



APPLICATION FOR TEST REPORT
UL 2849
On Behalf of

Prepared For: Huizhou Xingqishi Sporting Goods Co. LTD
Address: Shen Road building 3, Town Deep Li Industrial Zone, Tu Yuan Zhou,
Boluo County, Huizhou City, Guangdong

Product Name: Electric bike
Model: MN-20
Trade Mark: /

Manufacturer: Huizhou Xingqishi Sporting Goods Co. LTD
Address: Shen Road building 3, Town Deep Li Industrial Zone, Tu Yuan Zhou,
Boluo County, Huizhou City, Guangdong

Prepared By: Shenzhen Wuxiang Testing (Group) Co., Ltd.
Building B, Xinbaosheng, No.233, Xixiang Street, Bao'an District,
Shenzhen, China

Test Date: September 13, 2023 to September 19, 2023
Date of Report: September 19, 2023
Report No.: WUX202309134796UL





UL 2849 TEST REPORT

Standard: <u>ANSI/CAN/UL 2849-2022A</u>			
Report No.:	WUX202309134796UL	Client:	Huizhou Xingqishi Sporting Goods Co. LTD
Product:	Electric bike	Rated data:	Adaptor: Input:110V~, 50/60Hz, 2A Output: 54.6V===2A Specifications: 48V2A
Project Engineer:	Tony Bi		
Test Engineer:	Lucy Lu	Protection class	--
Application Date	September 13, 2023	Protection against moisture:	Min. IP44
Requested Date	September 19, 2023	Construction:	With battery
Re-test	☐	Operation mode	Continuous
Full-test	☒	Weight:	> 10kg
Tested Model :	MN-20	Sample No.	1#
Should the heating test be done in heating oven?	☐ Yes °C ☒ No		
Altitude during operation (m)	☐ Up to 2000 ☒ No		
Altitude of test laboratory (m)	☒ below 2000 ☐ No		
Other information:.....	Outdoor used, Battery, With over charge protection, Over discharge protection, over current protection and temperature protection.		

Lab Use Only			
Lab Start Date	September 13, 2023	Lab Finish Date	September 19, 2023
Ambient Temperature, °C	24.3	Relative Humidity, %	49.5

Remarks:

Tested by(Engineer: Rust He): Lucy LuChecked by(Manager: Tony Bi): Tony Bi

****Modified History****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2023/09/19	Lucy Lu



No.1	Clause(s)	Test(s)	Remark	Comment
	7	General	Maximum altitude of 2000 m ambient temperature range of 0° C to 40° C	Pass
	8	Power Levels	DC56V <240VA	Pass
	9	Combination of Battery, Battery Management System, and Charger	UL 2580 UL 1310	Pass
	10	User Protection While Charging	UL 2097	Pass
	11	Battery Packs	UL 2580	Pass
	12	Safety Circuits and Safety Analysis	UL 60730-1	Pass
	13	Enclosing and Insulating Hazardous Parts	UL 746C RTI>80℃ V-1, UL94 NO Sharp Edges	Pass
	14	Mounting	Vibration Test	Pass
	15	Printed Wiring Boards	UL 796	Pass
	16	Spacings and Separation of Circuits	UL 1310 for adaptor	Pass
	17	Flammability	V-0, UL94 Passed by UL 1310 for adaptor	Pass
	18	Internal Wiring and Terminals	Cannot touch live part	Pass
	19	Overcurrent Protection	UL 248-1	Pass
	20	Motors and Motor Controllers	UL 1004-1	Pass
	21	Operator Interface and Communication Devices	UL 62368-1	Pass
	22	Grounding and Bonding		N/A
	23	Chargers	UL 1310	Pass
	24	Electrical Cables and Connectors Between the eBike and the Equipment		Pass
	25	Supply Connections	UL 1310	Pass



	27	Input Test	See the table	Pass
	28	Temperature Test	See the table	Pass
	29	Isolation Resistance Test	See the table	Pass
	30	Dielectric Strength Test	See the table	Pass
	31	Humidity Conditioning	See the table	Pass
	32	Abnormal Operations Tests	See the table	Pass
	33	Impact Test	See the table	Pass
	34	Mold Stress	See the table	Pass
	35	Flexing Test		N/A
	36	Ingress Protection Tests	See the table	Pass
	37	Permanence of Marking	See the table	N/A
	38	Vibration Test	See the table	Pass
	39	Strain Relief	See the table	Pass
	40	Startup Assistance Mode Test		Pass
	41	Motor Assistance Control		Pass
	42-44	MARKINGS		Pass
	45-50	MARKINGS		Pass

**Spacings (16)**

16	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	--	54.6	1.6	>2.1	1.6	>2.1	
Input to Enclosure	--	--	--	--	--	--	
Primary component to accessible enclosure (RI)	--	--	--	--	--	--	
Primary trace to secondary trace under transformer (T1) (RI)	--	--	--	--	--	--	
Primary winding to secondary winding of transformer (T1) (RI)	--	--	--	--	--	--	
Supplementary information							
Note(s): --							

Protection of Users – Accessibility of Terminals (18)

18	Accessibility probe					Pass
Location	Dimension of opening	Tester	Observations	Pass	Fail	
Opening	No opening	Articulate probe	Can't touch Live parts and dangerous moving parts	√	--	



INPUT TEST (27)

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:

27	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
110	50	1.29	2	85.6	F1	1.29	Charge the battery
DC54.6V	--	1.6	2	81.9	--	--	Charge the battery
Voltage regulator: CTT01S ; Power meter: CTT15S; DC Electrical load: CTT48S;							



Temperature Test (28)

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:

28	TABLE: Thermal requirements,						Pass
	Supply voltage (V)	DC54.6V	--	--	--	--	—
	Ambient Tmin (°C)	23.4	--	--	--	--	—
	Ambient Tmax (°C)	24.1	--	--	--	--	—
	Max. load	Charge battery	--	--	--	--	
	Model	--	--	--	--	--	
Maximum measured temperature T of part/at::		T (°C)					Allowed Tmax (°C)
Enclosure of Adaptor		--	--	--	--	--	95
PCB near IC		50.9	--	--	--	--	130
Internal wire		37.3	--	--	--	--	75
Capacitor		41.0	--	--	--	--	105
Connector		44.0	--	--	--	--	70
Battery		33.8	--	--	--	--	60
Enclosure of battery		31.6	--	--	--	--	95
--							
Supplementary information:							
Temperature T of winding:		t1 (°C)	R1 (Ω)	t2 (°C)	R2 (Ω)	T (°C)	Allowed Tmax (°C)
--		--	--	--	--	--	--



- 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)

28	TABLE: Thermal requirements,						Pass
	Supply voltage (V)	AC110V 60Hz	--	--	--	--	—
	Ambient Tmin (°C)	24.2	--	--	--	--	—
	Ambient Tmax (°C)	24.5	--	--	--	--	—
	Max. load	Charge battery	--	--	--	--	
	Model	--	--	--	--	--	
Maximum measured temperature T of part/at::		T (°C)					Allowed Tmax (°C)
Enclosure of Adaptor		60.2	--	--	--	--	95
PCB near IC		47.3	--	--	--	--	130
Internal wire		40.1	--	--	--	--	75
Capacitor		52.9	--	--	--	--	105
Connector		45.7	--	--	--	--	70
Battery		36.6	--	--	--	--	60
Enclosure of battery		33.6	--	--	--	--	95
--							
Supplementary information:							
Temperature T of winding:	t1 (°C)	R1 (Ω)	t2 (°C)	R2 (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class
--	--	--	--	--	--	--	--



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)

Result:

28	TABLE: Thermal requirements,						Pass
	Supply voltage (V)	Power by full Battery	--	--	--	--	—
	Ambient Tmin (°C)	23.6	--	--	--	--	—
	Ambient Tmax (°C)	24.1	--	--	--	--	—
	Max. load	Max. load	--	--	--	--	
	Model	--	--	--	--	--	
Maximum measured temperature T of part/at::		T (°C)					Allowed Tmax (°C)
Enclosure of Adaptor		--	--	--	--	--	95
PCB near IC		58.7	--	--	--	--	130
Internal wire		41.4	--	--	--	--	75
Capacitor		40.8	--	--	--	--	105
Connector		--	--	--	--	--	70
Battery		39.1	--	--	--	--	60
Enclosure of battery		34.1	--	--	--	--	95
Winding of Motor		46.9	--	--	--	--	70
Enclosure of Motor		50.7	--	--	--	--	90
Supplementary information:							
Temperature T of winding:		t1 (°C)	R1 (Ω)	t2 (°C)	R2 (Ω)	T (°C)	Allowed T _{max} (°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)							

**Isolation Resistance Test (29)****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



Dielectric Strength Test (30)

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:

30	Electric strength test		Pass
Test voltage applied between:		Test voltage (V)	Breakdown
input and enclosure		AC1480 60Hz	No
Input and output		AC1480 60Hz	No

**Humidity Conditioning (31)**

31	Humidity Conditioning Test		Pass	
Test voltage: 48h, 90%R.H., 32°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				
31	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				

**Abnormal Operation Test (32)**

32	Abnormal Operations and Fault Conditions Test		Pass
Requirement		Result	Remarks
During the test:			
Fire propagates beyond the EUT?		Yes/No	--
Molten metal emitted?		Yes/No	--
Enclosures deform to cause non-compliance with the standard?		Yes/No	--
After the test:			
Electric strength test on reinforced insulation breakdown?		Yes/No	--
Electric strength test on Basic insulation breakdown?		Yes/No	--
SC: Short-circuited; OC: Open-circuited; OL: Over-load; BK: Block; RP: Reverse-polarity; LK: Lock; DC: Disconnect; OVC: Overcharging under Max. available charging voltage or 106% rated voltage; ED: Excessive discharging			
Voltage regulator, power meter, Data Acquisition/Switch Unit , Oscilloscope, Oscilloscope Probe, Digital Micro-ohmmeter, Withstanding Voltage Tester, DC Electrical load;			



32 Abnormal Operations and Fault Conditions Test			Pass
Ambient temperature (°C)		25.0°C	
Comp./ fault		Result / Observation	
U1 Pin 1-8	Test voltage: _DC54.6V_ Duration: _10min_ SC No: __ I/P current (A): _1.31_ 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 ____ ☒ No hazards Remark: --
U1 Pin 2-6	Test voltage: _DC54.6V_ Duration: _10min_ SC No: __ I/P current (A): _1.17_ 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 ____ ☒ No hazards Remark: --
U2 Pin 3-2	Test voltage: _DC54.6V_ Duration: _10min_ SC No: __ I/P current (A): _0.08_ I/P power (W): _0_	☐ Become steady, output power / current _____ ☒ Shut down immediately, and _____ No_ damaged, can't be recovered, repeated _____ times. ☐ Protected, can be recovered.	☐ Fuse opened immediately ☐ Fuse opened after ____ ☐ T.F opened after ____ ☐ see raw data ____ ☒ No hazards Remark: --
U2 pin 3-4	Test voltage: _DC54.6V_ Duration: _10min_ SC No: __ I/P current (A): _0.06_ I/P power (W): _0_	☐ Become steady, output power / current _____ ☒ Shut down immediately, and _____ No_ damaged, can't be recovered, repeated _____ times. ☐ Protected, can be recovered.	☐ Fuse opened immediately ☐ Fuse opened after ____ ☐ T.F opened after ____ ☐ see raw data ____ ☒ No hazards Remark: --
Battery	Test voltage: _DC54.6V_ Duration: _10min_ SC No: __ I/P current (A): _0_ I/P power (W): _0_	☐ Become steady, output power / current _____ ☒ Shut down immediately, and _____ No_ damaged, can't be recovered, repeated _____ times. ☐ Protected, can be recovered.	☐ Fuse opened immediately ☐ Fuse opened after ____ ☐ T.F opened after ____ ☐ see raw data ____ ☒ No hazards Remark:
Adaptor output	Test voltage: AC110V_ Duration: _10min_ SC No: __ I/P current (A): __ I/P power (W): _0.07_	☐ Become steady, output power / current _____ ☒ Shut down immediately, and _____ No_ damaged, can't be recovered, repeated _____ times. ☐ Protected, can be recovered.	☐ Fuse opened immediately ☐ Fuse opened after ____ ☐ T.F opened after ____ ☐ see raw data ____ ☒ No hazards Remark: --



Locked Motor	Test voltage: _54.6V_ Duration: _2h_ Fuse or Fuse resistor No: _ _ I/P current (A): _Max. 1.69A_ I/P power (W): _0_	☐ 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 ____ ☒ No hazards Winding of motor:75.4°C Remark: --
--------------	---	---	--

**Impact Test (33)**

33	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)				

33	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.				
33	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.				

**Mold Stress (34)**

34	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)				

34	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				
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				



Ingress Protection Tests (36)

Test procedure

For IPX4, the sample is positioned under oscillating spray tubes rotating at nearly $\pm 180^\circ$ from the vertical for 10 minutes. The oscillation rate is two cycles of about 360° 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 time. The flow rate again depends upon the tube size, Withstand voltage test is pass, No harmful effects

IPX4	-For IPX4, the sample is positioned under oscillating spray tubes rotating at nearly $\pm 180^\circ$ from the vertical for 10 minutes. The oscillation rate is two cycles of about 360° in 12 seconds. Each surface of the enclosure within the spray arch is to be tested for 1 min/m ² , with no less than 5 minutes of total test time. The 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)			

***Permanence of Marking (37)***

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

**Vibration Test (38)**

38	TABLE: Vibration tests				P
Model	OCV at start of test, (Vdc) for battery	Test frequency (Hz)	Vibration time (h)	Results	
Electric bicycle	Fully	10Hz~55Hz~10Hz	1h	P	
Electric bicycle	Fully	10Hz~55Hz~10Hz	1h	P	
Electric bicycle	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.					

**Strain-Relief Test pull test (39)**

Pull Location	Samples	Force	Observations	Pass	
				Pass	Fail
Connector wire	1#	35lbs (156N)	No damaged, no breakage, without displacement	✓	
Connector wire	2#	35lbs (156N)	No damaged, no breakage, without displacement	✓	
Connector wire	3#	35lbs (156N)	No damaged, no breakage, without displacement	✓	

push back test (39)

Pull Location	Samples	Force	Observations	Pass	
				Pass	Fail
Connector wire with switch	1#	6lbs (26.7N)	No damaged, no breakage	✓	
Connector wire with switch	2#	6lbs (26.7N)	No damaged, no breakage	✓	
Connector wire with switch	3#	6lbs (26.7N)	No damaged, no breakage	✓	



Photo documentation

Photo 1 Over view



Photo 2 Over view





Photo 3 Over view



Photo 4 Over view





Photo 5 Over view



Photo 6 Adaptor view



The end of report