

Grading & Aging Capacity 2026

Sizing the New PACK Line Bottleneck — NEGUP MACHINE

The bottleneck moved from the weld head to the test rack

For a decade PACK-line capacity was measured by how fast a robot could stack cells and how fast a laser could weld a busbar. Lines now stall at the quality gate: cell grading before assembly, aging before shipment, and end-of-line (EOL) verification at the finish. On 2 September 2026 a new Chinese group standard widened that gate — and turned test capacity into a capital-planning question.

What T/CPQS A0065—2026 changed

T/CPQS A0065—2026, *Safety Requirements and Test Methods for Electric Vehicle Traction Battery System During Service Life*, was jointly led by the China Consumer Product Quality Safety Promotion Association and the China Automotive Engineering Research Institute (CAERI), with more than twenty co-developers including Huawei Terminal, CATL, BYD, Gotion High-tech, EVE Energy, Xiaomi Auto and SGMW, plus the SAMR Defective Product Recall Technical Center (China Economic Net, 18 September 2026).

The design is two-stage. **Initial-state safety** covers 13 tests across mechanical, thermal, insulation and electrical safety, adding chassis abuse cases such as bottom impact, ground scraping and connector crush. **Post-durability safety** is the new part: samples are aged through mechanical, environmental and cycle durability, then re-tested for over-temperature, over-current, over-charge, over-discharge and immersion.

Table 1 — Quantified pass criteria that now shape equipment design

Insulation resistance after test	Not below 100 Ω/V	Inline hipot at module level, logged per serial
Airtightness leakage	Under 100 Pa/min	Seal / leak test station with calibrated decay measurement
Failed cells besides trigger cell	No more than 2	Propagation control + per-cell thermal and voltage traceability
Durability pre-treatment	Mechanical + environmental + cycle	Weeks of bench occupancy per sample; channel scheduling is critical
Baseline for GB 38031—2025	Mandatory since 1 July 2026	Group standard raises the high-water mark above the national minimum

CAERI positions the standard above GB 38031—2025; by August 2026 the institute had accumulated over one million real test data records (CCTV / CAERI, September 2026).

Table 2 — The five test gates in a modern PACK line

Cell grading	After formation	Capacity, OCV, internal resistance	Multi-channel cyclor plus sorting
Module pre-weld check	After stacking, before busbar welding	Insulation withstand, contact resistance	Inline hipot and milliohm scan
Aging / burn-in	Before shipment	Self-discharge drift, capacity retention	Temperature-controlled aging racks
PACK / module EOL	End of assembly	Function, BMS communication, seal integrity	EOL comprehensive test system
Durability re-verification	Off-line test laboratory	Post-vibration, post-cycle safety	Environmental and cycle benches

Data continuity is not optional: the standard demands before-and-after curves, not a pass/fail verdict. The grading machine at the head of the line and the EOL tester at the finish must write into one traceable dataset.

Table 3 — Test-equipment market signals, 2025–2033

Cell sorting machine sales, 2025	USD 882 million	QYResearch, Sep 2026
Cell sorting machine sales, 2032F	USD 2.586 billion	QYResearch, Sep 2026
Sorting-machine CAGR 2026–2032	16.5% (avg unit ~USD 36,000)	QYResearch, Sep 2026
Formation & grading equipment, 2025 → 2033	USD 450 million → USD 1.0 billion (10.5% CAGR)	Archive Market Research, 2026
Prismatic share of 2025 revenue / APAC share	~42% / over 60%	Archive Market Research, 2026
ESS sorting equipment price change	+18%	Chanye Shijie, Sep 2026
PACK lines procured with inline pack test	54.8%, +19 pts YoY	Q3 2026 supplier market summary
Household-storage shipments H1 2026	61 GWh, +206% YoY (>135 GWh full-year F)	SPIR via Repower, Sep 2026

For energy-storage cells, grading has moved from a two-parameter resistance-and-capacity screen to a six-dimension evaluation including self-discharge trend slope and high-temperature stand voltage drop (Chanye Shijie, 4 September 2026).

Specification checklist for your next line

Count channels, not cabinets. Grading capacity is set by simultaneous channels and temperature-controlled positions, not floor area.

Ask for energy recovery. 93–95% regenerative efficiency changes the operating cost of aging capacity more than any mechanical upgrade.

Put the first test node before the weld. Insulation and contact-resistance checks belong after module stacking, upstream of the busbar weld head.

Match probe life to takt. Hundreds of thousands of contacts per probe set, with fieldbus integration into MES.

Size for peak, not average. Small-format builders (18650, 21700, small prismatic LiFePO₄) face the same gate as EV lines.

Insist on measurement accuracy. Cell cyclers now quote $\pm 0.02\%$ F.S.; PACK-level systems reach $\pm 0.05\%$ F.S. at 95%+ regenerative efficiency.

NEGUP MACHINE builds the equipment this sequence runs on: the **NG-013 cell grading machine**, the **NG-014 pack aging machine**, and PACK / module EOL comprehensive test systems — plus cylindrical, prismatic and pouch assembly lines. Tell us your cell format, channel count and target throughput and we will size grading, aging and EOL capacity to the takt of your line.