



TEST REPORT

Report No.: STE24080710S

Product: 3D Printer

Model No.: Anycubic Kobra S1, (others refer to page 2)

Prepared for: Shenzhen Anycubic Technology Co., Ltd

Address: 1201-1314, Unit B, Block 3, Vanke Times Square, No. 85 Longcheng Avenue, Shangjing Community, Longcheng Subdistrict, Longgang District, Shenzhen, China

Prepared by: Shenzhen STE Testing Laboratory Co., Ltd.

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TEST REPORT

EN 60204-1

Safety of machinery - Electrical equipment of machines Part 1: General requirements

Report Number.....: STE24080710S

Tested by (name + signature).....: Plum Xiao / Test engineer

Approved by (name + signature).....: Awen Huang / Project manager

Date of issue.....: August 13, 2024

Total number of pages.....: 70

Testing Laboratory: Shenzhen STE Testing Laboratory Co., Ltd.

Address: 3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhe Community, Guanlan Street, Longhua District, Shenzhen, China

Applicant's name.....: Shenzhen Aincubic Technology Co., Ltd

Address.....: 1201-1314, Unit B, Block 3, Vanke Times Square, No. 85 Longcheng Avenue, Shangjing Community, Longcheng Subdistrict, Longgang District, Shenzhen, China

Manufacturer's name.....: Shenzhen Aincubic Technology Co., Ltd

Address.....: 1201-1314, Unit B, Block 3, Vanke Times Square, No. 85 Longcheng Avenue, Shangjing Community, Longcheng Subdistrict, Longgang District, Shenzhen, China

Test specification:

Standard.....: EN 60204-1: 2018

Test procedure.....: Type test

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

Test Report Form No.....: IEC60204_1B

Test Report Form(s) Originator.....: Eurofins Electrosuisse

Master TRF.....: Dated: 2019-03-15

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Test item description.....: 3D Printer

Model/Type reference.....: **Aincubic Kobra S1**, Kobra S1, Aincubic Kobra S1 Combo, Kobra S1 Combo

Trade Mark.....: ANYCUBIC

Ratings.....: Input: 100-240V~, 50/60Hz, Max.6.9A



Summary of testing:**Testing location:**

Shenzhen STE Testing Laboratory Co., Ltd.

3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, NiuHu Community, Guanlan Street, Longhua District, Shenzhen, China

Tests performed (name of test and test clause):

➤ EN 60204-1: 2018

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.

**Remarks:**

1. Height of CE mark is 5mm or more, height of WEEE symbol is 7mm or more, height of other marks is 5mm or more, height of letters and numerals is 2mm or more.

TEST ITEM PARTICULARS:

Equipment mobility.....: Transportable

Classification of installation and use.....: Class I

Supply Connection.....: Detachable power cord

Operating condition.....: [x] continuous
[] rated operating / resting time:

Possible test case verdicts:

- test case does not apply to the test object.....: N or N/A (Not Applicable)

- test object does meet the requirement.....: P (Pass)

- test object does not meet the requirement.....: F (Fail)

Testing.....:

Date of receipt of test item.....: July 15, 2024

Date(s) of performance of tests.....: July 15, 2024 to August 13, 2024

General remarks:

The test results presented in this report relate only to the object tested.
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"(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.

Manufacturer's Declaration per sub-clause 4.2.5 of IEC60335-1:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....:

☐ Yes
☒ Not applicable

General product information

1, The product is incorporated motor and power units.

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
1	Scope		-
	This part of IEC 60204 applies to the application of electrical, electronic and programmable electronic equipment and systems to machines not portable by hand while working, including a group of machines working together in a co-ordinated manner.	These machines are within this scope.	P
	This part of IEC 60204 is applicable to the electrical equipment or parts of the electrical equipment that operate with nominal supply voltages not exceeding 1 000 V for alternating current (AC) and not exceeding 1 500 V for direct current (DC), and with nominal supply frequencies not exceeding 200 Hz.	The nominal supply voltage for these machines is 100-240V ~, and the nominal frequency is 50/60Hz.	P
2	Normative references		--
3	Terms and definitions		--
4	General requirements		--
4.1	General		--
	Hazards relevant to the electrical equipment are assessed as part of the overall risk assessment of the machine as described		P
4.2	Selection of equipment		-
4.2.1	Electrical components and devices shall be: - suitable for their intended use - conform to IEC standards where such exist - be applied in accordance with supplier's instructions	This requirement has been considered during design.	-
4.2.2	Where appropriate electrical equipment in compliance with IEC 61439 series		-
4.3	Electrical supply		-
	The electrical equipment shall be designed to operate correctly with the relevant conditions of supply	They can be operated correctly with the relevant conditions of supply.	P
4.3.1	Electrical equipment to be designed for correct operation within the conditions of mains power supply		P
	- as stated below (4.3.2 or 4.3.3)	See 4.3.2	P

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- or as specified by the user		N
	- or as specified by the supplier (4.3.4)		N
4.3.2	AC supplies		P
	Supply Voltage: Steady state voltage: 0.9 ... 1.1 of nominal voltage	90-264V~	P
	Frequency: 0.99 ... 1.01 of nominal frequency continuously; 0.98 ... 1.02 short time.	49-51Hz /59-61Hz	P
	Harmonics: not exceeding 12 % of the total r.m.s. etc.		P
	Voltage unbalance: not exceeding 2% deviation		P
	Voltage interruption: interrupted or at zero voltage for not more than 3 ms at any random time in the supply cycle with more than 1 s between successive interruptions		P
	Voltage dips not exceeding 20 % of the rms voltage of the supply for more than one cycle with more than 1 s between successive dips		P
4.3.3	DC supplies		N
	Supply voltage: - batteries: 0.85 – 1.15 of nominal voltage - battery-operated vehicles: 0.7 – 1.2 of nom. volt. - from converting equipment: 0.9 – 1.1 of nom. volt.		N
	Voltage interruption: - batteries: not exceeding 5 ms - converting equipment: not exceeding 20 ms		N
	Ripple (peak-to-peak): not exceed. 0.15 of nom. volt.		N
4.3.4	Special supply systems (e.g. on-board generators, DC bus) limits acc. 4.3.2 /3 may be exceeded, provided equipment is designed accordingly		N
4.4	Physical environment and operating conditions		P
4.4.1	Electrical equipment suitable for the physical environment and operating conditions of its intended use.		P
4.4.2	Immunity and/or emission tests required unless	Tests according to EMI standard	P
	- incorporated devices and components comply with the relevant product standard and		N

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Clause	Requirement + Test	Result - Remark	Verdict
	- installation and wiring according supplier instructions or Annex H:		N
4.4.3	Electrical equipment shall be capable of operating correctly in the intended ambient air temperature. (Minimum requirement: air temperatures of +5 °C and +40 °C)	5 - 40°C, Normal working	P
4.4.4	Electrical equipment shall be capable of operating correctly when the relative humidity is up to 50 % at a maximum temperature of +40 °C	Normal working	P
	Harmful effects of condensation shall be avoided		P
4.4.5	Electrical equipment shall be capable of operating correctly at altitudes up to 1 000 m above mean sea level		P
	For equipment to be used at higher altitudes the reduction of dielectric strength, switching capability and cooling effects shall be taken into account	Altitude < 2000m	P
4.4.6	Electrical equipment shall be adequately protected against the ingress of solids and liquids (see 11.3)	IPX0	N
4.4.7	When equipment is subjected to radiation, additional measures shall be taken		P
4.4.8	Undesirable effects of vibration, shock and bump avoided by suitable means		P
4.5	Electrical equipment designed to withstand the effects of transportation and storage within a temperature range of - 25 to + 55 °C		P
4.6	Heavy or bulky electrical equipment of the machine provided with suitable means for handling		P

5	Incoming supply conductor terminations and devices for disconnecting and switching off		-
5.1	Incoming supply conductor terminations		-
	Recommendation that electrical equipment of a machine is connected to a single supply (For large complex machinery, there can be a need for more than one incoming supply)	1 power supply	P
	Unless a plug is provided, supply conductors should be terminated at the supply disconnecting device		P
	Neutral conductor clearly indicated in technical documentation with "N" (see cl. 16.1)		P
	A separate terminal, labelled N provided (it may be part of the supply disconnecting device)		P
	No connection between neutral conductor and protective bonding circuit		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Exception: a connection may be made between the neutral terminal and the PE terminal at the point of the connection of the electrical equipment to a TN-C supply system.		N
	For machines supplied from parallel sources the requirements of IEC 60364-1 apply		P
	All terminals of incoming supply clearly marked in acc. with IEC 60445)		P
5.2	Terminal for connection of external protective conductor (PE)		-
	For each incoming supply, a terminal shall be provided in the same compartment as the line conductor terminals for connection to the external protective conductor	A terminal has been provided for each incoming supply.	P
	Terminal size according to table 1 in relation to the line conductors	This requirement has been met.	P
	Where an external protective conductor other than copper is used, the terminal size and type shall be selected accordingly	This requirement has been met.	P
	At each incoming point this terminal shall be marked or labelled with the letters PE	This requirement has been met.	P
5.3	Supply disconnecting device		--
5.3.1	A supply disconnecting device shall be provided: -- for each incoming source of supply to a machine(s); -- for each on-board power supply.	A supply disconnecting device is provided.	P
	When two or more supply disconnecting devices are provided, protective interlocks for their correct operation shall also be provided in order to prevent a hazardous situation, including damage to the machine or to the work in progress.		P
5.3.2	The supply disconnecting device shall be one of the following:		-
	a) a switch-disconnector, acc. to IEC 60947-3 for at least appliance category AC-23 B or DC-23 B		N
	b) a control and protective switching device suitable for insulation acc. to IEC 60947-6-2		N
	c) a circuit-breaker suitable for isolation in accordance with IEC 60947-2;		P
	d) any other switching device in accordance with an IEC product standard for that device and which meets the isolation requirements of IEC 60947-1 as well as a utilization category defined in the product standard as appropriate for on-load switching of motors or other inductive loads;		N

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Clause	Requirement + Test	Result - Remark	Verdict
	e) a plug/ socket combination for a flexible cable supply.		P
5.3.3	A disconnection device acc. to 5.3.2 a) to d) has to fulfill all of the following requirements		P
	- isolate the electrical equipment from the supply and have one OFF (isolated) and one ON position marked with "O" and "I"		P
	- have a visible contact gap or a position indicator which cannot indicate OFF (isolated) until all contacts are actually open and the requirements for the isolating function have been satisfied		P
	- have an operating means (see 5.3.4)		P
	- coloured black or grey recommended (If used as an emergency stop, red/yellow combination selected)		P
	- be provided with a means permitting it to be locked in the OFF position (padlocks). When so locked, remote as well as local closing shall be prevented		P
	- disconnect all live conductors of its power supply circuit		P
	For TN supply systems, the neutral conductor may or may not be disconnected except in countries where disconnection of the neutral conductor (when used) is compulsory		N
	- have a braking capacity to interrupt the system, when the largest motor is stalled		N
	A plug/ socket combination used as a disconnection device shall: - comply with 13.4.5 - have a braking capacity to interrupt the system, when the largest motor is stalled		P
5.3.4	Operating means of supply disconnecting devices (e.g. a handle) shall be external to the enclosure		P
	Exception: for power-operated switchgear this can be some other means (e.g. pushbutton) instead of a handle		N
	The operating means shall be easily accessible and located between 0,6 m and 1,9 m above the servicing level (upper limit of 1,7 m is recommended)		P
	Where intended for emergency operation, see 10.7.3 or 10.8.3		P
	Where not intended for emergency operation - the colours black or grey are recommended - a supplementary cover or door that can be readily opened without a key or tool may be provided. It		P

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Clause	Requirement + Test	Result - Remark	Verdict
	shall clearly show its function, e.g. by relevant symbols		
5.3.5	The following circuits need not be disconnected by the supply disconnecting device: - lighting circuits for lighting needed during maintenance or repair; - socket outlets for the exclusive connection of repair or maintenance tools and equipment; - undervoltage protection circuits that are only provided for automatic tripping in the event of supply failure; - circuits supplying equipment that should normally remain energized for correct operation Such circuits should be provided with their own disconnecting device.		P
	Where expected circuits are not disconnected by the supply disconnecting device:		--
	- permanent warning labels shall be placed close to the operating means		P
	- a statement shall be included in the maintenance manual and		P
	- the conductors are identified by colour, taking into account the recommendation of Cl.13.2.4, or - expected circuits are separated from other circuits, or - expected circuits are identified by permanent warning labels		P
5.4	Devices for removal of power for prevention of unexpected start-up		-
	Devices for removal of power for the prevention of unexpected start-up shall be provided where this can create a hazard	There is such function to prevent unexpected start-up.	P
	Such devices shall be appropriate and convenient for the intended use, shall be suitably placed, and readily identifiable as to their function and purpose	These requirements have been met.	P
	Where not obvious, they shall be marked to indicate the extent of removal of power	Switch combination has been used.	P
	Devices in accordance with 5.3.2 may be used for this purpose		P
	Disconnectors, withdrawable fuse links and withdrawable links only used, if located in enclosed electrical operator area (see 3.1.23)		P
	The following devices that fulfill the isolation function may be provided for this purpose:		-
	Devices that do not fulfil the isolation function (e.g. a contactor switched off by a control circuit		P

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Clause	Requirement + Test	Result - Remark	Verdict
	etc.) only used for tasks such as: – inspections; – adjustments; – work on the electrical equipment where there are only minor risks (as described)		
5.5	Devices for isolating electrical equipment		-
	Such devices shall be: - appropriate and convenient for the intended use; - suitably placed; - readily identifiable as to which part or circuit of the equipment is served. They shall be marked unless their function and purpose is obvious		P
	Where it is necessary to work on individual parts of the electrical equipment of a machine, or on one of a number of machines fed by a common conductor bar, conductor wire or inductive power supply system, a disconnecting device is provided for each part, or for each machine, requiring separate isolation		P
	In addition, the following devices that fulfil the isolation function may be provided for this purpose: - devices described in 5.3.2; - disconnectors, withdrawable fuse links and withdrawable links only used, if located in enclosed electrical operator area (see 3.1.23) and information provided (see cl 17)		P
5.6	Protection against unauthorized, inadvertent and/or mistaken connection		-
	Where devices acc. to cl. 5.4 and 5. are located outside an enclosed electrical operator area, locking means in OFF position shall be provided When so secured, local and remote reconnection shall be prevented		P
	Where these devices are located inside an enclosed electrical operator area, other means of protection against unintended reconnection can be sufficient		N
	Where a plug/socket combinations is so positioned that it can be kept under the immediate supervision of the person carrying out the work, means for securing in the disconnected state are not needed		N
6	Protection against electric shock		-
6.1	The electrical equipment shall provide protection against electric shock by basic protection and fault protection		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Where the measures for protection as in 6.2, 6.3 and 6.4 are not practicable, other measures from IEC 60364-4-41 may be used (e.g. SELV)		P
6.2	Basic protection		-
6.2.1	For each circuit the measures of 6.2.2, 6.2.3 and, where applicable, 6.2.4 shall apply	Please see the relative report.	P
	Where not appropriate, other measures as defined in IEC 60364-4-41 may be applied (see also 6.2.5 and 6.2.6)		P
	For equipment in places open to all persons including children, 6.2.2 with a minimum protection of IP4X or IPXXD, or 6.2.3 shall be applied		N
6.2.2	Live parts shall be located inside enclosures that provide protection against contact with live parts of at least IP2X or IPXXB.	Live parts shield by enclosure	P
	Where the top surfaces of the enclosure are readily accessible, the minimum degree of protection against direct contact provided by the top surfaces shall be IP4X or IPXXD.		N
	Opening an enclosure (i.e. opening doors, lids, covers, and the like) shall be possible only under one of the following conditions:		P
a)	The use of a key or tool is necessary for access.	Need tools	P
	All live parts (including those on the inside of doors) likely to be touched when resetting or adjusting devices intended for such operations while the equipment is still connected, are protected against contact to at least IP2X or IPXXB		P
	Other live parts on the inside of doors are protected against unintentional direct contact to at least IP1X or IPXXA.		P
b)	The disconnection of live parts inside the enclosure before it can be opened (see explanation)		P.
	Exception: a key or tool as prescribed by the supplier can be used to defeat the interlock, provided that the following conditions are met:		--
	- it is possible at all times while the interlock is defeated to open the disconnecting device and lock the disconnecting device in the OFF position or otherwise prevent unauthorised closure of the disconnecting device;		P
	- upon closing the door, the interlock is automatically restored		N
	- all live parts (), likely to be touched ... are protected against unintentional contact to at least		N

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Clause	Requirement + Test	Result - Remark	Verdict
	IP2X or IPXXB and other live parts on the inside of doors shall be protected against unintentional contact to at least IP1X or IPXXA		
	- relevant information about the procedure for the defeat of the interlock is provided with the instructions for use of the electrical equipment		P
	- means are provided to restrict access to live parts behind doors that are not directly interlocked with the disconnecting means to skilled or instructed persons		P
	All parts still alive after switching off the disconnecting device shall be protected against direct contact to at least IP 2X or IP XXB and be marked with a warning sign in accordance with 16.2.1 except for:		N
	- parts that can be live only because of connection to interlocking circuits and that are distinguished by colour as potentially live in accordance with 13.2.4		N
	- the supply terminals of the supply disconnecting device when the latter is mounted alone in a separate enclosure		N
c)	Opening without the use of a key or a tool and without disconnection of live parts shall be possible only when all live parts are protected against direct contact to at least IP2X or IPXXB (see IEC 60529).		N
	Where barriers provide this protection, either they shall require a tool for their removal or all live parts protected by them shall be automatically disconnected when the barrier is removed.		N
	Where a hazard can be caused by manual action of devices (), such action shall be prevented by barriers or obstacles that require a tool for their removal		N
6.2.3	Protection by insulation of live parts		-
	Live parts protected by insulation shall be completely covered with insulation that can only be removed by destruction and that is capable of withstanding the mechanical, chemical, electrical, and thermal stresses to which it can be subjected under normal operating conditions	This requirement has been met.	P
	Note: Paint, varnish lacquer etc. alone are generally considered inadequate		N
6.2.4	Protection against residual voltages		-
	Live parts having a residual voltage greater than 60 V when disconnected, shall be discharged to 60 V or less within 5 s, if this does not interfere with the proper functioning of the equipment		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Exempted are components having stored charges of 60 μ C or less		N
	Where not possible , an appropriate warning shall be placed according to the details given		N
	In case of pins of plugs etc. the discharge time shall not exceed 1s. Otherwise such conductors shall be protected to at least IP2X or IPXXB.		N
	If above requirements cannot be achieved, additional disconnecting devices or appropriate warning devices shall be provided	Only for skilled person	N
	When equipment is accessible to all persons incl. children, warnings are not sufficient and a protection of IP4X or IPXXD is required		N
6.2.5	For protection by barriers, the requirements of IEC 60364-4-41 shall apply (412.2)		P
6.2.6	For protection by placing out of reach or protection by obstacles, the requirements of IEC 60364-4-41 shall apply (412.4 and 412.3)		P
	For conductor wire or bar systems with less than IP2X or IPXXB, see 12.7.1		N
6.3	Fault protection		-
6.3.1	For each circuit or part of el. equipment at least one of the measures of 6.3.2 to 6.3.3 shall be applied:		-
	- Prevention of the occurrence of a touch voltage		P
	- Protection by automatic disconnection of supply		P
6.3.2	Prevention of the occurrence of a touch voltage		-
6.3.2.2	Protection by provision of one or more of the following:		-
	- class II electrical devices or apparatus (double insulation, reinforced insulation or by equivalent insulation in accordance with IEC 61140) or		P
	- switchgear and control gear assemblies having total insulation in accordance with IEC 61439-1or		P
	- supplementary or reinforced insulation in accordance with IEC 60364-4-41(413.2)		P
6.3.2.3	For protection by electrical separation the requirements of IEC 60364-4-41 apply (413.5)		P
6.3.3	Protection by automatic disconnection of supply		-
	This measure consists of the interruption of one or more line conductors in a time within the limits		P

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Clause	Requirement + Test	Result - Remark	Verdict
	specified in Annex A for TN and TT systems		
	This requires co-ordination between: - the type of supply, the source impedance and the earthing system - several impedance values - characteristics of protective devices (For details see 18.2)		-
	This protective measure comprises both:		-
	– protective bonding of exposed conductive parts (see 8.2.3),	This measure has been taken.	P
	–one of the following:		-
	a) In TN systems, the following protective devices may be used:		P
	● overcurrent protective device or		P
	● residual current protective devices (RCDs) and associated overcurrent protective devices		P
	b) In TT systems either:		P
	● RCDs and associated overcurrent protective devices or		P
	● overcurrent protective devices provided a low fault loop impedance is assured		P
	c) In IT-Systems the requirements of IEC 60364-4-41 shall be fulfilled	Not IT-Systems	N
	During an insulation fault an acoustic and an optical signal shall be sustained. The acoustic signal may manually be muted		N
	Where automatic disconnection is provided under a) and disconnection acc. to A.1.1 cannot be assured, supplementary protective bonding shall be provided to fulfil A.1.3		N
	Where protection of a PDS (power drive system) is not provided by the converter, the necessary protection shall be acc. to the converter manufacturer's instructions		N
6.4	Protection by the use of PELV		N
6.4.1	PELV circuits shall satisfy all of the following conditions:		N
	a) the nominal voltage does not exceed: - 25 V AC r.m.s. or 60 V ripple-free AC when the equipment is normally used in dry locations and when large area contact of live parts with the human body is not expected; or - 6 V AC r.m.s. or 15 V ripple-free DC in all other cases;	No PELV circuit has been used.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	b) one side of the circuit or one point of the source of the supply of that circuit is connected to the protective bonding circuit;		N
	c) live parts of PELV circuits shall be electrically separated from other live circuits (see IEC 61558)		N
	d) conductors of each PELV circuit shall be physically separated from those of any other circuit. If this requirement is impracticable, the insulation provisions of 13.1.3 shall apply		N
	e) plugs and socket-outlets for a PELV circuit shall conform to the following: - plugs shall not to enter socket-outlets of other voltage systems - socket-outlets shall not admit plugs of other voltage systems		N
6.4.2	The sources for PELV shall be one of the following:		-
	- a safety isolating transformer in accordance with IEC 61558-1 and IEC 61558-2-6 or		N
	- a source of current with a degree of safety equivalent to that of the safety isolating transformer or		N
	- a source independent of circuit with higher voltage (e.g. battery or diesel –driven) or		N
	- electronic power supply conforming to appropriate standards		N

7	Protection of equipment		-
7.2	Overcurrent protection		P
7.2.1	Overcurrent protection shall be provided where the current in any circuit can exceed the rating of a component or the capacity of a conductor		P
7.2.2	Supply conductors		-
	Unless otherwise specified by the user, the supplier of the electrical equipment is not responsible for providing the supply conductors or the overcurrent protective device for it		P
	In the installation documents, the data necessary for conductor dimensioning and selecting the overcurrent protective device are stated (see 7.2.10 and 17.4)		P
7.2.3	Power circuits		-
	Devices for detection and interruption of overcurrent, selected in accordance with 7.2.10,		P

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Clause	Requirement + Test	Result - Remark	Verdict
	are applied to each live conductor including supplies to control circuit transformers.		
	The following conductors shall not be disconnected without disconnecting all associated live conductors: - the neutral conductor of AC power circuits; - the earthed conductor of DC power circuits; - DC power conductors bonded to exposed conductive parts of mobile machines.		P
	Where the cross-section area of the neutral conductor is at least equal to the line conductor, no overcurrent detection nor disconnecting device is required for that conductor		P
	Otherwise the measures detailed in 524 of IEC 60364-5-52:2009 shall apply		N
	In IT-Systems, it is recommended that no neutral conductor is used.		N
	Where a neutral conductor is used, the measures detailed in 431.2.2 of IEC 60364-4-43:2008 shall apply		N
7.2.4	Control circuits		-
	Conductors of control circuits directly connected to the supply shall be protected against overcurrent in accordance with 7.2.3.	This requirement has been met.	P
	Conductors of control circuits supplied by a transformer or DC supply shall be protected against overcurrent (see also 9.4.3.1.1):		P
	- In control circuits, connected to the protective bonding circuit, by an overcurrent protective device in the switched conductor		P
	- In circuits, not connected to the protective bonding circuit: ● Where all control circuits have the same current carrying capacity, by an overcurrent protective device in the switched conductor ● Otherwise, by an overcurrent protective device in both, switched and common conductors of each control circuit		P
	Exception: Where a supply unit provides current limiting below the capacity of the conductors and the connected components, no overcurrent protective device is required		N
7.2.5	Overcurrent protection shall be provided for circuits feeding general purpose socket outlets		P
7.2.6	Unearthed conductors of lighting circuits shall be protected separately from other circuits.		P

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.7	Transformers shall be protected in accordance with the manufacturer's instructions and includes: - avoiding tripping due to transformer magnetizing inrush currents - avoiding a winding temperature rise in excess of the permitted value for the insulation class when there is a short circuit at the secondary terminals		P
7.2.8	Location of over current protective device		-
	It shall be located at the point where a reduction in the cross sectional area of the conductors or another change reduces the current-carrying capacity of the conductors except:		P
	- current carrying capacity of the conductors is at least equal to that of the load and - conductors between the point of reduction of current-carrying capacity and the position of the overcurrent protective device is ≤ 3 m and - the conductor is protected e.g. by an enclosure or duct.		P
7.2.9	Over current protective devices		-
	The rated short-circuit breaking capacity I_{cn} shall be at least equal to the prospective fault current at the point of installation.		P
	Additional currents other than from the supply (e.g. from motors, from power factor correction capacitors) shall be taken into consideration.		P
	Where fuses are used, a type readily available in the country of use shall be selected, or arrangement shall be made with the use for the supply of spare parts	This requirement has been considered during design.	P
7.2.10	Rating and setting of over current protective devices		-
	Rated current of fuses or overcurrent setting of other protective devices selected as low as possible, but adequate for anticipated overcurrents.	This requirement has been met.	P
	The rated current of overcurrent protective device for conductors is determined by the current carrying capacity of the conductors to be protected in accordance with Cl. 12.4, D.2 and the maximum allowable interrupting time t in accordance with Clause D.3.	This requirement has been considered during design.	P
7.3	Protection of motors against overheating		-
7.3.1	Protection shall be provided for each motor rated at more than 0.5 kW.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Exception: - In applications where an automatic interruption of the motor operation is unacceptable (for example fire pumps), the means of detection shall give a warning signal to which the operator can respond.		N
	Automatic restarting prevented where this can cause a hazard		P
7.3.2	Protection achieved by overload protection device: - detection in each live conductor - switching off of all live conductors (not necessary to switch of neutral conductor)		P
	For special duty motors, appropriate protective devices are recommended		P
	For motors that cannot be overloaded, overload protection is not required.		N
7.3.3	Protection achieved by over-temperature protection device: Is recommended in situations where the cooling can be impaired (for example dusty environments)		N
7.4	Equipment shall be protected against abnormal temperatures that can result in a hazardous situation.	No need.	N
7.5	Protection against supply interruption or voltage reduction and subsequent restoration		-
	Where a voltage drop or a supply interruption can cause a hazardous condition, damage to the machine, or to the work in progress, under voltage protection shall be provided	No this kind of hazard has been found.	P
	The operation of the under voltage device shall not impair the operation of any stopping control of the machine	No under voltage device is used.	N
	Upon restoration of the voltage or upon switching on the incoming supply, automatic or unexpected restarting of the machine shall be prevented	Automatic of unexpected restarting of the machine can be prevented.	P
	Where only a part of the machine or of the group of machines working together in a coordinated manner is affected by the voltage reduction or supply interruption, the under voltage protection shall initiate appropriate control responses to ensure co-ordination		N
7.6	Motor overspeed protection shall be provided where overspeeding can occur and could possibly cause a hazardous situation.		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.7	Earth fault/residual current protection		-
	Use of earth fault/ residual current protection for automatic disconnection		P
7.8	Phase sequence protection		P
	Where an incorrect sequence of the supply voltage can cause a hazardous condition or damage to the machine, protection shall be provided		P
7.9	Protection against over voltage due to lighting and to switching surges		-
	Protection devices can be provided to protect against the effects of over voltages due to lighting or to switching surges		P
7.10	The short-circuit current rating of the electrical equipment shall be determined by the application of design rules or by calculation or by test.		P

8	Equipotential bonding		--
8.1	General		-
8.2	Protective bonding circuit		-
8.2.1	General		-
	All parts of the protective bonding circuit shall be so designed that they are capable of withstanding the highest thermal and mechanical stresses	All these circuits have been designed that are capable of withstanding the highest thermal and mechanical stresses.	P
	Protective conductors which does not form part of a cable shall not be less than:		--
	- 2.5 mm ² Cu or 16 mm ² Al if protection against mechanical damage is provided	≥ 2.5 mm ² Cu	P
	- 4 mm ² Cu or 16 mm ² Al if protection against mechanical damage is not provided		N
	Small parts and other conductive parts that do not constitute a hazard need not to be earthed		P
8.2.2	Protective conductors		-
	Protective conductors shall be identified in accordance with 13.2.2.	Please see clause 13.2.2 in detail.	P
	Copper conductors are preferred.		P
	Where a conductor material other than copper is used, its electrical resistance per unit length shall not exceed that of the allowable copper conductor and such conductors shall be not less than 16	Only copper conductors are used.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	mm ² in cross-sectional area.		
	Metal enclosures or frames or mounting plates may be used as protective conductors if they satisfy the following three requirements: -protection against mechanical, chemical or electrochemical deterioration -compliant with 543.1 of IEC 60364-5-54: permit the connection of other protective conductors where foreseen		P
	The cross-section of protective conductors shall be calculated according to 543.1.2 of IEC 60364-5-54, or selected in accordance with Table 1.	They have been used according to these requirements.	P
	Each protective conductor shall: -be part of a multicore cable, or; -be in a common enclosure with the line conductor, or; -have a cross-sectional area of at least; • 2.5 mm² Cu or 16 mm² Al with protection against mechanical damage • 4 mm² Cu or 16 mm² Al without protection against mechanical damage		P
	A protective conductor not forming part of a cable is considered to be mechanically protected if it is installed in a conduit, trunking or protected in a similar way.		P
	The following parts shall be connected to the protective bonding circuit but shall not be used as protective conductors: -conductive structural parts of the machine; -metal ducts of flexible or rigid construction; -metallic cable sheaths or armouring; -metallic pipes containing flammable materials such as gases, liquids, powder. -flexible or pliable metal conduits; -constructional parts subject to mechanical stress in normal service; • flexible metal parts; support wires; cable trays and cable ladders.		-P
8.2.3	Continuity of the protective bonding circuit		-
	Where a part is removed the protective bonding circuit for the remaining parts isn't interrupted.	This requirement has been met.	P
	Current-carrying capacity of connection and bonding points not impaired by mechanical, chemical, or electrochemical influences (e.g. electrolytic corrosion on aluminium parts)	Their current-carrying capacity is stable enough	P
	Where the electrical equipment is mounted on lids,		P

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Clause	Requirement + Test	Result - Remark	Verdict
	doors, or cover plates, continuity of the protective bonding circuit shall be ensured. The use of a protective conductor (see 8.2.2) is recommended.		
	For cables that are exposed to damage (for example flexible trailing cables) the continuity of the protective conductors are ensured by appropriate measures (for example monitoring).	Appropriate protection has been provided.	P
	Where the continuity can be interrupted, a first make last break contact is required.	No this kind of device is used.	N
8.2.4	Protective conductor connecting points are not intended to attach appliances or parts.		-
	Each connecting point shall be marked or labelled as such using the symbol IEC 60417-5019 or the letters PE or by use of bicolour GREEN / YELLOW		P
8.2.5	Mobile machines with on-board power supplies: The protective bonding system is connected to a single protective bonding terminal. This protective bonding terminal is the connection point for a possible additional external incoming power supply		N
8.2.6	Additional requirements for electrical equipment having earth leakage currents higher than 10 mA		-
	Where electrical equipment has an earth leakage current greater than 10 mA AC or DC the associated protective bonding circuit shall satisfy one of the following:		--
	a) the protective conductor is completely enclosed or otherwise protected		N
	b) the protective conductor has a cross-sectional area of at least 10 mm ² Cu or 16 mm ² Al		N
	c) a second protective conductor of at least the same cross-sectional area is provided		P
	d) the supply is automatically disconnected in case of loss of continuity of the protective conductor		N
	e) where a plug-socket combination is used, an industrial connector in accordance with IEC 60309 series is provided		P
	A statement shall be given in the instructions for installation that the equipment shall be installed as described in this 8.2.6.		P
8.3	Measures to restrict the effects of high leakage current can be taken as described	The measure described in this clause has been used.	P
8.4	If functional bonding is used, the connecting points should be marked with symbol IEC 60417-5020		P

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Clause	Requirement + Test	Result - Remark	Verdict
9	Control circuits and control functions		-
9.1	Control circuits		-
9.1.1	Control circuit supply		-
	Where control circuits are supplied from an AC source, transformers having separate windings shall be used to separate the power supply from the control supply.	An AC transformer has been used.	P
	Examples include: control transformers acc. to IEC 61558-2-2, SMPS acc. to IEC 61558-2-16 power supplies acc. to IEC 61204-7		P
	Where several transformers are used, it is recommended that the windings of those transformers be connected in such a manner that the secondary voltages are in phase.		N
	Exception: Transformers or switch mode power supply units fitted with transformers are not mandatory for machines with a single motor starter and/or a maximum of two control devices		N
	Where DC control circuits derived from an AC supply are connected to the protective bonding, they shall be supplied from a separate winding		N
9.1.2	Control circuit voltages		-
	The nominal voltage of control circuits should preferably not exceed -230 V @ 50 Hz -277 V @ 60 Hz - 220 V @ DC	The nominal voltage for control circuit is 100-240V~	P
9.1.3	Control circuits shall be provided with overcurrent protection in accordance with 7.2.4 and 7.2.10.		P
9.2	Control functions		-
9.2.2	Categories of stop functions are stop category 0, 1, 2	category 0	P
9.2.3	Operation		P
9.2.3.1	Where a machine has more than one control station, measures shall be provided to ensure that initiation of commands from different control stations do not lead to a hazardous situation.	Only one control station	N
9.2.3.2	Start functions shall operate by energizing the relevant circuit.		P
	Start of an operation shall be possible only when all of the relevant safety functions and/or protective		P

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Clause	Requirement + Test	Result - Remark	Verdict
	measures are in place and are operational.		
	Where safety functions and/or protective measures cannot be applied for certain operations, manual control of such operations are by hold-to-run controls, together with enabling devices, as appropriate.		P
	In the case of machines requiring the use of more than one control station to initiate a start, each of these control stations shall have a separate manually actuated start control device. The conditions to initiate a start are: -all required conditions for machine operation shall be met and -all start control devices shall be in the released (off) position, then -all start control devices have to be actuated concurrently (see 3.1.7).		N
9.2.3.3	Stop category 0 and/or stop category 1 and/or stop category 2 stop functions are provided as indicated by the risk assessment and the functional requirements of the machine (see 4.1).		P
	Stop functions shall override related start functions		P
	Where more than one control station is provided, stop commands from any control station is effective when required by the risk assessment of the machine.		N
9.2.3.4	Emergency operations (emergency stop, emergency switching off)		P
	Emergency stop or emergency switching off commands shall be sustained until it is reset.		P
	This reset shall be possible only by a manual action at that location where the command has been initiated.		P
	The reset of the command shall not restart the machinery but only permit restarting.		P
	It shall not be possible to restart the machinery until all emergency stop commands are reset.		P
	It shall not be possible to reenergize the machinery until all emergency switching off commands are reset.		P
9.2.3.4.2	The emergency stop does function either as a stop category 0 or as a stop category 1.		P
	- it shall override all other functions and operations in all modes - it shall stop the hazardous motion as quickly as practicable without creating other hazards		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- a reset shall not initiate a restart		
9.2.3.4.3	Emergency switching off should be provided where: - Protection against direct contact is achieved only by placing out of reach or by obstacles (see 6.2.6) or - there is the possibility of other hazards or damage caused by electricity		P
	Emergency switching off is accomplished by electromechanical switching devices, effecting a stop category 0 of machine actuators connected to this incoming supply		P
9.2.3.5	Operating modes		--
	Where machinery uses several control or operating modes requiring different protective measures and having a different impact on safety, it shall be fitted with a mode selector which can be locked in each position		N
	Another selection method can be used (for example an access code)		N
	Mode selection by itself does not initiate machine operation. A separate actuation of the start control has to be stated by the operator.		N
	Indication of the selected operating mode shall be provided (e.g. the position of a mode selector, the provision of an indicating light, a visual display indication)		N
9.2.3.6	Movement or action that can result in a hazardous situation shall be monitored by providing, for example, overtravel limiters, motor overspeed detection, mechanical overload detection or anti-collision devices		P
9.2.3.7	Hold-to-run controls shall require continuous actuation of the control device(s) to achieve operation		P
9.2.3.8	Two-hand controls shall be one of the following types and have the following features		N
	Type I: -this type requires: -the provision of two control devices and their concurrent actuation by both hands; -continuous concurrent actuation during the hazardous situation; -machine operation shall cease upon the release		N
	Type II: - a Type I control requiring the release of both		N

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Clause	Requirement + Test	Result - Remark	Verdict
	control devices before machine operation can be reinitiated		
	Type III: - a Type II control requiring concurrent actuation of the control devices as follows: -it shall be necessary to actuate the control devices within a certain time limit of each -other, not exceeding 0.5 s -where this time limit is exceeded, both control devices shall be released before machine -operation can be initiated		N
9.2.3.9	Enabling control shall be so arranged as to minimize the possibility of defeating, for example by requiring the de-activation of the enabling control device before machine operation may be reinitiated		P
9.2.3.10	Combined start and stop controls: Push-buttons etc. that alternately initiate and stop motion shall only be provided for functions, which cannot result in a hazardous situation.		P
9.2.4	Cableless control system		N
9.2.4.1	The CCS shall have functionality and a response time suitable for the application based on the risk assessment.		N
9.2.4.2	The ability of a CCS to control a machine shall be automatically monitored, either continuously or at suitable intervals.		N
	If the communication signal has degraded (e.g., reduced signal level, low battery power) a warning shall be given		N
	When the ability to control a machine has been lost, an automatic stop of the machine shall be initiated.		N
	Its restoration shall not restart the machine.		N
9.2.4.3	Measures shall be taken to prevent the machine from responding to signals other than those from the intended operator control station(s).		N
	Cableless operator control station(s) shall only control the intended machine(s) and shall affect only the intended machine functions.		N
9.2.4.4	When more than one cableless operator control station is used, then:		N
	- only one control station shall be enabled at a time except as necessary for the operation		N

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Clause	Requirement + Test	Result - Remark	Verdict
	- transfer of control shall require a deliberate manual action at the station having control		N
	- transfer shall only be possible if both stations are in the same mode		N
	- a transfer shall not change the mode of operation or function		N
	- on the station that has control, a visual indication shall indicate this		N
9.2.4.5	Portable cableless operator control stations shall be provided with means to prevent unauthorized use		N
	Each machine should have an indication when it is under cableless control		N
	When possible to be connected to several machines, means shall be provided on the portable device to select		N
	Selecting a machine shall not initiate control commands.		N
9.2.4.6	A deliberate disabling shall meet the requirements of 9.2.4.2.		N
	Where disabling without interrupting machine operation is necessary, appropriate means shall be provided to transfer control		N
9.2.4.7	Emergency stop devices on portable cableless operator control stations shall not be the sole means of initiating an emergency stop		N
	Confusion between active and inactive emergency stop devices shall be avoided		N
9.2.4.8	Restarting of a cableless control shall not result in a reset of an emergency stop condition		N
	The instructions shall state that a reset shall only be performed when it can be seen that the reason has been cleared		N
9.3	Protective interlocks		-
9.3.1	The reclosing or resetting of an interlocking safeguard shall not initiate hazardous machine operation.		P
9.3.2	Where an operating limit (for example speed, pressure, position) can be exceeded leading to a hazardous situation, means shall be provided to detect when a predetermined limit(s) is exceeded and initiate an appropriate control action.		P
9.3.3	The correct operation of auxiliary functions shall be		P

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Clause	Requirement + Test	Result - Remark	Verdict
	checked by appropriate devices		
	Where the non-operation of a device can cause a hazard, appropriate interlocking shall be provided		P
9.3.4	Interlocks between different operations and for contrary motions shall be provided, if these operations can lead to hazardous situations		N
9.3.5	Where braking of a motor is accomplished by current reversal, measures shall prevent the motor starting in the opposite direction at the end of braking where that reversal can cause a hazardous situation or damage to the machine or to the work in progress		N
	For this purpose, a device operating exclusively as a function of time is not permitted		N
	Control circuits shall be so arranged that rotation of a motor shaft, for example manually, does not result in a hazardous situation		N
9.3.6	Where it is necessary to suspend safety functions and/or protective measures, the control or operating mode selector shall simultaneously:		--
	- disable all other operating (control) modes		P
	- permit operation only by the use of a hold-to-run device or by a similar control device positioned so as to permit sight of the hazardous elements		P
	- prevent any operation of hazardous functions by voluntary or involuntary action on the machine's sensors		P
	If these four conditions cannot be fulfilled, the mode selector shall activate other protective measures to ensure a safe intervention zone. In addition, the operator shall be able to control operation of the parts he is working on from the adjustment point.		P
9.4	Control functions in the event of failure		-
9.4.1	The electrical control system(s) shall have an appropriate performance that has been determined from the risk assessment of the machine	According to the risk assessment.	N
	The requirements for safety-related control functions of IEC 62061 and/or ISO 13849-1, ISO 13849-2 shall apply		N
	Where memory retention is achieved for example, by battery power, measures shall be taken to prevent hazardous situations arising from failure, undervoltage or removal of the battery		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Means shall be provided to prevent unauthorized or inadvertent memory alteration by, for example, requiring the use of a key, access code or tool		N
9.4.2	Measures to minimize risk in the event of failure		-
9.4.2.2	Use of proven circuit techniques and components (see examples)		P
9.4.2.3	Provisions of partial or complete redundancy		P
9.4.2.4	Provision of diversity (see examples)		P
9.4.2.5	Provision for functional tests		P
9.4.3	Protection against malfunction of control circuits		-
9.4.3.1.1	Measures shall be provided to reduce the probability that insulation faults on any control circuit can cause malfunction		P
9.4.3.1.2	Method a) – Earthed control circuits fed by transformers		P
	The common conductor shall be connected to the protective bonding circuit at the point of supply.		P
	All control elements are to be inserted on the other side of the components		P
9.4.3.1.3	Method b) – Non-earthed control circuits fed by transformers shall either		N
	1) have 2-pole control switches that operate on both conductors; or		N
	2) be provided with a device that interrupts the circuit automatically in the event of an earth fault; or		N
	3) where 2) above would increase the risk, it can be sufficient to provide an insulation monitoring device that will initiate an acoustic and optical signal		N
9.4.3.1.4	Method c) – Control circuits fed by transformer with an earthed centre-tap winding shall have overcurrent protective devices that break both the conductors		N
	The control switches shall be 2-pole types that operate on both conductors		N
9.4.3.1.5	Method d) – Control circuits not fed by a transformer are only allowed for machines with a maximum of one motor starter and/or maximum of two control devices, in accordance with 9.1.1		N
	Possible cases are:		N

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Clause	Requirement + Test	Result - Remark	Verdict
	1) directly connected to an earthed supply system (TN- or TT-system)		N
	If powered between two lines, multi-pole control switches are required		N
	2) directly connected to a supply system that is not earthed or is earthed through a high impedance (IT-system)		N
	A device shall be provided that interrupts the circuit automatically in the event of an earth fault		N
9.4.3.2	Where the loss of memory due to a power failure can result in a hazardous situation, appropriate measures shall be taken	No memory device has been used.	N
9.4.3.3	Where the loss of continuity of control circuits depending upon sliding contacts can result in a hazard, appropriate measures shall be taken		N

10	Operator interface and machine-mounted control devices		-
10.1	General		-
10.1.1	General requirements		-
	Control devices for operator interface shall, as far as is practicable, be selected, mounted, and identified or coded in accordance with IEC 61310 series	These requirements appropriate for this machine have been complied with.	P
10.1.2	As far as is practicable, machine-mounted control devices shall be:		-
	- readily accessible for service and maintenance		P
	- mounted in such a manner as to minimize the possibility of damage from activities such as material handling		P
	The actuators of hand-operated control devices are selected and installed so that:		--
	- they are not less than 0,6 m above the servicing level and are within easy reach of the normal working position of the operator		P
	- the operator is not placed in a hazardous situation when operating them		P
	The actuators of foot-operated control devices are selected and installed so that:		--
	- they are within easy reach of the normal working position of the operator		P
	- the operator is not placed in a hazardous situation when operating them		P
10.1.3	The degree of protection (IP rating in accordance with IEC 60529) together with other appropriate		P

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Clause	Requirement + Test	Result - Remark	Verdict
	measures shall provide protection against:		
	– the effects of liquids, vapours, or gases found in the physical environment or used on the machine		P
	– the ingress of contaminants (for example swarf, dust, particulate matter)		P
	The operator interface control devices shall have a minimum degree of protection against contact with live parts of IPXXD (see IEC 60529)		P
10.1.4	Position sensors		-
	Position sensors (for example position switches, proximity switches) are so arranged that they will not be damaged in the event of overtravel		P
	Position sensors in circuits with safety-related control functions shall have direct opening action (see IEC 60947-5-1) or shall provide similar reliability (see 9.4.2)		P
10.1.5	Portable and pendant control stations		-
	Portable and pendant control stations and their control devices shall be so selected and arranged as to minimize the possibility of inadvertent machine operations caused by shocks and vibrations		N
10.2	Actuators		-
10.2.1	Actuators shall be colour-coded as follows:		-
	Push-button actuators shall be color -coded according to table 2		P
	The colours for START/ON actuators should be WHITE, GREY, BLACK or GREEN with a preference for WHITE. RED shall not be used		P
	The colour RED shall be used for emergency stop and emergency switching off actuators		P
	If a background exists, it shall be coloured YELLOW		P
	The colours for STOP/OFF actuators should be BLACK, GREY, or WHITE with a preference for BLACK. GREEN shall not be used. RED is permitted		P
	WHITE, GREY, or BLACK are the preferred colours for actuators that alternately act as START/ON and STOP/OFF actuators. The colours RED, YELLOW, or GREEN shall not be used		P
	The same is applicable for “hold-to-run” actuators		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Reset actuators shall be BLUE, WHITE, GREY, or BLACK. Where they also act as a STOP/OFF actuator, the colours WHITE, GREY, or BLACK are preferred with the main preference being for BLACK. GREEN shall not be used.		P
	The colour YELLOW is reserved for use in abnormal conditions		P
	Where the same colours are used for various functions, a supplementary means of coding shall be used for the identification		P
10.2.2	Recommended markings for actuators are given in table 2 and 3		P
10.3	Indicator lights and displays		-
10.3.1	Indicator lights and displays shall be selected and installed in such a manner as to be visible from the normal position of the operator (see also IEC 61310-1).		P
	Circuits used for visual or audible devices used to warn persons of an impending hazardous event shall be fitted with facilities to check the operability of these devices		P
10.3.2	Indicator lights should be colour-coded with respect to the condition (status) of the machine in accordance with Table 4.		P
	Indicating towers on machines have the applicable colours in the following order from the top down; RED, YELLOW, BLUE, GREEN and WHITE.	Their colors are according to table 3.	P
10.3.3	For further distinction or information and especially to give additional emphasis, flashing lights and displays can be provided		P
	Where flashing lights or displays are used to provide higher priority information, additional acoustic warnings should be considered		P
10.4	illuminated push-button actuators shall be colour-coded in accordance with Tables 2 and 4. Where there is difficulty in assigning an appropriate colour, WHITE is used.		N
	The colour RED for the emergency stop actuator shall not depend on the illumination of its light.		N
10.5	Devices having a rotational member , such as potentiometers and selector switches, shall have means of prevention of rotation of the stationary member. Friction alone isn't considered sufficient.		N

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Clause	Requirement + Test	Result - Remark	Verdict
10.6	Actuators used to initiate a start function or the movement of machine elements shall be constructed and mounted so as to minimize inadvertent operation		N
10.7	Emergency stop devices		-
10.7.1	Devices for emergency stop are readily accessible		P
	Emergency stop devices shall be provided at each location where the initiation of an emergency stop can be required		P
	In circumstances where confusion can occur between active and inactive emergency stop devices caused by disabling the operator control station, means (for example, information for use) are provided to minimise confusion.		P
10.7.2	The types of device for emergency stop include, but are not limited to: – a push-button device for actuation by the palm or the fist (e.g. mushroom) – a pull-cord operated switch – a pedal-operated switch without mechanical guard	A push-button operated switch.	P
	The devices shall be in accordance with IEC 60947-5-5.		P
10.7.3	Where a stop category 0 is suitable, the supply disconnecting device may serve the function of emergency stop where: – it is readily accessible to the operator; and – it is of the type described in 5.3.2 a), b), c), or d)		P
	Where intended for emergency use, the supply disconnecting device shall meet the colour requirements of 10.2.1		P
10.8	Emergency switching off devices		-
10.8.1	Such devices shall be located as necessary for the given application.		P
	Means are provided, where necessary, to avoid confusion between these devices.		P
10.8.2	The types of device for emergency switching off include: – a push-button operated switch with a palm or mushroom head type of actuator; – a pull-cord operated switch.	push-button operated switch	P
	The devices shall have direct opening action		N
10.8.3	Where the supply disconnecting device is to be		P

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Clause	Requirement + Test	Result - Remark	Verdict
	locally operated for emergency switching off, it shall be readily accessible and shall meet the colour requirements of 10.2.1		
10.9	Enabling control device		-
	Enabling control devices shall be selected and arranged so as to minimize the possibility of defeating		P
	They shall be designed in accordance with ergonomic principles		P
	Functions of two-position types: -position 1: off-function of the switch (actuator is not operated); -position 2: enabling function (actuator is operated)		P
	Functions of three-position types: -position 1: off-function of the switch (actuator is not operated) -position 2: enabling function (actuator is operated in its mid position) -position 3: off-function (actuator is operated past its mid position) -when returning from position 3 to position 2, the enabling function is not activated		N

11	Controlgear: location, mounting, and enclosures		-
11.1	General requirements		-
11.2	Location and mounting		-
11.2.1	Accessibility and maintenance		-
	All items of controlgear (inclusively terminals that are not part of controlgear components or devices) are placed and oriented so that they can be identified without moving them or the wiring		P
	For items that require checking for correct operation or that are liable to need replacement, those actions should be possible without dismantling other equipment or parts of the machine (except opening doors or removing covers, barriers or obstacles)		P
	All controlgear are mounted so as to facilitate its operation and maintenance	All of them can be identified without moving or the wiring.	P
	Necessary tools to adjust, maintain, or remove a device are supplied		P
	Where access is required for regular maintenance or adjustment, the relevant devices shall be		P

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Clause	Requirement + Test	Result - Remark	Verdict
	located between 0.4 m and 2.0 m above the servicing level		
	Recommendation, that terminals be least 0.2 m above the servicing level and so placed that conductors and cables can be easily connected	Above 0.2m and can be connected easily.	P
	Only operating, indicating, measuring, and cooling devices are mounted on doors or on normally removable access covers of enclosures		P
	Where connected through plug-in arrangements, their association shall be made clear by type (shape), marking or reference designation		P
	Plug-in devices that are handled during normal operation shall be provided with non-interchangeable features		P
	Plug/socket combinations that are handled during normal operation are unobstructedly accessible.		P
	Test points for connection of test equipment shall be: – mounted to provide unobstructed access – clearly identified to correspond with the documentation – adequately insulated – sufficiently spaced		P
11.2.2	Physical separation or grouping		-
	Non-electrical parts and devices not directly associated with the electrical equipment shall not be located within enclosures containing control gear	No this kind of parts or devices are located within enclosures containing control gear.	P
	Devices such as solenoid valves should be separated from the other electrical equipment.	All solenoid valves have been separated from the other electrical equipment.	P
	Control devices mounted in the same location and connected to the supply voltage, or to both supply and control voltages, shall be grouped separately from those connected only to the control voltages	Appropriate separation has been taken.	P
	Terminals shall be separated into groups for : -power circuits; -associated control circuits -other control circuits, fed from external sources	They have been separated appropriately.	P
	The clearances and creepage distances specified by the supplier shall be maintained, taking into account the external influences or conditions of the physical environment.	Appropriately clearances and creep distances have been provided.	P

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Clause	Requirement + Test	Result - Remark	Verdict
11.2.3	Heating effects		-
	The temperature rise inside electrical equipment enclosures shall not exceed the ambient temperature specified by the component manufacturers		P
	Heat generating components shall be located so that the temperature of each component in the vicinity remains within the permitted limit		P.
11.3	Degrees of protection		-
	The protection of controlgear against ingress of solid foreign objects and of liquids shall be adequate taking into account the external influences under which the machine is intended to operate and shall be sufficient against dust, coolants, lubricants and swarf		P
	Enclosures of control gear: at least IP 22		P
	Exception, where: a) an electrical operating area provides an appropriate degree of protection b) removable collectors on conductor wire or conductor bar systems are used and the measures of 12.7.1 are applied		P
11.4	Enclosures, doors and openings		-
	Enclosures shall be constructed using materials capable of withstanding the mechanical, electrical and thermal stresses as well as the effects of humidity and other environmental factors that are likely to be encountered in normal service	Metal with insulated materials to withstand mechanical, electrical and thermal stress	P
	Fasteners used to secure doors and covers should be of the captive type		N
	Windows provided for viewing internally mounted indicating devices shall be of a material suitable to withstand mechanical stress and chemical attack.		N
	It is recommended that enclosure doors having vertical hinges be not wider than 0,9 m, with an angle of opening of at least 95°		N
	The joints or gaskets of doors, lids, covers and enclosures shall withstand the chemical effects of the aggressive liquids, vapours, or gases used on the machine	They can withstand the chemical effects of the aggressive liquids, vapors, or gases used on the machine.	P
	They shall: - be securely attached - not deteriorate due to removal or replacement of		P

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Clause	Requirement + Test	Result - Remark	Verdict
	the door		
	Openings in enclosures (for example, for cable access), including those towards the floor or foundation or to other parts of the machine shall be equipped with means to ensure the degree of protection specified for the equipment.		P
	A suitable opening may be provided in the base of enclosures within the machine so that moisture due to condensation can drain away		P
	Openings for cable shall be easily re-opened on site	Rubber cushion used for hole on inside-enclosure	P
	There shall be no opening between enclosures containing electrical equipment and compartments containing coolant, lubricating or hydraulic fluids, or those into which oil, other liquids, or dust can penetrate	No this kind of opening has been found.	P
	Holes in an enclosure for mounting shall not impair the required protection.		P
	Equipment that, in normal or abnormal operation, can attain a surface temperature sufficient to cause a risk of fire or harmful effect to an enclosure material shall: – be located within an enclosure that will withstand, such temperatures; and – be located at a sufficient distance from adjacent equipment allowing safe dissipation of heat (see also 11.2.3); or – be otherwise screened by material that can withstand to the harmful effect.		N
11.5	Access to control gear		-
	Doors in gangways and for access to electrical operating areas shall: - be at least 0.7 m wide and 2.0 m high; - open outward; - have a means to allow opening from the inside without the use of a key or tool		N

12	Conductors and cables		-
12.1	General requirements		-
	Conductors and cables selected so as to be suitable for operating conditions and external influences that are existing	Input cables and outer ground bonding conductors are supplied by user according to instructions	P
	These requirements do not apply to the integral	Conform to relevant IEC	P

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Clause	Requirement + Test	Result - Remark	Verdict
	wiring of assemblies, subassemblies, and devices that are manufactured and tested in accordance with their relevant IEC standard (for example IEC 61800 series).	standards	
12.2	Conductors		-
	In general, conductors shall be of copper.		P
	Where aluminium conductors are used, the cross-sectional area shall be at least 16 mm ²	Only copper conductors are used.	N
	The cross-sectional area of conductors should not be less than as shown in Table 5		P
	Smaller cross-sectional areas or other constructions than shown in Table 5 may be used, provided adequate mechanical strength is achieved by other means		P
	Class 1 and class 2 conductors are primarily intended for use between rigid, non-moving parts where vibration is not likely to cause damage		P
	All conductors that are subject to frequent movement (for example one movement per hour of machine operation) shall have flexible stranding of class 5 or class 6.	This requirement has been met.	P
12.3	Insulation		-
	Where the insulation of conductors and cables can constitute hazards due for example to the propagation of a fire or the emission of toxic or corrosive fumes adequate means are provided.		P
	Special attention is given to the integrity of a circuit having a safety-related function		P
	The insulation of cables and conductors used, shall be suitable for a test voltage: – not less than 2 000 V AC for a duration of 5 min for operation at voltages higher than 50 VAC or 120 V DC, or – not less than 500 V AC for a duration of 5 min for PELV circuits (see IEC 60364-4-41, class III equipment).	This test has been carried out for the cables, and there is no breakdown is occurred.	P
	The insulation shall be such that it cannot be damaged in operation or during laying, especially for cables pulled into ducts.		P
12.4	Current-carrying capacity in normal service		-
	Max allowable temperature of conductors shall not exceed the values given in table 6.	See table6.	P
12.5	Conductor and cable voltage drop		-

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Clause	Requirement + Test	Result - Remark	Verdict
	The voltage drop for conductors and cables shall not exceed 5% of the nominal voltage	Not exceed 5%.	P
	In control circuits, the voltage drop shall not reduce the voltage at any device below the manufacturer's specification for that device, taking into account inrush currents.		P
12.6	Flexible cables		-
12.6.1	General		-
	Flexible cables shall have Class 5 or Class 6 conductors.	This requirement has been met.	P
	Cables that are subjected to severe duties shall be of adequate construction to protect against: - abrasion due to mechanical handling and dragging across rough surfaces - kinking due to operation without guides - stress resulting from guide rollers and forced guiding, being wound and re-wound on cable drums		P
12.6.2	Mechanical rating		-
	The tensile stress for copper conductors shall not exceed 15 N/mm ² of the copper cross-sectional area	Not exceed 15 N/mm	P
	Or special measures are taken to withstand the applied stress		P
	For material other than copper the applied stress shall be within the cable manufacturer's specification		N
12.6.3	For cables of circular cross-sectional area installed on drums, the maximum current should be derated in accordance with Table 7		P
12.7	Conductor wires, conductor bars and slip-ring assemblies		P
12.7.1	Basic protection		P
	During normal access to the machine, protection to conductor wires, conductor bars and slip-ring assemblies shall be achieved by the application of one of the following protective measures:		--
	– protection by partial insulation of live parts, or where this is not practicable;		P
	– protection by enclosures or barriers of at least IP2X (see 412.2 of IEC 60364-4-41)		P
	Horizontal top surfaces of barriers or enclosures that are readily accessible shall provide a degree of protection of at least IP4X or IPXXD		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Where the required degree of protection is not achieved, protection by placing live parts out of reach in combination with emergency switching off in accordance with 9.2.5.4.3 shall be applied.		N
	Conductor wires and conductor bars shall be so placed and/or protected as to:		--
	– prevent contact, especially for unprotected conductor wires and conductor bars, with conductive items such as the cords of pull-cord switches, strain-relief devices and drive chains;		P
	– prevent damage from a swinging load.		P
12.7.2	Protective conductors		-
	Protective conductor circuit (PE) and the neutral conductor (N) each use a separate conductor wire, conductor bar or slip-ring		P
	The continuity of the protective conductor circuit using sliding contacts shall be ensured by taking appropriate measures (for example, duplication of the current collector, continuity monitoring)		N
12.7.3	Protective conductor current collectors		-
	Protective conductor current collectors shall have a shape or construction so that they are not interchangeable with the other current collectors. Such current collectors shall be of the sliding contact type.		N
12.7.4	Removable current collectors with a disconnecter		-
	Removable current collectors having a disconnecter function shall be so designed that the protective conductor circuit is interrupted only after the live conductors have been disconnected, and the continuity of the protective conductor circuit is re-established before any live conductor is reconnected (see also 8.2.4).		N
12.7.5	Clearances in air		-
	Clearances between the respective conductors, and between adjacent systems, of conductor wires, conductor bars, slip-ring assemblies and their current collectors shall be suitable for at least a rated impulse voltage of an overvoltage category III in accordance with IEC 60664-1.		P
12.7.6	Creepage distances		-
	Creepage distances between the respective conductors, between adjacent systems of conductor wires, conductor bars and slip-ring assemblies, and their current collectors shall be		P

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Clause	Requirement + Test	Result - Remark	Verdict
	suitable for operation in the intended environment, for example open air (IEC 60664-1), inside buildings, protected by enclosures.		
	In abnormally dusty, moist or corrosive environments, the following creepage distance requirements apply:		--
	– unprotected conductor wires, conductor bars, and slip-ring assemblies shall be equipped with insulators with a minimum creepage distance of 60 mm;		N
	– enclosed conductor wires, insulated multipole conductor bars and insulated individual conductor bars shall have a minimum creepage distance of 30 mm.	No such condition exist.	N
	The manufacturer's recommendations shall be followed regarding special measures to prevent a gradual reduction in the insulation values due to unfavourable ambient conditions (for example deposits of conductive dust, chemical attack).		N
12.7.7	Conductor system sectioning		-
	Where conductor wires or conductor bars are arranged so that they can be divided into isolated sections, suitable design measures shall be employed to prevent the energization of adjacent sections by the current collectors themselves.	Suitable design measures taken	P
12.7.8	Construction and installation of conductor wire, conductor bar systems and slip-ring assemblies		P
	They shall be capable of withstanding, without damage, the mechanical forces and thermal effects of short-circuit currents		P
	Removable covers cannot be opened by one person without the aid of a tool		N
	Where common metal enclosures are used, the individual sections shall be bonded together and connected to the protective bonding circuit		P
	Conductor bar ducts that can be subject to accumulation of liquid shall have drainage facilities		N

13	Wiring practices		-
13.1	Connections and routing		-
13.1.1	General requirements		-
	All connections, especially those of the protective bonding circuit, shall be secured against accidental loosening.	Fixed by screws	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The means of connection shall be suitable for the cross-sectional areas and nature of the conductors being terminated.	Fixed by screws	P
	No connection of two or more conductors to one terminal, unless the terminal is designed for it	No terminal has been connected with three or more conductors.	P
	No soldered connections to terminals unless they are suitable for it	No soldered connection has been taken.	N
	Terminals on terminal blocks are plainly marked or labelled corresponding with the diagrams	All of them have been marked corresponding to markings on the diagrams.	P
	Installations of flexible conduits and cables are such that liquids drain away from the fittings	Liquids can drain away from the fittings.	P
	Retaining means for conductor strand and shields provided (no soldering for that purpose)	By appropriate terminals.	P
	Identification tags shall be legible, permanent, and appropriate for the physical environment.	They are legible, permanent, and appropriate for the physical environment.	P
	Terminal blocks mounted and wired so that the wiring does not cross over the terminals	No conductor crosses over the terminals.	P
	Conductor and cable runs		-
13.1.2	Conductors and cables shall be run from terminal to terminal without splices or joints. Connections using plug/socket combinations with suitable protection against accidental disconnection are not considered to be joints for the purpose of this Sub clause.	All of them are run from terminal to terminal without splices or joints.	P
	Exceptions are possible as described		P
	Terminations of cables shall be adequately supported to prevent mechanical stresses at the terminations of the conductors.	Adequate support measure has been taken.	P
	Protective conductor shall be placed close to the associated live conductors in order to decrease the impedance of the loop		P
13.1.3	Conductors of different circuits		P
	Conductors for circuits that operate at different voltages are separated by suitable barriers, or are insulated for the highest voltage that occurs within the same duct	Conductor for different circuits laid side by side or occupy the same duct	P
13.1.4	Conductors of AC circuits installed in ferromagnetic enclosures shall be arranged so that all conductors of each circuit, including the protective conductor of each circuit, are contained in the same enclosure		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Single-core cables armoured with steel wire or steel tape should not be used for AC circuits		P
	The cable between the pick-up and the pick-up converter as specified by the manufacturer of the inductive power supply shall be:		--
	– as short as practicable;		P
	– adequately protected against mechanical damage.	These requirements have been complied with.	P
13.2	Identification of conductors		P
13.2.1	General requirements		P
	Conductors shall be identifiable at each termination according to the technical documentation (see clause 17)	Make reference to clause 18.	P
	Conductors are identified by number, alphanumeric, colour (either solid or with one or more stripes), or a combination of colour and numbers or alphanumeric.	A combination of colour and numbers or alphanumeric.	P
	When numbers are used, they shall be Arabic; letters shall be Roman (either upper or lower case).	Arabic and Roman	P
13.2.2	Identification of the protective conductor		-
	Shall be really distinguishable by shape, location, marking or color	By marking and color.	P
	When identification is by color alone, the bicolor combination GREEN-AND YELLOW shall be used	By GREEN-AND-YELLOW.	P
	For the bicolor combination GREEN-AND YELLOW : one of the color covers at least 30% and not more than 70% of the surface of the conductor, the other color covering the remainder of the surface		P
	Use of graphical symbol 	The earthing symbol has been used.	P
13.2.3	Identification of the neutral conductor		-
	The color shall be Light Blue	Light blue.	P
	LIGHT BLUE must not be use for identification of any other conductor where confusion is possible	No other conductors use LIGHT BLUE.	P
	Where bare conductors are use as neutral conductors and identification by colour is use, they either be coloured by LIGHT BLUE stripes, 15 to 100 mm wide in each compartment or unit, or at each accessible position		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Bare conductor colour coloured LIGHT BLUE over its full length		N
13.2.4	Identification by colour		-
	Where colour-coding is used for identification of conductors (other than the protective conductor (see 13.2.2) and the neutral conductor (see 13.2.3)), the following colours may be used:		-
	BLACK, BROWN, RED, ORANGE, YELLOW, GREEN, BLUE (including LIGHT BLUE), VIOLET, GREY, WHITE, PINK, TURQUOISE.	Some colors have been used.	P
	It is recommended that, where colour is used for identification, the colour be used throughout the length of the conductor either by the colour of the insulation or by colour markers at regular intervals and at the ends or accessible location.	This requirement has been complied with.	P
	For safety reasons, the colour GREEN or the colour YELLOW should not be used where there is a possibility of confusion with the bicolour combination GREEN-AND-YELLOW (see 13.2.2).	Neither color GREEN nor the color YELLOW has been used.	P
	Where colour-coding is used for identification of conductors, it is recommended that they be colour-coded as follows: – BLACK: AC and DC power circuits; – RED: AC control circuits; – BLUE: DC control circuits; – ORANGE: excepted circuits in accordance with 5.3.5.	These requirements have complied with.	P
13.3	Wiring inside enclosures		-
	Panel conductors shall be supported where necessary to keep them in place	Appropriate support is provided.	P
	Non-Metallic ducts shall be permitted only when they are made with a flame-retardant insulating material	Some non-metallic ducts are used with a flame-retardant insulating material.	P
	Connections to devices mounted on doors or to other movable parts shall be made using flexible conductors according to 12.2 and 12.6.	Connections according to 12.2 and 12.6.	P
	The conductors shall be anchored to the fixed part and to the movable part independently of the electrical connection	Adequate anchored measures have been taken.	P
	Conductors and cables that do not run in ducts shall be adequately supported	All of them have been supported adequately.	P
	Terminal blocks or plug-socket combinations shall be used for control wiring that extends beyond the enclosure	This application has been taken.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Power cables and cables of measuring circuits may be directly connected to the terminals of the devices for which the connections were intended.	This application has been taken.	P
13.4	Wiring outside enclosures		-
13.4.1	General requirements-		-
	Conductors of a circuit shall not be distributed over different multi-core cables, conduits, etc.		P
13.4.2	Shall be enclosed in suitable ducts as described in 13.5 except for suitably protected cables	Only power cord located outside of enclosure, provided by user according to instructions	P
	Fittings used with ducts or cable shall be suitable for the physical environment		P
	Flexible conduit or flexible multi-conductor cable shall be used where it is necessary to employ flexible connections to pendant push-button stations		P
	The weight of the pendant stations shall be supported by means other than the flexible conduit or the flexible multi-conductor cable		P
	Flexible conduit or flexible multi-conductor cable shall be used for connections involving small or infrequent movements		P
13.4.3	Connections to moving parts shall take into account the foreseeable frequency of movement and shall be made using conductors in accordance with 12.2 and 12.6		-
	Bending radius of the cable of at least 10 times the diameter of the cable		P
	Flexible cables of machines shall be so installed or protected as to minimize the possibility of external damage (run over, forces, rubbing, heat, etc.)		P
	Cables close to moving parts, shall maintain a space of at least 25 mm between the moving parts and the cables or barriers are provided		P
	Where the distance mentioned above is not practicable, fixed barriers shall be provided between the cables and the moving parts		N
	The cable handling system shall be so designed that the lateral cable angles do not exceed 5°, avoiding torsion in the cable		P
	Measures shall be taken to ensure that at least two turns of flexible cables always remain on a drum		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Min. permitted bending radii for the forced guiding of flexible cables shall not less than the values given in table 8		P
	The strength section between section between two bends in an S-shaped length or a bend into another plane shall be at least 20 times the diameter of the cable		P
	Where flexible conduit is adjacent to moving parts, the construction and supporting means shall prevent damage to the flexible conduit under all conditions of operation		P
	Flexible metallic conduit shall not be used for rapid of frequent movements		P
13.4.4	Interconnection of devices on the machine		-
	The connections shall be conveniently placed, adequately protected, and shown on the relevant diagrams		P
	Such terminals shall be conveniently placed, adequately protected, and shown on the relevant diagrams		P
13.4.5	Plug/ socket combinations		-
	Components or devices inside an enclosure, terminated by fixed plug/socket combinations (no flexible cable), or components connected to a bus system by a plug/socket combination, are excluded		P
	Where the plug/socket contains a contact for the protective bonding circuit, it shall have a first make last break contact (see also 8.2.4).	Use Non-Detachable power cord	N
	Plug/socket combinations intended to be connected or disconnected during load conditions shall have sufficient load-breaking capacity		N
	Where the plug/socket combination is rated at 30 A, or greater, it shall be interlocked		N
	Plug/socket combinations that are rated at more than 16 A shall have a retaining means to prevent unintended or accidental disconnection.		N
	Where an unintended or accidental disconnection of plug/socket combinations can cause a hazardous situation, they shall have a retaining means.		N
	The installation of plug/socket combinations shall fulfil the following requirements as applicable: a) The component which remains live after disconnection shall have a degree of protection		N

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Clause	Requirement + Test	Result - Remark	Verdict
	of at least IP2X or IPXXB b) Metallic housings of plug/socket combinations shall be connected to the protective bonding circuit c) Plug/socket combinations intended to carry power loads but not to be disconnected during load conditions shall have a retaining means to prevent unintended or accidental disconnection and shall be clearly marked accordingly d) Where more than one plug/socket combination is provided in the same electrical equipment, the associated combinations shall be clearly identifiable. Mechanical coding is recommended Plug/socket combinations used in control circuits shall fulfil the applicable requirements of IEC 61984. Exception: combinations in accordance with IEC 60309-1, only those contacts shall be used for control circuits which are intended for those purposes. This exception does not apply to control circuits using high frequency signals superimposed on the power circuits.		
13.4.6	Dismantling for shipment		-
	Where it is necessary that wiring be disconnected for shipment, terminals or plug/socket combinations shall be provided at the sectional points.	All of them are enclosed suitably.	P
13.4.7	Additional conductors		-
	When spare conductors are provided, they shall be connected to spare terminals or isolated to prevent contact with live parts	All spare conductors are connected to spare terminals or isolated to prevent contact with live parts.	P
13.5	Ducts, connection boxes and other boxes		-
13.5.1	General requirements		-
	Ducts shall provide a degree of protection (see IEC 60529) suitable for the application		P
	No sharp edges, flash, burrs, rough surfaces, or threads with which the insulation of the conductors can come into contact		P
	Drain holes of 6 mm diameter are permitted		P
	Ducts and cables trays shall be rigidly supported and positioned at a sufficient distance from moving parts	Suitable support and sufficient distance has been taken.	P
	Where human passage is required, least 2 m above the working surface		N
	Where cable trays are only partially covered, the cables used shall be of a type suitable for		P

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Clause	Requirement + Test	Result - Remark	Verdict
	installation on open cable trays.		
13.5.2	Rigid metal conduit and fittings shall be of galvanized steel or of a corrosion-resistant material		P
	Fittings shall be compatible with the conduit and should be threaded		P
	Conduit bends shall be properly made		P
13.5.3	A flexible metal conduit shall consist of a flexible metal tubing or woven wire armour		P
13.5.4	Flexible non-metallic conduit shall be resistant to kinking		P
13.5.5	Cable trunking systems external to enclosures shall be rigidly supported and clear of all moving and of sources of contamination		P
	Where furnished in sections, the joints shall fit tightly but need not be gasketed		P
	The only openings permitted shall be those required for wiring or for drainage		P
13.5.6	The use of compartments or cable trunking systems within the column or base of a machine to enclose conductors is permitted provided they are isolated from coolant or oil reservoirs and are entirely enclosed		P
	Conductors shall be so secured		P
13.5.7	Connection boxes and other boxes used for wiring purposes shall be accessible for maintenance.		P
	Those boxes shall provide protection against the ingress of solid bodies and liquids		P
	They shall not have opened but unused knockouts nor any other openings		P
13.5.8	Motor connection boxes shall enclose only connections to the motor and motor-mounted devices (e.g. brakes, temperature sensors		P

14	Electric motors and associated equipment		--
14.1	Electric motors should conform to the relevant parts of IEC 60034 series		P
14.2	Enclosures for motors should be in accordance with IEC 60034-5	Conform to EN 60034-5	P
	The degree of protection shall be dependent on the application and the physical environment		P

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Clause	Requirement + Test	Result - Remark	Verdict
14.3	The dimensions of motors shall conform to those given in the IEC 60072 series	It is in compliance with IEC 60072 series.	P
14.4	Motors and its accessories shall be so mounted that they are adequately protected and are easily accessible for inspection, maintenance, etc.		P
	Proper cooling shall be ensured and the temperature rise shall remain within the limits of the insulation class (see IEC 60034-1)		P
	There shall be no opening between the motor compartment and any other compartment that does not meet the motor compartment requirements		P
14.5	The characteristics of motors and associated equipment shall be selected in accordance with the anticipated service and physical environmental conditions		P
14.6	Operation of the overload and over current protective devices for mechanical brake actuators shall initiate the simultaneous de-energization (release) of the associated machine actuators		P

15	SOCKET-OUTLETS AND LIGHTING		-
15.1	For socket-outlets intended for accessory equipment, the following apply:		-
	- they should conform to IEC 60309-1. Where not practicable, they should be clearly marked with the voltage and current ratings		P
	- the continuity of the protective bonding circuit to the socket-outlet shall be ensured		P
	- all unearthed conductors connected to the socket-outlet shall be protected against overcurrent and, when required, overload		P
	- where the power supply to the socket-outlet is not disconnected by the supply disconnecting device for the machine or the section of the machine, the requirements of 5.3.5 apply		P
	- where fault protection is provided by automatic disconnection of supply, the disconnection time shall be in accordance with Table A.1 for TN systems or Table A.2 for TT systems		P
	- socket-outlets with a rating not exceeding 20 A shall be provided with an RCD not exceeding 30 mA		P
15.2	Local lighting of the machine and equipment		-
15.2.1	The ON/OFF switch shall not be incorporated in		P

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Clause	Requirement + Test	Result - Remark	Verdict
	the lampholder or in the flexible connecting cords.		
	Stroboscopic effects from lights shall be avoided		P
15.2.2	The nominal voltage of the local lighting circuit shall not exceed 250 V between conductors. A voltage not exceeding 50 V between conductors is recommended.		P
	Lighting circuits shall be supplied from one of the following sources:		-
	– a dedicated isolating transformer connected to the supply disconnecting device. Overcurrent protection shall be provided in the secondary circuit		N
	– a dedicated isolating transformer connected before the supply disconnecting device. This is permitted for maintenance lighting in control enclosures only. Overcurrent protection shall be provided in the secondary circuit		N
	– a circuit of the electrical equipment of the machine for lighting, with dedicated overcurrent protection		P
	– an isolating transformer connected before the supply disconnecting device, provided with a dedicated primary disconnecting means (see 5.3.5) and secondary overcurrent protection, and mounted within the control enclosure adjacent to the supply disconnecting device		P
	– an externally supplied lighting circuit (for example factory lighting supply). This shall be permitted in control enclosures only, and for the machine work light(s) where their total power rating is not more than 3 kW		P
	– power supply units, for DC supply to LED light sources, fitted with isolating transformers		P
	Exception: where fixed lighting is out of reach of operators during normal operations, the provisions of this 15.2.2 do not apply		P
15.2.3	Local lighting circuits shall be protected in accordance with 7.2.6.		P
15.2.4	Adjustable lighting fittings shall be suitable for the physical environment.	Not adjustable	N
	The lampholders shall be: – in accordance with the relevant IEC standard; – constructed with an insulating material protecting the lamp cap so as to prevent unintentional contact		N
	Reflectors shall be supported by a bracket and not by the lampholder.		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Exception: where fixed lighting is out of reach of operators during normal operations, the provisions of this 15.2.4 do not apply		N
16	Marking, warning signs and reference designations		-
16.1	Warning signs, nameplates, markings, and identification plates shall be of sufficient durability to withstand the physical environment involved.	They can withstand the physical environment involved.	P
16.2	Warning signs		-
16.2.1	Electric shock hazard		-
	Enclosures that do not otherwise clearly show that they contain electrical shall be marked with the graphical symbol ISO 7010-W012	This warning sign has been used. 	P
	It may be omitted (see also 6.2.2 b)) for: – an enclosure equipped with a supply disconnecting device – an operator-machine interface or control station – a single device with its own enclosure (for example position sensor)		P
16.2.2	Hot surfaces hazard		-
	Where the risk assessment shows the need to warn against the possibility of hazardous surface temperatures, the graphical symbol ISO 7010-W017 shall be used		N
16.3	Control devices and visual indicators, shall be clearly and durably marked with regard to their functions	Appropriate markings have been provided for these devices.	P
	Preference should be given to the use of standard symbols given in IEC 60417 and ISO 7000.		P
16.4	Marking of enclosures of electrical equipment		P
	The following information shall be legibly and durably marked in a way that is plainly visible after the equipment is installed on enclosures that receive incoming power supplies:	They have been marked legibly and durably.	P
	•name or trade mark of supplier;		P
	•certification mark or other marking that can be required by local or regional legislation, when required;		P
	•type designation or model, where applicable;		P

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
	•serial number where applicable;		P
	•main document number (see IEC 62023) where applicable;		P
	•rated voltage, number of phases and frequency (if AC), and full-load current for each incoming supply.		P
	It is recommended that this information is provided adjacent to the main incoming supply(ies).	This requirement has been met.	P
16.5	Reference designations		-
	All enclosures, assemblies, control devices, and components shall be plainly identified with the same reference designation as shown in the technical documentation.	These information has been provided within the instruction manual.	P

17	Technical documentation		-
17.1	General		-
	The information necessary for identification, transport, installation, use, maintenance, decommissioning and disposal of the electrical equipment shall be supplied.	All the information has been provided by many forms.	P
	The information shall be in an agreed language	In English.	P
	Annex I should be considered as guidance for the preparation of information and documents.		P
17.2	Information related to the electrical equipment		-
	The following shall be supplied:		P
	a) where more than one document is provided, a main document for the electrical equipment as a whole, listing the complementary documents		P
	b) identification of the electrical equipment		P
	c) information on installation and mounting including: • a description of installation and mounting, and its connection to the electrical and other supplies • short-circuit current rating for each incoming power supply • rated voltage, number of phases and frequency (if AC.), type of distribution system (TT, TN, IT) and full-load current for each incoming supply • any additional electrical supply(ies) requirements (for example maximum supply source impedance, leakage current) for each incoming supply		P

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
	• space required for servicing • installation requirements regarding cooling • environmental limitations (for example lighting, vibration, EMC environment, atmospheric contaminants) • functional limitations (for example peak starting currents and permitted voltage drops) • precautions to be taken for the installation regarding electromagnetic compatibility		
	d) an instruction for the connection of conductive-parts in the vicinity of the machine to the protective bonding circuit: • metallic pipes • fences • ladders • handrails		P
	e) information on the functioning and operation as applicable: • an overview of the structure of the electrical equipment • procedures for programming or configuring • procedures for restarting after an unexpected stop • a sequence of operation		P
	f) information on maintenance, as appropriate: • frequency and method of functional testing • instructions for safe maintenance and where necessary suspend a safety function and/or protective measure (see 9.3.6) • guidance on the adjustment, repair, and frequency and method of preventive maintenance • details of the interconnections subject to replacement • required special devices or tools; • spare parts; • possible residual risks, indication of particular training and specification of personal protective equipment • instructions to restrict availability of keys or too(s) to skilled or instructed persons • settings (DIP-switches, programmable parameter values, etc); • information for validation of safety related control functions after repair or modification, and for periodic testing where necessary;		P
	g) information on handling, transportation and		P

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
	storage		
	h) information for proper disassembly and handling of components		P

18	Verification		-
18.1	The extent of verification will be given in the dedicated product standard for a particular machine. Where there is no such standard, the verifications shall always include the items a), b), c) and h) and may include one or more of the items d) to g): a) verification that the electrical equipment complies with its technical documentation b) verification of continuity of the protective bonding circuit (Test 1 of 18.2.2) c) in case of fault protection by automatic disconnection of supply, conditions shall be verified according to 18.2; d) insulation resistance test (see 18.3) e) voltage test (see 18.4) f) protection against residual voltage (see 18.5) g) verification that the relevant requirements of 8.2.6 are met h) functional tests (see 18.6)		-
	The results of the verification shall be documented.	The result has been documented.	P
18.2	Verification of conditions for protection by automatic disconnection of supply		-
18.2.1	Test 1 verifies the continuity of the protective bonding circuit. Test 2 verifies the conditions for protection by automatic disconnection of the supply in TN systems For TN-systems, those test methods are described in 18.2.2 and 18.2.3; their application for different conditions of supply are specified in 18.2.4 For TT systems, see Clause A.2 For IT systems, see IEC 60364-6		P
	Where RCDs are used in the electrical equipment, their function shall be verified in accordance with the manufacturer's instructions. The test procedure and test interval shall be specified in the maintenance instructions	Please see the relative clauses.	P
18.2.2	Test 1 – Verification of the continuity of the protective bonding circuit		--
	The resistance between the PE terminal (see 5.2 and Figure 4) and relevant points that are part of the protective bonding circuit shall be measured with a current between 0.2 A and approximately 10 A derived from an electrically separated supply source having a maximum no-load voltage of 24 V	Please see the test report.	P
	The resistance measured shall be in the expected range		P
18.2.3	Test 2 – Fault loop impedance verification and suitability of the associated		-

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
	overcurrent protective device		
	The connections of the power supply and of the incoming external protective conductor to the PE terminal of the machine, shall be verified by inspection.	They have been verified by inspection.	P
	The conditions for the protection by automatic disconnection of supply in accordance with 6.3.3 and Annex A shall be verified by both:		-
	a) verification of the fault loop impedance by: – calculation, or – measurement in accordance with A.4, and	Please see the test report.	P
	b) confirmation that the setting and characteristics of the associated overcurrent protective device are in accordance with the requirements of Annex A.		P
	Where a power drive system (PDS) is used, confirmation that the setting and characteristics of the protective device(s) are in accordance with the converter manufacturer's and protective device manufacturer's instructions		P
18.2.4	Application of the test methods for TN-systems		-
	When Test 2 of 18.2.3 is carried out by measurement, it shall always be preceded by Test 1 of 18.2.2	Each protective bonding circuit have been tested.	P
	The tests that are necessary for machines of different status are specified in Table 9		P
18.3	Insulation resistance tests (optional)		-
	When insulation resistance tests are performed, the insulation resistance measured at 500 V DC between the power circuit conductors and the protective bonding circuit shall be not less than 1 MΩ		P
	If the electrical equipment of the machine contains surge protection devices which are likely to operate during the test, it is permitted to either: – disconnect these devices, or – reduce the test voltage to a value lower than the voltage protection level of the surge protection devices	Please see the test report in detail.	P
18.4	Voltage tests (optional)		-
	The test voltage shall be at a nominal frequency of 50 Hz or 60 Hz.		P
	The maximum test voltage shall have a value of twice the rated supply voltage of the equipment or 1		P

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
	000 V, whichever is the greater		
	The test voltage shall be applied between the power circuit conductors and the protective bonding circuit for at least 1 s		P
	Components and devices that are not rated to withstand the test voltage and surge protection devices shall be disconnected		P
18.5	Protection against residual voltages		-
	Where appropriate, tests shall be performed to ensure compliance with 6.2.4.		N
18.6	Functional tests		-
	The functions of electrical equipment shall be tested.	The functions of electrical equipment equipped with this machine have been tested.	P
18.7	Retesting		-
	Where a portion of the machine or its associated equipment is changed or modified, the need for re-verification and testing of the electrical equipment shall be considered		N

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict

A	ANNEX A (NORMATIVE) FAULT PROTECTION BY AUTOMATIC DISCONNECTION OF SUPPLY		--
A.1	Fault protection for machines supplied from TN-systems		P
A.1.1	Fault protection shall be provided by an overcurrent protective device within a sufficiently short disconnecting time.		P
	5 s is considered sufficiently short for machines that are neither hand-held nor portable.		P
	Where not possible, supplementary protective bonding shall be provided in accordance with A.1.3		P
	For Class 1 hand-held equipment or portable equipment table A.1 specifies the maximum disconnecting times		N
A.1.2	Conditions for protection by overcurrent protective devices fulfilled		P
A.1.3	Condition for protection by reducing the touch voltage below 50 V fulfilled		P
A.1.4	Verification of conditions for protection by automatic disconnection of the supply (A.1.2) by		--
	-verification of the characteristics of the associated protective device and		N
	-measurement of the fault loop impedance (Zs)		N
	Exception: Verification of the continuity of the protective conductors may replace the measurement where appropriate		P
A.2	Fault protection for machines supplied from TT-systems		N
	Expand if applicable		N

B	ANNEX B (INFORMATIVE) ENQUIRY FORM FOR THE ELECTRICAL EQUIPMENT OF MACHINES		--
	The use of this form can facilitate an exchange of information between the user and supplier		P

C	ANNEX C (INFORMATIVE) EXAMPLES OF MACHINES COVERED BY THIS PART OF IEC 60204		--
	Non exhaustive list of examples This standard does not apply to machines within the scope of the IEC 60335 series		P

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
D	ANNEX D (INFORMATIVE) CURRENT-CARRYING CAPACITY AND OVERCURRENT PROTECTION OF CONDUCTORS AND CABLES		--
D.2.1	Correction factors for PVC conductors at higher temperatures		P
D.2.2	Methods of installation		P
D.2.3	Grouping and derating factors		--
D.4	Guidance for overcurrent protection of conductors		P
E	ANNEX E (INFORMATIVE) EXPLANATION OF EMERGENCY OPERATION FUNCTIONS		P
	Description of emergency stop, start, switching off, switching on		P
F	ANNEX (INFORMATIVE) GUIDE FOR THE USE OF THIS PART OF IEC 60204		--
	This standard gives a large number of general requirements that may or may not be applicable to the electrical equipment of a particular machine.		P
G	ANNEX (INFORMATIVE) COMPARISON OF TYPICAL CONDUCTOR CROSS-SECTIONAL AREAS		--
	Comparison of the American Wire Gauge (AWG), square millimetres, square inches, and circular mil		--
H	ANNEX (INFORMATIVE) MEASURES TO REDUCE THE EFFECTS OF ELECTROMAGNETIC INFLUENCES		--
	Expand if applicable		--
H.3.1	Only electrical equipment which meets the requirements of the appropriate EMC standards, or the EMC requirements of the relevant product standard, should be used		P
I	ANNEX I (INFORMATIVE) DOCUMENTATION / INFORMATION		--
	Table I.1 gives a list of Documentation / Information that can be applicable		P

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 60204-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Safety of machinery - Electrical equipment of machines Part 1: General requirements			
Differences according to: EN 60204-1:2018			
Attachment Form No: EU_GD_IEC60204_1B			
Attachment Originator: Eurofins Electrosuisse			
Master Attachment: 2019-03-15			
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	CENELEC COMMON MODIFICATIONS (EN)		P
4.4.2	Delete the 2nd paragraph and related bulleted list		P
4.4.5	Replace the text of the 2nd paragraph before the hyphenated list with: "For equipment to be used at higher altitudes, it is necessary to take into account changes in parameters for example, the reduction of:"		P
	Add the start of the 3rd paragraph: "Other parameters of different components can also alter with altitude."		P
6.3.1	Replace Note 1 with: "The risk of harmful physiological effects from touch voltages depends upon a number of factors. These include but are not limited to; touch voltage, duration of possible exposure, environmental factors, skin condition"		N/A
9.2.3.2	Replace the 4th paragraph with: "The provision of acoustic and/or visual warning signals before the starting of hazardous machine operation shall be considered during the risk assessment. Where the risk assessment determines that either or both are required the emission level of noise/light shall be suitable for the intended environment."		N/A
9.2.4.1	Replace the 2nd paragraph with: "Where a safety function of a CCS relies on data transmission the transmission reliability shall be considered."		N/A
9.2.4.8	Replace the last paragraph with: "Where the risk assessment shows that resetting of an emergency stop actuator on the portable cableless operator control station is not adequate then one or more supplementary fixed resets shall be provided."		N/A
11.4	In the 8th paragraph, replace "harmful" with "detrimental"		P
12.3	In the 1st paragraph, replace "should" with "shall"		N/A

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict
13.5.2	First paragraph, 2nd sentence, replace with "Where galvanic action is possible between dissimilar metals these metal combinations shall not be used".		N/A
16.1	Add to the first paragraph: "The markings shall be sufficiently durable to remain legible for the foreseen lifetime of the machine."		P
16.4	Delete the 2nd bullet		P
18.1	Add to paragraph 2: "Where the sequence cannot be followed verification a) and b) shall be conducted first."		P

	Add the following annexes		P
--	---------------------------	--	---

ZA	Annex ZA (normative) Normative references to international publications with their corresponding European publications		P
	A list of documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document		p

ZZA	Annex ZZA (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered		p
	This European Standard provides one voluntary means of conforming to essential requirements of Directive 2006/42/EC		P
	Once cited in the Official Journal of the European Union, compliance with the normative clauses of this standard given in Table ZZA.1 confers, within the limits of the scope of this standard, a presumption of conformity		P
	Table ZZA.1 shows the correspondence between this European Standard and Annex 1 of Directive 2006/42/EC		P
	Not considered are in this standard: - noise (1.7.4.2 and 1.5.8 of Annex I of the directive) - EMC (1.5.10 and 1.5.11)		P
	WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union		P
	WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.		P

EN 60204-1			
Clause	Requirement + Test	Result - Remark	Verdict

ZZB	Annex ZZB (informative) Relationship between this European Standard and the essential requirements of Directive 2014/35/EC aimed to be covered		P
	This European Standard provides one voluntary means of conforming to essential requirements of Directive 2014/35/EC		P
	Once cited in the Official Journal of the European Union, compliance with the normative clauses of this standard given in Table ZZB.1 confers, within the limits of the scope of this standard, a presumption of conformity		P
	Table ZZB.1 shows the correspondence between this European Standard and Annex 1 of Directive 2014/35/EC		P
	Remarks about certain objectives of Annex I:		P
	2b): For electromagnetic fields, this standard does not provide performance requirements for either immunity or emissions. Only general advice is given. EMF is not covered. Ionizing radiation is not considered.		P
	2c): Noise is not considered in this standard. Functional safety is not fully covered. Explosion of batteries has not been covered by this standard. Optical radiation is not covered		P
	3a): The standard only considers the mechanical requirements for electrical parts of a machine		P
	3b): For EMC, this standard does not provide performance requirements for either immunity or emissions. Only general advice is given Hazard associated with EMC and functional safety are not covered Safety-related security is not covered		P
	WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union		P
	WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.		P

Appendix tables

4.1.2	TABLE: List of critical components					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹	
Metal enclosure	Interchangeable	Interchangeable	Thickness 1.0mm	--	--	
Plastic enclosure	Toray Industries Inc	836V	ABS, V-1, min. thickness 1.5mm	UL94, UL746C	UL E41797	
AC inlet	Yueqing Lihe Electronics Co Ltd	LH-14	10A 250V	IEC 60320-1 EN 60320-1 VDE 0625-1	VDE 40048856	
- alt. AC inlet	Yueqing Qiyang Electronics Co., Ltd	AC-14 Series	10A 250V	IEC 60320-1	TUV SUD B0984590003	
Fuse	Shenzhen Lanson Electronics Co Ltd	5J	T10AL, 250V;	IEC 60127-1	VDE 40009306	
Switch	Leci Electronics Co., Ltd	RS601	AC 250V, 10A	IEC/EN 61058-1	VDE 40017430	
- alt. Switch	Yueqing Qiyang Electronics Co., Ltd	QY Series	AC 250V, 10A	IEC/EN 61058-1	TUV SUD B0984590002	
- alt. Switch	Yueqing Zuanhua Electronic Co.Ltd.	KCD Series	AC 250V, 6A	IEC/EN 61058-1	TUV R50541090	
Power unit	Powerld Enterprise Co., Ltd	LPD-150-24	I/P: 100-240V~, 50/60Hz, 3A O/P: 24VDC6.25A	EN IEC 62368-1	CE, UL E232347	
Internal wires	Interchangeable	Interchangeable	600V, 200°C, min. 18AWG	UL758	UL	
Output wire of SPS	Interchangeable	Interchangeable	600V, 200°C, min. 18AWG	UL758	UL	
Heat-shrinkable tube	Shenzhen Woer Heat-Shrinkable Material Co Ltd	RSFR-H	600V, 125°C, VW-1	UL 224	UL E203950	
PCB	Interchangeable	Interchangeable	V-0, 130°C	UL 796	UL	
Stepper motor 1	Guangzhou Ruibao Electrical Co., Ltd.	42SHDC40109 Z-15D	1.95VDC, 1.5A	EN 60335-1	CE	
- alt. Stepper motor 1	Zhongshan Shengyang Motor Co.,Ltd	42BYGH2250-B-15QHT	1.95VDC, 1.5A	EN 60335-1	CE	
Stepper motor 2	Guangzhou Ruibao Electrical Co., Ltd.	42SHDC6080Z-30D	1.98VDC, 2.2A	EN 60335-1	CE	
- alt. Stepper motor 2	Zhongshan Shengyang Motor Co.,Ltd	42BYGH3032-B-30QHT	1.98VDC, 2.2A	EN 60335-1	CE	
DC fan	Coolcox Corporation	CC8015H24S	24Vdc 0.15A	EN 60335-1	CE	

Appendix tables

4.1.2	TABLE: List of critical components					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹	
3D Printer Accessories	Shenzhen Anycubic Technology Co., Ltd	Anycubic Color Engine Pro	I/P: 100-240V~, 50/60Hz, 230W	EN 60335-1	CE	
Input terminal	Ningbo Xinlaiya Electronic Technology Co., Ltd.	XY series	250V 24A	EN 60998-2-1 EN 60998-1	VDE 40021684	
- alt. Input terminal	Cixi Kefa Electronics Co., Ltd	KF28	AC250V 24A	EN 60998-2-1 EN 60998-1	VDE 40036571	
Fuse	Dongguan Luoyi Electronic Technology Co., Ltd.	24FC	AC250V,5A	EN 60127-1:2006+A1+A2 EN 60127-7:2016	Certification No.: R50564270	
X-capacitor	JYH HSU (JEC) Electronics Ltd	MPX	X2, 250Vac, 100°C, 0.22uF	IEC 60384-14+A1	VDE 40044985	
Y-capacitor	JYH HSU (JEC) Electronics Ltd	JD	Y1, 250Vac, 125°C, 1500pF	IEC 60384-14+A1	VDE 40038642	
Varistor	JYH HSU (JEC) Electronics Ltd	10D561K	300Vac, 385Vdc, 6kV/3kA	IEC/EN 61051-1 IEC/EN 61051-2	TUV B105842 0001	
Relay	Yueqing Meigeer Electronic Electric Co., Ltd	MGR	24-380VAC, 5A	EN 60947-5-1	CB: M.2023.206.C 82656	
Power module	Shenzhen Hi-Link Electronics Co., Ltd.	HLK-30M24C	I/P: 100-240V~, 50-60Hz, 0.7A O/P: 24Vdc, 1.25A	IEC/EN 62368-1	CE Report: HTT20200631 1LR	

Appendix tables

18.2	TABLE: Test continuity of the protective bonding circuit				P
Measuring current ≥ 0.2 A; U ≤ 24 VAC/DC					—
Location	Cross-section [mm ²]	R [mΩ]	Limit [mΩ]	Remarks	
Between incoming PE terminal and relevant points that are part of the protective bonding circuit	1.5	142	500		
Supplementary information:					

18.3	TABLE: Insulation resistance tests				P
Location	Voltage(V) d.c	Time(s)	Measured insulation resistance(MΩ)	Limited insulation resistance(MΩ)	
Between power circuit conductors and protective bonding circuit	500V	60	189 MΩ	> 1 MΩ	
Between power circuit conductors and metal enclosure	500V	60	313 MΩ	> 1 MΩ	
Between power circuit conductors and Plastic parts	500V	60	422 MΩ	> 1 MΩ	
Supplementary information:					

18.4	TABLE: Voltage tests		P
Test voltage applied between:		Test voltage (V) a.c. / d.c.	Breakdown Yes / No
Between power circuit conductors and protective bonding circuit		1000 a.c., 50Hz, 1min	No
Between power circuit conductors and metal enclosure		1000 a.c., 50Hz, 1min	No
Between power circuit conductors and Plastic parts		1000 a.c., 50Hz, 1min	No
Supplementary information:			

Appendix tables

18.6		TABLE: Function tests		P
No.	Function	Requirement	Result	
1.	Vibration	Body <=0.1mm Dust cleaning <= 0.7mm	0.08mm	
2.	Transmission parts checking	Suitable for intended use, no abnormal noise	PASS	
3.	Speed variety for rotation parts moved by same bearing	< 5%	2.5%	
4.	Guard door protection device checking	Sensitive	PASS	
5.	Completed product	--	PASS	
Supplementary information:				

Appendix tables

Equipments used for the measurement

Equipments no	Equipment's name	Model	Specification		Last time calibrate	Next time calibrate	manufacture
STE-S-008	Withstand voltage insulation resistance tester	TH9320	Withstanding Voltage Test	AC:0.05~5KV DC:0.05~6KV	Jan. 09, 2024	Jan. 08, 2025	Changzhou Tonghui Electronics Co., Ltd
			Insulation Resistance Test	DC:50~1000, Constant Voltage			
STE-S-010	Grounding resistance tester	YD2654 B	Ground Resistance Test	AC1.5KV/5KV 100mA,60s AC:3.0~30A	Jan. 09, 2024	Jan. 08, 2025	Nanjing Changsheng Instrument Co., Ltd

Product Photos

Fig. 1



Fig. 2

Product Photos

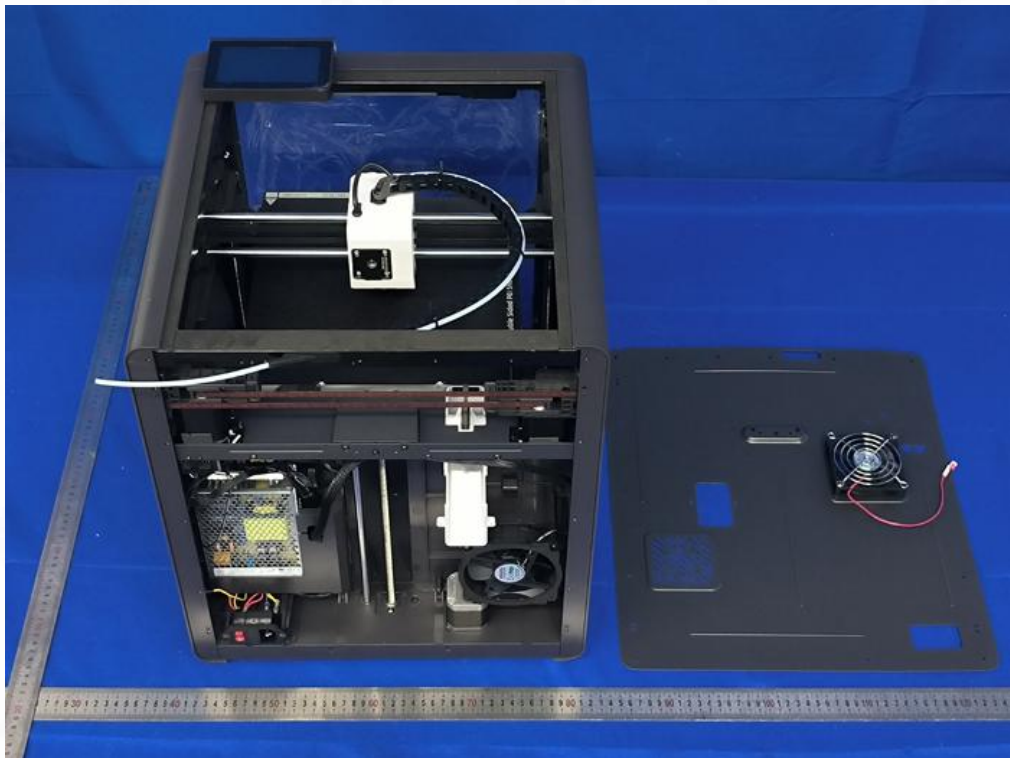


Fig. 3



Fig. 4

Product Photos

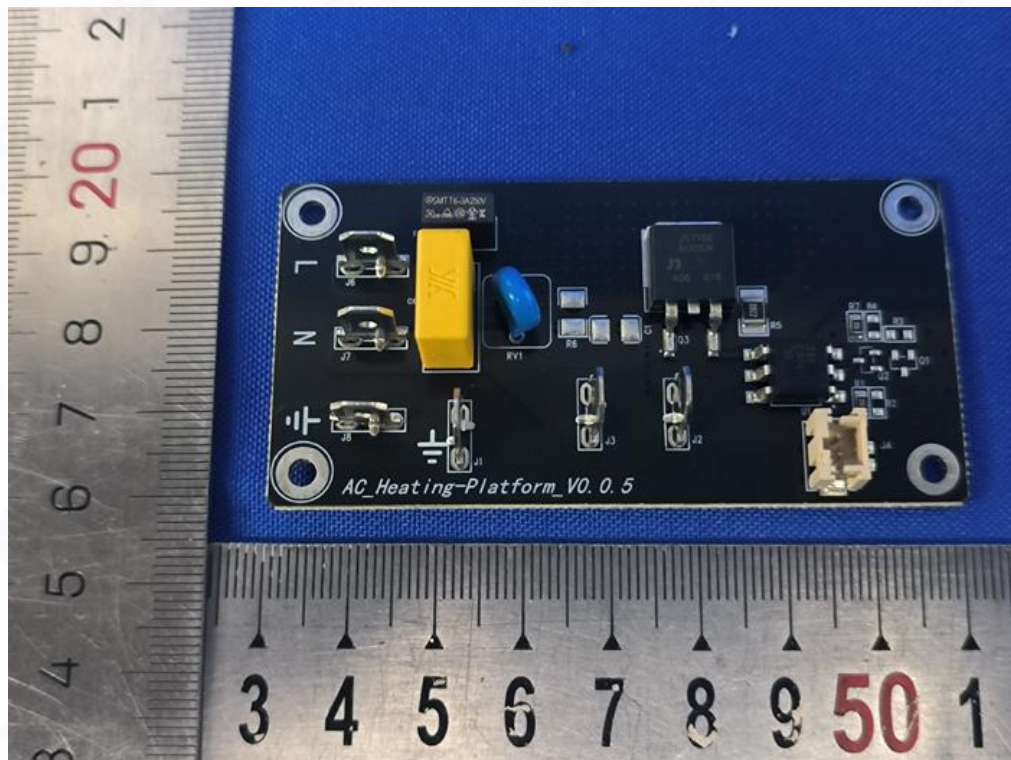


Fig. 5

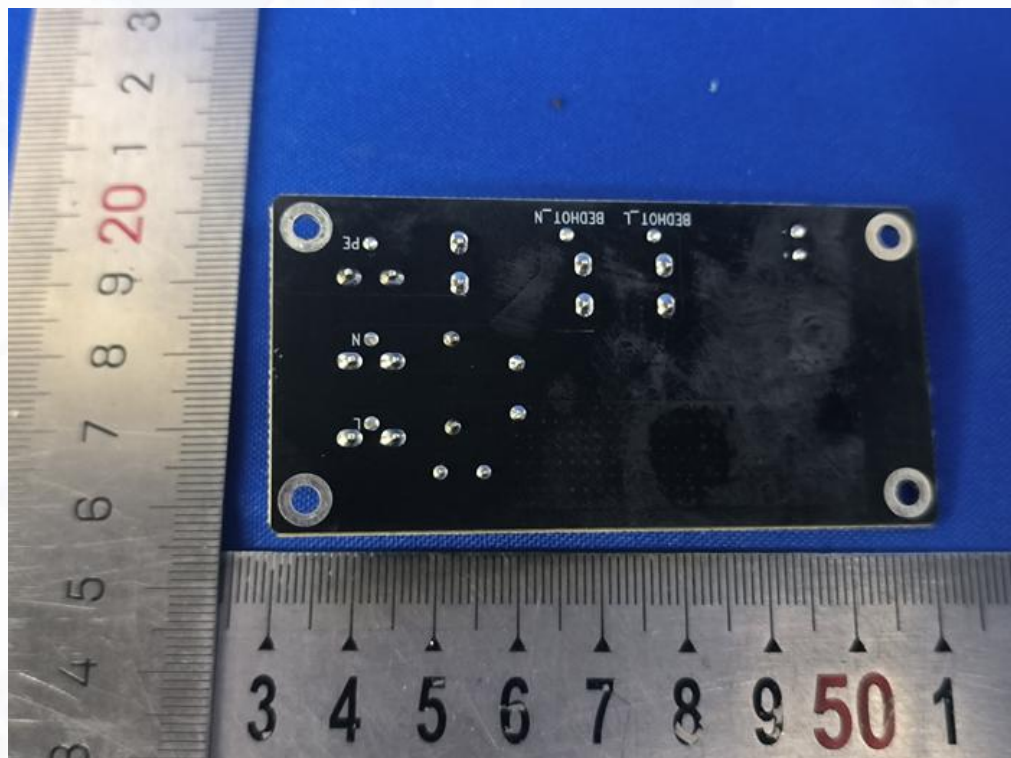


Fig. 6

Product Photos

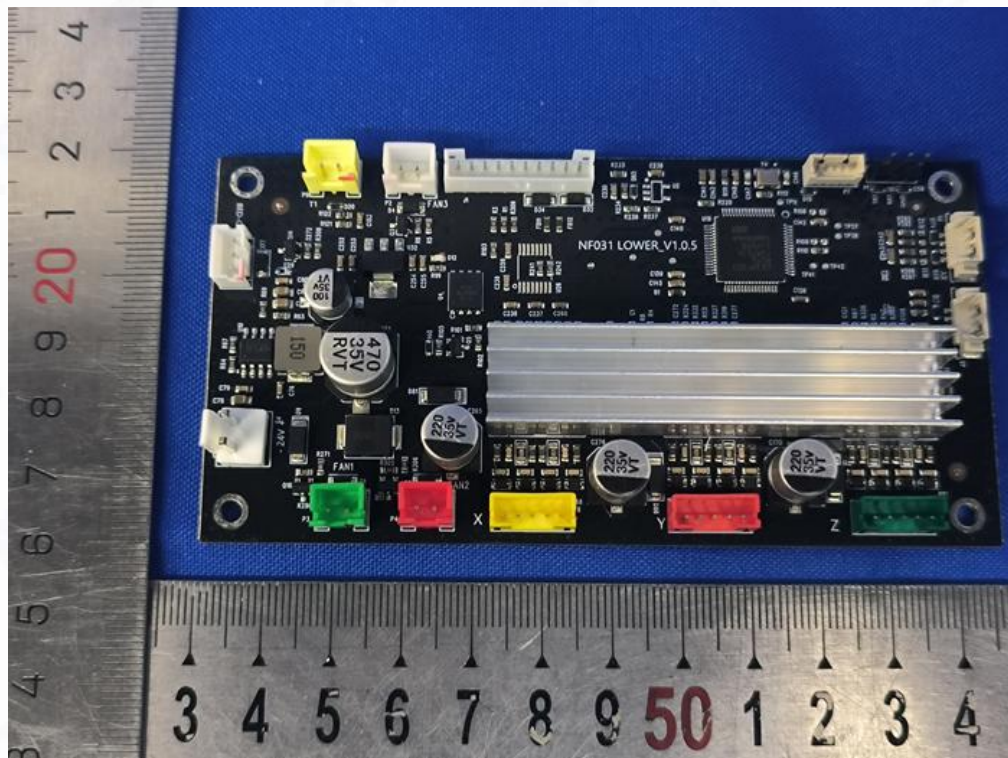


Fig. 7

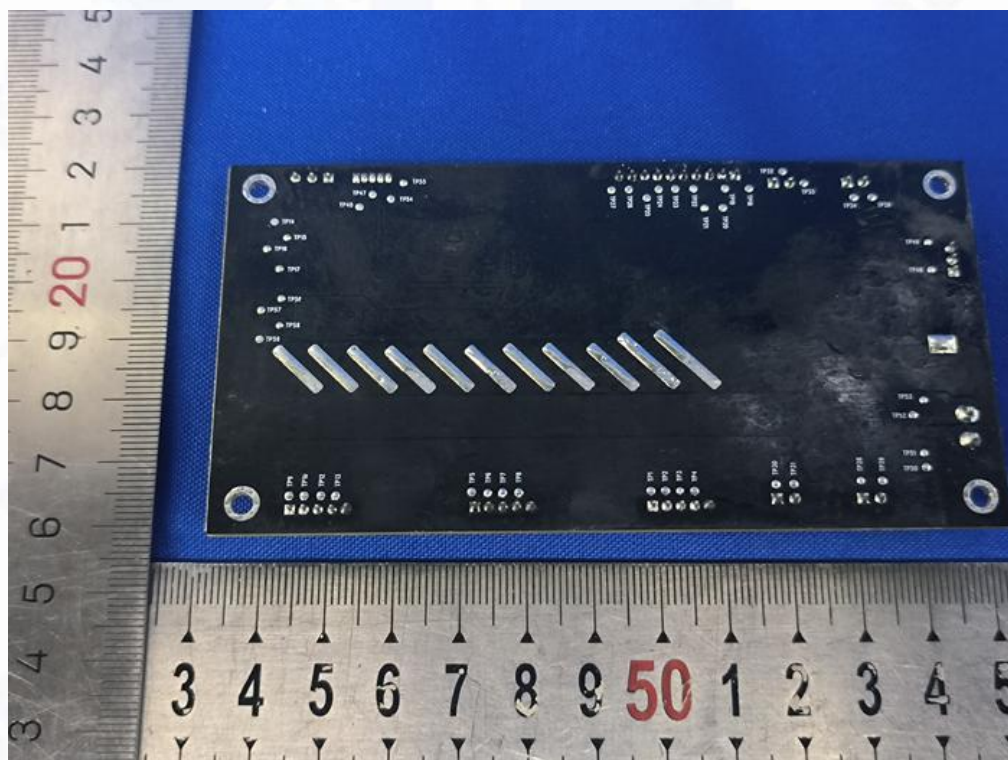


Fig. 8

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