switch in transportable tools is of momentary type, or		P
	Voltage recovery following an interruption of the supply gives rise to a hazard		P
	Relevant part of IEC 62841-3 ..... :		—
21.18.2.2	“On”/”off” control capable of being turned off by the operator with a single straight-line motion		P
	Flap cover covers the stop button so that pushing the flap actuates the stop		P
21.18.2.3	Power switch so located, designed or guarded that unintentional movement to the “on” position is unlikely		P
	Tool did not start when 100 mm sphere is applied to the power switch, or		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Two separate and dissimilar actions necessary before the motor is switched		P
21.18.2.4	Push-pull switch is turned off by an inward push		P
21.19	Protection against electric shock not affected when screws removed during user maintenance are incorrectly replaced during reassembly		P
	Creepage and clearances between live parts and accessible metal parts not reduced below values in 28.1 when screws are installed at improper screw locations		P
21.20	Tool marked with the first numeral of IP system complies with IEC 60529:2013 ..... :		P
21.21	No risk of electrical shock from charged capacitors when touching pins of the plug		P
	Max. voltage measured between pins of the plug is ≤ 34 V after 1 s after each disconnection (V) ..... :		N/A
	Capacitors rated ≤ 0.1 μF		N/A
	Capacitors complying with the requirements for protective impedance specified in 9.2 and 21.34		N/A
21.22	Non-detachable protective parts either removable with the aid of a tool or reliably fixed		P
	Snap-in devices have an obvious locked position and have fixing properties that do not deteriorate		P
	Parts disassembled and assembled 10 times prior to test		P
	Parts affected by temperature tested immediately after conditions of Clause 12		P
	Test applied to all parts likely to be detached, whether or not fixed by screws, rivets, or similar parts		P
	Weak areas of the covers or parts subjected during 10 s to - 50 N push force		P
	- 50 N pull force if the shape of the part prevents easy slippage of fingertips		N/A
	- 30 N pull force if projection of the gripped part is less than 10 mm in the direction of removal		P
	Test fingernail of Fig. 1 inserted in apertures and joints with a force of 10 N and then slid sideways with a force of 10 N		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Axial pull unlikely, test fingernail of Fig. 1 inserted in apertures and joints with a force of 10 N to enable a force of 30 N for 10 s by means of a loop		P
	A torque of 2 Nm applied at the same time as pull or push force on parts 50 mm or smaller and likely to be subjected to twisting		P
	A torque of 4 Nm applied at the same time as pull or push force on parts larger than 50 mm and likely to be subjected to twisting		P
	Projection was less than 10 mm and required a torque of (Nm), test torque reduced ..... :		P
	Parts not detached, and remained in locked position		P
21.23	Handles, knobs, grips, levers etc., withstood axial force of 30 N for 1 minute		N/A
21.24	Storage hooks and similar devices for flexible cords are smooth and well rounded		N/A
21.25	Current-carrying parts and other parts resistant to corrosion under normal use		N/A
	After tests of Clause 15, no sign of corrosion on relevant parts		N/A
	Stainless steel and similar corrosion-resistant alloys and plated steel considered satisfactory		N/A
21.26	Insulation between parts operating at SELV and other live parts complies with the requirements for double insulation or reinforced insulation		P
21.27	Insulation between parts separated by protective impedance comply with requirements for double or reinforced insulation		P
21.28	Shafts of operating knobs, handles, levers etc. not live unless their removal does not make the shaft accessible to test probe B of IEC 61032:1997		N/A
21.29	Handles, levers, and knobs of non-class III tool held or actuated in normal use do not become live during an insulation fault		N/A
	Metallic handles, levers, and knobs with shaft or fixings likely to become live due to basic insulation fault, either adequately covered by insulating material or their accessible parts separated from their shafts or fixings by insulation		N/A
	Exception for handles, levers, and knobs of transportable tools and lawn and garden machinery of class I ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Covering or insulating material complies with Electric Strength test in D.2 at 1250 V	See Table D.2	N/A
21.30	Tool likely to cut into concealed wiring or own cord, handles and grasping surfaces - made of insulating material, or		N/A
	- metal covered by insulating material, or		N/A
	- their accessible parts are separated by insulating barrier(s) from accessible metal parts that may become live by the output shaft		N/A
	Insulated, stick type, auxiliary handle is provided with a flange ≥ 12 mm high above grasping surface between grasping area and accessible parts that may become live by the output shaft		N/A
	21.30 not applicable as per relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 ..... :		N/A
21.31	Capacitors in class II tools not connected to accessible metal parts, and their metallic casings are separated from accessible metal parts by supplementary insulation		N/A
	Capacitors tied to accessible metal parts comply with Clauses 9.2 and 21.34		N/A
21.32	Capacitors not connected between contacts of the thermal cut-outs		N/A
21.33	Lamp holders used only for connection of lamps		N/A
21.34	Protective impedance consists of at least two separate components with impedance unlikely to change significantly during lifetime of tool		N/A
	When a component short or open-circuited, values in Clause 9.2 were not exceeded ..... :		N/A
	Resistors comply with 14.1 of IEC 60065:2011 and capacitors comply with 14.2 of IEC 60065:2011 .... :		N/A
	Single Y1 capacitor acc. to IEC 60384-14 used instead of two separate components ..... :		N/A
21.35	Tools is identified in the relevant part of IEC 62841-2 or IEC 62841-3 to produce a considerable amount of dust and has either integral dust collection/suction device or dust outlet(s)		N/A
	Dust discharge directed away from the operator		N/A
	Dust outlet with external suction device(s) does not impede the normal use of the tool		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
22	**INTERNAL WIRING**		**P**
22.1	Wireways smooth and free from sharp edges, cooling fins, etc		P
	Holes in metal through which insulated wires pass provided with bushings or, except as required by relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4, have smooth edges with radius ≥1,5 mm		P
	Wiring prevented from coming into contact with moving parts		P
22.2	Internal wiring adequately rigid, fixed or insulated such that creepage and clearances cannot be reduced below values in 28.1		P
	Sleeving used as supplementary insulation on internal wiring, retained in position by positive means (removable only by breaking or cutting, or clamped at both ends)		N/A
22.3	Use of green or green/yellow conductors for earthing terminals only		N/A
22.4	Aluminium wires not used for internal wiring		P
22.5	Stranded conductors with lead-tin soldering are only used with spring terminals with constant contact pressure, except when clamping means pose no risk of bad contact		P
22.6	No undue stress to electrical connections and internal conductors from tool parts movable to each other in normal use, during adjustment or user maintenance		P
	Flexible metallic tubes do not damage insulation of the conductors contained within them		P
	Open-coil springs not used to protect the wiring		P
	Adequate additional insulating lining when coiled spring is used		P
	Flexing test at a rate of ≤ 6/min, through the largest angle allowed by the construction		P
	Number of flexings 10 000 for conductors/ connections flexed during normal use; 2 000 for those flexed during adjustments; 100, for those flexed during user maintenance ..... :		—
	Tool withstands test of Annex D between live parts and accessible parts	See Table D.2	P
	Live parts not accessible after test		P

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Clause	Requirement + Test	Result - Remark	Verdict
23	**COMPONENTS**		P
23.1	Components comply with relevant IEC standards	See Table 23.1	P
	Batteries are regarded as part of the tool and comply with Annexes K and/or L		P
	Components used in accordance with their markings		P
	Applied exceptions ..... :		P
	Components not previously tested and found to comply with the relevant IEC standard for the number of cycles specified, tested to 23.1.1 … 23.1.11 ..... :		P
23.1.1	Capacitors in auxiliary windings of motors marked with their rated voltage and rated capacitance ..... :		P
23.1.2	Fixed capacitors for radio interference suppression comply with IEC 60384-14		P
23.1.3	Small lamp holders similar to E10 lamp holders meet requirements for E10 lamp holders in IEC 60238		P
23.1.4	Isolating and safety isolating transformers comply with IEC 61558-1 and IEC 61558-2-4 or IEC 61558-2-6, as applicable		P
	Switch mode power supply units and transformers for such units comply with IEC 61558-2-16		P
23.1.5	Appliance couplers comply with IEC 60320, or		N/A
	Instructions provided to inform user to connect the tool with non-IEC appliance couplers		N/A
23.1.6	Automatic temperature controls with electromechanical contacts that cycle in normal use have suitable endurance		N/A
	Tests to IEC 60730-1:2010, Cl. 17, conducted under conditions occurring in the tool		N/A
	Type of controls used and number of cycles per Cl. 17 of IEC 60730-1:2010 (cycles) ..... :		N/A
	Automatic controls comply with IEC 60730-1:2010, and are used in accordance with their marking		N/A
	Tests of Clause 17 of IEC 60730-1:2010 were not conducted on automatic controls because tool complies with this standard when protective device short-circuited		P
	Thermostats and temperature limiters tested in accordance with a specific exception in Note b) of Table 1 of Clause 12		P

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Clause	Requirement + Test	Result - Remark	Verdict
23.1.7	Unless otherwise specified, tests on components per other standards conducted separately according to the relevant standard		P
	Component, marked and used per its markings		P
	Components not mentioned in Table 1 of Clause 12 tested as part of the tool		P
23.1.8	Components not separately tested and found to comply with the component standards as references in 23.1 or components not marked or not used in accordance with their marking, tested in accordance with the referenced relevant standard under the conditions occurring in the tool		P
	No IEC standard referenced in 23.1, no additional tests		P
23.1.9	Tool operated at 1,1 times rated voltage at no-load, capacitor voltage did not exceed 1.1 times its rated voltage (V) ..... :		N/A
23.1.10	Switches constructed to prevent failure that might impair compliance with this standard		N/A
	Switches, separately tested and found to comply with IEC 61058-1:2008, comply with 23.1.10.1		N/A
	Switches, not separately tested and found to comply with IEC 61058-1:2008, or not complying with 23.1.10.1, tested as in 23.1.10.2 to 23.1.10.3		N/A
23.1.10.1	Power switches rated for a voltage and current not less than respective ratings of the tool		N/A
	Power switches rated for a.c. in a.c. tools and d.c. in d.c. tools		P
	Electronic power switches are at least classified for Continuous Duty as in IEC 61058-1:2008		P
	Switches for motor-operated tools and lawn and garden machinery classified for resistive and motor load as in 7.1.2.2 of IEC 61058-1:2008, if this load occurs in normal use		P
	Switches for magnetically driven tools and lawn and garden machinery classified for inductive load as in 7.1.2.8 of IEC 61058-1:2008, if this load occurs in normal use		P
	Switches alternatively regarded as switches for a declared specific load as in 7.1.2.5 of IEC 61058-1:2008 and classified based on the load conditions of the tool in normal use		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Ratings and load classifications for switches other than power switches are based on the conditions encountered in the tool		P
	Power switches for hand-held tools classified for min. 50K operating cycles ..... :		N/A
	Power switches for transportable tools and lawn and garden machinery classified for min. 10K operating cycles..... :		P
	Power switches with series electronics also endure 1000 operating cycles, electronics bypassed ..... :		P
	Switches other than power switches, if likely to be switched under electrical load, endure 1 000 operating cycles, unless the requirements of this standard are met with the switch short-circuited		P
	Exception for switches other than power switches that cannot be operated under electrical load		P
	Exception for motor reversing switches		P
	Exception for switches other than power switches, classified for 20 mA load as in 7.1.2.6 of IEC 61058-1:2008		P
23.1.10.2	Adequate endurance properties of switches		N/A
	Test of 17.2.4.4 of IEC 61058-1:2008 conducted at load specified in 23.1.10.2.1 or 23.1.10.2.2 ..... :		P
	Power switches for hand-held tools tested for 50K cycles.		P
	Power switches for transportable tools and lawn and garden machinery tested for 10K cycles		P
	Power switch contains mechanical contacts in series with electronic circuitry with one or more SSD and circuitry provides a protective function by reducing the current during switch operation, then test repeated on 3 samples for ≥ 1000 cycles with the electronics bypassed; or		P
	Protective function considered SCF and complies with the greater PL levels for power switches in 18.8		P
	Switches other than power switches, if likely to be switched while energized, tested for 1000 cycles under load conditions of normal use		P
	After tests all switches were able to be turned on and off and complied with the insulating compliance (TE3) of 17.2.5.3 of IEC 61058-1:2008 for basic insulation		P

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Clause	Requirement + Test	Result - Remark	Verdict
23.1.10.2.1	Power switches for motor-operated tools and lawn and garden machinery classified to 7.1.2.2 of IEC 61058-1:2008 and tested with external load as specified		N/A
	Power switches for magnetically driven tools and lawn and garden machinery classified to 7.1.2.8 of IEC 61058-1:2008 and tested with external load as specified		N/A
	Switches other than power switches, but which would encounter the same load conditions as power switches in normal use, tested as specified		N/A
23.1.10.2.2	For switches tested using the motor or magnetic load encountered in the tool, tested at rated voltage for the required number of cycles; tool is switched on at no-load and switched off at rated current or rated input		N/A
23.1.10.3	Power switches of motor-operated tools and lawn and garden machinery have adequate breaking capacity		N/A
	Locked-rotor test (TC9) of 17.2.4.9 of IEC 61058-1: 2008 at 6 times I-M or with locked motor, each period ≤ 0,5 s “on” and ≥ 10 s “off”		N/A
	Power switch showed no electrical or mechanical failure after test		N/A
23.1.11	Electronic power switches comply with 18.6 and 18.8		P
23.2	Tool not fitted with switches or automatic controls in flexible cords, except for protective devices such as RCDs		P
	Tool not fitted with devices causing the protection device in the fixed wiring to operate		P
	Tool not fitted with thermal cut-outs which can be reset by a soldering operation		P
23.3	Protection devices or circuits that switch off the tool are non-self-resetting a risk associated with inadvertent starting is specified		P
23.4	Plugs and socket-outlets for ELV circuits and those used as terminal devices for heating elements not interchangeable with mains plugs and socket-outlets in IEC 60884, IEC/TR 60083 or IEC 60906-1 or with connectors and appliance inlets complying with IEC 60320-1		P
23.5	Motors connected to the supply mains with insulation inadequate for the rated voltage comply with Annex B		P

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Clause	Requirement + Test	Result - Remark	Verdict
24	**SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS**		N/A
24.1	Tool provided with a supply cord ≥1,8 m and with a plug; cord length (m) ..... :		N/A
	Tool provided with a supply cord at least 1,8 m long and without a plug; cord length (m) ..... :		N/A
	Information for connection given in the instructions		N/A
	Tool provided with appliance inlet having at least same degree of protection against moisture as required for the tool		N/A
	Tool provided with a supply cord ≥ 0,2 m and≤ 0,5 m and with a plug or other connector having at least same degree of protection against moisture as required for the tool; cord length (m) ..... :		N/A
	Plugs, connectors and inlets suitable for the ratings of the tool		N/A
24.2	Supply cord assembled to the tool by attachment type (specify X, Y, or Z) ..... :		N/A
	Supply cord with type Z attachment is allowed as per relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 ..... :		N/A
	Supply cords with type X attachment are specially prepared cords only available from the manufacturer or its service agent ..... :		N/A
	Special cord includes part of the tool		N/A
24.3	Plugs fitted with only one flexible cord		N/A
24.4	Supply cord not lighter than ordinary tough rubber sheathed flexible cord or ordinary PVC sheathed flexible cord		N/A
	PVC cords not used if external metal parts exceed 75 K temperature rise during test of Clause 12		N/A
24.5	Nominal cross-section area of supply cord per Table 8 (mm2) ..... :		N/A
24.6	Supply cord of class I tool has green or green/yellow core connected to internal earthing terminal of the tool, and to earthing contact of plug		N/A
24.7	Lead-tin solder not used to consolidate leads under contact pressure, except when clamping means used prevents risk of a bad contact		N/A
	Clamping screws alone not used for securing soldered leads		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
24.8	Moulding supply cord to any part has no effect on the insulation of the cord		N/A
24.9	Supply cord protected against damage at its entry by flexible cord guard, or cord inlet, or bushing ..... :		N/A
24.10	Cord inlets and bushings shaped to prevent damage to supply cord		N/A
	Cord inlet and bushings reliably fixed and not removable without the aid of a tool		N/A
24.11	In tools other than transportable tools, supply cord being flexed during operation is protected against excessive flexing at its entry ..... :		N/A
	Flexing test performed in apparatus shown in Fig. 2		N/A
	Weight attached to cable or cord (kg) ..... :		—
	Oscillating member moved back and forth through an angle of 90° (45° on either side of the vertical) with rate of 60 flexings per minute		N/A
	After 10,000 flexings, sample turned through 90° about the centre of the cord entry		N/A
	Cord guard did not slip out from its location after completion of ten 1 sec lifts over 500 mm		N/A
	After the test, no conductor disconnected from terminal		N/A
	Number of strands versus number of broken strands of each conductor ≤ 10% ..... :		N/A
24.12	In tools other than transportable tools, supply cord being flexed during operation is protected against excessive bending at its entry ..... :		N/A
	Cord guard fixed reliably and projects outside tool for a distance beyond inlet opening of at least 5 times the overall diameter of cord		N/A
	Mass attached to the free end of cord (g) ..... :		—
	Curvature of cable or cord is nowhere less than 1,5 times the external diameter of cord		N/A
24.13	Tool provided with cord anchorage to relieve conductors of cord from strain, twisting, and protect them from abrasion.		N/A
	Pushing cord into the tool not possible		N/A
	Pull force was applied 25 times at the force shown in Table 9 (N) ..... :		—
	After pull test, cord, unless on an automatic cord reel, subjected to torque in Table 9 for 1 min (Nm) :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The cord was not damaged during the tests		N/A
	No appreciable strain at the terminals		N/A
	Cord longitudinal displacement (mm) ..... :		N/A
	No appreciable strain at the connection		N/A
24.14	Cord anchorage either accessible only with the aid of a tool, or the cord can only be fitted using a tool		N/A
24.15	Cord anchorages properly designed and located		N/A
	Cord cannot touch clamping screws of the cord anchorage that not separated from accessible metal parts by supplementary insulation		N/A
	Cord not clamped by metal screw bearing directly on the cord		N/A
	Glands are not used as cord anchorages		N/A
	Class I tool, cord anchorage of insulating material or with insulating lining fulfilling basic insulation, if an insulation fault on the cord could make accessible metal parts live		N/A
	Class I tool, sheath of the cord considered adequate		N/A
	Class II tool, cord anchorage of insulating material or insulated by supplementary insulation (sheath of the cord alone not sufficient)		N/A
24.16	Cord anchorages for type X attachment properly designed and located		N/A
	Cord anchorage allows easy replacement of cord		N/A
	Clear method of relief from strain and prevention of twisting		N/A
	Screws operated during cord replacement are not used to fix any other part		N/A
	Screws operated during cord replacement are used to fix other parts and, if omitted or incorrectly mounted, make the tool inoperative or clearly incomplete		N/A
	Parts fastened to the cord anchorage by the same screw could not be removed without the aid of a tool		N/A
	Conductors inserted into terminals, terminal screws tightened sufficiently to prevent conductors from easily changing their position, torque set at (Nm) .. :		N/A
24.17	Knots and tying strings for type X attachment are not used		N/A
24.18	For type X attachment, space for supply cord provided inside or as a part of tool		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- permits verification of correct connection and positioning of conductors		N/A
	- permits covers to be fitted without risk of damage to supply conductors or their insulation		N/A
	- ensures that uninsulated end of conductor, when detached from a terminal, cannot come into contact with accessible metal parts, or terminations are unlikely to slip free of the conductor		N/A
	For pillar terminals (with conductors that are not separately clamped ≤ 30 mm from terminal), and for other terminals with screw clamping, a force of 2 N applied to the wire in any direction and adjacent to the terminal, screw or stud		N/A
	The uninsulated end of the conductor did not come into contact with accessible metal parts		N/A
24.19	Appliance inlet prevents access to live parts during insertion or removal of the connector		N/A
	Easy insertion of connector		N/A
	After insertion of connector, tool not supported by the connector in any position of normal use on a flat horizontal surface		N/A
	Test probe B of IEC 61032:1997 applied to tool inlet other than appliance inlet per IEC 60320		N/A
	Appliance inlet complies with IEC 60320		N/A
24.20	Interconnection cords meet the requirements for the supply cord, exceptions as follows		N/A
	Cross-sectional area is based on maximum current through conductor during test of Clause 12		N/A
	Insulation adequate for conductor’s working voltage		N/A
	Test of 24.11 restricted to range of motion during normal use.		N/A
24.21	Interconnection cords not detachable without tool if compliance with this standard is impaired when they are disconnected		N/A
25	**TERMINALS FOR EXTERNAL CONDUCTORS**		P
25.1	Tool provided with terminals or equally effective devices for connection to external conductors		P
	Terminals only accessible with the aid of a tool		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Screws and nuts allowed to also clamp internal conductors when they are unlikely to be displaced when fitting supply conductors		P
	Screws and nuts do not fix other components		P
	For tool with type X attachment, soldered connections allowed for connection of external conductors, when soldering alone is not used to maintain conductor in position		N/A
	When provided, barriers prevent creepages and clearances between live parts and other metal parts from being reduced to < 50% of values in 28.1, the conductor can be fixed by soldering alone		N/A
	For type Y and Z attachments, soldered, welded, crimped and similar connections allowed for the connection of external conductors		N/A
	Class II tools, conductor so positioned or fixed that soldering, crimping, or welding alone not relied upon to maintain the conductor in the position		N/A
	Barriers prevent creepages and clearances between live parts and other metal parts from being reduced to < 50% of values in 28.1 for the Class of tool using Type Y or Z attachments		N/A
	Conductors connected by soldering are held in place near termination independent of solder		N/A
	Conductor is “hooked in” before soldering and the hole through which it passes is not too large		N/A
	Terminals of a component built into the tool used to secure external conductors		N/A
	Conductors connected by other means, leads additionally fixed near terminations		N/A
	Stranded conductors secured at insulation and conductor		N/A
25.2	Terminals for supply cords suitable for their purpose		P
	Supply cord terminals withstood pull force of 5 N		N/A
25.3	For type X attachment, when clamping means tightened or loosened, terminal did work loose, no stress on internal wiring, and creepage and clearances not reduced below values in 28.1		N/A
	Test per Clause 9.6, using 2/3 torque of that in Table 4, of IEC 60999-1:1999 (Nm) ..... :		N/A
	Terminals secured by two screws to prevent loosening, or by one screw in a recess, or by other suitable means		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Correct position of supply terminals maintained by switches and similar devices with recesses and verified after connection of supply cord and repositioning of device		N/A
	Sealing compound without other means of locking not used		N/A
	Self-hardening resins used only on terminals that are not subject to torsion in normal use		N/A
25.4	Type X attachment using terminals to clamp the conductor between metal surfaces do so without damage to conductor after torque test per Cl. 25.3		N/A
25.5	End of conductor inserted in the hole of pillar type terminals is visible, or can pass beyond threaded hole for a distance of half nominal diameter of screw, or 2,5 mm, the greater of the two (mm) ..... :		N/A
25.6	For type X attachment, terminals clearly recognizable and accessible after opening the tool		N/A
	All terminals located behind one cover, or one part of the enclosure		N/A
25.7	For tool with type X attachment, terminal devices located or shielded to prevent a strand of wire from escaping		N/A
	No risk of accidental connection between live parts and accessible metal parts		N/A
	For class II tool, no risk of accidental connection between live parts and metal parts with supplementary insulation only		N/A
	8 mm long free wire of the stranded supply conductor did not touch any accessible metal part		N/A
	8 mm long free wire of the stranded supply conductor did not touch any metal parts with supplementary insulation only		N/A
	8 mm long free wire of stranded conductor connected to an earthing terminal did not touch any live part		N/A
26	**PROVISION FOR EARTHING**		N/A
26.1	Accessible metal parts of class I tool permanently connected to an earthing terminal or termination within the tool	Class III tool	N/A
	Accessible metal parts of class I tool permanently connected to the earthing contact of the tool inlet		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Printed circuit boards are not used to provide continuity of protective earthing circuit		N/A
	No electrical connection between earthing terminals or contacts and neutral terminal		N/A
	No provision for earthing in Class II and III tools		N/A
	Rotating motor components with metal-to-metal bearing surfaces considered electrically bonded		N/A
	Metal parts behind a decorative cover that do not withstand test of Clause 20 considered accessible metal parts		N/A
26.2	Clamping means of earthing terminals adequately locked against accidental loosening		N/A
	Earthing connections not possible to loosen without the aid of a tool		N/A
	Terminals with screw clamping comply with the relevant requirements of Clause 25, and screwless terminals comply with IEC 60998-2-2		N/A
	For specially prepared cords, terminals comply with IEC 61210 and table 10		N/A
	Screwless terminals tested per IEC 60998-2-2		N/A
26.3	Earth connection of detachable parts was made before the current-carrying connections established when placing the part in position, and the current carrying connections separated before earth connection was broken when removing the part		N/A
	If cord slips out of cord anchorage, current-carrying conductors become taut before earthing conductor		N/A
26.4	No risk of corrosion between metal parts of earthing terminals and copper of earthing conductor		N/A
	Parts transmitting current in case of an insulation fault, other than parts of metal frame or enclosure, are coated or uncoated metal with adequate resistance to corrosion		N/A
	Thickness of electroplated coating (μm) ..... :		N/A
	Parts of coated or uncoated metal providing or transmitting contact pressure only, adequately protected against rusting		N/A
	Protection provided against risk of corrosion resulting from contact between copper and aluminium (or aluminium alloy)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Parts subjected to a treatment such as chromate conversion coating are used only to provide or transmit contact pressure		N/A
	Thickness of coating of steel measured in accordance with ISO 2178 or ISO 1463 (μm) ..... :		N/A
	Resistance to rusting test ..... :	See also 15.1	N/A
26.5	Resistance of earthing circuit (max. 0.1Ω) ..... :		N/A
	Test current (A) ..... :		—
	Voltage drop between the earthing terminal and accessible metal part (V) ..... :		—
			N/A
27	**SCREWS AND CONNECTIONS**		N/A
27.1	Fixings and electrical connections (earthing connections included) withstand mechanical stresses occurring in normal use		N/A
	Screws not made of soft metal such as zinc or aluminium		N/A
	Diameter of screws of insulating material not used for electrical or earthing connection, diameter (mm). ..... :		N/A
	Screws transmitting electrical contact pressure screw into metal		N/A
	Screws of insulating material not used if their replacement by a metal screw could impair supplementary or reinforced insulation		N/A
	Screws removed when replacing the supply cord with type X attachment, or during maintenance, are not of insulating material where their replacement by a metal screw could impair basic insulation		N/A
	Screws and nuts tightened and loosened 10 times for screw engaged with a thread of insulating material		N/A
	Nuts and other screws tightened and loosened five times		N/A
	Screws engaging with a thread of insulating material completely removed and reinserted each time		N/A
	When testing terminal screws and nuts, a flexible conductor of the largest cross-sectional area per Clause 24.5 placed, and each time repositioned, in the terminal (mm^2) ..... :		N/A
	Test using a suitable test screwdriver, spanner or key, torque as in Table 11 and the relevant column		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Column I for metal screw without head, flush with surface (Nm) ..... :		N/A
	Column II for other metal screws and nuts (Nm) .... :		N/A
	Column II for screws of insulating material, having a hexagonal head with a width across flats exceeding overall thread diameter (Nm) ..... :		N/A
	Column II for screws of insulating material, having a cylindrical head and a key socket with a width across corners exceeding overall thread diameter (Nm) ... :		N/A
	Column II for screws of insulating material, with a head having a slot or cross-slots longer than 1,5 times the overall thread diameter (Nm) ..... :		N/A
	Column III applied to other screws of insulating material (Nm) ..... :		N/A
	No damage impairing further use of fixing or electrical connections		N/A
27.2	Contact pressure not transmitted through insulating material other than ceramic, unless compensated for shrinkage or distortion		N/A
27.3	Space-threaded screws not used for connection of current-carrying parts, unless direct clamping and suitable locking provided		N/A
	No thread-cutting screws used for connection of current-carrying parts		N/A
	Use of two space-threaded or thread-cutting screws in earthing circuits		N/A
27.4	Screws making both mechanical and electrical connections are locked against loosening		N/A
	Rivets for current-carrying connections subjected to torsion in normal use locked against loosening		N/A
27.5	Screwless connectors not intended for disconnection in normal use prevent disconnection in normal use		N/A
	Connectors withstood 5 N pull through the wire		N/A
	Neither the connector nor the wire became disconnected		N/A
	Directions of the application and exit of the wire not in line, force applied in both directions, one at a time		N/A
	Connectors fulfilled relevant IEC standards and were considered to fulfil requirements of 27.5.		N/A
27.5.1	Conductors secured by more than one means, unless their detachment does not impair safety		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Only one means of securing, test with detached conductors		N/A
	Clearances not reduced below 50 % of values in 28.1		N/A
28	**CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH INSULATION**		N/A
28.1	Creepage and clearances not less than the values in Table 12, except for cross-over points of motor windings ..... :	See Table 28.1	N/A
	When a resonance voltage occurs, creepage and clearance are not less than specified for the voltage imposed by the resonance; these values increased by 4 mm in case of reinforced insulation		N/A
	Creepage and clearances for a tool with an appliance inlet measured with an appropriate connector inserted		N/A
	Creepage and clearances on a tool with other attachment measured on the tool as delivered		N/A
	Measurements on tool with belt made with the belt in place and belt tension adjusted to the most unfavourable position within its adjustment range		N/A
	Measurements repeated with the belt removed		N/A
	Movable parts placed in the most unfavourable position		N/A
	Nuts and screws with non-circular heads tightened in the most unfavourable position		N/A
	Clearances between terminals and accessible metal parts also measured with screws and nuts unscrewed as far as possible and they were not less than 50% of Table 12 ..... :	See Table 28.1	N/A
	Distances through slots or openings in external parts of insulating material measured to metal foil in contact with accessible surface with the foil pushed into corners using test probe B of IEC 61032:1997 :	See Table 28.1	N/A
	2 N force applied to internal wiring, bare conductors and uninsulated capillary tubes of thermostats and similar devices during measurement		N/A
	30 N force applied to enclosure		N/A
	Measurements made according to Annex A	See Table 28.1	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Creepage and clearances on a tool having parts with double insulation and no metal between basic insulation and supplementary insulation		N/A
	PWB with peak voltage stresses≤ 150 V per mm between parts of different potential provided with a min. distance of 0.2 mm, when protected against deposition of dirt	See Table 28.1	N/A
	-PWB with 100 V per mm provided with a min. distance of 0.5 mm, when not protected against deposition of dirt	See Table 28.1	N/A
	Values of the table applied when limits mentioned above resulted in higher values than in the table	See Table 28.1	N/A
	Distances reduced further since the tool complied with the requirements of Clause 18 distances short-circuited one at a time ..... :	See Table 28.1	N/A
	Creepage and clearances within optocouplers not measured when individual insulation adequately sealed, with air excluded between material layers		N/A
	For live parts of different polarity separated by basic insulation only, creepage and clearances reduced as tool complied with Clause 18 when creepage and clearances short-circuited ..... :	See Table 28.1	N/A
28.2	Distance through insulation between metal parts was ≥1.0 mm for working voltages ≤130 V when separated by supplementary insulation	See Table 28.2	N/A
	Distance through insulation between metal parts was ≥1.5 mm for working voltages ≤130 V when separated by reinforced insulation	See Table 28.2	N/A
	Distance through insulation between metal parts was ≥1.0 mm for working voltages > 130V ≤ 280V when separated by supplementary insulation, and ≥2.0 mm when separated by reinforced insulation	See Table 28.2	N/A
	Distance through reinforced insulation between windings and accessible metal parts was ≥1.0 mm for working voltages ≤ 280V	See Table 28.2	N/A
	Requirement waived as insulation applied was in thin sheet form, other than mica or similar, and for supplementary insulation consisting of at least two layers, one layer having withstood electrical strength test for supplementary insulation		N/A
	Requirement waived as insulation applied was in thin sheet form, other than mica or similar, and for reinforced insulation consisting of at least three layers, two layers having withstood electrical strength test for reinforced insulation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Requirement waived as max. temperature rise determined during test of Cl. 12 did not exceed values in 12.5 for inaccessible supplementary or reinforced insulation		N/A
	Requirement waived as inaccessible reinforced or supplementary insulation, after conditioning for 168h at 50 K above max. temperature rise determined per Cl. 12, withstood test of Annex D at the oven temperature and room temperature (°C) ..... :	See Table D.2	N/A
	For optocouplers, 168 h of conditioning at 50 K above the max. temperature rise measured on optocouplers during tests of Clauses 12 and 18, while operating under most difficult conditions		N/A
ANNEX B	**MOTORS NOT ISOLATED FROM THE SUPPLY MAINS AND HAVING BASIC INSULATION NOT DESIGNED FOR THE RATED VOLTAGE OF THE TOOL**		P
B.1.1	Motors with working voltage ≤ 42 V		P
B.9.2	Metal parts of motor considered bare live parts		P
B.12.4	Temperature rise of body of motor determined instead of the temperature rise of the windings		P
B.12.5	Temperature rise of the body of the motor in contact with insulating materials did not exceed values in Table 1 for the relevant insulting material	See Table 12.1	P
B.18. 201	Tool operated at rated voltage with the terminals of motor and its capacitors short circuited		P
	Tool operated at rated voltage with the supply to the motor open circuited		P
	Tool operated at rated voltage with shunt resistor open circuited during operation of motor		P
B.21.101	For class I tools with a motor supplied by a rectifier circuit, dc circuit insulated from accessible parts of the tool by double or reinforced insulation		N/A
ANNEX C	**LEAKAGE CURRENT**		N/A
C.2	Leakage current measurement of non-operating tool	See Tables C.2A and C.2B	N/A
C.3	Leakage current measurement of operating tool	See Tables C.3A to C.3D	N/A
ANNEX D	**ELECTRIC STRENGTH**		N/A
D.1	Any protective impedance were disconnected		N/A
	The tools were not connected to the supply		N/A
	Electric strength is checked by the tests of D.2		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For tools with heating elements, test voltages of IEC 60335-1:2010 apply to the heating elements only		N/A
	Insulation between live parts of motor in accordance with Annex B and its other metal parts not subjected to this test		N/A
	Tool in accordance with Annex L, tool is directly connected to the mains or to a non-isolated source		N/A
	Electronic devices bypassed to enable the test to be conducted		N/A
D.2	Test duration 1 min		N/A
	Voltage of substantially sinusoidal waveform, frequency 50 Hz or 60 Hz		N/A
	Electric strength test, voltages applied..... :	See Table D.2	N/A
	To distinguish between capacitor reactance current and unacceptable performance, d.c. potential 1,414 times the that for a.c. was used ..... :		N/A
	No flashover or breakdown occurred during the test	See Table D.2	N/A
ANNEX H	**LOW-POWER CIRCUITS**		N/A
	Any points closest to the supply at which the maximum power delivered to the variable resistor does not exceed 15 W at the end of 5 s identified as called a low power points ..... :		N/A
ANNEX K	**BATTERY TOOLS AND BATTERY PACKS**		P
K.1	Rated voltage for tools and battery packs ≤75 V d.c.		P
K.5.7	Tests to be done at rated voltage were done with a fully charged battery		P
K.5.201	Peak voltage of any superimposed ripple exceeding 10 % of the average value was included		P
K.5.202	Measurements of lithium-ion cell voltages were made using a filter as specified		P
K.5.203	Test area protected against fire and explosion, and well ventilated		P
K.5.204	Discharging and charging as specified		P
K.5.205	Thermocouples for lithium-ion cell temperature measurement located as specified		P
K.5.206	Currents measured during battery charging are average currents		P

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Clause	Requirement + Test	Result - Remark	Verdict
K.5.207	Fully charged batteries used, after resting for ≥ 2 h but ≤ 6 h at an ambient temperature of (20 ± 5) °C		P
K.5.208	Battery consisting of a single cell not subject to special preparations of a cell in a series configuration		P
K.5.209	For series arrangement of parallel clusters of cells, the cluster is treated as single cell for specified tests		P
K.5.210	End-of-discharge voltages for common cell chemistries observed ..... :		P
K.8.3	Battery tools and detachable or separable battery packs marked with additional information		P
	- Business name and address of the manufacturer and, where applicable, its authorised representative ..... :		—
	- Designation of series or type ..... :		—
	Battery tools also marked with additional information		P
	- Year of manufacture and a date code identifying at least the month of manufacture ..... :		—
	- Designation of the tool ..... :		—
	- identification for parts shipped separately for assembly by the end user		—
	Detachable or separable battery packs marked with additional information		P
	- capacity in Ah or mAh ..... :		—
	- type of battery ..... :		—
	No misunderstanding by additional markings		P
K.8.14.1.1	5) Battery tool use and care		P
	6) Service		P
K.8.14.2	e) Instructions for battery tools		P
K.9.1	Construction and enclosure provide adequate protection against electric shock		P
K.9.3	No two conductive, simultaneously accessible parts where the voltage between them is hazardous		P
	Conductive, simultaneously accessible parts provided with protective impedance		P
	Short circuit current between two simultaneously accessible parts (mA) ..... :		P
	Capacitance between two simultaneously accessible parts (μF) ..... :		P

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Clause	Requirement + Test	Result - Remark	Verdict
K.9.5	Electric strength test of D.2 with 750 V applied to insulating material protecting from electric shock	See Table D.2	N/A
K.12.1	Tool operated at no-load until maximum temperature reached or battery discharged ..... :		N/A
	No operation of protective devices during heating test		N/A
	Temperature rises met values in Table 2		N/A
K.12.201	Charging of lithium-ion battery under normal conditions did not exceed specified operating region for charging of the cell		N/A
	Charging procedure as specified		N/A
	Voltage, temperature and charging current monitored for all individual cells		N/A
	Test repeated with imbalanced battery		N/A
K.13.1	Thermoplastic materials of relevant enclosure parts sufficiently resistant to heat		N/A
	Ball-pressure test of IEC 60695-10-2:2003	See Table 13.1	N/A
K.13.2	Glow-wire test applicable only to external enclosure enclosing the current-carrying parts		N/A
	Non-metallic parts in of detachable or separable battery pack supporting connections that carry ≥0,2 A during charging and those within a distance of 3 mm, subjected to the glow-wire test at 850 °C	See Table 13.2	N/A
K.13.2.2101	Polymeric battery enclosure material around current-carrying parts at least classified V according to IEC 60695-11-10:2013, unless …		N/A
	… battery pack was tested to K.18.1 a).		N/A
K.18.1	Risk of fire or electric shock as a result of abnormal operation obviated as far as is practical		N/A
	No charring or burning of gauze or tissue paper resulted when battery tool and battery pack were subjected to any abnormal operations, tests a) to f)	See Table K.18.1	N/A
	No explosion during or after the test		N/A
	Adequate protection against electric shock		N/A
	Component(s) or conductors(s) that interrupt or limit the discharge current that operated operate during the above tests a) to f) ..... :	See Table K.18.1	N/A
	Test repeated two more times for devices relied upon to pass the test; devices opened the circuit in the same manner		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test repeated with the open-circuited device bridged for devices not relied upon to pass the test		N/A
	Protective electronic circuits whose function is relied on to pass a test regarded as providing a SCF and comply with 18.8 with a PL = a	See Table 18.8	N/A
K.18.8	Li-ion charging systems are covered by K.18.201		P
K.18.201	Risk of fire and explosion as a result of abnormal operation during charging of a lithium-ion battery is obviated as far as is practical		N/A
	No charring or burning of gauze or tissue paper, no explosion resulted when battery tool and battery pack were subjected to any abnormal conditions a) to d)	See Table K.18.201	N/A
	The cells did not exceed the upper limit charging voltage by more than 150 mV unless…		N/A
	…charging system permanently was disabled from recharging the battery		N/A
	No evident damage to the cell vent to impair compliance with Subclause K.21.202.		N/A
K.18.202	No risk of fire or explosion when main discharge connections of a series configured, integral Li-ion battery, detachable or separable Li-ion battery pack were shorted under extreme imbalance		N/A
	All cells fully charged, one cell fully discharged		N/A
	Main discharge connections of the battery were shorted, resistance ≤10 mΩ		N/A
	No explosion during or after the test		N/A
	No charring or burning of the gauze or tissue paper		N/A
	Component(s) or conductors(s) that interrupt or limit the discharge current that operated operate during the above tests		N/A
	Test repeated two more times for devices relied upon to pass the test; devices opened the circuit in the same manner		N/A
	Test repeated with the open-circuited device bridged		N/A
	Protective electronic circuits whose function is relied on to pass a test regarded as providing a SCF and comply with 18.8 with a PL = a	See Table 18.8	N/A
K.18.203	No risk of fire or explosion during abusive overcharging of batteries comprised of cells other than the Li-ion type		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Battery was charged during 1,25 h at a rate of 10 times the C5 rate for the battery		N/A
	No explosion during or after the test		N/A
	No charring or burning of the gauze or tissue paper		N/A
K.19.6	Marking with rated no-load speed required, measured no-load speed of the spindle did not exceed 110 % of the rated no-load speed		N/A
	No-load speed measured after - operated for 5 min at no-load - replacing the battery with a fully charged battery - operating for 1 min at no-load		N/A
K.19.201	Not possible to install a detachable or separable battery pack in reverse polarity		N/A
K.19.202	Li-ion battery enclosure designed to safely release gases generated as a result of venting		N/A
	Total area of the openings in the enclosure allowing gases to pass without obstruction is ≥ 20 mm²; or…		N/A
	… pressure drop within enclosure was tested , no rupture occurred		N/A
K.20.1	Battery tools and battery packs have adequate mechanical strength and withstand tests of 20.2 and K.20.3.1 or K.20.3.2 and		N/A
	- did not catch fire or explode		N/A
	- met requirements of clauses K.9, K.19 and either K.18.1 (f) or K.28.1 after tests of 20.2 and 28.1		N/A
	Li-ion battery tools and battery packs, after the test of K.20.3.1 or K.20.3.2, - did not have an open circuit voltage below 90 % of the voltage measured immediately prior to the test		N/A
	- demonstrated normal discharging and recharging after the test		N/A
	- showed no damage to the cell vent impairing compliance with K.21.202		N/A
K.20.3.1	Adequate mechanical strength after drop tests on a concrete surface from a height of 1 m		N/A
	Test repeated with the battery pack removed from the tool		N/A
	Test repeated on the battery pack by itself		N/A
	The test was repeated with each attachment or combination of attachments		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
K.20.3.2	Impact test with 50 mm, 0,55 kg smooth steel sphere for battery-operated transportable tools ..... :		N/A
	travel of the sphere was 1,3 m ..... :		N/A
	Damage (except to a guard) accepted, tool became incapable of normal operation		N/A
	Test repeated separately on detachable or separable battery packs with a mass ≥3 kg		N/A
	Additional drop test on detachable or separable battery packs with a mass <3 kg		N/A
K.21.17.1.2	The number of cycles is 6 000		N/A
K.21.201	Tool will not accept general purpose batteries as an energy source for their primary function		N/A
K.21.202	Venting of lithium-ion cells, if relied on for safety, not adversely obstructed		N/A
K.21.203	Unsuitable connector types not used for user accessible interfaces between elements of a Li-ion battery system		N/A
K.23.1.10	Power switches have adequate breaking capacity and present no electrical or mechanical failure		N/A
	50 cycles of making and breaking the locked output mechanism current		N/A
K.23.1.201	Power switches withstood, without excessive wear or other harmful effect, the mechanical, electrical, and thermal stresses occurring in normal use		N/A
	6000 cycles of operation making and breaking the no-load of the tool at a fully charged battery		N/A
K.23.201	Battery cells comply with IEC 62133		N/A
K.23.202	Rechargeable battery cells not of lithium-metal type		P
K.24.201	External flexible cable or cord of battery tools with separable battery packs have anchorages such that the conductors are relieved from strain, including twisting, where they are connected within the tool, and protected from abrasion		P
K.28.1	Creepage distances and clearances not less than the values in millimetres shown in Table K.1 ..... :	See Table 28.1	P
	Smaller clearance and creepage distances for parts of different polarity accepted, shorting of the two parts did not result in the tool starting		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For parts with a hazardous voltage between them, the sum total of the measured distances between each of these parts and their nearest accessible surface is not less than 1,5 mm clearance and 2,0 mm creepage (Fig. K.1) ..... :		P
	Creepage distances and clearances measured as indicated in Annex A		P
	Distances through slots or openings in external parts of insulating material measured to metal foil in contact with the accessible surface		P
	Foil pushed into corners and the like by means of test probe B of IEC 61032:1997, except not pressed into openings		P
	The sum total of distances measured between parts operating at hazardous voltage and accessible surfaces determined by measuring the distance from each part to the accessible surface		P
	Distances added together to determine the sum total (see Figure K.1)		P
	One of the distances was 1,0 mm or greater (see Annex A, cases 1 to 10)		P
	Force applied by means of test probe B of IEC 61032:1997 at the following values:		P
	– 2 N for bare conductors		P
	– 30 N for enclosures		P
	Means provided for securing the tool to a support considered to be accessible		P

ANNEX L	**BATTERY TOOLS AND BATTERY PACKS PROVIDED WITH MAINS CONNECTION OR NON-ISOLATED SOURCES**		N/A
L.1	Rated voltage for battery pack ≤250 V a.c. (single phase) or d.c. mains source and ≤75 V d.c. battery source		N/A
	Rated voltage for battery pack ≤75 V d.c.		N/A
L.5.7	Tests to be done at rated voltage were done with a fully charged battery		N/A
L.5.201	Peak voltage of any superimposed ripple exceeding 10 % of the average value was included		N/A
L.5.202	Measurements of lithium-ion cell voltages were made using a filter as specified		N/A
L.5.203	Test area protected against fire and explosion, and well ventilated		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
L.5.204	Discharging and charging as specified		N/A
L.5.205	Thermocouples for lithium-ion cell temperature measurement located as specified		N/A
L.5.206	Currents measured during battery charging are average currents		N/A
L.5.207	Fully charged batteries used, after resting for ≥ 2 h but ≤ 6 h at an ambient temperature of (20 ± 5) °C		N/A
L.5.208	Battery consisting of a single cell not subject to special preparations of a cell in a series configuration		N/A
L.5.209	For series arrangement of parallel clusters of cells, the cluster is treated as single cell for specified tests		N/A
L.5.210	End-of-discharge voltages for common cell chemistries observed ..... :		N/A
L.8.1	Non-isolated sources that can supply a tool, or tool that can be supplied directly from the mains, marked with as required by the standard:		N/A
	Rated voltage(s) or voltage range(s), (V) ..... :		—
	Symbol for nature of supply or frequency (Hz) ..... :		—
	Rated input, (W) or rated current (A) ..... :		—
	Symbol for class II ..... :		—
L.8.3	Tools and detachable or separable battery packs marked with additional information		N/A
	- Business name and address of the manufacturer and, where applicable, its authorised representative ..... :		—
	- Designation of series or type ..... :		—
	Tools also marked with additional information		N/A
	- Year of manufacture and a date code identifying at least the month of manufacture ..... :		—
	- Designation of the tool ..... :		—
	- identification for parts shipped separately for assembly by the end user		—
	Detachable or separable battery packs marked with additional information		N/A
	- capacity in Ah or mAh ..... :		—
	- type of battery ..... :		—
	No misunderstanding by additional markings		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
L.8.4	Markings of L.8.1, 8.2 and L.8.3 not on a detachable part of the tool		N/A
	Markings of 8.2 clearly discernible from outside the tool		N/A
	Markings of L.8.3 visible with any separable or detachable battery pack removed		N/A
	Other markings may be visible after removing cover		N/A
	Indications for switches and controls placed on or in vicinity of components		N/A
	Not placed on parts which can be repositioned		N/A
	Not positioned such that making the marking is misleading		N/A
L.8.14.1.1	5) Battery tool use and care		N/A
	6) Service		N/A
L.8.14.2	e) Instructions for battery tools		N/A
L.9	Construction and enclosure provide adequate protection against electric shock		N/A
	Tools connected to the mains or supplied by a non-isolated source.		N/A
	Tool also evaluated with the battery pack removed when removal without the use of a tool was possible		N/A
L.9.201	There are no two conductive simultaneously accessible parts where the voltage between them is hazardous, except when provided with protective impedance		N/A
	Short circuit current between two simultaneously accessible parts (mA) ..... :		N/A
	Capacitance between two simultaneously accessible parts (μF) ..... :		N/A
L.10	Applied only when tool is directly connected to mains, or to a non-isolated source		N/A
L.11	Applied only when tool is directly connected to mains, or to a non-isolated source		N/A
	Test on tool capable of charging the battery while performing its function conducted while charging a discharged battery pack		N/A
L.12	Applied only when tool directly connected to mains, or to a non-isolated source		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test on tool capable of charging the battery while performing its function conducted while charging a previously discharged battery pack with the charger connected		N/A
	Tool operated at no-load until maximum temperature reached or battery discharged ..... :		N/A
	Test repeated, allowing the battery pack to charge while the tool was not operating		N/A
L.12.201	Charging of lithium-ion battery under normal conditions did not exceed specified operating region for charging of the cell		N/A
	Charging procedure as specified		N/A
	Voltage, temperature and charging current monitored for all individual cells		N/A
	Test repeated with imbalanced battery		N/A
L.13.1	Applied only when tool directly connected to mains, or to a non-isolated source	See Table 13.1	N/A
	Tool capable of charging the battery while performing its function also evaluated with charger connected to the mains		N/A
	Tool also evaluated with battery power alone when more unfavourable temperatures may result		N/A
L.13.2	Non-metallic parts in of detachable or separable battery pack supporting connections that carry ≥0,2 A during charging and those within a distance of 3 mm, subjected to the glow-wire test at 850 °C	See Table 13.2	N/A
L.14	Applied only when tool directly connected to mains, or to a non-isolated source		N/A
L.16	Applied only when tool directly connected to mains, or to a non-isolated source		N/A
L.17	Applied only when tool directly connected to mains, or to a non-isolated source		N/A
	Tools not capable of continuous operation operated under battery power for the duration of the test, except evaluated for electric strength with their charger connected		N/A
L.18	Applied only when tool directly connected to mains, or to a non-isolated source, except L.18.8 and L.18.201 to L.18.204,		N/A
L.18.8	Applied only to charging systems other than Li-ion		N/A
L.18.201	Risk of fire or electric shock as a result of abnormal operation obviated as far as is practical		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	No charring or burning of gauze or tissue paper resulted when battery tool and battery pack were subjected to any abnormal operations, tests a) to f)	See Table L.18.201	N/A
	No explosion during or after the test		N/A
	Adequate protection against electric shock		N/A
	Component(s) or conductors(s) that interrupt or limit the discharge current that operated operate during the above tests a) to f) ..... :	See Table L.18.201	N/A
	Test repeated two more times for devices relied upon to pass the test; devices opened the circuit in the same manner		N/A
	Test repeated with the open-circuited device bridged		N/A
	Protective electronic circuits whose function is relied on to pass a test regarded as providing a SCF and comply with 18.8 with a PL = a	See Table 18.8	N/A
L.18.202	Risk of fire and explosion as a result of abnormal operation during charging of a lithium-ion battery is obviated as far as is practical		N/A
	No charring or burning of gauze or tissue paper, no explosion resulted when battery tool and battery pack were subjected to any abnormal conditions a) to d)	See Table L.18.202	N/A
	The cells did not exceed the upper limit charging voltage by more than 150 mV unless…		N/A
	…charging system permanently was disabled from recharging the battery		N/A
	No evident damage to the cell vent to impair compliance with Subclause K.21.202.		N/A
L.18.203	No risk of fire or explosion when main discharge connections of a series configured, integral Li-ion battery, detachable or separable Li-ion battery pack were shorted under extreme imbalance		N/A
	All cells fully charged, one cell fully discharged		N/A
	Main discharge connections of the battery were shorted, resistance ≤10 mΩ		N/A
	No explosion during or after the test		N/A
	No charring or burning of the gauze or tissue paper		N/A
	Component(s) or conductors(s) that interrupt or limit the discharge current that operated operate during the above tests ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test repeated two more times for devices relied upon to pass the test; devices opened the circuit in the same manner		N/A
	Test repeated with the open-circuited device bridged		N/A
	Protective electronic circuits whose function is relied on to pass a test regarded as providing a SCF and comply with 18.8 with a PL = a	See Table 18.8	N/A
L.18.204	No risk of fire or explosion during abusive overcharging of batteries comprised of cells other than the Li-ion type		N/A
	Battery was charged during 1,25 h at a rate of 10 times the C5 rate for the battery		N/A
	No explosion during or after the test		N/A
	No charring or burning of the gauze or tissue paper		N/A
L.19.201	Not possible to connect a battery pack in reverse polarity		N/A
L.19.202	Li-ion battery enclosure designed to safely release gases generated as a result of venting		N/A
	Total area of the openings in the enclosure allowing gases to pass without obstruction is ≥ 20 mm²; or…		N/A
	… pressure drop within enclosure was tested , no rupture occurred		N/A
L.20	Applied only when tool directly connected to mains, or to a non-isolated source, except L.20.201 and L.20.202		N/A
L.20.201	Battery tools with its battery pack attached have adequate mechanical strength and withstand tests of L.9, L.19, L.28.1 and either L.18.201 f) or L.28.201, and		N/A
	- did not catch fire or explode		N/A
	- demonstrated normal discharging and recharging after the test		N/A
	- showed no damage to the cell vent impairing compliance with L.21.202		N/A
L.20.202	For hand-held battery tools, L.20.202.1 applies; for transportable battery tools, L.20.202.2 applies		N/A
L.20.202.1	Adequate mechanical strength after drop tests on a concrete surface from a height of 1 m		N/A
	Test repeated with the battery pack removed from the tool		N/A
	Test repeated on the battery pack by itself		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The test was repeated with each attachment or combination of attachments		N/A
L.20.202.2	Impact test with 50 mm, 0,55 kg smooth steel sphere for battery-operated transportable tools ..... :		N/A
	travel of the sphere was 1,3 m ..... :		N/A
	Damage (except to a guard) accepted, tool became incapable of normal operation		N/A
	Test repeated separately on detachable or separable battery packs with a mass ≥3 kg		N/A
	Additional drop test on detachable or separable battery packs with a mass <3 kg		N/A
L.21	Applied only when tool directly connected to mains, or to a non-isolated source, except L.21.201 and L.21.202		N/A
L.21.201	Tool will not accept general purpose batteries as an energy source for their primary function		N/A
L.21.202	Venting of lithium-ion cells, if relied on for safety, not adversely obstructed		N/A
L.21.203	Unsuitable connector types not used for user accessible interfaces between elements of a Li-ion battery system		N/A
L.22	Applied only when tool directly connected to mains, or to a non-isolated source		N/A
L.23	Components		N/A
L.23.1.10	Applied only to power switches of tools capable of performing their intended operation when connected to the mains or to a non-isolated source		N/A
L.23.1.10.201	Switches controlling the primary operating means of the tool, except as indicated in L.23.1.10, have adequate breaking capacity and presented no electrical or mechanical failure		N/A
L.23.1.10.202	Power switches withstood, without excessive wear or other harmful effect, the mechanical, electrical, and thermal stresses occurring in normal use		N/A
	6000 cycles of operation making and breaking the no-load of the tool at a fully charged battery		N/A
L.23.201	Battery cells comply with IEC 62133		N/A
L.23.202	Rechargeable battery cells not of lithium-metal type		N/A
L.24.1	Also applied to the flexible cord between a non-isolated power source and the tool		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
L.24.3	Also applied to the flexible cord between a non-isolated power source and the tool		N/A
L.24.4	This subclause applied, except flexible cord provided between a non-isolated power source and the tool not provided with a plug that can be connected directly to the mains		N/A
L.24.5	Not applied to flexible cord provided between a non-isolated power source and the tool		N/A
L.24.20	Requirements of this Subclause applied, except the flexible cord between a non-isolated power source and the tool not provided with an appliance inlet that can allow direct connection to mains		N/A
L.24.201	External flexible cable and cord 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
L.25	Not applied to interconnecting cords		N/A
L.26	Applied to the tool directly connected to the mains or to a non-isolated source		N/A
L.28.1	Applied when tool is directly connected to the mains or to a non-isolated source		N/A
	Battery packs connected to the tool during the evaluation		N/A
	Tool also evaluated with the battery pack removed when the removal could be accomplished without the use of a tool		N/A
	Creepage distances and clearances of IEC 60335-1: 2010 applied as applicable		N/A
L.28.201	Creepage distances and clearances not less than the values in millimetres shown in Table L.1		N/A
	Smaller clearance and creepage distances for parts of different polarity accepted, shorting of the two parts did not result in the tool starting		N/A
	For parts having a hazardous voltage between them, the sum of the measured distances between each of these parts and their nearest accessible surface is not less than 1.5 mm clearance and 2.0 mm creepage (Fig. L.1)		N/A
	Creepage distances and clearances measured as indicated in Annex A		N/A
	Distances through slots or openings in external parts of insulating material measured to metal foil in contact with the accessible surface		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Foil pushed into corners and the like by means of test probe B of IEC 61032:1997, except not pressed into openings		N/A
	The sum total of distances measured between parts operating at hazardous voltage and accessible surfaces determined by measuring the distance from each part to the accessible surface		N/A
	Distances added together to determine the sum total (see Figure L.1)		N/A
	One of the distances was 1,0 mm or greater (see Annex A, cases 1 to 10)		N/A
	Force applied by means of test probe B of IEC 61032:1997 at the following values:		N/A
	– 2 N for bare conductors		N/A
	– 30 N for enclosures		N/A
	Means provided for securing the tool to a support considered to be accessible		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

8.12 A	TABLE: Label Heating Test		N/A
Test Conditions ..... :	Conditioned in oven for 24 h at (120 ± 2) °C Y/N Conditioned in oven for 200 h at: °C Y/N Amount of samples: 3		
Test Specimen	Material type	Good adhesion and no curling of edges	Label resists defacement and removal when scraped
--	--	--	--
Supplementary information:			

8.12 B	TABLE: Label immersion tests – Water		P
Test Conditions ..... :	Pre Treating for 24 h at relative humidity of 45 % and temperature: °C Time of labels in water: 48 h Amount of samples: 3		
Test Specimen	Material type	Good adhesion and no curling of edges	Label resists defacement and removal when scraped
1-2#	--	YES	YES
Supplementary information:			

8.12 C	TABLE: Label immersion tests - Oil (IRM 903)		N/A
Test Conditions ..... :	Pre Treating for 24 h at relative humidity of 45 % and temperature: °C Time of labels in oil: 48 h Amount of samples: 3		
Test Specimen	Material type	Good adhesion and no curling of edges	Label resists defacement and removal when scraped
--	--	--	--
Supplementary information:			

8.12 D	TABLE: Label Standard atmosphere tests		N/A
Test Conditions ..... :	Time of labels in controlled atmosphere at relative humidity of 45%: 72h Controlled atmosphere temperature: °C Amount of samples: 3		
Test Specimen	Material type	Good adhesion and no curling of edges	Label resists defacement and removal when scraped
--	--	--	--
Supplementary information:			

EN 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.1	TABLE: Protection against access to live parts				P
Measurement between relevant parts and poles of supply source		Rated voltage U (V)	Measured voltage (V)	Measured current (A)	Measured capacitance (μF)
Input to metal enclosure		14.4VDC	14.4VDC	1.38	0.01A
Supplementary information:					

11	TABLE: Input data under no-load conditions				P
Input deviation of/at:	**Rated P (W) or I (A)**	**Measured P (W) or I (A)**	**Ratio (%)**	**Required ratio (%)**	**Remark**
14.4VDC	1.5A	1.38A	-8	110	PASS
Supplementary information:					

EN 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

12.1A	TABLE: Temperature rise measurements under the conditions of 12.2 to 12.5	P
Test voltage (V) ..... :	14.4VDC	—
Ambient temperature, t_1 (°C) :	24.4	—
Ambient temperature, t_2 (°C) :	24.3	
Operating time (min, s) ..... :	1H	—
Speed (min^{-1}) ..... :	--	—
Input Wattage (W) ..... :	/	—
Input current (A) ..... :	/	—
Torque (Nm) ..... :	--	—

Thermocouple Locations	Temperature rise measured (K)	Temperature rise limit (K)
Stator winding (thermocouple)	36	70
Stator winding (S_1)R-R	23	70
Stator winding (S_2)R-R	22	70
Rotor winding R-R	22	70
Stator Laminations(Motor body)	24	--
Enclosure inside	24	--
Enclosure outside	20	--
Grip area (i.e. Handle, gear housing)	20	--
Brushholder	17	--
Brushholder lead	14	--
Internal wiring	11	55
Capacitor	12	75
Printed circuit board	21	95
Switch	10	95
Supplementary information:		

EN 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

13.1	TABLE: Ball Pressure Test of Thermoplastics				P
Allowed impression diameter (mm) ..... :			2,0		—
Object/ Part No.	Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
PCB	ABS	--	125	0.5	
Enclosure	PC	--	75	0.4	
Supplementary information:					

13.2	TABLE: Glow Wire Test					P
Object/ Part No.	Material	Manufacturer/ trademark	Test temperature (ºC)	Material ignited, Yes/No	Layer under Test Sample ignited, Yes/No	Verdict
Enclosure	PC	--	550	No	No	Pass
Supplementary information:						

EN 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

16	TABLE: Overload Protection of Transformers and Associated Circuits		N/A
Test voltage :		—	
Ambient temperature (°C) :		—	
Input current (A) / Input Wattage (W) :		—	
Applied short-circuit or overload :		—	
Measurement at:	Temperature rise (K)	Allowed Limit (K)	
Transformer winding (thermocouple)			
Transformer winding (T_1)R-R			
Transformer winding (T_2)R-R			
Transformer Lamination			
Internal wiring			
Capacitor			
Printed circuit board			
SELV circuits			
Supplementary Information:			

18.6.1	TABLE: Fault Condition Tests	P			
	Ambient temperature (°C) ..... :	25			—
	Fuse-link Current (A)	--			—
Component	Fault Condition	Test Voltage (V)	Test Duration*	Comment/Result Test repeated Yes/No**	
C5	S-C	DC14.4	10min	No	
R03	S-C	DC14.4	10min	No	

Supplementary Information:
* Tests were continued until
- a protective device operates, or
- until steady conditions are established or
- an open circuit occurs.

** Test was repeated on a second sample due to an intentionally weak part permanently open-circuited to terminate the test.

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Clause	Requirement + Test	Result - Remark	Verdict

18.8.1A	TABLE: Performance levels of Safety Critical Functions		N/A
Type and purpose of SCF	Min. PL determined based on:[1,2]	Min. PL	Actual PL
--	--	--	--

Supplementary Information:
[1] Relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 or; if no such part existent, ISO 13849-1 using Annex E as a guide

[2] For safety critical functions not listed in Table 4 of IEC 62841-1 and provided by electronic circuits, PL values were determined using the methods of ISO 13849-1.

EN 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

18.8.1B	**TABLE: Software in Safety Critical Functions**		—
H.11.12.3 from IEC 60730-1:2010			
H.11.12.3	Measures to avoid errors		—
H.11.12.3.1	For controls with software Class B or C the V-model for the software life cycle was applied		N/A
	Measures used for software class C are inherently acceptable for software class B		N/A
	Other methods applied if they incorporate disciplined and structured processes including design and test phases ..... :		N/A
H.11.12.3.2	Specification		—
H.11.12.3.2.1	Software safety requirements		—
H.11.12.3.2.1.1	The specification of the software safety requirements includes:		—
	• A description of each safety related function to be implemented, including its response time(s): ○ functions related to the application including their related software classes ○ functions related to the detection, annunciation and management of software or hardware faults		N/A
	• A description of interfaces between software and hardware		N/A
	• A description of interfaces between any safety and non-safety related functions		N/A
H.11.12.3.2.2	Software architecture		—
H.11.12.3.2.2.1	The description of software architecture shall include the following aspects:		—
	• Techniques and measures to control software faults/errors (refer to H.11.12.2)		N/A
	• Interactions between hardware and software		N/A
	• Partitioning into modules and their allocation to the specified safety functions		N/A
	• Hierarchy and call structure of the modules (control flow)		N/A
	• Interrupt handling		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	• Data flow and restrictions on data access		N/A
	• Architecture and storage of data		N/A
	• Time based dependencies of sequences and data		N/A
H.11.12.3.2.2.2	The architecture specification was verified against the specification of the software safety requirements by static analysis. Acceptable methods are:		—
	• Control flow analysis		N/A
	• Data flow analysis		N/A
	• Walk-throughs / design reviews		N/A
H.11.12.3.2.3.1	Based on the architecture design, software is suitably refined into modules. Software module design and coding are implemented in a way that is traceable to the software architecture and requirements		N/A
H.11.12.3.2.3.2	Software code is structured		N/A
H.11.12.3.2.3.3	Coded software is verified against the module specification, and the module specification is verified against the architecture specification by static analysis		N/A
H.11.12.3.2.4	Design and coding standards		—
	Program design and coding standards is consequently used during software design and maintenance		N/A
	Coding standards specify programming practice, proscribe unsafe language features, and specify procedures for source code documentation as well as for data naming conventions		N/A
H.11.12.3.3	Testing		—
H.11.12.3.3.1	Module design (software system design, software module design and coding)		—
H.11.12.3.3.1.1	A test concept with suitable test cases is defined based on the module design specification.		N/A
H.11.12.3.3.1.2	Each software module is tested as specified within the test concept		N/A
H.11.12.3.3.1.3	Test cases, test data and test results are documented		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
H.11.12.3.3.1.4	Code verification of a software module by static means includes such techniques as software inspections, walk-throughs, static analysis and formal proof		N/A
	Code verification of a software module by dynamic means includes functional testing, white-box testing and statistical testing		N/A
H.11.12.3.3.2	Software integration testing		N/A
H.11.12.3.3.2.1	A test concept with suitable test cases is defined based on the architecture design specification		N/A
H.11.12.3.3.2.2	The software is tested as specified within the test concept		N/A
H.11.12.3.3.2.3	Test cases, test data and test results are documented		N/A
H.11.12.3.3.3	Software validation		—
H.11.12.3.3.3.1	A validation concept with suitable test cases is defined based on the software safety requirements specification		N/A
H.11.12.3.3.3.2	The software is validated with reference to the requirements of the software safety requirements specification as specified within the validation concept.		N/A
	The software is exercised by simulation or stimulation of:		N/A
	• input signals present during normal operation		N/A
	• anticipated occurrences		N/A
	• undesired conditions requiring system action		N/A
H.11.12.3.3.3.4	Test cases, test data and test results are documented		N/A
H.11.12.3.4	Other Items		—
H.11.12.3.4.1	Tools, programming languages are assumed to be suitable if they comply with "increased confidence from use" according to IEC 61508-7, C.4.4	Only applicable for SCF with PL ≥ c	N/A
H.11.12.3.4.2	Management of software versions: All versions are uniquely identified for traceability		N/A
H.11.12.3.4.3	Software modification		—
H.11.12.3.4.3.1	Software modifications are based on a modification request which details the following:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	• the hazards which may be affected		N/A
	• the proposed change		N/A
	• the reasons for change		N/A
H.11.12.3.4.3.2	An analysis is carried out to determine the impact of the proposed modification on functional safety.		N/A
H.11.12.3.4.3.3	A detailed specification for the modification is generated including the necessary activities for verification and validation, such as a definition of suitable test cases		N/A
H.11.12.3.4.3.4	The modification are carried out as planned		N/A
H.11.12.3.4.3.5	The assessment of the modification is carried out based on the specified verification and validation activities. This may include:		N/A
	• a reverification of changed software modules		N/A
	• a reverification of affected software modules		N/A
	• a revalidation of the complete system		N/A
H.11.12.3.4.3.6	All details of modification activities are documented		N/A
H.11.12.3.5	For class C control functions: One of the combinations (a–p) of analytical measures given in the columns of table H.9 is used during hardware development ..... :	Measures to avoid errors for class C not required	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

27.1	TABLE: Torque Test for screws and nuts				P
Threaded part identification	**Thread diameter (mm)**	**Column number (I, II, or III)**	**Applied torque (Nm)**	**Number of cycles (5 or 10)**	
Metal screw	3.5	**II**	0.7	10	
Supplementary information:					

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

28.2	TABLE: Distance Through Insulation Measurements				N/A
Distance through insulation dti at/of:	**U r.m.s. (V)**	**Test voltage (V)**	**Required dti (mm)**	**dti (mm)**	
--	--	--	--	--	
Supplementary information:					

C.2A	TABLE: Leakage Current of the non-operating tool as per clause 14.1				N/A
Points of application	Test voltage (rated V)	Freq. (Hz)	Selector Switch Position	Allowed leakage current (mA)	Measured leakage (mA)
--	--	--	--	--	--
Supplementary Information:					

C.2B	TABLE: Leakage Current of the non-operating tool as per clause 14.4				N/A
Points of application	Test voltage (rated V)	Freq. (Hz)	Selector Switch Position	Allowed leakage current (mA)	Measured leakage (mA)
--	--	--	--	--	--
Supplementary Information:					

EN 62841-1			
Clause	Requirement + Test	Result - Remark	Verdict

C.3A	TABLE: Leakage Current of the operating tool as per clause 12.1				N/A
Points of application	Test voltage (1.06 X rated V)	Freq. (Hz)	Selector Switch Position (ON /OFF[1])	Allowed leakage current (mA)	Measured leakage (mA)
--	--	--	--	--	--
Supplementary Information:					

C.3B	TABLE: Leakage Current of the operating tool as per clause 14.3				N/A
Points of application	Test voltage (rated V)	Freq. (Hz)	Selector Switch Position (ON /OFF[1])	Allowed leakage current (mA)	Measured leakage (mA)
--	--	--	--	--	--
Supplementary Information:					

C.3C	TABLE: Leakage Current of the operating tool as per clause 18.5.1				N/A
Points of application	Test voltage (rated V)	Freq. (Hz)	Selector Switch Position (ON /OFF[1])	Allowed leakage current (mA)	Measured leakage (mA)
--	--	--	--	--	--
Supplementary Information:					

C.3D	TABLE: Leakage Current of the operating tool as per clause 18.5.4				N/A
Points of application	Test voltage (rated V)	Freq. (Hz)	Selector Switch Position (ON /OFF[1])	Allowed leakage current (mA)	Measured leakage (mA)
--	--	--	--	--	--
Supplementary Information:					

D.2	TABLE: Dielectric Strength			N/A
Test voltage applied between:		**Test during or after clause**	**Test potential applied (V)**	**Breakdown / flashover (Yes/No)**
- windings and metal core of the motor field over **basic insulation**		12.6	1250	/
- commutator and metal core of the motor armature over **basic insulation**		12.6	1250	/
- metal core and motor armature spindle of the motor armature over **supplementary insulation**		12.6	2500	/

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Clause	Requirement + Test	Result - Remark	Verdict

- commutator and motor armature spindle over **reinforced insulation**	12.6	3750	/
- between live parts and other metal parts over **basic insulation**	14.1	1250	/
- between inaccessible metal parts and accessible parts over **supplementary insulation**	14.1	2500	/
- between live parts and accessible parts over **reinforced insulation**	14.1	3750	/
- accessible metal parts in class I tools and the supply cord wrapped with metal foil	14.1	1250	/
- accessible metal parts in class II tools and the supply cord wrapped with metal foil	14.1	1750	/
- between live parts and other metal parts over **basic insulation**	14.2.2	1250	/
- between inaccessible metal parts and accessible parts over **supplementary insulation**	14.2.2	2500	/
- between live parts and accessible parts over **reinforced insulation**	14.2.2	3750	/
- live parts and accessible parts over **basic insulation**	14.3	1250	/
- live parts and accessible parts over **reinforced insulation**	14.3	3750	/
- live parts and accessible parts over **basic insulation**	14.4	1250	/
- live parts and accessible parts over **reinforced insulation**	14.4	3750	/
- between live parts and other metal parts over **basic insulation**	17.2 and 17.3	937,5	/
- between inaccessible metal parts and accessible parts over **supplementary insulation**	17.2 and 17.3	1875	/
- between live parts and accessible parts over **reinforced insulation**	17.2 and 17.3	2812,5	/
- live parts and accessible parts over **basic insulation**	18.3 and 18.4	1250	/
- live parts and accessible parts over **reinforced insulation**	18.3 and 18.4	3750	/
- live parts and accessible parts not grounded, if the tool does not operate anymore	18.5.1	1500	/
- live parts and accessible parts not grounded, if the tool still operates	18.5.1	2500	/
- commutator segments and armature shaft in series motors with class II armature construction	18.5.2	1500	/

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Clause	Requirement + Test	Result - Remark	Verdict

- live parts and accessible parts not grounded, if any winding is open circuited	18.5.4	1500	/
- live parts and accessible parts not grounded, if no windings are open circuited	18.5.4	2500	/
- live parts and accessible parts over **basic insulation**	20.2 to 20.4	1250	/
- live parts and accessible parts over **reinforced insulation**	20.2 to 20.4	3750	/
- between the handles and grasping surfaces in contact with foil and the output shaft of the tool	20.5	1250	/
- between live parts and other metal parts over **basic insulation**	21.12	937,5	/
- between inaccessible metal parts and accessible parts over **supplementary insulation**	21.12	1875	/
- between live parts and accessible parts over **reinforced insulation**	21.12	2812,5	/
- shafts of operating knobs, handles, levers etc. and their insulating covering wrapped in metal foil	21.29	1250	/
- live parts and accessible parts over **basic insulation**	22.6	1250	/
- live parts and accessible parts over **reinforced insulation**	22.6	3750	/
- basic insulation	28.2.b)	1250	/
- supplementary insulation	28.2.b)	2500	/
- reinforced insulation	28.2.b)	3750	/
- over insulation protecting from electric shock	K.9.5	750	/
Supplementary information:			

IEC62841_1D - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62841-1

EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

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

Differences according to ..... : EN 62841-1:2015+A11:2022

Attachment Form No. ..... : EU_GD_IEC62841_1D
Attachment Originator ..... : DEKRA Certification B.V.
Master Attachment ..... : 2015-09

	CENELEC COMMON MODIFICATIONS (EN)		–
8	**MARKINGS AND INSTRUCTIONS**		–
8.4	Replace the 2nd paragraph with the following:		–
	Markings specified in 8.2 and 8.3 are clearly discernible from the outside of the tool.		P
	Other markings on the tool may be visible after removal of a cover, provided that the location of the markings is readily accessible.		N/A
8.14	The words "Original instructions" appear on the language version(s) verified by the manufacturer or his authorised representative.		P
	Where no "Original instructions" exist in the official language(s) of the country where the tool is to be used, a translation into that/those language(s) is provided by the manufacturer or his authorised representative or by the person bringing the tool into the language area in question.		P
	The translations bear the words "Translation of the original instructions", and they are accompanied by a copy of the "Original instructions".		P
8.14.2	The noise emission, which is measured in accordance with I.2		P
	Where LpA does not exceed 70 dB(A), this fact is indicated; L_{pA} [dB(A)] .....: K_{pA} [dB(A)] .....:		P
	A-weighted sound pressure level LpA and its uncertainty KpA, where LpA exceeds 70 dB(A).		P

IEC62841_1D - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	peak C-weighted instantaneous sound pressure value LpCpeak, where this exceeds 63 Pa (130 dB in relation to 20 µPa) L_{pCpeak} (dB) .....: K_{pCpeak} (dB) .....:		P
	A-weighted sound power level LWA and its uncertainty KWA, where the A-weighted sound pressure level LpA exceeds 80 dB(A); L_{WA} [dB(A)] .....: K_{WA} [dB(A)] .....:		P
	The vibration total value and its uncertainty which is measured in accordance with I.3.		P
	When the vibration total value does not exceed 2,5 m/s², this is stated. Work mode - vibration emission value a (m/s²)….: Uncertainty K (m/s²)……...:		P
	When the vibration total value exceeds 2,5 m/s², its value is given in the instructions.		P
	Information that the declared vibration total value has been measured in accordance with a standard test method and may be used for comparing one tool with another		P
	Information that the declared vibration total value may also be used in a preliminary assessment of exposure.		P
	A warning that the vibration emission during actual use of the power tool can differ from the declared total value depending on the ways in which the tool is used		P
	A warning of the need to identify safety measures to protect the operator that are based on an estimation of exposure in the actual conditions of use (taking account of all parts of the operating cycle such as the times when the tool is switched off and when it is running idle in addition to the trigger time).		P

18	**ABNORMAL OPERATION**		P
18.8.1	In Table 4, replace the table footnote by the following: * Performance levels are to be specified in the relevant part of EN 62841-2, EN 62841-3 or EN 62841-4.		P

IEC62841_1D - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Delete the 5th paragraph and the subsequent NOTE 3.		P
21	**CONSTRUCTION**		**–**
21.18.1	delete the 2nd paragraph.		P
21.18.1.Z1	Unless hand-held tools are equipped with a momentary power switch without lock-on device, voltage recovery following an interruption of the supply do not give rise to a hazard.		P
	The relevant part of EN 62841-2 specifies if this subclause applies and gives specific requirements.		P
21.18.2.1	Unless transportable tools are equipped with a momentary power switch without lock-on device, voltage recovery following an interruption of the supply do not give rise to a hazard.		P
	The relevant part of EN 62841-3 specifies if this subclause applies and gives specific requirements.		PP
ANNEX E	**METHODS OF APPLYING ISO 13849-1 TO POWER TOOLS**		**–**
	(Void)		P
ANNEX I	**MEASUREMENT OF NOISE AND VIBRATION EMISSIONS**		**–**
	Replace the title of Annex I by the following **ANNEX I – (NORMATIVE)**		P
I.2	Noise test code (grade 2)		P
I.2.Z1	Noise reduction		–
	Add the following before I.2.1:		P
	Noise reduction at tools is an integral part of the design process and is achieved by particularly applying measures at source to control noise, see for example EN ISO 11688-1.		P
	The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values in relation to other machines of the same type with comparable non acoustical technical data.		P
	The major sound sources of tools are: motor, fan, gear.		P
I.2.1	General		–

IEC62841_1D - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	The noise emission determined by using 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 generated from the processed workpiece.		P
	The load conditions for particular tools are therefore specified in the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
I.2.2	Sound power level measured according to ISO 3744		P
I.2.2.2	Hand-held power tools		N/A
	For all hand-held power tools, the sound power level is determined by using a hemispherical / cylindrical measurement surface according to Figure I.2.		N/A
I.2.2.3	For all transportable powert tools, the sound power level is determined by using a cubic measurement surface according to Figure I.3.		N/A
I.2.2.4	The sound power level of lawn and garden machinery is determined as specified in the relevant part of IEC 62841-4.		N/A
I.2.3	Emission sound pressure level determination		N/A
I.2.3.1	The A-weighted emission sound pressure level of hand-held tools at the work station LpA according to ISO 11203		N/A
	If required, LpCpeak is measured at each of the five measurement positions specified in I.2.2		N/A
I.2.3.2	The A-weighted emission sound pressure level of transportable tools at the work station, LpA, is determined according to ISO 11201, grade 2.		P
	If required, the C-weighted peak emission sound pressure level LpCpeak is measured at the same operator’s position as the A-weighted sound pressure level LpA.		P
I.2.3.3	The emission sound pressure level of lawn and garden machinery is determined as specified in the relevant part of IEC 62841-4.		P
I.2.4	Installation and mounting conditions of the power tools during noise tests		–
	The power tool under test is new and equipped with accessories which affect the acoustic properties, as recommended by the manufacturer.		P

IEC62841_1D - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Prior to commencing testing, the power tool (including any required ancillary equipment) is set up in a stable condition in accordance with the manufacturer's instructions for safe use.		P
	A hand-held tool is held by the operator or suspended in such a way as to correspond to normal use, as specified in the relevant part of IEC 62841-2		N/A
	A transportable tool is so positioned, either placed on the test bench of Figure I.1		P
	Lawn and garden machinery is used and positioned as specified in the relevant part of IEC 62841-4.		N/A
I.2.5	Operating conditions		–
	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 of IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
I.2.6	Measurement uncertainties		–
	Uncertainties according to standard determined, recorded and reported		P
I.2.7	Information and deviations are recorded.		P
I.2.8	Information to be reported		P
	- reference to this noise test code / basic standard		P
	- description of the power tool;		P
	- description of mounting and operating conditions		P
	Sound power level L_{WA} (dB(A))…..:		P
	Sound pressure level L_{PA} (dB(A))…..:		P
	C-weighted peak emission sound pressure level LpCpeak (dB).....:		P
I.2.9	Declaration and verification of noise emission values		P
	Sound power level LWA (dB(A))…..:		P
	Sound pressure level LPA (dB(A))…..:		P
	C-weighted peak emission sound pressure level LpCpeak (dB).....:		P
I.3	Vibration		–
I.3.Z1	Vibration reduction		P
	Add the following before I.3.1:		P

IEC62841_1D - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	The vibration at the handles is kept as low as possible without unduly affecting the performance and the ergonomics (weight, handling, etc.) of the tool.		P
	In particular vibration is reduced by the application of engineering measures as given in CR 1030-1.		P
	The success of the applied vibration measures is assessed by comparing the vibration levels for the tool with those for other tools of the same type and with a comparable specification and performance.		P
I.3.1	Vibration measurement – General		P
	Details for particular types of tools are given in the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
	The vibration total value may be determined by using the measurements from a machine which has design and technical specifications replicating the machine concerned.		P
I.3.2	Symbols		P
I.3.3	Characterization of vibration		P
I.3.3.1	Direction of measurement		P
	Directions may be defined in the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
	If not defined the three orthogonal directions X, Y and Z as shown in Figure I.4. are related		P
I.3.3.2	Location of measurement		P
	The measurement positions for particular types of tools are specified in the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
I.3.3.3	Magnitude of vibration		P
I.3.3.4	Combination of vibration directions		P
I.3.4	Instrumentation requirements		P
	The vibration measurement equipment is in accordance with ISO 8041.		P
	Instrumentation for measuring other parameters whose characteristics are not covered by ISO 8041, is specified in the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
I.3.4.2	Transducers		N/A
I.3.5	Testing and operating conditions of the tool		N/A
I.3.5.1	Replace the 4th paragraph with the following:		N/A

IEC62841_1D - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	When the test procedure is not provided in a relevant part of EN 62841-2, EN 62841-3 or EN 62841-4, an operating condition is specified that is reproducible and representative of the noisiest operation in typical usage of the machine.		N/A
	The vibration test may simulate a single phase of a task or a working cycle, consisting of a set of operations where the operator is being exposed to vibration.		N/A
	However, the operating condition for the noise emission test is, if practicable, also used for the vibration test.		N/A
I.3.5.2	Attachment, workpiece and task		P
	Details for task and workpiece are given in the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
I.3.5.3	Operating conditions		P
	The relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 describes the modes of operation and the calculation of the declared emission value.		P
I.3.5.4	Operator		P
I.3.6	Measurement procedure and validity		P
I.3.6.1	Reported vibration values		P
	Details are specified in the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4.		P
	Work mode - vibration emission value a (m/s²)….:		P
	Uncertainty K (m/s²)……...:		P
I.3.6.2	Declaration of the vibration total value		P
	If required by the relevant part of IEC 62841-2, IEC 62841-3 or IEC 62841-4, the work mode description corresponding to the vibration emission is stated next to each declared value.		P
	Work mode - vibration emission value a (m/s²)….:		P
	Uncertainty K (m/s²)……...:		P
I.3.7	Measurement report		P
	The report includes the following information:		P
	a) reference to this standard		P
	b) specification of the machine		P

IEC62841_1D - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	c) attachments or accessories;		P
	d) operating and testing conditions		P
	e) measuring institution		P
	f) date of measurement		P
	g) instrumentation		P
	h) position and fastening of transducers, measuring directions and individual vibration values when relevant		P
	i) the arithmetic mean total vibration ah, for each operator the total vibration value ahv and the three single axes weighted acceleration values ahw. It is good practice to report all the measured values		P
	j) the uncertainty K of the vibration total value ah.		P
	Any deviations from the vibration test code in this standard is reported together with the technical justification for such deviations.		P

ANNEX K	**BATTERY TOOLS AND BATTERY PACKS**		**P**
K8.14.2 Z1	For battery tools with integral battery: instruction, how the integral battery can be removed safely from the tool after the tool's end of life, and information about the type of battery such as Li-Ion, NiCd and NiMH.	Li-Ion	P

ANNEX L	**BATTERY TOOLS AND BATTERY PACKS PROVIDED WITH MAINS CONNECTION OR NON-ISOLATED SOURCES**		**N/A**
K8.14.2 Z1	For battery tools with integral battery: instruction, how the integral battery can be removed safely from the tool after the tool's end of life, and information about the type of battery such as Li-Ion, NiCd and NiMH.		N/A

Part I: Test Report
3.1 EN ISO 12100: 2010 test report

6	Risk reduction		-
6.1	General		-
	The objective of risk rduction can be achieved by the elimination of hazards, or by separately or simultaneously reducing each of the two elements that determine the associated risk: -severity of harm from the hazard under consideration -probability of occurrence of that harm All protective measures intended for reaching this objective shall be applied in the following sequence, referred to as the three-step method(see also Figures 1 and 2)	This requirement is complied with. See related clauses.	Pass
6.2	Inherently safe design measures		-
6.2.1	General		-
	Inherently safe design measures are the first and most important step in the risk reduction process because protective measures inherent to the characteristics of the machine are likely to remain effective,whereas experience has shown that even well-designed safeguarding may fail or be violated and information for use may not be followed.	Appropriate machine design has been performed by the manufacturer.	Pass
	Inherently safe design measures are achieved by avoiding hazards or reducing risks by a suitable choice of design features of the machine itself and/or interaction between the exposed persons and the machine. NOTE See 6.3 for safeguarding and complementary measures that can be used to achieve the risk reduction objectives in the case where inherently safe design measures are not sufficient (see 6.1 for the three-step method).	Appropriate machine design has been performed by the manufacturer.	Pass
6.2	Consideration of geometrical factors and physical aspects		-
6.2.2.1	Geometrical factors such factors include the following.		-

	a) The form of machinery is designed to maximize direct visibility of the working areas and hazard zones from the control position—reducing blind spots, for example—and choosing and locating means of indirect vision where necessary(mirrors, etc.) so as to take into account the characteristics of humanvision, particularly when safe operation requires permanent direct control by the operator, for example: -the travelling and working area of mobile machines; -the zone of movement of lifted loads or of the carrier of machinery for lifting persons: -the area of contact of the tool of a hand-held or hand-guided machine with the material being worked. The design of the machine shall be such that, from the main control position, the operator is able to ensure that there are no exposed persons in the danger zones.	Appropriate machine design has been performed by the manufacturer.	Pass
	b) The form and the relative location of the mechanical components parts: for instance, crushing and shearing hazards are avoided by increasing the minimum gap between the moving parts, such that the part of the body under consideration can enter the gap safely, or by reducing the gap so that no part of the body can enter it (see ISO 13854 and ISO 13857).	Appropriate machine design has been performed by the manufacturer.	Pass
	c) Avoiding sharp edges and corners, protruding parts: in so far as their purpose allows, accessible parts of the machinery shall have no sharp edges, no sharp angels, no rough surfaces, no protruding parts likely to cause injury, and no openings which can“trap”parts of the body or clothing. In particular, sheet metal edges shall be deburred, flanged or trimmed, and open ends of tubes which can cause a“trap”shall be capped.	Appropriate machine design has been performed by the manufacturer.	Pass
	d) The form of the machine is designed so as to achieve a suitable working position and provide accessible manual controls (actuators).	Appropriate machine design has been performed by the manufacturer.	Pass
6.2.2.2	Physical aspects		-
	Such aspects include the following:		-
	a) limiting the actuating force to a sufficiently low value so that the actuated part does not generate a mechanical hazard;	The actuating force has been limited to be a sufficiently low value so that the actuated part dose not generate a mechanical hazard.	Pass
	b)limiting the mass and/or velocity of the movable elements, and hence their kinetic energy;	This have been limited.	Pass

	- c) limiting the emissions by acting on the characteristics of the source using measures for reducing 1)noise emission at source (see ISO/TR 11688-1), 2)the emission of vibration at source, such as redistribution or addition of mass and changes of process parameters [for example, frequency and/or amplitude of movements (for hand-held and hand-guided machinery, see CR 1030-1)], 3)the emission of hazardous substances, including the use of less hazardous substances or dust-reducing processes (granules instead of powders, milling instead of grinding), and 4)radiation emissions including, for example, avoiding the use of hazardous radiation sources, limiting the power of radiation to the lowest level sufficient for the proper functioning of the machine, designing the source so that the beam is concentrated on the target, increasing the distance between the source and the operator or providing for remote operation of the machinery [measures for reducing emission of non-ionizing radiation are given in 6.3.4.5 (see also EN 12198-1 and EN 12198-3)].	The emissions by acting on the characteristics of the source have been limited.	Pass
6.2.3	Taking into account the general technical knowledge regarding machine design This general technical knowledge can be derived from technical specifications for design (e.g. standards, design codes, calculation rules).These should be used to cover :		-
	a) mechanical stresses such as		-
	-stress limitation by implementation of correct calculation, construction and fastening methods as regards, e.g. bolted assemblies, welded assemblies	Has been taken into account.	Pass
	-stress limitation by overload prevention, (e.g. "fusible" plugs, pressure-limiting valve, breakage points, torque-limiting devices);	Has been taken into account.	Pass
	- avoiding fatigue in elements under variable stresses（notably cyclic stresses）;	Has been taken into account	Pass
	- static and dynamic balancing of rotating elements;	Has been taken into account	Pass
	b) materials and their properties such as		-
	- resistance to corrosion, ageing, abrasion and wear;	It has appropriate coating	Pass
	- hardness, ductility, brittleness;	The materials have been treated by appropriate methods	Pass
	- homogeneity	The materials have been treated by appropriate methods	Pass

	- toxicity	The materials is non-toxicity	Pass
	- flammability	The materials no flammability	Pass
	c) emission values for:		-
	- noise;	No noise will result in hazard in this machine.	Pass
	- vibration;	No vibration will result in hazard in this machine.	Pass
	- hazardous substances;	No hazardous substances will result in hazard in this machine.	Pass
	- radiation.	No radiation will result in hazard in this machine.	Pass
	When the reliability of particular components or assemblies is critical for safety (e.g. ropes, chains, lifting accessories for lifting loads or persons), stress values shall be multiplied by appropriate working coefficients.	Appropriate working coefficients have been taken into account during design and calculation.	Pass
6.2.4	Choice of an appropriate technology		-
	One or more hazards can be eliminated or risks reduced by the choice of the technology to be used in certain applications, e. g.:		-
	a)on machines intended for use in explosive atmospheres: -fully pneumatic or hydraulic control system and machine actuators: -"intrinsically safe" electrical equipment (see IEC60079-11)		Not applicable
	b)for particular products to be processed such as a solvent:equipment assuring that the temperature will remain far below the flash point.		Not applicable
	c)alternative equipment to avoid high noise level,e.g.: -electrical instead of pneumatic equipment - in certain conditions,water cutting instead of mechanical equipment.		Not applicable
6.2.5	Applying the principle of the positive mechanical action		-
	Positive mechanical action is achieved when a moving mechanical component inevitably moves another component along with it,either by direct contact or via rigid elements. An example of this positive opening operation of switching devices in an electrical circuit (see IEC 60947-5-1 and ISO 14119)	The principle of the positive mechanical action of a component on another component has been applied	Pass
6.2.6	Provisions for stability		-
	Machines shall be designed to have sufficient stability to allow them to be used safely in their specified conditions of use.	Satisfied it.	Pass
	Factors to be taken into account include		-

	-geometry of the base; -weight distribution,including loading; -dynamic forces due to movements of parts of the machine itself,or of elements held by the machine which may result in an overturning moment; -vibration	Taken into account during design.	Pass
	-oscillations of the centre of gravity;		Not applicable
	-characteristics of the supporting surface in case of traveling or installation on different sites (e.g.ground conditions,slope);	Taken into account during design.	Pass
	-external forces (e.g.wind pressure,manual forces)	Taken into account during design.	Pass
	Stability shall be considered in all phases of the life of the machine,including handling, traveling,installation,use,de-commissioning and dismantling.	Taken into account during design.	Pass
	Other protective measures for stability relevant to safeguarding are given in 6.3.2.6	Please see the related clause.	Pass
6.2.7	Provision for maintainability		-
	When designing a machine,the following maintainability factors shall be taken into account:		-
	-accessibility,taking into account the environment and the human boby measurements,including the dimensions of the working clothes and tools used;	These factors have been taken into account during design.	Pass
	-ease of handling,taking into account human capabilities;	These factors have been taken into account during design.	Pass
	-limitation of the number of special tools and equipment;	These factors have been taken into account during design.	Pass
6.2.8	Observing ergonomic principles	-	-
	Ergonomic principles shall be taken into account in designing machinery to reduce mental or physical stress and strain of the operator.	Appropriate ergonomic principles have been taken into account in designing machinery	Pass
	These principles shall be considered when allocating functions to operator and machine(degree of automation) in the basic design.	These principles have been taken into account during allocating functions to operator and machine.	Pass
	Account shall be taken of body sizes likely to be found in the intended user population, strengths and postures, movement amplitudes, frequency of cyclic actions (see ISO 10075 and ISO 10075-2)	All these factors have been taken into account during design.	Pass

	All elements of the “operator-machine” interface such as controls, signaling or data display elements, shall be designed to easily understood so that clear and unambiguous interaction between the operator and the machine is possible.(see EN 614-1, ISO 6385, EN 13861 and IEC 61310-1)	All arrangement and design of manual controls have been checked in compliance with.	Pass
	Designer’s attention is especially drawn to following ergonomic aspects of machine design		-
	a)Avoiding stressful postures and movements during use of the machine(e.g.by providing facilities to adjust the machine to suit the various operators).	Stressful postures and movements during use of the machine have been avoided.	Pass
	b) Designing machines, and more especially hand-held and mobile machines to enable them to be operated easily taking into account human effort, actuation of controls and hand, arm and leg anatomy.	This machine has been adjusted to the human strength and convenient movement.	Pass
	c) Limit as far as possible noise, vibration and thermal effects such as extreme temperatue	This machine with low noise, low vibration.	Pass
	d) Avoid linking the operator’s working rhythm to an automatic succession of cycles.	This situation has been avoided.	Pass
	e) Providing local lighting on or in the machine for the illumination of the working area and of adjusting, setting-up, and frequent maintenance zones when the design features of the machine and/or its guards render the ambient lighting inadequate. Flicker, dazzling, shadows and stroboscopic effects shall be avoided if they can cause a risk. If the position of the lighting source has to be adjusted, its location shall be such that it does not cause any risk to persons making the adjustment.		Not applicable
	f) Select, locate and identify manual controls(actuators) so that		-
	- they are clearly visible and identifiable and appropriately marked where necessary(see 6.4.4)	All design and arrangement are compliance with this requirement.	Pass
	- they can be safely operated without hesitation or loss of time and without ambiguity(e.g. a standard layout of controls reduces the possibility of error when an operator changes from a machine to another one of similar type having the same pattern of operation)	All design and arrangement of the control logic have been checked in compliance with this requirement.	Pass
	-their location(for push-buttons) and their movement (for levers and handwheels) are consistent with their effect (see IEC 61310-3)	All the function has been checked in compliance with this requirement.	Pass

	Where a control is designed and constructed to perform several different actions, namely where there is no one-to-one correspondence (e.g. keyboards), the action to be performed shall be clearly displayed and subject to confirmation where necessary.		Not applicable
	Controls shall be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles.	All the arrangement of the control logic have been checked in compliance with this requirement	Pass
	Constraints due to the necessary or foreseeable use of personal protective equipment(such as footwear, gloves)shall be taken into account.	There factors have been taken into account during design.	Pass
	g)Select, design and locate indicators, dials and visual display units so that		-
	-they fit within the parameters and characteristics of human perception		Pass
	-information displayed can be detected, identified and interpreted conveniently, i.e. long lasting, distinct, unambiguous and understandable with respect to the operator's requirements and the intended use;	All the information displayed comply with this requirement	Pass
	-the operator is able to perceive them form the control position		Pass
6.2.9	Preventing electrical hazard		-
	For the design of the electrical equipment of machines IEC 60201-1 gives general provisions, especially in clause 6 for protection against electric shock.	Please also make reference to EN 60204-1 test report.	-
	For requirements related to specific machines, see corresponding IEC standards(e.g. series of IEC 61029, IEC 60745, IEC 60335).		Not applicable
6.2.10	Preventing and hydraulic hazards		-
	Pneumatic and hydraulic equipment of machinery shall be designed so that:		-
	-the maximum rated pressure cannot be exceeded in the circuits(e.g. by means of pressure limiting devices)	Appropriate limiting devices have been provided.	Pass
	-no hazard results from pressure surges or rises, pressure losses or drops or losses of vacuum;	No such hazards exist.	Pass
	-no hazardous fluid jet or sudden hazardous movement of the hose (whiplash)results from leakage or component failures;		Not applicable
	-air receivers, air reservoirs or similar vessels(e.g. in gas loaded accumulators)comply with the design rules for these elements;	The devices are designed appropriately.	Pass
	-air elements of the equipment, and especially pipes and hoses, be protected against harmful external effects;	The pipes have been protected by appropriated devices.	Pass

	-as far as possible, reservoirs and similar vessels (e.g. in gas loaded accumulators)are automatically depressurized when isolating the machine from its power supply (see 6.3.5.4) and, if it is not possible, means are provided for their isolation, local depressurizing and pressure indication (see also ISO 14118, clause 5)	This requirement is complied with	Pass
	- all elements which remain under pressure after isolation of machine from its power supply be provided with clearly identified exhaust devices, and a warning label drawing attention to the necessity of depressurizing those elements before any setting or maintenance activity on the machine. See also ISO 4413 and ISO 4414	This requirement is complied with by appropriate design.	Pass
6.2.11	Applying inherently safe design measures to control system		-
6.2.11.1	General		-
	The design measures of the control system shall be chosen so that their safety-related performance privides a sufficient amount of risk reduction (see ISO 13849-1 or IEC 62061)	Inherently safe design measures to control system have applied.	Pass
	The correct measures of the control systems can avoid unforeseen and potentially hazardous machine behaviour.	Inherently safe Design measures to control system have applied.	Pass
	-an unsuitable design or modification (accidental or deliberate) of the control system logic;	No this kind of hazard in this machine	Pass
	- a temporary or permanent defect or a failure of one or several components of the control system;		Pass
	- a variation or a failure in the power supply of the control system;	No this kind of hazard in this machine.	Pass
	- inappropriate selection, design and location of the control devices;	No this kind of hazard in this machine.	Not applicable
	Typical examples of hazardous machine behaviour are:		-
	- unintended/unexpected start-up (see ISO 14188)	No this kind of hazard.	Pass
	- uncontrolled speed change;	No this kind of hazard.	Pass
	- failure to stop moving parts;	No this kind of hazard.	Pass
	- dropping or ejection of a mobile part of the machine or of a workpiece clamped by the machine;	No this kind of hazard.	Pass
	- machine action resulting from inhibition (defeating or failure) of protective devices	No this kind of hazard.	Pass

	In order to prevent hazardoues machine behaviour and to achieve safety functions, the design of control systems shall comply with the principles and methods presented in this subclause 6.2.11 and in 6.2.12.	The design of control systems comply with the related principles and methods	Pass
	These principles and methods shall be applied singly or in combination as appropriate to the circumstances (see ISO 13849-1 and EN 60204-1 and IEC 62061).	Please see the related clause.	Pass
	Control systems shall be designed to enable the operator to interact with the machine safely and easily; this requires one or several of the following solutions;		-
	-systematic analysis of start and stop conditions;	Systematic analysis have been applied.	Pass
	-provision for specific operating modes (e.g. start-up after normal stop. restart after cycle interruption or after emergency stop. removal of the workpieces contained in the machine, operation of a part of the machine in case of a failure of a machine element)	Enough provisions have been provided.	Pass
	-clear display of the faults;		Pass
	-measures to prevent accidental generation of unexpected start commands (e.g. shrouded start device) likely to cause dangerous machine behaviour (see ISO 14118 figure 1)	Main switch with lock and related devices are provided.	Pass
	-maintained stop commands (e.g. interlock) to prevent restarting that could result in dangerous machine behaviour (see ISO 14118:2000,figure 1)	This requirement is complied with.	Pass
	An assembly of machines may be divided into several zones for emergency stopping, for stopping as a result of protective devices and/or for isolation and energy dissipation.		Not applicable
	The different zones shall be clearly defined and it shall be obvious which parts of the machine belong to which zone.		Not applicable
	Likewise it shall be obvious which control devices (e.g. emergency stop devices, supply disconnecting devices) and/or protective devices belong to which zone.		Not applicable
	The interfaces between zones shall be designed such that no function in one zone creates hazards in another zone which has been stopped for an intervention.		Not applicable
	Control systems shall be designed to limit the movements of parts of the machinery, the machine itself, or workpieces and/or loads held by the machinery, to the safe design parameters (e.g. range, speed, acceleration, deceleration, load capacity). Allowance shall be made for dynamic effects (e.g. the swinging of loads).		Not applicable
	For example:		-

	-the traveling speed of mobile pedestrian controlled machinery other than remote-controlled shall be compatible with walking speed.		Not applicable
	-the range, speed, acceleration and deceleration of movements of the person-carrier and carrying vehicle for lifting persons shall be limited to non-hazardous values, taking into account the total reaction time of the operator and the machine.		Not applicable
	-the range of movements of parts of machinery for lifting loads shall be kept within specified limits.		Not applicable
	When machinery is designed to use synchronously different elements which can also be used independently the control system shall be designed to prevent risks due to lack of synchronization.		Not applicable
6.211.2	Starting of internal power source/switching on an external power supply.		-
	The starting of an internal power source or switching-on of an external power supply shall not result in a hazardous situation. For example: -starting the internal combustion engine shall not lead to movement of a mobile machine; -connection to mains electricity supply shall not result in the starting of working parts of a machine. See EN 60204-1, 7.5 (see also Annexes A and B).	Please also make reference to EN 60204-1 test report.	-
6.2.11.3	Starting/stopping of a mechanism		-
	The primary action for starting or accelerating the movement of a mechanism should be performed by passage from state 0 to state 1(if state 1 represents the highest energy state)	This requirement has been taken into account during design.	Pass
	The primary action for stopping or slowing down should be performed by removal or reduction of voltage or fluid pressure, or, if binary logic elements are considered, by passage from state 1 to 0 (if state 1 represents the highest energy state).	The type of stopping of this machine belongs to state 1and state 0.	Pass
	When, in order for the operator to maintain permanent control of deceleration, this principle not observed(e.g. a hydraulic braking vice of a self-propelled mobile machine),the machine shall be equipped with a means of slowing and stopping in case of failure of the main braking system	No such situation exist.	Pass
6.2.11.4	Restart after power interruption		-
	If it may generate a hazard,the spontaneous restart of a machine when it is re—energized alter power interruption shall be prevented (e.g. by use of a self-maintained relay, contactor or valve).	The spontaneous restart of amachine when it is re-energized after power interruption has been prevented by contactor.	-

6.2.11.5	Interruption of power supply situations resulting from interruption or excessive fluctuation of the power supply. At least the following requirements shall be met:	Machinery shall be designed to prevent hazardous	-
	-the stopping function of the machinery shall remain；		-
	-all devices whose permanent operation is required for safety shall operation an effective way to maintain safety(e.g. locking, clamping devices,cooling or heating devices, power-assisted steering of self-propelled mobile machinery);		-
	-parts of machinery or workpieces and/or loads held by machinery which are liable to move as a result of potential energy shall be retained for the time necessary to allow them to be safely lowered	No such situation exists.	-
6.2.11.6	Use of automatic monitoring		-
	Automatic monitoring is intended to ensure that a safety function(s) implemented by a protective measure do(es) not fail to be performed if the ability of a component or an element to perform its function is diminished ,or if the process conditions are	Appropriate automatic monitoring has been used.	-
	Automatic monitoring either detects a fault immediately or carries out periodic checks so that a fault is detected before the next demand upon the safety function.	Appropriate automatic monitoring has been used	-
	In either case, the protective measure can be initiated immediately or delayed until a specific event occurs (e.g. the beginning of the machine cycle) The protective measures may be, e.g.:	Appropriate automatic monitoring has been used.	-
	-the stopping of the hazardous process；	Emergency stop is provided	-
	-preventing the re-start of this process after the first stop following the failure;	Reset before restart is necessary	-
	-the triggering of an alarm		Not applicable
6.2.11.7	Safety functions implemented by programmable electronic control systems		-
6.2.11.7.1	General		-
	A control system including programmable electronic equipment(e.g. programmable controllers)can be used to implement safety functions machinery		-
	equipment(e.g. programmable controllers) can be used to implement safety functions machinery	safety functions are considered during design	-
	The design of the programmable electronic control system shall be such that the probability of random hardware failures and the likelihood of systematic failures that can adversely affect the performance of the safety—related control function(s)are sufficiently low	safety functions are considered during design	-

	Where a programmable electronic control system performs a monitoring function, the system behaviour on detection of a fault shall be considered(see also IEC 6I 508 series for further guidance)	satisfied this	-
	The programmable electronic control system should be installed and validated to ensure that the specified performance(e.g. safety integrity level(SIL)in IEC 6I 508 series)for each safety function has been achieved	it be installed and validated to ensure that the specified performance	-
	Validation comprises testing an analysis(e.g. static,dynamic or failure analysis)to show that all parts interact correctly to perform the safety function and that unintended functions do not occur	All parts interact correctly to perform the safety function and that unintended functions do not occur	-
6.2.11.7.2	Hardware aspects		-
	The hardware(including e.g. sensors, actuators,logic solvers)shall be selected (and/or designed)and installed to meet both the functional and performance requirements of the safety function(s)to be performed, in particular,by means of:	The hardware has been selected and installed to meet both the functional and performance requirements of the safety functions to be performed	-
	-architectural constraints(e.g. the configuration of the system, its ability to tolerate faults，its behaviour on detection of a fault)：	Appropriate devices are provided	-
	-selecting (and/or designing) equipment and devices with an appropriate probability of dangerous random hardware failure;	Appropriate devices are provided	-
	Incorporating measures and techniques within the hardware to avoid systematic failures and control systematic faults.	Appropriate devices are provided.	-
6.2.11.7.3	Software aspects		-
	The software (incfuding internal operating software(or system sofiware) and application software) shall be designed so as to satisfy the performance specification for the safety functions (see also IEC 61508-3)	It has PLC.	-
	Application software		-
	Application software should not be re-programmable by the user.	Not applicable	Not applicable
	This may be achieved by use of embedded software in a non re-programmable memory (e.g. micro-controller, application specific integrated circuit (ASIC)	Not applicable	Not applicable
	When the application requires reprogramming by the user, the access o the software dealing with safety functions should be restricted e.g. by : -locks; -passwords for the authorized persons		Not applicable
6.2.11.8	Principles relating to manuai control		-

	a)Manual control devices shall be designed and located according to the relevant ergonomic principles given in 6.2.8	Manual control devices have been designed and located according to the relevant ergonomic principles given in 4.8.7	Pass
	b)A stop control device shall be placed near each start control device. Where the start /stop function is performed by means of a hold-to-run control, a separate stop control device shali be provided when a risk can result from the hold-to-run control device failing to deliver a stop command when released.	A stop control device has been placed near each start control device.	Pass
	c) Manual controls shall be located out of reach of the danger zones (see IEC 61310-3), except for certain controls where, of necessity, they are located within a danger zone, such as emergency stop or teach pendant.	Manual controls have been located out of reach of the danger zones.	Pass
	d)Whhenever possible. control devices and control positions shall be located so that the operator is able to observe the working area or hazard zone.	The control devices and control positions have been located so that the operator is able to observe the working area or hazard zone.	Pass
	The driver of a ride-on mobile machine shall be able to actuate all control devices required to operate the machine from the driving position, except for functions which can be controlled more safely from other positions.		Not applicable
	On machinery intended for lifting persons, controls for lifting and lowering and, if appropriate, for moving the carrier, shall generally be located in the carrier. If safe operation requires controls to be situated outside the carrier, the operator in the carrier shall be provided with the means of preventing hazardous movements.		Not applicable
	e) if it is possible to start the same hazardous element by means of several controls, the control circuit shall be so arranged that only one control is effective at a given time. This applies especially to machines which can be manually controlled unit (teach pendant, for instance), with which the operator may enter danger zones.		Not applicable
	f) Control actuators shall be designed or guarded so that their effect, where a risk is involved, cannot occur without intentional operation (see ISO 9355-1 and ISO 447)	This requirement is complied with.	Pass

	g) For machine functions whose safe operation depends on permanent, direct control by the operator, measures shall be taken to ensure the presence of the operator at the control position, e.g. by the design and location of control devices.	This requirement is complied with.	Pass
	g) For machine functions whose safe operation depends on permanent, direct control by the operator, measures shall be taken to ensure the presence of the operator at the control position, e.g. by the design and location of control devices.	This requirement is complied with.	Pass
	h) For cableless control an automatic stop shall be performed when correct control signals are not received, including loss of communication(see EN 60204-1)		Not applicable
6.2.11.9	Control mode for setting, teaching, process changeover, fault-finding, cleaning or maintenance		Not applicable
	Where, for setting, teaching, process changeover, fault-finding, cleaning or maintenance of machinery, a guard has to displaced or removed and /or a protective device has to be disabled, and where it is necessary for the purpose of these operations for the machinery or part of the machinery to be put in operation, safety of the operator shall be achieved using a specific control mode which simultaneously:		Not applicable
	-disables all other control modes;		Not applicable
	-permits operation of the hazardous elements only by continuous actuation of an enabling device, a hold-to-run control device or a two –hand control device;		Not applicable
	-permits operation of the hazardous elements only in reduced risk conditions (e.g. reduced speed, reduced power/force, step-operation, e. g. with a limited movement control device)		Not applicable
	Prevents any operation of hazardous functions by voluntary or involuntary action on the machine’s sensors.		Not applicable
	This control mode shall be associated with one or more of following measures:		Not applicable
	-restriction of access to the danger zone as far as possible.		Not applicable
	-emergency stop control within immediate reach of the operator;		Not applicable
	Portable control unit(teach pendant)and/or local controls allowing sight of the controlled elements.(see IEC60204-1:9.2.4)		Not applicable
6.2.11.10	Selection of control and operating modes		-

	If machinery has been designed and built to allow for its use in several control or operating modes requiring different protective measures and /or work procedures(e.g. to allow for adjustment, setting, maintenance, inspection),it shall be fitted with a mode selector which can be locked in each position.		Not applicable
	Each position of the selector shall be clearly identifiable and shall exclusively allow one control or operating mode.		Not applicable
	The selector may be replaced by another selection means which restricts the use of certain functions of the machinery to certain categories of operators(e.g. access codes for certain numerically controlled functions).		Not applicable
6.211.11	Applying measures achieve electromagnetic Compatibility		-
	For guidance on electromagnetic compatibility, see IEC60204-1, and IEC61000-6 series		Not applicable
6.2.11.12	Provision of diagnostic systems to aid fault-finding		-
	Diagnostic systems to aid fault finding should be included in the control system so that there is no need to disable any protective measures		Not applicable
6.2.12	Minimizing the probability of failure of safety functions		-
6.2.12.1	General		-
	Safety of machinery is not only dependent on the reliability of the control systems but also on the reliability of all parts of the machine. The continued operation of the safety functions is essential for the safe use of the machine. This can be achieved by:		Pass
6.2.12.2	Use of reliable components		-
	“Reliable component”means components which are capable of withstanding all disturbances and stresses associated with the usage of the equipment in the conditions of intended use (including the environmental conditions),for the period of time or the probability of operations fixed for the use, with a low probability of failures generating a hazardous malfunctioning of the machine. Components shall be selected taking into account all factors mentioned above(see also 6.213	Reliable components have been used	-
6.2.12.3	Use of“oriented failure mode”components		-

	“Oriented failure mode”components or systems are those in which the predominant failure mode is known in advance and which can be used so that such a failure leads to a non-hazardous alteration of the machine function		Not applicable
	The use of such components should always be considered particularly in cases where redundancy is (see 6.2.12.4)not employed		Not applicable
6.2.12.4	Duplication(or redundancy)of components or subsystems		Not applicable
	In the design of safety-related parts of the machine, duplication(or redundancy) of components may be used so that if one component fails, another component(or other components) continue(s) to perform its(their) function, thereby ensuring that the safety function remains available		Not applicable
	In order to allow the proper action to be initiated, omponent failure shall be preferably detected by automatic monitoring (see 6.2.1 1.6) or in some circumstances by regular inspection,		Not applicable
	provided that the inspection interval is shorter than the expected lifetime of the components.		Not applicable
	Diversity of design and/or technology can be used to avoid common cause failures (e.g. from electromagnetic disturbance) or common mode failures.		Not applicable
6.2.13	Limiting exposure to hazards through reliability of quipment		-
	Increased reliability of all component parts of machinery reduces the frequency of incidents requiring rectification, thereby reducing exposure to hazards.	This requirement is complied with.	-
	This applies to power systems (operative part) as well as to control systems, to safety functions as well as to other functions of machinery.	This requirement is complied with.	-
	Safety-critical components (as e.g. certain sensors) with known reliability shall be used.	Safety-critical components are used in this machine.	-
	The elements of guards and of protective services shall be particularly reliable, as their failure can expose persons to hazards, and also as poor reliability would encourage attempts to defeat them.	This requirement is complied with.	-
6.2.14	Limiting exposure to hazards through mechanization or automation of loading(feeding) /unloading (removal) operations		-

	Mechanization and automation of machine loading/unloading operations and more generally of handling operations (of work pieces, materials, substances) limit the risk generated by these operations by reducing the exposure of persons to hazards at the operating points.	This requirement is complied with.	-
	Automation can be achieved e.g. by robots, handling devices. transfer mechanisms, air blast equipment.	This requirement has been complied with by design.	-
	Mechanization can be achieved, e.g. by feeding slides, push rods, hand-operated indexing tables.	This requirement has been complied with by design.	-
	While automatic feeding and removal devices have much to offer in preventing accidents to machine operators, they can create danger when any faults are being rectified.	Appropriate provisions have been provided.	-
	Care shall be taken to ensure that the use of these devices does not introduce further hazards (e.g. trapping, crushing) between the devices and parts of the machine or workpieces/materials being processed.	These devices will not introduce further hazards	-
	Suitable safeguards (see 6.3) shall be provided if this cannot be ensured.	Please see the related clause	-
	Automatic feeding and removal devices with their own control systems and the control systems of the associated machine shall be interconnected after thoroughly studying how all safety functions are performed in all control and operation modes of the whole equipment.	This requirement has been complied with by design	-
6.2.15	Limiting exposure to hazards through location of the setting and maintenance points outside of danger zones.		-
	The need for access to danger zones shall be minimized by locating maintenance, lubrication and setting points outside these zones.	This requirement has been complied with by design.	Pass
6.3	Safeguarding and complementary protective measures		-
6.3.1	General		-
	Guards and protective devices shall be used to protect persons whenever inherently safe design does not reasonably make it possible either to remove hazards or to sufficiently reduce risks. Complementary protective measures involving additional equipment (e.g. emergency stop equipment)may have to be implemented.	Appropriate guards and protective devices have been used to protect persons whenever inherently safe design does not reasonably make it possible either inherently safe either to remove hazards or to sufficiently reduce risks.	Pass
	The different kinds of' guards and protective devices are defined in 3.27 and 3.28.	Please see the related clause	Pass

	Certain safeguards may be used to avoid exposure to more than one hazard (e.g. a fixed guard preventing access to a zone where a mechanical hazard is present being used to reduce noise level and collect toxic emissions)	Such safeguards exist	Pass
6.3.2	Selection and implementation of guards and protective devices		-
6.3.2.1	General		-
	This subclause gives guidelines for the selection and the implementation of guards and protective devices the primary purpose of which is to protect persons against hazard generated by moving parts, according to the nature of those parts(see figure 4)and to the need for access to the danger zone(s)	Please see the related clause	Pass
	The exact choice of a safeguard for a particular machine shall be made on the basis of the risk assessment for that machine	Please see the related clause.	Pass
	In selecting an appropriate safeguard for a particular type of machinery or hazard zone, it shall be borne in mind that a fixed guard is simple and shall be used where access of an operation (operation without any malfunction) of the machinery.		Pass
	As the need for frequency of access increase this inevitably leads to the fixed guard not being replaced	This requirement is complied with	Pass
	This requires the use of an alternative protective measure (movable interlocking guard, sensitive protective equipment.)	Movable interlocking guard is used.	Pass
	A combination of safeguards may sometimes be required. For example, where, in conjunction with a fixed guard, a mechanical loading(feeding) device is used to feed a workpiece into a machine, thereby removing the need for assess to the primary hazard zone, a trip device may be requiring hazard between the secondary drawing-in or shearing hazard between the mechanical loading(feeding) device, when reachable, and the fixed guard.		Not applicable
	Consideration shall be given enclosure of control positions or intervention zones to provide combined protection against several hazards which may include:	This requirement has been taken into consideration.	Pass
	- hazards from falling or ejected objects(e.g. falling object protection structure)	No such hazards exist in this machine.	Pass
	- emission hazards(e.g. protection against noise, vibration, radiation , harmful substances)	No such hazards exist in this machine.	Pass
	- hazards due to the environment(e.g. protection against heat, cold, foul weather)	No such hazards exist in this machine.	Pass
	- hazards due to tipping over or rolling over of machinery(e.g. roll-over or tip-over protection structure)	No such hazards exist in this machine.	Pass

	The design of such enclosed work stations(e.g. cabs and cabins) shall take into account ergonomic principles concerning visibility,lighting, atmospheric conditions, access, posture.	No such hazards exist in this machine.	Pass
6.3.2.2	Where access to the hazard zone is not required during normal operation		-
	Where access to the hazard zone is not required during normal operation of the machinery, safeguard should be selected fiom the following:		-
	a) fixed guard (see also ISO 14120)	Fixed guards are provided.	Pass
	b) interlocking guard with or without guard locking (see also 6.3.3.2.3, ISO 14119, ISO 14120);	Provided.	Pass
	c) self-closing guard (see ISO 14120, 3.3.2)		Not applicable
	d) sensitive protective equipment, e.g. electro-sensitive protective equipment (see IEC 61496) or pressure sensitive mat (see ISO 13856)		Not applicable
6.3.2.3	Where access to the hazard zone is required during normal operation		-
	Where access to the hazard zone is required during normal operation of the machinery , safeguards should be selected fiom the following:		-
	a)interlocking guard with or without guard locking (see also ISO 14119, ISO 14120 and 6.3.3.2.3 of this standard);		Not appficable.
	b)sensitive protective equipment, e.g electro-sensitive protective equipment (see IEC 61496)		Not applicable
	c)two-hand control device (see ISO 13851)		Not applicable
6.3.2.4	Where access to the hazard zone is required for machine setting, teaching, process changeover, fault finding, cleaning or maintenance.		-
	As far as possible, machines shall be designed so that the safeguards provided for the protection of the production operator may ensure also the protection of personnel in charge of setting, teaching, process Changeover, fault finding, cleaning or maintenance without hindering them in performing their task.		Not applicable
	Such tasks shall be identified and considered in the risk assessment as parts of the use of the machine (see 5.2)		Not applicable
6.3.2.5	Selection and implementation of sensitive protective equipment		-
6.3.2.5.1	Setection		-

	Due to the great diversity ofthe technologies on which their detection function is based, all types of sensitive protective equipment are far from being equally suitable for safety applications.		Not applicable
	The following provisions are intended to provide the designer with criteria for selecting , for each application, the most suitable device(s).		Not applicable
	Types of sensitive protective equipment include, e.g.:		-
	- light curtains;		Not applicable
	- scanning devices as, e.g. laser scanners;		Not applicable
	- pressure sensitive mats;		Not applicable
	- trip bars, trip wires.		Not applicable
	Sensitive protective equipment can be used:		-
	- for tripping purposes;		Not applicable
	- for presence sensing;		Not applicable
	- for both tripping and presence sensing		Not applicable
	- to re-initiate machine operation, a practice which is subject to stringent conditions.		Not applicable
	The following characteristics of the machinery, among others, can preclude the sole use of sensitive protective equipment:		Not applicable
	- tendency for the machinery to eject materials or component parts;		Not applicable
	- necessity to guard against emissions (noise, radiation, dust, etc.)		Not applicable
	- erratic or excessive machine stopping time;		Not applicable
	-inability of a machine to stop part-way through a cycle.		Not applicable
6.3.2.5.2	Implementation		-
	consideration should be given to :		-
	a) size, characteristics and positioning of the detection zone (see ISO 13855, which deals with the positioning of some types of sensitive protective equipment)		Not applicable
	b)reaction of the device to fault conditions (see IEC 61496 for electro-sensitive protective equipment)		Not applicable

	c)possibility of circumvention		Not applicable
	d)detection capability and its variation over the course of time (e.g. as a result of its susceptibility to different environmental conditions such as the presence of reflecting surfaces, other artificial light sources, sunlight or impurities in the air.		Not applicable
	sensitive protective equipment shall be integrated in the operative part and associated with the control system of the machine so that :		-
	- a command is given as soon as a person or part of a person is detected ;		Not applicable

	- the withdrawal of the person or part of a person detected does not, by itself, restart the hazardous machine function(s);therefore, the command given by the sensitive protective equipment shall be maintained by the control system until a new command is given ;		Not applicable
	- restarting the hazardous machine function(s) results from the voluntary actuation , by the operator, of a control device placed outside the hazard zone , where this zone can be observed by the operator ;		Not applicable
	-the machine cannot operate during interruption of the detection function of the sensitive protective equipment,except during muting phases ;		Not applicable
	- the position and the shape of detection field prevents,possibly together with fixed guards , a person or part of a person from entering the hazard zone ,or being present in it , without being detected .		Not applicable
6.3.2.5.3	Additional requirements for sensitive protective equipment when used for cycle initiation .		-
	In this exceptional application, starting of the machine cycle is initiated by the withdrawal of a person or of the detected part of a person from the sensing field of the sensitive protective equipment , without any additional start command , hence deviating from the general requirement given in the second point of the dashed list in 6.3.2.5.2, above .After switching on the power supply ,or when the machine has been stopped by the tripping function of the sensitive protective equipment , the machine cycle shall be initiated only by voluntary actuation of a start control .		Not applicable
	Cycle initiation by sensitive protective equipment shall be subject to the following conditions :		-
	a)only active optoelectronic protective devices (AOPDs) complying with IEC 61496 series shall be used ;		Not applicable
	b) the requirements for an AOPD used as a tripping and presence-sensing device (see IEC 61496) are satisfied -in particular, location, minimum distance (see ISO 13855),detection capability, reliability and monitoring of control and braking systems;		Not applicable
	c) the cycle time of machine is short and the facility to re-initiate the machine upon clearing of the sensing field is limited to a period commensurate with a single normal cycle;		Not applicable

	d) entering the sensing field of the AOPD(s) or opening interlocking guards is the only way to enter the hazard zone;		Not applicable
	e) if there is more than one AOPD safeguarding the machine, only one of the AOPD(s) is capable of cycle re-initiation;		Not applicable
	f) with regard to the higher risk resulting from automatic cycle initiation, the AOPD and the associated control system comply with a higher safety-related performance than under normal conditions.		Not applicable
6.3.2.6	Protective measures for stability		-
	If stability cannot be achieved by inherently safe design measures such as weight distribution(see 4.6), it will be necessary to maintain it by protective measures such as the use of :		-
	- anchorage bolts;		Pass
	- locking devices		Not applicable
	- movement limiters or mechanical stops;		Not applicable
	- acceleration or deceleration limiters;		Not applicable
	- load limiters;		Not applicable
	- alarms warning of the approach to stability or tipping limits;		Not applicable
6.3.2.7	Other protective devices		-
	When a machine requires continuous control by the operator(e. g. mobile machines, cranes) and an error of the operator can generate a hazardous situation, this machine shall be equipped with the necessary devices to enable the operation to remain within specified limits, in particular		Not applicable
	- when the operator has insufficient visibility of the hazard zone;		Not applicable
	- when the operator lacks knowledge of the actual value of a safety-related parameter (e. g. a distance, a speed, the mass of a load, the angle of a slope)		Not applicable
	-when hazards may result form operation other then		Not applicable
	those controlled by the operator;		-
	The necessary devices include:		-
	- devices for limiting parameters of movement (distance, angle, velocity , acceleration)		Not applicable
	- overloading and moment limiting devices:		Not applicable
	- devices to prevent collisions or interference with other machines;		Not applicable
	-device for preventing hazards to pedestrian operators of mobile machinery or other pedestrians:		Not applicable
	- torque limiting devices, breakage points to prevent excessive stress of components and assemblies;		Not applicable
	- devices for limiting pressure. temperature;		Not applicable
	- devices for monitoring emissions;		Not applicable

	- devices prevent operation in the absence of the operator at the control position;		Not applicable
	- device to prevent lifting operations unless stabilizers are in place;		Not applicable
	- devices to ensure that components are in a safe position before traveling;		Not applicable
	Automatic protective measures triggered by such devices which take operation of the machinery out of the control of the operator (e.g. automatic stop of hazardous movement) should be preceded or accompanied by a warning signal to enable the operator to take appropriate action (see 6.4.3)		Not applicable
6.3.3	Requirements for the design of guards and protective devices		-
6.3.3.1	General requirements		-
	Guards and protective devices shall be designed to be suitable for the intended use taking into account mechanical and other hazards involved. Guards and protective devices shall be compatible with the working environment of the machine and designed so that they cannot be easily defeated. They shall provide the minimum possible interference with activities during operation and other phases of machine life, in order to reduce any incentive to defeat them.	Guards and protective devices have been appropriately designed.	Pass
	Guards and protective devices shall :		-
	- be of robust construction.	This requirement has been taken into account during design.	Pass
	- not give rise to any additional hazard;	This requirement has been taken into account during design.	Pass
	-not be easy to by-pass or render non-operational;	This requirement has been taken into account during design.	Pass
	-be located at an adequate distance from the danger zone (see ISO 13857 and ISO 13855).	This requirement has been taken into account during design.	Pass
	-cause minimum obstruction to the view of the production process:	This requirement has been taken into account during design.	Pass
	-enable essential work to be carried out on installation and/or replacement of tools and also for maintenance by allowing access only to the area where the work has to be done, if possible without the guard or protective device having to be moved;	This requirement has been taken into account during design.	Pass
	For openings in the guards see ISO 13857	This requirement has been taken into account during design.	Pass
6.3.3.2	Requirements for fixed guards		-
6.3.3.2.1	Functions of guards		-

	The functions that guards can achieve are:	These functions are achieved by fixed guards.	Pass
	-prevention of access to the space enclosed by guard and/or . -containment/capture of materials, workpieces, chips, liquids which may be ejected or dropped by the machine and reduction of emissions(noise, radiation, hazardous substances such as dust, fumes, gases)which may be generated by the machine.	These functions are achieved by fixed guards.	Pass
	Additionally, they may need to have particular propertied relating to electricity, temperature, fire, explosion, vibration. visibility(see ISO 14120) and operator position ergonomics(e.g. usability, operator's movements, posture, repetitive movements).	These functions are achieved by fixed guards.	Pass
6.3.3.2.2	Requirements for fixed guards		-
	Fixed guards shall be securely held in place:		-
	- either permanently (e.g. by welding) -or by means of fasteners (screws, nuts) making removal/opening impossible without using tools; they should not remain closed without their fasteners (see ISO 14120)	All the fixed guards are securely held in place by appropriate fasteners.	Pass
6.3.3.2.3	Requirements for movable guards		-
	a)movable guards which provide protection against hazards generated by moving transmission parts shall:		-
	-as far as possible remain fixed to the machinery or other structure (generally by means of hinges or guides) when open;	Gemels are used for the movable guards.	Pass
	-be interlocking guards (with guard locking when necessary) (see ISO 14119)		Not applicable
	b) movable guards against hazards generated by non-transmission moving parts shall be designed and associated with the machine control system so that;		-
	- moving parts cannot start up while they are within the operator’s reach and the operator cannot reach moving parts once they have start up; this can be achieved by interlocking guards, with guard locking when necessary.	Interlocking guards are provided to comply with these requirements.	Pass
	- they can be adjusted only by an intentional action, such as the use of tool or a key;	This requirement is complied with.	Pass
	-they absence or failure of one of their components prevents starting of the moving parts or stops them; this can be achieved by automatic monitoring (see 4.11.6)	This requirement is complied with.	Pass
6.3.3.2.4	Requirements for adjustable guards		-
	Adjustable guards may only be used where the hazard zone cannot for operational reasons be completely enclosed;		Not applicable
	They shall:		-

	-be designed so that the adjustment remains fixed during a given operation		Not applicable
	-be readily adjustable without the use of tools;		Not applicable
6.3.3.2.5	Requirements for interlocking guards with a start function (control guards)		Not applicable
	An interlocking guard with a start function may be used provided that		Not applicable
	- all requirements for interlocking guards are satisfied (see ISO 14119)		Not applicable
	- the cycle time of the machine is short		Not applicable
	-the maximum opening time of the guard is present to a low value (e.g. equal to the cycle time). When this time is exceeded, the hazardous function(s) cannot be initiated by the closing of the interlocking guard with a tart function and resetting is necessary before restarting the machine.		Not applicable
	- the dimensions or shape of the machine do not allow a person, or part of a person, to stay in the hazard zone or between the hazard zone and the guard while the guard is closed (see ISO 14120)		Not applicable
	- all other guards whether fixed (removable type) or movable are interlocking guards;		Not applicable
	-the interlocking device associated with the interlocking guard with a start function is designed in such a way – e.g. by duplication of position detectors and use of automatic monitoring (see 4.11.6)- that its failure cannot lead to an unintended/unexpected start-up;		Not applicable
	-the guard is securely held open(e.g. by a spring or counterweight)such that it cannot initiate a start while falling by its own weight;		Not applicable
6.3.3.2.6	Hazards from guards		-
	Care shall be taken to prevent hazards which might be generated by:		-
	- the guard construction (e.g. sharp edges or corners, material);	This requirement has been taken into account during design.	-
	- the movements of the guards (shearing or crushing zones generated by power-operated guards and by heavy guards which are liable to fall)	This requirement has been taken into account during design.	-
6.3.3.3	Technical characteristics of protective devices		-
	Protective devices shall be selected or designed and connected to the control system so as to ensure correct implementation of their safety function (s) is ensured.	This requirement has been taken into account during design.	-

	Protective devices shall be selected on the basis of their having met the appropriate product standard (for example, IEC 61496 for active optoelectronic protective devices) or shall be designed according to one or several of the principles formulated in ISO 13849-1 or IEC62061.	This requirement has been taken into account during design.	-
	Protective devices shall be installed and connected to the control system so that they cannot be easily defeated.	This requirement has been taken into account during design.	-
6.3.3.4	Provisions for alternative types of safeguards.	-	-
	Provisions should be made to facilitate the fitting of alternative types of safeguards on machinery where it is known that this fitting will be necessary because the work to be done on it will vary.		Not applicable
6.3.4	Safeguarding for reducing emissions		-
6.3.4.1	General		-
	If the measures for the reduction of emissions at source mentioned in 6.2.2.2 are not adequate, the machine shall be provided with additional protective measures (see 6.3.4.2 to 6.3.4.5).	No such hazard exists.	Pass
6.3.4.	Noise		-
	Additional protective measures include, for example: -enclosures (see ISO 15667) -screens fitted to the machine; -silencers (see ISO 14163)	No such hazard exists.	Pass
6.3.4.3	Vibration		-
	Additional protective measures include, for example, damping devices for vibration isolation between the source and the exposed person such as resilient mounting or suspended seats.	No such hazard exists.	Pass
	For measures for vibration isolation of stationary industrial machinery see EN 1299	No such hazard exists.	Pass
6.3.4.4	Hazardous substances		-
	Additional protective measures include, for example:		-
	-encapsulation of the machine (enclosure with negative pressure);		Not applicable
	- local exhaust ventilation with filtration.		Not applicable
	- wetting with liquids;		Not applicable
	- special ventilation in the area of the machine (air curtains , cabins for operators)		Not applicable
6.3.4.5	Radiation		-
	Additional protective measures include, for example:		-
	- use of filtering and absorption;		Not applicable
	- use of attenuating screens or guards		Not applicable
6.3.5	Complementary protective measures		-
6.3.5.1	General		-

	Protective measures which are neither inherently safe design measures, nor safeguarding (implementation of guards and/or protective devices),nor information for use may have to be implemented as required by the intended use and the reasonably foreseeable misuse of the machine. Such measures include, but are not limited to, the ones dealt with in 6.3.5.2 to 6.3.5.6	It meet the requirement.	Pass
6.3.5.2	Components and elements to achieve the emergency stop function		-
	If following a risk assessment, a machine needs to be fitted with components and elements to achieve an emergency stop function to enable actual or impending emergency situations to be averted, the following requirements apply:		-
	-the actuators shall be clearly identifiable, clearly visible and readily accessible	The actuators can be clearly identifiable, clearly visible and readily aessible	Pass
	-the hazardous process shall be stopped as quickly as possible without creating additional hazards. If this is not possible or the risk cannot be reduced, it should be questioned whether implementation of an emergency stop function is the best solution;	The hazardous process can be topped as quickly as possible without creating additional hazards	Pass
	-the emergency stop control shall trigger or permit the triggering of certain safeguard movements where necessary.	No this situation exists	Pass
	Once active operation of the emergency stop device has ceased following an emergency stop command, the effect of this command shall be sustained until it is rest.	Reset is necessary before re-start.	Pass
	This reset shall be possible only at that location where the emergency stop command has been initiated. The reset of the device shall not restart the machinery, but only permit restarting.	This requirement is complied with by appropriate design of the emergency stop	Pass
	More details for the design and selection of electrical components and elements to achieve the emergency stop function are provided in EN 60204 series.	Please see the related clauses.	Pass
6.3.5.3	Measures for the escape and rescue of trapped persons-		-
	Measures for the escape and rescue of trapped persons may consist e.g. of:		-
	-escape routes and shelters in installations generating operator-trapping hazards		Not applicable
	-arrangements for moving some elements by hand, after an emergency stop		Not applicable
	-arrangements for reversing the movement of some elements		Not applicable
	- anchorage points for descender devices;		Not applicable

	-means of communication to enable trapped operators to call for help		Not applicable
6.3.5.4	Measures for isolation and energy dissipation		-
	Especially with regard to their maintenance and repair, machines shall be equipped with the technical means to achieve the isolation from power supply(ies) and dissipation of stored energy as a result of following actions:		-
	a) isolating(disconnecting,separating)the machine(or defined parts of the machine) from all power supplies;	A main switch with lock is provided.	Pass
	b) locking (or otherwise securing) all the isolating units in the isolating position;	Please see the report for EN 60204	Pass
	dissipating or , if this is not possible or practicable, restraining (containing) any stored energy which may give rise to a hazard;	Please see the report for EN 60204	Pass
	verifying, by means of a safe working procedure, that the actions taken according to a), b) and c) above have produced the desired effect.	Please see the report for EN 60204	Pass
	See ISO 14118, clause 5 and EN 60204-1: 5.5 and 5.6		Pass
6.3.5.5	Provisions for easy and safe handling of machines and their heavy component parts		Pass
	Machines and their component parts which cannot be moved or transported by hand shall be provided or capable of being provided with suitable attachment devices for transport by means of lifting gear.	Appropriate attachments are provided.	Pass
	These attachments may be, among others,		Pass
	standardized lifting appliances with slings, hooks,eyebolts, or tapped holes for appliance fixing;		Pass
	appliances for automatic grabbing with a lifting hook when attachment is not possible from the ground.	Such devices are used.	Pass
	guiding grooves for machines to be transported by a fork truck;		Not applicable
	lifting gear and appliances integrated into the machine.		Not applicable
	Parts of machinery which can be removed manually in operation shall be provided with means for their safe removal and replacement; (See also 6.4.4c item 3).		Pass
6.3.5.6	Measures for safe access to machinery		-
	Machinery shall be so designed as to enable operation and all routine tasks relating to setting and/or maintenance, to be carried out,as far as possible, by a person remaining at ground level.	These requirements have been taken into account during design.	Pass

	Where this is not possible, machines shall have built-in platforms, stairs or other facilities to provide safe access for those tasks ,but care should be taken to ensure that such platforms or stairs do not give access to danger zones of machinery.		Not applicable
	The walking areas shall be made from materials which remain as slip resistant as practicable under working conditions and, depending on the height from the ground , suitable guard-rails(see ISO14122-3)shall be provided.		Not applicable
	In large automated installations, particular attention shall be given to safe means of access such as walkways, conveyor bridges or crossover points.		Not applicable
	Means of access to parts of machinery located at a height shall be provided with collective means of protection against falls(e.g. guard-rails for stairways, stepladders and platforms and/or safety cages for ladders)		Not applicable
	As necessary, anchorage points for personal protective equipment against falls from a height shall also be provided(e.g. in carriers of machinery for lifting persons or with elevating control stations)		Not applicable
	Openings shall whenever possible open towards a safe position, They shall be designed to prevent hazards due to unintended opening.		Not applicable
	The necessary aids for access shall be provided(e.g. steps, handholds).Control devices shall be designed and located to prevent their being used as aids for access.		Not applicable
	When machinery for lifting goods and/or persons includes landings at fixed levels, these shall be equipped with inter locking guards preventing falls when the platform is not present at the level.		Not applicable
	Movement of the lifting platform shall be prevented while the guards are open.		Not applicable
	For detailed provisions see ISO 14122.		Not applicable
	Information for use		-
6.4	General requirements		-
6.4.1	Drafting information for use is an integral part of the design of a machine(see figure2).	Please see the related clause.	Pass
6.4.1.1	Information of use consists of communication links, such as texts, words, signs, signals, symbols or diagrams, used separately or in combination to convey information to the user. It is directed to professional and/or non-professional users.	All the information is stated in the appropriate place.	Pass
6.4.1.2	Information shall be provided to the user about the intended use of the machine, taking into account, notably, all its operating modes.		-

	The information shall contain all directions required to ensure safe and correct use of the machine. With this in view, it shall inform and warn the user about residual risk.	All the information is stated in the appropriate place.	Pass
	The information shall indicate, as appropriate,		-
	- the need for training,	All the information is stated in the appropriate place.	Pass
	- the need for personal protective equipment,	All the information is stated in the appropriate place.	Pass
	- the possible need for additional guards devices (see Figure 2, Footnote d).	All the information is stated in the appropriate place.	Pass
	It shall not exclude uses of the machine that can reasonably be expected from its designation and description and shall also warn about the risk which would result from using the machine in other ways than the ones described in the information, especially considering its reasonably foreseeable misuse.	All the information is stated in the appropriate place.	Pass
6.4.1.3	Information for use shall cover, separately or in combination, transport, assembly and installation, commissioning, use of the machine (setting, teaching/programming or process changeover, operation, cleaning, fault-finding and maintenance) and, if necessary, dismantling, disabling and scrapping.	All the information is stated in the appropriate place.	Pass
6.4.2	Location and nature of the information for use		-
	Depending on the risk , the time when the information is needed by the user and the machine design , it shall be decided whether the information – or parts thereof – are to be given:	All the information is stated in the appropriate place.	Pass
	- in /on the machine itself (see 6.3 and 6.4.4)	Adequate information stated in the machine itself.	Pass
	-in accompanying documents (in particular instruction handbook , see 6.4.5)	Adequate information is stated in the accompanying documents	Pass
	- on the packaging	Adequate information is stated on the packaging	Pass
	- by other means such as signals and warnings outside the machine.	Adequate information is stated	Pass
	Standardized phrases shall be considered where important messages such as warnings need to be given (see also IEC 62079)	This requirement is considered.	Pass
6.4.3	Signals and warning devices		-
	Visual signals (e.g. flashing lights) and audible signals (e.g. sirens) may be used to warn of an impending hazardous event such as machine start-up or overspeed.	Signals and warning devices are provided.	Pass

	Such signals may also be used to warn the operator before the triggering of automatic protective measures (see last paragraph of 5.2.7)	Please see the related clause.	Pass
	It is essential that these signals:		-
	- be emitted before the occurrence of the hazardous event;	This requirement is taken into account during design and selection of the warning devices.	Pass
	- be unambiguous;	This requirement is taken into account during design and selection of the warning devices.	Pass
	- be clearly perceived and differentiated from all other signals used; - be clearly recognized by the operator and other persons.	This requirement is taken into account during design and selection of the warning devices.	Pass
	The warning devices shall be designed and located such that checking is easy.	This requirement is taken into account during design and selection of the warning devices.	Pass
	The information for use shall prescribe regular checking of warning devices.	This requirement is taken into account during design and selection of the warning devices.	Pass
	The attention of designers is drawn to the risks from “sensorial saturation” which results from too many visual and/or acoustic signals, which may also lead to defeating the warning devices.	This requirement is taken into account during design and selection of the warning devices.	Pass
6.4.4	Markings, signs (pictograms), written warnings		-
	Machinery shall bear all markings which are necessary:		-
	a) for its unambiguous identification, at least - name and address of the manufacturer; - designation of series or type; - serial number, if any.	Adequate information is provided.	Pass
	b) in order to indicate its compliance with mandatory requirements;		-
	- marking; -written indications (e.g. for machines intended for use in potentially explosive atmosphere)	Adequate information is provided.	Pass
	c) for its safe use, e.g. :		-
	- maximum speed of rotating parts; - maximum diameter of tools; -mass (expressed in kilograms) of the machine itself and/or of removable parts - maximum working load; - necessity of wearing personal protective equipment; - guard adjustment data; - frequency of inspection.	Adequate information is provided.	Pass

	Information printed directly on the machine should be permanent and remain legible throughout the expected life of the machine.	This requirement is complied with.	Pass
	Signs or written warnings only saying “danger” shall not be used.	This requirement is complied with.	Pass
	Readily understandable signs (pictograms) should be used in preference to written warnings.	This requirement is complied with.	Pass
	Signs and pictograms should only be used if the are understood in the culture in which the machinery is to be used.	This requirement is complied with.	Pass
	Markings shall comply with recognized standards (see ISO 2972, ISO 7000, particularly for pictograms, symbols, colours) See EN 60204 series as regards marking of electrical equipment.	This requirement is complied with.	Pass
6.4.5	Accompanying documents (in particular, instruction handbook)		-
6.4.5.1	Contents		-
	The instruction handbook or other written instructions (e.g. on the packaging) shall contain among others:		-
	a) information relating to transport, handling and storage of the machine e.g. :	All the related information is stated in the instruction handbook	Pass
	- storage conditions for the machine;	All the related information is stated in the instruction handbook	Pass
	-dimensions , mass value(s), position of the centre (s) of gravity;	All the related information is stated in the instruction handbook	Pass
	-indications for handling (e.g. drawings indicating application points for lifting equipment)	All the related information is stated in the instruction handbook	Pass
	b) information relating to installation and commissioning of the machine, e.g.		-
	- fixing/anchoring and vibration dampening requirements	All the related information is stated in the instruction handbook	Pass
	- assembly and mounting conditions;	All the related information is stated in the instruction handbook	Pass
	- space needed for use and maintenance;	All the related information is stated in the instruction handbook	Pass

	- permissible environmental conditions (e.g. temperature, moisture, vibration, electromagnetic radiation);	All the related information is stated in the instruction handbook	Pass
	-instructions for connecting the machine to power supply (particularly about protection against electrical overloading);	All the related information is stated in the instruction handbook	Pass
	- advice about waste removal /disposal;	All the related information is stated in the instruction handbook	Pass
	-if necessary, recommendations about protective measures which have to be taken by the user; e.g. additional safeguards, safety distances, safety signs and signals.	All the related information is stated in the instruction handbook	Pass
	c) information relating to the machine itself, e.g. :		-
	-detailed description of the machine, its fittings, its guards and/or protective devices;	All the related information is stated in the instruction handbook	Pass
	-comprehensive range of applications for which the machine is intended, including prohibited usages, if any , taking into account variations of the original machine if appropriate.	All the related information is stated in the instruction handbook	Pass
	-diagrams (especially schematic representation of safety functions);	All the related information is stated in the instruction handbook	Pass
	- data about noise and vibration generated by the machine, about radiation, gases, vapours, dust emitted by it, with reference to the measuring methods used.	All the related information is stated in the instruction handbook	Pass
	-technical documentation about electrical equipment (see EN 60204 series)	All the related information is stated in the instruction handbook	Pass
	-documents attesting that the machine complies with mandatory requirements;	All the related information is stated in the instruction handbook	Pass
	d)information relating to the use of the machine, e.g. about:	All the related information is stated in the instruction handbook	Pass

	- intended use; - description of manual controls (actuators); - setting and adjustment; - modes and means for stopping (especially emergency stop) - risks which could not be eliminated by the protective measures taken by the designer; - particular risks which may be generated by certain applications, by the use of certain fittings, and about specific safeguards which are necessary for such applications. -reasonably foreseeable misuse and prohibited usages; - fault identification and location , repair, and re-starting after an intervention; - personal protective equipment which need to be usd and training required.	All the related information is stated in the instruction handbook	Pass
	e) information for maintenance e.g.	All the related information is stated in the instruction handbook	Pass
	-nature and frequency of inspections for safety functions; -instructions relating to maintenance operations which require a definite technical knowledge or particular skills and hence should be carried out exclusively by skilled persons (e.g. maintenance staff, specialists) - instructions relating to maintenance actions (e.g. replacement of parts) which do not require specific skills and hence may be carried out by users (e.g. operators) -drawings and diagrams enabling maintenance personnel to carry out their task rationally (especially fault-finding tasks) f) information relating to de-commissioning , dismantling and disposal; g) information for emergency situations , e.g. : - type of fire-fighting equipment to be used. - warning about possible emission or leakage of harmful substance(s), and if possible, indication of means to fight their effects.	All the related information is stated in the instruction handbook	Pass
	h) maintenance instructions provided for skilled persons (second dash in e))and maintenance instructions provided for unskilled persons (third dash in e)), that should appear clearly separated from each other.	All the related information is stated in the instruction handbook	Pass
6.4.5.2	Production of the instruction handbook	All the related information is stated in the instruction handbook	Pass

	a) type and size of print shall ensure the best possible legibility. Safety warnings and/or cautions should be emphasized the use of colours, symbols and/or large print.	All the related information is stated in the instruction handbook	Pass
	b) information for use shall be given in the language(s) of the country in which the machine will be used for the first time and in the original version. If more than one language are to be used, each language should be readily distinguished from the other(s), and efforts should be made to keep the translated text and the relevant illustration together.	All the related information is stated in the instruction handbook	Pass
	c) whenever helpful to the understanding, text should be supplemented with written details enabling, for instance, manual controls (actuators) to be located and identified; they should not be separated from the accompanying text and should follow sequential operations.	All the related information is stated in the instruction handbook	Pass
	d) consideration should be given to presenting information in tabular form where this will aid understanding.Tables should be adjacent to the relevant text.	All the related information is stated in the instruction handbook	Pass
	e) the use of colours should be considered, particularly in relation to components requiring quick identification.	All the related information is stated in the instruction handbook	Pass
	f) when information for use is lengthy, a table of contents and/or an index should be given.	All the related information is stated in the instruction handbook	Pass
	g) safety-relevant instructions which involve immediate action should be provided in a form readily available to the operator.	All the related information is stated in the instruction handbook	Pass
6.4.5.3	Drafting and editing information for use		-
	a) relationship to model : the information shall clearly relate to the specific model of machine and, if necessary, other appropriate identification (for example, by serial number).	All the related information is stated in the instruction handbook	Pass
	b) communicate principles : when information for use is being prepared, the communication process “see-think-use” should be followed in order to achieve the maximum effect and should follow sequential operations. The questions “how ?” and “why ?” should be anticipated and the answers provided.	All the related information is stated in the instruction handbook	Pass
	c) information for use shall be as simple and as brief as possible, and should be expressed in consistent terms and units with a clear explanation of unusual technical terms.	All the related information is stated in the instruction handbook	Pass

	d) when it is foreseen that a machine will be put to non-professional use, the instructions should be written in a form that is readily understood by the non-professional users. If personal protective equipment is required for the safe use of the machine, clear advice should be given, e.g. on the packaging as well as on the machine, so that this information is prominently displayed at the point of sale.	All the related information is stated in the instruction handbook	Pass
	e) durability and availability of the documents : documents giving instructions for use should be produced in durable form (i.e. they should be able to survive frequent handling by the user). It may be useful to mark them “keep for future reference”. Where information for use is kept in electronic form (e.g. CD, DVD, tape) information on safety-related issues that need immediate action shall always be backed up with a hand copy that is readily available.	All the related information is stated in the instruction handbook	Pass
7	Documentation of risk assessment and risk reduction		-
	The documentation shall demonstrate the procedure that has been followed and the results that have been achieved. This includes, when relevant, documentation		-
	a)the machinery for which the risk assessment has been made (for example, specifications, limits, intended use);	See the risk assessment report in detail.	Pass
	b) any relevant assumptions that have been made (loads, strengths, safety factors, etc.);	See the risk assessment report in detail.	Pass
	c) the hazards and hazardous situations identified and the hazardous events considered in the risk assessment	See the risk assessment report in detail.	Pass
	d) the information on which risk assessment was based (see 5.2):	See the risk assessment report in detail.	Pass
	1) the data used and the sources (accident histories, experience gained from risk reduction applied to similar machinery, etc.);	See the risk assessment report in detail.	Pass
	2) the uncertainty associated with the data used and its impact on the risk assessment;	See the risk assessment report in detail.	Pass
	e) the risk reduction objectives to be achieved by protective measures;	See the risk assessment report in detail.	Pass
	f) the protective measures implemented to eliminate identified hazards or to reduce risk;	See the risk assessment report in detail.	Pass
	g) residual risks associated with the machinery;	See the risk assessment report in detail.	Pass
	h) the result of the risk assessment (see Figure 1);	See the risk assessment report in detail.	Pass
	i) any forms completed during the risk assessment.	See the risk assessment report in detail.	Pass

ATTACHMENT PHOTOGRAPHS OF EUT

Photo 1

Photo 2

Photo 3

Photo 4

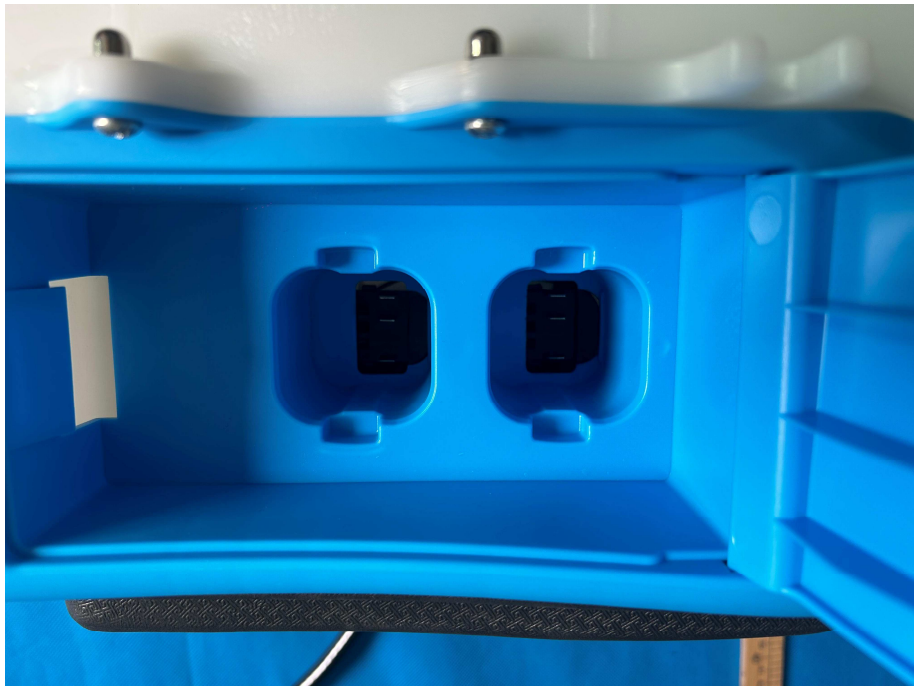

Photo 5

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