

1. General information

1.1. Range

This specification defines the performance and parameters of a rechargeable lithium-ion battery that TAFEL offers to its customers.

1.2. Application Range

Electric car / energy storage

1.3. Product Categories

Rechargeable lithium ion battery

1.4. Model:

153AH

2.Specification

2.1. Basic Parameters

Item	Specification	Condition
2.1.1. Capacity	Nominal 157.5 Ah (C_{nom})Min 153.0 Ah (C_{min})	Standard charging/discharging
2.1.2. Nominal Voltage	3.692 V	25°C , 0.33C
2.1.3. Operating Voltage	2.8 V~4.3 V2.5 V~4.3 V2.1V~4.3V	$T > 0\text{ }^{\circ}\text{C}$ -20°C < $T \leq 0\text{ }^{\circ}\text{C}$ $T \leq -20\text{ }^{\circ}\text{C}$
2.1.4. Standard charging(reference to 4.1.1)	153.0 A4.3 V	Constant currentConstant pressure

	7.65A25±2 °C	Cut off currenttemperature
2.1.5. Standard discharge(reference to 4.1.2)	153.0 A2.8 V 25±2 °C	Constant currentCut off currenttemperature
2.1.6. weight	2.64±0.03 kg	The weight needs to be fine-tuned after shipment
2.1.7. thickness	79.2±0.3mm	pressure: 300±20 kgf
2.1.8. dimension(L*W*H)	79.2 mm*148.7mm*97.7mm (Does not contain poles)	The thickness (including the outer casing insulation film) is tested under a pressure of 300 ± 20 kgf, and the height includes the bottom and top insulation stickers.Film, BOL
2.1.9. AC impedance	≤ 0.35 mΩ	AC 1KHz 60% SoC, BOL
2.1.10. Shipping voltage	3.81 ± 0.01V	60% SoC, 25 °C

2.2. Charging specification

2.2.1. Slow charging mode (regular charging)

temperature	Current
T>55°C	0.0A
45°C ≤ T < 55°C	51.0A
35°C ≤ T < 45°C	51.0A
25°C ≤ T < 35°C	51.0A
20°C ≤ T < 25°C	51.0A
15°C ≤ T < 20°C	45.9A
10°C ≤ T < 15°C	38.3A
5°C ≤ T < 10°C	30.6A
0°C ≤ T < 5°C	23.0A
-5°C ≤ T < 0°C	12.5A
-10°C ≤ T < -5°C	10.0A
15°C ≤ T < -10°C	7.5A
20°C ≤ T < -15°C	5.0A
T < -20°C	0.0A

2.2.2. Fast charge mode (step charging)

Fast charge mode (step charging)												
SOC	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	0%~80%SOC 平均倍率
55℃	168A	153A	153A	122A	122A	92A	77A	50A	50A	50A	/	0.66C
50℃	199A	184A	184A	153A	153A	122A	107A	77A	50A	50A	/	0.88C
45℃	245A	230A	230A	199A	199A	168A	153A	122A	50A	50A	/	1.2C
40℃	245A	230A	230A	199A	199A	168A	153A	122A	50A	50A	/	1.2C
35℃	245A	230A	230A	199A	199A	168A	153A	122A	50A	50A	/	1.2C
30℃	245A	230A	230A	199A	199A	168A	153A	122A	50A	50A	/	1.2C
25℃	245A	230A	230A	199A	199A	168A	153A	122A	50A	50A	/	1.2C
20℃	245A	230A	230A	199A	199A	168A	153A	122A	50A	50A	/	1.2C
15℃	245A	230A	230A	199A	199A	168A	153A	122A	38A	38A	/	1.2C
10℃	122A	112A	103A	92A	81A	66A	54A	46A	38A	38A	/	0.49C
5℃	84A	77A	69A	61A	54A	46A	38A	31A	31A	31A	/	0.34C
0℃	61A	54A	50A	46A	37A	31A	31A	23A	23A	23A	/	0.25C
under 0℃	/	/	/	/	/	/	/	/	/	/	/	/

2.3. Energy feedback voltage protection parameter

Item	Specification	Condition
2.3.1. Primary over pressure limit	4.25 V	Reach this voltage limit power 50%
2.3.2. Secondary over pressure limit	4.30V	Reach this voltage limit to charge everything
2.3.3. Three-level over voltage limit	4.35 V	Cut off the relay and stop everything
2.3.4. Primary under voltage limit	T > 0℃: 3.0V-20℃<T ≤ 0℃: 2.7V T ≤ -20℃: 2.3V	Reach this voltage limit power 50%
2.3.5. Secondary under voltage limit	T > 0℃: 2.8V-20℃<T ≤ 0℃: 2.5V T ≤ -20℃: 2.1V	Reach this voltage limit discharge
2.3.6. Three-stage undervoltage limit	T > 0℃: 2.6V-20℃<T ≤ 0℃: 2.3V T ≤ -20℃: 1.9V	Reach this voltage cut-off relay

3. Appearance and Size

3.1. Appearance

There are no deep scratches, cracks, rust, stains or leaks on the appearance, and other defects that affect the commercial value of the battery.

3.2. Dimension

T: 79.2mm (Insulated film, tested at 300 kgf for 2 seconds) W: 148.7mmH: 97.7mm (No poles, including top patch)H: 102.1mm (With pole, with top patch)

4. Performance Specification

4.1. Standard test conditions

4.1.1. 1C Charging

Unless otherwise specified, “1C Charging” includes constant current charging with a current rating of 153.0 A. When the voltage reaches 4.3V, the constant voltage is charged, and the charging current is gradually reduced to 7.65A to end the charging. For testing purposes, charging should be performed at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

4.1.2. 1C Discharging

The “1C discharge” is discharged to 2.8 V at a constant current of 153.0 A. Discharge should be performed at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ unless otherwise stated (eg low temperature discharge capacity test).

4.1.3. 0.33C Charging / 1C discharge cycle

The cell should be charged to 4.3V with a constant current of 51.0 A, then charged at a constant voltage with an off current of 7.65A. The cell should be discharged to 2.8 V at a constant current of 153.0 A. The battery should be allowed to stand for 20 minutes after each charge and discharge.

4.1.4. 1C Low Temperature Discharge

1C Low Temperature Discharge refers to discharge to a lower limit voltage with a constant current of 153.0 A, and discharge is performed at a specified test temperature.

4.1.5. Constant Current Charging (CC)

The cell is charged at a constant current and does not include a constant voltage charging process.

4.2. Electrical Performance Parameter

Item	Specification	Condition
4.2.1. Initial capacity*	$\geq 153.0 \text{ Ah (C}_{\min})$	Charge the battery according to 4.1.1And discharge the battery within 1 hour after full charge, dischargeAccording to 4.1.2
4.2.2. Capacity at different temperatures	$\geq 80\% \text{ C}_{25^\circ\text{C}}$	Charging the battery according to 4.1.1 at $25^\circ\text{C} \pm 2^\circ\text{C}$ Discharge the cell according to 4.1.4 at -30°C
	$\geq 84\% \text{ C}_{25^\circ\text{C}}$	Charging the battery according to 4.1.1 at $25^\circ\text{C} \pm 2^\circ\text{C}$ Discharge the cell according to 4.1.4 at -20°C
	$\geq 89\% \text{ C}_{25^\circ\text{C}}$	Charging the battery according to 4.1.1 at $25^\circ\text{C} \pm 2^\circ\text{C}$ Discharge the cell according to 4.1.4 at 0°C
	$\leq 105\% \text{ C}_{25^\circ\text{C}} / \geq 99\% \text{ C}_{25^\circ\text{C}}$	Charging the battery according to 4.1.1 at $25^\circ\text{C} \pm 2^\circ\text{C}$ Discharge the cell according to 4.1.4 at 45°C
	$\leq 110\% \text{ C}_{25^\circ\text{C}} / \geq 99\% \text{ C}_{25^\circ\text{C}}$	Charging the battery according to 4.1.1 at $25^\circ\text{C} \pm 2^\circ\text{C}$ Discharge the cell according to 4.1.4 at 60°C
4.2.3. 脉冲性能	600.0 A	Maximum allowable 10s discharge current peak($\geq 20\% \text{ SOC}$, 25°C)
	500.0 A	Maximum allowable 10s charging current peak($\leq 70\% \text{ SOC}$, 25°C)

* Battery initial capacity test time (within 7 days after the next position)** C25°C means battery discharge capacity, the battery is charged according to 4.1.1 at $25^\circ\text{C} \pm 2^\circ\text{C}$, according to 4.1.2 at $25^\circ\text{C} \pm 2^\circ\text{C}$ D is charge.

4.3. Cycle life and self-discharge

Item	Specification	Condition
4.3.1 Reversible capacity loss in 25°C	< 1.0% of C_{min}	The battery is stored in a shipping environment at a temperature of 25 ° C. After 1 month of storage, the capacity recovery capability after 3 cycles is performed according to the charging conditions of 4.1.1 and the discharge conditions of 4.1.2. *
4.3.2 Reversible capacity loss in 45°C	<1.5% of C_{min}	The battery is fully charged according to the charging conditions in 4.1.1. Store at a temperature controlled at 45 ° C for 4 weeks. After storage, according to the charging conditions of 4.1.1 and the discharge conditions of 4.1.2, the capacity recovery ability after three cycles. *
4.4.3 Cycle life at 25°C	$\geq 122.4Ah$	Charge and discharge the cell 1500 times according to 4.1.3 at 25 ° C $\pm$ 2 ° C. The last discharge capacity was compared to 122.4 Ah.
4.4.4 Cycle life at 45°C	$\geq 122.4Ah$	Charge and discharge the cell 1200 times according to 4.1.3 at 45 ° C $\pm$ 2 ° C. The last discharge capacity was compared to 122.4 Ah.

*Resilience: After storage, discharge 1C according to 4.1.2, then carry out 0.33C charging 1C discharge cycle 3 times according to 4.1.3, and use the third discharge capacity as recoverable capacity.

4.4. Safety Test

Item	Specification	Condition
4.4.1 Impact test	No leakage	The cell is charged according to 4.1.1, with a peak acceleration of 50gn for the cell and a half-sine wave impulse with a pulse duration of 11ms. The cell must be subjected to six impacts in three mutually perpendicular directions (x, y, z). (UN test)
4.4.2 Vibration test	No leakage	The battery is sinusoidally vibrated according to 4.1.1 charging, and the logarithmic scanning frequency is between 7 Hz and 200 Hz with a span of 15 minutes. (UN test)
4.4.3 Impact test	No explosion, no fire	The battery is charged according to 4.1.1. Place the battery on a flat surface and place a 15.8mm diameter stainless steel rod on the center of the battery. A piece of 9.1 kg weight 61 ± 2.5 cm is dropped to the intersection of the steel bar and the sample. (UN test)
4.4.4 Over-discharge test	No explosion, no fire	The battery is charged according to 4.1.1 and discharged at 1C constant current for 90 minutes.
4.4.5 Overcharge test	No explosion, no fire	The battery is charged according to 4.1.1 and overcharged at 1C until the SOC reaches 200% or the cell voltage reaches 6.45V, whichever comes first.
4.4.6 External short circuit test	No explosion, no fire	The battery is charged according to 4.1.1, the total resistance of the positive and negative connections Less than 5 mΩ for 10 minutes.
4.4.7 Hot box test	No explosion, no fire	The battery is charged according to 4.1.1, and the battery is heated in a gas circulating oven at a heating rate of 5 ° C per minute and maintained at 130 ° C for 30 minutes.
4.4.8 C Squeeze test	No explosion, no fire	The battery is charged according to 4.1.1, and the test extrusion basis (GB / T 31485-2015). The test shall be terminated when the displacement exceeds 30% of the battery height, or when the pressure reaches 200 KN, or when the cell voltage reaches 0 V.

5. Precautions and prohibition

The following are precautions for using a rechargeable lithium ion battery. Improper handling of the battery can cause heat, fire, and deterioration in performance. Please be sure to observe the following

Note

- ✓ Read the instruction manual before using the battery-equipped device. Please read the charging device manual before charging.
- ✓ When the battery is connected to the charging device for a while, but it is not charged, stop charging.
- ✓ Check the positive (+) and negative (-) directions before assembling the battery.
- ✓ When connecting the battery, check the insulation to prevent short circuit.
- ✓ The battery must be stored separately.
- ✓ When the battery needs to be stored for a long period of time, it must be stored in an environment with low drying and low temperature ($\leq 25^{\circ}\text{C}$).
- ✓ Do not leave the battery in direct sunlight or high temperatures.
- ✓ If odor or rust is detected during the first use, please return the product to the seller immediately.
- ✓ The battery must be kept away from children and pets.
- ✓ When the battery has a long life after a long period of use, replace it with a new one.
- ✓ Do not wear metal objects when handling batteries. (eg rings, watches, accessories, etc.).
- ✓ When using a battery to make a module or battery pack, follow the “first in, first out” principle.
- ✓ Charging time should not exceed the time specified in the specification.
- ✓ The battery should not be exposed to the operating temperature range specified in this document.

Prohibited

- ✓ Other charging devices cannot be used.
- ✓ Do not exceed the maximum charge rate.
- ✓ Do not to disassemble or modify the battery.
- ✓ Do not throw or hit the battery.
- ✓ Do not pierce the battery with sharp things. (such as nails, knives, pencils, drills)
- ✓ Do not mix with other batteries.
- ✓ Do not directly solder the battery.
- ✓ The battery cannot be loaded during the manufacturing process.
- ✓ Do not pack old and new batteries together.
- ✓ Do not expose the battery to high temperatures. (such as fire)
- ✓ Do not put the battery in a microwave or high pressure container.
- ✓ Do not invert the battery.
- ✓ Do not to contact the positive and negative electrodes with a metal material. (such as metal, wire)
- ✓ Do not submerge or soak the battery with water or sea water.
- ✓ Do not bend the battery without the battery manufacturer's permission.

6. Dimensions

