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Report No.: CT20240304111-1SR

Dongguan True Safety Testing Co., Ltd.

TEST REPORT	
UL 2849	
Electric Bicycles, Electrically power Assisted Cycles (EPAC Bicycles) , Electric Scooters, and Electric Motorcycles	
Testing Laboratory Name .....	Dongguan True Safety Testing Co., Ltd.
Address .....	Room 201, No.20, East of Houjie Avenue, Houjie, Dongguan, Guangdong, China
Testing location .....	Room 201, No.20, East of Houjie Avenue, Houjie, Dongguan, Guangdong, China
Testing Laboratory Authorization	: ISO 17025 by an ILAC-MRA is CNAS L9412 CPSC Certification Number is 1755
Applicant's Name .....	Changzhou Leili Vehicle Parts Co.,Ltd
Address .....	NO.2 Floor.3B,kechuang Industrial Zone,Hutang Town, wujin district. Changzhou, Jiangsu Province, China
Manufacturer .....	Changzhou Leili Vehicle Parts Co.,Ltd
Address .....	NO.2 Floor.3B,kechuang Industrial Zone,Hutang Town, wujin district. Changzhou, Jiangsu Province, China
Test specification	
Standard.....	UL 2849
Procedure deviation .....	N/A
Non-standard test method .....	N/A
Test item description .....	Electric Bicycle
Trademark .....	/
Model and/or type reference .....	CM1000
Additional Model .....	CMS1000, CMC1000, CMPLUS, CMPRO, CR12000,Light Bee X, Ultra Bee, Storm Bee, MX4(All models share same electric circuits except outer shape and model name.)
Rating(s).....	36Vdc 15A 250W
Date of receipt of test item.....	Mar. 21, 2024
Date(s) of performance of tests.....	Mar. 21, 2024 to Mar. 28, 2024
Test case verdicts	
Test case does not apply to the test object :	N/A
Test item does meet the requirement:	P(ass)
Test item does not meet the requirement:	F(ail)



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Name and address of the testing laboratory :

Dongguan True Safety Testing Co., Ltd.

Room 201, No.20, East of Houjie Avenue, Houjie, Dongguan,  
Guangdong, China

Test by :

*Leo Huang*

Signature/Report writer

Mar. 28, 2024

Date

Review by:

*Cyrol Chen*

Signature/Report Reviewer

Mar. 28, 2024

Date

Approved by:

*Brige Li*

Signature/Technical Supervisor

Mar. 28, 2024

Date





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**Copy of marking plate:**

Electric Bicycle  
Model: CM1000  
Rating:36Vdc 15A 250W

Changzhou Leili Vehicle Parts Co.,Ltd  
DATE CODE: YYMM  
CONFORMS TO UL STD 2849



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No.1	Clause(s)	Test(s)	Remark	Comment
	7	Connection to Supply Source	UL 1310	Pass
	8	Personnel Protection Systems	UL 2231-1	Pass
	9	Bonding of the Vehicle	Screw to fix.	Pass
	10	Double Insulation	UL 1310 for adaptor	Pass
	11	Safety Circuits and Safety Analysis	UL 60730-1	Pass
	12	Enclosures	IP54	Pass
	13	Materials	UL 746C RTI>80°C V-1, UL94	Pass
	14	Flammability	V-1, UL94 Passed by UL 1310 for adaptor	Pass
	15	Electrical Spacings and Separation of Circuits	Passed by UL 1310 for adaptor	Pass
	16	Printed Wiring Boards	UL 796	Pass
	17	Wiring and Terminals	Non-replaceable batteries No Terminals outside	Pass
	18	Transformers	Passed by UL 1310 for adaptor	Pass
	19	Fuses	Passed by UL 1310 for adaptor	Pass
	20	Capacitors		Pass
	21	Strength of Enclosures		Pass
	22	Sharp Edges		Pass
	23	Battery Packs	UL 2580	Pass
	24	Operator Interface	UL 60950-1	Pass
	25	Motors and Motor Controllers	UL 1004-1	Pass
	26	Mounting		Pass
	28	Input Test	See the table	Pass
	29	Leakage Current	See the table	Pass
	30	Capacitor Discharge Test	See the table	Pass
	31	Temperature Test	See the table	Pass
	32	Dielectric Strength Test	See the table	Pass



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Report No.: CT20240304111-ISR

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	33	Isolation Resistance Test	See the table	Pass
	34	Humidity Conditioning	See the table	Pass
	35	Abnormal Operations Tests	See the table	Pass
	36	Vibration Test	See the table	N/A
	37	Impact Test	See the table	Pass
	38	Environmental Tests	See the table	Pass
	39	Motor Assistance Control - Pedalec		Pass
	40	Startup Assistance Mode Test		Pass
	41	Maximum Assistance Speed		Pass
	42	Mold Stress	See the table	Pass
	43	Permanence of Marking	See the table	Pass
	45-46	MARKINGS		Pass
	48-52	INSTRUCTIONS		Pass



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### ***Spacings (15)***

13	Electrical Spacings						Pass
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)	
opposite polarity of battery	--	36	1.6	>3.2	1.6	>3,2	
Supplementary information							
Note(s): --							

### ***Protection of Users – Accessibility of Terminals (17)***

<b>17</b>	<b><i>Accessibility probe</i></b>					Pass
Location	Dimension of opening	Tester	Observations	Pass	Fail	
Opening	No opening	Articulate probe	Can't touch Live parts and dangerous moving parts	√	--	



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## INPUT TEST (28)

### Method:

EUT is operating at:  $U=U_n$ ,  $F=F_n$ .

Load of the EUT is under maximum normal load.

The input current and wattage to the EUT shall be measured.

Multiple rated voltages or rated voltage range, each rated voltage shall be measured. The current and power shall be taken under steady state conditions.

### Result:

Result:

28	TABLE: Electrical data (in normal conditions)						Pass
[ X ] Max. Available load [ ] All interfaces and wireless max. load transmission [ ] 1/8 of 100% or [ ] Max. available non-clipped output power _____ [ ] _____							
U (V)	F (Hz)	I (A)	I rated (A)	P (W)	Fuse #	I fuse (A)	Condition/status
90	50	0.488	--	151.4	F1	0.488	Charge the battery
90	60	0.489	--	150.5	F1	0.489	Charge the battery
120	50	0.476	1.0	150.9	F1	0.476	Charge the battery
120	60	0.476	1.0	150.9	F1	0.476	Charge the battery
240	50	0.307	1.0	150.8	F1	0.307	Charge the battery
240	60	0.307	1.0	150.7	F1	0.307	Charge the battery
264	50	0.289	--	150.8	F1	0.289	Charge the battery
264	60	0.289	--	150.8	F1	0.289	Charge the battery
Voltage regulator: CTT01S ; Power meter: CTT15S; DC Electrical load: CTT48S;							



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### Leakage Current (29)

29	Leakage Current			Pass
Test voltage: 120V/ 60Hz				
Measured point:		U <sub>2</sub> (mV)	(mA)	Limit (mA)
Line and output accessible terminal		--	0.09	0.5
Neutral and output accessible terminal		--	0.10	0.5
Line and accessible enclosure surface		--	0.11	0.5
Neutral and accessible enclosure surface		--	0.11	0.5
Oscilloscope, Measuring circuit for touch current according to Annex D, Leakage Current Tester				

### Capacitor Discharge Test (30)

30	Discharge of Capacitors in Equipment				N/A
Test voltage: 120V/ 60Hz					
Condition	1 calculated (s)	1 measured (ms)	t u→ 0V (ms)	Comments	
L and N Positive half cycle	--	--	--	--	





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Report No.: CT20240304111-1SR

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## Temperature Test (31)

### Method:

EUT primary is  $U=U_n$ ,  $F=F_n$ , operated under normal max. load.

Temperatures of parts are measured by thermal couplers, windings are measured by resistance change method.

Measuring place shall be a point close to the heat source. The test is continued until thermal stable.

Voltage is changed lower or higher tolerance without rest of time.

### Result:

31	TABLE: Thermal requirements,						Pass
	Supply voltage (V) .....	120V	--	--	--	--	
	Ambient Tmin ( °C) .....	23.9	--	--	--	--	
	Ambient Tmax ( °C) .....	24.3	--	--	--	--	
	Max. load	Charge battery	--	--	--	--	
	Model	--	--	--	--	--	
Maximum measured temperature T of part/at::		T ( °C)					Allowed Tmax ( °C)
Enclosure of Adaptor		--	--	--	--	--	95
PCB		55.6	--	--	--	--	130
Internal wire		37.9	--	--	--	--	75
Battery		42.3	--	--	--	--	60
Enclosure of battery		39.3	--	--	--	--	95
Supplementary information:							
Temperature T of winding:		t1 (°C)	R1 ( )	t2 (°C)	R2 ( )	T ( °C)	Allowed T <sub>max</sub> ( °C)
--		--	--	--	--	--	--
Supplementary information:							
- NF: No Fire - NE: No Explosion - NL: No Leakage - NR: No Rupture - NS: No Electric shock hazard - Fire: the emission of flames from a cell or battery. - Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled. - Leakage: visible escape of liquid electrolyte.- Others (please explain)							



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**Dielectric Voltage-Withstand Test (32)**

**Method:**

The test is made while the EUT is still in well-heated condition Make sure the power switch of the EUT is in ON position.  
Thin material can be tested in room temperature.  
The test voltage is a.c. of 50 or 60 Hz or d.c. voltage equal to peak value of the a.c. voltage.  
Test voltage is applied gradually raised from zero to the specified voltage and held at that value for 60s. Insulation breakdown is: Current flows through the insulation rapidly increases in an uncontrolled manner; that is the insulation does not restrict the flow of the current.  
Corona discharge or a single momentary flashover is not regarded as insulation breakdown.  
A test incorporating reinforced insulation and lower grades insulation (BI, SI), care is taken not to overstress BI or SI.  
Where capacitors (X or Y capacitors) are across the insulation, d.c. voltage is recommended for the test. Discharge resistors shall be disconnected before testing.

**Result:**

32	Electric strength test	Pass
Test voltage applied between:		Test voltage (V)
input and enclosure		Breakdown
input and output		No
		No



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Report No.: CT20240304111-1SR

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**Isolation Resistance Test (33)**

**Method:**

The test is made while the EUT is still in well-heated condition Make sure the power switch of the EUT is in ON position.

Thin material can be tested in room temperature. The test voltage is d.c. 500 voltage

Test voltage is applied gradually raised from zero to the specified voltage and held at that value for 60s.

33	TABLE: Insulation resistance measurements		Pass
Insulation resistance R between:		R (MΩ)	Required R (Ω)
DC input and enclosure		>100 MΩ	50000Ω
L/N and enclosure		>100 MΩ	50000Ω
L/N and output		>100 MΩ	50000Ω



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### ***Humidity Conditioning (34)***

34	Humidity Conditioning Test			Pass
Test voltage: 48h, 90%R.H., 34°C				
Measured point:		Test V (V)	Measured	Limit
Input and Enclosure		DC500V	>100MΩ	30000Ω
Neutral and output accessible terminal		DC500V	>100MΩ	30000Ω
Line and accessible enclosure surface		DC500V	>100MΩ	30000Ω
Neutral and accessible enclosure surface		DC500V	>100MΩ	30000Ω
Oscilloscope, Measuring circuit for touch current according to Annex D, Leakage Current Tester				
34	Dielectric Voltage-Withstand Test			Pass
Measured point:		Test V (V)	Breakdown	Limit
Line and output accessible terminal		AC 1480V	No	100mA
Neutral and output accessible terminal		AC 1480V	No	100mA
Line and accessible enclosure surface		AC 1480V	No	100mA
Neutral and accessible enclosure surface		AC 1480V	No	100mA
Oscilloscope, Measuring circuit for touch current according to Annex D, Leakage Current Tester				



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### Abnormal Operation Test (35)

35	Abnormal Operations and Fault Conditions Test		Pass
Requirement		Result	Remarks
<b>During the test:</b>			
Fire propagates beyond the EUT?		Yes/No	--
Molten metal emitted?		Yes/No	--
Enclosures deform to cause non-compliance with the standard?		Yes/No	--
<b>After the test:</b>			
Electric strength test on reinforced insulation breakdown?		Yes/No	--
Electric strength test on Basic insulation breakdown?		Yes/No	--
<b>SC:</b> Short-circuited; <b>OC:</b> Open-circuited; <b>OL:</b> Over-load; <b>BK:</b> Block; <b>RP:</b> Reverse-polarity; <b>LK:</b> Lock; <b>DC:</b> Disconnect; <b>OVC:</b> Overcharging under Max. available charging voltage or 106% rated voltage; <b>ED:</b> Excessive discharging			
Voltage regulator, power meter, Data Acquisition/Switch Unit , Oscilloscope, Oscilloscope Probe, Digital Micro-ohmmeter, Withstanding Voltage Tester, DC Electrical load;			
<b>42 Abnormal Operations and Fault Conditions Test</b>			<b>Pass</b>
Ambient temperature ( C) .....		25.0 C	
Comp./ fault		Result / Observation	
Battery	Test voltage: _DC36V_ Duration: _10min_ SC No: __ I/P current (A): __ I/P power (W): __	Become steady, output power / current _____ Shut down immediately, and _____damaged, can't be recovered, repeated __ times. <input checked="" type="checkbox"/> Protected, can be recovered.	
		Fuse opened immediately Fuse opened after _____ T.F opened after __ see raw data __ <input checked="" type="checkbox"/> No hazards Remark:--	
Adaptor output	Test voltage: AC120V_ Duration: _10min_ SC No: __ I/P current (A): __ I/P power (W): __	Become steady, output power / current _____ Shut down immediately, and _____damaged, can't be recovered, repeated __ times. Protected, can be recovered.	
		Fuse opened immediately Fuse opened after _____ T.F opened after __ see raw data __ <input checked="" type="checkbox"/> No hazards Remark: --	



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**Vibration Test (36)**

30	TABLE: Vibration tests				P
Model	OCV at start of test, (Vdc) for battery	Test frequency (Hz)	Vibration time (h)	Results	
Battery	Fully	10Hz~55Hz~10Hz	1h	P	
Battery	Fully	10Hz~55Hz~10Hz	1h	P	
Battery	Fully	10Hz~55Hz~10Hz	1h	P	
Supplementary information: - NF: No Fire - NE: No Explosion - NL: No Leakage - NR: No Rupture - NS: No Electric shock hazard - No loosening of parts - Operate normally.					



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### Impact Test (37)

37	TABLE: Strain relief test			Pass
Test part	Temperature (°C)	Duration (h)	Result	
Enclosure	75	1h	Pass electrical strength	
Notes: Oven temperature shall be 10 K higher than the maximum temperature on the enclosure but not less than 70°C.				
supplementary information: - NF: No Fire - NE: No Explosion - NL: No Leakage - Fire: the emission of flames from a cell or battery. - Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled. - Leakage: visible escape of liquid electrolyte.- Others (please explain)				

37	TABLE: Impact test Vertically				Pass
Model	weighing	Test temperature (°C)	Impact energy (J)	Results	
Enclosure	0.535kg, D:50.8mm	25	6.8J	P	
Enclosure	0.535kg, D:50.8mm	25	6.8J	P	
Enclosure	0.535kg, D:50.8mm	25	6.8J	P	
No damage.					
37	TABLE: Impact test Horizontally				Pass
Model	weighing	Test temperature (°C)	Impact energy (J)	Results	
Enclosure	0.535kg, D:50.8mm	25	6.8J	P	
Enclosure	0.535kg, D:50.8mm	25	6.8J	P	
Enclosure	0.535kg, D:50.8mm	25	6.8J	P	
No damage.					



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**Water Exposure Tests (38.1)**

Test procedure

For IP54, the sample is positioned under oscillating spray tubes rotating at nearly±180° from the vertical for 10 minutes. The oscillation rate is two cycles of about360° in 12 seconds. Each surface of the enclosure within the spray arch is to be tested for 1 min/m2, with no less than 5 minutes of total test timeThe flow rate again depends upon the tube size, Withstand voltage test is pass, No harmful effects

IP54	-For IP54, the sample is positioned under oscillating spray tubes rotating at nearly±180° from the vertical for 10 minutes. The oscillation rate is two cycles of about360° in 12 seconds. Each surface of the enclosure within the spray arch is to be tested for 1 min/m2, with no less than 5 minutes of total test timeThe flow rate again depends upon the tube size, Withstand voltage test is pass, No harmful effects	No harmful effects	Pass
supplementary information: - NF: No Fire - NE: No Explosion - NL: No Leakage - Fire: the emission of flames from a cell or battery. - Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled. - Leakage: visible escape of liquid electrolyte.- Others (please explain)			





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### Thermal Cycling Test (38.2)

39	TABLE: Heating Test					P
Sample		OCV at start of test, (Vdc)	Temperature raise rated(°C/min)	Test temperature (°C)	Duration (h)	Results
1#		Full battery	5°C/min ± 2 °C/min	50 to -300	6h	P
<b>Supplementary information:</b> supplementary information: - NF: No Fire - NE: No Explosion - NL: No Leakage - Fire: the emission of flames from a cell or battery. - Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled. - Leakage: visible escape of liquid electrolyte.- Others (please explain)						
Measured point:			Test V (V)	Measured	Limit	
Input and Enclosure			DC500V	>100MΩ	30000Ω	
Neutral and output accessible terminal			DC500V	>100MΩ	30000Ω	
Line and accessible enclosure surface			DC500V	>100MΩ	30000Ω	
Neutral and accessible enclosure surface			DC500V	>100MΩ	30000Ω	
Oscilloscope, Measuring circuit for touch current according to Annex D, Leakage Current Tester						
34	Dielectric Voltage-Withstand Test					Pass
Measured point:			Test V (V)	Breakdown	Limit	
Line and output accessible terminal			AC 1480V	No	100mA	
Neutral and output accessible terminal			AC 1480V	No	100mA	
Line and accessible enclosure surface			AC 1480V	No	100mA	
Neutral and accessible enclosure surface			AC 1480V	No	100mA	
Oscilloscope, Measuring circuit for touch current according to Annex D, Leakage Current Tester						



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### **Mold Stress (42)**

37	TABLE: Strain relief test			Pass
Test part		Temperature (°C)	Duration (h)	Result
Enclosure		70	1h	Pass electrical strength
Notes: Oven temperature shall be 10 K higher than the maximum temperature on the enclosure but not less than 70°C.				
supplementary information: - NF: No Fire - NE: No Explosion - NL: No Leakage - Fire: the emission of flames from a cell or battery. - Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled. - Leakage: visible escape of liquid electrolyte.- Others (please explain)				

42	TABLE: Insulation resistance measurements			Pass
Measured point:		Test V (V)	Measured	Limit
Input and Enclosure		DC500V	>100MΩ	30000Ω
Neutral and output accessible terminal		DC500V	>100MΩ	30000Ω
Line and accessible enclosure surface		DC500V	>100MΩ	30000Ω
Neutral and accessible enclosure surface		DC500V	>100MΩ	30000Ω
Oscilloscope, Measuring circuit for touch current according to Annex D, Leakage Current Tester				
42	Dielectric Voltage-Withstand Test			Pass
Measured point:		Test V (V)	Breakdown	Limit
Line and output accessible terminal		AC 1480V	No	100mA
Neutral and output accessible terminal		AC 1480V	No	100mA
Line and accessible enclosure surface		AC 1480V	No	100mA
Neutral and accessible enclosure surface		AC 1480V	No	100mA
Oscilloscope, Measuring circuit for touch current according to Annex D, Leakage Current Tester				



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***Permanence of Marking (43)***

43	MARKING DURABILITY		Durable and legible	
Type of marking	15 seconds of water	15 seconds of petroleum	Pass	Fail
Rating label	--	--	√	--
Stop watch				



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**Sample Pictures:**

**Photo 1 General appearance of the EUT**



**Photo 2 General appearance of the EUT**

