Test Report No. TRIND-PC-C1904002/01-03

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Applicant:	HANGZHOU XIZI IPARKING CO., LTD. NO.181 Hongda Road, Yuhang Economic Development Zone, Hangzhou, P. R. China
Manufacturer:	Same as above
Test Item:	Chain drived lift-sliding mechanical parking system
Mark of origin:	N/A
Type Designation(s):	PSHL-2-XI
Serial No(s):	Prototype
Test requirements:	EN60204-1:2006+A1:2009+AC:2010
	Safety of machinery – Electrical equipment of machines Part 1: General requirements
Test result:	The test item passed the test requirement(s).
Testing Laboratory	TÜV NORD (Hangzhou) Co., Ltd.
	5 Floor, No.50 Jiuhuan Road, Jianggan District, Hangzhou, China.310019
Testing location:	At manufacturer's premises
Compiled by (+ signature):	Ken Jia TÜV NORD (Hangzhou) Co., Ltd.
Approved by (+ signature):	Jack Cai TÜV NORD (Hangzhou) Co., Ltd.
Date of issue:	2019-05-28
Other Aspects: This report is only valid together with The result of this report is established diagrams to the non-conformities for t	other parts which named -01, -02 and -03. in the corrective measures provided by manufacturer include the design he test sample.
Test Report Format No:	TRF EN 60204_2006+A1_2009+AC:2010_TNC
TRF Originator:	TÜV NORD China, Date: 2011-10
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Test case verdicts:	
Does not tested to the test object	N/T
Test case does not apply to the test object:	N/A
Test item does meet the requirement:	P(ass)
Test item does not meet the requirement:	F(ail)

Additional Information :

Abbreviations used in this report :

None

Others:

The test sample was found not in compliance with the test requirements. The non-conformities were notified to the applicant. For clearance of those non-conformities, the technical documentation and proposed corrective measures to each non-conformities which submitted by applicant were considered acceptable for this test.

Brief description of the test item:

Refer to the report of TRIND-PC-C1904002/01-01.

Technical Specifications:

Refer to the report of TRIND-PC-C1904002/01-01.



	EN60204-1:2006+A1:2009+AC:2010			
Clause	Requirement – Test	Result – Remark	Verdict	
4.	GENERAL REQUIREMENTS		_	
4.1	General considerations		_	
	hazard and risk assessment	Complied	Р	
4.2	Selection of equipment		_	
4.2.1	electrical components/devices suitable for their intended use; and	Major electrical components and devices confirm to relevant EN standards	Р	
	conform to the relevant IEC or EN standards:		Р	
	and be applied in accordance with the supplier's instructions	Complied	Р	
4.2.2	The electrical equipment of the machine satisfies the safety requirements identified by the risk assessment of the machine.	Complied	Ρ	
	Depending upon the machine, its intended use and its electrical equipment, parts of the electrical equipment of the machine are in compliance with EN 60439-1 and, as necessary, other relevant parts of the EN 60439 series (see also Annex F).		N/A	
4.3	Power supply and related conditions:		_	
4.3.1	Electrical equipment to be designed for correct operation with conditions of mains power supply	See 4.3.2 and 4.3.3	Р	
4.3.2	Supply Voltage	$380~V\pm10\%$	Р	
	Frequency:	$50Hz \pm 1\%$	Р	
	Harmonics:	Less than 10%	Р	
	Voltage unbalance:	Less than 2% of positive sequence components	Р	
	Voltage interruption:	< 3ms; 1s between interruption	Р	
	Voltage dips:	< 20%; 1s between interruption	Р	
4.3.3	DC Voltage	No DC main voltage	N/A	
	Voltage interruption:	See above	N/A	
	Ripple (peak-peak):	See above	N/A	
4.3.4	Onboard power supply acc. to cl. 4.3.2 and 4.3.3	No on-board generator	N/A	
4.4	Physical environment and operating conditions		_	
4.4.1	Electrical equipment to be suitable for use in physical environment and operating conditions	See 4.4.2 to 4.4.8.	Р	
	An agreement between user and supplier (see 4.1 and Annex B).	See above	N/A	
4.4.2	Electromagnetic compatibility (EMC)		Р	
	Equipment not to generate electromagnetic disturbances above harmful levels (applicable generic EMC-standard: EN 61000-6-3 or EN 61000-6-4)	Declaration provided by the manufacturer	Ρ	

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	EN60204-1:2006+A1:2009+AC:2010			
Clause	Requirement – Test	Result – Remark	Verdict	
	Equipment has adequate level of immunity to EMC (applicable generic EMC-standards: EN 61000-6-1 or EN 61000-6-2)	See above	Р	
4.4.3	Electrical equipment to be capable for correct operation at intended ambient air temperature	Between+0 °C and +45 °C	Р	
4.4.4	Electrical equipment to be capable for correct operation at specified relative humidity: at and	Below 75%	Ρ	
4.4.5	Electrical equipment capable of operating correctly at altitudes up to 1000 m above m.s.l.	Up to 1000 m	Р	
4.4.6	Electrical equipment shall be adequately protected against ingress of solid properties and liquids	IP44	Р	
4.4.7	Equipment subject to radiation, additional measures to be taken to avoid equipment malfunction	Declaration provided by the manufacturer	Ρ	
4.4.8	Undesirable effects of vibration, shock and bump avoided	See instruction manual	Р	
4.5	Electrical equipment designed to withstand the effects of transportation and storage within a temperature range of -25 to +55 °C		Р	
	A special agreement between supplier and user (see Annex B).	See above	Р	
4.6	Heavy or bulky electrical equipment of the machine provided with suitable means for handling	Information for transportation and installation is provided in instructions and handling devices are equipped where necessary.	Ρ	
4.7	Electrical equipment installed and operated in accordance with the supplier's instruction	See instruction manual	Р	
5.	INCOMING SUPPLY CONDUCTOR TERMINATIONS AND DEVICES FOR DISCONNECTING AND SWITCHING OFF		_	
5.1	Incoming supply conductor terminal		_	
	electrical equipment of a machine connected to a single power supply	Single power supply of 380 V 3~ 50 Hz	Р	
	power supply conductors terminated to main disconnecting device of electrical equipment	Incoming supply is directly connected to the supply terminal of the main circuit breaker. (see installation instruction)	Ρ	
	neutral conductor "N" clearly indicated in technical documentation (see 16.1 and also annex B).		Р	
	no connection between neutral conductor and protective bonding circuit nor combined PEN-terminals.		Р	
	All terminals of incoming supply clearly marked (symbols acc. to EN 60445 and 16.1)	Terminals identified with markings of L1, L2, L3	Р	
5.2	Terminal for connection to external protective earthi	ng system		
	Terminal for connection of external protective conductor provided and marked with "PE"	PE terminal on the bottom of the control panel	Р	

	EN60204-1:2006+A1:2009+AC:2010			
Clause	Requirement – Test	Result – Remark	Verdict	
	Cross section of incoming PE conductor acc. to cl. 5.2, table 1	According to clause 5.2, Table 1	Р	
	Terminals allow connection of external protective earth conductors PE (see EN 60445 and also 8.2.6)	Main terminal block	Р	
5.3	Supply disconnecting device		-	
5.3.1	Power supply disconnecting device provided for electrical equipment		_	
5.3.2	Type of power supply disconnecting device:	-	_	
	a) Switch-disconnector, acc. to EN 60947-3 for appliance category AC-23 B or DC-23 B		Р	
	b) Disconnector with or without fuses, with aux. contact (acc. to EN 60947-3)		Р	
	c) Power CB suitable for isolation (acc. to EN 60947-2)		N/A	
	d) Any other switching device in accordance with an IEC product standard for that device and which meets the isolation requirements of EN 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/A	
	e) plug and socket outlets or appliance couplers for flexible cable supply		N/A	
5.3.3	When the supply disconnecting device is one of the	types specified in 5.3.2 a) to d):	_	
	Isolator for electrical equipment from supply (acc. to EN 60947-2)		Р	
	One OFF (isolated) and one ON position only		Р	
	Clearly marked with "0" and "I"		Р	
	visible isolating distance or		Р	
	Position indication which cannot indicate the OFF- position until all contacts are actually open		Р	
	External operating device provided (except power operated CB's)		Р	
	Colour black or grey preferred, where the external operating means is not intended for emergency operations (see 10.7.4 and 10.8.4)		Р	
	If used as an emergency stop, red/yellow combination selected		Р	
	Locking means provided to lock in OFF-position		Р	
	In locked position, remote or local closing prevented		Р	
	Disconnection of all live conductors (Exception: TN- supply systems, neutral conductor)		Р	
	Sufficient breaking capacity		Р	
	When the supply disconnecting device is a plug/soc	ket combination:	-	

EN60204-1:2006+A1:2009+AC:2010			
Clause	Requirement – Test	Result – Remark	Verdict
	– have the switching capability, or be interlocked with a switching device that has a breaking capacity, sufficient to interrupt the current of the largest motor when stalled together with the sum of the normal running currents of all other motors and/or loads.		N/A
	When the interlocked switching device is electrically operated (for example a contactor) it has an appropriate utilization category		N/A
	- a) to f) of 13.4.5.		N/A
	Where the supply disconnecting device is a plug/source	cket combination,	_
	 a switching device with an appropriate utilization category provided for switching the machine on and off (e.g. by the use of the interlocked switching device described above); 		N/A
5.3.4	Handle of disconnecting device to be easily accessible		Р
	Handle located between 0.6m and 1.9m above service level (upper limit of 1.7 m is recommended)		Р
5.3.5	Following circuits not disconnected by supply discor	nnecting device:	_
	Lighting circuits during maintenance or repair		N/A
	Plug/socket outlets exclusively used for maintenance or repair		N/A
	Undervoltage protection circuits used for automatic tripping only at power supply failures		N/A
	Circuits of equipment to remain normally energised for satisfactory operation		N/A
	Control circuits for interlocking purposes		N/A
	Circuits which are not disconnected by supply disco	nnecting device:	-
	Permanent warning labels placed in proximity of supply disconnectors (see 16.1)		N/A
	Corresponding statement in maintenance manual, and		N/A
	Warning label in proximity of circuit concerned		N/A
	or wiring separated from other wiring		N/A
	or conductors identified by colour taking into account the recommendation of 13.2.4		N/A
5.4	Disconnecting devices to prevent unexpected start-	up:	-
	Means shall be provided to prevent inadvertent and / or mistaken closure of the disconnecting device (see also 5.6)	Lock in OFF-position	Р
	Such devices appropriate and convenient for intended use		Р
	Suitable placed		Р
	Readily identifiable (see 16.1)		Р



	EN60204-1:2006+A1:2009+AC:2010			
Clause	Requirement – Test	Result – Remark	Verdict	
	Devices that fulfill the isolation function provided:		-	
	- devices described in 5.3.2,	See 5.3.2	Р	
	 disconnectors, withdrawable fuse links and withdrawable links only if located in an enclosed electrical operating area (see 3.19). 		N/A	
	Devices that do not fulfill the isolation function (for e for the following situations only:	xample a contactor switched off by a	control circuit)	
	– inspections;		Р	
	– adjustments;		Р	
	- work on the electrical equipment where:		Р	
	• there is no hazard arising from electric shock (see Clause 6) and burn;		Р	
	 the switching off means remains effective throughout the work; 		Р	
	• the work is of a minor nature (for example replacement of plug-in devices without disturbing existing wiring).		Ρ	
5.5	Devices provided for disconnecting (isolating) electrical equipment to enable work to be carried out when it is de-energized and isolated.		Р	
	Such disconnecting devices appropriate and convenient for intended use and		Р	
	Suitably located and readily identifiable to which part it serves (see 16.1).		Р	
	Provided with adequate means to prevent unauthorised, inadvertent and /or mistaken closing (see also 5.6)	See above	Р	
	Supply-disconnecting device used (see 5.3)		Р	
	Disconnecting device provided for each separated part of the machine or partial machine where necessary		Р	
	In addition to the supply disconnecting device as ab	ove:	-	
	Devices described in 5.3.2; Disconnectors, fuse links etc. used only in enclosed electrical operating areas (see 3.15) and relevant information is provided with the electrical equipment (see 17.2 b) 9) and b)12)).	See manual	Ρ	
5.6	Devices acc. to cl. 5.4 and 5.5 that are located outside an enclosed electrical operating area	The isolation device located on the enclosure	door of the	
	Means provided with device to secure them in the OFF position (disconnected state), (for example by provisions for padlocking, trapped key interlocking)	Provisions for padlocking	Р	
	When so secured, remote as well as local reconnection shall be prevented.	No reconnection	Р	



EN60204-1:2006+A1:2009+AC:2010			
Clause	Requirement – Test	Result – Remark	Verdict
	Other means of protection against reconnection (for example warning labels in accordance with 16.1) used for non-lockable disconnecting devices (for example withdrawable fuse-links, withdrawable links)		N/A
	Locking device not necessary for plug/ socket outlet combinations, if located in a suitable manner and Under immediate supervision of the person carrying out the work		N/A
6	PROTECTION AGAINST ELECTRIC SHOCK		_
6.2	Protection against direct contact:		_
6.2.1	- by means of protection by enclosure	All live parts were protected by enclosure or integrated insulation with the approved components.	Ρ
	- by means of insulation of live parts	See 6.2.3	Р
	- by means of protection against residual voltages	See 18.5	Р
6.2.2	Protection by enclosure:		_
	 Live parts located inside enclosures conform to relevant requirements of clauses 4, 11 and 14 Protection against direct contact at least IP2X or IPXXB 		Р
	Where top surfaces of enclosures are readily accessible, degree of protection against direct contact is IP4X or IPXXD.		N/A
	Opening of enclosure possible only under following	conditions:	
	a) use of a key or a tool. Special requirements for enclosed electrical operating areas may apply	Кеу	Р
	live parts inside of doors with protection degree of IP1X or IPXXA	IP2X	Р
	live parts likely to be touched during resetting or adjustment with protection degree IP2X or IPXXB	IP2X	Р
	b) disconnection of live parts inside enclosure prior to opening of enclosure		N/A
	at door interlocking safety circuit, door will open only when main isolator is in open position		N/A
	 opening of disconnector possible at all times while interlock is defeated 	See above b)	N/A
	- and lock the disconnecting device in the OFF (isolated) position or otherwise prevent unauthorised closure of the disconnecting device;		N/A
	- upon closing the door, interlock is automatically restored		N/A



	EN60204-1:2006+A1:2009+AC:2010		
Clause	Requirement – Test	Result – Remark	Verdict
	 – all live parts, that are likely to be touched when resetting or adjusting devices intended for such operations while the equipment is still connected, are protected against direct contact to at least IP2X or IPXXB and other live parts on the inside of doors are protected against direct contact to at least IP1X or IPXXA; 		N/A
	 relevant information is provided with the electrical equipment (see 17.2 b)9) and b)12)). 		N/A
	Means provided to restrict access to live parts behind doors not directly interlocked with the disconnecting means to skilled or instructed persons. (See 17.2 b)12)).		N/A
	All parts remaining live after switching off mains supply to be protected against direct contact with at least IP2X or IPXXB		N/A
	Such parts marked with warning symbol acc. to cl.16.2.1 (see also 13.2.4 for identification of conductors by colour).		N/A
	Excepted from this requirement for marking are:		_
	- Parts that can be live only due to connection to interlocking circuits, distinguished by colour as potentially live acc. to cl. 13.2.4		N/A
	- Terminals of supply disconnecting device when latter mounted alone in a separate enclosure		N/A
	c) opening of doors without use of key or tool and without disconnection of live parts possible only when all live parts are protected against direct contact by IP2X or IPXXB		N/A
	where protection is provided by barriers, tools required for their removal or		N/A
	all live parts automatically disconnected when barrier is removed		N/A
6.2.3	Protection by insulation of live parts:		_
	Live parts completely covered with insulation	All the liver parts insulated appropriately for intended use in the equipment	Р
	insulation can be removed only by destruction	Complied	Р
	insulation capable to withstand mechanical, chemical, electrical and thermal stress occurring under normal service conditions	Complied	Р
	Paint, varnish lacquer etc. not used as insulation	Complied	Р
6.2.4	Protection of residual voltage:		-
	Live parts with residual voltage > 60V after disconnection, to be discharged to \leq 60V within 5s after disconnection, except for components with charges \leq 60 μC		N/A

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Clause	Requirement – Test	Result – Remark	Verdict	
	Where pins of plugs or similar devices after withdrawal are exposed, discharge time \leq 1s,	None	N/A	
	Or, such conductors protected against direct contact by at least IP2X or IPXXB	See above	N/A	
	if above requirements cannot be achieved (for example a warning notice in accordance with 16.1), additional disconnecting devices or appropriate warning devices shall be applied. (see cl. 12.7.4)	See above	N/A	
6.2.5	Protection by barriers acc. to EN 60364-4-41 cl. 412.2		Р	
6.2.6	Protection by placing out of reach or protection by obstacles acc. to EN 60364-4-41, cl. 412.4 and 412.3)	No such protection	N/A	
	For collector wire- or bar systems, with protection less than IP2X, see cl. 13.8.1	See above	N/A	
6.3	Protection against indirect contact:		-	
6.3.2	Measures to prevent the occurrence of a hazardous touch voltage		_	
6.3.2.2	use of class II electrical devices or apparatus (double insulation, reinforced insulation or by equivalent insulation acc. to EN 61140)		N/A	
	use of switchgear and controlgear assemblies with total insulation acc. to EN 60439-1		N/A	
	application of supplementary or reinforced insulation acc. to EN 60364-4-41, 413.2		N/A	
6.3.2.3	Electrical separation of an individual circuit to prevent hazardous touch voltage acc. to EN 60364-4-41, cl. 413.5		N/A	
6.3.3	Protection by automatic disconnection of supply by r	neans of:	_	
	Protective bonding of exposed conductive parts (see 8.2.3), and	Complied	Р	
	a) Overcurrent protective device for automatic disconnection on detection of an insulation fault in a TN-system, or	Complied	Р	
	b) Residual current protective devices to initiate the automatic disconnection of the supply on detection of an insulation fault from a live part to exposed conductive parts or to earth in TT systems, or		N/A	
	 c) Use of insulation monitoring or residual current protective devices to initiate automatic disconnection in a IT-System, and 		N/A	
	Except where a protective device is provided to interrupt the supply in the case of the first earth fault, an insulation monitoring device shall be provided to indicate the occurrence of a first fault from a live part to exposed conductive parts or to earth, initiating an audible and/or visual signal which shall continue as long as the fault persists.		N/A	



	EN60204-1:2006+A1:2009+AC:2010			
Clause	Requirement – Test	Result – Remark	Verdict	
	Where automatic disconnection is provided in accordance with a) and disconnection within the time specified in Clause A.1 cannot be assured, supplementary bonding shall be provided as necessary to meet the requirements of Clause A.3.	Automatic disconnected within 2 s	Ρ	
6.4	Protection by application of PELV circuit which have	to fulfil following requirements:	_	
6.4.1	a) nominal voltage not to exceed 25 AC (r.m.s.) or 60 DC (ripple-free) or	24 DC from the switching power supply	Р	
	6VAC or 15VDC for all other cases		N/A	
	b) one side of PELV- circuit or one point of source of supply to be connected to PE- circuit	Complied	Р	
	c) live parts of PELV- circuits to be electrically separated from other live circuits.		Р	
	Electrical separation equal as required for safety isolating transformers (see IEC 61558-1 and IEC 61558-2-6)	Double isolation	Р	
	d) conductors of each PELV circuit to be physically separated from those of any other circuit.		Р	
	If not practicable, insulation provisions acc. to cl. 13.1.3 shall be applied		N/A	
	e) plugs and socket outlets for PELV- circuits shall c	conform to following requirements:	-	
	plugs shall not be able to enter socket outlets of other voltage systems	None	N/A	
	socket outlets shall not admit plugs of other voltage systems	None	N/A	
6.4.2	Sources for PELV- circuits to be one of the following	:	-	
	safety isolating transformers acc. to IEC 61558-1 and IEC 61558-2-6		N/A	
	source of current providing a degree of safety, equivalent to safety isolating transformers		N/A	
	electrochemical or other source, independent of circuit with higher voltage		N/A	
	electronic power supply conforming to appropriate standards	switching power supply	Р	
7	PROTECTION EQUIPMENT		_	
7.2	Overcurrent protection:		-	
7.2.1	Overcurrent protection device provided		Р	
7.2.2	Overcurrent protective device at incoming feeder to the electrical equipment (see to cl. 7.2.10 and cl. 18.5)		Р	
	Electrical equipment supplier state data for overcurrent protective device	See instructions	Р	
7.2.3	Power circuits:		_	
	Overcurrent protective devices applied to each live conductors except for neutral earth conductor		Р	



	EN60204-1:2006+A1:2009+AC:2010			
Clause	Requirement – Test	Result – Remark	Verdict	
	The following conductors, as applicable, are not dis conductors:	connected without disconnecting all a	ssociated live	
	- the neutral conductor of a.c. power circuits;		Р	
	- the earthed conductor of d.c. power circuits;		Р	
	 – d.c. power conductors bonded to exposed conductive parts of mobile machines. 	No mobile machines	N/A	
	Cross sectional area of neutral conductor to be at least equal to phase conductor, no overcurrent protective/ disconnecting device required		N/A	
	For neutral earth conductors with cross sections smaller than phase conductors, measures acc. to 524 of IEC 60364-5-52 will apply		Ρ	
	For IT-systems use of neutral earth conductor (N) is not recommended. Nevertheless if a N-conductor is used, measures acc. to cl. 473.3.2.2 of IEC 60364-4-43 shall apply.		Ρ	
7.2.4	Control circuits:		-	
	Conductors of control circuits directly connected to supply voltage and circuits feeding control voltage transformers protected against overcurrent acc. to cl. 7.2.3		Ρ	
	Conductors of control circuits supplied by a control protected against overcurrent (see also 9.4.3.1):	circuit transformer or d.c. supply are		
	 in control circuits connected to the protective bonding circuit, by inserting an overcurrent protective device into the switched conductor; 		Ρ	
	- in control circuits not connected to the protective	bonding circuit:	-	
	- where the same cross sectional area conductors are used in all control circuits, by inserting an overcurrent protective device into the switched conductor, and;		N/A	
	- where different cross sectional areas conductors are used in different sub-circuits, by inserting an overcurrent protective device into both switched and common conductors of each sub-circuit.		N/A	
7.2.5	Socket outlets and their associated conductors:		_	
	Overcurrent protection devices for socket outlets provided for non-earthed live conductors of each circuit feeding such socket outlets		Ρ	
7.2.6	Lighting circuits:			
	All unearthed conductors of local lighting circuits protected by overcurrent protective devices		N/A	
7.2.7	Transformers:		_	
	Transformers protected against overcurrent acc. to with the manufacturer's instructions.		Р	

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Clause	Requirement – Test	Result – Remark	Verdict
	Avoid unnecessary tripping due to overcurrent caused by magnetising inrush currents		Р
	Avoid temperature rise of transformer winding in excess of its permitted of its insulation class of transformer in case of short circuit at secondary terminals		Р
	Type and setting of overcurrent protective device acc. to recommendations of transformer manufacturer		Р
7.2.8	Location of protective devices:		_
	Overcurrent protective device located at point where a reduction in the cross sectional area of the conductors or another change reduces the current- carrying capacity of the conductors, except		Ρ
	Current carrying capacity of conductors at least equal to that the load, and		Р
	The part of the conductor between the point of reduction of current-carrying capacity and the position of the overcurrent protective device not longer than 3 meters, and		Ρ
	Conductor installed in such a manner as to reduce the possibility of a short-circuit, for example, protected by an enclosure or duct		Р
7.2.9	Overcurrent protective devices:		_
	Rated short-circuit breaking capacity at least equal to prospective fault current at point of installation		Р
	Current other than those coming from supply side taken into account		Р
	Reduced breaking capacity is permitted, where another protective device is installed at supply side with the necessary breaking capacity		Ρ
	Back-up protection carefully checked, no destruction of conductor or overcurrent protective device may result		Р
	Co-ordination with other protective devices in circuit required		Р
	Where fuses are provided as overcurrent protective devices, a type readily available in the country of use shall be selected, or arrangements shall be made for the supply of spare parts.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
7.2.10	Rating and setting of overcurrent protective devices:		_
	The rated current or setting of an overcurrent protective device is determined by the current carrying capacity of the conductors to be protected in accordance with 12.4, D.2 and the maximum allowable interrupting time t in accordance with Clause D.3, taking into account the needs of coordination with other electrical devices in the protected circuit.		Ρ
	Settings of overcurrent protective devices appropriately listed in technical documentation	In circuit diagram	Р
7.3	Protection of motors against overheating:		-
7.3.1	General		_
	Protection of motors against overheating provided for each motor rated at more than 0,5 kW		Р
	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/A
	Overload protection achieved by overload protection (7.3.2), over-temperature protection (7.3.3) or current-limiting protection (7.3.4)	Overload protection	Р
	Automatic restarting of motors prevented after operation of overload protective device, to avoid cause of a hazardous condition		Ρ
7.3.2	Overload protection	_	_
	Current overload detection provided for each live conductor except for neutral conductor	Motor verified accord to EN 60034- 1	Р
	However, where the motor overload detection is not used for cable overload protection (see also Clause D.2), the number of overload detection devices may be reduced at the request of the user (see also Annex B).		N/A
	For motors having single phase or d.c. power supply, detection in only one unearthed live conductor is permitted	See manual	Ρ
7.3.3	Over-temperature protection		_
	The provision of motors with over-temperature protection (see IEC 60034-11) recommended in situations where the cooling can be impaired (for example dusty environments).		N/A
	Depending upon the type of motor, protection under stalled rotor or loss of phase conditions is not always ensured by over-temperature protection, and additional protection should then be provided.		N/A



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Clause	Requirement – Test	Result – Remark	Verdict	
	Over-temperature protection also recommended for motors that cannot be overloaded (for example torque motors, motion drives that are either protected by mechanical overload protection devices or are adequately dimensioned), where the possibility of over- temperature exists (for example due to reduced cooling).		N/A	
7.3.4	Current limiting protection		-	
	Where protection against the effects of overheating in three phase motors is achieved by current limitation, the number of current limitation devices may be reduced from 3 to 2 (see 7.3.2).		Р	
	For motors having single phase a.c or d.c. power supplies, current limitation in only one unearthed live conductor is permitted.		Ν	
7.4	Abnormal temperature protection:		_	
	Resistance heating or similar devices which cause excessive heat, equipped with suitable overtemperature (for example, due to short-time rating or loss of cooling medium) detection	None	N/A	
7.5	Protection against supply interruption or voltage red	uction and subsequent restoration	-	
	Under voltage protection provided for applications where loss of supply or under voltage causes a hazardous condition	No malfunctioning resulting from a voltage drop or supply interruption.	N/A	
	If interruption or reduction of supply voltage is allowed for a short period of time, delayed undervoltage protection provided.	See above	N/A	
	Undervoltage protection not impair any stopping control of the machine	See above	N/A	
	Upon restoration of supply voltage, automatic or unexpected restarting of machine prevented	No automatic restarting possible	N/A	
	Undervoltage protection to initiate appropriate control responses to ensure co-ordination the groups of machines working together	See above	N/A	
7.6	Motor overspeed protection:		_	
	Overspeed protection provided where overspeeding causes a hazardous condition		Р	
	Overspeed protection initiates appropriate control response and prevents automatic restarting		Р	
	The overspeed protection operates in such a manner that the mechanical speed limit of the motor or its load is not exceeded.		Р	
7.7	Earth fault / residual current protection:		_	
	To reduce damage to equipment due to earth fault currents less than the detection level of the overcurrent protection, earth fault/residual protection used		N/A	

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Clause	Requirement – Test	Result – Remark	Verdict	
	Detection level for earth fault protection set as low as possible		N/A	
7.8	Phase sequence protection:		_	
	Protection from incorrect phase sequence of supply voltage provided		Р	
7.9	Protection against overvoltages due to lightning strik	e or switching action:	_	
	Protective devices for the suppression of overvoltages caused by lightning strikes or switching surges provided		Ρ	
	Devices for suppression of overvoltages due to lightning, connected at incoming terminals of the supply disconnecting device		Ρ	
	Devices for suppression of overvoltages due to switching surges connected across terminals of all equipment requiring such protection		Ρ	
8	EQUIPOTENTIAL BONDING		_	
8.2.1	General:		_	
	All parts of protective bonding circuit capable to withstand max. thermal and mechanical stress, caused by earth-fault currents	See 8.2.2 to 8.2.8	Ρ	
	A supplementary bonding conductor provided, where the conductance of structural parts of the electrical equipment or of the machine is less than that of the smallest protective conductor connected to the exposed conductive parts.	The supplementary bonding conductor is provided for the frame of machine	Ρ	
	This supplementary bonding conductor having a cross-sectional area not less than half that of the corresponding protective conductor.		Ρ	
	When an IT distribution system is used, machine structure will be part of the protective bonding circuit in conjunction with insulation monitoring. See 6.3.3 c).	No IT distribution system	N/A	
	Conductive structural parts of equipment in accordance with 6.3.2.2 need not be connected to the protective bonding circuit.	All conductive structural parts of machine are connected to protective bonding circuit	N/A	
	Extraneous conductive parts which form the structure of the machine need not be connected to the protective bonding circuit where all the equipment provided is in accordance with 6.3.2.2.		N/A	
	Exposed conductive parts of equipment in accordance with 6.3.2.3 shall not be connected to the protective bonding circuit.		N/A	
8.2.2	Protective conductors:		_	
	Identification and marking of protective conductors acc. to cl. 13.2.2	See 13.2.2	Р	
	Copper conductors used as protective conductors	Complied	Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
	Other conductor materials allowed, if cross section of such conductors is not less than 16 mm ²	No conductor other than copper used	N/A	
	Cross-sectional area of protective conductors determined acc. to IEC 60364-5-54, cl. 543 or EN 60439-1, cl. 7.4.3.1.7, table 4		Ρ	
	Relationship between cross-section area of phase conductor and PE acc. to table 1 (see 5.2). See also 8.2.8.	See above	Р	
8.2.3	Continuity of protective bonding circuit:		_	
	All exposed conductive parts connected to protective bonding circuit acc. to 8.2.1. (see 8.2.5 for exception)	All exposed conductive parts connected to the protective bonding circuit	Р	
	In case of removal of parts of PE system, remaining parts not to be interrupted		N/A	
	Current-carrying capacity of connections and bonding points not impaired by mechanical, chemical or electrochemical influences	Complied	Р	
	Particular consideration should be given if enclosure consists of aluminium and its alloys	None	N/A	
	Metal conduits and cable armouring not used as protective conductors but connected to protective bonding circuit	No flexible metal conduits and metallic cable sheaths used as protective conductors	Р	
	Protective conductor in cables exposed to damage (e.g. flexible trailing cables) is ensured by appropriate measures (e.g. monitoring)	Complied	Р	
	For continuity of the protective conductor using collector wires, collector bars and slip-ring assemblies, see 12.7.2	None	N/A	
8.2.4	Exclusions of switching devices from protective bond	ding circuit:	_	
	Protective bonding circuit not incorporate a switching-/overcurrent protective device	No such devices in protective bonding circuit	Р	
	No means of interruption of the protective bonding conductor provided.	Complied	Р	
	Exception : links for test or measurement purposes that cannot be opened without the use of a tool and that are located in an enclosed electrical operating area.	None	N/A	
	Where the continuity of the protective bonding circuit can be interrupted by means of removable current collectors or plug/socket combinations, the protective bonding circuit shall be interrupted by a first make last break contact.	None	N/A	
	This also applies to removable or withdrawable plug-in units (see also 13.4.5).	See above	N/A	



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Clause	Requirement – Test	Result – Remark	Verdict		
8.2.5	Equipment parts that need not to be connected to p	rotective bonding circuit:	_		
	Parts which cannot be touched on large surfaces or grasped by hand due to its small size (less than approx. 50 x 50 mm), small parts such as screws, rivets, nameplates (see also 410.3.3.5 of IEC 60364-4-41) or	Nameplate, screws, etc.	Р		
	are located in such way, that either contact with live parts or an insulation failure is unlikely	Complied	Р		
8.2.6	Protective conductor connecting points:		_		
	PE conductor connecting points have no other functions and not used for connection of appliances or other parts	No other function than PE connection	Р		
	Each protective conductor connecting point identified by using the symbol IEC 60417-5019 (DB:2002-10)	Complied	Ρ		
	or with the letters PE, the graphical symbol being preferred, or by use of the bicolour combination GREEN-AND-YELLOW, or by any combination of these.	See above (see 5.2)	N/A		
8.2.7	Mobile machines		_		
	On mobile machines with on-board power supplies, the protective conductors, the conductive structural parts of the electrical equipment, and those extraneous conductive parts which form the structure of the machine connected to a protective bonding terminal	No mobile machines	N/A		
	Where a mobile machine is also capable of being connected to an external incoming power supply, this protective bonding terminal fixed to the connection point for the external protective conductor.	See above	N/A		
8.2.8	Additional protective bonding requirements for elect leakage currents higher than 10 mA a.c. or d.c.	rical equipment having earth	_		
	Where electrical equipment has an earth leakage current (for example adjustable speed electrical power drive systems and information technology equipment) > 10 mA a.c. or d.c. in any incoming supply, for the associated protective bonding circuit:				
	a) the protective conductor having a cross- sectional area of at least 10 mm ² Cu or 16 mm ² Al, through its total run, or	Provided on the speed electrical power drive system	Р		
	b) where the protective conductor has a cross- sectional area of less than 10 mm ² Cu or 16 mm ² AI, a second protective conductor of at least the same cross-sectional area provided up to a point where the protective conductor has a cross- sectional area not less than 10 mm ² Cu or 16 mm ² AI, or	See above	N/A		
	c) automatic disconnection of the supply in case of loss of continuity of the protective conductor.	See above	N/A		

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Clause	Requirement – Test	Result – Remark	Verdict	
	To prevent difficulties associated with electromagnetic disturbances, the requirements of 4.4.2 also apply to the installation of duplicate protective conductors.		Р	
	In addition, a warning label provided adjacent to the PE terminal, and where necessary on the nameplate of the electrical equipment.		Р	
	Information about the leakage current and the minimum cross sectional area of the external protective conductor (see 17.2 b) 1)).		Р	
8.3	Functional bonding		-	
	Protection against maloperation as a result of insulation failures by connecting to a common conductor in accordance with 9.4.3.1.		Ρ	
	For recommendations regarding functional bonding to avoid maloperation due to electromagnetic disturbances, see 4.4.2.	Complied	Ρ	
8.4	Measures to limit the effects of high leakage current	t	-	
	Equipment having high leakage current by connection of that equipment to a dedicated supply transformer having separate windings	No high leakage currents	N/A	
	The protective bonding circuit connected to exposed conductive parts of the equipment and, in addition, to the secondary winding of the transformer.	See above	N/A	
	The protective conductor(s) between the equipment and the secondary winding of the transformer in compliance with one or more of the arrangements described in 8.2.8.	See above	N/A	
9	CONTROL CIRCUITS AND CONTROL FUNCTION	IS	-	
9.1.1	Control circuits supplied by transformers have separately isolated windings	Complied	Р	
	If several transformers used, secondary voltages in phase		Р	
	DC- control circuits connected to PE circuit supplied from a separate winding of the control circuit transformer or supplied from another control circuit transformer		Р	
	Transformers not mandatory for machines with a single motor starter and maximum of two control devices		N/A	
9.1.2	Nominal voltage not exceed 277VAC when supplied from a transformer	Max. 24 V	Р	
9.1.3	Control circuits provided with overcurrent protection		Р	
9.2	Control functions:		_	
9.2.1	Start function initiated by energising relevant starting circuit		Р	

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Clause	Requirement – Test	Result – Remark	Verdict
9.2.2	Stop functions:		_
	Stop category 0: Stopping by immediate removal of power to machine actuators		Р
	Stop category 1: A controlled stop with power available to machine actuators. Then removal of power when stop condition has been achieved.		N/A
	Stop category 2: A controlled stop with power left available to machine actuators		N/A
9.2.3	Mode of operations of machines:		_
	Hazardous condition, resulting from a mode selection, prevented by suitable means		Р
	Mode selection does not start up the machine		Р
	Separate control action required by operator		Р
	Relevant safety functions and/or protective measures implemented for each specific operating mode		Ρ
	Indication of selected operating mode provided		Р
9.2.4	If safety functions and/or protective measures (for e purposes) need to be suspended, protection be ens	xample for setting or maintenance ured by:	_
	 disabling all other operating (control) modes; and 	Complied	Ρ
	 other relevant means (see 4.11.9 of ISO 12100-2: example, one or more of the following: 	2003), that can include, for	_
	- initiation of operation by a hold-to-run device or by a similar control device;	teaching device	Р
	- a portable control station with an emergency stop device and, where appropriate, an enabling device.	teaching device with three-position switch	Р
	Where a portable control station is in use, initiation of motion be possible only from that control station;		Ρ
	- a cableless control station with a device to initiate stop functions in accordance with 9.2.7.3 and, where appropriate, an enabling device.	None	N/A
	Where a cableless control station is in use, initiation of motion be possible only from that control station;	None	N/A
	- limitation of the speed or the power of motion;	None	N/A
	- limitation of the range of motion.	None	N/A
9.2.5	Operation:		_
9.2.5.1	Necessary safety functions and/or protective measures (for example interlocks (see 9.3)) provided for safe operation	Interlocks provided	Р

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Clause	Requirement – Test	Result – Remark	Verdict	
	Unintended or unexpected movement of machine prevented after any stopping of machine	Enable device provided	Р	
	Where a machine has more than one control station, measures be provided to ensure that initiation of commands from different control stations do not lead to a hazardous situation.		N/A	
9.2.5.2	Start of operation possible only when all relevant safety functions and/or protective measures are functional, except for conditions stated in cl.9.2.4	Interlock devices on door, Reset devices and light-curtain should be recovered before start of operation	Р	
	For machines where under certain operating conditions no safety functions and/or protective measures can be applied, manual control of such operations by hold-to- run controls, together with enabling devices	Teaching device with three- position switch provided	Ρ	
	Suitable interlocks provided to secure correct sequential start		Р	
	In the case of machines requiring the use of more the start:	nan one control station to initiate a	_	
	Each control station has a separate, manually actuated start control device		N/A	
	The conditions to initiate a start be:		_	
	All required conditions for automatic machine operation are fulfilled, and		N/A	
	All start control devices in released position (OFF), then		N/A	
	All start control devices simultaneously actuated (see 3.6)		N/A	
9.2.5.3	Stop functions of stop categories 0, 1 and/or 2 shall be provided, based on a risk-assessment and functional requirements of the machine	Category 0 and 1	Р	
	Stop functions override related start functions (see 9.2.5.2)		Р	
	Facilities provided for connection of protective devices / interlocks		Р	
	If such protective device/ interlock causes a machine stop, it may be necessary to send such condition to the logic of the control system	Feedback to safety controller	Р	
	Resetting of stop function must not initiate any hazardous situation		Р	
	Where more than one control station is provided, stop commands from any control station be effective when required by the risk assessment of the machine.		Ρ	
9.2.5.4	Emergency operations (emergency stop, emergency	y switching off)	_	
9.2.5.4.1	General		_	

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Clause	Requirement – Test	Result – Remark	Verdict
	Both of emergency stop and emergency switching off functions of the emergency operations listed in Annex E initiated by a single human action.	Emergency stop provided	Р
	Once active operation of an emergency stop (see 10.7) or emergency switching off (see 10.8) actuator has ceased following a command, the effect of this command be sustained until it is reset.		Ρ
	This reset possible only by a manual action at that location where the command has been initiated.	Complied	Р
	The reset of the command do not restart the machinery but only permit restarting.	Complied	Р
	Not be possible to restart the machinery until all emergency stop commands have been reset.		Р
	Not be possible to reenergize the machinery until all emergency switching off commands have been reset.		Ρ
9.2.5.4.2	Design of emergency stop equipment, including functional aspects acc. to ISO 13850.		Р
	Emergency stop acts either as stop of category 0 or as stop of category 1 (see 9.2.2)	Category 0 and 1	Р
	For determination of category of emergency stop, see risk assessment		Р
	In addition to the requirements for stop (see 9.2.5.3)	,	_
	Emergency stop has priority over all other functions and over all modes of operation		Р
	Power to machine actuators that can cause hazardous situation(s) either removed immediately (stop category 0) or controlled in such a way to stop the hazardous motion as quickly as possible (stop category 1) without creating other hazards	Power of the actuator can immediately removed	Ρ
	Resetting must not initiate a restart	Complied	Р
9.2.5.4.3	Functional aspects of emergency switching-off funct 60364-5-53 and should be provided where:	ion are given in 536.4 of IEC	
	Protection against direct contact is achieved only by placing out of reach or by obstacles	None	N/A
	There is the possibility of other hazards or damage by electricity	None	N/A
	Emergency switching- off is accomplished by switching off the relevant incoming supply by electromechanical switching devices, effecting a stop category 0 of machine actuators connected to this incoming supply	None	N/A
	When a machine cannot tolerate a stop category 0 stop, other means of protection is to be provided so that emergency switching-off is not necessary	None	N/A
9.2.5.5	Monitoring of command actions:		_

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Clause	Requirement – Test	Result – Remark	Verdict	
	Movement or action of a machine or parts of it, that can result in a hazardous condition be monitored by providing, e.g. overtravel limiters, motor overspeed detection, mechanical overload detection or anti-collision devices.		N/A	
9.2.6	Other control functions		_	
9.2.6.1	Hold-to-run controls (inching switches) require continuous actuation of control devices to achieve operation		Р	
9.2.6.2	Three types of two-hand controls defined in ISO 138	351:	_	
	Type I: Two control devices and their and their simultaneous actuation by both hands	No three type of two-hand control	N/A	
	Continuous simultaneous actuation during the hazardous situation		N/A	
	Machine operation to cease upon the release of either one or both control devices when the hazardous situations are still present		N/A	
	A Type I two-hand control device is not considered to be suitable for the initiation of hazardous operation.		N/A	
	Type II: Type I control, requiring release of both control devices before machine operation may be re-initiated		N/A	
	Type III: It shall be necessary to actuate the control de-vices within a certain time limit of each other, not exceeding 0.5 s		N/A	
	After exceeding this time limit, both controls shall be released before machine operation may be initiated		N/A	
9.2.6.3	Enabling control (see also 10.9) is a manually activa	ted control function interlock that:	-	
	a) when activated allows a machine operation to be initiated by a separate start control, and	Three-position switch in teaching device as the enabling control	Р	
	b) when de-activated		_	
	 – initiates a stop function in accordance with 9.2.5.3, and 		Р	
	- prevents initiation of machine operation.		Р	
	Enabling control arranged so 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. It should not be possible to defeat the enabling function by simple means.		Ρ	
9.2.6.4	Push-buttons and similar control devices, that when operated, alternately initiate and stop motion used only for functions which cannot produce a hazardous situation		Ρ	
9.2.7	Cableless control		_	

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Clause	Requirement – Test	Result – Remark	Verdict	
9.2.7.1	Means provided to readily remove or disconnect power supply of operator control station (see also 9.2.7.3)	None	N/A	
	Means provided as necessary to prevent unauthorised use of operator control station	See above	N/A	
	Each operator control station shall carry an unambiguous indication of which machine is intended to be controlled by that operator control station	See above	N/A	
9.2.7.2	Measures shall be taken to ensure that control com	mands:	-	
	Affect intended machine only and	See above	N/A	
	Affect intended functions only	See above	N/A	
	Measures taken to prevent machine from responding signals other than those from intended operator control station(s)	See above	N/A	
	If necessary, means shall be provided so that machine can be controlled only from operator control stations in one or more predetermined zones or locations	See above	N/A	
9.7.2.3	Cableless control station include a separate, clearly identifiable mean to indicate stop function of machine or of all motions which could cause a hazardous situation	See above	N/A	
	Actuating means to indicate this stop function, not marked or labelled as emergency stop device (see10.7)	See above	N/A	
	Enabling control arranged so 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. It should not be possible to defeat the enabling function by simple means.	See above	N/A	
	A machine equipped with cableless control to have a to prevent a hazardous operation for the following site	means automatically initiating a stop tuations:	_	
	a stop signal is received	See above	N/A	
	a fault is detected in the cableless control system	See above	N/A	
	a valid signal (which includes a signal that communication is established and maintained) has not been detected within a certain time, outside of range of cableless control, where no hazardous situation can occur (see annex B)	See above	N/A	
9.7.2.4	For machines with more than one operator control station, including one or more cableless control stations, measures provided to ensure, that one control station only can be enabled at a given time	See above	N/A	
	Indication of which operator control station is in control of the machine, provided at suitable locations, as determined by risk assessment of the machine	See above	N/A	

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Clause	Requirement – Test	Result – Remark	Verdict	
	Exception: stop commands from any one of the control stations shall be effective	See above	N/A	
9.2.7.5	Variation in battery voltage not cause a hazardous condition		-	
	Clear warning given to operator of battery powered cableless control stations, if the are controlling one or more potentially hazardous motions when the battery voltage exceeds specified limits	See above	N/A	
	Under those circumstances, cableless operator control station remain functional long enough for the operator to put the machine in a non-hazardous condition	See above	N/A	
9.3	Protective interlocks:		_	
9.3.1	Reclosing or resetting of an interlocking safeguard not to initiate hazardous machine operation	Complied	Р	
9.3.2	Where operating limit (for example speed, pressure, position) can be exceeded leading to a hazardous situation, means be provided to detect when a predetermined limit(s) is exceeded and initiate an appropriate control action	The position limiting device provided	Ρ	
9.3.3	Where non-operation of devices for auxiliary functions causes a hazardous situation, damage to the machine or to the process, appropriate interlocking be provided	None	N/A	
9.3.4	Interlocks of contactors, relays, etc. between different operations and for opposite motions, interlocks against such incorrect operation provided		Ρ	
	Reversing contactors interlocked in such way, that in normal service no short circuit occurs during switching operation		Ρ	
	Where, for safety or for continuous operation, certain functions on the machine are required to be interrelated, proper co-ordination ensured by suitable interlocks		Ρ	
	For a group of machines working together in a co- ordinated manner and having more than one controller, provisions made for co-ordination of this controller		Ρ	
	If a failure of a mechanical brake actuator can result that the brake, is applied when the associated machine actuator is energised and a hazardous condition results, interlocks be provided to switch off the machine actuator		N/A	
9.3.5	Where braking of a motor is accomplished by current reversal, effective measures provided to prevent motor starting in opposite direction at end of breaking where that reversal causes a hazardous situation, damage to the machine or to the process		N/A	

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Clause	Requirement – Test	Result – Remark	Verdict		
	Control circuits arranged, so that rotation of a motor shaft, not to result in a hazardous situation		N/A		
9.4	Control functions in the event of failure:		_		
9.4.1	The electrical control circuits have an appropriate level of safety performance acc. to IEC 62061 (e.g. for PLC) and/or ISO 13849-1:1999, ISO 13849- 2:2003, that has been determined from the risk assessment at the machine.	The safety control system consisted of safety relay and IO, contactor, sensor, limit switch used.	Ρ		
	Measures to reduce those risks include but are not	limited to:			
	- protective devices on the machine, (e.g. interlocking guards, trip devices)		N/A		
	- protective interlocking of electrical circuit		Р		
	- use of proven circuit techniques and components (see cl. 9.4.2.)		Р		
	- provision of partial or complete redundancy (see cl. 9.4.2.2) or diversity (see cl. 9.4.2.3)	Redundancy	Р		
	- provision for functional tests (see cl. 9.4.2.4)		Р		
	Where memory retention is achieved for example, by battery power, measures be taken to prevent hazardous situations arising from failure or removal of the battery		Ρ		
	Means provided to prevent unauthorized or inadvertent memory alteration by, for example, requiring the use of a key, access code or tool.	Code	Р		
9.4.2	Measures to minimize risk in the event of failure:		_		
9.4.2.1	bonding of control circuits to protective circuit for operational purposes (see cl. 9.4.3.1 and figure 2)		Р		
	connection of control devices in accordance with cl. 9.4.3.1		Р		
	stopping by de-energising (see cl. 9.2.2)		Р		
	switching of all control circuit conductors to device being controlled (see cl. 9.4.3.1)		Р		
	use of switching devices having direct opening action (see IEC 60947-5-1)		Р		
	circuit design to reduce possibility of failures causing undesirable operations		Р		
9.4.2.2	on-line redundancy for normal operation		Р		
	off-line redundancy for protective functions, effective only when operating function fails		N/A		
	where off-line redundancy is used, suitable measures taken, to ensure that those control circuits are available when required		N/A		
9.4.2.3	Use of control circuits having different principles of or devices can reduce faults and failures. Examples in	operation or using different types of clude:	_		
	Combination of normally open and normally closed contacts operated by interlocking guards		Р		

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Clause	Requirement – Test	Result – Remark	Verdict
	Use of different types of circuit components in control circuit		Р
	Combination of electromechanical and electronic circuits in redundant configurations	Complied	Р
	Combination of electrical and non-electrical systems (e.g. mechanical, hydraulic, pneumatic) may perform redundant functions and provide diversity		N/A
9.4.2.4	Automatic functional test carried out by the control system	-	-
	Manual function tests by inspection		Р
	Tests at start-up and at predetermined intervals or as a		Р
	Combination as appropriate (see cl.17.2 and 18.6)		Р
9.4.3	Protection against maloperation due to earth faults, circuit continuity:	voltage interruptions and loss of	_
9.4.3.1	Earth faults on any control circuit causes no unintentional starting, potentially hazardous motions or prevent stopping of machine	-	_
	Methods to meet these requirements include but are	e not limited to the following:	-
	Method a) Control circuits, fed by control transformers:		
	1) In case of earthed control circuit supplies, the common conductor is connected to the protective bonding circuit at the point of supply.	Complied	Р
	All contacts, solid state elements etc., which are intended to operate an electromagnetic or other device (for example, a relay, indicator light) are inserted between one side, the switched conductor of the control circuit supply and one terminal of the coil or device.	Complied	Ρ
	The other terminal of the coil or device (preferably always having the same marking) is connected directly to the common conductor of the control circuit supply without any switching elements (see Figure 3).		Ρ
	Exception: Contacts of protective devices may be a conductor and the coils, provided that:	connected between the common	_
	 the circuit is interrupted automatically in the event of an earth fault, or 		N/A
	 the connection is very short (for example in the same enclosure) so that an earth fault is unlikely (for example overload relays). 		N/A
	2) Control circuits fed from a control transformer and not connected to the protective bonding circuit, having the same arrangement as shown in Figure 3 and provided with a device that interrupts the circuit automatically in the event of an earth fault (see also 7.2.4).	Compiled	Ρ

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Clause	Requirement – Test	Result – Remark	Verdict	
	Method b) Control circuits fed from a control transformer with a centre-tapped winding, this centre tap connected to the protective bonding circuit, arranged as shown in Figure 4 with the overcurrent protective device having switching elements in all control circuit supply conductors.		N/A	
	Method c) Where the control circuit is not fed from	a control transformer and is either:	_	
	1) directly connected between the phase conductors of an earthed supply, or;		N/A	
	2) directly connected between the phase conductors or between a phase conductor and a neutral conductor of a supply that is not earthed or is earthed through a high impedance,		N/A	
	Multi-pole control switches that switch all live conductors are used for START or STOP of those machine functions that can cause a hazardous situation or damage to the machine in the event of unintentional starting or failure to stop, or		N/A	
	In the case of c) 2), a device shall be provided that interrupts the circuit automatically in the event of an earth fault.		N/A	
9.4.3.2	If control system uses a memory device, proper functioning in the event of power failure ensured to prevent any loss of memory that could result in a hazardous situation		Р	
9.4.3.3	If loss of continuity of safety-related control circuits depending upon sliding contacts which could result in a hazardous situation, appropriate measures be taken	No sliding contacts	N/A	
10	OPERATOR INTERFACE AND MACHINE-MOUNT	ED CONTROL DEVICES	_	
10.1.1	Devices to be selected, mounted and identified or coded acc. to relevant parts of IEC 61310		Р	
	Possibility of inadvertent operation minimized by, for example, positioning of devices, suitable design, provision of additional protective measures.		Р	
	Particular consideration given to the selection, arrangement, programming and use of operator input devices such as touch screens, keypads and keyboards, for the control of hazardous machine operations. See IEC 60447.		Ρ	
10.1.2	Machine-mounted control devices readily accessible for service and maintenance and mounted to minimise possibility of damage from activities such as material handling		Ρ	
	Actuators of hand-operated control devices selected	and installed as follows:	_	
	Mounted not less than 0.6 m above servicing level, and within easy reach for operator (normal working position)		Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
	Placed so that operator is not exposed to a hazardous situation when operating them		Р	
	The actuators of foot-operated control devices select	cted and installed so that:		
	 they are within easy reach of the normal working position of the operator; 	None	N/A	
	 the operator is not placed in a hazardous situation when operating them. 		N/A	
10.1.3	Degree of protection sufficient for expected use aga	inst:	-	
	Effects of aggressive liquids, vapours or gases in environment of machine		Р	
	Ingress of contaminants		N/A	
	Operator interface control devices have a minimum degree of protection against direct contact of IPXXD	IP44	Р	
10.1.4	Position sensors arranged so, that they will not be damaged in the event of overtravel		Р	
	Position sensors used in circuits with safety-related control functions either have direct opening action or provide similar reliability		Р	
10.1.5	Portable or pendant operator control stations and control devices selected or arranged in such way as to minimise possibility of inadvertent machine operations caused by shocks and vibrations (see also 4.4.8)	None	N/A	
10.2	Push-buttons		-	
10.2.1	Pushbutton actuators colour-coded acc. to table 2 (see also 9.2 and Annex B)		Р	
	Where the same colour WHITE, GREY, or BLACK is used for various functions (for example WHITE for START/ON and for STOP/OFF actuators), a supplementary means of coding (for example shape, position, symbol) be used for the identification of push-button actuators.		Р	
10.2.2	Recommendation that push buttons are preferably marked directly on actuator with symbols acc. to table 3		Р	
10.3.1	Colours for indication lights: RED, YELLOW, GREEN, BLUE (for flashing indicator lights and displays, see 10.3.3)		N/A	
	Colours for confirmation: BLUE and WHITE; GREEN may be used in some cases		N/A	
	Indicator lights and displays selected and installed in such a manner as to be visible from the normal position of the operator (see also IEC 61310-1).		N/A	
	Indicator light circuits used for warning lights fitted with facilities to check the operability of these lights.		N/A	



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Clause	Requirement – Test	Result – Remark	Verdict
10.3.2	Unless otherwise agreed between supplier and user, indicator lights colour-coded with respect to status of machine acc. to table 4		N/A
	Indicating towers on machines have the applicable colours in the following order from the top down; RED, YELLOW, BLUE, GREEN and WHITE.		N/A
10.3.3	Flashing lights for further information may be used f	for following purposes:	_
	- to attract attention or		Р
	- to request immediate action or		N/A
	- to indicate a discrepancy between command and actual state or		N/A
	- to indicate a change in process (flashing during transition)		N/A
	Higher frequency of flashing lights (pulse/pause ratios) recommended for higher priority of information		N/A
	Where flashing lights or displays are used to provide higher priority information, audible warning devices also be provided.		Р
10.4	Illuminated push-button actuators colour-coded acc. to tables 2 and 4		Р
	WHITE colour shall be used, if it is difficult in assigning an appropriate colour		Р
	RED colour shall be used, for emergency stop actuators, not depending upon illumination conditions (ON /OFF status) only		Р
10.5	Rotary control devices having a rotational member such as potentiometers and selector switches, mounted in such way as to prevent rotation of stationary member		Ρ
10.6	Start devices used to initiate start functions or movement of machine or elements designed and mounted such as to minimise inadvertent operation		Р
	Mushroom - type actuators used for two-hand control devices (see also ISO 13851)		N/A
10.7	Devices for emergency stop:		_
10.7.1	Devices for emergency stop readily accessible		Р
	Devices for emergency stop located at each operator control station and other locations where initiation of emergency stop is required (see cl. 9.2.7.3 for exception)		Р
	For 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) be provided to minimise confusion.		N/A
10.7.2	Types of devices for emergency stop include follow	ing elements:	_

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Clause	Requirement – Test	Result – Remark	Verdict	
	push-button operated switch with a palm or mushroom head type or		Р	
	pull-cord operated switch or		N/A	
	pedal-operated switch without mechanical guard	None	N/A	
	Devices be of self- latching type and contacts are of direct opening operation (see IEC 60947-5-1, Annex K)		Р	
10.7.3	Actuators of emergency stop devices are coloured RED		Р	
	Background immediately around actuator is coloured YELLOW (See also ISO 13850)		Р	
10.7.4	Supply disconnecting device may be locally operate stop when:	d to serve as function of emergency	_	
	it is readily accessible to operator	No readily accessible	N/A	
	it is of type described in cl. 5.3.2 a), b), c), or d)		N/A	
	Supply disconnecting device to meet colour requirements of cl. 10.7.3		N/A	
10.8	Devices for emergency switching off:		_	
10.8.1	Location of emergency switching-off devices normally placed separate from operator control station		N/A	
	Where it is necessary to provide a control station with an emergency stop device and an emergency switching off device, means be provided to avoid confusion between these devices		N/A	
10.8.2	Types of emergency switching-off devices include:		_	
	Push-button operated switch with a palm or mushroom head type of actuator or		N/A	
	Pull-cord operated switch		N/A	
	Devices of self-latching type and ensure direct opening action (see IEC 60947-5-1, Annex K)		N/A	
	Push-button operated switch in break-glass enclosure		N/A	
10.8.3	Actuators of emergency switching-off devices are coloured RED	See above	N/A	
	Background immediately around actuator (push- button) coloured YELLOW	See above	N/A	
	Where confusion can occur between emergency stop and emergency switching off devices, means be provided to minimise confusion.	See above	N/A	
10.8.4	When supply disconnecting device is locally operated for emergency switching-off, it shall be readily accessible		Р	
	Supply disconnecting device locally operated for emergency switching-off to meet colour requirement acc. to cl. 10.8.3		Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
10.9	Enabling control device		_	
	Enabling control device to signal the enabling control to allow operation when actuated in one position only.		N/A	
	In any other position, operation stopped or prevented.		N/A	
	Enabling control devices selected and arranged so as to minimize the possibility of defeating.		N/A	
	Enabling control devices selected that have the follo	owing features:	-	
	 designed in accordance with ergonomic principles; 	See above	N/A	
	– for a two-position type:		_	
	- position 1: off-function of the switch (actuator is not operated);	See above	N/A	
	- position 2: enabling function (actuator is operated).	See above	N/A	
	 – for a three-position type: 		_	
	- position 1: off-function of the switch (actuator is not operated);	Complied	N/A	
	- position 2: enabling function (actuator is operated in its mid position);	Complied	N/A	
	- position 3: off-function (actuator is operated past its mid position);	Complied	N/A	
	- when returning from position 3 to position 2, the enabling function is not activated.	Complied	N/A	
11	CONTROLGEAR: LOCATION, MOUNTING, AND E	ENCLOSURES	_	
11.1	All controlgear located and mounted so, as to facilitate:		_	
	- its accessibility and maintainability		Р	
	- its protection against external influences or operating conditions under which operation is intended		Р	
	- operation and maintenance of the machine and its associated equipment		Р	
11.2	Location and mounting:		_	
11.2.1	all control-gear components placed and oriented so, that identification is possible without moving them or the associated wiring	Relevant marks provided	Р	
	Components checked for correct operation or possible replacement without dismantling other equipment or parts of the machine (except opening doors or removing covers, barriers or obstacles)	See manual	Р	
	Terminals not associated with controlgear also to conform to this requirement		Р	
	Operation and maintenance of all control gear possible from front of cabinet		Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
	Special tools to adjust, maintain, or remove a device provided with the equipment	None	Ν	
	Access for regular maintenance or adjustment to equipment, relevant devices located between 0.4m to 2.0 m above servicing level		Р	
	Terminals located at least 0.2 m above servicing level and placed such, that conductors and cables can be easily connected		Р	
	No devices mounted on doors, except those for operating, indicating, measuring and cooling purposes on normally removable access-covers of enclosure	Operating, indicating	Р	
	Plug-in type control devices belonging functionally together, their association made clear by type (shape), marking or reference designation single or in combination (see cl. 13.4.5)	None	N/A	
	Plug-in type control devices, that are handled during normal operation, shall be designed with non-interchangeable characteristics, where lack of such facility can result in malfunctioning	None	N/A	
	Plug/socket combinations, handled during normal operation, shall be located and mounted so as to provide unobstructed access	None	N/A	
	If test points for connection of test equipment are pro-	ovided, they should be:	_	
	- mounted so as to provide unobstructed access	None	N/A	
	- clearly marked to correspond with the documentation (see cl. 17.3)	See above	N/A	
	- adequately insulated	See above	N/A	
	- sufficiently spaced	See above	N/A	
11.2.2	Non-electrical parts and devices, not directly associated with the electrical equipment, not located within enclosures containing controlgear	Separated	Ρ	
	Devices such as solenoid valves separated from other electrical equipment	Complied	Р	
	Control devices mounted at same location and connected to the main supply voltage, or to both main supply and control voltage, are grouped separately from those connected to control voltage only	Separated	Ρ	
	Terminals separated into groups for:		_	
	power circuits or		Р	
	associated control circuits or		Р	
	other control circuits, fed from external sources		N/A	
	Terminal groups mounted adjacently, providing that each group is readily identified		Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
	When arranging the location of devices, clearances and creepage distances specified for them by the supplier shall be maintained, taking into account external influences or physical conditions of its environment	Considered	Ρ	
11.2.3	Heat generating components located so, that temperature of each component in its vicinity remains within the permitted limits		Ρ	
11.3	Degrees of protection:		-	
	Protection of control gear against ingress of solid foreign objects and liquids shall be adequate.		Р	
	External influences under which the equipment is intended to operate is to be taken into account	Located in a appropriate place where there is no external influence	Ρ	
	Its protection sufficient against dust, coolants and swarf	Guards provided	Р	
	Enclosures of control gear provide a degree of protection of at least IP22		Р	
	Exceptions:	-	-	
	a) Where an electrical operating area is used as a protective enclosure for an appropriate degree of protection against ingress of solid bodies and liquids		N/A	
	b) Where removable collectors on collector bar systems are used, and IP22 is not achieved but measures of cl. 6.2.5 are applied		N/A	
11.4	Enclosures, doors and openings:		-	
	Enclosures to withstand mechanical, electrical and thermal stress as well as effects of humidity and other environmental factors during normal service		Р	
	Fasteners for doors or covers of captive type	Fasteners	Р	
	Windows for viewing internally mounted indicating devices, made of material suitable to withstand mechanical stress and chemical attack	None	N/A	
	Doors of enclosure not wider than 0,9 meter		Р	
	Doors with vertical hinges, preferably lift-off type		Р	
	Doors with opening angle of at least 95°		Р	
	Gaskets of doors, lids, covers and enclosures withstand the chemical effects of aggressive liquids, vapours or gases used on the machine		Р	
	Means used to maintain degree of protection of an e that require opening or removed for operational or m	enclosure of doors, lids and covers maintenance shall:	-	
	- be securely attached to either door, cover or enclosure	Attached to the door	Р	
	- not deteriorate due to removal or replacement of door or cover and so impair degree of protection		Р	



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Clause	Requirement – Test	Result – Remark	Verdict	
	Where openings in enclosures are provided (for example, for cable access), including those towards the floor or foundation or to other parts of the machine, means be provided to ensure the degree of protection specified for the equipment.		N/A	
	Openings for cable entries at enclosure to be easily re-opened on site		Р	
	Suitable opening in base of enclosure within the machine provided, as to enable drainage of moisture due to condensation		Р	
	No opening between enclosure containing electrical equipment and compartment containing coolant, lubricating or hydraulic fluids		N/A	
	Holes in enclosure for mounting purposes not impair required degree of protection	Sheath provided	Р	
	Equipment that could attain a surface temperature s harmful effect to an enclosure material during norma	ufficient to cause a risk of fire or al or abnormal operation shall:	_	
	- be located within an enclosure, that can withstand, without risk of fire or harmful effect, the heat emitted by the equipment or	Guards provided	Р	
	- be mounted and located at sufficient distance from adjacent equipment, so as to allow safe dissipation of heat or	Sufficient distance	Р	
	- be otherwise screened by material that can withstand, without risk of fire or harmful effect, the heat emitted by the equipment		Р	
11.5	Access to controlgear		-	
	Doors in gangways and for access to electrical operating areas shall:		_	
	- be at least 0.7 meter wide and 2.0 meter high;	None	N/A	
	- open outwards	See above	N/A	
	- have a means (for example panic bolts) to allow opening from the inside without the use of a key or tool	See above	N/A	
	Enclosures which readily allow a person to fully enter provided with means to allow escape, for example panic bolts on the inside of doors.	See above	N/A	
	Enclosures intended for such access, for example for resetting, adjusting, maintenance, have a clear width of at least 0,7 m and a clear height of at least 2,1 m	See above	N/A	
	In cases where equipment is likely to be live during access and/or conducting parts are exposed, the clear width be at least 1,0 m.	See above	N/A	
	In cases where such parts are present on both sides of the access way, the clear width be at least 1,5 m	See above	N/A	

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Clause	Requirement – Test	Result – Remark	Verdict	
12	CONDUCTORS AND CABLES			
12.1	Conductors and cables selected so as to be suitable for operating conditions and external influences that are existing	Complied	Ρ	
	Requirements not applicable for integral wiring of assemblies, subassemblies and devices that are manufactured and tested acc. to their relevant standard		Ρ	
12.2	Generally conductors shall be of copper	Only copper conductors	Р	
	If aluminium conductors are used, the min. cross- sectional area to be at least 16 mm ²	See above	N/A	
	To ensure adequate mechanical strength, the cross-sectional area of conductors not less than as shown in Table 5	Not less than as shown in Table 5	Ρ	
	Conductors with smaller cross-sectional areas or other constructions than shown in Table 5 used in equipment, provided adequate mechanical strength is achieved by other means and proper functioning is not impaired	See above	N/A	
	Max. permitted conductor temperatures under normal-/ short circuit conditions will not exceed values given in table 5	According to table D.5, cable is designed to permitted temperature for short-circuit condition.	Ρ	
	Class 1 and class 2 conductors are primarily intended for use between rigid, non-moving parts	Complied	Ρ	
	All conductors which are subject to frequent movement to be of flexible stranded copper acc. to class 5 or class 6	No frequent movement	N/A	
12.3	Types of insulation include: Polyvinyl chloride (PVC)	Insulation of internal wiring material is polyvinyl chloride (PVC) and has an appropriate flame- retardant rating.	Ρ	
	Rubber, natural and synthetic	See above	N/A	
	Silicone rubber (SiR)	See above	N/A	
	Mineral	See above	N/A	
	Cross-linked Polyethylene (XLPE)	See above	N/A	
	Ethylene Propylene Rubber compound (EPR)	See above	N/A	
	Poly-Tetra-Fluor-Ethylene (PTFE)	See above	N/A	
	Where insulation of conductors or cables can constitute hazards due to propagation of fire or emission of toxic/ corrosive fumes, guidance from cable supplier to be sought	Complied	Ρ	
	Special attention to integrity of a circuit having a safety-related function	Complied	Р	
	Dielectric strength of insulation adequate for required test voltage with a min. of 2000VAC for cables operating with voltages >50VAC or >120 VDC		Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
	For PELV circuits, dielectric strength adequate for test voltage of 500VAC for a duration of 5 minutes (see IEC 60364-4-41, class III equipment)		Р	
	Mechanical strength and thickness of insulation such that, insulation cannot be damaged during cable laying or in operation	No such damage likely at normal installation	Р	
12.4	Current-carrying capacities for PVC insulated wiring between enclosures and individual items of equipment under steady-state conditions according to values given in table 6	The conductor cross-sectional area complies with table 6.	Р	
12.5	Voltage drop from point of supply to load not exceeding 5% of nominal voltage under normal operating conditions	Voltage drop of supply is not exceeding 5% of nominal voltage.	Р	
12.6.1	Flexible cables have cl. 5 or cl. 6 conductors	None	N/A	
	cables exposed to severe duties shall be of adequat	e construction to protect against:		
	abrasion due to mechanical handling and dragging across rough surfaces	See above	N/A	
	kinking to operation without cable guides	See above	N/A	
	stress resulting from guide rollers and forced guiding, being wound and re-wound on cable drums	See above	N/A	
12.6.2	Cable handling system of machine designed such, as to keep tensile stress of conductors as low as practicable during machine operation	See above	N/A	
	tensile stress for copper conductors not to exceed 15 N/mm ² of copper cross section area	See above	N/A	
	where tensile stress of conductors is exceeding 15 N/mm ² , cables of special design are used	See above	N/A	
	maximum stress for flexible cables with material other than copper be within the cable manufacturer's specification	See above	N/A	
12.6.3	Cables wound on drums selected such, as the maximum allowable conductor temperature is not exceeded	No cable drum	N/A	
	cables for circular cross-section area, installed on drums, max. current-currying capacity in free air as declared acc. to table 7	See above	N/A	
12.7.1	Conductor wires, conductor bars and slip-ring asser	mblies:		
	They shall be installed or enclosed in such way, that during normal access to the machine, protection against direct contact is achieved by application by one of the following protective measures:			
	- protection by partial insulation of live parts, or where this is not practicable;	No collector wires, collector bars and slip-ring assemblies	N/A	
	- protection by enclosure or barriers provide a degree of protection of at least IP2X		N/A	
	Horizontal top surfaces of barriers or enclosures which are readily accessible provide a degree of protection of at least IP4X	See above	N/A	



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Clause	Requirement – Test	Result – Remark	Verdict	
	If required degree of protection is not achieved, protection by placing live parts out of reach in combination with emergency switching-off acc. to cl. 9.2.5.4.3 applied	See above	N/A	
	Conductor wires and conductor bars placed and/or	protected so 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; 	See above	N/A	
	- prevent damage from a swinging load	See above	N/A	
12.7.2	Where conductor wires and conductor bars and slip-ring assemblies are installed as part of the PE- circuit, they do not carry current in normal operation	See above	N/A	
12.7.3	Protective conductors of current collectors have a shape or are designed such, so that they are not interchangeable with other current collectors of the sliding contact type	See above	N/A	
12.7.4	Removable current collectors with disconnector function are designed such, that PE-circuit is interrupted only after live conductors have been disconnected and the continuity of the PE-circuit is re-established before any live conductor is reconnected (see also 8.2.4)	See above	N/A	
12.7.5	Clearances between respective conductors and between adjacent systems of conductor wires, conductor bars, slip-ring assemblies and their current collectors designed for for at least a rated impulse voltage of an overvoltage category III in accordance with IEC 60664-1		N/A	
12.7.6	Creepage distances suitable for operation in the intended environment, for example open air (IEC 60664-1), inside buildings, protected by enclosures		N/A	
	In abnormally dusty, moist or corrosive environment	ts, following creepage distances apply	:	
	- for unprotected conductor wires, bars and slip- ring assemblies equipped with insulators, the minimum creepage distance is 60 mm	None	N/A	
	- for enclosed conductor wires, insulated multipole conductor bars and insulated individual conductor bars, the minimum creepage distance is 30 mm		N/A	
	Gradual reduction of insulation values due to unfavourable ambient conditions regarded	See above	N/A	
12.7.7	Suitable design measures taken, in order to prevent energisation of adjacent sections by current collectors themselves		N/A	
12.7.8	conductor wires, conductor bar systems and slip- ring assemblies used for power circuits kept separately from those used for control circuit applications		N/A	

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Clause	Requirement – Test	Result – Remark	Verdict
	above systems capable of withstanding without damage to mechanical forces and thermal effects of short circuit currents		N/A
	removable covers to above systems, laid underground or under floor, designed that they cannot be opened by one person without the use of a tool		N/A
	Conductor bars which are installed in a common metal enclosure, the individual section of it bonded together and connected to a protective bonding conductor at several points depending upon their length	See above	N/A
	Metal covers of conductor bars laid underground or underfloor, bonded together and connected to a protective bonding conductor	See above	N/A
	The protective bonding circuit to include the covers or cover plates of metal enclosures or underfloor ducts. Where metal hinges form a part of the bonding circuit, their continuity be verified (see Clause 18).	See above	N/A
	Underground and under floor conductor bar ducts have drainage facilities	See above	N/A
13	WIRING PRACTICES		_
13.1.1	All connections, especially those of the protective bonding circuit, secured against accidental loosening	Complied	Ρ
	Means of connection suitable for cross-sectional areas and nature of conductors being terminated	The incoming supply conductors (L1,L2, L3) and protective conductor terminated at the terminals in the motor terminal box.	Ρ
	Connection of two or more conductors to one terminal only where terminal is designed for that purpose	None	N/A
	Only one PE-conductor connected to one terminal connecting point	Complied	Р
	Soldered connections only, where terminals are provided which are suitable for soldering connections	None	N/A
	Terminals on terminal blocks plainly identified to correspond with markings on wiring diagrams	Complied	Р
	Where an incorrect electrical connection (for example, arising from replacement of devices) can be a source of risk and it is not practicable to reduce the possibility of incorrect connection by design measures, the conductors and/or terminations be identified in accordance with 13.2.1.	Complied	Ρ
	Installation of flexible conduits and cables such, that liquids are drained away from fittings and joints	No liquids drained likely from the fittings	N/A



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Clause	Requirement – Test	Result – Remark	Verdict	
	Means to retain stranded conductors together when terminating conductors at terminals/ devices provided	By tubing	Р	
	Solder not used for that purpose	Complied	Р	
	Shielded conductors terminated so, as to prevent fraying of strands and to permit easy disconnection	None	N/A	
	Identification tags legible, permanent and appropriate for physical environment	Complied	Р	
	Terminal blocks mounted and wired so, that internal and external wiring does not cross over terminals	Complied	Ρ	
13.1.2	Conductors and cables runned from terminal to terminal without splices or joints	Complied	Р	
	Connections using plug/socket combinations with suitable protection against accidental disconnection are not considered to be joints for the purpose of this Subclause.	None	N/A	
	Exception: Where it is impracticable to provide terminals in a junction box (for example on mobile machines, on machines having long flexible cables; cable connections exceeding a length which is not practical to be supplied by the cable manufacturer on one cable drum; repair of cable due to mechanical stresses during installation and operation), splices or joints may be used	Terminals in the terminal box	N/A	
	Where it is necessary to connect or disconnect cables, sufficient extra length provided for that purpose	Complied	Р	
	Terminations of cables adequately supported to prevent mechanical stress at termination points of conductors	Complied	Ρ	
	Protective conductor (PE) placed close to associated conductors in order to decrease loop impedance	Complied	Ρ	
13.1.3	Conductors of different circuits laid side by side and occupy the same duct or be in same multiconductor cable, provided that such arrangement does not impair proper functioning of respective circuits	Complied	Ρ	
	Where circuits operate at different voltage levels, conductors separated by suitable barriers or insulated for maximum voltage to which any conductor within the same duct is subjected, for example line to line voltage for unearthed systems and phase to earth voltage for earthed systems	Single voltage level	N/A	
13.1.4	Connection between pick-up and pick-up converter	of an inductive power supply system		
	The cable between the pick-up and the pick-up convinductive power supply shall be:	verter as specified by the manufactur	er of the	
	- as short as practicable;	None	N/A	



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Clause	Requirement – Test	Result – Remark	Verdict	
	 adequately protected against mechanical damage. 	See above	N/A	
13.2	Identification of conductors:			
13.2.1	Conductors identifiable at each termination point acc. to technical documentation	Conductors are identified by tags at each termination in accordance with the electrical schematic.	Р	
	Identification of conductors by number, alphanumeric, colour (either solid or with one or more stripes), or a combination of colour and numbers or alphanumeric	Colour is used throughout the length of the conductor.	Ρ	
	When numbers are used, they are Arabic; letters are Roman (either upper or lower case).	Complied	Р	
13.2.2	Protective conductor readily distinguishable by shape, location, marking or colour	Protective conductor is distinguished by colouring, numbering and symbol.	Ρ	
	Bicolour combination GREEN- AND- YELLOW used throughout the length of the conductor	Complied	Р	
	This colour identification is strictly reserved for the protective conductor, so that it can be easily identified by its shape	Complied	Р	
	Ends or accessible positions of a protective conductor clearly identified by graphical symbol IEC 60417-5019 (DB:2002-10) or by bicolour combination GREEN- AND- YELLOW	Bicolour combination green-and- yellow	Ρ	
13.2.3	Where a circuit includes a neutral conductor that is identified by colour alone, the colour used for this conductor is BLUE. In order to avoid confusion with other colours, it is recommended that an unsaturated blue be used, called here "light blue" (see 3.2.2 of IEC 60446).		Ρ	
	Where the selected colour is the sole identification of the neutral conductor, that colour not be used for identifying any other conductor where confusion is possible		N/A	
	Where bare conductors are used as neutral conductors and identification by colour is used, they either be coloured by a stripe, 15 to 100 mm wide in each compartment or unit, or at each accessible position or coloured throughout their length		N/A	
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:	Complied	Ρ	
	BLACK, BROWN, RED, ORANGE, YELLOW, GREEN, BLUE (including LIGHT BLUE), VIOLET, GREY, WHITE, PINK, TURQUOISE.			

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Clause	Requirement – Test	Result – Remark	Verdict	
	If colour coding of conductors applies, conductors coded over its full length, either by colouring of insulation or coloured markers at regular intervals and at the ends or accessible location.	Complied	Ρ	
	For safety reasons, colour GREEN or colour YELLOW not used where there is a possibility or confusion with the bicolour combination: GREEN – AND - YELLOW	Complied	Р	
	GREEN or YELLOW as a single code must not be used, except in bicolour combination GREEN-AND-YELLOW	Complied	Р	
	Where colour-coding is used for identification of cor coded as follows:	ductors, it is recommended that they	be colour-	
	- BLACK: a.c. and d.c. power circuits;	Complied	Р	
	– RED: a.c. control circuits;	Complied	Р	
	- BLUE: d.c. control circuits;	Complied	Р	
	- ORANGE: excepted circuits in accordance with 5.3.5.	None	N/A	
	Exceptions: to the above are permitted where:			
	 insulation is used that is not available in the colours recommended; or 	See above	N/A	
	 multiconductor cable is used, but not the bicolour combination GREEN-AND-YELLOW. 	None	N/A	
13.3	Conductors inside enclosures supported where necessary to keep it in place	Complied	Р	
	Non-metallic ducts permitted only when they are of flame-retardant insulating material (see the IEC 60332 series)		Ρ	
	Electrical equipment mounted inside cabinets, designed to permit modification of wiring from front of cabinet (see cl. 11.2.1)		Р	
	Where that is not possible, access doors or swing out panels provided	None	N/A	
	Connections to devices mounted on doors or to other movable parts made with flexible conductors (acc. to cl.12.2 and 12.6) to allow for frequent movement of those parts	Flexible	Ρ	
	Conductors be anchored to the fixed part and the movable part, independently of the electrical connection (see also 8.2.3 and 11.2.1)	Independently connected	Р	
	Conductors and cables that do not run in ducts are adequately supported	Complied	Р	
	Terminal blocks or plug /socket combinations used for control wiring, that extends beyond the enclosure	Complied	Ρ	
	Power cables and cables for measuring-circuits are directly connected to terminals of field located devices	None	N/A	

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Clause	Requirement – Test	Result – Remark	Verdict	
13.4	Wiring outside enclosures:			
13.4.1	Introduction of cables- or ducts by means of individual glands, bushings etc. into an enclosure must not reduce degree of protection of it (see 11.3)	The glands are fit for the hole of enclosure	Р	
13.4.2	Conductors and their connections outside of the enclosure, are enclosed in suitable ducts as described in cl. 13.5	Complied	Р	
	Where devices such as position switches or proximity switches are supplied with a dedicated cable, their cable need not be enclosed in a duct when the cable is suitable for the purpose, sufficiently short, and so located or protected, that the risk of damage is minimized.		Ρ	
	Fittings used with ducts or multiconductor cables are suitable for the physical environment		Р	
	Flexible conduit or flexible multiconductor cable is used for flexible connections to pendant push- button stations	Flexible	Р	
	Weight of pendant stations is supported by other means than flexible conduits or flexible multicore cables	See above	N/A	
13.4.3	Connections to frequently moving elements of the machine, designed acc. to cl. 12.2 and 12.6		Р	
	Flexible cables and conduits installed so, as to avoid excessive flexing and straining, particularly at the fittings	The special device which can move with the moving element is used to hold the cable	Ρ	
	Cables exposed to movement supported in such way, as to prevent mechanical strain at connecting points	See above	Ρ	
	If this is achieved by provision of a loop, it has sufficient length to provide for a bending radius of at least 10 times the diameter of the cable		N/A	
	Flexible cables of machines installed or protected in damage due to factors, that include the following cal	such way, as to minimise the possib ble use or potential abuse:	ility of external	
	- being runned over by the machine itself		Р	
	- being runned over by vehicles or other machines		Р	
	 coming into contact with the machine structure during movements 		Р	
	 running in and out of cable baskets or, on / off cable drums 		N/A	
	 acceleration and wind forces on festoon systems or suspended cables 		N/A	
	- excessive rubbing by cable collector		N/A	
	- exposure to excessive radiated heat		N/A	
	Cable sheath resistant to normal wear expected from normal movement and effects of atmospheric contaminants		Р	

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Clause	Requirement – Test	Result – Remark	Verdict
	Where cables are close to moving parts, space of at least 25mm maintained between moving parts and cables	> 30 mm	Р
	Where that distance is not practicable, fixed barriers provided between cables and moving parts	See above	N/A
	Cable handling system designed such, that lateral cather the cable when	able angle does not exceed 5°, avoid	ing torsion at
	- being wound on and off the cable drums and		N/A
	 approaching and leaving cable guidance's 		N/A
	Measures taken to ensure that at least two turns of cable remain on the drum		N/A
	Cable guides designed such, that the inner bending radius is not less than values given in table 8		N/A
	Straight section between two bends at least 20 times the cable diameter		N/A
	Construction and supporting means prevent damage to flexible cable under all operating conditions		N/A
	No flexible conduit used for connections subject to rapid or frequent movements except when specifically designed for that purpose.		N/A
13.4.4	In case where several sensors or control elements are connected in series, it is recommended to connect them via intermediate terminals	None	N/A
	Intermediate terminals are adequately protected	See above	N/A
	Intermediate terminals are indicated on the wiring diagram	See above	N/A
	This enables easy access for testing purposes	See above	N/A
13.4.5	Where plug/socket combinations are provided, they fulfill one or more of the following requirements as applicable: Exception: 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.		
	a) When installed correctly in accordance with f), plug/socket combinations of such type and installed in such way, as to prevent unintentional contact with live parts at any time , including during insertion or removal of the connectors	None	N/A
	Min. degree of protection: IPXXB.		N/A
	PELV circuits are excepted from this requirement		N/A
	b) Have a first make last break protective bonding contact (earthing contact) (see also 6.3, 8.2.4) if used in TN- or TT-systems.		N/A
	c) Plug/socket combinations intended to be connected or disconnected during load conditions have sufficient load-breaking capacity.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict	
	Plug/socket combinations rated at 30 A, or greater, are interlocked with a switching device so that the connection and disconnection is possible only when the switching device is in the OFF position.		N/A	
	d) Plug/socket combinations rated at more than 16 A have a retaining means to prevent unintended or accidental disconnection.		N/A	
	e) Where an unintended or accidental disconnection of plug/socket combinations can cause a hazardous situation, they have a retaining means.		N/A	
	The installation of plug/socket combinations fulfill the	e following requirements as applicabl	e:	
	f) Min. degree of protection for the component which remains live after disconnection (except for PELV circuits): IP2X or IPXXB, taking into account the required clearance and creepage distances		N/A	
	 g) Metallic housings of plug/socket combinations connected to the protective bonding circuit (except for PELV circuits) 		N/A	
	h) Plug/socket combinations intended to carry power loads but not to be disconnected during load conditions have a retaining means to prevent unintended or accidental disconnection and are clearly marked that they are not intended to be disconnected under load.		N/A	
	i) Where more than one plug/socket combination is provided in the same electrical equipment, the associated combinations are clearly identifiable. It is recommended that mechanical coding be used to prevent incorrect insertion.		N/A	
	 j) Plug/socket combinations used in control circuits fulfil the applicable requirements of IEC 61984. Exception: see item k). 		N/A	
	 k) No plug/socket combinations intended for household and similar general purposes used for control circuits. 		N/A	
	In plug/socket combinations in accordance with IEC 60309-1, only those contacts are used for control circuits which are intended for those purposes. Exception: The requirements of item k) do not apply to control functions using high frequency signals on the power supply.		N/A	
13.4.6	If wiring needs to be disconnected for shipment, terminals or plug/socket combinations are provided at the disconnecting points		N/A	
13.4.7	Additional wiring for maintenance or repair purposes provided		N/A	
13.5	Ducts, connection boxes and other boxes:		1	
13.5.1	Ducts provide a degree of protection suitable for the application (see IEC 60529)		Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
	All sharp edges, flash, burrs, rough surfaces or threads which the insulation of conductors can come into contact, removed from ducts and conduits		Р	
	In order to avoid confusion between conduits for electrical installation and those for oil, water or air, either physically separated or suitably identified	Separated	Р	
	Ducts or cable trays rigidly supported and positioned at sufficient distance from moving parts		Р	
	Ducts or cable trays mounted at least 2 meters above the working surface in areas where human passage is required	> 2 m	Р	
	Ducts provided only for mechanical protection (see cl. 8.2.3)		Р	
	Cable trays which are partially covered, not to serve as cable trays or installation trunking		Р	
	Conductors and cables suitable for installation with or without the use of open cable trays or cable support means		Р	
13.5.2	Cable trays dimensioned or located such, as to enable easy access for installation of additional conductors and cables		Р	
	Consideration given on percentage of filling of such ducts.		Р	
13.5.3	Rigid metal conduits or trays consist of galvanised steel or corrosion-resistant material, suitable for the environmental conditions.	Galvanised steel	Р	
	Application of cable trays of different metal avoided, due to electrolytic corrosion	Galvanised steel	Р	
	Installation conduits secured, held in place and supported at each end		Р	
	Joints and fittings compatible with conduits and appropriate for its application		Р	
	Conduit-bends fabricated such, as to avoid damage or reduction of internal cross-section		Р	
13.5.4	Flexible metallic conduits and fittings consist of flexible metal tubing or wire mesh armour.	None	N/A	
	They are suitable for its application and environmental conditions		N/A	
13.5.5	Flexible non-metallic conduits are resistant to buckling and with similar characteristics as the sheath of multicore cables		Ρ	
	They shall be suitable for its application and environmental conditions		Р	
	Joints and fittings compatible with conduits and appropriate for its application		Р	

Clause 13.5.6	Requirement – Test Cable trunking systems outside of enclosures are rigidly supported and kept clear of moving and contaminating parts of the machine Covers shaped to overlap the sides; gaskets permitted	Result – Remark	P
13.5.6	Cable trunking systems outside of enclosures are rigidly supported and kept clear of moving and contaminating parts of the machine Covers shaped to overlap the sides; gaskets permitted	No shaped cover	Р
	Covers shaped to overlap the sides; gaskets permitted	No shaped cover	
			Р
	suitable means	Attached to cable trucking by special slot	Р
	On horizontal cable trunking systems, no cover on the bottom unless specifically designed for such installation		Р
	Where the cable trunking system is furnished in sections, the joints between sections fit tightly but need not be gasketed.		Р
	The only openings permitted are those required for wiring or for drainage		Р
	Cable trunking systems not to have opened but unused knockouts		Р
13.5.7	Installation of cables layed in cable trays with covers permitted within the machine-foundations, providing that they are completely closed and separated from coolant and lubrication systems (see cl. 13.5.6)		Р
13.5.8	Cable connection boxes and junction boxes used for wiring purposes are accessible for maintenance (see cl. 11.3)		Р
	They provide protection against ingress of solids or liquids, taking into account external influences during operation of the machine (see cl. 11.3)		Р
	Junction boxes not have openings for cable entries and are designed so, as to avoid ingress of entrained dust, lubricants and coolant		Р
13.5.9	Motor terminal boxes used for motor cable connection and for devices attached to the motor		Р
14	ELECTRIC MOTORS AND ASSOCIATED EQUIPM	ENT	Р
14.1	Electric motors are conform to EN 60034 series	In according to EN60034-1	Р
	Electric motors and associated equipment protected	against following risks:	
	overcurrent (see cl. 7.2)	See manual	Р
	thermal overload (see cl. 7.3)	See manual	Р
	overspeed (see cl. 7.6)		N/A
	Compliance ensured with the requirements stated (see clauses 5.3, 5.4, 5.5, 7.5, 7.6 and 9.4)		Р
	Motor control equipment located and mounted acc. to cl. 11	No control	N/A
14.2	Selection of motor enclosure recommended acc. to EN 60034-5		Р
	Degree of protection at least IP23	IP 44	Р



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Clause	Requirement – Test	Result – Remark	Verdict	
	Incorporated motors mounted such, as to provide adequate protection against mechanical damage	Complied	Р	
14.3	Dimensions of motors conform to those given in EN 60072 series	Complied	Р	
14.4	Each motor with associated coupling, belt, pulley or chain mounted such, as to provide adequate protection and easy access for inspection, maintenance, adjustment or alignment, lubrication and replacement	Complied	Ρ	
	Motors mounted such, as to allow easy access to all terminal boxes	Complied	Р	
	Motors mounted such, as to ensure proper cooling Temperature rise to be within limits of relevant insulation class	Complied	Р	
	Temperature rise within limits of relevant insulation class	Complied	Р	
	If possible, motor compartments stay clean and dry and when required, ventilated directly to the outside of the machine	Intended to be installed in an spacious area	N/A	
	Motor-vents at an acceptable level and designed such, as to avoid ingress of swarf, dust or water spray	None	N/A	
	No opening between motor compartment and any other compartment, which does not fulfil the requirement for motor compartments	Complied	Ρ	
14.5	Electric motors selected acc. to service and environmental conditions	Complied	Р	
	Design criteria for evaluation include:			
	- type of motor	See above	Р	
	- type of duty cycle (see IEC 60034-1)	Continues operation	Р	
	- fixed speed or variable speed operation	Variable speed	Р	
	- mechanical vibrations	Considered	Р	
	- type of motor control	No control	N/A	
	 influence of the harmonic spectrum of voltage and/or current when supplied from static converter on the temperature rise 	Complied	Р	
	 method of starting and possible influence of inrush current 	Complied	Р	
	 variation of counter torque load with time and speed 	Complied	Р	
	- influence of loads with large inertia	Complied	Р	
	 – influence of constant torque or constant power operation 	Complied	Р	
	 possible need of inductive reactors between motor and converter 	Complied	Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
14.6	Operation of overload or overcurrent protective devices for mechanical brake-actuators initiate simultaneous de-energisation(release) of associated machine actuators	The brake-actuator will be energized after the power off in the circuit	Р	
15	ACCESSORIES AND LIGHTING			
15.1	Where the machine or its associated equipment is p for auxiliary equipment, the following will apply:	rovided with socket-outlets		
	socket-outlets are conform to regulations	Socket-outlet provided in enclosure	Р	
	if not possible, they are clearly marked with voltage and current ratings		Р	
	continuity of protective bonding circuit to be ensured except where protection is provided by PELV		Р	
	all unearthed conductors connected to socket- outlets, protected against overcurrent		Р	
	when required, protection against overload in accordance with cl. 7.2 and cl. 7.3 separately from protection of other circuits		Р	
	if power supply to socket-outlets is not disconnected, than requirements of cl.5.3.5 apply		N/A	
15.2	Local lighting of the machine and equipment	None local lighting		
15.2.1	Connection to PE-circuit acc. to cl. 8.2.2		N/A	
	ON-OFF switch not incorporated in lampholder or in flexible connecting cord		N/A	
	Stroboscopic effects from lights avoided		N/A	
	If fixed lighting is provided in an enclosure, electromagnetic compatibility (EMC) taken into account, Application of EMC requirements acc. to principles stated in cl. 4.4.2		N/A	
15.2.2	If higher voltages are applied, value not exceeding 250 V between conductors		N/A	
	Nominal voltage of local lighting circuits not exceeding 50 V		N/A	
	Lighting circuits supplied from one of the following set	ources:		
	 – from a dedicated isolating transformer connected to load side or 		N/A	
	 overcurrent protection provided in secondary circuit or 		N/A	
	 a dedicated isolating transformer connected to line side provided or (see also 5.3.5 and 13.1.3) 		N/A	
	- source permitted for maintenance purpose or		N/A	
	 lighting circuits placed in control enclosures only or 		N/A	
	 overcurrent protection provided in secondary circuit or 		N/A	

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Clause	Requirement – Test	Result – Remark	Verdict
	 – from a machine-circuit with dedicated overcurrent protection or 		N/A
	 from an isolating transformer connected to line side of supply disconnecting device, when a dedicated primary disconnecting means and a secondary overcurrent protection are provided or 		N/A
	 for an externally supplied lighting circuit, which is only permitted in a control enclosures 		N/A
	Exception: Where fixed lighting is out of reach for operator during normal operations, provisions of this subclause do not apply		N/A
15.2.3	local lighting circuits protected		
15.2.4	adjustable lighting fittings suitable for the physical environment provided		N/A
	lampholders in accordance with relevant IEC- publications and		N/A
	designed of an insulating material protecting the lamp cap, as to prevent unintentional contact		N/A
	reflectors supported by a bracket and not by the lampholder		N/A
	Exception: Where fixed lighting is out of reach for operator during normal operations, provisions of this subclause do not apply		N/A
16	MARKING, WARNING SIGNS AND REFERENCE	DESIGNATIONS	
16.1	Warning signs, nameplates, markings- and identification plates of sufficient durability to withstand the physical environment involved	Complied	Ρ
16.2	Warning signs		
16.2.1	Electric shock hazard		
	Enclosures that do not otherwise clearly show that they contain electrical equipment that can give rise to a risk of electric shock, are marked with the graphical symbol IEC 60417-5036 (DB:2002-10)	On the terminal box	Ρ
	Warning sign plainly visible on the enclosure, door or cover-plate	Complied	Р
	The warning sign may be omitted for (see also 6.2.2	? b)):	
	 an enclosures equipped with a supply disconnecting device or 	See above	N/A
	 an operator - machine interface or for a control- station or 	See above	N/A
	 a single device with its own enclosure 	See above	N/A
16.2.2	Where the risk assessment shows the need to warn against the possibility of hazardous surface temperatures of the electrical equipment, the graphical symbol IEC 60417-5041 (DB:2002-10) is used	None	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
16.3	Control devices, visual indicators and displays (particularly those related to safety) clearly and durably marked with regard to their functions either on, or adjacent to it	None	N/A
	such markings as agreed between user and supplier	See above	N/A
	preference given to the use of standard symbols given in IEC 60417- DB:2002 and ISO 7000.	See above	N/A
16.4	Marking of equipment		
	Equipment (for example controlgear assemblies) legibly and durably marked so that it is plainly visible after equipment installation	Complied	Ρ
	Nameplates attached to enclosures adjacent to each information:	h incoming supply shall contain the fo	bllowing
	 name or trade mark of supplier and 	Complied	Р
	- certification mark, when required and	CE mark	Р
	- serial number, where applicable and	Complied	Р
	 rated voltage and 	380 V,	Р
	– number of phases and	3~	Р
	- frequency (if AC) and	50 Hz	Р
	- full-load current for each supply		Р
	 short-circuit interrupting capacity of overcurrent protective device, where furnished as part of device of equipment 		Р
	- main document number (see IEC 62023)	See nameplate	Р
	Full-load current shown on nameplate not less than the running currents of all motors and other electrical loads, that are in operation at the same time under normal conditions	Complied	Ρ
	if a single motor controller is used, that information provided instead, on the machine nameplate	No controller	N/A
16.5	All enclosures, assemblies, control devices and components plainly identified with the same reference designation as shown in technical documentation	Complied	Ρ
17	TECHNICAL DOCUMENTATION		
17.1	Information necessary for installation, operation and maintenance of electrical equipment for a machine supplied by means of drawings, wiring diagrams, charts, tables and instruction manuals	Complied	Ρ
	Information provided in an agreed language	English	Р
17.2	Information provided with electrical equipment shall	include:	
	a) A main document (parts list or list of documents);		Р

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Clause	Requirement – Test	Result – Remark	Verdict	
	b) Complementary documents including:			
	1) a clear, comprehensive description of the equipment, installation and mounting instructions and information regarding connection to the electrical supply(ies)	Complied	Р	
	2) electrical supply requirements	Complied	Р	
	3) information about the physical environment	Complied	Р	
	4) overview (block) diagram(s)		N/A	
	5) circuit / wiring diagram(s)		N/A	
	6) information about:			
	software program documentation/ listing	No software	N/A	
	sequence of operation(s)	Complied	Р	
	frequency of inspection	Complied	Р	
	frequency and method of functional testing	Complied	Р	
	guidance on the adjustment, maintenance and repair, particularly of the protective devices and circuits	Complied	Р	
	recommended spare parts list; and	Complied	Р	
	list of tools supplied.		N/A	
	7) description of safeguards, interlocking func tions and interlocking of separating safeguards for dangerous movements of co-ordinated operating machines		N/A	
	8) description of safeguards and means provided for applications with to suspend the safeguards		N/A	
	9) instructions on the procedures for securing the machine for safe maintenance; (see also 17.8);	Complied	Р	
	10) information on handling, transportation and storage;	Complied	Р	
	11) information regarding load currents, peak starting currents and permitted voltage drops, as applicable;	Complied	Р	
	12) information on the residual risks due to the protection measures adopted, indication of whether any particular training is required and specification of any necessary personal protective equipment.		N/A	
17.3	Requirements applicable to all documentation			
	Unless otherwise agreed between manufacturer and	user:		
	 documentation to be in accordance with relevant parts of IEC 61082 	Complied	Р	
	 reference designation system to be in accordance with relevant parts of IEC 61346 	Complied	Р	
	– instructions/manuals to be in accordance with IEC 62079.	Complied	Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
	 parts lists where provided to be in accordance with IEC 62027, class B. 	Complied	Р	
	For referencing to different documents, the supplier	has to select one of following method	s:	
	 where the documentation consists of a small number of documents (for example less than 5), each of the documents carry a cross-reference with document numbers of all other documents belonging to the electrical equipment or 		N/A	
	 for single level main documents only (see IEC 62023), all documents to be listed with document numbers and titles in a drawing or document list 		N/A	
	 – all documents of a certain level (see IEC 62023) of the document structure shall be listed, with document numbers and titles, in a parts list belonging to the same level. 		N/A	
17.4	The installation diagram provides all necessary information regarding preliminary work for the setting-up of the machine (including commissioning)	Complied	Р	
	In complex cases, it is necessary to refer to the assembly drawings for details	Complied	Ρ	
	Recommended routing, type and cross-sectional areas for the conductors of the supply cables installed on site clearly indicated	Complied	Ρ	
	Necessary data or choosing type, characteristics, rated currents and setting for the overcurrent protective devices for the supply conductors stated (see cl. 7.2.2)	Complied	Р	
	Detailed information provided about size, purpose and location of any cable ducts within the foundation, that are provided by the user	Complied	Ρ	
	Detailed information provided about size, type and purpose of cable ducts, trays or supports between machine and associated equipment	Complied	Ρ	
	Diagram to indicate where space is required for removal or servicing of electrical equipment	Complied	Р	
	Where appropriate, an interconnection diagram or table provided	Complied	Р	
17.5	Where necessary an overview diagram provided for explanation of the principle of operation		N/A	
	Overview diagram symbolically represents the electrical equipment with its functional interrelationships without showing all the interconnections		N/A	
	The function diagram used as either part of or addition to the block diagram		N/A	
17.6	Circuit diagrams show the electrical circuits on the machine and its associated electrical equipment	Principle diagrams, control circuit diagrams, arrangement diagram of elements are provided	Ρ	

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Clause	Requirement – Test	Result – Remark	Verdict	
	Any graphical symbol not shown in IEC 60617- DB:2001 must be separately shown and described on the wiring diagrams or supporting documents		Р	
	The symbols and identification of components consistent throughout all documents and on the machine		Р	
	Where appropriate, a diagram provided, showing the interface terminals and connections		Р	
	The diagram shows a reference to the detailed circuit diagram of each unit		Р	
	Switch symbols shown on the circuit diagrams with all supplies turned off and with the machine and its electrical equipment ready for a normal start		Ρ	
	Conductors identified acc. to cl.13.2		Р	
	Characteristics relating to the function of the control device and components which are not evident from their symbolic representation, included on the diagrams adjacent to the symbol or referenced to a footnote		Ρ	
17.7	Technical documentation containing an operating manual, outlining proper procedures for set-up and use of electrical equipment	Complied	Ρ	
	Particular attention given to safety measures provided	Complied	Р	
	Detailed information provided on methods for equipment programming, program verification and additional safety procedures	Complied	Р	
17.8	Technical documentation to contain a mainte- nance manual, detailing proper procedures for adjustment, servicing or preventive inspection and repair	Complied	Ρ	
	Recommendations regarding maintenance or service intervals and records are part of it	Complied	Р	
	Methods for the verification of proper operation provided	Complied	Р	
17.9	The parts list, where provided, comprises as a minimum information for ordering of spares or replacement of parts which are required for preventive or corrective maintenance and recommended spares	Complied	Ρ	
18	VERIFICATION		Р	
18.1	The extent of verification will be given in the dedicated product standard for a particular machine.	Complied	Р	
	Where there is no dedicated product standard for th items a), b) and f) and may include one or more of t	e machine, the verifications always ir he items c) to e):	nclude the	
	a) verification, that electrical equipment is in compliance with the technical documentation	Complied	Р	

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Clause	Requirement – Test	Result – Remark	Verdict	
	b) in case of protection against indirect contact by automatic disconnection, conditions for protection by automatic disconnection to be verified according to 18.2;	Verified according to 18.2	Р	
	c) insulation resistance test (see 18.3);	Complied	Р	
	d) voltage test (see 18.4);	Complied	Р	
	e) protection against residual voltage (see 18.5);	No capacitor	N/A	
	f) functional tests (see 18.6).	Complied	Р	
	When these tests are performed, the sequence listed above recommended	Complied	Р	
	When the electrical equipment is modified, the requirements stated in 18.7 apply	See 18.7	N/A	
	For tests in accordance with 18.2 and 18.3, measuring equipment in accordance with the EN 61557 series	Complied	Р	
	The results of the verification to be documented.	Complied	Р	
18.2	Verification of conditions for protection by automatic	disconnection of supply		
18.2.1	General			
	The conditions for automatic disconnection of supply (see 6.3.3) verified by tests.		Р	
	For TN-systems, those test methods are described in 18.2.2;		Р	
	Their application for different conditions of supply are specified in 18.2.3.		N/A	
	For TT and IT systems, see IEC 60364-6-61	TN power system	N/A	
18.2.2	Test methods in TN-systems			
	TEST 1 – Verification of the continuity of the protect	ive bonding circuit		
	The resistance between the PE terminal (see 5.2 and Figure 3) and relevant points measured with a current 0,2 A to 10 A	10 A	Р	
	No use of a PELV supply recommended since such supplies can produce misleading results in this test.		N/A	
	The resistance measured to be in the expected range according to the length, the cross sectional area, and the material of the related protective bonding conductor(s)	See Annex 1	Р	
	TEST 2 – Fault loop impedance verification and suit device	ability of the associated overcurrent	protective	
	Connections of power supply and of incoming external protective conductor to the PE terminal of the machine verified by inspection		N/A	
	Conditions for the protection by automatic disconned A verified by both:	ction of supply in accordance with 6.	3.3 and Annex	
	1) verification of the fault loop impedance by:			

	EN60204-1:2006+A1:2009+AC:2010				
Clause	Requirement – Test	Result – Remark	Verdict		
	– calculation, or		Р		
	- measurement in accordance with A.4, and		N/A		
	2) confirmation that the setting and characteristics of the associated overcurrent protective device are in accordance with the requirements of Annex A		Ρ		
18.2.3	Application of the test methods for TN-systems				
	Test 1 of 18.2.2 carried out on each protective bonding circuit of a machine		Р		
	When Test 2 of 18.2.2 is carried out by measure- ment, it is always to be preceded by Test 1.		Р		
	The tests that are necessary for machines of different status are specified in Table 9.		Р		
	Table 10 can be used to enable determination of the machine status.		Р		
18.3	Insulation resistance measured with 500VDC between power circuit conductors and protective bonding circuit is to be $\geq 1.0~M\Omega$	Complied	Ρ		
	Test made on individual sections of complete electrical installation	Test in complete electrical installation.	Р		
	For certain parts of the electrical equipment, a lower minimum insulation value is permitted, but not less than 50 $k\Omega$	>> 10.0 MΩ	Р		
	If the electrical equipment of the machine contains s during the test, it is permitted to either:	surge protection devices which are lik	ely to operate		
	- disconnect these devices, or	None	N/A		
	 reduce the test voltage to a value lower than the voltage protection level of the surge protection devices, but not lower than the peak value of the upper limit of the supply (phase to neutral) voltage. 	See above	N/A		
18.4	When voltage tests are performed, test equipment in accordance with IEC 61180-2	Complied	Р		
	Test voltage at a nominal frequency of 50Hz or 60Hz,	50Hz	Р		
	Maximum test voltage at a value of twice the rated supply voltage of the equipment or 1000 VAC (or 1414 VDC), whichever is the greater	1000 VAC	Ρ		
	Maximum test voltage applied between the power circuit conductors and the protective bonding circuit for a period of approximately 1 s.	Complied	Ρ		
	Requirements are satisfied if no disruptive discharge occurs.	Complied	Р		
	Components not rated to withstand these test voltage are disconnected during testing	Complied	Р		
	Components and devices that have been voltage tested in accordance with their product standards are disconnected during testing.	None	N/A		

E.

EN60204-1:2006+A1:2009+AC:2010			
Clause	Requirement – Test	Result – Remark	Verdict
18.5	Tests for protection against residual voltages are performed to ensure compliance with cl. 6.2.4		Р
18.6	Function tests of the electrical equipment performed, particularly those related to function of circuits for electrical safety (for example earth fault detection)	Power on/off test	Ρ
18.7	Where a portion of the machine and its associated equipment is changed or modified, that portion is reverified and retested as appropriate (see cl. 18.1)		N/A

Appended Table

1. Measuring item: Continuity of the protective bonding circuit

1.1 Measuring instruments:

ltem	Model	Series No.	Calibration due
Machine Tester	MT300E	II.07.506	Dec.2019

1.2 Measuring condition: 10A/60Hz for 10 s

1.3 Measuring standard:

Minimum effective protective conductor cross- sectional area of the branch under test (mm ²)	Max. measured voltage drop (V)
1.0	3.3
1.5	2.6
2.5	1.9
4.0	1.4
> 6.0	1.0

1.4 Measuring results:

Measuring points	Cross-sectional area (mm ²)	Test result (V drop)
PE & back plate inside of enclosure	1.5	0.01
PE & frame of machine	1.5	0.01

2. Measuring Item: Insulation resistance test

2.1 Measuring instruments:

Item	Model	Series No.	Calibration due
Machine Tester	MT300E	II.07.506	Dec.2019

2.2 Measuring condition: 500 V D.C., more than 1 $\mbox{M}\Omega$

2.3 Measuring results:

Measuring points	Test results (MΩ)
PE & Main Power	>10
-	-

3. Measuring Item: Voltage test

3.1 Measuring instruments:

Item	Model	Series No.	Calibration due
Machine Tester	MT300E	II.07.506	Dec.2019

3.2 Measuring condition: 1000 V A.C. for 1 sec 50/60Hz, between the conductors of all circuits and the protective bonding circuit.

3.3 Measuring results:

Measuring points	Test results
PE & Main Power	No break through
-	-

End of this Test Report