Technical Guide: Rechargeable Vape Batteries

1. Battery Classification & Specifications

Vape batteries are typically High-Drain Lithium-ion cells. In industrial reuse, you will encounter two main form factors:

Li-Po (Lithium Polymer): Flat, rectangular cells wrapped in silver aluminum foil.

Cylindrical Cells: Small round batteries such as 13350, 13450, or 16350 (The numbers represent dimensions: e.g., 13mm diameter, 35mm length).

Parameter	Value	Description
Nominal Voltage	3.7V	The average operating voltage.
Max Charge Voltage	4.2V	The upper safety limit. Never exceed this.
Cut-off Voltage	3.0V - 3.2V	The lower limit. Discharging below this damages chemistry.
Discharge Rate	2C - 5C+	High-rate discharge capability for heating coils.

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2. The Charging Protocol (CC-CV Method)

To recharge these cells safely, a specialized charging IC (e.g., TP4056 or MCP73831) must be used to follow the Constant Current - Constant Voltage curve.

Pre-Conditioning (Trickle Charge): If the battery is below 2.9V, a tiny current is applied to "wake up" the cell.

Constant Current (CC) Stage: The battery is charged at a steady rate (e.g., 500mA). The voltage rises rapidly.

Constant Voltage (CV) Stage: Once the voltage hits 4.2V, the charger holds the voltage steady while the current gradually drops.

Termination: Charging stops automatically when the current falls below 10% of the initial rate.

3. Critical Safety & Operational Rules

[WARNING] Salvaged batteries lack the outer protective casing of consumer products. Handle with extreme caution.

Avoid Short Circuits: Never let the positive (+) and negative (-) tabs touch. Use Kapton Tape (Polyimide tape) to insulate exposed terminals immediately after disassembly.

Monitor Temperature: If a battery feels hot (above 45°C / 113°F) during charging, stop

immediately. Heat indicates high internal resistance or internal shorting.

Never Charge Below Freezing: Charging at temperatures below 0°C (32°F) causes "Lithium Plating," which leads to permanent damage and potential fire hazards.

Mechanical Integrity: Do not use batteries with dents, punctures, or swelling (bloating). A bloated battery is a fire risk.

4. Storage & Maintenance for Industrial Use

If you are storing these batteries for future use in sensors or IoT devices:
Storage SoC (State of Charge): Store batteries at 3.8V - 3.85V (roughly 50% charge). This is the "Goldilocks zone" for chemical stability.
Self-Discharge: Small Li-Po cells lose 1-2% charge per month. Check voltage every 3 months to prevent the voltage from dropping into the "dead zone" (below 2.5V).
Environment: Store in a cool, dry place. Ideally in a fire-rated Li-Po bag or a metal container.

5. Industrial Application Checklist

- When repurposing a vape battery for a new project, use this checklist:

- Voltage Test: Is the OCV (Open Circuit Voltage) above 3.0V?
- Physical Inspection: No swelling or electrolyte odor?
- PCM Check: Does the battery have a Protection Circuit Module attached? (Highly recommended for reuse).
- Capacity Test: Does the actual mAh match the labeled capacity?