ZHENGZHOU F-WHEEL INDUSTRIAL CO., LTD
ZHENGZHOU CITY LIANYUN ROAD 27 DISTRICT NO. 123 HUANGHE SCIENCE AND TECHNOLOGY COLLEGE SCIENCE AND TECHNOLOGY PARK (SOUTH) B

Sample Description : D3+

As above test item and its relevant information regarding to the submission are provided and confirmed by the applicant. SGS is not liable to either the test item or its relevant information, in terms of the accuracy, suitability, reliability or/and integrity accordingly.

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Sample Receiving Date : Aug 08, 2019

Test Performing Date : Aug 08, 2019 to Mar 03, 2020

Test Performed : Selected test(s) as requested by applicant

Test Result(s) : For further details, please refer to the following page(s)

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

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Test Conducted: Based on

EN 15194:2017 Cycles - Electrically power assisted cycles - EPAC

1. **Scope:**

   This European Standard applies to EPAC bicycles for private and commercial use with exception of EPAC intended for hire from unattended station.
   This European Standard is intended to cover all common significant hazards, hazardous situations and events (see Clause 4) of electrically power assisted bicycles, when used as intended and under condition of misuse that are reasonably foreseeable by the manufacturer.
   This European Standard is intended to cover electrically power assisted bicycles of a type which have a maximum continuous rated power of 0,25 kW, of which the output is progressively reduced and finally cut off as the EPAC reaches a speed of 25 km/h, or sooner, if the cyclist stops pedalling.
   This European Standard specifies requirements and test methods for engine power management systems, electrical circuits including the charging system for the design and assembly of electrically power assisted bicycles and sub-assemblies for systems having a rated voltage up to and including 48 V d.c. or integrated battery charger with a nominal 230 V a.c. input.
   This European Standard specifies safety and safety related performance requirements for the design, assembly, and testing of EPAC bicycles and subassemblies intended for use on public roads, and lays down guidelines for instructions on the use and care of such bicycles.
   This European Standard applies to EPAC bicycles that have a maximum saddle height of 635 mm or more and that are intended for use on public roads.
   This European Standard is not applicable to EPACs which are manufactured before the date of its publication as EN.
2. **Number of Tested Sample:** 2 set of packaged samples, 3 pieces of front fork, 3 sets of frame & fork assembly, 2 sets of saddle & seat post assembly, 3 sets of handlebar & stem assembly, 1 set of crank assembly, 4 pieces of chain, 1 couple of pedal and 1 set of other electric parts.
3. **Sample description:**

   Maximum saddle height: 855 mm
   Wheels: 14” wheels
   Speed: Single speed
   Brakes: Disc brakes on front & rear
   Reflectors: White reflector on front, red reflector on rear, white wheel reflector, yellow pedal reflectors
   Others: Quick release device on seat tube.
   Electric motor maximum continuous rated power: 210W
   Cut off speed: 23km/h
   Battery output voltage: 36VDC
   Battery charger input voltage: 100-240VAC
4. **Test Results:** Details shown as following table

Clause	Test Item	Test Requirement / Test Method	Test Result
4	Safety requirements and/or protective measures		
4.1	General	EPAC shall be designed according to the principles of EN ISO 12100 for relevant but not significant hazards, which are not dealt with by this document. It includes evaluation of such risks for all relevant components. Means shall be provided to the user to prevent an unauthorized use of the EPAC e.g. key, locks, electronic control device.	NT
4.2	Electrical requirements		
4.2.1	Electric circuit	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.	Pass See remark 1
4.2.2	Controls and symbols	If symbols are used, their meaning shall be described in the instructions for use. “On” “Off” symbols, lightings symbols, start-up assistance symbols, audible warning device symbols design shall be in accordance with those described in Annex I and Annex J. A master control device shall be fitted to switch on and shut off the assistance, which shall be apparent, easy to reach and unmistakable. This master control device shall be activated by voluntary action to enable all assistance modes (start up and pedalling) before use of the EPAC.	Pass See remark 1
4.2.3	Batteries	a) The EPAC and batteries pack shall be designed in order to avoid risk of fire and mechanical deterioration resulting from abnormal use. Compliance is checked by the test described in 4.2.3.2. b) During the test the EPAC and the batteries shall not emit flames, molten metal or poisonous ignitable gas in hazardous amounts and any enclosure shall show no damage that could impair compliance with this European Standard. Safety and compatibility of the battery/charger combination shall be ensured, according to the manufacturer's specifications. c) The battery terminals shall be protected against creating an accidental short circuit. d) An appropriate care shall be taken to ensure that the batteries are protected against overcharging. An appropriate overheating and short circuit protection device shall be fitted.	Pass See remark 1 and remark 2
4.2.4	Battery charger	Chargers for EPAC are considered to be operated in a residential (household) environment.	Pass See remark 1 and remark 2
4.2.5	Electric cables and connections		
4.2.5.1	General	All connectors for cable and wire shall be selected to prevent corrosion of electrical contact conductance.	Pass See remark 1
4.2.5.2	Requirements	Cable and plug temperature shall be lower than that specified by the manufacturer of the cables and plugs. Damage to cable and plug insulation shall be prevented.	Pass See remark 1

Clause	Test Item	Test Requirement / Test Method	Test Result
		The cable cross sections shall be selected in accordance to EN 60335-1:2012, Table 11. If these requirements are not met, a temperature rise test shall be performed, in accordance to 4.2.5.3.	
4.2.6	Wiring	Requirements on wiring shall be checked according to the following sequence at an ambient room temperature (20 ± 5) °C. a) Wire ways shall be smooth and free from sharp edges. b) Wires shall be protected so that they do not come into contact with burrs, cooling fins or similar sharp edges that may cause damage to their insulation. Holes in metal through which insulated wires pass shall have smooth well-rounded surfaces or be provided with bushings. c) Wiring shall be effectively prevented from coming into contact with moving parts. Compliance with a), b), c) shall be checked by inspection. d) Separate parts of the EPAC that can move in normal use or during user maintenance relative to each other, shall not cause undue stress to electrical connections and internal conductors, including those providing ground continuity. If an open coil spring is used to protect wire, it shall be correctly installed and insulated. Flexible metallic tubes shall not cause damage to the insulation of the conductors contained within them. Compliance with d) shall be checked by inspection and by the following test method. If flexing occurs in normal use, the appliance is placed in its normal operational position and is supplied at rated voltage under normal operation. The movable part is moved backwards and forwards through the largest angle permitted by its construction, so that the conductor is flexed. For conductors that are flexed in normal use, flex movable part for 10 000 cycles at a test frequency of 0,5 Hz. For conductors that are flexed during user maintenance, flex the movable part for 100 cycles at the same frequency.	Pass See remark 1
4.2.7	Power cables and conduits	Conduit entries, cable entries and knockouts shall be constructed or located so that the introduction of the conduit or cable does not reduce the protection measures adopted by the manufacturer. Compliance is checked by inspection. Guidance for power cables size selection is given in HD 60364-5-52:2011, 5.22.1.2, 523.1523.3 and Table A. The insulation of internal wiring shall withstand the electrical stress likely to occur in normal use. The wiring and its connections shall withstand the electrical strength test. The test voltage expressed in V shall be equal to(500 + 2×Ur) for 2 min and applied between live parts and	Pass See remark 1

Clause	Test Item	Test Requirement / Test Method	Test Result
		other metal parts only.	
4.2.8	External and internal electrical connections	Electrical connection shall comply with HD 60364-5-52:2011, 526.1 and 526.2.	Pass See remark 1
4.2.9	Moisture resistance	The electrical components of a fully assembled EPAC shall be tested and shall comply with IPX4 requirements according to EN 60529:1991.	Pass See remark 1
4.2.10	Mechanical strength test	The electrical components including the battery shall have adequate mechanical strength and be constructed to withstand such rough handling that may be expected in normal use. Compliance is checked by: — Applying impacts to the battery pack mounted on the EPAC by means of the spring hammer as specified in EN 60068-2-75. The battery pack is rigidly supported and three impacts are applied to every point of the enclosure that is likely to be weak with an impact energy of (0,7 ± 0,05) J. After the test the battery pack shall show no damage that could impair compliance with this European Standard; — Detachable batteries are submitted to free fall on a rigid surface as specified in EN 22248 at a height of 0,90 m in three different positions. The positions shall be one surface, one edge and one corner of the enclosure that is likely to be weak. After the test the battery pack shall show no damage that could lead to emission of dangerous substances (gas or liquid) ignition, fire or overheating.	Pass See remark 1
4.2.11	Maximum speed for which the electric motor gives assistance	The electrical motor assistance shall stop when the EPAC reaches a speed of 25 km/h or lower speed if limited by design. The maximum speed of the EPAC for which the electric motor gives assistance shall not differ by more than +10 % from the maximum assistance speed indicated in the marking required by Clause 5 when determined according to the test method described in 4.2.11.2.	Pass
4.2.12	Start-up assistance mode	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.	NA
4.2.13	Power management	a) When tested by the method described in 4.2.13.2 the recordings shall show that assistance shall be provided only when the cyclist pedals forward. This requirement shall be checked according to the test methods described in 4.2.13.2.3; b) assistance shall be cut off when the cyclist stops pedalling forward and the cut-off distance shall not exceed 2 m; c) If all braking devices (e.g. levers, back pedal) are equipped with cut-off switches, the cut off distance shall not exceed 5 m; d) the power output or assistance shall be progressively reduced (see Annex B) and finally cut off as the EPAC reaches the	Pass

Clause	Test Item	Test Requirement / Test Method	Test Result
		maximum assistance speed as designed. This requirement shall be checked according to the test methods described in 4.2.13.2; e) the assistance shall be progressively and smoothly managed (e.g. no hunting); f) two independent applying actions shall be required to start the electrical assistance mode (e.g. power switch and forward pedalling activation); a traffic caused stop (e.g. traffic lights) is not subject to this requirement; g) after a deactivation of the electrical assistance mode due to any hazardous electric drive malfunction, the electric drive shall not start automatically without rider intervention (pedalling is not considered as rider intervention).	
4.2.14	Maximum power measurement — Measurement at the engine shaft	The maximum continuous rated power shall be measured according to EN 60034-1 when the motor reaches its thermal equilibrium as specified by the manufacturer. In circumstance where the power is measured directly at the shaft of the electronic motor, the result of the measurement shall be divided by 1,10 to consider the measurement uncertainty and then divided by 1,05 to include for example the transmission losses, unless the real values of these losses are determined.	Pass
4.2.15	Electro Magnetic Compatibility		
4.2.15.1	Emission	The EPAC and ESA shall fulfil the requirements of Annex C.	Pass See remark 3
4.2.15.2	Immunity	The EPAC and ESA shall fulfil the requirements of Annex C.	Pass See remark 3
4.2.15.3	Battery charger	As an EPAC is not intended to be used while charging on the electric network, for integrated charger the whole EPAC plus integrated charger shall be tested for EMC according to the applicable standards based on the European EMC directive.	NA
4.2.16	Failure mode	It shall be possible to ride the EPAC by pedalling even if the assistance failed. This requirement shall be checked as described in 4.2.16.2.	Pass
4.2.17	Anti-tampering measure		
4.2.17.1	General	Anti-tampering measures apply to tampering or modifications that general consumers carry out concerning the control unit, drive unit or other parts of power assisting system by using commercially available tools, equipment or parts.	/
4.2.17.2	Prevention of tampering of the motor	The following anti-tampering requirements shall be taken into account: a) Anti-tampering relevant parameters indicated below shall only be accessible to the manufacturer or authorized persons and changes of software configuration parameters require programming tools that are not commercially available or security protected: 1) maximum speed with motor assistance (all systems), 2) parameters affecting the maximum vehicle speed limited by design,	Pass See remark 4

Clause	Test Item	Test Requirement / Test Method	Test Result
		3) maximum gear ratio (system with middle motors), 4) maximum motor power (all systems), 5) maximum speed of starting up assistance; b) Assumable manipulations on the approval relevant configuration shall be prevented or compensated by effective counter measures, i.e. plausibility logics to detect manipulations on sensors; c) Closed set of components (i.e. operation only with released battery); d) Protection against opening of relevant components without traces (sealing).	
4.3	Mechanical requirements		
4.3.2	Sharp edges	Exposed edges that could come into contact with the rider's hands, legs, etc., during normal riding or normal handling and normal maintenance shall not be sharp, e.g. deburred, broken, rolled or processed with comparable techniques.	Pass See remark 5
4.3.3	Security and strength of safety-related fasteners		
4.3.3.1	Security of screws	Any screws used in the assembly of suspension systems or screws used to attach bracket attached electric generators, brake-mechanisms and mud-guards to the frame or fork, and the saddle to the seat-post shall be provided with suitable locking devices, e.g. lock-washers, lock-nuts, thread locking compound or stiff nuts.	Pass See remark 5
4.3.3.2	Minimum failure torque	The minimum failure torque of bolted joints for the fastening of handle bars, handlebar-stems, bar-ends, saddle and seat-posts shall be at least 50 % greater than the manufacturer's recommended tightening torque.	Pass See remark 5
4.3.3.3	Folding bicycles mechanism	If provided, folding bicycle mechanism shall be designed so that EPAC can be locked for use in a simple, stable, safe way and when folded no damage shall occur to any cables. No locking mechanism shall contact the wheels or tyres during riding, and it shall be impossible to unintentionally loosen or unlock the folding mechanisms during riding.	NA See remark 5
4.3.4	Protrusions	These requirements are intended to address the hazards associated with the users of EPACs falling on projections or rigid components (e.g. handlebars, levers) on EPAC possibly causing internal injury or skin puncture. Tubes and rigid components in the form of projections which constitute a puncture hazard to the rider should be protected. The size and shape of the end protection has not been stipulated, but an adequate shape shall be given to avoid puncturing of the body. Screw threads which constitute a puncture hazard shall be limited to a protrusion length of one major diameter of the screw beyond the internally threaded mating part.	Pass See remark 5
4.3.5	Brakes		
4.3.5.1	Braking-systems	EPAC shall be equipped with at least two independently actuated braking-systems. At least one shall operate on the front wheel	Pass See remark 5

Clause	Test Item	Test Requirement / Test Method	Test Result
		and one on the rear wheel. The braking-systems shall operate without binding and shall be capable of meeting the braking-performance requirements of 4.3.5.9. No hand shall need to be taken from the handlebar to operate the brake levers. If additional braking-systems are implemented, they shall meet the brake requirements of 4.3.5. Brake-blocks containing asbestos shall not be used.	
4.3.5.2	Hand-operated brakes		
4.3.5.2.1	Brake-lever position	The brake levers for front and rear brakes shall be positioned according to the legislation or custom and practice of the country in which EPAC is to be sold, and EPAC manufacturer shall state in the manufacturer's instructions which levers operate the front and rear brakes (see also Clause 6 i)).	Pass See remark 5
4.3.5.2.2	Brake-lever grip dimensions	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 or any other covering present shall over a distance of not less than 40 mm as shown in Figure 1 not exceed 90 mm. Conformance shall be established by the method detailed in 4.3.5.2.2.2. The range of adjustment on the brake-lever ought to permit these dimensions to be obtained.	Pass See remark 5
4.3.5.3	Attachment of brake assembly and cable requirements	Cable pinch-bolts shall not sever any of the cable strands when assembled to the manufacturer's instructions. In the event of a cable failing, no part of the brake mechanism shall inadvertently inhibit the rotation of the wheel. The cable end shall either be protected with a cap that shall withstand a removal force of not less than 20 N or be otherwise treated to prevent unravelling.	Pass See remark 5
4.3.5.4	Brake-levers – Position of applied force	For the purposes of braking tests in this standard, for brake-levers similar to Type A, the test force shall be applied at a distance, b, which is equal to either dimension a as determined in 4.3.5.2.2.2 or 25 mm from the free end of the brake-lever, whichever is the greater (see Figure 4).	Pass See remark 5
4.3.5.5	Brake-block and brake-pad assemblies – Safety test	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 when tested by the method specified in 4.3.5.5.2.	Pass See remark 5
4.3.5.6	Brake adjustment	Each brake shall be capable of adjustment with or without the use of a tool to an efficient operating position until the friction material has worn to the point of requiring replacement as recommended in the manufacturer's instructions. Also, when correctly adjusted, the friction material shall not contact anything other than the intended braking surface. The brake blocks of a bicycle with rod brakes shall not come into contact with the rim of the wheels when the steering angle of the	Pass See remark 5

<table>
<tr><th>Clause</th><th>Test Item</th><th>Test Requirement / Test Method</th><th>Test Result</th></tr>
<tr><td></td><td></td><td>handlebars is set at 60°, nor shall the rods be bent, or be twisted after the handlebars are reset to the central position.</td><td></td></tr>
<tr><td>4.3.5.7</td><td>Hand-operated braking-system – Strength test</td><td>When tested by the method described in 4.3.5.7.2, there shall be no failure of the braking-system or of any component thereof.</td><td>Pass
See remark 5</td></tr>
<tr><td>4.3.5.8</td><td colspan="3">Back-pedal braking system – Strength test</td></tr>
<tr><td>4.3.5.8.1</td><td>General</td><td>If a back-pedal braking system is fitted, the brake shall be actuated by the operator's foot applying force to the pedal in a direction opposite to that of the drive force. The brake mechanism shall function regardless of any drive-gear positions or adjustments. The differential between the drive and brake positions of the crank shall not exceed 60°.
The measurement shall be taken with the crank held against each position with a pedal force of at least 250 N. The force shall be maintained for 1 min in each position.</td><td>NA
See remark 5</td></tr>
<tr><td>4.3.5.8.2</td><td>Requirement</td><td>When tested in accordance with 4.3.5.8.3, there shall be no failure of the brake system or any component thereof.</td><td>NA
See remark 5</td></tr>
<tr><td>4.3.5.9</td><td>Braking performance</td><td>Requirements
Where EPAC is fitted with secondary brake-levers attached to brake-levers, bar-ends or aerodynamic extensions, separate tests shall be conducted for the operation of the secondary brake-levers in addition to tests with the normal levers.
When tested in accordance with 4.3.5.9.5, the bicycle shall fulfil the requirements shown in Table 1.
Table 1 — Calculated braking performance value
Forces in N
<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>
Linearity requirements
When tested by the methods described in 4.3.5.9.5.6 c) 1) and 2), the braking force FBr average shall be linearly proportional (within ± 20 %) to the progressively increasing intended operating forces FOp intend.
The requirement applies to braking forces FBr average equal to and greater than 80 N (according to Annex F).

Ratio between wet and dry braking performance requirements
In order to ensure safety for both wet and dry braking, the ratio of</td><td>Pass
See remark 5</td></tr>
</table>

Clause	Test Item	Test Requirement / Test Method	Test Result
		braking performance wet: dry shall be greater than 4:10. The methods for calculating this ratio are given in 4.3.5.9.5.6 g).	
4.3.5.10	Brakes – Heat-resistance test	Throughout the test described in 4.3.5.10.3, the brake-lever shall not touch the handlebar-grip, the operating force shall not exceed 180 N, and the braking force shall not deviate outside the range 60 N to 115 N. Immediately after having been subjected to the test described in 4.3.5.10.3, the brakes shall achieve at least 60 % of the braking performance which was recorded at the highest operating force used during the performance tests 4.3.5.9.5.6 c) 1) and 2).	Pass See remark 5
4.3.5.11	Back-pedal brake linearity test	This test shall be conducted on a fully assembled EPAC. The output force for a back-pedal brake shall be measured tangentially to the circumference of the rear tyre, when the wheel is rotated in the direction of forward movement, while a force of between 90 N and 300 N is being applied to the pedal at right angles to the crank and in the direction of braking. The braking force reading shall be taken during a steady pull and after one revolution of the wheel. A minimum of five results, each at a different pedal force level, shall be taken. Each result shall be the average of three individual readings at the same load level. The results shall be plotted on a graph, showing the line of best fit and the ± 20 % limit lines obtained by the method of least squares outlined in Annex F.	NA See remark 5
4.3.6	Steering		
4.3.6.1	Handlebar – Dimensions	Adjust the handlebar height to its highest normal riding position and the saddle to its lowest normal riding position as specified by the manufacturer (see Clause 6 i)). Measure the vertical distance from the centre and top of the handlebar grips to a point where the saddle surface is intersected by the seat post axis (see Figure 9). This dimension shall not exceed 400 mm.	Pass See remark 5
4.3.6.2	Handlebar grips and plugs	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.	Pass See remark 5
4.3.6.3	Handlebar stem – Insertion-depth mark or positive stop	The handlebar-stem shall be provided with one of the two following alternative means of ensuring a safe insertion depth into the fork steerer: a) it shall contain a permanent, transverse mark, of length not less than the external diameter of the stem, that clearly indicates the minimum insertion depth of the handlebar-stem into the fork steerer. The insertion mark shall be located at a position not less than 2,5 times the external diameter of the handlebar-stem from the bottom of the stem, and there shall be at least one stem diameter's length of contiguous, circumferential stem material below the mark; b) it shall incorporates a permanent stop to prevent it from being	Pass See remark 5

Clause	Test Item	Test Requirement / Test Method	Test Result
		drawn out of the fork steerer such as to leave the insertion less than the amount specified in a) above.	
4.3.6.4	Handlebar stem to fork steerer – Clamping requirements	The distance g, see Figure 11, between the top of the handlebar stem and the top of the fork steerer to which the handlebar stem is clamped shall not be greater than 5 mm. The upper part of the fork steerer to which the handlebar stem is clamped shall not be threaded. The dimension g shall also ensure that the proper adjustment of the steering system can be achieved. For aluminium and composite fork steerer any internal device that could damage the internal surface of the fork steerer shall be avoided.	NA See remark 5
4.3.6.5	Steering stability	The steering shall be free to turn through at least 60° either side of the straight-ahead position and shall exhibit no tight spots, stiffness or slackness in the bearings when correctly adjusted. A minimum of 25 % of the total mass of EPAC and rider shall act on the front wheel when the rider is holding the handlebar grips and sitting on the saddle, with the saddle and rider in their most rearward positions.	Pass See remark 5
4.3.6.6	Steering assembly – Static strength and safety tests		
4.3.6.6.1	Handlebar and stem assembly – Lateral bending test	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.	Pass See remark 5
4.3.6.6.2	Handlebar-stem – Forward bending test	**Requirement for Stage 1** 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. **Requirement for Stage 2** When tested by the method described in 4.3.6.6.2.5, there shall be no visible cracks or fractures.	Pass See remark 5
4.3.6.6.3	Handlebar to handlebar-stem – Torsional safety test	When tested by the method described in 4.3.6.6.3.2, there shall be no movement of the handlebar relative to the handlebar-stem.	Pass See remark 5
4.3.6.6.4	Handlebar-stem to fork steerer – Torsional safety test	When tested by the method described in 4.3.6.6.4.2, there shall be no movement of the handlebar-stem relative to the fork steerer.	Pass See remark 5
4.3.6.6.5	Bar-end to handlebar – Torsional safety test	When tested by the method described in 4.3.6.6.5.2, there shall be no movement of the bar-end in relation to the handlebar.	NA See remark 5
4.3.6.7	Handlebar and stem assembly – Fatigue test	When tested by the method described in 4.3.6.7.3 or 4.3.6.7.4, there shall be no visible cracks or fractures in any part of the handlebar and stem assembly or any bolt failure.	Pass See remark 5

Clause	Test Item	Test Requirement / Test Method	Test Result
		For composite handlebars or stems, the running displacements (peak-to-peak value) at the points where the test forces are applied shall not increase by more than 20 % of the initial values.	
4.3.7	Frames		
4.3.7.1	Suspension-frames – Special requirement	The design shall be such that if the spring or damper fails, neither the tyre shall contact any part of the frame nor the assembly carrying the rear wheel become detached from the rest of the frame.	NA See remark 5
4.3.7.2	Frame – Impact test (falling mass)	When tested by the method described in 4.3.7.2.3, there shall be no visible cracks or fractures of the frame. The permanent deformation measured between the axes of the wheel axles shall not exceed the following values: a) 30 mm where a fork is fitted; b) where a dummy fork is fitted in place of a fork, the values are given in Table 9. **Table 9 — The values of permanent deformation** Fork type / Real fork / Dummy fork Permanent deformation / 30 mm / 10 mm	Pass See remark 5
4.3.7.3	Frame and front fork assembly – Impact test (falling frame)	When tested by the method described in 4.3.7.3.3, there shall be no visible cracks or fractures in the assembly and after the second impact there shall be no separation of any parts of any suspension system. The permanent deformation measured between the axes of the wheel axles shall not exceed the values specified in Table 11. **Table 11 — The values of permanent deformation** Permanent deformation / 60 mm	Pass See remark 5
4.3.7.4	Frame – Fatigue test with pedalling forces	When tested by the method described in 4.3.7.4.3, there shall be no visible cracks or fractures in any part of the frame, and there shall be no separation of any parts of the suspension system. For composite frames, the running displacements (peak-to-peak values) at the points where the test forces are applied shall not increase by more than 20 % of the initial values (see 4.3.1.6).	Pass See remark 5
4.3.7.5	Frame – Fatigue test with horizontal forces	When tested by the method described in 4.3.7.5.3, there shall be no visible cracks or fractures in the frame and there shall be no separation of any parts of any suspension system. For composite frames, the running displacement (peak-to-peak value) at the point where the test forces are applied shall not increase by more than 20 % of the initial values (see 4.3.1.6).	Pass See remark 5
4.3.7.6	Frame – Fatigue test with a vertical force	When tested by the method described in 4.3.7.6.3, there shall be no visible cracks or fractures in the frame and there shall be no separation of any parts of the suspension system. For composite frames, the running displacement (peak-to-peak value) at the point where the test forces are applied shall not	Pass See remark 5

Clause	Test Item	Test Requirement / Test Method	Test Result
		increase by more than 20 % of the initial value (see 4.3.1.6).	
4.3.8	Front fork		
4.3.8.1	General	4.3.8.2, 4.3.8.4, 4.3.8.5 and 4.3.8.6 apply to all types of fork. In the strength tests, 4.3.8.4, 4.3.8.5, 4.3.8.6 and 4.3.8.7, a suspension-fork shall be tested in its free, uncompressed length condition.	/
4.3.8.2	Means of location of the axle and wheel retention	The slots or other means of location for the wheel-axle within the front fork shall be such that when the axle or cones are firmly abutting the top face of the slots, the front wheel remains central within the fork. The front fork and wheel shall also fulfil the requirements of 4.3.9.4 and 4.3.9.5.	Pass See remark 5
4.3.8.3	Suspension-forks – Special requirements		
4.3.8.3.1	Tyre-clearance	When tested by the method described in 4.3.8.3.1.2, the tyre shall not contact the crown of the fork nor shall the components separate.	NA See remark 5
4.3.8.3.2	Tensile test	When tested by the method described in 4.3.8.3.2.2, 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.	NA See remark 5
4.3.8.4	Front fork – Static bending test	When tested by the method described in 4.3.8.4.2, 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 wheelaxle or simulated axle in relation to the axis of the fork steerer, shall not exceed 10 mm.	Pass See remark 5
4.3.8.5	Front fork – Rearward impact test		
4.3.8.5.1	Forks made entirely of metal		
4.3.8.5.1.1	Crown/steerer joint assembled by welding or brazing	When tested by the method described in 4.3.8.5.3, 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 wheelaxle or simulated axle in relation to the axis of the fork steerer, shall not exceed 45 mm. If the fork is used in the frame impact test (falling-mass), 4.3.7.2, there is no need to perform this test.	Pass See remark 5
4.3.8.5.1.2	Crown/steerer joint assembled by press-fitting, bonding, or clamping	When tested by the method described 4.3.8.5.4 a), if there are any 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, exceeds 45 mm, the fork shall be considered to have failed. If the fork meets these criteria then it shall be subjected to a second test as described in 4.3.8.5.4 b), after which, it shall exhibit no fractures, then it shall be subjected to a third test as described in 4.3.8.5.4 c), irrespective of the amount of permanent deformation, there shall be no relative movement between the steerer and the crown.	NA See remark 5
4.3.8.5.	Forks which have	When tested by the method described in 4.3.8.5.3, there shall be	NA

<table>
<tr><th>Clause</th><th>Test Item</th><th>Test Requirement / Test Method</th><th>Test Result</th></tr>
<tr><td>2</td><td>composite parts</td><td>no fractures in any part of a 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. After which, it shall exhibit no fractures, then it shall be subjected to a second test as described in 4.3.8.5.4 c) Torque on fork, irrespective of the amount of permanent deformation, there shall be no relative movement between the steerer and the crown.</td><td>See remark 5</td></tr>
<tr><td>4.3.8.6</td><td>Front fork – Bending fatigue test plus rearward impact test</td><td>When tested by the method described in 4.3.8.6.2, 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 (see 4.3.1.6).</td><td>Pass
See remark 5</td></tr>
<tr><td>4.3.8.7</td><td colspan="3">Forks intended for use with hub- or disc-brakes</td></tr>
<tr><td>4.3.8.7.2</td><td>Static brake-torque test</td><td>When tested by the method described in 4.3.8.7.3, there shall be no fractures or visible cracks in any part of the fork.</td><td>Pass
See remark 5</td></tr>
<tr><td>4.3.8.7.4</td><td>Fork for hub/disc-brake – Brake mount fatigue test</td><td>When tested by the method described in 4.3.8.7.5, there shall be no fractures or visible cracks in any part of the fork and, in the case of suspension-forks, there shall be no separation of any parts.</td><td>Pass
See remark 5</td></tr>
<tr><td>4.3.8.8</td><td>Tensile test for a non-welded fork</td><td>When tested by the method described in 4.3.8.8.3, there shall be no detachment or loosening of any parts of the assembly.</td><td>NA
See remark 5</td></tr>
<tr><td>4.3.9</td><td colspan="3">Wheels and wheel/tyre assembly</td></tr>
<tr><td>4.3.9.1</td><td>Wheels/tyre</td><td>When measured by the method described in 4.3.9.1.2, the run-out shall not exceed the values which are given in Table 22.
Table 22 — Wheel/tyre assembly - Concentricity and lateral tolerance
Dimensions in millimetres
<table><tr><td></td><td>Intended for rim-brakes</td><td>Not intended for rim-brakes</td></tr><tr><td>Concentricity and lateral tolerance</td><td>1</td><td>2</td></tr></table></td><td>Pass
See remark 5</td></tr>
<tr><td>4.3.9.2</td><td>Wheel/tyre assembly – Clearance</td><td>Alignment of the wheel assembly in EPAC shall allow not less than the clearance values given in Table 23 between the tyre and any frame or fork element or a front mudguard and its attachment bolts.
Table 23 — Wheel/tyre assembly - Clearance
<table><tr><td>Clearance</td><td>6</td></tr></table></td><td>Pass
See remark 5</td></tr>
<tr><td>4.3.9.3</td><td>Wheel/tyre assembly – Static strength test</td><td>When a fully assembled wheel fitted with a tyre inflated to the maximum inflation pressure is tested by the method described in 4.3.9.3.2, there shall be no failure of any of the components of the wheel, and the permanent deformation, measured at the point of application of the force on the rim, shall not exceed the values which are given in Table 24.</td><td>Pass
See remark 5</td></tr>
</table>

Clause	Test Item	Test Requirement / Test Method	Test Result
		Table 24 — The values of permanent deformation Permanent deformation: 1,5	
4.3.9.4	Wheels – Wheel retention		
4.3.9.4.1	General	Wheel retention safety is related to the combination of wheel, retention device, and drop-out design. Wheels shall be secured to EPAC frame and fork such that when adjusted to the manufacturer's instructions they comply with 4.3.9.4.2, 4.3.9.4.3 and 4.3.9.5. Wheel nuts shall have a minimum removal torque of 70 % of the manufacturer's recommended tightening torque. Where quick-release axle devices are used they shall comply with 4.3.9.5.	Pass See remark 5
4.3.9.4.2	Wheel retention – Retention devices secured	When tested by the method described in 4.3.9.4.2.2, there shall be no relative motion between the axle and the front fork/frame.	Pass See remark 5
4.3.9.4.3	Front wheel retention – Retention devices unsecured	EPAC shall be equipped with secondary retention system that retains the front wheel in the dropouts when the primary retention system is in the open (unlocked) position and wheel off the ground. Where threaded axles and nuts are fitted, and the nuts are unscrewed by at least 360° from the finger tight condition and the brake system disconnected or released, the wheel shall not detach from the front fork when a force of 100 N is applied radially outwards, in line with the drop-out slots, and maintained for 1 min. Where quick-release is fitted, and the quick-release lever is fully open and the brake system is disconnected or released, the wheel shall not detach from the front fork when a force of 100 N is applied to the wheel radially outwards, in line with the drop-out slots, and maintained for 1 min.	Pass See remark 5
4.3.9.5	Wheels – Quick-release devices – Operating features	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;	NA See remark 5

Clause	Test Item	Test Requirement / Test Method	Test Result
		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.	
4.3.10	Rims, tyres and tubes		
4.3.10.1	General	Non-pneumatic tyres are excluded from the requirements of 4.3.10.2 and 4.3.10.3.	/
4.3.10.2	Tyre inflation pressure	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.	Pass See remark 5
4.3.10.3	Tyre and rim compatibility	Tyres that comply with the requirements of ISO 5775-1 and rims that comply with the requirements of ISO 5775-2 are compatible. The tyre, tube and tape shall be compatible with the rim design. When inflated to 110 % of the maximum inflation pressure, determined by the lower value between maximum inflation pressures recommended on the rim or the tyre, for a period of not less than 5 min, the tyre shall remain intact on the rim.	Pass See remark 5
4.3.10.4	Rim-wear	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, (see also Clause 6 z) and 5.1). Where the rim is made of composite materials, the manufacturer shall include in the manufacturer's instructions warnings of the danger of rim failure caused by wear of the braking surfaces.	NA See remark 5
4.3.10.5	Greenhouse effect test for composite wheels	When a fully assembled wheel made of composite material, fitted with the appropriate size tyre and inflated according to the lowest value between maximum inflation pressure recommended on the rim or the tyre, is tested by the method described as 4.3.10.5.3, there shall be: — no failure of any of the components of the wheel; — no tyre separation from the rim during the test; — no increase in rim width greater than 5 % of the initial maximal width value; — compliance of lateral and concentricity tolerance according to 4.3.9.1; — compliance of tyre and rim compatibility according to 4.3.10.3; — compliance of static strength according to 4.3.9.3.	NA See remark 5
4.3.11	Front mudguard	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	Pass See remark 5

Clause	Test Item	Test Requirement / Test Method	Test Result
		not prevent rotation of the wheel or obstruct steering.	
4.3.12	Pedals and pedal/crank drive system		
4.3.12.1	Pedal tread		
4.3.12.1.1	Tread surface	The tread surface of a pedal shall be secured against movement within the pedal assembly.	Pass See remark 5
4.3.12.1.2	Toe Clips	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. Pedals designed to be used only with toe-clips or shoe-retention devices shall have toe-clips or shoe-retention devices securely attached and need not comply with the requirements of 4.3.12.1.2 a) and b).	Pass See remark 5
4.3.12.2	Pedal clearance		
4.3.12.2.1	Ground clearance	With EPAC un-laden, the pedal at its lowest point and the tread surface of the pedal parallel to the ground and uppermost where it has only one tread surface, EPAC shall be capable of being leaned over at an angle of θ from the vertical before any part of the pedal touches the ground. The values are given in Table 26. When EPAC is equipped with a suspension system, this measurement shall be taken with the suspension adjusted to the softest condition and with EPAC depressed into a position such as would be caused by a rider weighing 90 kg. **Table 26 — The values of ground clearance** Lean angle θ: 25	Pass See remark 5
4.3.12.2.2	Toe clearance	EPACs shall have at least C clearance between the pedal and front tyre or mudguard (when turned to any position). The clearance shall be measured forward and parallel to the longitudinal axis of EPAC from the centre of either pedal-axle to the arc swept by the tyre or mudguard, whichever results in the least clearance (see Figure 37). The values are given in Table 27. **Table 27 — The values of toe clearance** Dimensions in millimetres Toe clearance C: without foot retention 100; with foot retention 89 NOTE Foot retention system, e.g. quick-release pedal or toe-clip.	Pass See remark 5
4.3.12.3	Pedal – Static strength test	When tested by the method described in 4.3.12.3.2, there shall be no fractures, visible cracks, or distortion of the pedal or spindle that could affect the operation of the pedal and pedal-spindle.	Pass See remark 5
4.3.12.4	Pedal – Impact test	When tested by the method described in 4.3.12.4.2, there shall be no fractures of any part of the pedal body, the pedal-spindle or any failure of the bearing system.	Pass See remark 5

Clause	Test Item	Test Requirement / Test Method	Test Result
4.3.12.5	Pedal – Dynamic durability test	When tested by the method described in 4.3.12.5.2, there shall be no fractures or visible cracking of any part of the pedal, the pedal-spindle nor any failure of the bearing system.	Pass See remark 5
4.3.12.6	Drive-system – Static strength test	a) Drive-system with chain When tested by the method described in 4.3.12.6.2, there shall be no fracture of any component of the drive system, and drive capability shall not be lost. b) Drive-system with belt When tested by the method described in 4.3.12.6.3, there shall be no fracture of any component of the drive system, and the belt shall not slip/skip, fracture or cause any loss in drive capability. Smooth sliding between pulleys and belt is allowed at a rate not exceeding 1 °/s at the drive axis.	Pass See remark 5
4.3.12.7	Crank assembly – Fatigue test	When tested by the method described in 4.3.12.7.2, there shall be no fractures or visible cracks in the cranks, the bottom-bracket spindle or any of the attachment features, or loosening or detachment of the chain-wheel from the crank. For composite cranks, the running displacements (peak-to-peak values) of either crank at the point where the test forces are applied shall not increase by more than 20 % of the initial value (see 4.3.1.6).	Pass See remark 5
4.3.13	Drive-chain and drive belt		
4.3.13.1	Drive-chain	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.	Pass See remark 5
4.3.13.2	Drive belt	Where a belt-drive is used as a means of transmitting the motive force, the drive belt shall operate over the front and rear pulleys without binding. And when tested by the methods described in 4.3.13.2.2, there shall be no evidence of cracking, fracture or delamination of the belt drive.	NA See remark 5
4.3.14	Chain-wheel and belt-drive protective device		
4.3.14.1	Requirement	EPAC shall be equipped with one of the following; a) a chain wheel disc or drive pulley disk which conforms to 4.3.14.2; or b) a chain and drive belt protective device which conforms to 4.3.14.3; or c) where fitted with positive foot-retention devices on the pedals, a combined front gear-change guide which conforms to 4.3.14.4 shall be used.	Pass See remark 5
4.3.14.2	Chain-wheel disc and drive pulley disc diameter	A chain-wheel disc shall exceed the diameter of the outer chain-wheel, when measured across the tips of the teeth by not less than 10 mm (see Figure 44). A drive pulley disc shall exceed the diameter of the front pulley, when measured across the tips of the teeth by not less than 10	Pass See remark 5

Clause	Test Item	Test Requirement / Test Method	Test Result
		mm (see Figure 45). Where the design is such that the pedal-crank and chainwheel are too close together to accommodate a full disc, a partial disc may be fitted which closely abuts the pedal-crank.	
4.3.14.3	Chain and drive belt protective device	A chain protective device shall, as a minimum, shield the side-plates and top surface of the chain and the chain-wheel for a distance of at least 25 mm rearwards along the chain from the point where the chainwheel teeth first pass between the side-plates of the chain and forwards round the outer chain-wheel to a horizontal line passing through the bottom-bracket axle centre (see Figure 46 a)). A drive belt protective device shall, as a minimum, shield the side and top surface of the drive belt and the front pulley for a distance of at least 25 mm rearwards along the drive belt from the point where the tip circle of the pulley is intersected by the tip line of the belt (line C in Figure 46 b)) and forwards round the front pulley to a horizontal line passing through the bottom-bracket axle centre (see Figure 46 b)).	NA See remark 5
4.3.14.4	Combined front gear-change guide	When the chain is located in the outer gear position, some portion of the combined front gear change guide shall be above the chain in the region 25 mm from the point where the chain wheel first passes between the side plates of the chain, parallel to the chain side plates in the direction towards the rear wheel of the bicycle (see Figure 47). In addition some portion of the combined front gear change guide shall be present below the chain in the region beyond 25 mm from the point where the chain wheel first passes between the side plates of the chain, parallel to the chain side plates in the direction towards the rear wheel of the bicycle (see Figure 47). It is recommended that the gap between front-gear and front gear-change guide specified by the manufacturer is properly set.	NA See remark 5
4.3.15	Saddles and seat-posts		
4.3.15.1	Limiting dimensions	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.	Pass See remark 5
4.3.15.2	Seat-post – Insertion-depth mark or positive stop	The seat-post shall be provided with one of the two following alternative means of ensuring a safe insertion-depth into the frame: a) it shall contain a permanent, transverse mark of length not less than the external diameter or the major dimension of the cross-section of the seat-post that clearly indicates the minimum insertiondepth of the seat-post into the frame. For a circular cross-section, the mark shall be located not less than two diameters of the seat-post from the bottom of the seat-post (i.e. where the diameter is the external diameter). For a non-circular cross-section, the insertion-depth mark shall be located not	Pass See remark 5

Clause	Test Item	Test Requirement / Test Method	Test Result
		less than 65 mm from the bottom of the seat-post (i.e. where seat-post has its full cross-section); b) it shall incorporate a permanent stop to prevent it from being drawn out of the frame such as to leave the insertion less than the amount specified in a) above.	
4.3.15.3	Saddle/seat-post – Safety test		
4.3.15.3.1	General	If a suspension seat-post is involved, the test may be conducted with the suspension-system either free to operate or locked. If it is locked, the pillar shall be at its maximum length.	/
4.3.15.3.2	Saddles with adjustment-clamps	When tested by the method described in 4.3.15.3.4, there shall be no movement of the saddle adjustment clamp in any direction with respect to the seat-post, or of the seat-post with respect to the frame, nor any failure of saddle, adjustment clamp or seat-post. If the saddle design is such that it cannot accurately test the saddle/seat-post clamp, it shall be possible to use a fixture which is representative of the saddle dimensions.	Pass See remark 5
4.3.15.3.3	Saddles without adjustment-clamps	Saddles that are not clamped, but are designed to pivot in a vertical plane with respect to the seat-post, shall be allowed to move within the parameters of the design and shall withstand the tests described in 4.3.15.3.4 without failure of any components.	NA See remark 5
4.3.15.4	Saddle – Static strength test	When tested by the method described in 4.3.15.4.2, the saddle cover and/or plastic moulding shall not disengage from the chassis of the saddle, and there shall be no cracking or permanent distortion of the saddle assembly.	Pass See remark 5
4.3.15.5	Saddle and seat-post clamp – Fatigue test	When tested by method described in 4.3.15.5.3, there shall be no fractures or visible cracks in the seat-post or in the saddle, and no loosening of the clamp.	Pass See remark 5
4.3.15.6	Seat-post – Fatigue test		
4.3.15.6.1	General	In the following test, if a suspension seat-post is involved, the test shall be conducted with the suspension system adjusted to give maximum resistance. Conduct the test in two stages on the same assembly as per 4.3.15.6.2 and 4.3.15.6.4.	/
4.3.15.6.2	Requirement for stage 1		
4.3.15.6.2.1	Seat-post without suspension system	When tested by the method described in 4.3.15.6.3, there shall be no visible cracks or fractures in the seat-post, nor any bolt failure. For composite seat-post, the peak deflection of seat-post during the test shall not increase by more than 20 % of the initial value.	Pass See remark 5
4.3.15.6.2.2	Seat-post with suspension system	When tested by the method described in 4.3.15.6.3, there shall be no visible cracks or fractures in the seat-post, nor any bolt failure. The design shall be such that in the event of failure of the suspension system, the two main parts do not separate nor does the upper part (i.e. the part to which the saddle would be attached) become free to swivel in the lower part.	NA See remark 5
4.3.15.6	Requirement for stage 2		

Clause	Test Item	Test Requirement / Test Method	Test Result
.4			
4.3.15.6.4.1	Seat-post without suspension system	When tested by the method described in 4.3.15.6.5, there shall be no fractures, and the displacement shall not exceed 10 mm during testing.	Pass See remark 5
4.3.15.6.4.2	Seat-post with suspension system	When tested by the method described in 4.3.15.6.5, there shall be no fractures. The design shall be such that in the event of failure of the suspension system, the two main parts do not separate nor does the upper part (i.e. the part to which the saddle would be attached) become free to swivel in the lower part.	NA See remark 5
4.3.16	Spoke protector	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.	NA See remark 5
4.3.17	Luggage carriers	If luggage carriers are fitted or provided they shall comply with EN ISO 11243.	NA See remark 5
4.3.18	Road-test of a fully-assembled EPAC	When tested by the method described in 4.3.18.2, there shall be no system or component failure and no loosening or misalignment of the saddle, handlebar, controls or reflectors. The EPAC shall with or without assistance exhibit stable handling in braking, turning and steering, and it shall be possible to ride with one hand removed from the handlebar (as when giving hand signals), without difficulty of operation or hazard to the rider.	Pass See remark 5
4.3.19	Lighting systems and reflectors		
4.3.19.1	General	EPAC shall be equipped with reflectors at the front, rear and side. EPAC shall be equipped with lighting systems and reflectors in conformity with the national regulations in the country in which EPAC is marketed, because national regulations for lighting systems and reflectors differ from country to country.	Pass See remark 5
4.3.19.2	Wiring harness	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.	Pass See remark 5
4.3.19.3	Lighting systems	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.	NT See remark 5
4.3.19.4	Reflectors		
4.3.19.4.1	General	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 retro-reflective devices shall comply with the requirements of ISO 6742-2.	Pass See remark 5 See remark 6
4.3.19.4.2	Rear reflectors	Rear reflectors shall be red in colour.	Pass See remark 5
4.3.19.4	Side reflectors	The retro reflective device(s) shall be either	Pass

Clause	Test Item	Test Requirement / Test Method	Test Result
.3		a) a reflectors fitted on the front half and on the rear half of EPAC. At least one of these shall be mounted on the spokes of the wheel. Where EPAC incorporates features at the rear wheel other than the frame and mudguard stays, the moving reflector shall be mounted on the front wheel; or b) a continuous circle of reflective material applied to both sides of each wheel within 10 cm of the outer diameter of the tyre. All side reflectors shall be of the same colour, either white (clear) or yellow.	See remark 5
4.3.19.4.4	Front reflectors	Front reflectors shall be white (clear) in colour.	Pass See remark 5
4.3.19.4.5	Pedal reflectors	Each pedal shall have reflectors, located on the front and rear surfaces of the pedal. The reflector elements shall be either integral with the construction of the pedal or mechanically attached, but shall be recessed from the edge of the pedal, or of the reflector housing, to prevent contact of the reflector element with a flat edge placed in contact with the edge of the pedal.	Pass See remark 5
4.3.20	Warning device	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.	Pass See remark 5
4.3.21	Thermal hazards	A warning shall be placed on the surface if the temperature of the hot accessible surface could be above 60 °C (see EN ISO 7010:2012, symbol W017). Brake systems are excluded from this requirement.	NA See remark 5
4.3.22	Performance levels (PLrs) for control system of EPACs	The safety related parts of the control systems of the EPAC shall comply with the required performance level (PLr) given in Table 34 in accordance with EN ISO 13849-1. Should risk assessment indicate that additional or different PLr are required for a particular application, these should be determined in accordance with EN ISO 13849 (all parts). Such PLr will be outside the scope of this standard. The manufacturer of the EPAC shall record the process adopted for verification of compliance with PLr for each relevant safety function. **Table 34 — Safety functions related to defined hazards** Safety function / Performance Level Prevention of an unintentional self-start of the EPAC / PLr c Prevention of electric motor assistance functions without pedalling, and without activation of the start-up assistance mode / PLr c Prevention of risk of fire in case of management system failure for batteries with capacity above 100 Wh / PLr c	NT See remark 5
5	Marking, labelling		
5.1	Requirement	Details please see the contents of standard.	Pass See remark 5
5.2	Durability test	When tested by the method described in 5.2.2, the marking shall remain easily legible. It shall not be easily possible to remove any label nor shall any label show any sign of curling.	Pass See remark 5
6	Instruction for use	Details please see the contents of standard.	Pass

Clause	Test Item	Test Requirement / Test Method	Test Result
			See remark 5

Remark:

1. SGS Reference No.: GZES190802190831.
2. SGS Reference No.: GZES190802190832.
3. SGS Reference No.: GZEM190801497901.
4. The content of this part is extracted from the test number GZHL1906023395BC.
5. SGS Reference No.：TJHL2001000201BC.
   This test was subcontracted to SGS-CSTC Standards Technical Services (Tianjin)Co., Ltd.
6. Reflector test report（Report No.: 1061.02932.001, Date: 31 May 2019, issued by: ACT）was submitted by clients for document review at time of testing.
   Reflector test report（Report No.: 1061.02932.002, Date: 31 May 2019, issued by: ACT）was submitted by clients for document review at time of testing.
   Reflector test report（Report No.: 1061.0011.001, Date: 01 Feb 2019, issued by: ACT）was submitted by clients for document review at time of testing.
   Reflector test report（Report No.: 204.0021.04.R1, Date:19 September 2018, issued by: ACT）was submitted by clients for document review at time of testing.
7. NA = Not applicable.
8. NT = Not tested as per client's request.

Sample Photo(s):

End of Report