TEST REPORT

BS EN 15194:2017+A1:2023

Cycles - Electrically power assisted cycles - EPAC Bicycles

BS EN 60204-1:2018

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

BS EN ISO 12100:2010

Safety of machinery - General principles for design- Risk assessment and risk reduction

Report Number.....:	M2507958SJ-R895
Date of issue.....:	2025-07-24
Total number of pages.....:	55
Name of Testing Laboratory preparing the Report.....:	Shenzhen Meiou Testing Technology Co., Ltd
Applicant's name.....:	Shenzhen Tuxiang Technology Co., Ltd.
Address.....:	A503, Gongcun Commercial Plaza, Phase 2 Jinluan International Business Building, Sanlian Community, Longhua Street, Longhua District, Shenzhen City, Guangdong Province
Test specification:	
Standard.....:	BS EN 15194:2017+A1:2023 BS EN 60204-1:2018 BS EN ISO 12100:2010
TRF template used.....:	Safety report
Test Report Form No.....:	BS EN15194
Master TRF.....:	Dated 2019-11-15
Test item description.....:	Electric Bicycle
Trade Mark.....:	KETELES
Manufacturer.....:	Same as applicant
Model/Type reference.....:	K800, K800Pro, K8, K808, KS600, KF9, K802, K820, K860, KF10, KF11, KF6, KS9, KS5, KS8, K801, K880, KF8, KS300, MX300, C6, XDC600, S11, V3, V3Pro, T750Plus, X2000Plus, X3000Plus, G550, G650, XF4000, XC4000, Q7, MQ3000, GF750
Ratings.....:	Adaptor: Input: 100-240VAC~ 50Hz, 2.0A Output: DC54.6V ⎓ 2.0A Electric Bicycle: input: DC54.6V ⎓ 2.0A Battery:48V 23Ah

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	Shenzhen Meiou Testing Technology Co., Ltd	
Testing location/ address.....:		301, Building A2, Huafa Industrial Park, Fuyuan 1st Road, Zhancheng Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China	
Tested by (name, function, signature).....:		Tobin Project Engineer	
Approved by (name, function, signature)...:		Jack Huang Reviewer	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name, function, signature)..:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature)..:			
Approved by (name, function, signature)...:			
Supervised by (name, function, signature) :			

highest permissible voltage:	N/A
-if lighting circuit voltage is not obtained directly from the power supply,state preferred voltage:	N/A
Functional identification:	See installation and operation manual
Inscriptions /special markings:	Yes
-mark of certification:	CE symbol provided
-on electrical equipment:	English
-language	Provided by English
Technical documentation (media,language):	Yes
For which of following classes of persons is access to the interior of the switchgear cabinets required during normal operation of the equipment:	Protected by enclosure
Locks with removable keys provided for fastening doors or covers	N/A
Type of two-hand control to be provided:	N/A
-where it is type III,time limit (max.0,5 s)within which each pair of push-buttons are to be operated	N/A
Indicate special limitations on size or weight which affect the transport of a particular machine or control gear assemblies to the installation site:	P
-maximum dimensions:	See instruction and marking
-maximum weight:	See instruction and marking
Repetition of manual controlled cycles of operation:	N/A
-length of time expected that machine will be operated at this rate without subsequent pause:	N/A
Certificate for operating tests	P
-with the loaded machine to be supplied (specially built machines)	N/A
-on a loaded prototype machine to be supplied (normal machines):	P
Time delay for cableless control systems:	N/A
Specific method of conductor identification to be used:	Color and code used
Test case verdicts	
Test case does not apply to the test object..... :	N(/A)
Test item does meet the requirement .....:	P(ass)
Test item does not meet the requirement..... :	F(ail)
Testing	
Date of receipt of test item.....:	2025-07-19
Date(s)of performance of test..... :	2025-07-19 to 2025-07-24
General remarks	
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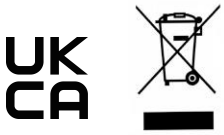
test results presented in this report relate only to the item(s)tested.

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

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

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

Electric Bicycle
Model: K800
Input: DC54.6V 2A
48V 23Ah



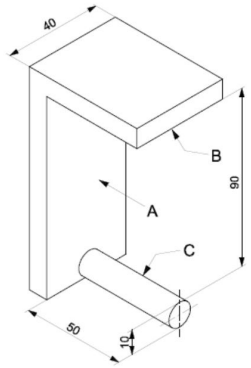
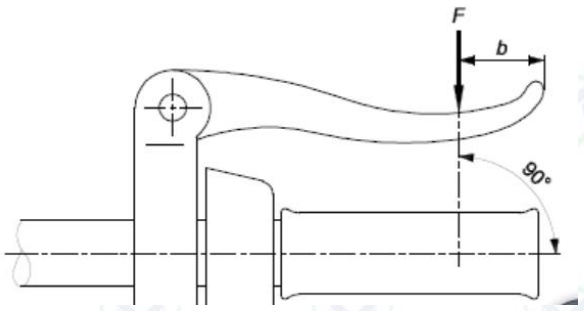
BS EN 15194

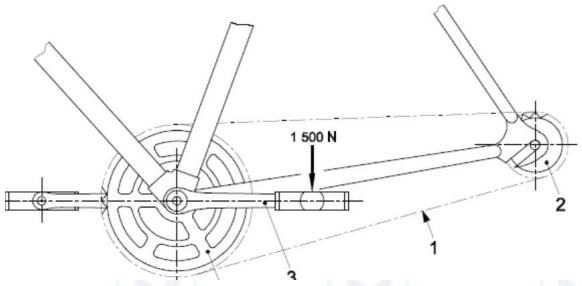
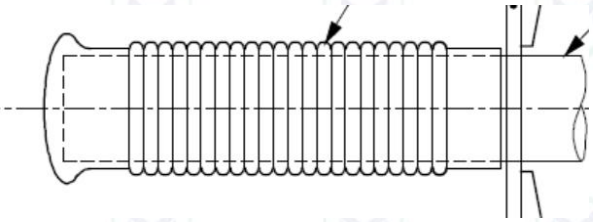
year of construction XXXX/XX
cut off speed XX km/h
maximum continuous rated power 250W
maximum permissible total weight XX kg
Shenzhen Tuxiang Technology Co., Ltd.
Made In China

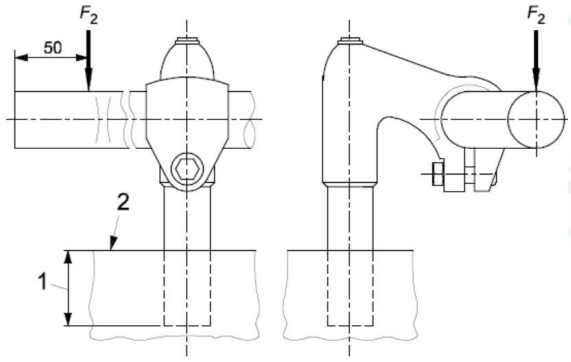
BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
4	Safety requirements and/or protective measures		P
4.2	Electrical requirements		P
4.2.1	Electric circuit		P
	The electrical control system shall be designed so that, should it malfunction in a hazardous manner, it shall switch off power to the electric motor without causing a hazardous situation and it requires user interaction to switch on again..		P
4.2.2	Controls and symbols	On, off	P
4.2.3	Batteries		P
	Battery terminals are short-circuited with the batteries in a fully charged condition. Motor terminals are short-circuited; all commands are in “ON” position, while the batteries are fully charged. The EPAC is operated with the electric motor or drive system blocked until the motor torque stops or the battery is fully discharged. The battery is charged for double the recommended charging period or for 24 h whichever is greater.	Charge 24h, The battery pass by EN 62133-2	P
4,2,4	Battery charger		P
	Chargers for EPAC are considered to be operated in a residential (household) environment.	Output:54.6V Passed by CE certificate	P
4.2.5	Electric cables and connections		P
	All connectors for cable and wire shall be selected to prevent corrosion of electrical contact conductance.		P
4.2.5.3	At an ambient room temperature (20 ± 5) °C, discharge the fully charged EPAC battery to the discharging limit specified by the EPAC or ESA manufacturer at the maximum current allowable by the system and record it. Measure the cable and plug temperatures and ensure, by examination, that there is no deterioration of the insulation on either assembly.		N/A
4.2.6	Wiring	No sharp edges on wire way. Cannot touch moving part	P
4.2.7	Power cables and conduits		P
4.2.8	External and internal electrical connections		P

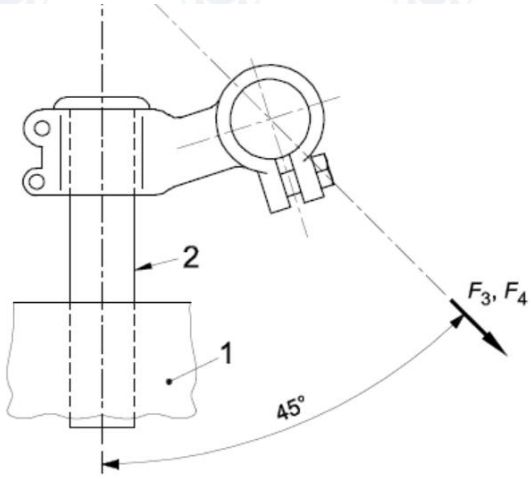
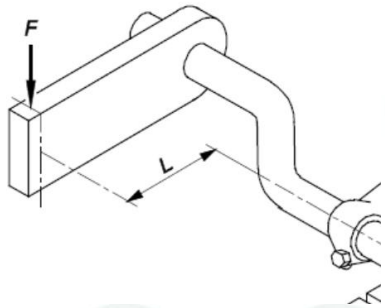
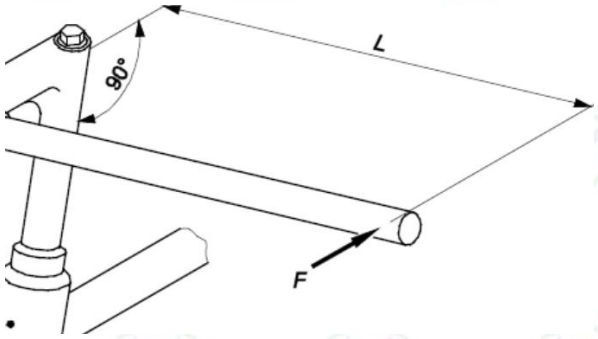
BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
4.2.9	Moisture resistance	>IPX4	P
4.2.10	Mechanical strength test	Impact test for battery	P
	Impact energy of 0.7J.	Three times, 0.7J, No damaged	P
	Detachable batteries are submitted to free fall on a rigid surface. 0.9m Three times	Drop test for battery Three times, 0.9m No damaged	P
4.2.11	Maximum speed for which the electric motor gives assistance	Max. 25km/h	P
4.2.12	Start-up assistance mode		P
	An EPAC can be equipped with a start-up assistance mode that operates up to a maximum speed of 6 km/h. This mode shall be activated by the voluntary and maintained action of the user either when riding without pedalling or when the user is pushing the cycle.		P
4.2.13	Power management		P
	Assistance shall be cut off when the cyclist stops pedalling forward and the cut-off distance shall not exceed 2 m		N/A
	All braking devices (e.g. levers, back pedal) are equipped with cut-off switches, the cut off distance shall not exceed 5 m		P
	The power output or assistance shall be progressively reduced and finally cut off		P
	The assistance shall be progressively and smoothly managed		P
	Two independent applying actions shall be required to start the electrical assistance mode		P
4.2.14	Maximum power measurement	Max.250W	P
4.2.15	Electro Magnetic Compatibility		P
4.2.15.1	Emission		P
4.2.15.2	Immunity		P
4.2.5.13	Battery charger		P
4.2.16	Failure mode		P

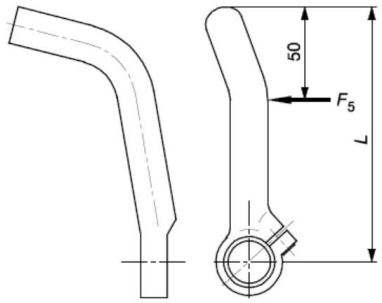
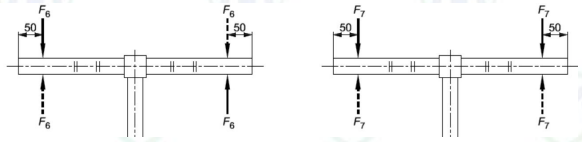
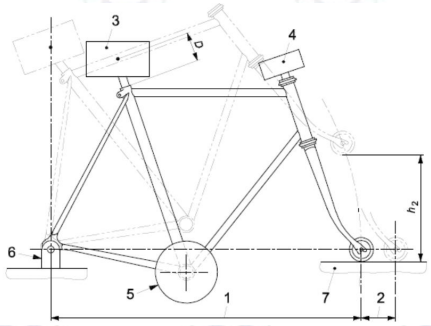
BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
	It shall be possible to ride the EPAC by pedalling even if the assistance failed.		P
4.2.17	Anti-tampering measure	Sealing	P
4.3	Mechanical requirements		P
4.3.1.5	Fatigue test	Not to exceed 10 Hz, 1000 test cycles	P
4.3.1.6	Fatigue test for composite components	2000 cycles	P
4.3.1.7	Plastic material test ambient temperature	2h, 23℃	P
4.3.1.8	Crack detection methods	BS EN ISO 3452-1 No crack	P
4.3.2	Sharp edges	No sharp edge	P
4.3.3	Security and strength of safety-related fasteners		P
4.3.3.1	Security of screws	Lock-washers, lock-nuts	P
4.3.3.2	Minimum failure torque		P
4.3.3.3	Folding bicycles mechanism	Folded no damage the cables, No touch the wheel and unintentionally loosen or unlock	P
4.3.4	Protrusions	the rider is protected	P
4.3.5	Brakes		P
4.3.5.1	Braking-systems		P
4.3.5.2.1	Brake-lever position		P
4.3.5.2.1.1	Brake-lever grip dimensions		P
	The dimension, d, measured between the outer surfaces of the brake-lever in the region intended for contact with the rider's fingers and the handlebar	>40mm	P
4.3.5.2.2.2	Test method for the brake-lever similar		P

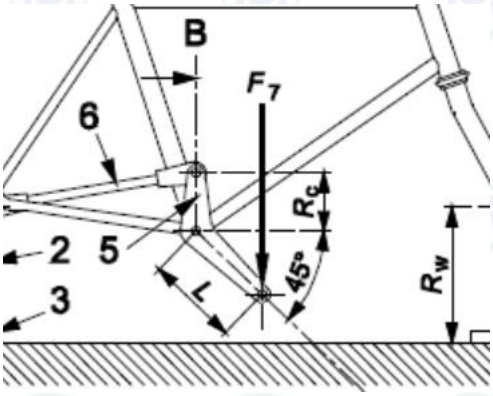
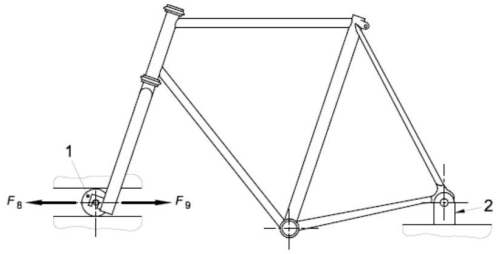
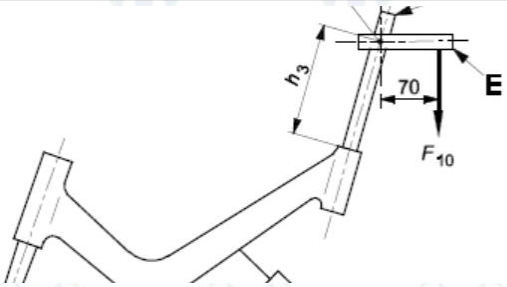
BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
			P
4.3.5.3	Attachment of brake assembly and cable requirements	<15N	P
4.3.5.4	Brake-levers – Position of applied force.	<10N	P
4.3.5.5	Brake-block and brake-pad assemblies – Safety test		P
4.3.5.5.1	The friction material shall be securely attached to the holder, backing-plate, or shoe and there shall be no failure of the braking system or any component thereof		P
4.3.5.6	Brake adjustment		P
	Each brake shall be equipped with an adjustment mechanism either manual or automatic.	Automatic	P
4.3.5.7	Hand-operated braking-system – Strength test	450N,10 cycle, No damage	P
			P
4.3.5.8	Back-pedal braking system – Strength test		P

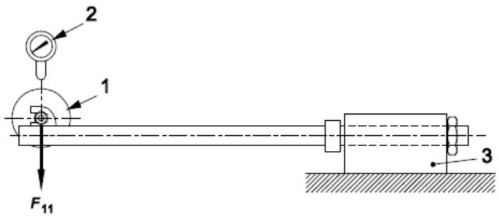
BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
		1500N, 1min, No damaged	P
4.3.5.9	Braking performance	brake-levers	P
	<table><tr><th>Condition</th><th>Brake in use</th><th>Minimum braking performance value, B_p</th></tr><tr><td rowspan="2">Dry</td><td>Front only</td><td>340</td></tr><tr><td>Rear only</td><td>220</td></tr><tr><td rowspan="2">Wet</td><td>Front only</td><td>220</td></tr><tr><td>Rear only</td><td>140</td></tr></table>	>400	P
4.3.5.10	Brakes – Heat-resistance test	190N V=12.5km/h >60%	P
4.3.5.11	Back-pedal brake linearity test		N/A
4.3.6	Steering		P
4.3.6.1	Handlebar – Dimensions	<100mm	P
4.3.6.2	Handlebar grips and plugs		P
4.3.6.2.1	The ends of the handlebar shall be fitted with handgrips or end plugs. When tested by the method described in 4.3.6.2.2 and 4.3.6.2.3, the handgrips or plugs shall withstand the specified removal forces.		P
4.3.6.2.2	in water at room temperature for one hour until the handlebar is at a temperature lower than −5 °C. 	70N, 1min No damaged	P
4.3.6.2.3	Hot water test method in hot water of +60 °C ± 2 °C for one hour.	100N 1min No damaged	P

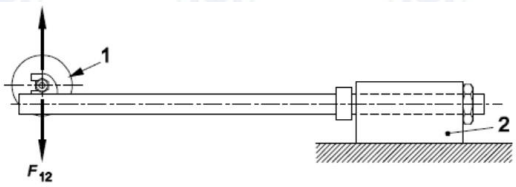
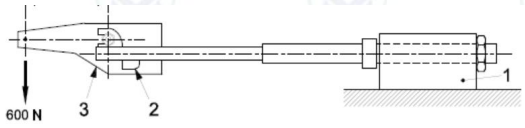
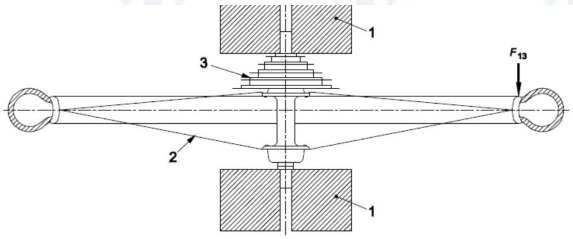
BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
4.3.6.3	Handlebar stem – Insertion-depth mark or positive stop		P
	a) it shall contain a permanent, transverse mark,		P
	b) it shall incorporates a permanent stop to prevent it from being drawn out of the fork steerer such as to leave the insertion less than the amount specified in a) above		P
4.3.6.4	Handlebar stem to fork steerer – Clamping requirements		P
	the handlebar stem is clamped	<5mm	P
4.3.6.5	Steering stability		P
4.3.6.6	Steering assembly – Static strength and safety tests		P
4.3.6.6.1	Handlebar and stem assembly – Lateral bending test		P
4.3.6.6.1.2	When tested by the method described in 4.3.6.6.1.3, there shall be no cracking or fracture of the handlebar, stem or clamp-bolt and the permanent deformation measured at the point of application of the test force shall not exceed 15 mm	800N 1min, No damaged <3mm	P
			P
4.3.6.6.2	Handlebar-stem – Forward bending test		P
	When tested by the method described in 4.3.6.6.2.3, there shall be no visible cracks or fractures and the permanent deformation measured at the point of application of the test force and in the direction of the test force shall not exceed 10 mm.	F3: 600N 1min, <2mm F4: 2600N, No cracks	P

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
			P
4.3.6.6.3	Handlebar to handlebar-stem – Torsional safety test	70Nm No movement	P
			P
4.3.6.6.4	Handlebar-stem to fork steerer – Torsional safety test	40Nm No move	P
			P
4.3.6.6.5	Bar-end to handlebar – Torsional safety test	300N 1min No move	P

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
			P
4.3.6.7	Handlebar and stem assembly – Fatigue test	F6: 220N F7: 280N	P
			P
4.3.7	Frames		P
4.3.7.2	Frame – Impact test	Drop height: 360mm A striker of mass 22,5 kg	P
4.3.7.3	Frame and front fork assembly – Impact test	1: 30kg 2: 10kg 3: 50kg Drop height: 300mm No damaged	P
			P
4.3.7.4	Frame – Fatigue test with pedalling forces	1000N 100000cycles No damaged	P

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
			P
4.3.7.5	Frame – Fatigue test with horizontal forces	F8: 600N F9: 600N 100000cycles No damaged	P
			P
4.3.7.6	Frame – Fatigue test with a vertical force	1100N 50000 cycles No damaged	P
			P
4.3.8	Front fork		P
4.3.8.2	Means of location of the axle and wheel retention		P
4.3.8.3.1	Tyre-clearance test	2800N 1min No damaged	P
	the tyre shall not contact the crown of the fork nor shall the components separate.		P
4.3.8.3.2	Tensile test	2300N, 1min No damaged	P

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
	there shall be no detachment or loosening of any parts of the assembly and the tubular, telescopic components of any fork-leg shall not separate under the test force.		P
4.3.8.4	Front fork – Static bending test	1500N to 100N No damaged	P
	there shall be no fractures or visible cracks in any part of the fork, and the permanent deformation, measured as the displacement of the axis of the wheel-axle or simulated axle in relation to the axis of the fork steerer, shall not exceed 10 mm.		P
			P
	Locate a deflection measuring device over the loading-attachment in order to measure deflection and permanent deformation of the fork perpendicular to the steerer axis and in the plane of the wheel.		P
4.3.8.5	Front fork – Rearward impact test	22.5kg 360mm 80Nm No damaged	P
4.3.8.5.1	Forks made entirely of metal		P
4.3.8.5.2	Forks which have composite parts		P
4.3.8.6	Front fork – Bending fatigue test plus rearward impact test	500N 100000 cycles No damaged	P
	there shall be no fractures in any part of the fork, and the permanent deformation, measured as the displacement of the axis of the wheel-axle or simulated axle in relation to the axis of the fork steerer, shall not exceed 45 mm. For composite forks, the running displacement (peak-to-peak value) at the points where the test forces are applied shall not increase by more than 20 % of the initial values		P

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
			P
4.3.8.7	Forks intended for use with hub- or disc-brakes		P
4.3.8.7.2	Static brake-torque test	1000N 1min, 100N No damaged	P
	Apply a rearward force of 1 000 N to the torque arm perpendicular to the fork steerer axis and in the plane of the wheel. Maintain this force for 1 min, then reduce the force to 100 N		P
	there shall be no fractures or visible cracks in any part of the fork.		P
4.3.8.7.4	Brake mount fatigue test	12000 cycles No damaged	P
			P
4.3.8.8	Tensile test for a non-welded fork	5000N 1min No damaged	P
	there shall be no detachment or loosening of any parts of the assembly.		P
4.3.9	Wheels and wheel/tyre assembly		P
4.3.9.1	Wheels/tyre assembly – Concentricity tolerance and lateral tolerance		P
4.3.9.2	Wheel/tyre assembly – Clearance	<6	P
4.3.9.3	Wheel/tyre assembly – Static strength test	250N 1min No damaged	P
			P

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
4.3.9.4	Wheels – Wheel retention	2300N, 1min No damaged	P
	there shall be no relative motion between the axle and the front fork/frame.		P
4.3.9.5	Wheels – Quick-release devices – Operating features		P
	Any quick-release device shall have the following operating features: a) it shall be adjustable to allow setting for tightness; b) its form and marking shall clearly indicate whether the device is in the open or locked position; c) if adjustable by a lever, the force required to close a properly set lever shall not exceed 200 N and, at this closing force there shall be no permanent deformation of the quick-release device; d) the releasing force of the clamping device when closed shall not be less than 50 N; e) if operated by a lever, the quick-release device shall withstand without fracture or permanent deformation a closing force of not less than 250 N applied with the adjustment set to prevent closure at this force; f) the wheel retention with the quick-release device in the clamped position shall be in accordance with 4.3.9.4.2, 4.3.9.4.3; g) the front wheel retention with the quick-release device in the open position shall be in accordance with 4.3.9.4.3. If applied to a lever, the forces specified in c), d), and e) shall be applied 5 mm from the tip end of the lever.		P
4.3.10	Rims, tyres and tubes		P
4.3.10.2	Tyre inflation pressure		P

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Clause	**Requirement**	**Remarks - Results**	**Verdict**
	The maximum inflation pressure recommended by the manufacturer shall be permanently marked on the side wall of the tyre so as to be readily visible when the latter is assembled on the wheel. If the rim manufacturer recommends a maximum tyre inflation pressure, it shall be clearly and permanently marked on the rim and also specified in the manufacturer's instructions. It is recommended that the minimum inflation pressure specified by the tyre manufacturer also be permanently marked on the side wall of the tyre.		P
4.3.10.3	Tyre and rim compatibility	<4mm	P
4.3.10.4	Rim-wear		P
	In the case where the rim forms part of a braking system and there is a danger of failure due to wear, the manufacturer shall make the rider aware of this danger by durable and legible marking on the rim, in an area not obscured by the tyre		P
4.3.10.5	Greenhouse effect test for composite wheels	80℃, 4h	P
	no failure of any of the components of the wheel;		P
	no tyre separation from the rim during the test;		P
	no increase in rim width greater than 5 % of the initial maximal width value		P
	compliance of lateral and concentricity tolerance		P
	compliance of tyre and rim compatibility		P
	compliance of static strength		P
4.3.11	Front mudguard		P
	If front mudguard is fitted, when tested by the method described in the two-stage tests in 4.3.11.2 (for mudguard with stays) or 4.3.11.3 (for mudguard without stays), the front mudguard shall not prevent rotation of the wheel or obstruct steering.		P
4.3.11.2	Front mudguard with stays test methods		P

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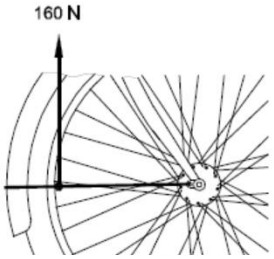
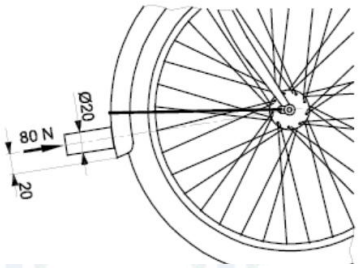
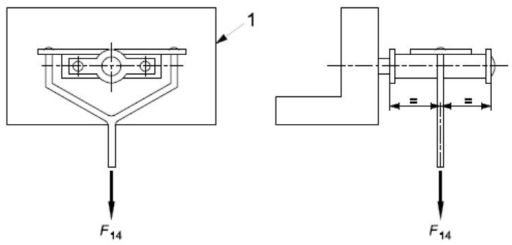
Clause	**Requirement**	**Remarks - Results**	**Verdict**
			P
4.3.11.3	Front mudguard without stays test methods		P
			P
4.3.12	Pedals and pedal/crank drive system		P
4.3.12.1	Pedal tread		P
	The tread surface of a pedal shall be secured against movement within the pedal assembly		P
4.3.12.1.2	Pedals intended to be used without toe-clips, or for optional use with toe-clips, shall have: a) tread surfaces on the top and bottom surfaces of the pedal; or b) a definite preferred position that automatically presents the tread surface to the rider's foot.		P
4.3.12.2	Pedal clearance		P
4.3.12.3	Pedal – Static strength test	1500N, 1min No damaged	P
			P
4.3.12.4	Pedal – Impact test	15kg, 400mm No damaged	P

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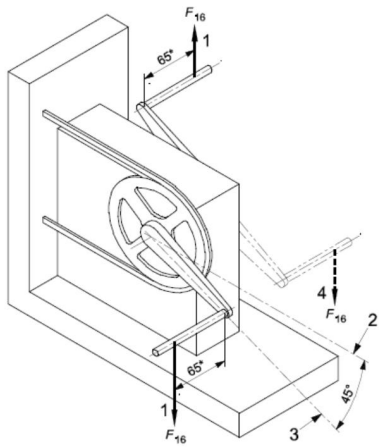
Clause	**Requirement**	**Remarks - Results**	**Verdict**
4.3.12.5	Pedal – Dynamic durability test	80kg, 100000 cycles 180° No damaged	P
4.3.12.6	Drive-system – Static strength test	1500N No damaged	P
4.3.12.7	Crank assembly – Fatigue test	1300N, 100000 cycles No damaged	P
			P
4.3.13	Drive-chain and drive belt		P
4.3.13.1	Drive-chain		P
	Where a chain-drive is used as a means of transmitting the motive force, the chain shall operate over the front and rear sprockets without binding. The chain shall conform to the tensile strength and push-out force requirements of ISO 9633.		P
4.3.13.2	Drive belt	4000N No damaged	P
4.3.14	Chain-wheel and belt-drive protective device	D_2>D1+10mm	P

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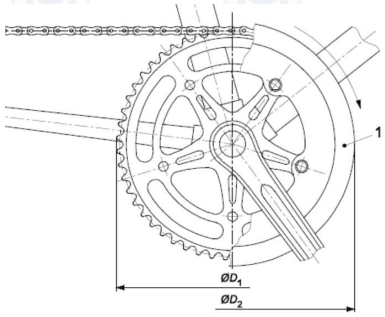
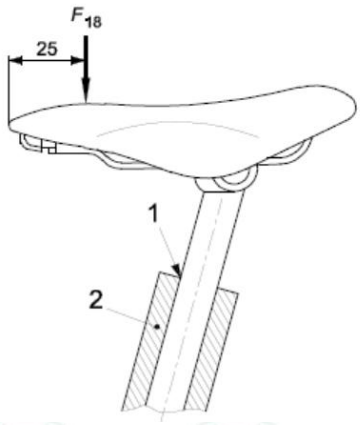
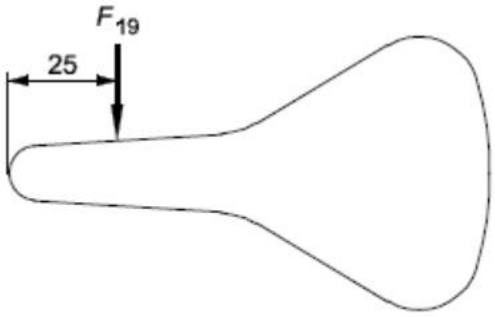
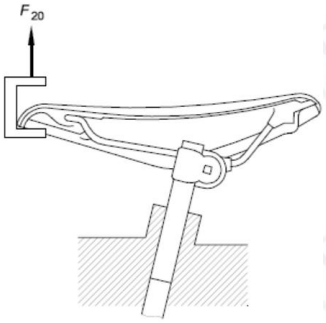
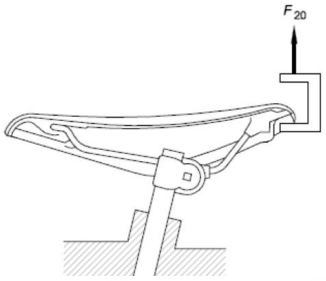
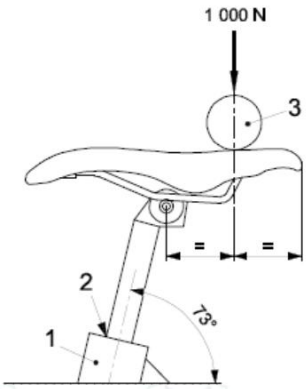
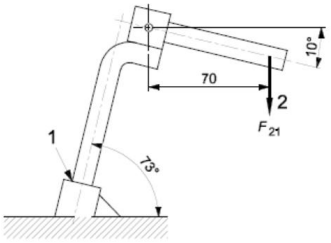
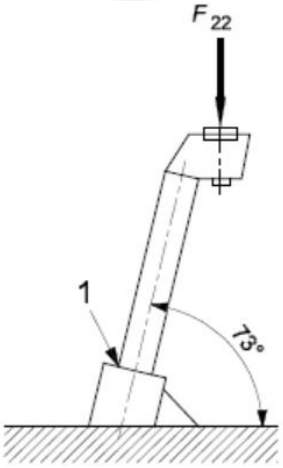
Clause	**Requirement**	**Remarks - Results**	**Verdict**
			P
4.3.14.3	Chain and drive belt protective device	>30mm	P
4.3.14.4	Combined front gear-change guide	>30mm	P
4.3.15	Saddles and seat-posts		P
	No part of the saddle, saddle supports, or accessories to the saddle shall be more than 125 mm above the top saddle surface at the point where the saddle surface is intersected by the seat-post axis.		P
4.3.15.2	Seat-post – Insertion-depth mark or positive stop		P
4.3.15.3	Saddle/seat-post – Safety test	F18: 650N 1min No damaged. F19: 250N 1min No damaged	P
			--

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
			--
4.3.15.4	Saddle – Static strength test	F20: 400N 1min No damaged	P
			--
			P
4.3.15.5	Saddle and seat-post clamp – Fatigue test	1000N 200000 cycles No damaged	P
			--

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
4.3.15.6	Seat-post – Fatigue test	1000N, 100000 Cycles No damaged	P
			--
		F22: 2000N 1min No damaged	N/A
4.3.16	Spoke protector		P
	EPAC bicycles with multiple free-wheel/cassette sprockets shall be fitted with a spoke-protector guard to prevent the chain interfering with or stopping rotation of the wheel through improper adjustment or damage.		P
4.3.17	Luggage carriers		N/A
4.3.18	Road-test of a fully-assembled EPAC		N/A
4.3.19	Lighting systems and reflectors		P
4.3.19.2	Wiring harness		P
	When a wiring harness is fitted, it shall be positioned to avoid any damage by contact with moving parts or sharp edges. All connections shall withstand a tensile force in any direction of 10 N.		P
4.3.19.3	Lighting systems		P

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
	The lighting system consists of a front and a rear light. These devices shall comply with the provisions in force in the country in which the product is marketed. If there are no forced provisions of these devices, the lighting system shall comply with the requirements of ISO 6742-1.		P
4.3.19.4	Reflectors		P
4.3.19.4.2	Rear reflectors		P
4.3.19.4.3	Side reflectors		N/A
4.3.19.4.4	Front reflectors		N/A
4.3.19.4.5	Pedal reflectors		N/A
4.3.20	Warning device		P
	Where a bell or other suitable device is fitted, it shall comply with the provisions in force in the country in which the product is marketed.		P
4.3.21	Thermal hazards		N/A
	A warning shall be placed on the surface if the temperature of the hot accessible surface could be above 60 ℃		N/A
4.3.22	Performance levels (PLrs) for control system of EPACs		N/A
4.4	List of significant hazards		P

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
	The following significant hazards have been considered in this standard: NOTE 1 The risk analysis was focused on EPAC as bicycles for city and trekking, including folding bicycles. Mountain bike and racing bike were not considered. a) Mechanical hazards: high deceleration, high acceleration, Protrusion, instability; kinetic energy; rotating elements and moving elements, rough, slippery surface, sharp edges; b) Electrical hazards: electromagnetic phenomena; electrostatic phenomena; overload; short-circuit; thermal radiation; NOTE 2 The strength of the battery holder combination should the EPAC fall to the side will be considered at the next revision. c) Thermal hazards: explosion; flame; radiation from heat sources; d) Ergonomic hazards: effort; lighting; posture; e) Hazards associated with the environment in which the machine is used: water (rain and projection); f) Combination of hazards: braking under wet and dry condition, handgrips, motor management system, engine power management, installed braking power.		P
5	Marking, labelling		P
	— contact and address of the manufacturer or authorized representative; — EPAC according to BS EN 15194; — appropriate marking required by legislation (CE); — year of construction, that is the year in which the manufacturing was completed (it is not possible to use a code); — cut off speed XX km/h; — maximum continuous rated power XX kW; — maximum permissible total weight (e.g. marked near the seat post or handlebar); — designation of series or type; — individual serial number if any; — mass if EPAC mass is more than 25 kg — mass of the EPAC in the most usual configuration.		P

BS EN 15194:2017+A1:2023			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
	a) visibly and permanently marked with a successive frame number at a readily visible location such as near the pedal-crank, the seat-post, or the handlebar; b) visibly and durably marked, with the name of the manufacturer of complete EPAC or the manufacturer's representative and the number of this document, i.e. BS EN 15194.; the method of testing for durability is specified in 5.2		P
	e) front fork; f) handlebar and handlebar-stem; g) seat-post; h) brake-levers, brake blocks and/or brake-block holders; i) outer brake-cable casing; j) hydraulic-brake tubing; k) disc-brake callipers, brake-discs, and brake pads; l) chain; m) pedals and cranks; n) bottom-bracket spindle; o) wheel-rims.		P
5.2	Durability test	Water 15s Petroleum spirit 15s	P
6	Instruction for use		P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
1	Scope	Industrial machine	P
2	Normative references	Considered	P
3	Definitions	Considered	P
4	General requirements	Considered	P
4.1	General considerations (EN 1050; hazards, safeguarding (EN 292-2 cl. 4), inquiry form etc.)	Covered by Machinery Directive.	P
4.2	Selection of equipment	See below	P
4.2.1	General (compliance with EN or IEC standards)	Evidence for compliance with the relevant European regulations is given by licenses or Declarations of Conformity.	P
4.2.2	Electrical equipment in compliance with the EN 60439 series	Not applicable	N/A
4.3	Electrical supply (+/-10%, +/-1Hz, harmonics, unbalance, impulses, interruption, dips etc.)	Information regarding electric supply tolerances is in user manual. (240V±10%, 50/60±1%Hz)	P
4.4	Physical environment and operating conditions	See below	P
4.4.1	General (see annex B)	See below	P
4.4.2	Electromagnetic Compatibility (see EMC directive)	Considered.	P
4.4.3	Ambient Air Temperature (5-40°C) (see annex B)	5-40°C as stated in user manual.	P
4.4.4	Humidity (30-95%)	30-95%, as stated in user manual.	P
4.4.5	Altitude (1000m)	Max. 1000m, as stated in user manual.	P
4.4.6	Contaminants (see 11.3 and annex B for details)	The electric equipment is installed in proper cabinets and boxes. See 12.3 Suitable for use.	P
4.4.7	Ionizing and non-ionizing Radiation (see annex B)	Not intended to be exposed to radiation	N/A
4.4.8	Vibration, Shock and Bump (see annex B)	Not required.	N/A
4.5	Transportation and storage (-25-55°C/70°C)	-25 to +55°C for transportation and storage, as stated in user manual.	P
4.6	Provision for handling (see 13.4.6)	Information provided in user manual.	P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
4.7	Installation (EN's for ergonomic design)	Information provided in user manual.	P
5	Incoming Supply Conductor Terminations and Devices for Disconnecting and Switching off	See below	P
5.1	Incoming supply conductor terminations (EN 60445, 5.2, 5.3.1 and 5.3.2d)	Single power supply; Incoming terminals provided and marked as L, N	P
5.2	Terminal for connection to the external protective earthing system (table 1, 8.2.2 and EN 60445)		N/A
5.3	Supply disconnecting (isolating) device	See below	P
5.3.1	General (for each supply)	Single power supply	P
5.3.2	Type - switch-disconnector (EN 60947-3 AC- 23B or DC-23B) - disconnector with auxiliary contact (EN 60947-3) - circuit-breaker (EN 60947-2) - plug/socket combination (16A/3kW) - plug and socket-outlet (IP2X/XXB, see 3.39 and 14.4.5)	Switch-disconnector (EN 60947-3) provided N/A N/A N/A N/A	P
5.3.3	Requirements (IEC 60417-5007, IEC 60417-5008, red handle for E-stop, padlock, stalled motor, etc.)	Disconnector fulfills the requirements.	P
5.3.4	Operating handle (0.6-1.7/1.9m)	The handle of main disconnector is located at a height of 0.6~1.8m above the servicing level.	P
5.3.5	Excepted circuits (lighting, undervoltage, UPS, etc.)	No such circuit.	N/A
5.4	Devices for switching off for prevention of unexpected start-up (disconnect of 5.3.2, 3.17 and 5.6)	The main disconnector can be locked in the OFF position, which can fulfill the requirement of the clause.	P
5.5	Devices for disconnecting electrical equipment (see 5.3, 5.3.2 and 5.6)	The main disconnector can be locked in the OFF position, which can fulfill the requirement of the clause.	P
5.6	Protection against unauthorized, inadvertent and/or mistaken	The main disconnector can be locked in the OFF position, which can fulfill the	P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
	connection (see 5.4, 5.5 and 5.3.2 d)	requirement of the clause.	
6	Protection against electric Shock	See below	P
6.1	General	See below	P
6.2	Protection against direct contact	See below	P
6.2.1	General (see 6.2, IEC 60364-4 and EN 60529 IP4X/XXB)	See below	P
6.2.2	Protection by enclosures (general > IP4X; a) opened by tool and without disconnect > IP2X inside; b) disconnect with interlock > IP2X inside; c) without tool and without disconnect > IP2X and interlock for barrier)	- Live parts inside the electrical cabinet are provided protection against direct contact: IP2X - All openings (cable or wiring go through) are protected by cable glands or ducts properly. - top surface of cabinet> IP4X	P
6.2.3	Protection by insulation of live parts (completely covered)	All of the electrical components with high voltage are inside the enclosure. Live parts are insulated.	P
6.2.4	Protection against residual voltage (60V/5sec or 60μC/1sec or IP2X)	Warnings of the electrical shock are attached on the enclosure of invertors.	P
6.2.5	Protection by barriers (see 412.2 of IEC 60364-4-41)	Not used.	N/A
6.2.6	Protection by placing out of reach or protection by obstacles (see 412.4 and 412.3 of IEC 60364-4-41)	Not used.	N/A
6.3	Protection against indirect contact	See below	P
6.3.1	General (see 3.27, 6.3.2 to 6.3.3)	See below	P
6.3.2	Prevention of the occurrence of a touch voltage	See below	P
6.3.2.1	General	See below	P
6.3.2.2	Protection by use of class II equipment or by equivalent insulation	class II construction is used for accessible cable.	P
6.3.2.3	Protection by electrical separation	No used.	N/A
6.3.3	Protection by automatic disconnection of supply	The conductive parts connecting to the PE system and the over-current	P

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Clause	**Requirement**	**Remarks - Results**	**Verdict**
		protection devices (approved fuse) provided.	
6.4	Protection by the use of PELV	See below	P
6.4.1	General requirements (25/60V and 6/15 etc.)	54.6V DC	P
6.4.2	Sources for PELV	Switching power supply.	P
7	Protection of Equipment	See below	P
7.1	General	See below	P
7.2	Overcurrent protection	See below	P
7.2.1	General	Circuit breaker and fuse are used as overcurrent protection devices.	P
7.2.2	Supply conductor (data for installation protection device)	Relevant information provided in the circuit diagram.	P
7.2.3	Power circuits (7.2.10, neutral conductor, etc.)	1. Information of wire sizes and over current protection rating in circuit diagram are checked. 2. Overcurrent protective devices are applied to each live conductor. 3. Wire sizes are in compliance with tables 5,6	P
7.2.4	Control circuits (connection to safety ground)	Control circuits are fed by switching power supply and transformer; Control circuits are connected to the protective bonding circuit. Circuit breakers are used for overcurrent protection of AC control circuit.	P
7.2.5	Socket outlets and their associated conductors (for each socket outlet)	Overcurrent protection provided.	P
7.2.6	Lighting circuits (unearthed conductor)	Checked and ok.	P
7.2.7	Transformers (see 7.2.10)		P
7.2.8	Location of overcurrent protective devices (conductor, reduction for less 3m and own duct)	Over-current protection devices are provided at the points where the conductors to be protected are connected to its supply.	P
7.2.9	Overcurrent protective devices (must readily available in country of use)	Considered	P
7.2.10	Rating and setting of overcurrent protective devices	The rating and setting of the overcurrent protective devices are checked and ok.	P

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Clause	**Requirement**	**Remarks - Results**	**Verdict**
	(as low as possible)		
7.3	Protection of motors against overheating	See below	P
7.3.1	General (more than 0.5kW, restart not possible)		P
7.3.2	Overload protection	Thermorelay used.	P
7.3.3	Over-temperature protection (IEC 60034-11)	Thermorelay used.	P
7.3.4	Current limiting protection	Thermorelay used.	P
7.4	Abnormal temperature protection (heater protection)	Temperature sensor and overcurrent protection used.	P
7.5	Protection against supply interruption or voltage reduction and subsequent restoration (undervoltage device, restart not possible)	Considered.	P
7.6	Motor overspeed protection (see 9.3.2)	Not safety relevant.	N/A
7.7	Earth fault/residual current protection (see 6.3)	No such protection used.	N/A
7.8	Phase sequence protection	Not safety relevant.	N/A
7.9	Protection against overvoltage due to lightning and to switching surge	No such device is used on the machine.	N/A
8	Equipotential Bonding	See below	P
8.1	General	See below	P
8.2	Protective conductors		N/A
8.2.1	General (Figure 2, all stress, etc.)		N/A
8.2.2	Protective conductors (13.2.2, size in accordance with Table 1)		N/A
8.2.3	Continuity of the protective bonding circuit (Doors, hinges etc. need conductor, except for PELV etc.)		N/A
8.2.4	Exclusion of switching devices from the protective bonding circuit	No switching devices are used in PE circuit.	N/A

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
8.2.5	Parts that need not be connected to the protective bonding circuit (insulation failure unlikely, 50x50mm^2)		N/A
8.2.6	Protective conductor connecting points (IEC 60417- 5019 or green-and-yellow, PE only for supply terminal)		N/A
8.2.7	Mobile machines		N/A
8.2.8	Additional protective bonding requirements for electrical equipment having earth leakage current higher than 10mA a.c. or d.c.		N/A
8.3	Functional bonding (insulation failure and EMI, see 4.4.2 and 9.4.3.1)		N/A
8.4	Measures to limit the effects of high leakage current	See 8.2.8.	N/A
9	Control Circuits and Control Functions	See below.	P
9.1	Control circuits	See below	P
9.1.1	Control circuit supply (Transformer, except for less than two controls etc.)	Evidence about compliance with applicable regulations are provided; Transformer used.	P
9.1.2	Control circuit voltages (< = 277V	54.6V DC	P
9.1.3	Protection (7.2.4 and 7.2.10)	Protected by fuse according to 7.2.4,7.2.10	P
9.2	Control functions	See below	P
9.2.1	Start functions (9.2.5.2)	Start by energizing the corresponding circuit.	P
9.2.2	Stop functions (category 0, 1, and 2 etc.)	Stop function of category 0 used.	P
9.2.3	Operating modes (separate action for mode selector functions etc.)	Switch provided for mode selection with same safety level.	N/A
9.2.4	Suspension of safeguards (hold-to-run, speed limiting, range of motion)	Not applicable	N/A

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Clause	**Requirement**	**Remarks - Results**	**Verdict**
9.2.5	Operation	See below	P
9.2.5.1	General (interlock see 9.3)	Safety protection provided.	P
9.2.5.2	Start (safeguard in place, interlocks with sequential starting ...)	The start can be operated only when all safeguards are in places and functional.	P
9.2.5.3	Stop (category depends on risk assessment based on EN 1050 ...)	See 9.2.2.	P
9.2.5.4	Emergency operations (emergency stop, emergency switching off)	See below	P
9.2.5.4.1	General	See below	P
9.2.5.4.2	Emergency stop (see ISO 13850, category 0/1 stop, see 9.2.5.3, 9.2.2)	E-stop is correctly placed in the workstation and Category 0 provided.	P
9.2.5.4.3	Emergency switching off (see IEC 60364-4-53, 536.4)	No emergency switching off is provided.	N/A
9.2.5.5	Monitoring of command actions (for hazardous movement)	From working position, the operator can monitor the command actions.	P
9.2.6	Other control functions	See below	P
9.2.6.1	Hold-to-run controls (continuous actuation)		P
9.2.6.2	Two-hand control (type I, II, and III...)	No two-hand control is used.	N/A
9.2.6.3	Enabling device (see also 10.9)	No enabling devices provided.	N/A
9.2.6.4	Combined start and stop controls (for secondary function only)	No such control device	N/A
9.2.7	Cableless control	No cableless control used.	N/A
9.2.7.1	General	Not applicable	N/A
9.2.7.2	Control limitation	Not applicable	N/A
9.2.7.3	Stop (see annex B)	Not applicable	N/A
9.2.7.4	Use of more than one operator control station	Not applicable	N/A
9.2.7.5	Battery-powered operator control stations	Not applicable	N/A
9.3	Protective interlocks	See below.	P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
9.3.1	Reclosing or resetting of interlocked safeguards (no automatic start...)	Compliant	P
9.3.2	Exceeding operating limits	Compliant	P
9.3.3	Operation of auxiliary functions (Sensors...)	Checked by control system .	P
9.3.4	Interlocks between different operations and for contrary motions (interlock against contrary motion)	Appropriate interlock has been provided for related parts.	P
9.3.5	Reverse current braking (time function is not possible...)	Not applicable	N/A
9.4	Control functions in case of failure	See below	P
9.4.1	General requirements (protective device, proven techniques, redundancy, functional tests...)	Measures to reduce those risks include but are not limit to : -use of proven circuit techniques and components	P
9.4.2	Measures to minimize risk in the event of failure	See below	P
9.4.2.1	Use of proven circuit techniques and components (one terminal, de-energizing for stop, positive open operation, design...)	Compliant	P
9.4.2.2	Provisions of partial or complete redundancy (on-line, off-line...)	Compliant	P
9.4.2.3	Provision of diversity (combination of open and closed contacts, different components, electrical and non-electrical systems...)	Compliant	P
9.4.2.4	Provision for functional tests (automatic or manually (17.2 and 18.6)...)	Functional tests were carried out during inspection.	P
9.4.3	Protection against maloperation due to earth faults, voltage interruptions and loss of circuit continuity	See below.	P
9.4.3.1	Earth faults (method a, b, c)	Control circuit is protected according to method a.1).	P
9.4.3.2	Voltage interruptions (7.5...)	See clause 7.5.	N/A
9.4.3.3	Loss of circuit continuity	No sliding contacts are used for safety function circuit.	N/A

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
10	Operator Interface and Machine mounted Control Devices	See below	P
10.1	General	See below	P
10.1.1	General device requirements (IEC 61310 and IEC 60447)	Meaning of the switches is marked, 'I' and 'O' are also marked near the switches.	P
10.1.2	Location and mounting (>= 0.6m...)	0.6 - 1.8m	P
10.1.3	Protection (IPXXD, EN 60529...)	At least IP42, sealing provided for control panel.	P
10.1.4	Position sensors (no damage...)	None.	N/A
10.1.5	Portable and pendant control stations	None.	N/A
10.2	Push-buttons	See below.	P
10.2.1	Colors (table 2, red and yellow!...)	Run - green Stop – red	P
10.2.2	Markings (IEC 60417, EN 50099...)	Meaning of the switches is marked	P
10.3	Indicator lights and displays	See below.	P
10.3.1	Modes of use (Red, yellow, green...)	Complied.	P
10.3.2	Colors (EN 50099...)	Complied.	P
10.3.3	Flashing lights and displays (Immediate action...)	Red for emergency conditions.	P
10.4	Illuminated push-buttons (table 2 and 4...)	None.	N/A
10.5	Rotary control devices (Rotation...)	Emergency stop switch and switches are mounted in such way as to prevent rotation of the stationary member.	P
10.6	Start devices (Inadvertent operation...)	Inadvertent operation is not expected due to its construction.	P
10.7	Emergency stop devices	See below	P
10.7.1	Location of emergency stop devices (see 9.2.7.3)	One emergency stop device is provided in the working position.	P
10.7.2	Types of emergency stop device (push-button, pull-cord, and pedal-operated)	Push-button type emergency stop device are used, self-latching type and positive opening operation used.	P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
10.7.3	Color of actuators (red and yellow)	Red actuators and yellow back ground.	P
10.7.4	Local operation of the supply disconnecting device to effect emergency stop (disconnecting device based on 5.3.2 a), b) or c); color see 10.7.3)	No such function.	N/A
10.8	Emergency switching off devices	Not applicable	N/A
10.8.1	Location of emergency switching off devices	Not applicable	N/A
10.8.2	Types of emergency switching off device (push-button operated, pull-cord operated, see EN 60947-5-1)	Not applicable	N/A
10.8.3	Color of actuators (Red and Yellow background)	Not applicable	N/A
10.8.4	Local operation of the supply disconnecting device to effect emergency switching off (see 10.8.3)	Not applicable	N/A
10.9	Enabling control device (position 1/2/3)	Not applicable	N/A
11	Controlgear: location, mounting and enclosures	See below	P
11.1	General requirements	See below	P
11.2	Location and mounting	See below	P
11.2.1	Accessibility and maintenance (0.4-2.0m, see 13.4.5)	Terminals are above 0.2m from the servicing level. All of controlgears are about 0.4m from the servicing level. No devices mounted on door.	P
11.2.2	Physical separation or grouping (power circuits, associated control circuits, other)	Controls in power circuit and control circuit, terminals are arranged in groups separately.	P
11.2.3	Heating effects (limits...)	Sufficient space inside the electric cabinet.	P
11.3	Degrees of protection (at least IP22 for enclosures of controlgear, see EN 60529...)	The enclosure of the control device is at least IP42	P
11.4	Enclosures, doors and openings (doors <= 0.9m, no openings between liquids and electrical devices, fasteners of captive type...)	The screws are standard size; The width of the door is less than 0.9m; Opening angle: > 95° Enclosure material is steel and the	P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
		gasket material are used.	
11.5	Access to controlgear (see 481.2.4 of IEC 60364-4-81, 0.7m x 2.0m...)	No gangway	N/A
12	Conductors and Cables	See below	P
12.1	General requirements (EN 60439-1...)	See below	P
12.2	Conductors (table 5)	Cross section of wiring at least 0.5 mm^2 Copper conductors meet the requirement of table 5, 6.	P
12.3	Insulation (PVC, 2000V test voltage, 500V for PELV, see IEC 60364-4-41, class III equipment...)	PVC insulated copper conductors are used. Insulation test conducted: 2000V, 5min;	P
12.4	Current-carrying capacity in normal service (table 5, table 6, and D2...)	The conductor sizes are checked according to Table 6.	P
12.5	Conductor and cable voltage drop (<= 5%...)	Voltage drop is less than 5%.	P
12.6	Flexible cables	See below	P
12.6.1	General (table D.4...)	Class 5 conductors are inside the flexible cables.	P
12.6.2	Mechanical rating (15 N/mm^2...)	The cables are properly fixed and protected.	P
12.6.3	Flexible cables (table 7, see clause 44 of IEC 60621-3)	No cables wound on drums.	N/A
12.7	Conductor wires, conductor bars and slip-ring assemblies	No collector wires, collector bars or slip-ring assemblies used.	N/A
12.7.1	Protection against direct contact (see 412.2.2 of IEC 60364-4-41)	Not used.	N/A
12.7.2	Protective conductor circuit	Not used.	N/A
12.7.3	Protective conductor current collectors	Not used.	N/A
12.7.4	Removable current collectors with a disconnector function (see 8.2.4)	Not used.	N/A

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
12.7.5	Clearances in air	Not used.	N/A
12.7.6	Creepage distances	Not used.	N/A
12.7.7	Conductor system sectioning	Not used.	N/A
12.7.8	Construction and installation of collector wire , collector bar systems and slip-ring assemblies	Not used.	N/A
13	Wiring Practices	See below	P
13.1	Connections and routing	See below	P
13.1.1	General requirements (loosening, one terminal, correspond with schematics, no solder, EN 60947-7-1, no cross overs...)	The connections are protected against loosening. One PE conductor is connected to one terminal. No solder connections. All terminals and conductors are marked according to 13.2.1.	P
13.1.2	Conductor and cable runs (from terminal to terminal, no strain to termination, ...)	Direct run of wiring from terminal to terminal, no cross over, no extended strain and no splices or joints.	P
13.1.3	Conductors of different circuits (insulation for highest voltage, separation of live conductors before disconnect or marked with different color...)	All conductors are insulated for the highest voltage.	P
13.1.4	Connection between pick-up converter of an inductive power supply system (as short as possible…)	Not applicable.	N/A
13.2	Identification of conductors	See below	P
13.2.1	General requirements	Color and Alphanumeric, or color and number identification used.	P
13.2.2	Identification of the protective conductor (60417-IEC-5019 symbol or green-and-yellow...)	Earth conductor marking is found; The GREEN-AND-YELLOW conductor is used only for protective conductor; 60417-IEC-5019 symbols used except terminal for main earthing conductor.	P
13.2.3	Identification of the neutral conductor (Light blue (3.2.2 of IEC 60446)...)	No neutral conductor used	N/A
13.2.4	Identification of other conductors (black > power, red > control, orange > interlock...)	In compliance with color code	P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
13.3	Wiring inside enclosures (IEC 60332, 11.2.1, 8.2.3...)	Easy maintenance.	P
13.4	Wiring outside enclosures	See below	P
13.4.1	General requirements (individual glands, bushings, ...)		P
13.4.2	External ducts (13.5, ...)	Flexible conduit is used.	P
13.4.3	Connection to moving elements of the machine (12.2, 12.6, flexible conduit, 25mm, no metallic conduits, ...)	None.	N/A
13.4.4	Interconnection of devices on the machine (no in series connection of devices...)	Through terminals.	P
13.4.5	Plug/socket combinations (safety ground first, > 16A must be locked, identification, see 6.2.4 and IEC 60309-1...)	None.	N/A
13.4.6	Dismantling for shipment (protected, ...)	None.	N/A
13.4.7	Additional conductors (spare conductors)	Not applicable	N/A
13.5	Ducts, connection boxes and other boxes	See below	P
13.5.1	General requirements (No edges, separation from liquids...)	Fulfilled.	P
13.5.2	Percentage fill of duct	Considered.	P
13.5.3	Rigid metal conduit and fittings (Corrosion...)	Not used.	N/A
13.5.4	Flexible metal conduit and fittings	Not used.	N/A
13.5.5	Flexible non-metallic conduit and fittings	Considered	P
13.5.6	Cable trunking systems	Not used.	N/A
13.5.7	Machine compartments and cable trunking systems	Considered	P
13.5.8	Connection boxes and other boxes (see 11.3)	Considered.	P
13.5.9	Motor connection boxes	No other components inside.	P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
14	Electric Motors and associated Equipment	See below	P
14.1	General requirements (EN 60034-1, 7.3, 7.6, 7.2, 5.3, 5.4, 5.5, 7.5, 7.6, 9.4, 11...)	Complied with EN 60034-1.	P
14.2	Motor enclosure (EN 60034-5, IP23...)	Complied with EN 60034-5.	P
14.3	Motor dimensions (IEC 60072-1, IEC 60072-2...)	Not safety related.	N/A
14.4	Motor mounting and compartments (EN 60034-1, guarding...)	Adequately protected and easily accessed.	P
14.5	Criteria for motor selection (EN 60034-1, IEC 60146, ...)	Suitable for operation	P
14.6	Protective devices for mechanical brakes	Not applicable	N/A
15	Accessories and Lighting	See below	N/A
15.1	Accessories (socket-outlets based on EN 60309-1, see 6.4, 7.2, 7.3, 5.3.5...)	No such kinds of socket-outlets are used.	N/A
15.2	Local lighting of the machine and equipment	No local lighting used. Ambient lighting sufficient for operation.	N/A
15.2.1	General (see 8.2.2, 4.4.2...)	Not used.	N/A
15.2.2	Supply (<= 50V, 250V, one source like transformer, separate overcurrent protection, factory lighting, 7.2.6...)	Not used.	N/A
15.2.3	Protection (7.2.6...)	Not used.	N/A
15.2.4	Fittings (lampholders based on IEC, ...)	Not used.	N/A
16	Marking, warning signs and reference designations	See below	P
16.1	General	See below	P
16.2	Warning signs (IEC 60417-5036, no disconnect, ...)	Flash Warning label is marked.	P
16.3	Functional identification (IEC 60417, ISO 7000...)	Appropriate identifications provided.	P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
16.4	Marking of equipment (name, mark, ratings, IEC 62023...)	Required information provided in the nameplate.	P
16.5	Reference designation	Suitable designation provided.	P
17	Technical Documentation	See below	P
17.1	General (see annex B)	The information provided is considered adequate and in English	P
17.2	Information to be provided (description, supply requirements, environment, block diagram, schematics, sequence of operation, inspection, functional tests, maintenance, part lists...)	The documentation provided is considered complete, see also below	P
17.3	Requirements applicable to all documentation (IEC 61082, IEC 61346 IEC 62079, IEC 62027, cross-reference, ...)	Relevant information provided in the user manual.	P
17.4	Installation documents (supplies, drawing, location, Annex B, interconnection drawing...)	Sufficient information is given in the user manual.	P
17.5	Overview diagrams and function diagrams (IEC 61082series ...)	Not required	N/A
17.6	Circuit diagram (IEC 60617, cross-reference...)	Circuit diagram provided in the user manual.	P
17.7	Operating manual (see also product specific standard, 1.7.4 in Annex I of Machinery Directive...)	Checked by inspection.	P
17.8	Maintenance manual	Checked by inspection.	P
17.9	Parts list	Parts list of electric components are provided	P
18	Verification	See below	P
18.1	General	See below	P
18.2	Verification of conditions for protection by automatic disconnection of supply	See below	P

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**
18.2.1	General	TN system	P
18.2.2	Test methods in TN-systems	Test 1 performed, measured voltage drop between the PE terminal and test point is Max:0.02V Test 2 shall be verified under final installation.	P
18.2.3	Application of the test methods for TN-systems	See 18.2.2	P
18.3	Insulation resistance tests (500Vdc, > 1 MΩ...)	Resistance is more than 50M	P
18.4	Voltage tests (1000Vac, 1 sec, 500VA...)	No breakdowns were recorded	P
18.5	Protection against residual voltages (6.2.4...)	Not applicable.	N/A
18.6	Functional tests (all safety related functions and components...)	Tested and OK.	P
18.7	Retesting (after modifications...)	Not applicable.	N/A
Annex B	Inquiry Form (Annex B of BS EN 60204-1) (for information between supplier and user only) – Name of manufacturer: – Name of end user, if applicable: – Order number, if applicable: – Type/Model of machine: – Serial number:	Not applicable	N/A

BS EN 60204-1:2018			
Clause	**Requirement**	**Remarks - Results**	**Verdict**

1. Continuity of the protective bonding circuit

Test Points	Test Result(mΩ)	Test Current(A)	Voltage Drop(V)
Motor	--	--	--
Shell	--	--	--

2. Insulation Resistance

Test Points	Test Result(MΩ)
Motor	733
Shell	805

3. Withstanding Voltage

Test Points	Breakdown
L, N - Enclosure	No

BS EN ISO 12100

I. Introduction.

In general this risk assessment report for the MCA Unit Loader, model ASS'Y-2020-WD and its variants made by Beijing Sunshine Technology Co., Ltd. was carried out in accordance with the requirements of Machinery Directive and the standards of BS EN ISO 12100-2010.

After the first assessment, some measures to eliminate the risks are given for the modification of machine or of relative documents with taking into account the explicit C-type EN standard or related B-type standard. While taking appropriate provisions for the existing risks, the procedures and principles to eliminate the risk according to the most general B-type standard for any kind of machine, BS EN ISO 12100-2010, are followed, i.e.:

- First step: consider the possibility of eliminating risk at design stage.
- Second step: if impossible, protect the dangerous zone with appropriate design of safety guard or safety device.
- Third step: If above impossible, give warning signs to draw attention of operators bout the residual risks.

In addition, some check list drawn from the explicit C-type EN standards, which are found suitable for or near the characteristic of this machine, are used to help developing the provisions for the elimination of the risks. Finally the risk assessment was carried out again to ensure this machine and its relative documents are totally compliance with the Machinery Directive.

BS EN ISO 12100

Ⅱ. Risk assessment Methodology

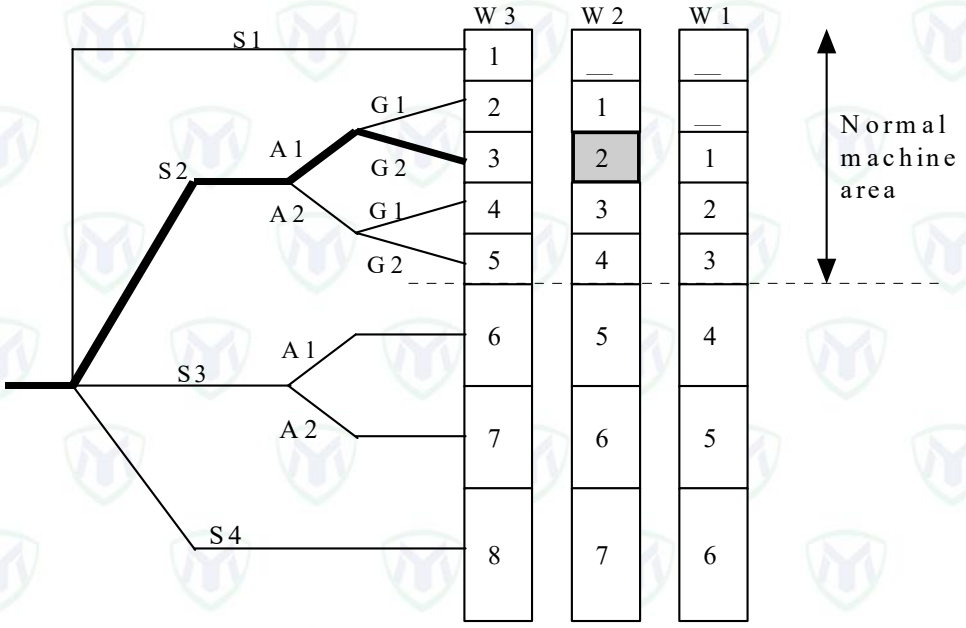
This risk assessment report is based on the methods mentioned in the BS EN ISO 14121 and DINV 19250 standards, and the 4 factors S-A-G-W have been used for evaluating the level of risks.

S: Severity of possible harm
- S1: Slight (normally reversible)
- S2: Serious (normally irreversible)
- S3: Cause a few men die
- S4: Calamity or cause many men die

A: Frequency and duration of exposure
- A1: Seldom to very often
- A2: Frequent to continuous

G: Possibilities of avoidance
- G1: Possible
- G2: Impossible

W: Probability of occurrence of harm
- W1: Low
- W2: Medium
- W3: High



Solutions for the level of hazards
1: Protected by warning sign
2: Protected by guard and warning sign
3: Consider the other design, choose the best one, add both guard and warning sign
4: Consider another two designs, choose the best one, add both guard and warning sign
5: Consider another three designs, choose the best one, add both guard and warning sign

BS EN ISO 12100

2. Risk assessment and risk reduction

Risk assessment and risk reduction				
Machine		MCA Unit Loader	Analyst	Xifeng Zhang
Sources		Specifications, preliminary design	Extent	Use phase: setting and operation
Method		Checklists: BS EN ISO 12100: 2010 Annex B	Date	July 02, 2021
No.	Type of group	Hazards		Risk reduction Protective measures
		origin	Potential consequnces	
1	Mechanical hazards	moving elements rotating elements sharp edges	crushing drawing-in or trapping entanglement stabbing or puncture	Fixed guards, emergency stop, and warning signs are used to eliminate these hazards. Round the sharp edges.
2	Electrical hazards	live parts overload short-circuit parts which have become live under fault conditions	fire shock	Attach the flash warning out of the electrical cabinet, And the door must be opened by the key which kept by skilled operator. Protecting bonding circuits are used for protection. BS EN 60204-1 applied.
3	Themal hazards	objects or materials with a high or low temperature	scald	Cooling system, fixed guards and interlocking moveable guards are used to eliminate this hazard.
4	Noise hazards	manufacturing process	discomfort	Eliminate the noise source.
5	Vibration hazards	none	none	none
6	Radiation hazards	none	none	none
7	Material substance hazards	none	none	none
8	Ergonomic hazards	posture	discomfort fatigue	Opration actuators were designed in a heght of 0.6m to 1.8m.
9	Hazards associated with the environment in which the machine is	none	none	none

BS EN ISO 12100				
	used			
10	Combination of hazards	none	none	none

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No.	Hazards source	S	A	G	W	Level
1.1	Crushing	S2	A2	G2	W2	4
Where	Working area.					
When	Machine is running and maintenance.					
Improvement result						
Method		S	A	G	W	Level
Fixed guards, emergency stop, and warning signs are used to eliminate this hazard.		S2	A1	G1	W1	-

No.	Hazards source	S	A	G	W	Level
1.2	Drawing-in or trapping	S2	A2	G2	W2	4
Where	Rotating elements					
When	Machine is running and maintenance.					
Improvement result						
Method		S	A	G	W	Level
Fixed guards, emergency stop, and warning signs are used to eliminate this hazard.		S2	A1	G1	W1	-

No.	Hazards source	S	A	G	W	Level
1.3	Entanglement	S2	A2	G2	W2	3
Where	Rotating elements					
When	Machine is running and maintenance.					
Improvement result						
Method		S	A	G	W	Level
Fixed guards, emergency stop, and warning signs are used to eliminate this hazard.		S2	A1	G1	W1	-

No.	Hazards source	S	A	G	W	Level
1.4	Stabbing or puncture	S2	A2	G1	W2	3
Where	Machine body.					
When	All the time.					
Improvement result						
Method		S	A	G	W	Level
Round the sharp edges.		S2	A1	G1	W1	-

No.	Hazards source	S	A	G	W	Level

BS EN ISO 12100

2.1	Contact with live parts	S2	A1	G2	W2	2
Where	Working area and electrical cabinet.					
When	Machine is running and maintenance.					
Improvement result						
Method		S	A	G	W	Level
Attach the flash warning out of the electrical cabinet. And the door must be opened by the key which kept by skilled operator.All live parts are suitable protected. BS EN 60204-1 applied.		S2	A1	G1	W1	-

No.	Hazards source	S	A	G	W	Level
2.2	Contact with parts which have become live under faulty conditions	S2	A1	G2	W2	2
Where	Working area and electrical cabinet.					
When	Machine is running and maintenance.					
Improvement result						
Method		S	A	G	W	Level
Attach the flash warning out of the electrical cabinet. And the door must be opened by the key which kept by skilled operator.All live parts are suitable protected. BS EN 60204-1 applied.		S2	A1	G1	W1	-

No.	Hazards source	S	A	G	W	Level
3	Scald	S2	A2	G2	W2	4
Where	Hot sureface, hot elements.					
When	Machine is running and maintenance					
Improvement result						
Method		S	A	G	W	Level
Cooling system, fixed guards and interlocking moveable guards are used to eliminate this hazard.		S2	A1	G1	W1	-

BS EN ISO 12100

No.	Hazards source	S	A	G	W	Level
4	Noise	S1	A2	G2	W2	1
Where	Around the machine.					
When	Machine is running.					
Improvement result						
Method		S	A	G	W	Level
Eliminate the noise source.		S1	A1	G1	W1	-

No.	Hazards source	S	A	G	W	Level
8	Ergonomic	S1	A2	G1	W2	1
Where	Opration postion and maintenance postion.					
When	Oprating and maintenance.					
Improvement result						
Method		S	A	G	W	Level
Opration actuators were designed in a heght of 0.6m to 1.8m.		S1	A1	G1	W1	-

Product photo

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

— End of report —