



ALBA 2026 CONFERENCE, MAINZ 19-20 MAY
SE01 / C. Mondoloni

OEM REQUIREMENTS FOR 12V MAIN BATTERY
IF TECHNOLOGY TO MOVE FROM LEAD ACID
TO LITHIUM ION OR SODIUM ION

Main Driver

- Remains lead ban risk even if seems now frozen by EC

Other Technical / Economical impacts drivers :

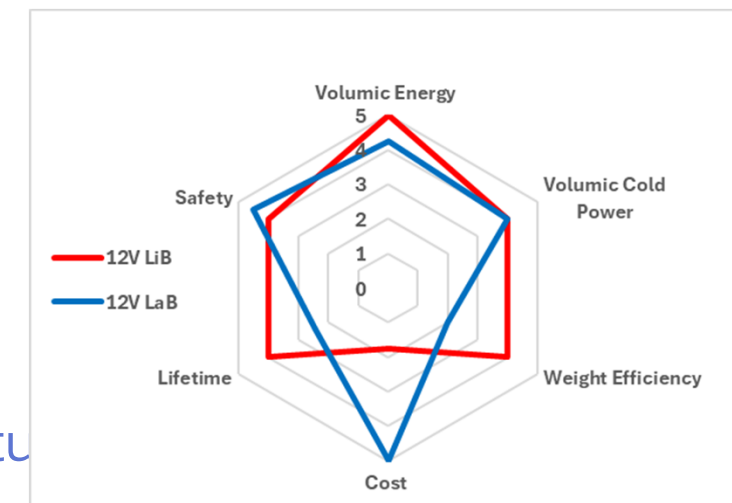
✓ Pros

- Up to 8-10 years life span (vs 4-5 years with Lead acid)
- No ageing effect due to long parking if battery at low SoC (no sulfation)
 - o reduction of warranty cost, no battery replacement but only recharge
- High charge acceptance ability
 - o recharge from 20% to 80% in about 10 minutes (including at very low temperature)
- Weight saving (up to -10kg)
- Easier to meet vehicle ASIL safety requirements and battery diagnosis (Car Archi. EE could be simplified)
- New potential battery management strategies to reduce CO2 emission

✓ Cons

- Cost (especially for Li12V)
- Thermal constraints (ambient temp $< 65^{\circ}\text{C}$) + Crash and Fire risk --> packaging
- Potential impact on electrical architecture for low battery size ($\leq 20\text{Ah}$) → no possibility to adopt melting fuses

LIB / LAB comparison
for same battery Cn(Ah)

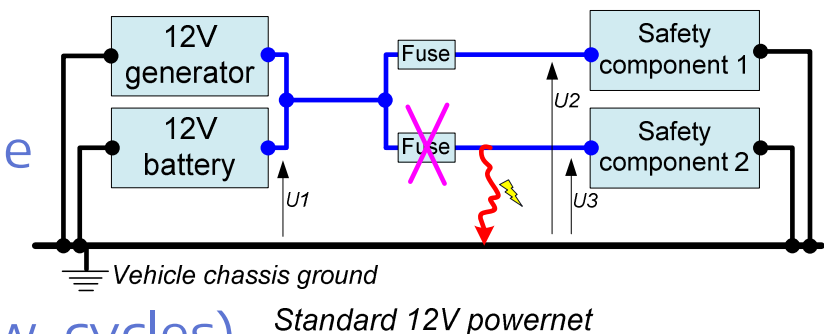
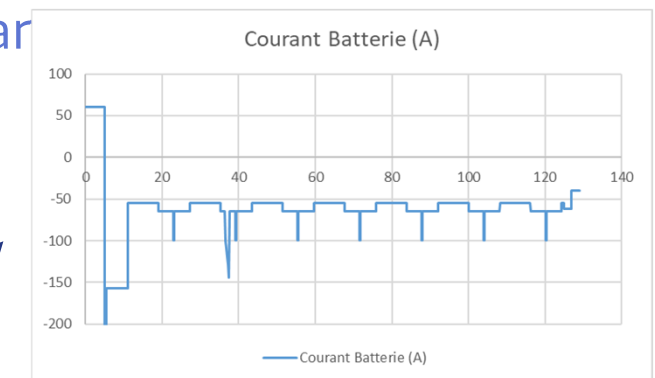


Context

- Moderate Car segment with HEV powertrain
- Medium Battery size with flat design (resulting partly from integration constraints on new cars)

Key / high level expectations

- Cell chemistry, technology and Battery design in line with durability and weight targets
- Operational voltage range similar to lead acid batteries : 6V / 15V
- Operational temperature range ideally : -30°C / 75°C
- Cells and battery high volumic performances especially concerning power
 - o Ability to satisfy safety profiles (keeping for ex. $\geq 10.5\text{V}$ (120 sec) on ASIL B relevant events)
 - o Ability to Melt fuse on car for standard 12V powernet
 - o Full Charging ability in 10 to 20 minutes ideally in larger possible T / SOC range
 - o Charge absorption ability (19V scenario) to be addressed
- Good cycling ability (> 2000 (100%DOD) cycles and about 100.000 MHT shallow-cycles)
- Low self discharge (2% / Month)
- Safe chemistry to satisfy hazard risk (fire, explosion, leakage, venting)



Other needs

- Integrated electric board with BMS (inc. Battery State Diagnosis) + circuit breaker system (Mosfets) + CAN

Cockpit Integration Context

- Battery with flat design (typically less than 140 mm) or even very flat design (less than 100 or 70 mm)

EE requirements

- Power reserve typically from 1,5kW / 2 minutes (safety relevant features) to 4 KW / transient (melt fuse)
 - o CCA at -20°C with minimum ideally at 15C for a given battery nominal capacity
 - o Ri / OCV map down to -20 / 30°C at 2C and normalisation factors up to 5C
 - Will help to check safety profiles achievable (Voltage ≥ 10.5 V on ASIL B relevant events)
- If High volumic power combined with high CR / SOF recovery, Energy content could become less critical
 - o Minimum energy needed for vehicle in parked phases including specific ones (post crash, melt fuse...)
 - o Deficit of energy content for Na ion cells can it be solved versus Li 12V for battery with high «cell volumic pack fill rate» ?
- **How to predict aging impact on power / energy reserve for batteries having with 2 OCV or discharge curves plateaux ?**
- Optimal Charging Management to confirm
 - o Overcharge ability of Na ion (side reactions / gaz production / chemistry choice impact)
 - o J2801 or 75°C HT endurance ability ?
 - o Charge absorption ability at 19V (for ex. 3C during x sec / 1C till 2 minutes)