Number	Test categories	Test project	The test content	Equipment	An overview of test principles/methods	Test time/period	Testing capability
1	Battery	554065-Pouch Cell	Pouch Cell production	**Anode Mixing**: Planetary Mixer (XFZH02) **Cathode Mixing**: Planetary Mixer (XFZH02/05/10) **Anode and Cathode Coating**: Transfer Coater (KC-M-480-10-M. M) **Rolling**: Calender (LDHY400-N45-BZ) **Slitting**: Automatic Slitting Machine (XFT480A) **Produce**: Automatic Producing Machine (ZP060-2-SC-CCD) **Winding**: Automatic Winding Machine (XSW160A-01)	**Anode Mixing:** The dispersing thickener CMC was dissolved in H2O, and then the conducting agent, anode powder and binder SBR were added and dispersed at different times to get the anode slurry; **Cathode Mixing:** The binder PVDF is dissolved in the solvent NMP, the conductive agent and cathode powder are added successively to get the cathode slurry after stirring and dispersing for different times; **Anode and Cathode Coating:** cathode and anode slurry is coated on aluminum foil and copper foil fluid collection by using transfer coater, and cathode and anode are obtained by baking in the coater oven. **Rolling:** The anode and cathode after drying are rolled under different pressure of roller to get different compacted anode and cathode electrodes; **Slitting:** The anode and cathode electrodes after rolling are slit according to different battery sizes; **Produce:** After slitting the anode and cathode electrodes through automatic production machine welding ear, glue, testing, to get qualified anode and cathode electrodes; **Assembly:** Different types of batteries are assembled by different equipment, and then encapsulated by aluminum plastic film or steel shell to get the batteries	3 days	10 batches/day
2	Battery	18650-Cylindrical Cell	Cylindrical Cell production	**Anode Mixing**: Planetary Mixer (XFZH02) **Cathode Mixing:** Planetary Mixer (XFZH02/05/10) **Anode and Cathode Coating:** Transfer Coater (KC-M-480-10-M. M) **Rolling:** Calender (LDHY400-N45-BZ) **Slitting:** Automatic Slitting Machine (XFT480A) **Produce:** Automatic Producing Machine (ZP060-2-SC-CCD) **Winding:** Automatic Winding Machine (ZY-18/65-L)		3 days	
3	Battery	7090130-Laminated Cell	Laminated Cell production	**Anode Mixing**: Planetary Mixer (XFZH02) **Cathode Mixing:** Planetary Mixer (XFZH02/05/10) **Anode and Cathode Coating:** Transfer Coater (KC-M-480-10-M. M) **Rolling:** Calender (LDHY400-N45-BZ) **Slitting:** Automatic Slitting Machine (XFT480A) **Produce:** Automatic Producing Machine (ZP060-2-SC-CCD) **Laminating:** Automatic Laminator (G-Z150CWU)		3 days	
4	Battery	monocell	Monocell production	**Anode Mixing**: Planetary Mixer (XFZH02) **Cathode Mixing:** Planetary Mixer (XFZH02/05/10) **Anode and Cathode Coating:** Transfer Coater (KC-M-480-10-M. M) **Rolling:** Calender (LDHY400-N45-BZ) **Slitting:** Automatic Slitting Machine (XFT480A) **Produce:** Automatic Producing Machine (ZP060-2-SC-CCD) **Laminating:** Manual Lamination		3 days	2 batches/day

5	Battery	coating	Anode and Cathode production	**Anode Mixing**：Planetary Mixer (XFZH02) **Cathode Mixing**：Planetary Mixer (XFZH02/05/10) **Anode and Cathode Coating**：Transfer Coater (KC-M-480-10-M. M)	Same as anode and cathod mixing and coating	2 days	**Anode**：1~3 batches/day **Cathode**：2 batches/day
6	Battery	Viscosity/fineness/solid content (measured)	Viscosity/fineness/solid content of anode and cathode	**Viscosity:** Intelligent viscometer NDJ-5ST **Fineness:** scraper fineness meter **Solid content:** Solid content tester DSH-1**6**	**Viscosity**: to fix the rotor and speed, test slurry viscosity; **Fineness:** to trace slurry drops on the fineness meter, scraping slurry with the scraper, the fracture is the fineness of the slurry; **Solid content:** Take 4~6g slurry into the sample tray, remove the solvent in the slurry by drying at high temperature, and get the solid content of the slurry.	1天	**Anode**：8 batches/day **Cathode**：4 batches/day
7	Battery	Static settling performance of slurry	The slurry viscosity changes with the increase of shelving time to determine whether the slurry has settled	Intelligent viscometer NDJ-5ST	The viscosity of the slurry with a shelving time of 6/12/24h was tested. If the viscosity decreased significantly, the slurry sedimentation occurred.	2天	**Anode**：3 batches/day **Cathode**：2 batches/day
8	Battery	Compaction performance (primary roll)	Compacting performance of electrode	Calender (LDHY400-N45-BZ)	Sheet thickness decreases with the increase of roll pressure, each pressure roll once to get the corresponding compaction: compaction = surface density/(sheet thickness - foil thickness), the anode edge shiny on behalf of sheet pressing for maximum compaction, cathode fold light transmission or fracture for maximum compaction;	1天	15batches/day
9	Battery	Compaction performance (primary roll)		Calender (LDHY400-N45-BZ)	Sheet thickness decreases with the increase of roll pressure, each pressure roll twice to get the corresponding compaction: compaction = surface density/(sheet thickness - foil thickness), the anode edge shiny on behalf of sheet pressing for maximum compaction, cathode fold light transmission or fracture for maximum compaction;	1天	10 batches/day
10	Battery	Liquid absorption performance	Fluid absorption capacity of electrode	Pipetting device P100(10-100μL)	To fix the compacted electrode , take 10μL electrolyte drops on the electrode, time until the electrolyte is absorbed, test 3 points, get the liquid absorption time;	1天	20 batches/day
11	Battery	Electrode rebound	Physical expansion rate of electrode	Calender (LDHY400-N45-BZ)	Under fixed compaction, test the thickness change of 0/0.5/2/24/48h, and calculate the physical expansion rate :(sheet thickness - initial thickness)/(initial thickness - foil thickness) *100%	3天	15batches/day
12	Battery	Peel strength (single side uncompacted electrode)	Bonding force between powder and fluid collector	Shimadzu stripping machine AGX-10kNVD	The single unrolled electrode was cut into 25mm*200mm, bonded with 3M glue on the steel plate, and the peeling speed was 100 mm/min for peeling test, and the peeling strength was obtained, and the sample was re-tested for 3-6 times.	2天	20 batches/day
13	Battery	Peel strength (double-sided or rolled back electrode)			The double-sided or rolled back electrode was cut into 25mm*200mm, bonded with 3M glue on the steel plate, and the peeling speed was 100 mm/min for peeling test, and the peeling strength was obtained, and the sample was re-tested for 3-6 times.	2天	10 batches/day
14	Battery	cohesion	The bonding force between powders	Shimadzu stripping machine AGX-10kNVD	The single unrolled electrode was cut into 25mm*200mm, bonded with green rubber on the steel plate, and the peeling speed was 100 mm/min for peeling test, and the peeling strength was obtained, and the sample was re-tested for 3-6 times.	2天	10 batches/day
15	Battery	Electrode resistance	Electrode resistance at constant or different pressures	Electrode resistance meter BER2500	Constant pressure test：15 MPa pressure , holding pressure 15s, sampling a point every 1s, 15 resistance data; Conductivity test under different compaction density (pressure)： pressure range 5-60 MPa, interval 10 MPa, pressure holding 25s, generally test seven pressure points;	20min	10 batches/day

16	Battery	Viscosity curve (continuous test)	Viscosity changes with increasing shear rate (take continuous viscosity)	Rheometer HAAKE MARS 40	At room temperature, select the continuous test mode, take a small amount of slurry on the turntable, test the viscosity curve with increasing shear rate, can be used to judge the slurry settling performance, stability and leveling;	20min	10 batches/day
17	Battery	Viscosity curve (step test)	Viscosity change with increasing shear rate (take steady-state viscosity)		At room temperature, select step test mode, take a small amount of slurry on the turntable, test the viscosity curve with increasing shear rate, can be used to judge the slurry settling performance, stability and leveling;	30min	10 batches/day
18	Battery	Thixotropy (thixotropic ring test)	Thixotropy (thixotropic ring test)		At room temperature, the thixotropic ring test mode was selected, and a small amount of slurry was put on the turntable to test the viscosity curve with the shear rate firstly increasing, then keeping constant, and finally decreasing, which could be used to judge the leveling and thixotropy of the slurry.	20min	10 batches/day
19	Battery	Thixotropy (three-stage test)	Thixotropy (three-stage test)		At room temperature, the thixothixoring test mode was selected, and a small amount of slurry was placed on the turntable to test the viscosity curve of low shear for a period of time, then high shear for a period of time, and finally low shear for a period of time, which can be used to simulate the paste coating process and investigate the viscosity recovery ability of slurry.	20min	10 batches/day
20	Battery	Battery disassembly, expansion of the charged electrode	electrode chemical expansion rate (100%SOC)	micrometer	After the battery is divided into capacites-disassembled at full charge, the anode electrode thickness is measured, and the expansion rate is calculated :(negative electrode thickness - negative electrode thickness after rolling)/(negative electrode thickness after rolling - foil thickness)	30min	/
21	Battery	Room temperature cycle	Cycle performance	NEWARE-BTS-5V12A	At room temperature, the charge and discharge test was carried out at a fixed rate and voltage range. After the retention rate was 80%, the normal temperature cycle performance of the battery was obtained.	/	6cycles/day (1C/1C cycling)
22	Battery	45 degree temperature cycle	High temperature cycling performance	NEWARE-BTS-5V12A	At 45℃, the battery was charged and discharged at a fixed rate and voltage range, and the high temperature cycle performance of the battery was obtained after the retention rate was 80%.	/	
23	Battery	Low temperature cycle	Low temperature cycling performance	NEWARE-BTS-5V12A+GDBELL-BTT-150C	At low temperature, charge and discharge tests were carried out at a fixed rate and voltage range, and the low-temperature cycle performance of the battery was obtained after the retention rate was 80%.	/	
24	Battery	Rate charge (small)	Low rate charge performance	NEWARE-BTS-5V60A	Fixed discharge at 0.5C, charge at 0.2C/0.5C/1.0C/2.0C/3.0C rate, calculate charge rate performance with constant charge capacity;	1天	10 batches/day

25	Battery	Rate charge(medium, large)	High rate charge performance	NEWARE-BTS-5V100A	Fixed discharge at 0.5C, charge at 0.2C/1.0C/3.0C/5.0C/7.0C or 1.0C/2.0C/3.0C/5.0C /10C rate, calculate charge rate performance with constant charge capacity;	1天	10 batches/day
26	Battery	Rate discharge (small)	Low rate discharge performance	NEWARE-BTS-5V60A	Fixed charge at 0.5C, discharge at 0.2C/0.5C/1.0C/2.0C/3.0C rate, calculate discharge rate performance with constant discharge capacity;	1天	10 batches/day
27	Battery	Rate discharge(medium, large)	High rate discharge performance	NEWARE-BTS-5V100A	Fixed charge at 0.5C, discharge at 0.2C/1.0C/3.0C/5.0C/7.0C or 1.0C/2.0C/3.0C/5.0C /10C rate, calculate discharge rate performance with constant discharge capacity;	1天	10 batches/day
28	Battery	80 degrees 6 h	High temperature storage Performance	NEWARE-BTS-5V6A+GDBELL-BE-8103	The battery was fully charged at 1C constant current and constant voltage, stored at 80℃ in open circuit state for 6 hours, and then stored at 25℃ for 5h, and the capacity retention rate was calculated at 1C constant current until the termination voltage. Then it was fully charged with 1C constant current and constant voltage, and the discharge termination voltage was reached at 1C constant current at 25℃ to calculate the capacity recovery rate.	2天	10 batches/day
29	Battery	60 ℃ high temperature for 7 days storage/charge maintenance	High temperature storage Performance	NEWARE-BTS-5V6A+GDBELL-BE-8103	The battery was fully charged at 1C constant current and constant voltage, stored at 60℃ in open circuit state for 7 days, and then stored at 25℃ for 5h, and the capacity retention rate was calculated at 1C constant current until the termination voltage. Then it was fully charged with 1C constant current and constant voltage, and the discharge termination voltage was reached at 1C constant current at 25℃ to calculate the capacity recovery rate.	10天	10 batches/day
30	Battery	Discharge at different temperatures	Discharge performance at different temperatures	NEWARE-BTS-5V6A+GDBELL-BTT-150C	First, it is fully charged at a constant current and voltage of 0.5C at 25℃. After storage at -10℃ and -20℃ for 4h, the discharge capacity was calculated by constant discharge voltage to termination voltage.	2天	10 batches/day
31	Battery	DCR test at room temperature (DC internal resistance)	DCR	Arbin-RBT4108	he battery is charged at a constant rate (≥ 0.1C) to the specified SOC (0≤ SOC %≤100%); At room temperature, a constant current of I1 (≥0.1C) was charged for 10S or a constant current of discharge for 10S, and the terminal voltage U1 of discharge for 10S was recorded. Instantly increase the current to I2 (≥0.1C)， constant current charge for 10S or constant current discharge for 10S, and record the discharge terminal voltage U2 for 10S; Calculate DCR = (U2 - U1)/(I2 - I1);	1.5天	10 batches/day
32	Battery	DCR test at low temperature (DC internal resistance)	DCR	NEWARE-BTS-5V6A+GDBELL-BTT-150C	he battery is charged at a constant rate (≥ 0.1C) to the specified SOC (0≤ SOC %≤100%); At low temperature, a constant current of I1 (≥0.1C) was charged for 10S or a constant current of discharge for 10S, and the terminal voltage U1 of discharge for 10S was recorded. Instantly increase the current to I2 (≥0.1C)， constant current charge for 10S or constant current discharge for 10S, and record the discharge terminal voltage U2 for 10S; Calculate DCR = (U2 - U1)/(I2 - I1);	1.5天	5 batches/day

33	Battery	Lithium evolution at room temperature	Lithium evolution at room temperature	NEWARE-BTS-5V12A	After 3 weeks of cycle at a fixed rate at room temperature, the anode interface was disassembled at full charge to observe lithium evolution	1天	10 batches/day
34	Battery	Lithium evolution at low temperature	Lithium evolution at low temperature	NEWARE-BTS-5V6A+GDBELL-BTT-150C	After 3 weeks of cycle at a fixed rate at low temperature, the anode interface was disassembled at full charge to observe lithium evolution	1天	5 batches/day
35	Battery	HPPC power test at room temperature	Power performance at room temperature	Arbin-RBT4108	1) Charge to 4.4V at 1C constant current and constant voltage, cut-off current 0.05C, Let stand for 30 min. 2) Discharge at 3C for 10s and leave for 40S; 3) discharge at 1C for 5min30s and stand for 30min; 4) 3C real discharge for 10s, static 40S, 2C charge for 10s, static 40S; 5) Discharge at 1C for 5min50s and stand for 30min; 6) Repeat Step 4) -5) 9 times, test the charge and discharge power of 90%, 80%, 70%, 60%, 50%, 40%, 30%, 20%, 10%SOC successively, and stop until the discharge voltage drops below 2.75V;	1天	10 batches/day
36	Battery	gas test	Battery gas production	Gas production tester	Before adding the medium silicone oil, test the weight of the battery m1, after adding the medium, test the weight of the battery m2, get the volume of the battery gas production :(m1-m2)/ρ	20min	24samples/day
37	Battery	dQ/dV	dQ/dV curve	Arbin-RBT4108	Charging and discharging at 0.05C for 2 weeks, dQ/dV analysis was performed to determine the peak position of phase transition	100h	5 batches/day
38	Battery	Acupuncture	Battery safety performance	GDBELL-BE-6045W-2T	With φ6 ~10mm high temperature resistant needle, 25±5mm/s rate perpendicular to the battery, through to the battery inside and stay, observe 1h;	3h	1 batch/day
39	Battery	Extrusion		GDBELL-BE-6045W-2T	The battery was placed on the test platform, and extrusion was carried out in the vertical direction (extrusion rate 5±1mm/s). When the shape variable reached 30% of the overall size of the extrusion direction, the test was stopped, and the test was kept for 10min and 1h	3h	1 batch/day
40	Battery	Hot box		GDBELL-BTT-150CS	The battery is fully charged and put into the box. The temperature rise rate of 5℃/min is raised to 130℃. After 30min, the heating is stopped,Record the battery changes within 1 hour;	3h	1 batch/day
41	Battery	Short circuit test		GDBELL-BE-8102	The anode and cathode terminals of the battery are short-circuited for 10 minutes, and the external circuit resistance is less than 5mω. Observe for 1 hour.	3h	1 batch/day
42	Battery	The overcharge test		NEWARE-MIFB-200-2CH10V60A	Charge at the specified current constant current to 1.5 times the upper limit voltage or stop charging when the charging time reaches 1h. Observe and record the charging curve and temperature change curve for 1h.	3h	1 batch/day
43	Battery	The ARC test	Test the thermal safety of materials and batteries under adiabatic conditions	Omnical-Φ1	The instrument for testing and analyzing the thermal safety performance of samples in an adiabatic environment can simulate the thermal characteristics of the exothermic reaction process when the internal heat of the battery cannot be lost in time, and obtain the thermodynamic and kinetic data such as the activation energy, reaction order, adiabatic temperature rise and reaction heat under the condition of thermal runaway	5days/sample	
44	Battery	The CT test	Test the battery for internal defects	nanoVoxel3000	Using the X-ray fluoroscopy ability, a series of 2D fluoroscopic images from different angles are taken, and then synthesized into 3D image data by 3D reconstruction software. Virtual cutting observation can be carried out at any position and direction. According to the sharpness and scanning time requirements, you can choose "overall quick scan", "spiral overall scan", "local scan" and other modes	1h/sample	1 batch/day