TEST REPORT
EN 17128
Light motorized vehicles for the transportation of persons and goods and related facilities and not subject to type-approval for on-road use - Personal light electric vehicles (PLEV) - Safety requirements and test methods

Report Number. :	XK2404027219S
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Testing Laboratory:	Shenzhen SiCT Technology Co., Ltd.
Testing location/ address:	202, Building 3, No.111 Huanguan Middle Road, Songyuanxia Community, Guanhu Street, Longhua District, Shenzhen, Guangdong, China
Applicant's name :	Shenzhen KuKirin Technology Co., Ltd.
Address :	Room 4F4913, Shenzhou Computer Building, Marie Curie Avenue, Vanke City Community, Bantian Street, Longgang District, Shenzhen City
Test specification:	
Standard :	EN 17128:2020
Test procedure :	CE Scheme

Test item description :	Electric Scooter
Trade Mark :	KuKirin
Manufacturer :	Shenzhen KuKirin Technology Co., Ltd.
Model/Type reference :	G4
Ratings :	Please See marking plate

Summary of testing:	
Tests performed (name of test and test clause): - Full test has been done on EN 17128:2020	**Testing location:** 202, Building 3, No.111 Huanguan Middle Road, Songyuanxia Community, Guanhu Street, Longhua District, Shenzhen, Guangdong, China

Copy of packaging plate:

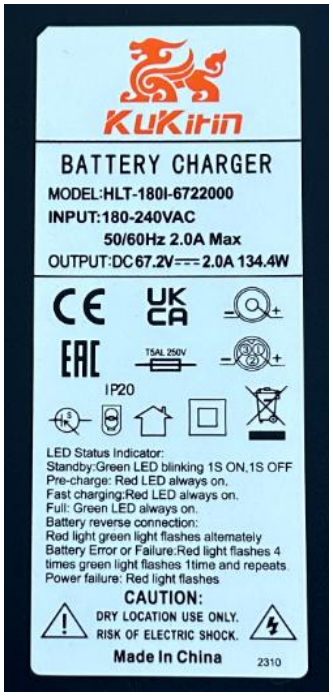
Electric Scooter
Model: G4
Input: DC67.2V

Max Speed：25 km/h

Battery capacity: 60V/20Ah

WARNING – To reduce the risk of injury, user must read instruction manual Store Indoors When Not in Use
Manufacture: Shenzhen KuKirin Technology Co., Ltd.
Address: Room 4F4913, Shenzhou Computer Building, Marie Curie Avenue, Vanke City Community, Bantian Street, Longgang District, Shenzhen City
Made in China

IPX4 III



Test item particulars ..... :	Electric Scooter
Supply Connection ..... :	Battery pack appliances
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item.....:	2024-03-26
Date (s) of performance of tests.....:	2024-03-26 to 2024-04-07

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

General product information:

This product is a folding electric scooter, this scooter have following characteristics

Product	G4
Max. speed	25km/h
Min. Start-up speed	6km/h
Max. payload	120kg
Brake system	Mechanical brake and electric brake, one brake lever control both
Bell	Mechanical bell (See attachment pictures)
Front lamp	White light at front (See attachment pictures)
Rear lamp	Red light at back (See attachment pictures)
Front reflector and side reflector	Yellow reflector on both side and white reflector on front (See attachment pictures)
Rear reflector	Red reflector at back (See attachment pictures)
Folding	Both operating devices are intended to be operated by hand(s) they both automatically return to their original status and the locking devices reengage. From fold to unfold situation: auto lock.
Driving power	Two independent and dissimilar intentional actions: Moving forward at a speed of more than 5 km/h, then press accelerator.
Wheel	Two wheels (Pneumatic front wheel) and motor in rear wheel. (See attachment pictures)
Pedestrian mode (walk mode)	Activated by adjusting button on display plate. Light is flashing to warning others.

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Clause	Requirement + Test	Result - Remark	Verdict
4	**Classes of vehicles**		P
	Various personal light electric vehicles (vehicles) exist covering as many different uses offered to different users based on their age, mass, size and driving experience.	Class 2	P
	The main classes of vehicle are defined below combined with the main design choices that characterize them.		P
5	**General safety requirements and protective measures**		P
	Vehicle shall comply with the specific requirements of all clauses of this standard.		P
	For vehicles which are not sold fully assembled, there shall be a maximum of three separate parts requiring assembly (e.g. steering device, wheels and batteries), the necessary tools and detailed assembly instructions shall be provided which specify by a text and diagrams the operations to be carried out as well as the clamping force.	Tools provided	P
6	**Electrical components**		P
6.1	**General mechanical strength**		P
	The ESA including the battery shall have adequate mechanical strength and be constructed to withstand such rough handling that may be expected in intended use and foreseeable misuse.		P
	Compliance is checked by:		---
	- Applying impacts to the enclosures of ESA mounted on the vehicles by means of the spring hammer as specified in EN 60068-2-75:2014. The ESA 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.	0,7 J impact.	P
	- Detachable ESA are submitted to free fall on a rigid surface as specified in EN 22248:1992 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 are likely to be the most onerous position.	No detachable ESA.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	After the test the ESA shall show no damage that could lead to emission of dangerous substances (gas or liquid) ignition, fire or overheating. A temperature rise test shall be performed, in accordance with 6.3.2.2, During the test, the temperature rises are monitored continuously and shall not exceed the values shown in EN 60335-1:2012, Table 3 and after the test the ESA shall show no damage or malfunction that could impair the safe use of the vehicles.	No damage.	P
	Batteries and other electric conductive power supply systems shall be assessed and tested in accordance with EN 62133-1:2017 and EN62133-2:2017 or other relevant standards.	Battery and cell meet EN 62133 requirements.	P
6.2	**Electrical power on/off control**		P
	An electrical power on/off control shall be fitted to on and power-off the driving power. It shall be apparent, easy to reach and unmistakable. This electrical power on/off control shall be activated voluntary by the user to enable the driving power.	Electrical power on/off control equipped.	P
	The electrical power on/off system shall be designed such that, in the event of a malfunction, the vehicle shall still be able to stop or be able to be stopped with a smooth deceleration (as defined in 15.4.2.5 Electric failure braking compensation).	Vehicle is equipped with a mechanical braking system at rear wheel.	P
	The electrical power on/off system shall be located in a position easily reachable by the user with appropriate symbol given in Annex F.		P
	On self-balancing vehicles or vehicles with electric brake, the power -off control shall not disconnect the power while driving : the power -off control shall only work without user on the vehicle.		N/A
6.3	**Electrical cables and connections**		---
6.3.1	**General**		---
	All electrical connectors shall be selected to prevent the corrosion.		P
6.3.2	**Cable and plugs**		P
6.3.2.1	**Requirements**		P
	After the test according to 6.3.2.2, there shall be no deterioration of the insulation on either assembly.		P

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	The cable cross sections shall be selected in accordance with EN 61558-1:2005, EN 61558-2-16:2009,EN 60335-1:2012, EN 60335-2-29:2004, Table 11 or a temperature rise test shall be performed, in accordance with 6.3.2.2 the temperature of the cables and plugs in use shall be at least 5 °C lower than the maximum specified by the manufacturer.	Temperature of the cables and plugs in use is 5° C lower than the maximum specified by the manufacturer.	P
6.3.2.2	**Test method**		---
	At an ambient room temperature (20 ± 5)°C, discharge the fully charged vehicle battery to the discharging limit for the vehicle, and the vehicle is supplied at rated voltage and operated under normal operation:		P
	- measure the cable and plug temperatures.		P
6.3.3	**Wiring**		P
	Wiring shall be checked according to the following sequence at an ambient room temperature (20 ± 5) °C.		P
	a) Wireway shall be smooth and free from sharp edges.		P
	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.		P
	c) Holes in metal through which insulated wires pass shall have smooth well-rounded surfaces or be provided with bushings.		P
	d) Wires shall be effectively prevented from coming into contact with moving parts. Compliance with a), b), c) and d) shall be checked by physical inspection.		P
	e) Separate parts of the vehicles 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 earthing continuity.	No earthing.	P
	f) 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.	No open coil spring and flexible metallic tubes.	P
	Compliance with e) f) shall be checked by inspection and by the following test method:		P
	1) If flexing occurs in normal use, the product is placed in its normal operational position and is supplied at rated voltage under normal operation.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	2) The movable part is moved from an extreme position to the opposite extreme position, so that the conductor undergoes maximum flexion.		P
	3) For conductors that are flexed in normal use, flex movable part for 10 000 cycles at a test frequency of 0,5 Hz.		N/A
	4) For conductors that are flexed during user maintenance, flex the movable part for 100 cycles at the same frequency.		P
6.3.4	**Wiring harness**		P
	When a wiring harness is installed, it shall be positioned to avoid any damage related to contact with moving parts or sharp edges. All connections shall withstand a tensile force of 10 N in any direction.		P
6.3.5	**Power cables and conduits**		P
	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.		P
	Compliance is checked by inspection.		P
	The insulation of internal wiring shall withstand the electrical stress likely to occur in intended use. The wiring and its connections shall withstand an electrical strength test with the following characteristics.		P
	The test voltage expressed in volts shall be equal to (500 +2xUr) where Ur is the rated voltage. The test voltage is applied for 2 min between live parts and other metal parts only.		P
6.3.6	**External and internal electrical connections**		P
	Electrical connection shall comply with HD 60364-5-52:2011, 526.1 and tested in accordance with HD 60364-5-52:2011, 526.2.	Meet requirements.	P
6.4	**Moisture resistance**		P
	The enclosure of electrical components of a fully assembled vehicles shall comply with and be tested in accordance with IPX4 tested in accordance with EN 60335--1:2012, 15.1.	IPX4	P
6.5	**Resistance to vibration for electric functions**		P
6.5.1	**Requirements**		---
	This requirements applies to all PLEV class 1 to 4	Class 2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The vehicle shall withstand a vibration test representing the foreseeable use on roads and public areas.		P
	When tested according to the method described in 6.5.2, all electric functions shall be fully maintained. Verification shall be by function test after the vibration test.		P
6.5.2	**Test method**		P
	A random vibration test in accordance with EN 60068-2-64 :2008 shall be performed.		P
	Install the vehicle to the shaker table so the input vibratory motion is perpendicular to the plane of movement of the vehicle (excitation in vertical axis).		P
	The vehicle shall be fixed at the wheel axles, if necessary, the wheels can be removed. If a fixation at the wheel axles is not possible, the vehicle can be clamped at the deck (footrest) or frame. Any test fixture used shall be as rigid and symmetrical as practicable. The mounting method(s) used shall be noted in the test report.	Clamped at the deck.	P
	When necessary to determine resonant frequencies, accelerometers shall be attached to the vehicle to measure and record the equipment's vibration response in the axis of vibration to determine resonant frequencies and amplification factors. Locations selected may include frame structure, handlebar, footrest, batteries or other large components and modules.	Handlebar and footrest selected to test.	P
	The control accelerometer(s) shall be attached to the test fixture as near as practicable to the equipment mounting location. When more than one accelerometer is employed for test level control, the average of the accelerometer control signals of the acceleration power spectral densities (PSD) shall be used as the test level control.		P
	Before the random vibration test, perform a 0,5 g-PK sinusoidal scan from 5 Hz to 500 Hz at a sweep rate not exceeding 1.0 octave/minute. Record plots of response accelerometers at selected position on the vehicle to determine resonant frequencies and amplification factors.		P
	Apply the appropriate test level PSD of Table 3 for 15 h. During this random vibration period, also perform a PSD analysis of the vibration response measurements on the equipment.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Repeat the sinusoidal scan. Any changes in vibration resonant frequencies shall be recorded.		P
	The vibration tests shall be performed under normal ambient environmental conditions with a temperature of +23°C ± 5°C (relative humidity < 85 %, normal atmospheric pressure).	Temperature: +23°C. Humidity: 75%.	P
	The appropriate random vibration test curve shall be selected from Table 2 depending on the wheel size and design of the vehicle. The test curves are given in Table 3 and Figure 1.	No suspension system Wheel size:10 inch Wheel type: Pneumatic	P
7	**Driving power management**		P
7.1	**Driving power activation**		P
7.1.1	**Requirements**		---
	Driving power shall only be provided following at least two independent and dissimilar intentional actions by the user. In addition:		P
	a) for vehicles of class 1 or 2 with a partially electrically powered vehicle, the driving power shall not be delivered while moving forward at a speed of less than 3 km/h.	Start up speed need to be more than 5km/h.	P
	Verification shall be by the test of 7.1.2.		P
	b) for vehicles of class 1 or 2, it shall be possible for the user to power-off the driving power at any time during use in accordance with the driving power procedure described by the manufacturer in the instruction manual (see 7.3 and 19.4). For vehicles of class 3 or 4, the Driving power management shall not power-off motor power at any specified speed.		P
	Verification shall be by inspection and function test.		P
	c) for vehicles of class 1 and 2, the cut-off of driving power shall take priority over the maintenance of power assistance (for example, if the user holds his accelerator grip while he is actuating the brake, the power assistance shall be cut off).		P
	Verification shall be by the test of 7.1.2.		P
	Compliance with the following requirements shall be checked by the test methods described in 7.1.2;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	d) Vehicles of class 3 or 4 shall act as follows: 1) Horizontal level foot rests (maintain constant speed), 2) Tilt back of foot rest shall result in a progressive controlled braking, 3) Foot rest tilt to the front shall result in a progressive controlled acceleration, 4) The vehicle shall be self-balancing in all operating states. Verification shall be by inspection and function test.		N/A
	Verification shall be by inspection and function test.		N/A
	e) When the vehicle approaches the maximum speed of its class, the driving power shall be reduced in such a way that the maximum speed limit will not be exceeded. The driving power shall be managed smoothly and progressively.		P
	f) In the case where a class 1 or 2 vehicle is equipped with a mechanical brake system, the driving power shall be cut off at the commencement of braking (according to 15.4.2).		P
	g) In the case where the vehicle is equipped with an electric brake, the driving power management shall be such that braking starts immediately.		P
	h) For self-balancing vehicles, the driving power shall ensure that the vehicle speed cannot exceed the maximum speed of the vehicle's class.		N/A
	i) In case of overspeed during driving, the following shall apply to vehicles of class 3 or 4: 1) There shall be audible and if possible (in the particular vehicle) visual and other (physical) warnings to alert the user of a system issue. 2) In all cases, the vehicle shall be slowed automatically and brought to a safe speed (lower than the maximum speed).		N/A
	j) In case of overheating of the driving power management during driving, the following shall apply for vehicles of class 3 or 4: 1) There shall be audible and if possible (in the particular vehicle) visual and other (physical) warnings to alert the user of a system issue. 2) In all cases, the vehicle shall be slowed automatically and brought to a safe stop. 3) It shall not be possible to drive the self-balancing vehicle until the vehicle's control system detects that the initiating problem has been corrected.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	k) In case of insufficient battery power, the following shall apply for vehicles of class 3 or 4: 1) There shall be audible and if possible (in the particular vehicle) visual and other (physical) warnings to alert the user of a system issue. 2) In all cases, the vehicle shall be slowed automatically and brought to a safe stop. 3) It shall not be possible to drive the self-balancing vehicle until the vehicle's control system detects that the initiating problem has been corrected.		N/A
	l) Acceleration Limitation 1) The acceleration of the vehicle shall be smooth without shocks and limited to 2 m/s^2 in order to avoid unstable riding conditions.	1,6 m/s^2	P
7.1.2	**Test method**		---
7.1.2.1	**Test conditions**		---
	a) The test may be carried out on a test track, a test bench or on a roller.		P
	b) The test track shall comply with 8.1.2.2		P
	c) The speedometer shall be accurate to ± 2 %.		P
	d) The ambient temperature shall be between 5 °C and 35 °C.	23,7°C	P
	e) The maximum wind speed shall not exceed 3 m/s.	1,7m/s	P
	f) The battery shall be fully charged in accordance with the manufacturer's instructions.	Fully charged battery.	P
	g) The most onerous condition shall be applied (worst speed and gear ratio).		P
	h) With the vehicle operate under normal operation, but the motors are loaded to 33 % their locked rotor current by adjusting the load on its rotational axis in the forward direction.		P
7.1.2.2	Test procedure		---
	a) For vehicles class 1 or 2, check that no driving power is delivered while moving forward at a speed of less than 3 km/h. Compliance shall be checked, in accordance with the technology used, either by: 1) when attempting to drive the vehicle forward using the normal controls or procedures for speeds less than 3 km/h, measuring the no-load current or checking the torque delivered to the driving wheel		P

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Clause	Requirement + Test	Result - Remark	Verdict
	b) For vehicles of class 1 or 2 check whether the power assistance is cut-off when the brake is applied. Compliance shall be checked, in accordance with the technology used, by: 1) measuring the no-load current or checking the torque delivered to the driving wheel before and after actuating the direct or indirect braking system. 2) reproducing the power assistance cut-off situation 30 times. The power assistance shall not continue after actuation of the braking system. Power assistance may resume immediately after releasing the braking device.		P
	c) At the end of the tests, the power assistance cut-off systems shall be made to fail (to simulate, for example, cable detachment or failure of a sensor). It shall no longer be possible to activate the power assistance by any means whatsoever.		P
	d) With the vehicle at standstill or if the electric power doesn't start at 0 km/h: bring the vehicle in a stable riding position at 6 km/h (±2 km/h) and with the vehicle operate under normal operation, but the motors are loaded to 33 % of their locked rotor current by adjusting the load on its rotational axis in the forward direction.		P
	Move the acceleration device to its maximum position and keep it in this position until the vehicle reaches 60 % of its maximum speed.		P
	Measure the time from the start until the vehicle reaches 50 % of its maximum speed. Calculate the acceleration.		P
	Calculate the acceleration.		P
7.2	**Power failure of control system**		P
	For class 1 and class 2 vehicles, in the event of an electrical power failure the vehicle shall be able to brake normally or, shall come to a standstill with a deceleration between (1,5 - 2) m/s^2.	Brake normally with mechanical brake at rear wheel.	P
	For class 3 and class 4 vehicles, a fault condition in the power control system shall be indicated by a warning signal (visual, audible, vibrating…) on the handlebar, the vehicle itself or to the remote control (see 17).		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	In a driving condition the loss of connection to the warning device, on the remote control, shall result in a speed reduction to 6 km/h or less for a Class 4 vehicle; the speed reduction shall happen in a safe manner without creating additional hazards with corresponding audio notification and tilt back of decks on self-balancing vehicles.		N/A
7.3	**Unintended or unauthorized use of vehicle**		P
	Means shall be provided to prevent an unintended or unauthorized use of the vehicle, e.g. keys, locks, electronic control device.		P
8	**Speed limitation**		P
8.1	**Pedestrian mode (Walk mode)**		P
8.1.1	**General**		P
	Vehicles classes 2 and 4 shall be equipped with a pedestrian mode for limiting the speed to a maximum of 6 km/h.	Pedestrian mode(walk mode) activated by Bluetooth setting and maximum speed <6km/h.	P
	A distinctive and visible warning light shall be provided to indicate both to the user and others in the vicinity of the vehicle when pedestrian mode is in operation. It shall be active only when the pedestrian mode is activated.		P
	Verification shall be in accordance with 8.1.2.		P
8.1.2	**Test method**		---
8.1.2.1	**Test conditions**		---
	a) The test may be carried out on a test track, a test bench or on a roller b) The speed measuring apparatus and test conditions shall have the following characteristics: 1) accuracy: ± 2 %; 2) Resolution: 0, 1 km/h. c) The ambient temperature shall be between 5 °C and 35 °C. d) Maximum wind speed: 3 m/s. e) The battery shall be fully charged in accordance with the manufacturer's instructions. f) With the vehicle operate under normal operation, but the motors are loaded to 33 % of their locked rotor current by adjusting the load on its rotational axis in the forward direction.	Ambient temperature:29,6°C Maximum wind speed: 1,7m/s	P
8.1.2.2	Characteristic of the test track		---

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Clause	Requirement + Test	Result - Remark	Verdict
	The gradient of the track shall not exceed 0,5 %. If the gradient is less than 0,2 % carry out all runs in the same direction. If the gradient lies between 0,2 % and 0,5 % carry out alternate runs in opposite directions;		N/A
	The surface shall be hard, of concrete or fine asphalt free from loose dirt or gravel. The minimum coefficient of friction between the dry surface and the vehicle tyre shall be 0,75.		N/A
8.1.2.3	Characteristic of the test bench		---
	The test bench shall simulate normal road conditions.		N/A
8.1.2.4	Characteristic of the roller		---
	The test roller shall support with bearing to decrease the resistance, load need to add to the roller to reach rated current (see Figure 2).		P
8.1.2.5	Test procedure a) Prepare the vehicle by running it for 5 min at 80 % of the maximum power speed as declared by the manufacturer, then stop it. b) Actuate the mode for limiting the speed to 6 km/h (or less) and check whether the speed operating range of the power assistance is limited to 6 km/h (or a lower value).		P
8.2	**Maximum speed with power assistance**		P
8.2.1	**Requirements**		P
	The maximum speed for which the electric motor gives assistance shall be in accordance with the maximum permitted speed for the class. It may differ by (± 10 %) of the maximum speed marked on the vehicle given in the instruction manual/sheet and determined according to the test method described in 8.2.2.The maximum speed in this mode shall not exceed 25 km/h.		P
8.2.2	**Test method**		---
8.2.2.1	**Test conditions**		---
	The test shall be performed in accordance with 8.1.2.1, 8.1.2.2 and 8.1.2.3.		P
8.2.2.2	**Test procedure**		---
8.2.2.2.1	**Test for vehicle with 100 % electric propulsion**		P
	If performed with a test bench:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Put the vehicle on the bench and bring it to the maximum achievable speed and maintain the speed for 60 s at least.		P
	b) Measure the vehicle speed by measuring the speed of the test bench.		P
	If performed with a test track:		N/A
	c) Put the vehicle on the track and bring it to the maximum achievable speed and maintain the speed for 60 s at least;		N/A
	d) Measure the vehicle speed.		N/A
	e) The measured speed shall not exceed 25 km/h (± 10) % and the maximum speed (± 10) % indicated by the manufacturer in the instruction manual/sheet if lower.	Max. Speed measured on the sample which claims a maximum speed of 25km/h: 24,4 km/h.	P
8.2.2.2.2	**Test for vehicle partially electrically powered**		N/A
	a) The test shall be carried out on a bench powered such that the speed of the PLEV can be increased to 120 % of the maximum speed achievable solely under electrical power and the speed of the vehicle shall be measurable in accordance with 8.1.2.1;		N/A
	b) Put the vehicle on the bench and bring it to the maximum speed achievable solely with vehicle electrical power.		N/A
	c) Using the test bench drive increase the vehicle speed to 120 % of the maximum speed achievable solely with vehicle electrical power and maintain for 30 s. The measured speed shall not exceed 25 km/h (± 10) % and the maximum speed (± 10) % indicated by the manufacturer in the instruction manual/sheet if lower.		N/A
	d) Disconnect the test bench drive while maintaining the vehicle speed control at maximum achievable setting. Measure the vehicle speed.		N/A
8.3	**Reverse mode**	No reverse mode.	N/A
8.3.1	**Requirement**		N/A
	Vehicles with a reverse driving function shall be equipped with a device limiting its speed to 6 km/h when travelling in reverse. If travelling in reverse, an active sound signal shall be audible.		N/A
8.3.2	**Test method**		---
	The test shall be carried out on a test bench as follows:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Prepare the vehicle by running it for 5 min at 80 % of the speed corresponding to maximum power as declared by the manufacturer, then stop it.		N/A
	b) Drive the test bench to simulate driving the vehicle in the reverse direction of travel at the maximum achievable speed. Check that the speed operating range of the power assistance is limited to 6 km/h (or a lower value).		N/A
9	**Electromagnetic compatibility**		P
10	**Charging of batteries**		P
10.1	**General**		P
	If a vehicle has an integrated and built-in battery charging system (i.e; integrated charger), the user shall be protected against hazards due to accidental contact with the charging connections on the vehicle and its charging systems. For enclosures of charging system, see 6.4 Moisture resistance.		P
	Battery charging systems shall be in accordance with EN IEC 62485 series and EN 60204-1 or EN 60335-2-29:2004 as appropriate.		P
	The charging system shall prevent any hazards arising because of overloading, overcharge and overcurrent and over discharge determined according to the test method described in 10.2.		P
10.2	**Test method**		---
	Component parts in the charging system are faulted as below 1) to 4), one at a time, if the outcome of such a fault is uncertain based upon analysis.		P
	1. open-circuit at the terminal of any component, other than a monolithic integrated circuit.		P
	2. short-circuit of capacitors, unless they comply with EN 60384-14:2013.		P
	3. short-circuit of any two terminals of an electronic component, other than a monolithic integrated circuit. This fault is not applied between the two circuits of an optocoupler.		P
	4. short-circuit is introduced to the charging system across a component or between adjacent PCB tracks at a location expected to produce the most unfavourable results to evaluate the effect of back-feed from the battery.		P
	For each fault condition introduced, the state of the battery before charging is as follows:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	A series configured battery shall have a deliberate imbalance. The imbalance is introduced into a fully discharged battery by charging one cell to approximately 50 % of full charge or less.		P
	Conduct the charging test, each cell voltage is continuously monitored to determine if it has exceeded the limit condition. Venting of the cells is permitted.		P
	For vehicles with external battery charging system, charging contacts and plugs shall be designed in a way that accidently touching live parts is prevented (e.g. caps for plugs and outlets).		P
	Voltage between charging contacts shall conform to appropriate standards according to the application and/or environment of the charging systems, such as EN 60204-1, EN 61140:2016, EN 60335-2-29:2004 and EN 61851:2001 (all parts).		P
	Battery charging currents shall be chosen to be as low as reasonably practicable.		P
10.3	**Safeguarding and complementary protective measures**		P
	The following measures shall be applied where appropriate:		P
	— charging systems shall be designed in such a way that the charging connections are only activated when the vehicle is connected to them;		P
	— charging systems shall display the charging status or give a signal when the battery is fully charged;		P
	— charging systems shall be designed in such a way that the correct charging of the battery is automatically supervised, and thus hazards caused by overloading or charging of deeply discharged batteries are prevented.		P
11	**Energy storage within the vehicle**		P
11.1	**Requirements**		P
	The vehicle as well as the sets of energy storage (i.e. battery) shall be designed and constructed such as to prevent any risk of fire and mechanical deterioration resulting from foreseeable abnormal use. Compliance with this requirement is checked by the test described in 11.2.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	During the test, the vehicle and the batteries shall not emit any flames, molten metal or release any toxic or flammable gas in hazardous amounts. Protective enclosures shall show no damage when checked visually.		P
	Safety and compatibility of the charger/battery assembly shall be provided in accordance with the charger/battery manufacturer's specifications.		P
	Any exposed person shall be protected from direct or indirect contact with live parts on the vehicle.		P
	The energy storage shall be protected in order to prevent any accidental short circuit. It is necessary to ensure that batteries are protected against any overcharging, a suitable protective device against overheating and short circuits shall be provided.		P
11.2	**Test method**		---
	The test shall be conducted according to EN 62133 (all parts) or, as follows:	Approved battery	P
	a) Battery terminals are short-circuited using fully charged batteries.		N/A
	b) Motor terminals are short-circuited; all of the controls are in ON position and batteries fully charged.		N/A
	c) The vehicle is operated with the electric motor or drive system locked so as to fully discharge the battery or until the system stops.		N/A
	d) The battery is charged for double the recommended charging period or for 24 h, choosing the longest of these two periods.		N/A
	Verification: there shall be no visible damage for a), b), c) and d) and no overvoltage for d).		N/A
12	**Structural integrity**		P
12.1	**General**		P
12.1.1	**Numbers and conditioning of samples**		P
	In general, for static, impact and fatigue tests, each test shall be carried out on a new sample, but if only one sample is available, it is permissible to carry out all of the tests on the same sample by following the fatigue, then static and then impact test sequence.		P
	When more than one test is carried out on the same sample, the test sequence shall be clearly recorded in the test report or record of testing.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	It should be noted that if more than one test is carried out on the same sample, earlier tests can influence the results of subsequent tests. Also, if a sample fails when it has been subjected to more than one test, a direct comparison with the result of a single test is not possible.		P
	For all strength tests, samples shall be fully assembled.		P
12.1.2	**Test condition tolerances**		P
	Unless stated otherwise, tolerances on the nominal values shall be:		P
	— forces and torques 0/+ 5 % — masses +/− 1 % — dimensions +/− 1 mm — angles +/− 1° — duration +/− 5 s — temperatures +/− 2 °C — pressures +/− 5 %		P
12.1.3	**Crack detection**		P
	Standardized methods may be used to highlight the presence of cracks when visible cracks are specified as criteria of failure in the tests described in this standard.		P
12.2	**Static load test**		P
12.2.1	**Deck/frame**		P
12.2.1.1	**Requirement**		P
	When tested according to the method described in sub Clauses 12.2.1.2, 12.2.1.3 or 12.2.1.4 there shall be no cracks or fractures, or collapse of the structure, or unfolding. Where the construction of the vehicle does not allow the full mass to be applied in normal use to each deck then the maximum mass is divided by two to achieve the test load for each deck.		P
12.2.1.2	**Test method – 2-wheeled single track vehicle**		P
	Progressively apply a mass of 100 kg or, when greater, a mass equal to the maximum permissible payload marked on the vehicle in accordance with 19.2.1 and multiplied by a safety factor of 2,5 during 1 min with a flat device having a surface of 100 mm × 100 mm to the centre of one or two deck(s) (see Figure 3).		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If plastic material is used for the deck or steering system the kick scooter has to be conditioned for at least 6 h at a temperature of (−5 ± 1) °C. Start the test within 1 min of removing the PLEV from the conditioning environment and complete it within 5 min.		P
12.2.1.3	**Test method – 3-wheeled vehicle**		N/A
	Progressively apply a mass of 100 kg or, when greater, a mass equal to the maximum permissible payload marked on the vehicle in accordance with 19.2.1 and multiplied by a safety factor of 2,5 during 1 min with a flat device having a surface of 100 mm × 100 mm to the centre of the two following positions a and b simultaneously (see Figure 4).		N/A
	If plastic material is used for the deck or steering system the 3-wheeled vehicle has to be conditioned for at least 6 h at a temperature of (−5 ± 1) °C. Start the test within 1 min of removing the PLEV from the conditioning environment and complete it within 5 min.		N/A
12.2.1.4	**Test method – self-balancing vehicle**		N/A
	Progressively apply a mass of a minimum of 100 kg or, when greater, a mass equal to the maximum permissible payload marked on the vehicle in accordance with 19.2.1 and multiplied by a safety factor of 2,5 during 1 min with a flat device having a surface of 100 mm × 100 mm to the centre of each deck (see Figure 5).		N/A
	If plastic material is used for the deck or steering system the self-balancing vehicle has to be conditioned for at least 6 h at a temperature of (−5 ± 1) °C. Start the test within 1 min of removing the PLEV from the conditioning environment and complete it within 5 min.		N/A
12.2.2	**Handle bar and steering column**		P
12.2.2.1	**Bending test**		P
12.2.2.1.1	**Requirements**		P
	When tested according to the method described in 12.2.2.1.2, there shall be no cracks or fractures, or deterioration of the operation of the handlebar or steering column.		P
12.2.2.1.2	**Test methods**		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The steering column shall be in maximum high position and centrally loaded with a 50 kg mass, applied in directions A and B, each for 1 min, as shown in Figure 6.		P
	The handlebar shall be in maximum high position and loaded with a 50 kg mass divided in two, for 1 min, as shown in Figure 7.		P
12.2.2.2	**Vertical loading test**		P
12.2.2.2.1	**Requirements**		P
	Following the test performed according to the method described in 12.2.2.2.2, there shall be no cracks or fractures, or deterioration of the operation of the handlebar or steering column. Nor shall there be any movement of the telescopic part.		P
12.2.2.2.2	**Test method**		P
	The handlebar shall be assembled in accordance with the manufacturer's instruction manual/sheet.		P
	Draw out the telescopic tube up to half of its adjustment range (± 1 cm) and engage the locking system.		P
	Load the vehicle by applying a mass “m” of 50 kg simultaneously to the centre of each hand grip in directions A as shown in Figure 8.		P
	Maintain the load for 1 min.		P
	Determine whether the head tube has not become separated, the handlebar has not moved, the locking systems are still operational and engaged and whether the operation of the handlebar or steering column has not deteriorated.		P
12.2.2.3	**Torque test**		P
12.2.2.3.1	**Requirement**		P
	When tested according to the method described in 12.2.2.3.2, there shall be no movement of the handlebar stem in relation to the steering tube.		P
12.2.2.3.2	**Test method**		P
	If necessary, assemble the handlebar and the steering column according to the manufacturer's instructions.		P
	— Lock the fork in rotation.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	— Apply a torque C of 20 Nm once in each direction of possible rotation in a plane perpendicular to the axis of the handlebar/fork assembly. Maintain each torque for 1 min.		P
12.2.2.4	**Handlebar grips and plugs**		P
12.2.2.4.1	**Requirements**		P
	The ends of the handlebar shall be fitted with grips or end plugs. When tested according to the method described in 12.2.2.4.2, the grips or plugs shall withstand a dismantling force of 70 N.		P
12.2.2.4.2	**Test method**		P
	Leave the handlebar to reach ambient temperature then apply a force of 70 N to the grip or plug in the dismantling direction. Maintain the force for 1 min.		P
	An example of handlebar grip drawing attachment is given is Figure 10.		P
12.2.2.5	**Telescopic handlebar (if fitted)**	No telescopic handlebar.	N/A
	The handlebar stem shall be provided with one of the two following means to guarantee a safe insertion depth into the steering column:		N/A
	a) the handlebar stem shall be provided with a permanent, transverse mark, of a length greater than or equal to the external diameter of the handlebar stem clearly indicating the minimum depth for inserting its rod into the steering column. The insertion mark shall be positioned at least 2,5 times the external diameter of the rod from the lower end of the handlebar stem. The length of the solid section of the handlebar stem below the mark shall be at least equal to the external diameter of the rod;		N/A
	b) the handlebar stem shall be provided with a permanent stop to prevent it from being drawn out of the steering column beyond the minimum insertion depth defined in a).		N/A
12.3	**Frontal impact resistance**		P
12.3.1	**Requirements for class 2**		P

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Clause	Requirement + Test	Result - Remark	Verdict
	When tested according to the method described in 12.3.3, there shall be no visible cracks or fractures in any point of the folding mechanism -head tube-handlebar assembly. There shall be no visible cracks or fractures in any part of the frame and there shall be no separation of any elements of the suspension system. The assembly remains operational even if significant clearances are found. These clearances are acceptable if they do not involve the safety of the user. In particular, the locking of the folding system, if any, shall be checked when the scooter is unfolded		P
	If applicable, the folding mechanisms shall remain locked.		P
12.3.2	**Test method for vehicle of class 2**		P
	Adjust the handlebar at the maximum height.		P
	The frame is mounted on a rigid fixture by the rear axle attachment points.		P
	The frame is loaded with masses and can turn around the rear axle. The assembly is rotated about the rear axle and then let falling down on the anvil. M1: 50 kg; M2: 2x10 kg		P
	As shown in Figure 11, mount the assembly at its rear axle attachment points so that it is free to rotate about the rear axis in a vertical plane.		P
	The sample shall be fitted with the front wheel		P
	Securely fix mass M1 on the deck. The centre of the mass is aligned with the centre of the deck (Figure 11). The length of the platform is 100 mm and it shall cover the whole width of the deck.		P
	Securely fix masses M2 on each side of the handlebar (see Figure 11).		P
	Support the front fork on a flat steel anvil so that the frame is in its normal position of use.		P
	Rotate the assembly around the rear axis until the distance d between the wheel and the anvil is (200 ± 1) mm (see Figure 12). Then allow the assembly to fall freely to impact on the anvil.		P
	Repeat the test and then check for damages.		P
12.3.3	**Requirements for class 4**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	When tested according to the method described in 12.3.4, there shall be no visible cracks or fractures in any part of the frame and there shall be no separation of any elements of the suspension system. The assembly remains operational even if significant clearances are found. These clearances are acceptable if they do not involve the safety of the user.		N/A
12.3.4	**Test method for vehicle of class 4**		N/A
	The vehicle shall jump/drive over at 8-10 km/h of a pavement step down (foreseeable risk) where the step should be limited to 1/4 height of the wheel diameter (see Figure 13). The test shall be conducted with the mass of the maximum design load separated to the two platforms. If appropriate, tyre pressure shall be adjusted according to the maximum value given by the manufacturer.		N/A
	Repeat the test and then check for damages.		N/A
12.4	**Fatigue test (dynamic)**		P
12.4.1	**General**		P
	All types of vehicles fitted with a mechanical linked handlebar shall be subjected to this test.		P
	The head tube/steering clearance/fork link can influence failures during handlebar fatigue tests. For this reason, a handlebar shall always be tested on a complete product. When there is a folding mechanism, this enables the handlebar's strength to be tested at the same time.		P
	In the case of suspension frames where the rigidity of the suspensions can be adjusted, adjust the suspensions to provide maximum stiffness.		P
	In the case of a pneumatic damper for which the air pressure cannot be adjusted, replace the suspension unit with a rigid link, making sure that the end fastening systems and the lateral rigidity accurately simulate the characteristics of the original system.	No pneumatic damper.	N/A
	For suspension frames on which the chain stays do not have pivots but use the bending phenomenon, check that any dampers are adjusted to provide the minimum strength in order to ensure a suitable check of the frame.	No such device.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	When a suspension frame has adjustable supports or links to vary the strength of the scooter against the ground-contact forces or to modify the attitude of the scooter, position these adjustable components to ensure maximum forces in the frame.	No such device.	N/A
12.4.2	**Requirements**		P
	When tested according to the method described in sub Clauses 12.4.3 to 12.4.5, there shall be no visible cracks or fractures in any point of the folding mechanism -head tube-handlebar assembly. There shall be no visible cracks or fractures in any part of the frame and there shall be no separation of any elements of the suspension system. The assembly remains operational even if significant clearances are found. These clearances are acceptable if they do not involve the safety of the user. In particular, the locking of the folding system, if any, shall be checked when the scooter is unfolded.		P
12.4.3	**Test method for a 2-wheeled single track vehicle**		P
	Use a new product for the test.		P
	A complete vehicle shall withstand the fatigue test.		P
	This test is carried out on a test apparatus as shown in Figure 14:		P
	— a circumferential speed of 0,8 m/s — a distance of 25 km. — a diameter of the drum of minimum of 700mm — a mass of 100 kg shall be placed centrally on the free space of the deck (see Figure 3). — a mass of 10 kg shall be placed on the handlebar in maximum extended position. — the distance between the raised sections shall be such that the vehicle passes over one ramp every 1,5 s.		P
	For testing multi-track vehicles, the raised sections shall be displaced so that the wheels do not travel over these raised sections simultaneously. The sections shall be spaced so that each wheel travels over two sections per second.		P
12.4.4	**Test method for a 3-wheeled vehicle**		N/A
	Use a new product for the test.		N/A
	A complete vehicle shall withstand the fatigue test.		N/A
	This test is carried out on a test apparatus as shown in Figure 14:		N/A
	— a circumferential speed of 0,8 m/s		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	— a distance of 25 km.		N/A
	— a diameter of the drum of minimum of 700mm		N/A
	— a mass of 100 kg shall be placed centrally on the free space of the deck (see Figure 3).		N/A
	— a mass of 10 kg shall be placed on the handlebar in maximum extended position.		N/A
	— the distance between the raised sections shall be such that the vehicle passes over one ramp every 1,5 s.		N/A
	For testing multi-track vehicles, the raised sections shall be displaced so that the wheels do not travel over these raised sections simultaneously. The sections shall be spaced so that each wheel travels over two sections per second.		N/A
12.4.5	**Test method for a self-balancing vehicle**		N/A
12.4.5.1	**General**		N/A
	This test consists of 3 steps: (1) setting-up for the test, (2) test motion and (3) inspection. This test utilizes three apparatus: (1) test road, (2) a test load and (3) a supporting device (if necessary for maintaining the position of the vehicle during testing).		N/A
	The apparatus (1) test road simulates environment of the intended use of the vehicle, and typically employs a test drum or a treadmill.		N/A
	Determine the specifications of the (2) test load according to the maximum permissible load or according to the weight of intended users.		N/A
12.4.5.2	**Apparatus**		N/A
	The apparatus required shall include the following:		N/A
	a) Swept Sinusoidal Vibration test		N/A
	The vehicle is firmly secured to the platform of the vibration machine in its normal operating position. Supports may be used to maintain the normal operating position but care shall be taken to ensure these do not affect the results of the test.		N/A
	The vibration shall be a sinusoidal waveform with logarithmic sweep between 7 Hz and 200 Hz and back to 7Hz traversed in 15 min. This cycle shall be repeated 12-times for a total of 3 h.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	From 7 Hz to a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained as 0,8 mm (1,6 mm total excursion) and the frequency increased until a peak acceleration of 2 gn occurs (approximately 25 Hz). A peak acceleration of 2 gn is then, maintained until the frequency is increased to 200 Hz.		N/A
	b) Test weight:		N/A
	The test mass shall be applied to the vehicle by a test dummy or where a dummy is not required by an appropriate mass in accordance with the following:		N/A
	- Test dummy		N/A
	A test dummy shall be used when it is necessary to simulate the body mass distribution and kinematics of the user and any accessories (e.g. back pack).		N/A
	Its mass shall simulate the weight of the self-balancing vehicle user where applicable. The total mass shall be the maximum mass of intended user and any accessories (e.g. back pack).		N/A
	- Mass		N/A
	When a test dummy is not required a mass equivalent to the maximum mass of the intended users and any accessories (e.g. back pack) shall be applied.		N/A
	c) Supporting device		N/A
	When the self-balancing vehicle is not able to maintain its position on the test road by itself, a supporting device shall be provided. The supporting device shall hold the self-balancing vehicle either directly or through a suitably connected dummy without affecting the outcome of the test.		N/A
12.5	**Procedure**		N/A
	a) The self-balancing vehicle is positioned on the vibration machine supporting if necessary in accordance with 12.4.5.2 and either, as appropriate, with the test load or test dummy applying the load(s) in accordance to 12.4.5.2.		N/A
	b) Visible damage such as fractures, deformation, jiggling, looseness or disengagement of parts, and changes in self-balancing vehicle function shall be recorded.		N/A
13	**Edges and protrusions**		P
13.1	**General**		P

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Clause	Requirement + Test	Result - Remark	Verdict
	These requirements are intended to address the hazards associated with the users of vehicles falling on projections or rigid components (e.g. handlebars, levers) on vehicle possibly causing internal injury or skin puncture.		P
13.2	**Sharp edges**		P
	Adequate shape shall be given to avoid puncturing of the body.		P
13.3	**Protrusions**		P
	Tubes and rigid components in the form of projections which constitute a puncture hazard to the user shall be protected.		P
	Screw threads which constitute a puncture/cut hazard shall be limited to a protrusion length of one major diameter of the screw beyond the internally threaded mating part.		P
14	**Moving parts**		P
14.1	**Clearance between moving parts**		P
	To prevent crushing of fingers the distance separating accessible moving parts from other moving parts or from fixed parts of the vehicle shall, either be less than 5 mm, or greater than 18 mm in any position.		P
	This requirement does not apply to the wheel with its support systems, or to the rear brake/braking system, if any, or to brake actuating levers.		P
14.2	**Guarding of moving parts**		P
	Wheels shall be covered to avoid unintentional contact between a foot of the user and the moving wheel.		P
14.3	**Folding mechanism**		P
14.3.1	**General requirement**		P
14.3.1.1	**General**		P
	Vehicles that can be folded for storage or transportation shall be fitted with one or more locking mechanism(s). The locking mechanism(s) shall comply with the requirements in 14.3.1.3.		P
	The function of any operating or locking device shall not be impaired after being tested in accordance with 14.3.1.2.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Folding mechanisms shall be designed so that the vehicles can be locked for use in a simple, stable and safe way and folding shall not damage cables.		P
	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.		P
14.3.1.2	**Incomplete deployment**		P
	To avoid hazards due to incomplete deployment, at least one locking device shall engage automatically when the vehicle is unfolded for use.		P
	If the locking device is not visible without damaging the vehicle, a second sample may be used.		P
14.3.1.3	**Unintentional release of locking mechanism(s)**		P
	To avoid unintentional release, one of the following conditions shall be fulfilled:		P
	a) there shall be at least one operating device which fulfils the following:		N/A
	1) the operating device shall require at least two consecutive actions, the second being dependent on the first having been carried out and maintained by the user ; and		N/A
	2) the operating device shall not be activated or damaged in one single action during testing in accordance with 14.3.1.3;		N/A
	or		-
	b) there shall be two separate and independent operating devices which fulfil one of the following:		P
	1) where one operating device is intended to be operated by foot (e.g. by its position, shape, according to the manufacturer's instructions for use.) it shall automatically return to its original status and the locking device shall reengage; or		N/A
	2) where both operating devices are intended to be operated by hand(s) (e.g. by their position, shape, according to the manufacturer's instructions for use.) they shall both automatically return to their original status and the locking devices shall reengage.		P
	When tested in accordance to 14.3.2, the vehicle shall not fold and the locking device(s) shall not be released.		P
14.3.2	**Test methods**		P

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Clause	Requirement + Test	Result - Remark	Verdict
14.3.2.1	**Preconditioning**		P
	Operate the locking devices 200 times.		P
14.3.2.2	**Unintentional release of the locking mechanism by one single action**		P
	Place the vehicle fully deployed and ready for use on a horizontal flat surface.		P
	Apply a force of 150N or a torque of 2,2 Nm to the locking device. This force or torque shall be applied to the locking device in the direction most likely to open the locking device in one single action. The force or torque shall be applied for a period of 5 s.		P
	Folding mechanism shall not be released.		P
15	**Adequate stability (see D.10)**		P
15.1	**Footrest/ deck**		P
	In case the user is standing permanently, each deck shall be equipped with an anti-slide surface with an area of at least 150 cm^2.		P
	In case the user is seating normally (not standing) while driving, the footrest shall be anti-slide and shall have a minimum length of 6,5 cm.	No seating	N/A
	In case the user is standing momentarily and the vehicle has an integrated seat, the footrest shall be anti-slide and shall have a minimum length of 6,5 cm and a minimum width of 10 cm (see Figure 15).		N/A
15.2	**Handlebar adjustment**	No adjustable handlebar	N/A
	The handlebar height adjustment system shall be fitted with devices to avoid inadvertent separation or detachment during use.		N/A
15.3	**Surface**		P
15.3.1	**Slippery surface**		P
15.3.1.1	**Requirements for wheel adhesion**		P
	The wheels shall be constructed from non-slip material. This requirement is considered to be fulfilled if a coefficient of adhesion, μ0, of at least 0,30 is achieved in the test according to 15.3.1.2		P
15.3.1.2	**Wheel adhesion test**		P
	Wheel adhesion shall be tested by pulling a clean wheel along a steel plate having a fine brushed and degreased surface of arithmetical mean roughness Ra of 1,5 ìm to 2,0 ìm (see Figure 16).		P

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Clause	Requirement + Test	Result - Remark	Verdict
	A vertical force F1 of 100 N shall be applied to the wheel which is moved along the steel plate perpendicular to the vehicle's longitudinal axis and perpendicular to the surface brush direction by a horizontal force F2, applied at the height of the wheel's axis.		P
	The maximum force shall be recorded.		P
	The test shall be repeated 10 times and the mean value of F2 shall be calculated.		P
	The test shall be carried out at a speed of approximately 1 mm/s.		P
	The coefficient of adhesion shall be calculated according to Formula (1): $\mu_0 = \frac{F_2}{m_E \cdot g + F_1}$		P
15.3.2	**Irregular surface**		P
	When loaded with a 90 kg mass, the dimensions of the tyres of the vehicle shall be:		P
	a) For vehicle with aligned wheels or with one front wheel:		P
	— the front tyre shall have a minimum diameter of 125 mm and a **minimum width of 25 mm**		P
	— the rear tyre shall have a **minimum width of 25 mm**		P
	b) For self-balancing vehicle:		N/A
	— the tyre shall have a minimum diameter of 125 mm and **a minimum width of 25 mm**		N/A
	c) For all others vehicles:		N/A
	— the tyre shall have a minimum diameter of 125 mm or **a minimum width of 25 mm**		N/A
15.4	**Braking devices**		P
15.4.1	**General**		P
	All vehicles shall be equipped with service brake system and, when indicated, a parking brake or parking device as follows:		P
	a) Class 1 and 2 single track vehicles (e.g. vehicle with aligned wheels) shall be equipped with at least one braking device;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Class 1 and 2 multi-track vehicles (e.g. vehicle with unaligned wheels) shall be equipped with a parking device and one of the following:		N/A
	1) If there are two rear wheels, the vehicle shall be equipped with a braking device on all rear wheels or an independent front and a combined rear wheels brake. The braking device shall be operated by the actuation of a single control or all wheel integrated braking system,	Mechanical brake at rear wheel.	N/A
	2) If there is one rear wheel, the vehicle shall be equipped with all wheel integrated braking system or with independent front wheel and rear wheel brakes;		N/A
	c) Class 3 and 4 multi-track vehicles shall be equipped with an acceleration controlled braking system.		N/A
	d) Class 3 and 4 single track self-balancing vehicles shall be equipped with a brake.		N/A
	When a parking brake or parking device is not required, instructions to avoid the vehicle running away when unattended shall be provided in the owner's manual.		N/A
15.4.2	**Braking performance**		P
15.4.2.1	**General requirements**		P
	All vehicle shall meet each of the requirements specified in the following paragraphs unless otherwise indicated.		P
	A vehicle shall have a configuration that enables a user to actuate the braking device by hand with a lever or by foot while being in a normal driving position and with both hands on the steering control.	By hand with a lever.	P
	In case the vehicle is not equipped with a handle bar, the actuation of the braking device shall be performed according to the instructions provided by the manufacturer in accordance with the second sentence of 7.1.1.d). These instructions shall be a part of the user's manual.		N/A
15.4.2.2	**Hand operated braking system – Strength test**		P
	There shall be no failure of the braking system or of any component thereof when tested in accordance with 15.4.3.2.		P
15.4.2.3	**Dry stop**		P

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Clause	Requirement + Test	Result - Remark	Verdict
	When the brakes are tested in accordance with the test procedure set out in 15.4.3.4, the following condition shall be met:		P
	- the Mean Fully Developed Deceleration (MFDD) shall be: ≥ 1,7 (m/s^2).		P
	The vehicle speed at the start of braking shall be 90 % of the maximum speed of the vehicle achievable solely by power assistance.		P
15.4.2.4	**Vehicle behaviour during braking**		P
	During the tests (see Clause 15.4.3), the following shall not occur in a way which causes the user to have to use his feet, other than for the application of the brake, to control the vehicle:		P
	a) excessive juddering;		P
	b) front wheel locking;		P
	c) vehicle instability (for example, uncontrollable lifting of the rear wheel);		P
	d) user's loss of control or balance;		P
	e) excessive side-skidding.		P
15.4.2.5	**Electric failure braking compensation**		P
	In the event of an electric braking failure, the vehicle shall be able to brake normally or, shall come to a standstill with a minimum deceleration of 1,25 (+/– 0,25) m/s^2 as describe in 15.4.3.5.	Brake normally with mechanical brake at rear wheel.	P
15.4.2.6	**Parking device**		N/A
	When required in accordance with 15.4.1, the parking device shall make it possible to maintain the vehicle stationary on up or down gradient of 18 % even in the absence of the user. The user shall be able to achieve this parking action from the riding position.		N/A
	The parking device system shall have a control which is separate from the service braking device controls. The vehicle shall be held in the locked in the parking position by a purely mechanical device.		N/A
15.4.3	**Test methods**		P
15.4.3.1	**Braking test force applications**		P
	a) Actuation by hand		P
	The braking actuation forces shall be less than 200 N when measured at 25 mm from the end of the hand lever.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Actuation by foot		N/A
	After checking that the braking system is correctly adjusted in accordance with the manufacturer's instructions, apply a force to the brake pedal so that the resulting force is vertical to the direction of riding. The vertical force on the brake pedal shall be 700 N, or any other lesser value required to achieve the required performance.		N/A
15.4.3.2	**Hand operated brake strength test**		P
	The test shall be performed on a fully-assembled vehicle. The brake operating systems shall withstand the applied force.		P
	After checking that the braking system is correctly adjusted in accordance with the manufacturer's instruction manual/sheet, apply a force to the brake lever at the point specified in 15.4.3.1. This force shall be 450 N, or any other lesser value required to bring:		P
	a) the brake lever into contact with the handlebar grip or, where there is no grip, the handlebar;		P
	b) the brake lever extension to the same level as the surface of the handlebar or into contact with the handlebar.		P
	Repeat the test 10 times for each brake lever or brake lever extension.		P
15.4.3.3	**Brake performance test conditions (classes 2 and 4)**	Class 2	P
	The mass (*M*t) of the vehicle shall be Technical Permissible Maximum Mass (TPMM).		P
	The test track shall be a clean, dry, level surface, with a gradient ≤ 1 %; with good adherence (e.g. asphalt or concrete) and with the test lane of 1,20 m width.		P
	The ambient temperature shall be between 5 °C and 35 °C. The wind speed shall be no more than 3 m/s.	Ambient temperature:23,7°C Maximum wind speed: 1,7m/s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The user shall be in a position as for normal riding and shall maintain the same position throughout the test. The speed and distance shall be determined using instrumentation having an accuracy of ± 1 % at the prescribed speed for the test. The mean fully developed deceleration (MFDD) may be determined by other methods than the measurement of speed and distance; in this case, the accuracy of the MFDD shall be within ± 3 %.		P
	Pneumatic tyres shall be inflated in accordance with the manufacturer's instruction manual/sheet for the vehicle loading condition for the test.		P
	Vehicle position and wheel locking:		P
	— The vehicle is positioned in the centre of the test lane for the beginning of each stop;		P
	— Stops are made without the vehicle wheels passing outside the applicable test lane and without wheel locking.		P
	A running-in cycle shall be performed on each brake before the performance tests are carried out.		P
	Actuate the brakes for at least three seconds to obtain steady deceleration whilst the vehicle is riding at a speed of approximately 90 % of the maximum speed achievable solely with power assistance. Repeat this operation 10 times.		P
	All types of brakes shall be subject to this running-in phase.		P
	The following tests shall be carried out to measure the data required to determine MFDD in accordance with 15.4.3.4, formula (5):		P
	a) If the gradient of the track is less than 0,2 %, the following measurements shall be taken in the order presented:		P
	1) five valid measurements in dry conditions;		P
	2) two preparation tests in wet conditions (results not recorded);		P
	3) five consecutive valid measurements in wet conditions.		P
	b) If the gradient of the track is between 0,2 % and 0,5 %, the following measurements shall be taken in the order presented:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	1) six consecutive valid measurements in dry conditions, alternating the direction of travel with each test;		P
	2) two preparation tests in wet conditions (results not recorded);		P
	3) six consecutive valid measurements in wet conditions, alternating the direction of travel with each test.		P
	c) For each series of five or six consecutive measurements, the test results corresponding to the longest measured stopping distance shall be used in the determination of MFDD in accordance with 15.4.3.4 for the tests of 15.4.3.3.4, a)1) and a)3 or b) 1) and b) 3) as appropriate.		P
	A rest period between two successive measurements shall not exceed 3 min.		P
15.4.3.4	**Stop performance calculation (classes 2 and 4)**		P
	For the calculation of MFDD, the following formula shall be used:		P
	$MFDD = \frac{V_b^2 - V_e^2}{25,92 \cdot (S_e - S_b)}$,in m/s²		P
15.4.3.5	**Electric braking failure compensation test**		N/A
15.4.3.5.1	**Requirement**		N/A
	The requirement of 15.4.2.5 shall be achieved.		N/A
	In case of electric braking failure, the vehicle shall stop with a smooth deceleration regarding 7.2		N/A
15.4.3.5.2	**Test method for an electrical braking system**		P
	This test is not conducted when the vehicle is equipped with a completely mechanical braking system.		P
	— Bring the vehicle to V_{max} and interrupt the power from the battery.		P
	— Measure the deceleration during the complete stop but excluding the final 0,5 s.		P
	The test track shall be a clean, dry, level surface, with a gradient ≤ 1 %; with good adherence (e.g. asphalt or concrete) and with the test lane of 1,20 m width.		P
	The ambient temperature shall be between 5 °C and 35 °C. The wind speed shall be no more than 3 m/s.		P

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Clause	Requirement + Test	Result - Remark	Verdict
16	**Presence awareness**		P
16.1	**Lighting**		P
16.1.1	**Retro-reflectors**		P
	Vehicles shall be fitted with front, side and rear retro-reflector according to ISO 6742-2:2015. The rear reflector shall be red in colour. The front reflector shall be white (clear) in colour. All side reflectors shall be of the same colour, either white (clear) or yellow.	White reflector at front. Red reflector at rear. Yellow reflector at side. All approved.	P
16.1.2	**Front and rear lightning**		P
	Vehicles of class 2 and 4 shall be fitted with active front and rear lights according to ISO 6742-1:2015 (see D.12).	White light at front. Red light at rear. All approved.	P
	The manufacturer shall indicate in the user's manual how an active front and rear light can be fitted to the vehicles of class 1 and 3. The controls for lighting shall be marked in accordance with Annex F.		N/A
16.2	**Audible warning to alert persons**		P
	An audible device shall be provided to allow a warning to be given to persons in the vicinity of the vehicle.	Roating bell provided on handlebar.	P
	The audible warning device shall be controlled by a command from a device on the handlebar.		P
	On a vehicle without a handlebar, a warning device which can be carried by the user of a vehicle (remote control) shall be provided with the vehicle. The vehicle shall only be able to start if the remote control is connected either physically and/or via wireless.		N/A
	The control for the audible warning shall be marked in accordance with Annex F.		P
	The device shall comply with ISO 14878:2015 Class II.	Approved bell.	P
	A remote control shall comply with 17.1.		N/A
17	**System failure and malfunction warning devices**		P
17.1	**General**		P
	The warning symbols audible signal are given in Annex F.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Audible warning devices provided with the vehicle shall be unambiguous and easily perceived. The operator shall be able to check the operation of the audible warning devices at all times.		P
	If the vehicle is equipped with a remote control for any audible warning device required by this standard, the vehicle shall only be able to start if the remote control is connected either physically and/or via wireless.	No such device.	N/A
17.2	**Audible/ vibrating signalling**		P
	Audible devices required by this standard shall comply with ISO 14878:2015 Class II.		P
17.3	**Loss of connection to the warning system**		N/A
	Loss of connection to the warning system shall be relayed by a warning signal (visual, audible, vibrating,…) on the vehicle or on the remote control.		N/A
	In a driving condition the loss of connection to the warning device shall result in a speed reduction to 6 km/h for a Class 4 vehicle; the speed reduction shall happen in a safe manner without creating additional hazards and with corresponding audio notification and tilt back of decks on self-balancing vehicles.		N/A
18	**Hot surfaces**		P
18.1	**Requirements**		P
	Hot surfaces of the vehicle (temperatures above 57°C), except brake systems, which are not in continuous contact with the user shall be protected to prevent inadvertent contact.		P
	The seat, handgrips, handgrip levers, footrests and decks are parts that are considered in continuous contact with the user. In no circumstance during the test of 18.2 shall their temperature exceed 43 °C. A durable visible warning shall be fixed as close as possible to the brake if the temperature of the brake system could be above 60 °C (see ISO 7010:2019, symbol W017).		P
	The instructions manual shall contain a notice warning of the possible danger of burns if the brakes are touched after a prolonged or severe use.		P
	Outer surface temperature of cables and connections that can be reached by the user shall not exceed 57 °C while in use on performance test rig.		P
18.2	**Test method**		P

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Clause	Requirement + Test	Result - Remark	Verdict
	To be tested by measurement (tolerance ± 2°C) only if there are heat producing elements in the direct vicinity of the grips, the footrest or the deck.		P
	Put the vehicle on the bench with a fully charged battery. Operate the vehicle under maximum load until 20 % of battery charge remains (maximum warm up). Measure temperature of grips, footrest(s) and deck(s).		P
19	**Product information and marking**		P
19.1	**General**		P
	The following product information should accompany each product.		P
	All text shall be printed in the official language or at least one of the official languages of the country of sale. If other languages are included, they shall be easy to distinguish, e.g. by separate presentation.	In English	P
	All text shall be clearly legible. Sentences shall be short and of simple construction. The words used shall be uncomplicated and in everyday use.		P
	Information and warnings on the vehicle should preferably be provided in the form of readily understandable symbols or pictograms when available.		P
19.2	**Marking**	See copy of marking plate	P
19.2.1	**General**		P
	The vehicle shall be legibly, visibly and permanently marked with at least the following:		P
	the business name and full address of the manufacturer or, where applicable, his authorized representative, importer or organization responsible for its sale;	See copy of marking plate	P
	designation of the vehicle;	See copy of marking plate	P
	the mandatory marking;	See copy of marking plate	P
	reference to this European Standard, i.e. EN 17128:2020;	See copy of marking plate	P
	designation of series or class with maximum speed (e.g. kick scooter, class 2, 25km/h);	See copy of marking plate	P
	serial or identification number;	See copy of marking plate	P
	It is recommended that the identification number is in accordance with ISO 3779.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	year of construction that is the year in which the manufacturing process is completed.	See copy of marking plate	P
	nominal power expressed in watts (W);	See copy of marking plate	P
	mass of the most usual configuration, in kilograms (kg);	See copy of marking plate	P
	maximum permissible payload, user including luggage.	See copy of marking plate	P
19.2.2	**Durability of marking of the frame or chassis**		P
	Rub the marking by hand for 15 s with a piece of cloth soaked in water and again for 15 s with a piece of cloth soaked in petroleum spirit.		P
	After the test the marking shall remain easily legible.		P
	It shall not be easy to remove any label nor shall any label show any sign of curling. After rubbing the text shall still be clearly legible.		P
19.2.3	**Battery**		P
	Information concerning the battery shall comply with existing corresponding standards.		P
	Additionally, the following information shall appear on the battery:		P
	the output voltage;	See copy of marking plate	P
	the charging voltage;	See copy of marking plate	P
	the power;	See copy of marking plate	P
	warning on the risks;	See copy of marking plate	P
19.2.4	**Tyres**		P
	The maximum pressure for inflatable tyres (if present) shall be marked on the tyre or in the instructions for use.	Maximum pressure marked on the tyre	P
19.3	**Purchase information**		P
19.3.1	**General**		P
	Information at point of sale could be given on the packaging, on an information sheet in the store or on internet.	On internet	P
19.3.2	**Information at point of sale**		P
	The following information shall be given:		P
	— Only use the product in accordance with local regulations;		P
	— For which age the vehicle is designed;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	— Protective helmet is strongly recommended.		P
	All product information as required in this standard shall be provided in the official language(s) of the country of sale.		P
	Warning sentences shall be written in letters whose upper case shall be at least 2,5 mm in height. The word “WARNING” shall be written in upper case. The word “WARNING!” can be given at the top of a list of warnings:		P
	— **“WARNING! Never use the product close to a water source”**		P
	— **“WARNING! Stop using the product when damaged”**		P
	The information needed to control machinery shall be provided in a form that is unambiguous and easily understood. It shall not be excessive to the extent of overloading the operator.		P
	Visual display units or any other interactive means of communication between the operator and the machine shall be easily understood and easy to use (see Annex F).		P
19.3.3	**Information on the packaging**	See copy of marking plate	P
	In the case where the product is delivered in a package to the final customer, the following information shall appear on the packaging:		P
	— the business name and full address of the manufacturer and, where applicable, his authorized representative,	See copy of marking plate	P
	— the designation: PLEV,	See copy of marking plate	P
	— use warnings:	See copy of marking plate	P
	“WARNING! Never use the product out of the spaces authorized by the regulations”	See copy of marking plate	P
	— the number of this standard followed by the use class, specified as follows: EN 17128 (class xx),	See copy of marking plate	P
	— for which age the vehicle is designed	See copy of marking plate	P
	— indication of the maximum weight of the user according with manufacturer recommendation, specifies as follows: MAX XXXKg,	See copy of marking plate	P
	— indication of the maximum speed according with manufacturer declaration and within the range of permitted speed corresponding with the declared class, specified as follows: XX km/h.	See copy of marking plate	P

EN 17128			
Clause	Requirement + Test	Result - Remark	Verdict
19.4	**Instructions for use**		P
19.4.1	**General**		P
	Instructions concerning safe use of the vehicle shall be provided with the vehicle in the form of instruction sheet, instruction manual, leaflet or other similar physical support.		P
	These instructions shall include at least the following and shall be headed as follows:		P
	"IMPORTANT! Read carefully and keep for future reference"		P
	— The intended use of the vehicle.		P
	— The name or trade mark of the manufacturer, importer or organization responsible for its sale.		P
	— Means to identify the product.		P
	— The description of the propulsion system technology and its detailed method of operation;		P
	— Instructions for initial assembly, folding and erection, when applicable (see Clause 5).		P
	— Explanation for light indicators.		P
	— Instructions covering all functions of the vehicle, specially driving power assistance start mode (e.g. pushing the vehicle by more than 3 km/h and activating the power assistance mode).		P
	— Instructions for operating parking and/or *braking device*(s).		P
	— An instruction that the *parking device, if available,* shall be engaged when vehicle is not on use.		N/A
	— For vehicles fitted with load carrying accessory (ies), details of the maximum permissible load.		P
	— A statement that any load attached to the handlebar will affect the stability of the *vehicle.*		P
	— Instructions for routine inspection, maintenance, cleaning and/or washing.		P
	— A statement that the vehicle shall be used only for one person.		P
	— A statement that accessories and any additional items which are not approved by the manufacturer shall not be used.		P
	— Instruction concerning safe use of the vehicle together with an indication of:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	1) the maximum weight of the user in kg,		P
	2) the maximum and if relevant minimum height of the user,		P
	3) the maximum and/or minimum age of the user as appropriate.		P
	— Indication the maximum continuous rated power of the electric motor according with manufacturer declaration, specified as follows: XX W.		P
	— The mandatory marking;		P
	— The user should check the limits of use in accordance with the local regulations (e.g. use in pedestrian areas, on-road);		P
	— Description of the correct methods of use including braking techniques and warning on the extension of braking distances during wet weather;		P
	— Description of intended surfaces (flat, clean, dry, level and if possible, distance from other road users);		P
	— The use of protective equipment such as: hand/wrist, knee, head and elbow protections;		P
	— The necessary preparations for using the product, for example: the notification that it is necessary to check that the steering system is correctly adjusted, that all connection elements (such as a folding system) are correctly tightened and not broken, and that the brakes and wheels are in good condition;		P
	— Obligation to always wear shoes;		P
	— Others recommendations such as: special precautions for use at dark; not to touch the brake disc,		P
	— The method for adjusting the suspensions if the product has any;		N/A
	— The maximum permissible mass of the user;		P
	— Warning aiming to draw the user's attention to any damages related to intensive use and to recommend periodic inspections of the frame, fork and suspension attachments (if any). The warning may be formulated as follows:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	"WARNING! As with any mechanical component, a vehicle is subject to high stresses and wear. The various materials and components may react differently to wear or fatigue. If the expected service life for a component has been exceeded, it may break suddenly, therefore risking causing injuries to the user. Cracks, scratches and discoloration in the areas subject to high stresses indicate that the component has exceeded its service life and should be replaced."		P
	— Traffic in the city has many obstacles to cross such as curbs or steps. It is recommended to avoid obstacle jumps. It is important to anticipate and adapt your trajectory and speed to those of a pedestrian before crossing these obstacles. It is also recommended to get out of the vehicle when these obstacles become dangerous due to their shape, height or slippage.		P
	— An instruction to keep the printed instructions for further reference and to be read carefully before use.		P
	WARNING Keep plastic covering away from children to avoid suffocation.		P
	— For inflatable tyres the maximum pressure shall be marked on the tyre or in the instructions for use.		P
	Additionally, the following recommendations shall be given:		P
	— Take the time to learn the basics of the practice to avoid any serious accident that can take place in the first months;		P
	— Get closer to your seller so he can refer you to an appropriate training organization;		P
	— Avoid high traffic areas or overcrowded areas;		P
	— In any case, anticipate your trajectory and your speed while respecting the code of the road, the code of the sidewalk and the most vulnerable;		P
	— Notify your presence when approaching a pedestrian or cyclist when you are not seen or heard.		P
	— Cross the protected passages while walking.		P
	— In all cases, take care of yourself and others.		P
	— Do not divert the use of the vehicle		P
	— This vehicle is not intended for acrobatic use.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	— Caution, the brake may become hot in use. Do not touch after use.		P
	— Regularly check the tightening of the various bolted elements, in particular the wheel axles, the folding system, the steering system and the brake shaft.		P
	— Eliminate any sharp edges caused by use.		P
	— Do not modify or transform the vehicle, including the steering tube and sleeve, stem, folding mechanism and rear brake.		P
	Any other relevant information may be added, at the manufacturer's discretion.		P
	Any other valuable information specified by the manufacturer.		P
19.4.2	**Noise emission**		P
19.4.2.1	**General**		P
	In case of doubt, a-weighted sound pressure levels shall be measured to a maximum 70 dB according to EN ISO 3744:2010, if necessary (see 19.4.2.2).		P
19.4.2.2	**Requirements**		P
	The following information shall be inserted in the instructions for use:		P
	— the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB(A); where this level does not exceed 70 dB(A), this fact must be indicated,		P
	—the peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20 μPa),		P
	— the A-weighted sound power level emitted by the machinery, where the A-weighted emission sound pressure level at workstations exceeds 80 dB(A).		P
19.4.3	**Battery charging**		P
	Information for use shall contain instructions for battery charging, in particular:		P
	— recommendations on charging the battery and use of the charger;		P
	— procedure for charging the battery;		P
	— environmental conditions (e.g. outdoor or indoor charging);		P

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Clause	Requirement + Test	Result - Remark	Verdict
	— requirement to power-off the vehicle during charging, or into a certain non-operational mode;		P
	— appropriate warnings.		P
19.5	**Instructions on servicing and maintenance**		P
	It shall be clearly explained that regular maintenance of the vehicle is a factor of safety. These explanations include the following points:		P
	— list regarding the maintenance that can be performed by the user himself;		P
	— cleaning recommendations		P
	— description regarding the maintenance and replacement of wear parts; (, wheels, brake pads, cables, etc.);		P
	— a note specifying that the self-tightening nuts as well as the other self-tightening fastenings may lose their efficiency and that they may need to be retightened;		P
	NOTE Average value of 20N/m is given unless other value is provided by the manufacturer.		P
	— lubrication recommendations –- locations and frequency of lubrication, recommended lubricant;		P
	— the method for adjusting the brakes and recommendations concerning the replacement of friction components;		P
	— method for adjusting or setting all of the components that would need to be adjusted regularly or after replacement of a part;		P
	— recommendation not make any modifications that are not noted in the manufacturer's instructions;		P
	— information on where the user can find a qualified maintenance shop for items he cannot do by himself (e.g. replacement of wear parts, electronic components, tightening torques …).		P

ATTACHMENT PHOTOGRAPHS OF EUT

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

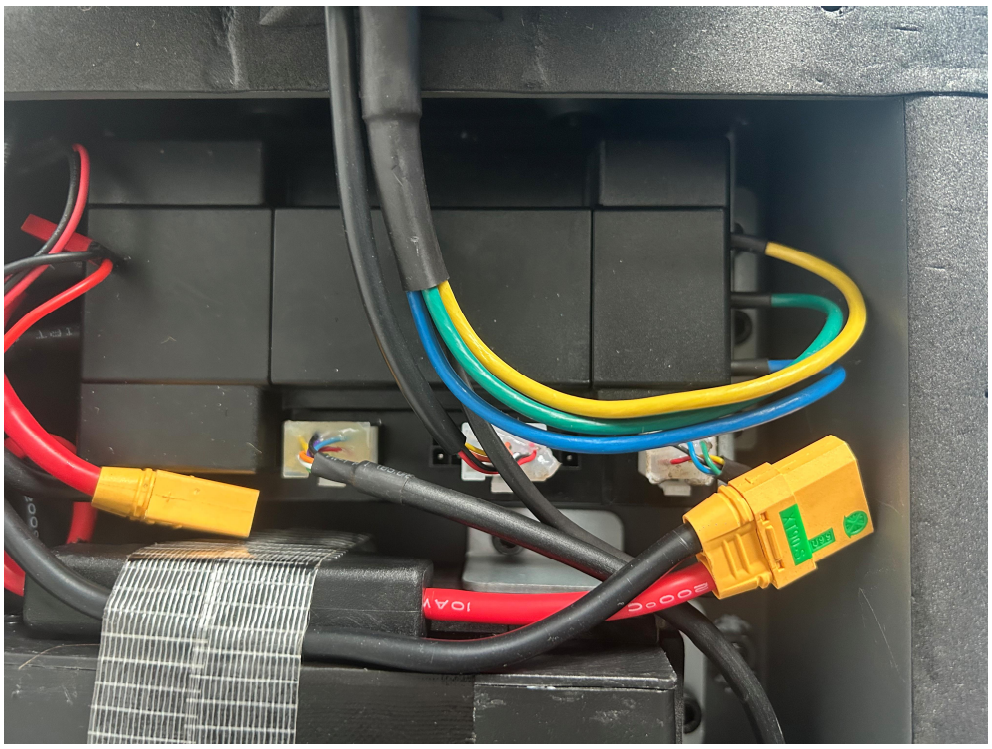

Photo 6

Photo 7

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