



**Report of CE Compliance Assessment  
EN 60204-1:2018 Electrical Safety**

**K9000 TRU BLU Ver 2.0  
DOG WASH EQUIPMENT**

**Document No: TRUBLU-P02-MD-ES-CR-REV3**

prepared by

**STRADIA Pty Ltd**

for

**TRU BLU DOG WASH**

**34 Caramut Road,  
Warrnambool, Vic**

**Dated: 14<sup>th</sup> December 2022**

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## General Information

<b>TEST REPORT</b> <b>EN 60204-1:2018</b> <b>Safety of machinery- Electrical equipment of machines,</b> <b>Part 1: General requirements</b>	
<b>Report Reference No. ....:</b>	<b>TRUBLU-P02-MD-ES-CR-REV2</b>
<b>Tested by (+ signature) ....:</b>	<b>John Devlin</b> 
<b>Review by (+ signature) ....:</b>	<b>Cornelius Chidlow</b> 
<b>Approved by (name + signature).....:</b>	<b>Cornelius Chidlow</b>
<b>Date of issue .....</b>	<b>14<sup>th</sup> December 2022</b>
<b>Contents.....:</b>	Contents and Total Number of Pages Given in Contents Table
<b>Testing Laboratory</b>	
<b>Name.....:</b>	Stradia Pty Ltd
<b>Address .....</b>	PO Box 754, Williamstown, Victoria, Australia 3015
<b>Applicant</b>	
<b>Name.....:</b>	TruBlu Dog Wash Pty Ltd
<b>Address .....</b>	34 Caramut Road, Warrnambool, Vic
<b>Test specification:</b>	
<b>Directive .....</b>	2006/42/EC
<b>Standard.....:</b>	EN 60204-1:2018
<b>Test procedure .....</b>	CE- MD
<b>Test item</b>	
<b>Description.....:</b>	Twin Dogwash
<b>Model/Type reference .....</b>	K9000-2.0
<b>Main test type .....</b>	-
<b>Trademark .....</b>	TruBlu Dogwash
<b>Manufacturer.....:</b>	TruBlu Pty Ltd
<b>Address .....</b>	34 Caramut Road, Warrnambool, Vic
<b>Rating(s).....:</b>	Supply: <b>240</b> Vac 50 Hz <b>20</b> A

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#### Copy of marking plate:

TRU-BLU <b>K9000</b>   	
MODEL:	BUILD DATE:
<input type="text"/>	<input type="text"/>
SERIAL NO:	<input type="text"/>
WEIGHT:	<input type="text"/>
ELECTRICAL:	<input type="text"/>
MAX. LOAD:	<input type="text"/>

Remarks:

#### Summary of testing:

The product has been tested and found in compliance with EN60204-1:2018 for Safety of machine-Electrical equipment of machines, Part 1: General requirements, provided action items are addressed

#### Test case verdicts

Test case does not apply to test object: N (N/A)

Test item does meet the requirement: P (Pass)

Test item does NOT meet the requirement: F (Fail)

#### Testing

Date of receipt of test item : -

Date(s) of performance of test : 24<sup>th</sup> February 2022

Testing Location/Address : 34 Caramut Road, Warrnambool, Vic

#### General remarks

This report shall not be reproduced except in full without the written approval of the testing laboratory.

The test results presented in this report relate only to the item(s) tested.

"(see remark #)" refers to a remark appended to the report.

"(see Annex #)" refers to an annex appended to the report.

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#### General Product Information:

The K9000-V2.0 unit provides a facility for washing dogs, with soap dispensing and drying facilities, with on-board hot water options. The machine can be note or card operated for payment

The K9000-V2.0-Twin is a two station version of the original K9000-v2.0 single unit. It provides the same functionality as the single unit.

The K9000-V2.0X is a physically smaller version of the original unit. It provides the same functionality with the same internal hardware in a smaller footprint.



K9000-V2.0

#### Product Family:

The outcome of this assessment can therefore be applied to all members of the K9000 range.

The range includes:

K9000-V2.0

K9000-V2.0-Twin

K9000-V2.0X



K9000-V2.0-Twin



K9000-V2.0X

#### Variant Models:

None

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## Action Items:

Clause	Requirement to be Implemented	Action	Result
4.6	(Video is available for installation) Add lifting point labels	Video available for installation Added lifting point labels	completed
7.10	Determine lcc and add to marking plate	ICC most likely determined by hot water heater. Calculation done	completed
13.1.1	Has one ferrule with two wires in places Door has two wires in terminal strip  Ensure each terminal only has one inserted ferrule. Two wires per ferrule is acceptable if designed for it	Has one ferrule with two wires in places – so was OK Door has two wires in terminal strip	completed
13.2.3	Neutral conductor to be consistent in colour  Replace the one black neutral conductor as discussed	All blue except for one black wire that is being replaced	completed
13.3	Non-metallic supports shall be made with a flame-retardant insulating material (see IEC 60332 series)	See Email 21/4/22 specification on supports: UL specs:- nylon 66, meets 94v-2 flammability  This conforms to EN 45545-2	Part acceptable
16.2.2	Hot water heater not thought to be able to cause burns, and outer case is cool. However the water is hot  Add warning label with heat symbol to hot water heater. Use graphical symbol ISO 7010-W017	Add symbol to hot water heater. Note: Water not thought to be 'very' hot, but add anyway	completed
17.1	Ensure the manual complies with Annex I.	Needs schematic and parts list either added or available as separate documents These are available, just need to be made available as part of the documentation. Is being completed	completed
18	Complete section 18 testing	Completed	completed
18	Appendix 1: Conformity of Relevant parts	Conformity of some parts needs confirmation/completion	Work in progress

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Clause	Requirement - Test	Result - Remark	Verdict
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### 4. GENERAL REQUIREMENTS

<b>4</b>	<b>GENERAL REQUIREMENTS</b>		-
<b>4.1</b>	<b>General</b>		
	Hazards relevant to the electrical equipment are assessed as part of the overall risk assessment of the machine as described	Yes	P
<b>4.2</b>	<b>Selection of Equipment</b>		
<b>4.2.1</b>	Electrical components and device shall be: <ul style="list-style-type: none"> <li>suitable for their intended use</li> <li>conform to IEC standards where such exist</li> <li>be applied in accordance with the supplier's instructions</li> </ul>	Yes	P
<b>4.2.2</b>	Where appropriate electrical equipment in compliance with IEC 61439 series	Yes	P
<b>4.3</b>	<b>Electrical Supply</b>		
<b>4.3.1</b>	Electrical equipment to be designed for correct operation within the conditions of mains power supply	Yes	P
<b>4.3.2</b>	<b>AC Supplies</b>		
	Supply Voltage: Steady state voltage: 0.9 to 1.1 of nominal voltage	Yes	P
	Frequency: 0.99 to 1.01 of nominal frequency continuously; 0.98 to 1.02 short time.	Yes	P
	Harmonics: not exceeding 12 % of the total r.m.s. etc.	N/A	N
	Voltage unbalance: not exceeding 2% deviation	N/A	N
	Voltage interruption: interrupted or at zero voltage for not more than 3 ms at any random time in the supply cycle with more than 1 s between successive interruptions	N/A	N
	Voltage dips not exceeding 20 % of the rms voltage of the supply for more than one cycle with more than 1 s between successive dips	Yes	P
<b>4.3.1</b>	Electrical equipment to be designed for correct operation within the conditions of mains power supply	Yes	P
<b>4.3.3</b>	<b>DC Supplies</b>		
	Supply voltage: <ul style="list-style-type: none"> <li>batteries: 0.85 – 1.15 of nominal voltage</li> <li>battery-operated vehicles: 0.7 – 1.2 of nom. volt.</li> <li>from converting equipment: 0.9 – 1.1 of nom. volt.</li> </ul>	AC-DC converter	P
	Voltage interruption: <ul style="list-style-type: none"> <li>batteries: not exceeding 5 ms</li> <li>converting equipment: not exceeding 20 ms</li> </ul>	Yes	P
	Ripple (peak-to-peak): not exceed. 0.15 of nom. volt.	Yes	P
<b>4.3.4</b>	Special supply systems (e.g. on-board generators, DC bus) limits acc. 4.3.2 / 3 may be exceeded, provided equipment is designed accordingly		N
<b>4.4</b>	<b>Physical environment and operating conditions</b>		
<b>4.4.1</b>	Electrical equipment suitable for the physical environment and operating conditions of its intended use.	Yes	P
<b>4.4.2</b>	Immunity and/or emission tests required unless <ul style="list-style-type: none"> <li>incorporated devices and components comply with the relevant product standard and</li> </ul>	ERMC testing passed	P

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<b>4</b>	<b>GENERAL REQUIREMENTS</b>		<b>-</b>
	<ul style="list-style-type: none"> <li>installation and wiring according supplier instructions or Annex H:</li> </ul>		
4.4.3	Electrical equipment shall be capable of operating correctly in the intended ambient air temperature. (Minimum requirement: air temperatures of +5 °C and +40 °C)	Yes	P
4.4.4	Electrical equipment shall be capable of operating correctly when the relative humidity is up to 50% at a maximum temperature of +40°C	Yes	P
	Harmful effects of condensation shall be avoided		
4.4.5	Electrical equipment shall be capable of operating correctly at altitudes up to 1000 m above mean sea level	Yes	P
4.4.6	Electrical equipment shall be adequately protected against the ingress of solids and liquids (see 11.3)	Yes	P
4.4.7	When equipment is subjected to radiation, additional measure shall be taken	N/A	N
4.4.8	Undesirable effects of vibration, shock and bump avoided by suitable means	Yes	P
4.5	Electrical equipment designed to withstand the effects of transportation and storage within a temperature range of - 25 to + 55 °C	Yes	P
4.6	Heavy or bulky electrical equipment of the machine provided with suitable means for handling	Video available for installation Add lifting point labels	P

### 5. INCOMING SUPPLY CONDUCTOR TERMINATIONS AND DEVICES FOR DISCONNECTING AND SWITCHING OFF

<b>5</b>	<b>INCOMING SUPPLY CONDUCTOR TERMINATIONS AND DEVICES FOR DISCONNECTING AND SWITCHING OFF</b>		<b>-</b>
<b>5.1</b>	<b>Incoming supply conductor terminations</b>		
	Recommendation that electrical equipment of a machine is connected to a single supply (For large complex machinery, there can be a need for more than one incoming supply)	Yes	P
	Unless a plug is provided, supply conductors should be terminated at the supply disconnecting device	Yes	P
	Neutral conductor clearly indicated in technical documentation with "N" (see cl. 16.1)	Yes	P
	A separate terminal, labelled N, is provided (it may be part of the supply disconnecting device)	Yes	P
	No connection between the neutral conductor and the protective bonding circuit	Not connected	P
	For machines supplied from parallel sources the requirements of IEC 60364-1 apply	None	P
	All terminals of incoming supply clearly marked in ac. with IEC 60445)	Yes	P
<b>5.2</b>	<b>Terminal for connection of external protective conductor (PE)</b>		
	For each incoming supply, a terminal shall be provided in the same compartment as the line conductor terminals for connection to the external protective conductor	Yes	P
	Terminal size according to table 1 in relation to the line conductors	Yes	P
	Where an external protective conductor other than	Copper	P



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<b>5</b>	<b>INCOMING SUPPLY CONDUCTOR TERMINATIONS AND DEVICES FOR DISCONNECTING AND SWITCHING OFF</b>		-
	copper is used, the terminal size and type shall be selected accordingly		
	At each incoming point this terminal shall be marked or labelled with the letters 'PE'	Yes	P
<b>5.3</b>	<b>Supply disconnecting device</b>		
<b>5.3.1</b>	A supply disconnecting device shall be provided: <ul style="list-style-type: none"> <li>for each incoming supply to a machine</li> <li>for each on-board power supply</li> </ul>	RCD internal to machine	P
	Where two or more such devices exist, interlocks shall be provided to prevent hazardous situations	N/A	N
<b>5.3.2</b>	The supply disconnecting device shall be one of the following:		
	a) a switch-disconnector, acc. to I C 60947-3 for at least appliance category AC-23 B or DC-23 B	Separate lockable isolating switch part of installation instructions	P
	b) a control and protective switching device suitable for insulation acc. to IEC 60947-6-2		
	c) a circuit-breaker suitable for isolation (acc. to IEC 60947-2)		
	d) any other switching device in accordance with an IEC product standard for that device and which meets the isolation requirements and the appropriate utilization category and/or specified endurance requirements		
	e) a plug/socket combination for a flexible cable supply		
<b>5.3.3</b>	A disconnection device acc. to 5.3.2 a) to d) has to fulfil all of the following requirements		
	<ul style="list-style-type: none"> <li>isolate the electrical equipment from the supply and have one OFF (isolated) and one ON position marked with "O" and "I"</li> </ul>	Yes	P
	<ul style="list-style-type: none"> <li>- have a visible contact gap or a position indicator which cannot indicate OFF (isolated) until all contacts are actually open and the requirements for the isolating function have been satisfied</li> </ul>	Yes	P
	<ul style="list-style-type: none"> <li>have an operating means (see 5.3.4)</li> </ul>	Yes	P
	<ul style="list-style-type: none"> <li>coloured black or grey recommended (If used as an emergency stop, red/yellow combination selected)</li> </ul>	Red/Yellow	P
	<ul style="list-style-type: none"> <li>be provided with a means permitting it to be locked in the OFF position (padlocks). When so locked, remote as well as local closing shall be prevented</li> </ul>	Yes	P
	<ul style="list-style-type: none"> <li>disconnect all live conductors of its power supply circuit For TN supply systems, the neutral conductor may or may not be disconnected except in countries where disconnection of the neutral conductor (when used) is compulsory</li> </ul>	Yes	P
	<ul style="list-style-type: none"> <li>have a braking capacity to interrupt the</li> </ul>	Yes	P

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Clause	Requirement - Test	Result - Remark	Verdict
<b>5</b>	<b>INCOMING SUPPLY CONDUCTOR TERMINATIONS AND DEVICES FOR DISCONNECTING AND SWITCHING OFF</b>	-	
	system,when the largest motor is stalled		
	A plug/socket combination used as a disconnection device shall: <ul style="list-style-type: none"> <li>comply with 13.4.5</li> <li>have a braking capacity to interrupt the system,when the largest motor is stalled</li> </ul>	N/A	N
5.3.4	Operating means of supply disconnecting devices (e.g. a handle) shall be external to the enclosure	Yes, external switch	P
	The operating means shall be easily accessible and located between 0,6 and 1,9 m above the servicing level (an upper limit of 1,7 m is recommended)	Yes	P
5.3.5	The following circuits need not be disconnected by the supply disconnecting device: <ul style="list-style-type: none"> <li>lighting circuits for lighting needed during maintenance or repair;</li> <li>socket outlets for the exclusive connection of repair or maintenance tools and equipment;</li> <li>undervoltage protection circuits that are only provided for automatic tripping in the event of supply failure;</li> <li>circuits supplying equipment that should nor ally remain energized for correct operation</li> </ul> <p>Such circuits should be provided with their own disconnecting device.</p>	All are disconnected	P
5.4	<b>Devices for the Removal of Power for Prevention of Unexpected Start-up</b>		
	Devices for removal of power for the prevention of unexpected start-up shall be provided where this can create a hazard	Yes	P
	They shall be appropriate and convenient for the intended use, suitably placed, and readily identifiable as to their function and purpose	Yes	P
	Where not obvious, they shall be marked to indicate the extent of removal of power	Yes	P
	Devices in accordance with 5.3.2 may be used for this purpose	Yes	P
	Disconnectors, withdrawable fuse links and withdrawable links only used, if located in enclosed electrical operator area (see 3.1.23)	N/A	N
	Devices that do not fulfil the isolation function (e.g. a contactor switched off by a control circuit etc.) only used for tasks such as: <ul style="list-style-type: none"> <li>inspections;</li> <li>adjustments;</li> </ul> work on the electrical equipment where there are only minor risks (as described)	N/A	N
5.5	<b>Devices for Isolating Electrical Equipment</b>		
	Devices shall be provided for isolating electrical equipment or parts of it to enable work	Yes	P
	Such devices shall be: <ul style="list-style-type: none"> <li>appropriate and convenient for the intended</li> </ul>	Yes	P

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<b>5</b>	<b>INCOMING SUPPLY CONDUCTOR TERMINATIONS AND DEVICES FOR DISCONNECTING AND SWITCHING OFF</b>		-
	use; <ul style="list-style-type: none"> <li>• suitably placed;</li> <li>• readily identifiable as to which part or circuit of the equipment is served. They shall be marked unless their function and purpose is obvious</li> </ul>		
	Where it is necessary to work on individual parts of the electrical equipment of a machine, or on one of a number of machines fed by a common conductor bar, conductor wire or inductive power supply system, a disconnecting device is provided for each part, or for each machine, requiring separate isolation	N/A	N
	In addition, the following devices that fulfil the isolation function may be provided for this purpose: <ul style="list-style-type: none"> <li>• devices described in 5.3.2;</li> <li>• disconnectors, withdrawable fuse links and withdrawable links only used, if located in enclosed electrical operator area (see 3.1.23) and information provided (see cl 17)</li> </ul>	Yes	P
<b>5.6</b>	<b>Protection against Unauthorised, Inadvertent and/or Mistaken Connection</b>		
	Where devices acc. to cl. 5.4 and 5.5 are located outside an enclosed electrical operator area, locking means in an OFF position shall be provided. When so secured, local and remote reconnection shall be prevented	Yes	P
	Where these devices are located inside an enclosed electrical operator area, other means of protection against unintended reconnection can be sufficient	N/A	N
	Where a plug/socket combination is so positioned that it can be kept under the immediate supervision of the person carrying out the work, means for securing in the disconnected state are not needed	N/A	N

## 6. PROTECTION AGAINST ELECTRIC SHOCK

<b>6</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		-
<b>6.1</b>	<b>Incoming supply conductor terminations</b>		
	The electrical equipment shall provide protection against electric shock by basic protection and fault protection	Yes	P
	Where the measures for protection as in 6.2, 6.3 and 6.4 are not practicable, other measures from IEC 60364-4-41 may be used (e.g. SELV)	Yes	P
<b>6.2</b>	<b>Basic Protection</b>		
<b>6.2.1</b>	For each circuit the measures of 6.2.2, 6.2.3, and where applicable, 6.2.4 shall apply	Yes	P
	Where not appropriate, other measures as defined in IEC 60364-4-41 may be applied (see also 6.2.5 and 6.2.6)	N/A	N
	For equipment in places open to all persons including children, 6.2.2 with a minimum protection of IP4X or IPXXD, or 6.2.3 shall be applied	IP4X	P
<b>6.2.2</b>	Live part shall be located inside enclosures that	Yes, IP2X	P

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<b>6</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		-
	provide protection against contact with live parts of at least IP2X or IPXXB.		
	Where the top surfaces of the enclosure are readily accessible, the minimum degree of protection against contact with live parts provided by the top surfaces shall be IP4X or IPXXD.	N/A	N
	Opening an enclosure (i.e. opening doors, lids, covers, etc.) shall be possible only under one of the following conditions:		-
	a) The use of a key or tool is necessary for access	Yes, key	P
	b) The disconnection of live parts inside the enclosure before it can be opened (see explanation)	N	
	c) Opening without the use of a key or a tool and without disconnection of live parts shall be possible only when all live parts are protected against contact to at least IP2X or IPXXB.	N	
6.2.3	Live parts protected by insulation shall be completely covered with insulation that can only be removed by destruction, and that is capable of withstanding the mechanical, chemical, electrical, and thermal stresses to which it can be subjected under normal operating conditions	Yes	P
6.2.4	Live part having a residual voltage greater than 60 V when disconnected, shall be discharged to 60 V or less within 5 sec, if this does not interfere with the proper functioning of the equipment	N/A	P
6.2.5	For protection by barriers, the requirements of IEC 60364-4-41 shall apply (412.2)	Yes	P
6.2.6	For protection by placing out of reach or protection by obstacles, the requirements of IE 60364-4-41 shall apply (412.4 and 412.3)	Yes	P
<b>6.3</b>	<b>Fault Protection</b>		
6.3.1	For each circuit or part of el. equipment at least one of the measures of 6.3.2 to 6.3.3 shall be applied:		
	a) Prevention of the occurrence of a touch voltage	Yes	P
	b) Protection by automatic disconnection of supply	Yes, RCD	P
6.3.2	Prevention of the occurrence of a touch voltage		-
6.3.2.2	Protection by provision of one or more of the following:		-
	a) class II electrical devices or apparatus (double insulation, reinforce insulation or by equivalent insulation in accordance with IE 61140) or		
	b) switchgear and control gear assemblies having total insulation in accordance with IE 61439-1 or	Yes	P
	c) supplementary or reinforced insulation in accordance with IE 60364-4-41 (413.2)		
6.3.2.3	For protection by electrical separation the requirements of IEC 60364-4-41 apply (413.5)	Yes	P
6.3.3	Protection by automatic disconnection of supply		-
	This measure consists of the interruption of one, or	TN system	P

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<b>6</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		-
	more, line conductors in a time within the limits specified in Annex A for TN and TT systems		
	This requires co-ordination between: <ul style="list-style-type: none"> <li>the type of supply, the source impedance and the earthing system</li> <li>several impedance values</li> <li>characteristics of protective devices</li> </ul> (For details see 8.2)	Yes	P
	This protective measure comprises both:		-
	<ul style="list-style-type: none"> <li>protective bonding of exposed parts (8.2. )</li> <li>one of the following:</li> </ul>		
	a) In TN systems, the following protective devices may be used:		
	<ul style="list-style-type: none"> <li>overcurrent protective device or</li> <li>residual current protective devices (RC s) and associated overcurrent protective devices</li> </ul>	Yes	P
	b) In TT systems, either:		
	<ul style="list-style-type: none"> <li>RCDs and associated over current protective devices, or</li> <li>overcurrent protective devices provided a low fault loop impedance is assured</li> </ul>		
	c) In IT-Systems the requirements of IEC60364-4-41 shall be fulfilled	N/A	N
	During an insulation fault, an acoustic and an optical signal shall be sustained. The acoustic signal may be manually be muted	N/A	N
	Where automatic disconnection is provided under a), and disconnection acc. to A.1.1 cannot be assured, supplementary protective bonding shall be provided to fulfil A.1.3	Is assured	P
	Where protection of a PDS (power drive system) is not provided by the converter, the necessary protection shall be according to the converter manufacturer's instructions	N/A	N
<b>6.4</b>	<b>Protection by use of PELV</b>		-
<b>6.4.1</b>	PELV circuits shall satisfy the following conditions		-
	a) the nominal voltage does not exceed: <ul style="list-style-type: none"> <li>- 25 V AC r.m.s. or 60 V ripple-free AC when the equipment is normally used in dry locations and when large area contact of live parts with the human body is not expected; or</li> <li>- 6 V AC r.m.s. or 15 V ripple-free DC in all other cases;</li> </ul>	Yes	P
	b) one side of the circuit or one point of the source of the supply of that circuit is connected to the protective bonding circuit;	Yes	P
	c) live parts of PELV circuits shall be electrically separated from other live circuits (see IEC 1558)	Yes	P
	d) conductors of each PELV circuit shall be physically separated from these of any other circuit. If this requirement is impracticable, the insulation provisions of 13.1.3 shall apply	Yes	P

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<b>6</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		<b>-</b>
	e) plugs and socket-outlets for a PELV circuit shall conform to the following: - plugs shall not enter socket-outlets of other voltage systems - socket-outlets shall not admit plugs of other voltage systems	N/A	N
<b>6.4.2</b>	The sources for PELV shall be one of the following:		-
	<ul style="list-style-type: none"> <li>a safety isolating transformer in accordance with IEC61558-1 and IEC 61558-2-6 or</li> </ul>	N/A	N
	<ul style="list-style-type: none"> <li>a source of current with a degree of safety equivalent to that of the safety isolating transformer, or</li> </ul>	N/A	N
	<ul style="list-style-type: none"> <li>a source independent of circuit with higher voltage (e.g. battery or diesel-driven) or</li> </ul>	N/A	N
	<ul style="list-style-type: none"> <li>electronic power supply conforming to appropriate standards</li> </ul>	Yes	P

## 7. PROTECTION OF EQUIPMENT

<b>7</b>	<b>PROTECTION OF EQUIPMENT</b>		<b>-</b>
<b>7.2</b>	<b>Overcurrent Protection</b>		<b>-</b>
<b>7.2.1</b>	Overcurrent protection shall be provided where the current in any circuit can exceed the rating of a component or the capacity of a conductor	Yes	P
<b>7.2.2</b>	Supply conductors		-
	Unless otherwise specified by the user, the supplier of the electrical equipment is not responsible for providing the supply conductors or the overcurrent protective device for it	Yes	P
	In the installation documents, the data necessary for conductor dimensioning and selecting the overcurrent protective device are stated (see 7.2.10 and 17.4)	Yes	P
<b>7.2.3</b>	Power Circuits		-
	Devices for detection and interruption of overcurrent, selected in accordance with 7.2.1, are applied to each live conductor including supplies to control circuit transformers.	Yes	P
	The following conductors shall not be disconnected without disconnecting all associated live conductors: <ul style="list-style-type: none"> <li>the neutral conductor of AC power circuits;</li> <li>the earthed conductor of DC power circuits;</li> </ul> DC power conductors bonded to exposed conductive parts of mobile machines.	Yes	P
	Where the cross-section area of the neutral conductor is at least equal to the line conductor, no overcurrent detection nor disconnecting device is required for that conductor	Yes	P
	Otherwise the measures detailed in 524 of IEC 60364-5-52:2009 shall apply	N/A	N
	In IT-Systems, it is recommended that no neutral conductor is used. Where a neutral conductor is used, the measures detailed in 431.2.2 of IEC 60364-4-43:2008 shall apply	N/A	N
<b>7.2.4</b>	<b>Control Circuits</b>		<b>-</b>

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<b>7</b>	<b>PROTECTION OF EQUIPMENT</b>		<b>-</b>
	Conductors of control circuits directly connected to the supply shall be protected against overcurrent in accordance with 7.2.3.	Yes	P
	Conductors of control circuits supplied by a transformer or DC supply shall be protected against overcurrent (see also 9.4.3.1.1):		-
	<ul style="list-style-type: none"> <li>In control circuits, connected to the protective bonding circuit, by an overcurrent protective device in the switched conductor</li> </ul>	Yes	P
	<ul style="list-style-type: none"> <li>In circuits, not connected to the protective bonding circuit: <ul style="list-style-type: none"> <li>Where all control circuits have the same current carrying capacity, by an overcurrent protective device in the switched conductor</li> <li>Otherwise, by an overcurrent protective device in both, switched and common conductors of each control circuit</li> </ul> </li> </ul>	N/A	N
7.2.5	Overcurrent protection shall be provided for circuits feeding general purpose socket outlets	N/A	N
7.2.6	Unearthed conductor of lighting circuits shall be protected separately from other circuits.	N/A, 12VDC LED lighting only	N
7.2.7	Transformers shall be protected in accordance with the manufacturer's instructions and includes: <ul style="list-style-type: none"> <li>avoiding tripping due to transformer magnetizing inrush currents</li> <li>avoiding a winding temperature rise in excess of the permitted value for the insulation class when there is a short circuit at the secondary terminals</li> </ul>	None	N
7.2.8	Location of overcurrent protective devices		-
	It shall be located at the point where a reduction in the cross sectional area of the conductors or another change reduces the current-carrying capacity of the conductors except:	Yes	P
	<ul style="list-style-type: none"> <li>current carrying capacity of the conductors is at least equal to that of the load and</li> <li>conductors between the point of reduction of current-carrying capacity and the position of the overcurrent protective device is <math>\leq 3</math> m and</li> <li>the conductor is protected e.g. by an enclosure or duct.</li> </ul>	Yes	P
7.2.9	Overcurrent protective devices		-
	The rated short-circuit breaking capacity shall be at least equal to the prospective fault current at the point of installation. Additional currents other than from the supply (e.g. from motors, from power factor correction capacitors) shall be taken into consideration.	Yes	P
	Where fuses are provided as overcurrent protective devices, a type readily available in the country of use shall be selected, or arrangement shall be made for the supply of spare parts.	Yes, standard fuses. Spares provided	P



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<b>7</b>	<b>PROTECTION OF EQUIPMENT</b>		-
<b>7.2.10</b>	Rating and setting of overcurrent protective devices:		-
	Rated current of fuse or overcurrent setting of other protective devices selected as low as possible, but adequate for anticipated overcurrent.	Yes	P
	The rated current of overcurrent protective device for conductors is determined by the current carrying capacity of the conductors to be protected in accordance with Cl. 12.4, D.2 and the maximum allowable interrupting time <i>t</i> in accordance with Clause D.3.	Yes	P
<b>7.3</b>	<b>Protection of Motor against Overheating</b>		
<b>7.3.1</b>	Protection shall be provided for each motor rated at more than 0.5 kW.	Yes	P
	Automatic restarting prevented where this can cause a hazard	N/A	N
<b>7.3.2</b>	Protection achieved by overload protection device: <ul style="list-style-type: none"> <li>• detection in each live conductor</li> <li>• switching off of all live conductors (not necessary to switch of neutral conductor)</li> </ul>	Yes Motor in dryer	P
	For special duty motors, appropriate protective devices are recommended	N/A	N
	For motors that cannot be overloaded, overload protection is not required.	N/A	N
<b>7.3.3</b>	Protection achieved by over-temperature protection device: Is recommended in situations where the cooling can be impaired (for example dusty environments)	Cooling is adequate	P
<b>7.4</b>	Equipment shall be protected against abnormal temperatures that can result in a hazardous situation.	Yes	P
<b>7.5</b>	<b>Protection against the effects of supply interruption or voltage reduction and subsequent restoration</b>		-
	Where a supply interruption or a voltage reduction can cause a hazardous situation, damage to the machine, or to the work in progress, undervoltage protection is provided.	Yes, no issues for power outages, fluctuations	P
	Upon restoration of supply voltage, automatic or unexpected restarting of machine prevented.	Does not restart for customer	P
	Undervoltage protection does initiate appropriate control responses to ensure necessary coordination of groups of machines working together	N/A	N
<b>7.6</b>	Motor overspeed protection shall be provided where over-speeding can occur and could possibly cause a hazardous situation.	Not required	N
<b>7.7</b>	Additional earth fault/residual current protection In addition to providing overcurrent protection for automatic disconnection as described in 6.3, earth fault/residual current protection can be provided to reduce damage to equipment due to earth fault currents less than the detection level of the overcurrent protection. The setting of the devices shall be as low as possible consistent with correct operation of the equipment.	N/A	N



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<b>7</b>	<b>PROTECTION OF EQUIPMENT</b>		-
7.8	Phase sequence protection shall be provided, where an incorrect phase sequence of the supply voltage can cause a hazardous situation or damage to the machine.	Single Phase	N
7.9	Surge protective devices (SPDs) can be provided to protect against the effects of over-voltages due to lightning or to switching surges.	None	N
7.10	Short-circuit current rating The short-circuit current rating of the electrical equipment shall be determined. This can be done by the application of design rules, or by calculation, or by test.	ICC most likely determined by hot water heater	P

## 8. EQUIPONTENTIAL BONDING


<b>8</b>	<b>EQUIPONTENTIAL BONDING</b>		-
8.2	<b>Protective Bonding Circuit</b>		-
8.2.1	All parts of the protective bonding circuit shall be so designed that they are capable of withstanding the highest thermal and mechanical stresses	Yes	P
	Protective conductors which does not form part of a cable shall not be less than:	Yes	P
	<ul style="list-style-type: none"> <li>2.5 mm<sup>2</sup> Cu or 16 mm<sup>2</sup> Al if protection against mechanical damage is provided</li> </ul>	Copper 2.5mm	P
	<ul style="list-style-type: none"> <li>4 mm<sup>2</sup> Cu or 16 mm<sup>2</sup> Al if protection against mechanical damage is not provided</li> </ul>	Copper 4mm	P
	Small parts and other conductive parts that do not constitute a hazard need not to be earthed	None	P
8.2.2	<b>Protective Conductors</b>		-
	Protective conductors shall be identified inaccordance with 13.2.2.	Yes	P
	Copper conductors are preferred.	Yes	P
	Where other material is used, its electrical resistance per unit length shall not exceed that of the allowable copper conductor and such conductors shall be not less than 16 mm <sup>2</sup> in cross-sectional area.	N/A	N
	Metal enclosures or frames or mounting plates may be used as protective conductors if they satisfy the following three requirements: <ul style="list-style-type: none"> <li>protection against mechanical, chemical or electrochemical deterioration</li> <li>compliant with 543.1 of IEC 60364-5-54:</li> <li>permit the connection of other protective conductors where foreseen</li> </ul>	Yes	P
	The cross-section of protective conductors shall be calculated according to 543.1.2 of IEC 60364-5-54, or selected in accordance with Table 1.	Yes	P
	Each protective conductor shall: <ul style="list-style-type: none"> <li>be part of a multicore cable, or;</li> <li>be in a common enclosure with the line conductor, or;</li> <li>have a cross-sectional area of at least; <ul style="list-style-type: none"> <li>2.5 mm<sup>2</sup> Cu or 16 mm<sup>2</sup> I with protection against mechanical damage</li> </ul> </li> </ul>	Yes	P

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	<ul style="list-style-type: none"> <li>4 mm<sup>2</sup> Cu or 16 mm<sup>2</sup> Al without protection against mechanical damage</li> </ul>		
	A protective conductor not forming part of a cable is considered to be mechanically protected if it is installed in a conduit, trunking, or protected in a similar way.	Yes	P
	<p>The following parts shall be connected to the protective bonding circuit but shall not be used as protective conductors:</p> <ul style="list-style-type: none"> <li>conductive structural parts of the machine;</li> <li>metal ducts of flexible or rigid construction;</li> <li>metallic cable sheaths or armouring;</li> <li>metallic pipes containing flammable materials such as gases, liquids, powder.</li> <li>flexible or pliable metal conduits;</li> <li>constructional parts subject to mechanical stress in normal service;</li> <li>flexible metal parts; support wires; cable trays, and cable ladders.</li> </ul>	Yes	P
8.2.3	Continuity of the protective bonding circuit		-
	Where a part is removed the protective bonding circuit for the remaining parts isn't interrupted.	Yes	P
	Current-carrying capacity of connection and bonding points not impaired by mechanical, chemical, or electrochemical influences (e.g. electrolytic corrosion on aluminium parts)	No	P
	Where the electrical equipment is mounted on lids, doors, or cover plates, continuity of the protective bonding circuit shall be ensured. The use of a protective conductor (see 8.2.2) is recommended.	Yes, braid earth strap	P
	For cables that are exposed to damage (for example flexible trailing cables the continuity of the protective conductors are ensured by appropriate measures (for example monitoring).	Yes, braid earth strap	P
	Where the continuity can be interrupted, a first make last break contact is required.	N/A	N
8.2.4	Protective conductor connecting points are not intended to attach appliances or parts.	Yes	P
	<p>Each connecting point shall be marked or labelled as such using the symbol IEC 60417-5019 or the letters PE, or by use of bicolour GREEN / YELLOW</p> 	Yes	P
8.2.5	Mobile machines with on-board power supplied: The protective bonding system is connected to a single protective bonding terminal. This protective bonding terminal is the connection point for a possible additional external incoming power supply	N/A	N
8.2.6	Additional requirements for electrical equipment having earth leakage currents higher than 10 mA	<10mA leakage	N
	a) the protective conductor is completely enclosed or otherwise protected		
	b) the protective conductor has a cross-sectional area of at least 10 mm <sup>2</sup> Cu or 16 mm <sup>2</sup> Al		

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	c) a second protective conductor of at least the same cross-sectional area is provided		
	d) the supply is automatically disconnected in case of loss of continuity of the protective conductor		
	e) where a plug-socket combination is used, an industrial connector in accordance with IEC 60309 series is provided		
	A statement shall be given in the instructions for installation that the equipment shall be installed as describe in this 8.2.6.		
8.3	Measures to restrict the effects of high leakage current can be taken as described	N/A	N
8.4	If functional bonding is used, the connecting points should be marked with symbol  IEC 60417-5020	N/A	N

## 9. CONTROL CIRCUIT AND CONTROL FUNCTIONS

<b>9</b>	<b>CONTROL CIRCUIT AND CONTROL FUNCTIONS</b>		<b>-</b>
<b>9.1</b>	<b>Control Circuit</b>		<b>-</b>
9.1.1	Where control circuit are supplied from an AC source, transformers having separate windings shall be used to separate the power supply from the control supply.	N/A	N
	Where several transformers are used, it is recommended that the secondary voltages are in phase.	N/A	N
	Where DC control circuits derived from an AC supply are connected to the protective bonding, they shall be supplied from a separate winding	N/A AC-DC converter used	P
9.1.2	The nominal voltage of control circuits should preferably not exceed <ul style="list-style-type: none"> <li>- 230 V @ 50 Hz</li> <li>- 277 V @ 60 Hz</li> <li>- 220 V @ DC</li> </ul>	24VDC control circuits	P
9.1.3	Control circuits are provided with overcurrent protection in accordance with 7.2. and 7.2.10.	Yes	P
<b>9.2</b>	<b>Control Functions</b>		<b>-</b>
9.2.2	Category of stop function (stop category 0, 1, or 2)	Cat 0 from wall switch	P
<b>9.2.3</b>	<b>Operation</b>		<b>-</b>
9.2.3.1	Where a machine has more than one control station, measure shall be provided to ensure that initiation of commands from different control stations do not lead to a hazardous situation.	Single control station for each wash unit Twin has physically separate controls on same control panel	P
9.2.3.2	Start functions shall operate by energising the relevant circuit.	Yes	P
	Start of an operation shall be possible only when all of the relevant safety functions and/or protective measure are in place and are operational.	Yes	P
	Where safety functions and/or protective measures cannot be applied for certain operations, manual control of such operations are by hold-to-run controls, together with enabling devices, as appropriate.	Yes	P

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	In the case of machines requiring the use of more than one control station to initiate a start, each of these control stations shall have a separate manually actuated start control device. The conditions to initiate a start are: <ul style="list-style-type: none"> <li>- all required conditions for machine operations shall be met and</li> <li>- all start control devices shall be in the released (off) position, then</li> <li>- all start control devices have to be actuated concurrently (see 3.1.7).</li> </ul>	Single control for each unit of twin. They operate independently	P
9.2.3.3	Stop category 0 and/or stop category 1 and/or stop category 2 stop functions are provided as indicated by the risk assessment and the functional requirements of the machine (see 4.1).	Yes	P
	Stop functions shall override related start functions	Yes	P
	Where more than one control station is provided, stop commands from any control station is effective when required by the risk assessment of the machine.	Yes	P
9.2.3.4	Emergency operations (emergency stop, emergency switching off)		-
9.2.3.4.1	Emergency stop or emergency switching off commands shall be sustained until it is reset.	Yes	P
	This reset shall be possible only by a manual action at that location where the command has been initiated.	Yes	P
	The reset of the command shall not restart the machinery but only permit restarting.	Yes	P
	It shall not be possible to restart the machinery until all emergency stop commands are reset.	Yes	P
	It shall not be possible to reenergize the machinery until all emergency switching off commands are reset.	Yes	P
9.2.3.4.2	The emergency stop does function either as a stop category 0 or as a stop category 1.	Yes	P
	<ul style="list-style-type: none"> <li>- it shall override all other functions and operations in all modes</li> <li>- it shall stop the hazardous motion as quickly as practicable without creating other hazards</li> <li>- a reset shall not initiate a restart</li> </ul>	Yes	P
9.2.3.4.3	Emergency switching off should be provided where: <ul style="list-style-type: none"> <li>- Protection against direct contact is achieved only by placing out of reach or by obstacles (see 6.2.6), or</li> <li>- there is the possibility of other hazards or damage caused by electricity</li> </ul>	Yes	P
	Emergency switching off is accomplished by electromechanical switching devices, effecting a stop category 0 of machine actuators connected to this incoming supply	Yes	P
9.2.3.5	Operating Modes		
	Where machinery uses several control or operating modes requiring different protective measures and having a different impact on safety, it shall be fitted with a mode selector which can be locked in each position	N/A	N

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<b>9</b>	<b>CONTROL CIRCUIT AND CONTROL FUNCTIONS</b>		<b>-</b>
	Another selection method can be used (for example an access code)	N/A	N
	Mode selection by itself does not initiate machine operation. A separate actuation of the start control has to be stated by the operator.	N/A	N
	Indication of the selected operating mode shall be provided (e.g. the position of a mode selector, the provision of an indicating light, a visual display indication)	N/A	N
9.2.3.6	Movement or action that can result in a hazardous situation shall be monitored by providing, for example, overtravel limiters, motor overspeed detection, mechanical overload detection or anti-collision devices	N/A	N
9.2.3.7	Hold-to-run controls shall require continuous actuation of the control device(s) to achieve operation	N/A	N
9.2.3.8	Two-hand controls shall be one of the following types and have the following features	N/A	N
	Type I: this type requires: <ul style="list-style-type: none"> <li>- the provision of two control devices and their concurrent actuation by both hands;</li> <li>- continuous concurrent actuation during the hazardous situation;</li> <li>- machine operation shall cease upon the release</li> </ul>	N/A	N
	Type II: a Type I control requiring the release of both control devices before machine operation can be reinitiated	N/A	N
	Type III: a Type II control requiring concurrent actuation of the control devices as follows: <ul style="list-style-type: none"> <li>- it shall be necessary to actuate the control devices within a certain time limit of each other, not exceeding 0.5 s</li> <li>- where this time limit is exceeded, both control devices shall be released before machine operation can be initiate</li> </ul>	N/A	N
9.2.3.9	Enabling control shall be so arranged as to minimize the possibility of defeating, for example by requiring the de-activation of the enabling control device before machine operation may be reinitiated	N/A	N
9.2.3.10	Combined start and stop controls: Push-buttons etc. that alternately initiate and stop motions shall only be provided for functions which cannot result in a hazardous situation.	N/A	N
9.2.4.4	When more than one cableless operator control station is used, then:	N/A	N
	- only one control station shall be enabled at a time except as necessary for the operation	N/A	N
	- transfer of control shall require a deliberate manual action at the station having control	N/A	N
	- transfer shall only be possible if both stations are in the same mode	N/A	N

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<b>9</b>	<b>CONTROL CIRCUIT AND CONTROL FUNCTIONS</b>		<b>-</b>
	- a transfer shall not change the mode of operation or function	N/A	N
	- on the station that has control, a visual indication shall indicate this	N/A	N
9.2.4.5	Portable cableless operator control stations shall be provided with means to prevent unauthorised use	N/A	N
	Each machine should have an indication when it is under cableless control	N/A	N
	When possible to be connected to several machines, means shall be provided on the portable device to select	N/A	N
	Selecting a machine shall not initiate control commands.	N/A	N
9.2.4.6	A deliberate disabling shall meet the requirements of 9.2.4.2.	N/A	N
	Where disabling without interrupting machine operation is necessary, appropriate means shall be provided to transfer control	N/A	N
	Emergency stop devices on portable cableless operator control stations shall not be the sole means of initiating an emergency stop	N/A	N
	Confusion between active and inactive emergency stop devices shall be avoided	N/A	N
	Restarting of a cableless control shall not result in a reset of an emergency stop condition	N/A	N
	The instructions shall state that a reset shall only be performed when it can be seen that the reason has been cleared	N/A	N
9.3			
9.3.1	The reclosing or resetting of an interlocking safeguard does not initiate hazardous machine operation.	N/A	N
9.3.2	Where an operating limit (for example speed, pressure, position) can be exceeded leading to a hazardous situation, means shall be provided to detect when a predetermined limit(s) is exceeded and initiate an appropriate control action	N/A	N
9.3.3	The correct operation of auxiliary functions shall be checked by appropriate devices	N/A	N
	Where the non-operation of a device can cause a hazard, appropriate interlocking shall be provided	N/A	N
9.3.4	Interlocks between different operations and for contrary motions shall be provided, if these operations can lead to hazardous situations	N/A	N
9.3.5	Where braking of a motor is accomplished by current reversal, measures shall prevent the motor starting in the opposite direction at the end of braking where that reversal can cause a hazardous situation or damage to the machine or to the work in progress	N/A	N
	For this purpose, a device operating exclusively as a function of time is not permitted	N/A	N
	Control circuits shall be so arranged that rotation of a motor shaft, for example manually, does not result in a hazardous situation	N/A	N

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<b>9</b>	<b>CONTROL CIRCUIT AND CONTROL FUNCTIONS</b>		<b>-</b>
9.3.6	Where it is necessary to suspend safety functions and/or protective measures, the control or operating mode selector shall simultaneously:	N/A	N
	- disable all other operating (control) modes	N/A	N
	- permit operation only by the use of a hold-to-run device or by a similar control device positioned so as to permit sight of the hazardous elements	N/A	N
	- prevent any operation of hazardous functions by voluntary or involuntary action on the machine's sensors	N/A	N
	If these four conditions cannot be fulfilled, the mode selector shall activate other protective measures to ensure a safe intervention zone. In addition, the operator shall be able to control operation of the parts he is working on from the adjustment point.	N/A	N
9.4	<b>Control Functions in the event of Failure</b>		<b>-</b>
9.4.1	The electrical control system(s) shall have an appropriate performance that has been determined from the risk assessment of the machine	Yes	P
	The requirements for safety-related control functions of IEC 62061 and/or ISO 13849-1, ISO 13849-2 shall apply	PLr of 'a'	P
	Where memory retention is achieved for example, by battery power, measures shall be taken to prevent hazardous situations arising from failure, undervoltage or removal of the battery	N/A	N
	Means shall be provided to prevent unauthorized or inadvertent memory alteration by, for example, requiring the use of a key, access code or tool	N/A	N
9.4.2	Measure to minimize risk in the event of failure		<b>-</b>
9.4.2.1	Measure to minimize risk in the event of failure include but are not limited to: • use of proven circuit techniques and components; • provisions of partial or complete redundancy; • provision of diversity; • provision for functional tests.	Yes, proven circuit techniques	P
9.4.2.2	Use of proven circuit techniques and components (see examples)	Yes	P
9.4.2.3	Provisions of partial or complete redundancy	None	N
9.4.2.4	Provision of diversity (see examples)	None	N
9.4.2.5	Provision for functional tests	None	N
9.4.3	Protection against malfunction of control circuits	None	N
9.4.3.1.1	Measure shall be provided to reduce the probability that insulation faults on any control circuit can cause malfunction	Yes	P
9.4.3.1.2	Method a) – Earthed control circuits fed by transformers	N/A	N
	The common conductor shall be connected to the protective bonding circuit at the point of supply.	N/A	N
	All control elements are to be inserted on the other side of the components	N/A	N
9.4.3.1.3	Method b) – Non-earthed control circuits fed by transformers shall either	N/A	N



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<b>9</b>	<b>CONTROL CIRCUIT AND CONTROL FUNCTIONS</b>		<b>-</b>
	1) have 2-pole control switches that operate on both conductors; or	N/A	N
	2) be provided with a device that interrupts the circuit automatically in the event of an earth fault; or	Yes	P
	3) where 2) above would increase the risk, it can be sufficient to provide an insulation monitoring device that will initiate an acoustic and optical signal	N/A	N
9.4.3.1.4	Method c) – Control circuits fed by transformer with an earthed centre-tap winding shall have overcurrent protective devices that break both the conductors	N/A	N
	The control switches shall be 2-pole types that operate on both conductors	N/A	N
9.4.3.1.5	Method d) – Control circuits not fed by a transformer are only allowed for machines with a maximum of one motor starter and/or maximum of two control devices, in accordance with 9.1.1	Yes	P
	Possible cases are:		
	1) directly connected to an earthed supply system(TN- or TT-system)	Yes	P
	If powered between two lines, multi-pole control switches are required	N/A	N
	2) directly connected to a supply system that is not earthed, or is earthed through a high impedance (IT-system)	N/A	N
	A device shall be provided that interrupts the circuit automatically in the event of an earth fault	Yes	P
9.4.3.2	Where the loss of memory due to a power failure can result in hazardous situation, appropriate measures shall be taken	N/A	N
9.4.3.3	Where the loss of continuity of control circuits depending upon sliding contacts can result in a hazard, appropriate measures shall be taken	N/A	N

### 10. CONTROL CIRCUIT AND CONTROL FUNCTIONS

<b>10</b>	<b>CONTROL CIRCUIT AND CONTROL FUNCTIONS</b>		<b>-</b>
10.1.1	Control devices for operator interface shall, as far as is practicable, be selected, mounted, and identified or coded in accordance with IEC 61310 series	Yes	P
10.1.2	As far as is practicable, machine-mounted control devices shall be:		
	- readily accessible for service and maintenance	Yes	P
	- mounted in such a manner as to minimize the possibility of damage from activities such as material handling	Yes	P
	The actuators of hand-operated control devices are selected and installed so that:		
	- they are not less than 0,6 m above the servicing level and are within easy reach of the normal working position of the operator	Yes	P
	- the operator is not placed in a hazardous situation when operating them	Yes	P



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<b>10</b>	<b>CONTROL CIRCUIT AND CONTROL FUNCTIONS</b>		<b>-</b>
	The actuators of foot-operated control devices are selected and installed so that:	N/A	N
	- they are within easy reach of the normal working position of the operator		
	- The operator is not placed in a hazardous situation when operating the		
10.1.3	The degree of protection (IP rating in accordance with IEC 60529) together with other appropriate measures shall provide protection against:	IP42	P
	- the effects of liquids, vapours, or gases found in the physical environment or used on the machine	Yes	P
	- the ingress of contaminants (for example swarf, dust, particulate matter)	Yes	P
	The operator interface control devices shall have a minimum degree of protection against contact with live parts of IPXXD (see IEC 60529)	IP42	P
10.1.4	Position sensors (for example position switches, proximity switches) are so arranged that they will not be damaged in the event of over travel	N/A	N
	Position sensors in circuits with safety-related control functions shall have direct opening action (see IEC 60947-5-1) or shall provide similar reliability (see 9.4.2)	N/A	N
10.1.5	Portable and pendant operator control stations and their control devices are so selected and arranged as to minimize the possibility of machine operations caused by inadvertent actuation, shocks and vibrations	N/A	N
10.2	<b>Actuators</b>		
10.2.1	Actuators shall be colour-coded as follows:		
	The colours for START/ON actuators should be WHITE, GREY, BLACK or GREEN with a preference for WHITE. RED shall not be used	Commercial user interface. Colours chosen to help user interact with machine	P
	The colour RED shall be used for emergency stop and emergency switching off actuators	Commercial user interface. Colours chosen to help user interact with machine	P
	If a background exists, it shall be coloured YELLOW	Commercial user interface. Colours chosen to help user interact with machine	P
	The colours for STOP/OFF actuators should be BLACK, GREY, or WHITE with a preference for BLACK. GREEN shall not be used. RED is permitted	Commercial user interface. Colours chosen to help user interact with machine	P
	WHITE, GREY, or BLACK are the preferred colours for actuators that alternately act a START/ON and STOP/OFF actuators. The colours RED, YELLOW, or GREEN shall not be used	Commercial user interface. Colours chosen to help user interact with machine	P
	The same is applicable for "hold-to-run" actuators	Commercial user interface. Colours chosen to help user interact with machine	P
	Reset actuators shall be BLUE, WHITE, GREEN, or BLACK. Where they also act as a STOP/OFF actuator, the colours WHITE, GREY, or BLACK are preferred with the main preference being for BLACK. GREEN shall not be used.	Commercial user interface. Colours chosen to help user interact with machine	P

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Clause	Requirement - Test	Result - Remark	Verdict
<b>10</b>	<b>CONTROL CIRCUIT AND CONTROL FUNCTIONS</b>		-
	The colour YELLOW is reserved for use in abnormal conditions	Commercial user interface. Colours chosen to help user interact with machine	P
	Where the same colours are used for various functions, a supplementary means of coding shall be used for the identification	Commercial user interface. Colours chosen to help user interact with machine	P
10.2.2	Recommended markings for actuators are given in tables 2 and 3	Commercial user interface. Colours chosen to help user interact with machine	P
10.3	<b>Indicator Lights and Displays</b>		-
10.3.1	Indicator lights and displays shall be selected and installed in such a manner as to be visible from the normal position of the operator (see also IEC 61310-1).	Yes, LCD display	P
	Circuits used for visual or audible devices use to warn persons of an impending hazardous event shall be fitted with facilities to check the operability of these devices	No warnings	P
10.3.2	Indicator lights should be colour-coded with respect to the condition (status) of the machine in accordance with Table 4.	None	P
	Indicating towers on machines have the applicable colours in the following order from the top down; RED, YELLOW, BLUE, GREEN and WHITE.	None	N
10.3.3	For further distinction or information and especially to give additional emphasis, flashing lights and displays can be provided	None	N
	Where flashing lights or displays are used to provide higher priority information, additional acoustic warnings should be considered	None	N
10.4	illuminated push-button actuators shall be colour-coded in accordance with Tables 2 and 4. Where there is difficulty in assigning an appropriate colour, WHITE is used.	None	N
	The colour RED for the emergency stop actuator shall not depend on the illumination of its light.	No	P
10.5	Devices having a rotational member, such as potentiometers and selector switches, shall have means of prevention of rotation of the stationary member. Friction alone isn't considered sufficient.	None	P
10.6	Actuators used to initiate a start function or the movement of machine elements shall be constructed and mounted so as to minimize inadvertent operation	Yes	P
10.7	<b>Emergency Stop Devices</b>		-
10.7.1	Devices for emergency stop are readily accessible		
	Emergency stop devices shall be provided at each location where the initiation of an emergency stop can be required	Main switch used as E-stop	P
	In circumstances where confusion can occur between active and inactive emergency stop devices caused by disabling the operator control station, means (for example, information for use) are provided to minimise confusion.	Yes	P
10.7.2	The type of device for emergency stop include, but are not limited to:		

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<b>10</b>	<b>CONTROL CIRCUIT AND CONTROL FUNCTIONS</b>		-
	<ul style="list-style-type: none"> <li>- a push-button device for actuation by the palm or the fist (e.g. mushroom)</li> <li>- a pull-cord operated switch a pedal-operated switch without mechanical guard</li> </ul>		
	The devices shall be in accordance with IEC60947-5-5.	Yes	P
10.7.3	Where a stop category 0 is suitable, the supply disconnecting device may serve the function of emergency stop where: <ul style="list-style-type: none"> <li>- it is readily accessible to the operator; and</li> <li>- it is of the type described in 5.3. a), b), c), or d)</li> </ul>	Yes	P
	Where intended for emergency use, the supply disconnecting device shall meet the colour requirements of 10.2.1	Yes	P
10.8	<b>Emergency Switching Off Devices</b>		-
10.8.1	Such devices shall be located as necessary for the given application.	Yes	P
	Means are provided, where necessary, to avoid confusion between these devices.	Yes	P
10.8.2	The type of device for emergency switching off include: <ul style="list-style-type: none"> <li>- a push-button operated switch with a palm or mushroom head type of actuator</li> <li>- a pull-cord operated switch</li> </ul>	switch	P
	The devices shall have direct opening action	Yes	P
10.8.3	Where the supply disconnecting device is to be locally operated for emergency switching off, it shall be readily accessible and shall meet the colour requirements of 10.2.1	Yes	P
10.9	<b>Enabling Control Devices</b>		-
	Enabling control devices shall be elected and arranged so as to minimize the possibility of defeating	N/A	N
	They shall be designed in accordance with ergonomic principles	N/A	N
	Function of two-position types: <ul style="list-style-type: none"> <li>- position 1: off-function of the switch (actuator is not operated);</li> <li>- position 2: enabling function (actuator is operated)</li> </ul>	N/A	N
	Function of three-position types: <ul style="list-style-type: none"> <li>- position 1: off-function of the switch (actuator is not operated)</li> <li>- position 2: enabling function (actuator is operated in its mid position)</li> <li>- position 3: off-function (actuator is operated past its mid position)</li> <li>- when returning from position 3 to position 2, the enabling function is not activated</li> </ul>	N/A	N

## 11. CONTROL GEAR: LOCATION, MOUNTING AND ENCLOSURES

<b>11</b>	<b>CONTROL GEAR: LOCATION, MOUNTING AND ENCLOSURES</b>		-
11.2.1	All items of control gear (inclusively terminals that are not part of control gear components or devices) are	Yes	P

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<b>11</b>	<b>CONTROL GEAR: LOCATION, MOUNTING AND ENCLOSURES</b>	<b>-</b>	
	placed a d oriented so that they can be identified without moving them or the wiring		
	For items that require checking for correct operation or that are liable to need replacement, those actions should be possible without dismantling other equipment or parts of the machine (except opening doors or removing covers, barriers or obstacle)	Yes	P
	All control gear is mounted so as to facilitate its operation and maintenance	Yes	P
	Necessary tools to adjust, maintain, or remove a device are supplied	Yes, key, plus handle. Rest are standard tools	P
	Where access is required for regular maintenance or adjustment, the relevant devices shall be located between 0.4 m and 2.0 m above the servicing level	Yes	P
	Recommendation, that terminals be least 0.2 above the servicing level and so placed that conductors and cables can be easily connected	Yes	P
	Only operating, indicating, measuring, and cooling devices are mounted on doors or on normally removable access covers of enclosures	Yes	P
	Where connected through plug-in arrangements, their association shall be made clear by type (shape), marking or reference designation	N/A	N
	Plug-in devices that are handled during normal operation shall be provided with non-interchangeable features	N/A	N
	Plug/socket combinations that are handled during normal operation are unobstructedly accessible.	N/A	N
	Test points for connection of test equipment shall be: - mounted to provide unobstructed access - clearly identified to correspond with the documentation - adequately insulated sufficiently spaced	N/A	N
<b>11.2.2</b>	<b>Physical separation or grouping</b>		
	Non-electrical parts and devices, not directly associated with the electrical equipment, shall not be located within enclosures containing control gear	Located in separate area of main cabinet.	P
	Devices such as solenoid valves should be separated from the other electrical equipment (for example in a separate compartment)	Yes	P
	Control devices mounted in the same location and connected to the supply voltage, or to both supply and control voltages, should be grouped separately from those connected only to the control voltages	Yes	P
	Terminals shall be separated into groups for: - power circuits - associated control circuits - other control circuits, fed from external sources (for example for interlocking)	Yes	P
	The clearances and creepage distances specified by the supplier shall be maintained, taking into account the external influences or conditions of the physical environment.	Yes	P

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<b>11</b>	<b>CONTROL GEAR: LOCATION, MOUNTING AND ENCLOSURES</b>		-
11.2.3	The temperature rise inside electrical equipment enclosures shall not exceed the ambient temperature specified by the component manufacturers	No	P
	Heat generating components (for example heat sinks, power resistors) are located so, that the temperature of each component in the vicinity remains within the permitted limit	Yes	P
11.3	<b>Degrees of Protection</b>		-
	The protection of control gear against ingress of solid foreign objects and of liquids shall be adequate taking into account the external influences under which the machine is intended to operate and shall be sufficient against dust, coolants, lubricants and swarf	Yes	P
	Enclosures of control gear provide a degree of protection of at least IP22 (see IEC 60529)	Yes	P
11.4	<b>Enclosures, Doors and Openings</b>		-
	Enclosures shall be constructed using materials capable of withstanding the mechanical, electrical and thermal stresses as well as the effects of humidity and other environmental factors that are likely to be encountered in normal service	Yes	P
	Fasteners used to secure doors and covers should be of the captive type	Yes	P
	Windows of enclosures shall be of a material suitable to withstand expected mechanical stress and chemical attack	N/A	N
	It is recommended that enclosure doors having vertical hinges be not wider than 0,9 m, with an angle of opening of at least 95°	Yes	P
	Joints or gaskets of doors, lids, etc. shall withstand the chemical effects of the aggressive liquids, vapours, or gases used on the machine.	Yes	P
	They shall: <ul style="list-style-type: none"> <li>- be securely attached</li> <li>- not deteriorate due to removal or replacement of the door</li> </ul>	Yes	P
	Openings in enclosures (for example, for cable access), including those towards the floor or foundation or to other parts of the machine shall be equipped with means to ensure the degree of protection specified for the equipment.	Yes	P
	A suitable opening may be provided in the base of enclosures within the machine so that moisture due to condensation can drain away	Yes	P
	Openings for cable entries shall be easily re-opened on site	Yes	P
	There shall be no opening between enclosures containing electrical equipment and compartments containing coolant, lubricating or hydraulic fluids, or those into which oil, other liquids, or dust can penetrate.	No	P
	Holes in an enclosure for mounting shall not impair the required protection.	Yes	P
	Equipment that, in normal or abnormal operation, can	Yes	P

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<b>11</b>	<b>CONTROL GEAR: LOCATION, MOUNTING AND ENCLOSURES</b>		-
	<p>attain a surface temperature sufficient to cause a risk of fire or harmful effect to an enclosure material shall:</p> <ul style="list-style-type: none"> <li>- be located within an enclosure that will withstand such temperatures; and</li> <li>- be located at a sufficient distance from adjacent equipment allowing safe dissipation of heat (see also 11.2.3); or</li> <li>- be otherwise screened by material that can withstand to the harmful effect.</li> </ul>		
<b>11.4</b>	<b>Access to Electrical equipment</b>		-
	<p>Doors in gangways for access to electrical operating areas shall:</p> <ul style="list-style-type: none"> <li>- be at least 0.7 m wide and 2.0 m high</li> <li>- open outwards</li> <li>- have a means (for example panic bolts) to allow opening from the inside without the use of a key or tool</li> </ul>	N/A	N

## 12. CONDUCTORS AND CABLES

<b>12</b>	<b>CONDUCTORS AND CABLES</b>		-
<b>12.1</b>	Conductors and cables shall be selected so as to be suitable for the operating conditions and external influences that can exist	Yes	P
	These requirements do not apply to the integral wiring of assemblies, subassemblies, and devices that are manufactured and tested in accordance with their relevant IEC standard (for example IEC 61800 series).	Yes	P
<b>12.2</b>	Conductors should be of copper. Where aluminium conductors are used, the cross-sectional area shall be at least 16 mm <sup>2</sup> .	copper	P
	The cross-sectional area of conductors should not be less than as shown in Table 5	Yes	P
	Smaller cross-sectional areas or other constructions than shown in Table 5 may be used, provided adequate mechanical strength is achieved by other means	Yes	P
	Class 1 and class 2 conductors are primarily intended for use between rigid, non-moving parts where vibration is not likely to cause damage	None	P
	All conductors that are subject to frequent movement should have flexible stranding of class 5 or class 6.	Yes	P
<b>12.3</b>	Where the insulation of conductor and cables can constitute hazards due for example to the propagation of a fire or the emission of toxic or corrosive fumes adequate means are provided. Special attention is given to the integrity of a circuit having a safety-related function	All mains cables are 0.6/1.0kV PVC insulated cables with annealed copper conductors, to AS/NZS 1125, AS/NZS 5000.1 and AS/NZS 3191. These are similar to EN 50525-2-31:2011 and IEC 60227-1:2011.	P

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<b>12</b>	<b>CONTDUCTORS AND CABLES</b>		-
		All Control cables are to ASNZS 3808 and ASNZS 1125. These are 300V/500V, PVC insulated (V-75, and V-90) PVC cables with annealed copper conductors. They comply generally with VDE 0250.	
	The insulation of cables and conductors used, shall be suitable for a test voltage:		
	- not less than 2 000 V AC for a duration of 5 min for operation at voltages higher than 50 V AC or 20 V DC, or		
	- not less than 500 V AC for a duration of 5 min for PELV circuits (see IEC 60364-4-41, class III equipment).		
	The insulation shall be such that it cannot be damaged in operation or during laying, especially for cables pulled into ducts.		
12.4	Current-carrying capacity in norm I service in accordance with table 6. Or in accordance with supplier's recommendation.	Yes	P
12.5	The voltage drop from the point of supply to the load in any power circuit cable shall not exceed 5 % of the nominal voltage under normal operating conditions.	Yes	P
	In control circuits, the voltage drop shall not reduce the voltage at any device below the manufacturer's specification for that device, taking into account inrush currents.	Yes	P
12.6	<b>Flexible Cables</b>		-
12.6.1	Flexible cables shall have Class 5 or Class 6 conductors	Yes	P
	Cables that are subjected to severe duties shall be of adequate construction to protect against: <ul style="list-style-type: none"> <li>- abrasion due to mechanical handling and dragging across rough surfaces</li> <li>- kinking due to operation without guides</li> <li>- stress resulting from guide rollers and forced guiding, being wound and re-wound on cable drums</li> </ul>	N/A	N
12.6.2	The tensile stress applied to copper conductors shall not exceed 15 N/mm <sup>2</sup> of cross-sectional area Or special measures are taken to withstand the applied stress	Yes	P
	For material other than copper the applied stress shall be within the cable manufacturer's specification	N/A	N
12.6.3	For cables of circular cross-sectional area installed on drums, the maximum current should be derated in accordance with Table 7	N/A	N
12.7	<b>Conductor wires, conductor bars and slip-ring assemblies</b>		-
12.7.1	During normal access to the machine, protection to conductor wires, conductor bars and slip-ring	N/A	N



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<b>12</b>	<b>CONT CONDUCTORS AND CABLES</b>		-
	assemblies shall be achieved by the application of one of the following protective measures:		
	- protection by partial insulation of live parts, or where this is not practicable	N/A	N
	- protection by enclosures or barriers of at least IP2 or IPXXB	Yes	P
	Horizontal top surfaces of barriers or enclosures that are readily accessible shall provide a degree of protection of at least IP4X or IPXXD	Yes	P
	Where the required degree of protection is not achieved, protection by placing live parts out of reach in combination with emergency switching off in accordance with 9.2.5.4.3 shall be applied	N/A	N
	Conductor wires and conductor bars shall be so placed and/or protected as to:		
	- prevent contact, especially for unprotected conductor wires and conductor bars, with conductive items such as the cords of pull-cord switches, strain-relief devices and drive chains	Yes	P
	- prevent damage from a swinging load	Yes	P
12.7.2	Protective conductor circuit (PE) and the neutral conductor (N) each use a separate conductor wire, conductor bar or slip-ring	Yes	P
	The continuity of the protective conductor circuit using sliding contacts shall be ensured by taking appropriate measures (for example, duplication of the current collector, continuity monitoring)	N/A	N
12.7.3	Protective conductor current collectors shall have a shape or construction so that they are not interchangeable with the other current collectors. Such current collectors shall be of the sliding contact type	N/A	N
12.7.4	Removable current collectors with disconnect function: The protective conductor circuit interrupts after and reconnects before any live conductor	N/A	N
12.7.5	Clearances in air between conductors and adjacent systems shall be suitable for at least a rated impulse voltage of an overvoltage category III in accordance with IEC 60664-1	Yes	P
12.7.6	Creepage distances between conductors and adjacent systems shall be suitable for operation in the intended environment, e.g. open air, inside buildings, protected by enclosures	Yes	P
	In abnormally dusty, moist or corrosive environments, the following creepage distance requirements apply:	N/A	N
	- unprotected conductor wires, conductor bars, and slip-ring assemblies: 60 mm	N/A	N
	- enclosed conductor wires, insulated multipole conductor bars and insulated individual conductor bars: 30 mm	N/A	N
12.7.7	Conductor system divided into isolated sections: suitable design measures shall be employed to prevent the energization of adjacent sections by the current collectors themselves	N/A	N



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<b>12</b>	<b>CONTDUCTORS AND CABLES</b>		-
12.7.8	Conductor wires, conductor bars and slip-ring assemblies in power circuits shall be grouped separately from those in control circuits	Yes	P
	They shall be capable of withstanding, without damage, the mechanical forces and thermal effects of short-circuit currents	Yes	P
	Removable covers cannot be opened by one person without the aid of a tool	Yes	P
	Where common metal enclosures are used, the individual sections shall be bonded together and connected to the protective bonding circuit	Yes	P
	Conductor bar ducts that can be subject to accumulation of liquid shall have drainage facilities	N/A	N

### 13. WIRING PRACTICE

<b>13</b>	<b>WIRING PRACTICE</b>		-
13.1	<b>Connections and routing</b>		
13.1.1	All connections shall be secured against accidental loosening	Yes	P
	The means of connection shall be suitable for the cross-sectional areas and nature of the conductors being terminated	Yes	P
	No connection of two or more conductors to one terminal, unless the terminal is designed for it	Has one ferrule with two wires in places Door has two wires in terminal strip	P
	No soldered connections to terminals unless they are suitable for it	Yes	P
	Terminals on terminal blocks are plainly marked or labelled corresponding with the diagrams	Yes	P
	Installations of flexible conduits and cables are such that liquids drain away from the fittings	Yes	P
	Retaining means for conductor strand and shields provided (no soldering for that purpose)	Yes	P
	Identification tags shall be legible, permanent, and appropriate for the physical environment	Yes	P
	Terminal blocks mounted and wired so that the wiring does not cross over the terminals	No	P
13.1.2	Conductors and cables shall be run from terminal to terminal without splices or joints	None	P
	Connections using plug/socket combinations with suitable protection against accidental disconnection are not considered to be splices or joints for the purpose of this subclause	Yes	P
	Exceptions are possible as described	N/A	N
	Terminations of cables shall be adequately supported to prevent mechanical stresses at the terminations of the conductors	Yes	P
	Protective conductor shall be placed close to the associated live conductors in order to decrease the impedance of the loop	Yes	P
13.1.3	Conductors for circuits that operate at different voltages are separated by suitable barriers, or are insulated for the highest voltage that occurs within	Yes	P

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<b>13</b>	<b>WIRING PRACTICE</b>		-
	thesame duct		
13.1.4	Conductors of AC circuits installed in ferromagnetic enclosures shall be arranged so that all conductors of each circuit, including the protective conductor of each circuit, are contained in the same enclosure	N/A	N
	Single-core cables armoured with steel wire or steel tape should not be used for AC circuits	N/A	N
13.1.5	The cable between the pick-up and the pick-up converter of an inductive power supply system shall be: <ul style="list-style-type: none"> <li>- as short as practicable</li> <li>- adequately protected against mechanical damage</li> </ul>	None	N
13.2	<b>Identification of Conductors</b>		
13.2.1	Each conductor shall be identifiable at each termination in accordance with the technical documentation	Yes	P
13.2.2	When identification of the protective conductor is by colour alone, the bicolour combination GREEN-AND-YELLOW shall be used throughout the length of the conductor	Yes	P
	Where the protective conductor can be easily identified colour coding throughout its length is not necessary, but the ends or accessible location are clearly identified by the graphical symbol or by the bicolour combination GREEN-AND-YELLOW	Yes	P
	Exception: Protective bonding conductors may be marked with the letters PB and/or the symbol IEC 60417-5021	None	P
13.2.3	Where a neutral conductor is identified by colour alone, the colour shall be BLUE (preferably light blue)	Yes One black wire to be replaced	P
	In this case that colour shall not be used for identifying any other conductor where confusion is possible	Yes	P
	Bare conductors used as neutral conductors shall have at minimum a stripe in LIGHT BLUE 15 mm to 100 mm wide in each compartment or unit and at each accessible location	N/A	N
13.2.4	Where colour-coding is used, BLACK, BROWN, RED, ORANGE, YELLOW, GREEN, BLUE (including LIGHT BLUE), VIOLET, GREY, WHITE, PINK, TURQUOISE may be used	Yes	P
	GREEN and YELLOW should not be used where there is a possibility of confusion with the bicolour combination GREEN-AND-YELLOW	Yes	P
13.3	<b>Wiring inside Enclosures</b>		
	Conductors inside enclosures shall be supported where necessary	Yes	P
	Non-metallic supports shall be made with a flame-retardant insulating material (see IEC 60332 series)	TBD Nylon 66 - Meets UL 94v-2	TBD

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Clause	Requirement - Test	Result - Remark	Verdict
<b>13</b>	<b>WIRING PRACTICE</b>		-
	Connections to devices mounted on doors or to other movable parts shall be made using flexible conductors in accordance with 12.2 and 12.6.	Yes See 12.3 for cable specs	P
	Conductors and cables that do not run in ducts shall be adequately supported	Yes	P
<b>13.4</b>	<b>Wiring outside Enclosures</b>		
<b>13.4.1</b>	Conductors of a circuit shall not be distributed over different multi-core cables, conduits, etc.	LED lighting cable goes outside main cabinet	P
<b>13.4.2</b>	Conductors and their connections external to the electrical equipment shall be placed in suitable ducts (see cl.13.5)	Gland for exit	P
<b>13.4.3</b>	Connections to moving parts shall take into account the foreseeable frequency of movement and shall be made using conductors in accordance with 12.2 and 12.6	Yes	P
	The bending radius of the cable shall be at least 10 times the diameter of the cable	Yes	P
	Flexible cables of machines shall be so installed or protected as to minimize the possibility of external damage (run over, forces, rubbing, heat, etc.)	Yes	P
	Cables close to moving parts, shall maintain a space of at least 25 mm between the moving parts and the cables or barriers are provided	None	P
	Cable handling systems: Lateral cable angles not exceeding 5°, at being wound on and off cable drums or approaching and leaving cable guidance devices. The bending radius shall be in accordance with Table 8	None	P
	Flexible conduit shall not be used for connections subject to rapid or frequent movements except when specifically designed for that purpose	Yes, permanently fixed	P
<b>13.4.4</b>	Where several machine-mounted devices are connected in series or in parallel, it is recommended that the connections between those devices be made through terminals forming intermediate test points	Yes	P
<b>13.4.5</b>	<b>Plug and Socket Combinations</b>		
	Components or devices inside an enclosure, terminated by fixed plug/socket combinations (no flexible cable), or components connected to a bus system by a plug/socket combination, are excluded	Yes	P
	Where the plug/socket contains a contact for the protective bonding circuit, it shall have a first make last break contact (see also 8.2.4).	None	P
	Plug/socket combinations intended to be connected or disconnected during load conditions shall have sufficient load-breaking capacity	None	N
	Where the plug/socket combination is rated at 30 A, or greater, it shall be interlocked	None	N
	Plug/socket combinations that are rated at more than 16 A shall have a retaining means to prevent unintended or accidental disconnection.	None	N
	Where an unintended or accidental disconnection of plug/socket combinations can cause a hazardous situation, they shall have a retaining means.	N/A	N

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<b>13</b>	<b>WIRING PRACTICE</b>		-
13.4.6	Where it is necessary that wiring be disconnected for shipment, terminals or plug/socket combinations shall be provided at the sectional points.	Yes	P
13.4.7	When spare conductors are provided, they shall be connected to spare terminals or isolated to prevent contact with live parts	None	P
13.5	<b>Ducts, connection boxes and other boxes</b>		-
	Ducts shall provide a degree of protection (see IEC 60529) suitable for the application	None	N
	No sharp edges, flash, burrs, rough surfaces, or threads with which the insulation of the conductors can come into contact	None	P
	Where human passage is required, at least 2 m above the working surface	N/A	N
	Where cable trays are only partially covered, the cables used shall be of a type suitable for installation on open cable trays.	None	N
13.5.2	Rigid metal conduit and fittings shall be of galvanized steel or of a corrosion-resistant material	None	N
	Fittings shall be compatible with the conduit and should be threaded	Yes	P
	Conduit bends shall be properly made	Flexible conduit	P
13.5.3	A flexible metal conduit shall consist of a flexible metal tubing or woven wire armour	None	P
13.5.4	Flexible non-metallic conduit shall be resistant to kinking	None	N
13.5.5	Cable trunking systems external to enclosures shall be rigidly supported and clear of all moving parts and of sources of contamination	None	N
	Where furnished in sections, the joints shall fit tightly but need not be gasketed	None	N
	The only openings permitted shall be those required for wiring or for drainage	None	N
13.5.6	The use of compartments or cable trunking systems within the column or base of a machine to enclose conductors is permitted provided they are isolated from coolant or oil reservoirs and are entirely enclosed	N/A	N
	Conductors shall be so secured	N/A	N
13.5.7	Connection boxes and other boxes used for wiring purposes shall be accessible for maintenance.	Yes	P
	Those boxes shall provide protection against the ingress of solid bodies and liquids	Yes	P
	They shall not have opened but unused knockouts nor any other openings	No	P
13.5.8	Motor connection boxes shall enclose only connections to the motor and motor-mounted devices (e.g. brakes, temperature sensors)	None	P

### 14. ELECTRIC MOTORS AND ASSOCIATED EQUIPMENT

<b>14</b>	<b>ELECTRIC MOTORS AND ASSOCIATED EQUIPMENT</b>		-
14.1	Electric motors should conform to the relevant parts of IEC 60034 series	Yes	P

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<b>14</b>	<b>ELECTRIC MOTORS AND ASSOCIATED EQUIPMENT</b>		<b>-</b>
14.2	Enclosures for motors should be in accordance with IEC 60034-5	Yes	P
	The degree of protection shall be dependent on the application and the physical environment	Yes	P
14.3	The dimensions of motors shall conform to those given in the IEC 60072 series	Yes	P
14.4	Motors and its accessories shall be so mounted that they are adequately protected and are easily accessible for inspection, maintenance, etc.	Yes	P
	Proper cooling shall be ensured and the temperature rise shall remain within the limits of the insulation class (see IEC 60034-1)	Yes	P
	There shall be no opening between the motor compartment and any other compartment that does not meet the motor compartment requirements	Yes	P
14.5	The characteristics of motors and associated equipment shall be selected in accordance with the anticipated service and physical environmental conditions	Yes	P
14.6	Operation of the overload and overcurrent protective devices for mechanical brake actuators shall initiate the simultaneous de-energization (release) of the associated machine actuators	Yes	P

### 15. SOCKET-OUTLETS AND LIGHTING

<b>15</b>	<b>SOCKET-OUTLETS AND LIGHTING</b>		<b>-</b>
15.1	For socket-outlets intended for accessory equipment, the following apply:	N/A	N
	- they should conform to IEC 60309-1. Where not practicable, they should be clearly marked with the voltage and current ratings		
	- the continuity of the protective bonding circuit to the socket-outlet shall be ensured		
	- all unearthed conductors connected to the socket-outlet shall be protected against overcurrent and, when required, overload		
	- where the power supply to the socket-outlet is not disconnected by the supply disconnecting device for the machine or the section of the machine, the requirements of 5.3.5 apply		
	- where fault protection is provided by automatic disconnection of supply, the disconnection time shall be in accordance with Table A.1 for TN systems or Table A.2 for TT systems		
	- socket-outlets with a rating not exceeding 20 A shall be provided with an RCD not exceeding 30 metres		
15.2	<b>Local lighting of the Machine and of the Equipment</b>		<b>-</b>
15.2.1	The ON/OFF switch shall not be incorporated in the lamp holder or in the flexible connecting cord	None. LED lighting provided controlled by the controller	P
	Stroboscopic effects from lights shall be avoided	None	P
15.2.2	The nominal voltage of the local lighting circuit shall	12V LED lighting used	P

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<b>15</b>	<b>SOCKET-OUTLETS AND LIGHTING</b>		-
	not exceed 250 V between conductors. A voltage not exceeding 50 V is recommended		
	Lighting circuits shall be supplied from one of the following sources:	N/A – 12V LED lighting	P
	- a dedicated isolating transformer connected to the supply disconnecting device. Overcurrent protection shall be provided in the secondary circuit		
	- a dedicated isolating transformer connected before the supply disconnecting device. This is permitted for maintenance lighting in control enclosures only. Overcurrent protection shall be provided in the secondary circuit		
	- a circuit of the electrical equipment of the machine for lighting, with dedicated overcurrent protection		
	- an isolating transformer connected before the supply disconnecting device, provided with a dedicated primary disconnecting means (see 5.3.5) and secondary overcurrent protection, and mounted within the control enclosure adjacent to the supply disconnecting device		
	- an externally supplied lighting circuit (for example factory lighting supply). This shall be permitted in control enclosures only, and for the machine work light(s) where their total power rating is not more than 3 kW		
	- power supply units, for DC supply to LED light sources, fitted with insulating transformers		
	Exception: where fixed lighting is out of reach of operators during normal operations, the provisions of this 15.2.2 do not apply	N/A	N
15.2.3	Local lighting circuits shall be protected in accordance with 7.2.6	LED lighting	N
15.2.4	Adjustable lighting fittings shall be suitable for the physical environment	None	N
	The lamp holders shall be:		
	- in accordance with the relevant IEC standard		
	- constructed with an insulating material protecting the lamp cap so as to prevent unintentional contact		
	Reflectors shall be supported by a bracket and not by the lamp holder		
	Exception: where fixed lighting is out of reach of operators during normal operations, the provisions of this 15.2.4 do not apply		

### 16. MARKING, WARNING SIGNS AND REFERENCE DESIGNATIONS

<b>16</b>	<b>MARKING, WARNING SIGNS AND REFERENCE DESIGNATIONS</b>		-
16.1	Warning signs, name plates, markings, labels and identification plates shall be of sufficient durability	Yes	P

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<b>16</b>	<b>MARKING, WARNING SIGNS AND REFERENCE DESIGNATIONS</b>		-
16.2.1	Enclosures that do not otherwise clearly show that they contain electrical equipment shall be marked with the graphical symbol ISO 7010-W012 	Yes	P
	It may be omitted (see also 6.2.2b) for: <ul style="list-style-type: none"> <li>- an enclosure equipped with a supply disconnecting device</li> <li>- an operator-machine interface or control station</li> <li>- single device with its own enclosure (for example position sensor)</li> </ul>		
16.2.2	Where the risk assessment shows the need to warn against the possibility of hazardous surface temperatures, the graphical symbol ISO 7010-W017 shall be used 	Add symbol to hot water heater. Not thought to be very hot, but add anyway	P
16.3	Control devices and visual indicators, shall be clearly and durably marked with regard to their functions	Yes	P
16.4	The following information shall be legibly and durably marked - plainly visible after installation on enclosures that receive incoming power supplies: <ul style="list-style-type: none"> <li>- name or trade mark of supplier</li> <li>- certification mark or other marking where applicable</li> <li>- type designation or model, where applicable</li> <li>- serial number where applicable</li> <li>- main document number (see IEC 60203) where applicable</li> <li>- rated voltage, number of phases and frequency (if AC), and full-load current for each incoming supply</li> </ul> It is recommended that this information is provided adjacent to the main incoming supply(ies)	Yes	P
16.5	All enclosures, assemblies, control devices, and components shall be plainly identified with the same reference designation as shown in the technical documentation	Yes	P

## 17. TECHNICAL DOCUMENTATION

<b>17</b>	<b>TECHNICAL DOCUMENTATION</b>		-
17.1	The information necessary for identification, transport, installation, use, maintenance, decommissioning and disposal of the electrical equipment shall be supplied	Yes	P
	Annex I should be considered as guidance for the preparation of information and documents	TBD	TBD
17.2	<b>Information related to the electrical equipment</b>		-
	a) where more than one document is provided, a main document for the electrical equipment as a whole, listing the complementary documents	Yes	P
	b) identification of the electrical equipment	Yes	P
	c) information on installation and mounting	Yes	P



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Clause	Requirement - Test	Result - Remark	Verdict
<b>17</b>	<b>TECHNICAL DOCUMENTATION</b>		-
	including: <ul style="list-style-type: none"> <li>• a description of installation and mounting, and its connection to the electrical and other supplies</li> <li>• short-circuit current rating for each incoming powersupply</li> <li>• rated voltage, number of phase and frequency (ifAC.), type of distribution system (TT, TN, IT) and full-load current for each incoming supply</li> <li>• any additional electrical supply(ies) requirements (for example maximum supply source impedance,leakage current) for each incoming supply</li> <li>• space required for servicing</li> <li>• installation requirements regarding cooling</li> <li>• environmental limitations (for example lighting,vibration, EMC environment, atmospheric contaminants)</li> <li>• functional limitation (for example peak startingcurrent and permitted voltage drops)</li> <li>• precautions to be taken for the installationregarding electromagnetic compatibility</li> </ul>		
	d) an instruction for the connection of conductive parts in the vicinity of the machine to the protective bonding circuit: <ul style="list-style-type: none"> <li>• metallic pipes</li> <li>• fences</li> <li>• ladders</li> <li>• handrails</li> </ul>	Yes	P
	e) information on the functioning and operation as applicable: <ul style="list-style-type: none"> <li>• an overview of the structure of the electrical equipment</li> <li>• procedures for programming or configuring</li> <li>• procedures for restarting after an unexpected stop a sequence of operation</li> </ul>	Yes	P
	f) information on maintenance, as appropriate: <ul style="list-style-type: none"> <li>• frequency and method of functional testing</li> <li>• instructions for safe maintenance and where necessary suspend a safety function and/ rprotective measure (see 9.3.6)</li> <li>• guidance on the adjustment, repair, and frequencyand method of preventive maintenance</li> <li>• details of the interconnections subject toreplacement</li> <li>• require special devices or tools;</li> <li>• spare parts;</li> <li>• possible residual risks, indication of particular training and specification of personal protective equipment</li> </ul>	Yes	P



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<b>17</b>	<b>TECHNICAL DOCUMENTATION</b>		-
	<ul style="list-style-type: none"> <li>instructions to restrict availability of keys or tools to skilled or instructed persons</li> <li>settings (DIP-switches, programmable parameter values, etc);</li> <li>information for validation of safety related control functions after repair or modification, and for periodic testing where necessary;</li> </ul>		
	g) information on handling, transportation and storage	Yes	P
	h) information for proper disassembly and handling of components	Yes	P

## 18. VERIFICATION

<b>18</b>	<b>VERIFICATION</b>		-
18.1	<p>The extent of verification will be given in the dedicated product standard for a particular machine. Where there is no such standard, the verifications shall always include the items a), b), c) and h) and may include one or more of the items d) to g):</p> <ul style="list-style-type: none"> <li>a) verification that the electrical equipment complies with its technical documentation</li> <li>b) verification of continuity of the protective bonding circuit (Test 1 of 18.2.2)</li> <li>c) in case of fault protection by automatic disconnection of supply, conditions shall be verified according to 18.2;</li> <li>d) insulation resistance test (see 18.3)</li> <li>e) voltage test (see 18.4)</li> <li>f) protection against residual voltage (see 18.5)</li> <li>g) verification that the relevant requirements of 18.2.6 are met</li> <li>h) functional tests (see 18.6)</li> </ul>	Yes	P
18.2	<b>Verification of conditions for protection by automatic disconnection of supply</b>		
18.2.1	<p>Test 1 verifies the continuity of the protective bonding circuit.</p> <p>Test 2 verifies the conditions for protection by automatic disconnection of the supplying TN systems</p> <p>For TN-systems, those test methods are described in 18.2.2 and 18.2.3; their application for different conditions of supply are specified in 18.2.4</p> <p>For TT systems, see Clause A.2</p> <p>For IT systems, see IEC 60364-6</p>		
	Where RCDs are used in the electrical equipment, their function shall be verified in accordance with the manufacturer's instructions. The test procedure and test interval shall be specified in the maintenance instructions	RCDs used. Functionality verified	P

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Clause	Requirement - Test	Result - Remark	Verdict
<b>18</b>	<b>VERIFICATION</b>		-
<b>18.2.2</b>	<b>Test 1: Verification of the continuity of the protective bonding circuit</b>		
	The resistance between the PE terminal (see 5.2 and Figure 4) and relevant points that are part of the protective bonding circuit shall be measured with a current between 0.2 A and approximately 10 A derived from an electrically separated supply source having a maximum no-load voltage of 24 V	See document: Earth resistance test-calculated.docx Resistance less than 4mOhms	P
	The resistance measured shall be in the expected range		
<b>18.2.3</b>	<b>Test 2: Fault loop impedance verification and suitability of the associated overcurrent protective device</b>		
	The connections of each power supply including the connection of the associated protective conductor to the PE terminal of the machine, shall be verified by inspection	Protective Earth bonding verified	P
	The conditions for the protection by automatic disconnection of supply in accordance with 6.3.3 and Annex A shall be verified by both		
	a) verification of the fault loop impedance by - calculation, or - measurement in accordance with A.4, and	Calculated	P
	b) confirmation that the setting and characteristics of the associated overcurrent protective device are in accordance with the requirement of Annex A, and	Tested, Plus experience with units	P
	Where a power drive system (PDS) is used, confirmation that the setting and characteristics of the protective device(s) are in accordance with the converter manufacturer's and protective device manufacturer's instructions	NA	NA
<b>18.2.4</b>	<b>Application of the test methods for TN-systems</b>		
	When Test 2 of 18.2. is carried out by measurement, it shall always be preceded by Test 1 of 18.2.2		
	The tests that are necessary for machines of different status are specified in Table 9	Type C1	P
<b>18.3</b>	<b>Insulation resistance tests (optional)</b>		
	When insulation resistance tests are performance, the insulation resistance measured at 500 V DC between the power circuit conductors and the protective bonding circuit shall be not less than 1 MΩ	Not required. Electrical cable and fittings specified to meet this requirement	P
	If the electrical equipment of the machine contains surge protection devices which are likely to operate during the test, it is permitted to either: - disconnect these devices, or - reduce the test voltage to a value lower than the voltage protection level of the surge protection devices	None	NA
<b>18.4</b>	<b>Voltage Tests (optional)</b>		
	The test voltage shall be at a nominal frequency of 50 Hz or 60 Hz.	Yes	P
	The maximum test voltage shall have a value of twice the rated supply voltage of the equipment or 1000 V, whichever is the greater	Not required. Electrical cable and fittings specified to meet this requirement	P

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<b>18</b>	<b>VERIFICATION</b>		<b>-</b>
		Supply cannot work with this voltage so test applies to input wiring. The power supply, motor and heater wiring which is installed to standard meets the standard, but components won't withstand voltage	
	The test voltage shall be applied between the power circuit conductors and the protective bonding circuit for at least 1 sec		
	Components and devices that are not rated to withstand the test voltage and surge protection devices shall be disconnected		
<b>18.5</b>	<b>Protection against Residual Voltages</b>		
	Where appropriate, tests shall be performed to ensure compliance with 6.2.4	6.2.4 is NA	NA
<b>18.5</b>	<b>Functional Tests</b>		
	The functions of electrical equipment shall be tested	Functionally OK	P
<b>18.6</b>	<b>Retesting</b>		
	Where a portion of the machine or its associated equipment is changed or modified, the need for re-verification and testing of the electrical equipment shall be considered	NA	NA

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#### Appendix 1 : Conformity of Relevant Components

No.	Name	Model	Spec.	Manufacturer	Approval
1	MDB timer keypad harness cable	MDBTIMERHARNESS	MDB timer keypad harness cable	Cableco Pty Ltd	None Known
2	Valve & Coil	0.9101	Solenoid Valve Assembly	IMI Bushjost/Norgren	CE EAC
3	Control Cable 17C+E 1.0mm	CC218	18 Core	Eltech Industries	None Known
4	Control Cable 2 Core No Earth 1.0mm (black numbered 1 to 2)	CC202NE	2 Core	Eltech Industries	None Known
5	Iwaki Electromagnetic Metering Pump ES Series	ES-B11VC3M-3D-R8	Product Dosing Pumps	Iwaki	CE, AS/NZS 61000.6.3 & EN 61000-6-3
6	6 AMP Circuit Breaker	SH 201 C 6	6 AMP Circuit Breaker	ABB STOTZ-KONTAKT GmbH Germany - China	CE
7	10 AMP Circuit Breaker	SH 201 C 10	10 AMP Circuit Breaker	ABB STOTZ-KONTAKT GmbH Germany - China	CE
8	20 AMP Circuit Breaker	S 201 D 20	20 AMP Circuit Breaker	ABB STOTZ-KONTAKT GmbH Germany - China	CE EAC
9	32 AMP Circuit Breaker	DDM60C32/030	32 AMP Circuit Breaker	General Electric GE	CE EAC CCC
10	2.5mm Earth Electrical Wire	EVK150025G/Y	2.5mm Earth Electrical Wire	Eltech Industries	AS/NZS 3191
11	4.0mm Red Electrical Wire	EVK15603.4	4.0mm Red Electrical Wire	Eltech Industries	AS/NZS 3191
12	4.0mm Black Electrical Wire	EVK15603BK	4.0mm Black Electrical Wire	Eltech Industries	AS/NZS 5000.1 & 3191
13	4.0mm Earth Electrical Wire	EVK15603.0	4.0mm Earth Electrical Wire	Eltech Industries	AS/NZS 3191
14	2.5mm Black Electrical Wire	EVK150025.1	2.5mm Black Electrical Wire	Eltech Industries	AS/NZS 3191
15	1.5mm Brown Electrical Wire	EVK130025.3	1.5mm Brown Electrical Wire	Eltech Industries	AS/NZS 3191
16	Breaker Box	KV 6109	Breaker Box	Hensel	CE
17	700 watts (2.9amps) on high 500 watts (2 amps) on low	700 watts (2.9amps) on high 500 watts (2 amps) on low	Heated dryer element		None Known
18	Switch TGL CTR-Off DPDT 6A 240V Screw	ST056 Electus	Heated Dryer Switch	Electus	None Known
19	Domel 1100W Vacum Motor	34200001	Dryer Motor	VACspairs	CE
20	Domel 750W Vacum Motor	34200003	Dryer Motor	VACspairs	CE
21	50 Litre Electrical Hot Water System	075757 HWS Elec Rheem Meps Dual 191/050 3.6kw 50LTR	50 Litre Electrical Hot Water System	Rheem	WaterMark AS 3498 LicW519 SAI Global
22	Stainless Steel Water Sensor Flow Switch		Stainless Steel Water Sensor Flow Switch		None Known
23	QL Coin Mech	Model # Q23236-DF Config AU068_F3	QL Coin Mech	Microcoin	CE

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24	GBA/Microcoin MDB Interface	P0955	Coin Mech MDB Interface	Microcoin	CE
25	MDBVMC301 Control Board	MDBVMC301 Integrated	K9000ECU Board	Integrated Dispensing Systems P/L	None Known
26	Note Reader	SUB8-0111-113-00	ST1 Note Reader	Microcoin	CE
27	LCD 2 x 20 Integrated Screen	LCD 2 x 20 Integrated Screen	2.0 ECU Screen	Integrated Dispensing Systems P/L	None Known
28	Keypad for MDBVMC	KEYPAD Integrated Sisp	2.0 ECU Button Board	Integrated Dispensing Systems P/L	None Known
29	2.0 Wim board to terminal strip loom	DOGLOOM Cableco	2.0 Wim board to terminal strip loom	Cableco Pty Ltd	None Known
30	Control Module Box	TG PC 3023-11-to/S 302x232x110 201 513 91	Control Module Box	els spelsberg	CE
31	DIN Mounting Rail 35x7.5mm Slotted	AUSR35/7.5S	Control Module Rails (1x280mm & 2x60mm)	Eltech Industries	None Known
32	Cable Gland 16mm - Black	CG16	16mm Black Glands	Eltech Industries	None Known
33	Cable Gland 12mm - Black	CG12	12mm Black Gland	Eltech Industries	None Known
34	Cable Gland 20mm - Black	CG20	20mm Black Gland	Eltech Industries	None Known
35			Blue Jumper (4 length & 5 length)	IPD Group Limited	None Known
36	0.75mm Yellow Electrical Wire	FHDT124020Y100	0.75mm Yellow Electrical Wire	Austech	AS/NZS 3191
37	1.0mm Blue Electrical Wire	EVK13202.2	1.0mm Blue Electrical Wire	Eltech Industries	AS/NZS 3191
38	1.5mm Blue Electrical Wire	EVK130025.2	1.5mm Blue Electrical Wire	Eltech Industries	AS/NZS 3191
39	1.0mm Brown Electrical Wire	EVK13202.3	1.0mm Brown Electrical Wire	Eltech Industries	AS/NZS 3191
40	1.0mm White Electrical Wire	EVK13202.5	1.0mm White Electrical Wire	Eltech Industries	AS/NZS 3191
41	1.0mm Red Electrical Wire	EVK13202.4	1.0mm Red Electrical Wire	Eltech Industries	AS/NZS 3191
42	1.5mm Black Electrical Wire	EVK130025BK	1.5mm Black Electrical Wire	Eltech Industries	AS/NZS 3191
43	0.75mm Black Electrical Wire	EVK12402.1	0.75mm Black Electrical Wire	Eltech Industries	AS/NZS 3191
44	Single Red Wire Ferrels		Single Red Bootlace		None Known
45	Double Red Wire Ferrels		Double Red Bootlace		None Known
46	Double Black Wire Ferrels		Double Black Bootlace		None Known
47	Single Blue Wire Ferrels		Single Blue Bootlace		None Known
48	Single Black Wire Ferrels		Single Black Bootlace		None Known
49	Control Cable 17C+E 1.0mm	CC218	Control Cable 17C+E 1.0mm	Eltech Industries	BEP-AMI 78008 AS/NZS 1125 (Conductor), AS/NZS 3808(Insulation) & AS/NZS 3808(Sheath)

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50	Pump Relay	G2RV-SR700 24VAC/DC	Pump Relays	Omron	c(UL)us LISTED, CE, TUV Polycarbonate with standard screws only
51	4 sq.mm Ground / Earth Wires	CGT4N	Breakers	Connectwell	CE, c(SA)us, c(UR)us, VDE, EX, Aex ell Ex ell, IECEE, LR
52	4 sq.mm Single Level Fuse Terminal Blocks with LED indication.	1U/CF4UL (110V 240V)	Fuse Holders	Connectwell	RU SA CE
53	4 sq.mm Single Level Fuse Terminal Blocks with LED indication.	CF4U/CF4UL (6V 60V)	Fuse Holders	Connectwell	RU SA CE
54	Transformer 12VDC (LED LIGHT)	HDR-30-12	Transformer	MW Mean Well	CE, c(UR)us UL60950-1, CB, EN6095-1
55	Transformer 24VDC (Control)	HDR-60-24	Transformer	MW Mean Well	CE, c(UR)us UL60950-1, CB, EN6095-1
56	4 sp.mm Multiple Connection Terminal Block with 3 connection points	CMC1-2	Terminal Block	Connectwell	CE, c(SA)us, c(UR)us, VDE, Aex ell Ex ell, IECEE, LR
57	4 sq.mm Multiple Connection Terminal Blocks with 4 connection points.	CMC2-2	Terminal Block	Connectwell	CE, c(SA)us, c(UR)us, VDE, Aex ell Ex ell, IECEE, LR
58	Through connector 4mm2	CTS4UN	Terminal Block	Connectwell	CE, c(SA)us, c(UR)us, VDE, EX, Aex ell Ex ell, IEC, IECEE, LR
59	End Plate	EP2.5/4UN	End Panel	Connectwell	N/a
60	End Plate	EPCMC1-2	End Panel	Connectwell	N/a
61	End Plate	EPCMC2-2	End Panel	Connectwell	N/a
62	Fuse M205 Q/Blow 3A 20x5mm	SF2162Electus	3AMP Fuse	Tech Brands Electus Distribution	None Known
63	Fuse M205 S/Blow 2A 20x5mm	SF2174Electus	2AMP Fuse	Tech Brands Electus Distribution	None Known
64	Dryer & Pump Relays	VS220-20	Relays	ELKO	CE
65	Flow Sensor	Flow Sensor	Flow Sensor	K9000 Dog Wash Pty Ltd	
66	high powered flexible LED tape light	high powered flexible LED tape light	LED Strip Light	Hardkorr Lighting	CE, RoHS, C-Tick
67	99GF Braided Ground Straps	MBJ6-150-6	Braided Earth Strap	Eriflex	CULus, RoHS
68	Connector Strips White	Art. 0556 3	Terminal Strip	Wurth	CE

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Appendix 2 : Data Sheets of testing

18.2	TABLE: Continuity of the protective bonding circuit			P
Location	Current(A)	Frequency (Hz)	Measured Voltage (V)	Calculated Resistance (mΩ)
Between incoming PE terminal and relevant points that are part of the protective bonding circuit	10	--		
Note: see document Earth resistance test-calculated.docx				

18.3	TABLE: insulation resistance tests			P
Location	Voltage (V d.c)	Frequency (Hz)	Time(s)	Measured insulation resistance (MΩ)
Between power circuit conductors L <sub>1</sub> and protective bonding circuit	500			
Between power circuit conductors L <sub>2</sub> and protective bonding circuit	500			
Between power circuit conductors L <sub>3</sub> and protective bonding circuit	500			
Note:				

18.4	TABLE: voltage tests		P
test voltage applied between:	test voltage (V) a.c. / d.c.	breakdown Yes / No	
Between power circuit conductors L <sub>1</sub> and protective bonding circuit	1000Va.c.		
Between power circuit conductors L <sub>2</sub> and protective bonding circuit	1000Va.c.		
Between power circuit conductors L <sub>3</sub> and protective bonding circuit	1000Va.c.		
supplementary information:			



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Photos of Equipment Under Test