

# Test Report

Client Name : DELTA BISIKLET MOTOSİKLET SPOR TUR. TAS GIDA  
SAN TIC LTD STI.

Address : BOSNA HERSEK CAD 21/ D 06490 EMEK ANKARA  
TURKEY

Product Name : Electric Bicycle

Date : Jun. 24, 2020



**Anbotek (Guangzhou) Compliance Laboratory Limited**

**TEST REPORT  
EN 15194****Cycles - Electrically power assisted cycles - EPAC Bicycles**

Reference No.....: 58250SC00023801

Compiled by.....: Jonny Wu



Approved by.....: Terry Tian



Date of issue.....: Jun. 24, 2020

Contents.....: 18 pages report

**Testing laboratory**

Name.....: Anbotek (Guangzhou) Compliance Laboratory Limited

Address.....: Rm.508, Bld.2, No.232, Kezhu Road, Science City, Economic &  
Technology Development Area, Guangzhou, Guangdong, China.  
510663

Testing location.....: Same as above

**Client**Name.....: DELTA BISIKLET MOTOSIKLET SPOR TUR. TAS GIDA SAN TIC  
LTD STI.

Address.....: BOSNA HERSEK CAD 21/ D 06490 EMEK ANKARA TURKEY

**Test specification**

Standard.....: EN 15194: 2017

Test procedure.....: Type test

Procedure deviation.....: N.A.

Non-standard test method.....: N.A.

**Test item**

Description.....: Electric Bicycle

Trademark.....: GEOTECH



Model and/or type reference.....: FOLD UP E20

Manufacturer.....: CDC BIKES CO.,LIMITED

Address.....: Room 212,building B,No.15 of Guangshenbei Road, Xintang town,  
Zengcheng District,Guangzhou,China

Rating(s).....: 100-240VAC, 50/60Hz, 2A; 36VDC, 10Ah, 250W

<p><b>Possible test case verdicts</b></p> <ul style="list-style-type: none"> <li>- test case does not apply to the test object ..... : N (N.A.)</li> <li>- test object does meet the requirement ..... : P (Pass)</li> <li>- test object does not meet the requirement ..... : F (Fail)</li> </ul>
<p><b>Testing</b></p> <p>Date of receipt of test item ..... : Jun. 12, 2020</p> <p>Date(s) of performance of tests..... : Jun. 12, 2020 to Jun. 22, 2020</p> <p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p> <p>"(see Enclosure #)" refers to additional information appended to the report.</p> <p>"(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>
<p><b>General product information:</b></p> <ol style="list-style-type: none"> <li>1. The Switching Power Adapter of Electric Bicycle used has been approved by CE.</li> <li>2. Factory: CDC BIKES CO.,LIMITED Address: Room 212,building B,No.15 of Guangshenbei Road, Xintang town, Zengcheng District,Guangzhou,China</li> </ol>

<p><b>Copy of marking plate(s)</b></p> <p>Formed as following:</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;"><b>Electric Bicycle</b></p> <p><b>Model: FOLD UP E20</b></p> <p><b>Rating: 100-240VAC, 50/60Hz, 2A; 36VDC, 10Ah, 250W</b></p> <p><b>Manufacturer: CDC BIKES CO.,LIMITED</b></p> <p><b>Address: Room 212,building B,No.15 of Guangshenbei Road, Xintang town, Zengcheng District,Guangzhou,China</b></p> <p style="text-align: center;">   </p> </div>
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EN 15194			
Clause	Requirement – Test	Result - Remark	Verdict

## EN 15194:2017 test report

4.1	GENERAL		P
4.2	EPAC specific additional requirements		P
4.2.1	Electric circuit		P
	The electrical control system shall be designed so that, should it malfunction in a hazardous manner, it shall switch off power to the electric motor.	Battery has key lock system	P
	If symbols are used, their meaning shall be described in the instructions for use, their function is one described in ISO 2575, their design shall be according to that standard.	Warning symbol in battery charger and user manual	P
4.2.2	Batteries		P
4.2.2.1	Requirements		P
	EPAC and pack of batteries shall be designed in order to avoid risk of fire, mechanical deterioration resulting from abnormal use. Compliance is checked by the test described in 4.2.2.2.		P
	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.		P
	Safety and compatibility of the combination battery charger combination shall be ensured, according to the manufacturer's specifications.		P
	The battery terminals shall be protected against hazardous contacts creating short circuit.		P
	Care should be taken that the batteries are protected against overcharging. An appropriate overheating and short circuit protection device shall be fitted		P
	Batteries and the charger unit shall be labeled in order to be able to check their compatibility.		P
4.2.2.2	Test method		P
	1) Battery terminals are short-circuited with the batteries in a fully charged condition.		P
	2) Motor terminals are short-circuited, all commands are in ON position, whilst the batteries are fully charged.		P
	3) The EPAC is operated with the electric motor or drive system locked up so as to fully discharge the battery or until the system stops.		P
	4) The battery is charged for double the recommended charging period or for 24 hours depending upon which is the longest period.		P

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EN 15194			
Clause	Requirement – Test	Result - Remark	Verdict
4.2.3	Electric cables and connections		P
	The temperature shall be lower than the one specified for the cables and plugs and there shall not be corrosion on plug pins and no damage on cable insulation.		P
	Discharge full charged battery to the discharging limit given by the battery manufacturer at the maximum current given by the electric motor and controller and record it. Measure cable and plug temperature and judge cable and plug by view.		P
4.2.3.1	Requiements		P
	Cable and plug temperature shall be lower than that specified by the manufacturer of the cables and plugs. There shall be no corrosion on plug pins and no damage to cable and plug insulation.		P
4.2.3.2	Test method		P
	Discharge the fully charged EPAC battery to the discharging limit specified by the EPAC or ESA manufacturer at the maximum current allowable by the system and record it, giving consideration to the electric motor and /or the controller and /or the battery controller. Measure the cable and plug temperatures and ensure, by examination, that there is no deterioration of the insulation on either assembly.		P
4.2.3.3	Terminals for external conductors	No such terminal	P
	a) Wire ways 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 edges which 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.		P
	c) Wiring shall be effectively prevented from coming into contact with moving parts.		P
	If any open coil spring is used , it shall be correctly installed and insulated. Flexible metallic tubes shall not cause damage to the insulation of the conductors contained within them.		N
	e) The movable part is moved backwards and forwards, so that the conductor is flexed through the largest angle permitted by the construction. The number of flexings for conductors flexed in normal use is 10 000 and the rate of flexing 30 per min; for conductors flexed during user maintenance the number is 100 with the same rate of flexing at (20 ± 10) °C.		N



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	f) The insulation of internal wiring shall withstand the electrical stress likely to occur in normal use.		N
	Terminals which attachment of the conductor is such that it can easily be replaced shall allow the connection of conductors having nominal cross-sectional areas shown in the following table. However if a specially prepared cord is used, the terminals need only be suitable for the connection of that cord.		N
	g) In case of integrated battery charger, electric safety of battery charger applied.		N
4.2.3.4	Power cables and conduits		P
	Conduit entries, cable entries and knock-outs 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
4.2.3.5	External and internal electrical connections		P
	Electrical connection shall comply with IEC 60364-5-52:2001, Clauses 526.1 and 526.2.		P
4.2.3.6	Moisture resistance		P
	The EPAC are subjected to the test of IEC 60529 as follow:IPX4 appliances as described in Clause 14.2.4.a.		P
4.2.3.7	Mechanical strength		P
	EPAC shall have adequate mechanical strength and be constructed to withstand such rough handing that may be expected in normal use.		P
	Apply impacts to the battery pack mounted on the EPAC by means of the spring hammer as specified in IEC 600682-75. 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 impair compliance with this European Standard.		P
	Detachable battery packs are submitted to free fall at a height of 0.90 meter in three different positions.		P
	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.		P
4.2.4	Power management		P
4.2.4.1	General		P
	The test may be performed either on a test track or on a test bench.		P
4.2.4.2	Requirements		P
	Under all circumstances the braking efficiency		P

EN 15194			
Clause	Requirement – Test	Result - Remark	Verdict
	shall comply with the bicycle standard pr EN 14764		
	a) Assistance is provided only when the cyclist pedals forward.		P
	b) Assistance is cut off when the cyclist stops pedalling forward such that the cut off distance does not exceed 5 m with brake lever cut off switch or 2m without brake lever cut off switch. This requirement has to be checked according to the test methods described in 4.2.4.3.2		P
	c) The output or assistance is progressively reduced and finally cut off as the vehicle reaches the maximum assistance speed as designed. This requirement has to be checked according to the test methods described in 4.2.6.2		P
4.2.4.3	Test procedure – Electric motor management test		N
4.2.4.3.1	Check that there is no electric motor assistance when pedalling backward. Test for checking that no electric motor assistance is provided when pedalling backward shall be adapted to the technology used. For example, pedal backward and check the no load current point or that no torque is delivered on the driving wheel (see Annex B).		N
4.2.4.3.2	Check the assistance cut off.		N
4.2.4.3.2.1	Test conditions		--
	The test may be performed either on a test track or on a test bench or on a stand which keeps the motor driven wheel free of the ground.		N
	The time-measuring device shall have the following characteristics:		N
	Accuracy;		N
	The ambient temperature shall be between 5°C and 35°C;		N
	The battery shall be fully charged according to the manufacturer instructions.		N
4.2.4.3.2.2	Test method		N
	Worst case conditions of gearing and speed shall be applied.		N
	Worst condition for speed is defined as 90 % of cut off speed.		N
	Check the distance between stopping pedalling and actuating the switch brake simultaneously (if any) to no power corresponding to no load current point provided by the electric motor by using		N
	linear speed versus time measurement (an		N



EN 15194			
Clause	Requirement – Test	Result - Remark	Verdict
	example is given in informative B);		
	torque versus distance measurement,		N
	or any other appropriate method.		N
4.2.5	Electro Magnetic Compatibility	For details see EMC report	P
	The EPAC is not intended to be used while charging, for integrated charger the whole EPAC plus integrated charger shall be tested.		P
	The following European standards apply for battery charger: EN 55014-1, EN 55014-2, EN 61000-3-2, EN 61000-3-3.		P
4.2.6	Maximum speed for which the electric motor gives assistance		P
4.2.6.1	Requirements		P
	The maximum speed for which the electric motor gives assistance may differ by $\pm 5\%$ when determined according to the test method described in 5.1, from the values specified by the manufacturer.		P
	During a production conformity check, the maximum speed may differ by $\pm 10\%$ from the above-mentioned determined value.		P
4.2.6.2	Test method - Cut off speed measurement		P
4.2.6.2.1	Test conditions		P
	The test may be performed either on a test track or on a test bench or on a stand which keeps the motor driven wheel free of the ground		P
	The speed-measuring device shall have the following characteristics:		P
	Accuracy: $\pm 2\%$ ;		P
	Resolution: 0,1 km/h;		P
	The ambient temperature between 5°C and 35°C;		P
	Maximum wind speed: 3m/s;		P
	The battery shall be fully charged according to the manufacturer instructions		P
4.2.6.2.2	Test procedure	EPAC tested on road	--
	Pre-condition the EPAC by running 5 minutes at 80% of the maximum assistance speed as declared by the manufacturer.	Cut off Speed measured directly by bicycle meter	P
	Pedalling, go steadily to reach a speed equal to 1,25 times the maximum assistance speed as declared by the manufacturer.		P
	Record continuously the current and note the speed at which the current drops to a value equal to or less than "no load current point".		P



EN 15194			
Clause	Requirement – Test	Result - Remark	Verdict
4.2.7	Maximum power measurement		P
4.2.7.1	Measurement at the engine shaft		P
	The maximum continuous rated power shall be measured according to EN 60034-1 standard, clause 3.2.1 Duty type S1.		P
4.2.7.2	Alternative method		N
	Annex D gives guidance on how to measure the power at the wheel.		N

5	Marking and labelling		P
	In addition to the requirements of Pr EN 14764, the EPAC shall be visibly and durably marked as follows:		P
	- EPAC	EPAC	P
	- XX km/h	21.5	P
	- XX W		N
6	Instructions for use		P
	In addition to the instruction required by the bicycles standard EN 15194, each EPAC shall be provided with a set of instructions containing information on:	Has been contained in user manual	P
	1) concept and description of electric assistance; 2) recommendation for washing; 3) maximum range as determined according to the EN 15194; 4) control and tell tales; 5) specific EPAC recommendations for use 6) specific EPAC warnings; 7) recommendations about battery charging and charger use.		P

	Annex A (informative) Battery charging - Temperature		P
	Safety and quality of battery charging can be improved by sensing the battery temperature during charging. Most battery charger manufacturers set their chargers to have an optimal ambient temperature of 20 C to 25C.lower temperatures result in under charge, higher temperatures result in over charge. Whilst it is normal when building battery packs from Ni-Cad, Ni-Mh and Li-ion battery cells, to include temperature sensing, this is not always the case with valve regulated lead acid (VRLA) batteries. The main reason for including temperature sensing in VRLA batteries is to protect		P

EN 15194			
Clause	Requirement – Test	Result - Remark	Verdict
	<p>against one or more cells within the battery pack becoming short circuited. This lowers the terminal voltage and can allow the charger to supply more power than is required, which can lead to a dangerous thermal situation.</p> <p>Temperature sensors should be fitted to each battery within the pack and this information fed back to the battery charger.</p> <p>It is recommended that positive temperature coefficient (PTC) thermistors are used. All thermistors should be connected in series between the charger temperature pin (T) and the battery pack negative pin (-). Should any battery within the pack reach 60c the charger thermal detection circuitry should be adjusted to detect this condition and take suitable measures to stop any further increase in temperature.</p>		
	<p>Annex B (informative) Example of relation between speed/torque/current</p>		P
	<p>Figure B.1 — Example of relation between speed/torque/current The relationship between motor-current <math>I_M</math> and torque <math>T</math> is linear according to <math>T = kT (I_M - I_{M0})</math> with <math>I_{M0}</math> : no load motor current at no load speed or <math>v_0 \leq 25</math> km/h <math>T</math> expressed in Nm <math>kT</math> expressed in Nm/A <math>I_M</math> expressed in A <math>I_{M0}</math> expressed in A <math>v_0</math> expressed in km/h The relation of power is: <math>P = 2 \times T \times I</math></p>		

Test Tables

4.2	TABLE: temperature rise measurements				P
	T1(°C)		24.5		--
	T2(°C)		25.0		--
	Test Voltage(V)		36VDC		--
	Input current for DC Motor (A)		1.6		--
	Rated continuous Power on shaft				--
	Winding temperature rise measurements:				P
	Insulation class		See below		--
Temperature rise dT of winding	R1(Ω)	R2(Ω)	dT(k)	Required dT(k)	Insulation class
DC Motor winding	0.3245	0.4238	73.8	105.0	Class F
Temperature rise measurements					P
	T1(°C)		24.5		--
	T2(°C)		25.0		--
Temperature rise dT part/at:	tm °C		Tc °C		Required Tmax °C
Enclosure of adaptor	26.2		41.2		70
Enclosure of battery unit-1	28.8		43.8		70
Enclosure of battery unit-3	28.9		43.9		70
Plastic enclosure of battery Compartment inside	27.2		42.2		70
Appliance inlet connector	26.3		41.3		85
Fuse holder	26.9		41.9		85
DC connector	26.8		41.8		85
NOTE:					
Tm=measured temperature					
Tc=tm corrected (tm-tc+40°C max. RATED ambient)					
Tmax=maximum permitted temperature					



Test Tables

4.2.3.3	TABLE: Electric strength tests for wiring			P
Test voltage applied between:		Voltage shape(AC, DC impulse, surge)	Test Voltage (V)	Breakdown Yes/No
Input terminal of controller-metal frame		DC	572	No
Supplementary information: 500+2XVr for 2min, Vr is the rated voltage				

4.2.2	TABLE: Fault condition tests			P
	Ambient temperature(°C)		25.0	--
Fault No.	Fault	Supply Voltage(V)	Test time	Observation
4.2.2-1	Battery terminal S-C	36VDC	10s	Output voltage from 42.0V in normal condition decrease to 0V when terminal s-c fuse broken, battery recoverable after new fuse replaced. No hazard occur, no obvious temperature rise, no flame, molten metal or poisonous gas appear.
4.2.2-2	Motor input(controller output) two terminals s-c	36VDC	30min	EPAC system stop, normal current of battery decrease from 3.6A to 0.05A output of controller decrease to 0A when drive motor locked. No hazard occur, no obvious temperature rise, no flame, molten metal or poisonous gas appear.
4.2.2-2	Motor input(controller output) three terminals s-c	36VDC	1h	Normal current of battery decrease from 3.6A to 1.1A, output of controller s-c, in controller overload condition and broken after 15min, excess temperature observed in aluminium case of controller. No flame, molten metal or poisonous gas appear. Controller not recoverable.
4.2.2-3	Motor block	36VDC	30min	EPAC system stop, normal current of battery decrease from 42.0V to 0.05A, output of controller decrease to 0A when drive motor locked. No hazard occur, no obvious temperature rise no flame, molten metal or poisonous gas appear 24 hours overcharging.
4.2.2-4	Batter over charging	36VDC	2 times charging period or 2h	Battery charger turns from red to green after 5.5 hours charging, no hazard occur, no obvious temperature rise, no flame, molten metal of poisonous gas appear 24

Test Tables

				hours overcharging.
Supplementary information:				
Note1: Normal charging time for the battery charger is 4 hours, so test for 4.2.2-4) is 24 hours.				

4.2.3.3	TABLE: Batteries			P
Is it possible to install the battery in a reverse polarity position?		Yes		P
Rechargeable batteries				
Charging			Discharging	
	Meas. Current	Manuf. Specs.	Meas. Current	Manuf. Specs.
Max. current during normal condition	1.75A	2.0A	3.82A	10A
Testresults				Verdict
-- Chemical leaks				
-- Explosion of the battery				
-- Emission of flame or expulsion of molten metal				
-- Electric strength tests of equipment after completion of tests				
Supplementary information:				
1. Charging current measured at AC 230V, 50Hz input of battery charger.				
2. Discharging current measured at battery terminal with EPAC in normal ride condition average speed 20 km/h. Start current of battery is about 15.A for 2-3 seconds.				

4.2.4.1	TABLE: Power Management			P
Test condition: worst condition of the lowest gear ratio and 90% cut off speed as below, brake lever cut off switch for front wheel operate. Limit distance for this condition is 5 meters.				
T1=0.424s	S1=Vavr X t1=2.875 X 0.424s=1.22m			
T2=0.428s	S2=Vavr X t2=2.875 X 0.428s=1.23m			
T3=0.396s	S3=Vavr X t3=2.875 X 0.396s=1.14m			
T4=0.462s	S4=Vavr X t4=2.875 X 0.462s=1.33m			
T5=0.420s	S5=Vavr X t5=2.875 X 0.420s=1.21m			
T6=0.408s	S6=Vavr X t6=2.875 X 0.408s=1.17m			
T7=0.369s	S7=Vavr X t7=2.875 X 0.369s=1.06m			
T8=0.410s	S8=Vavr X t8=2.875 X 0.410s=1.18m			
T9=0.422s	S9=Vavr X t9=2.875 X 0.422s=1.21m			
T10=0.426s	S10=Vavr X t10=2.875 X 0.426s=1.22m			
Savr=(s1+S2+.....+S9+S10)/10=1.17m				
NOTE: Vstart: Start speed of front wheel which is 90% cut off speed.				
Vend: End speed of front wheel after brake lever cut off switch.				
Vacr: Average speed of front wheel from start to end.				
tn: Time between actuating the switch brake to no load current point monitored on current meter.				

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Test Tables

Sn: Cut off distance in one measure, savr: average cut off distance in 10 times.

TABLE: List of critical components				P
Object/part No.	Manufacturer/trademark	Type/model	Technical data	Mark(s) of conformity <sup>1)</sup>
Battery charger	Interchangeable	Interchangeable	Input: 100-240VAC 2.0A 50/60Hz Output: 42.0Vdc, 2.0A	CE
Battery	Interchangeable	Interchangeable	36V, 10Ah, 360Wh	CE



## Photo Documentation



**Photo Documentation****Photo 3**

- front
- rear
- right side
- left side
- top
- bottom
- partial

**Photo 4**

- front
- rear
- right side
- left side
- top
- bottom
- partial





**Photo Documentation****Photo 5**

- front
- rear
- right side
- left side
- top
- bottom
- partial

**Photo 6**

- front
- rear
- right side
- left side
- top
- bottom
- partial





Photo Documentation



\*\*\*End of report\*\*\*