ULTRALIFE®

HOW TO INSPECT BATTERY PACKS WITH ULTRALIFE BOBBIN (LOW RATE) LI/SOCL2 CELLS

Lithium Thionyl Chloride (Li/SOCl2) Suggested Inspection Procedures

BATTERY PACK INSPECTION / PREPARATION FOR USE OR RE-USE

1. **Check the Open Circuit Voltage (OCV) of the pack.** If the pack voltage is less than the OCV voltages below, contact the pack manufacturer, pack may not be fit for use.
2. **Depassivation:** Apply the resistive load or constant current suggested below at temperatures of +68°F (+20°C) or above to the cutoff voltage specified to depassivate the pack.
3. **Remove the resistive load or constant current** when the pack voltage reaches the depassivation cutoff voltage referenced.
4. **If the pack does not reach depassivation cutoff voltage in 30 minutes,** there is significant passivation or other problems with the pack, call the pack manufacturer for additional instruction.
5. **Once the pack has been fully depassivated to the cutoff voltage indicated,** apply the constant current or resistive load indicated to check for cathode freeze over.
6. **Cathode Freeze Over Check:** A depassivated pack should quickly reach the cutoff voltage for the cathode freeze over check. If the pack reaches the voltage cutoff in less than 3 minutes, the pack is considered functionally usable. If the pack voltage does not reach the voltage cutoff in 3 minutes, the voltage increases then decays, or plateaus below the voltage cutoff, do not use the pack. The pack may have cells with damaged cathodes. Contact the pack manufacturer for additional information prior to use. DO NOT allow the pack to remain on the cathode freeze over load for more than 5 minutes maximum. Load times in excess of 5 minutes at room temperature will damage the cells.

AA BOBBIN (P/N: UHE-ER14505-X)

CELL TYPE(S)		DEPASSIVATION		CATHODE FREEZE OVER CHECK	
Number of Cells in Series	Pack Open Circuit Voltage (OCV)	Resistive Load at 11.4 mA Constant Current	Cutoff Voltage*	Resistive Load at 46 mA Constant Current	Cutoff Voltage*
2	7.30 V	561 Ohm (0.25 watt min.)	5.70 V	140 Ohm (1.00 watt min.)	5.70 V
3	10.95 V	841 Ohm (0.25 watt min.)	8.90 V	210 Ohm (1.00 watt min.)	8.90 V
4	14.60 V	1122 Ohm (0.50 watt min.)	12.10 V	280 Ohm (1.50 watt min.)	12.10 V
5	18.25 V	1402 Ohm (0.50 watt min.)	15.30 V	351 Ohm (1.50 watt min.)	15.30 V
6	21.90 V	1683 Ohm (0.50 watt min.)	18.50 V	421 Ohm (2.00 watt min.)	18.50 V
7	25.55 V	1963 Ohm (0.50 watt min.)	21.70 V	491 Ohm (2.00 watt min.)	21.70 V
8	29.20 V	2244 Ohm (1.00 watt min.)	24.90 V	561 Ohm (2.50 watt min.)	24.90 V
9	32.85 V	2524 Ohm (1.00 watt min.)	28.10 V	631 Ohm (3.00 watt min.)	28.10 V
10	36.50 V	2805 Ohm (1.00 watt min.)	31.30 V	701 Ohm (3.00 watt min.)	31.30 V
11	40.15 V	3085 Ohm (1.00 watt min.)	34.50 V	771 Ohm (3.50 watt min.)	34.50 V
12	43.80 V	3366 Ohm (1.00 watt min.)	37.70 V	841 Ohm (3.50 watt min.)	37.70 V

* Assumes pack contains a series diode. If no series diode is installed in the pack, add 0.7 V to the cutoff voltage.
Measured voltage must exceed cutoff voltage after recommended time period.

C BOBBIN (P/N: UHE-ER26500-X)

CELL TYPE(S)		DEPASSIVATION		CATHODE FREEZE OVER CHECK	
Number of Cells in Series	Pack Open Circuit Voltage (OCV)	Resistive Load at 25 mA Constant Current	Cutoff Voltage*	Resistive Load at 98 mA Constant Current	Cutoff Voltage*
2	7.30 V	260 Ohm (0.50 watt min.)	5.70 V	65 Ohm (1.50 watt min.)	5.70 V
3	10.95 V	391 Ohm (0.50 watt min.)	8.90 V	98 Ohm (2.00 watt min.)	8.90 V
4	14.60 V	521 Ohm (1.00 watt min.)	12.10 V	130 Ohm (2.50 watt min.)	12.10 V
5	18.25 V	651 Ohm (1.00 watt min.)	15.30 V	163 Ohm (3.00 watt min.)	15.30 V
6	21.90 V	781 Ohm (1.00 watt min.)	18.50 V	195 Ohm (4.00 watt min.)	18.50 V
7	25.55 V	912 Ohm (1.00 watt min.)	21.70 V	228 Ohm (4.50 watt min.)	21.70 V
8	29.20 V	1,042 Ohm (1.50 watt min.)	24.90 V	260 Ohm (5.00 watt min.)	24.90 V
9	32.85 V	1,172 Ohm (1.50 watt min.)	28.10 V	293 Ohm (6.00 watt min.)	28.10 V
10	36.50 V	1,302 Ohm (1.50 watt min.)	31.30 V	326 Ohm (6.50 watt min.)	31.30 V
11	40.15 V	1,433 Ohm (2.00 watt min.)	34.50 V	358 Ohm (7.00 watt min.)	34.50 V
12	43.80 V	1,563 Ohm (2.00 watt min.)	37.70 V	391 Ohm (7.50 watt min.)	37.70 V

D BOBBIN (P/N: UHE-ER34615-X)

CELL TYPE(S)		DEPASSIVATION		CATHODE FREEZE OVER CHECK	
Number of Cells in Series	Pack Open Circuit Voltage (OCV)	Resistive Load at 49 mA Constant Current	Cutoff Voltage*	Resistive Load at 195 mA Constant Current	Cutoff Voltage*
2	7.30 V	131 Ohm (1.00 watt min.)	5.70 V	33 Ohm (2.50 watt min.)	5.70 V
3	10.95 V	197 Ohm (1.00 watt min.)	8.90 V	49 Ohm (4.00 watt min.)	8.90 V
4	14.60 V	262 Ohm (1.50 watt min.)	12.10 V	66 Ohm (5.00 watt min.)	12.10 V
5	18.25 V	328 Ohm (1.50 watt min.)	15.30 V	82 Ohm (6.50 watt min.)	15.30 V
6	21.90 V	393 Ohm (2.00 watt min.)	18.50 V	98 Ohm (7.50 watt min.)	18.50 V
7	25.55 V	459 Ohm (2.50 watt min.)	21.70 V	115 Ohm (9.00 watt min.)	21.70 V
8	29.20 V	525 Ohm (2.50 watt min.)	24.90 V	131 Ohm (10.00 watt min.)	24.90 V
9	32.85 V	590 Ohm (3.00 watt min.)	28.10 V	148 Ohm (11.50 watt min.)	28.10 V
10	36.50 V	656 Ohm (3.50 watt min.)	31.30 V	164 Ohm (12.50 watt min.)	31.30 V
11	40.15 V	721 Ohm (3.50 watt min.)	34.50 V	180 Ohm (14.00 watt min.)	34.50 V
12	43.80 V	787 Ohm (4.00 watt min.)	37.70 V	197 Ohm (15.00 watt min.)	37.70 V

* Assumes pack contains a series diode. If no series diode is installed in the pack, add 0.7 V to the cutoff voltage. Measured voltage must exceed cutoff voltage after recommended time period.

Notice:
The constant current and resistive loads suggested for depassivation above are based on current densities of approximately 1.0 mA / cm2 of common surface area in the Ultralife cells referenced.
The 1.0 mA / cm2 depassivation load level should not damage the cell or cause cathode freeze over damage at temperatures of +32°F (0°C) or higher.
Depassivate battery packs at room temperature +68°F - +77°F (+20°C - +25°C).
Every cell manufacturer has slightly different common surface area in the cells they produce. The above depassivation loads may not be appropriate for cells produced by other manufacturers.
Contact the actual cell / battery pack manufacturer for specific depassivation procedures for the cells you are depassivating. Only the manufacturer can provide exact specifications.

Caution:
All caution must be used to avoid short circuiting cells when depassivating. Cell internal heating, venting, leaking, or rupture could occur. Call the cell or pack manufacturer for any questions.
Due to the heat generated at the resistor, use resistors with the minimum power rating or more for depassivation and cathode freeze over check. Wound power resistors are recommended. Ensure that the heat generated by the resistor will not short the battery pack by melting wire or connection insulation.
Do not leave the constant current or resistive load on the pack unattended, failure to remove the resistor or constant current will deplete the pack.
Do not leave the constant current or resistive load suggested for cathode freeze over check on the battery pack for more than 5 minutes. The cells in the battery pack can be damaged if the load is left on for more than 5 minutes.

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