



CONSORTIUM FOR  
**BATTERY  
INNOVATION**

**CENELEC**  
EUROPEAN COMMITTEE  
FOR ELECTROTECHNICAL STANDARDIZATION

**Bringing together**  
the automotive-battery value chain

## Workshop on **Automotive Lead Battery Advancements (ALBA)**

**12-13 June 2024**  
**Colombes (Paris), France**

The *Consortium for Battery Innovation* (CBI) in collaboration with *European Committee for Electrotechnical Standardization* (CENELEC TC21X WG3) are holding a workshop bringing together global technical experts from the advanced lead battery and automotive industries.

The “DCA & Heat” **workshop series** (Kloster Eberbach 2017, Alcalá de Henares 2018, Bruges 2019) has enabled technical in-depth discussions about hot research topics among the automotive battery industry, their suppliers and customers, and research institutes. During the travel-restricted pandemic years, two online editions and several content-related experts working groups have kept this spirit. With **ALBA** 2022 in Bergamo and 2023 in Wolfsburg, face-to-face workshops were resumed under a new name that reflects the wider scope of topics as it evolved over the past 7 years.

Compact plenary talks will expose overviews and summaries to all participants, this year focusing on **auxiliary and backup (a&b) applications**, particularly for battery-electric vehicles (BEV) and in support of Functional Safety.

- A special session will discuss **market trends** and challenges for automotive 12V systems and their batteries, and **opportunities** for the lead battery supply base

In parallel break-out sessions, each participant will have the opportunity to discuss in depth three of the following topics and plan collaborative work streams associated with them:

- New test methods and new experimental data for **charge recovery**, which covers both power capability (state of function, SOF) and energy (state of charge, SOC)
- New **test methods for 12V auxiliary & backup** batteries, e.g., characterization of pulse power, and **engineering tools** for battery sizing and selection
- Best practices for **test cells** and **cell testing** dedicated to a&b battery applications
- **AGM saturation**: definition, measurement and evolution of side reactions
- New approaches to optimize **positive active mass (PAM)** and **positive plate** durability for a&b batteries
- Recommendations for **12V battery charging strategy & operation** in BEV to minimize battery warranty and maximize function availability

CBI will also hold the European Technical Workshop on 11-12 June at the same location. We are looking forward to meeting you in person this summer in France!

*INTERNATIONAL LEAD ASSOCIATION*  
**COMPETITION LAW COMPLIANCE GUIDELINES**  
**Conduct of Meetings**

ILA members are bound by a set of guidelines which are designed to ensure compliance with competition law in all major jurisdictions. Every member company is provided with a copy of the guidelines and agreement with their terms is a condition of membership. The following extract governs the conduct of Association meetings.

- 1) **Supervision by counsel or others.** It shall be for the Association to decide whether any topic for discussion requires Counsel to attend any meeting of the Association. In the event that Counsel is not required it will be necessary for a Member or Officer with sufficient knowledge and understanding of the restrictions imposed by these Guidelines to be present.
- 2) **Minutes.** Minutes must be kept of all meetings and must accurately report what actions, if any, were taken.
- 3) **Literature or Handouts** Whether prepared by the Association staff, individual Members or guest speakers, any literature or handouts which it is felt may have anti-competition implications must be reviewed by counsel in advance of distribution.
- 4) **Prohibited Topics** The following topics of discussion must be avoided at all Association meetings and other functions:
  - a) past, current or future pricing practices;
  - b) what constitutes a "fair" profit level;
  - c) elements of price, costs or methods of constructing prices;
  - d) discounts, credit terms or other conditions of sales;
  - e) individual companies' market shares or the allocation of markets or customers;
  - f) refusals to deal with any supplier or customer;
  - g) confidential company statistical data or competitive plans or forecasts;

In the event that a subject is raised at any meeting of the Association which causes an anti-competitive concern to an attending Member, that member should immediately draw his or her concern to the attention of a Member of the Association's staff and request that the discussion be discontinued until such time as the Member is satisfied as to its propriety.

- 5) **Informal Meetings.** These guidelines also apply to lunches, dinners and like social functions that may precede or follow Association meetings. Competition law violations occurring at social functions carry the same legal impact as those occurring at formal meetings.

## Timing Overview

Wed 12 Jun 2024			Thu 13 Jun 2024		
10:00	coffee		08:30	Plenary CR 4 overview talks	
10:15					
10:30					
10:45					
11:00	Plenary		09:15	Pitches (90") for Breakout CR	
11:15	Overview (90" pitches) SAT + CEL		09:30	poster session CR 12 posters in 3 clusters from material research to IEC validation	
11:30					
11:45	Overview (90" pitches) AUX		10:00	coffee	
12:00	lunch fingerfood in conference lobby		10:15		
12:15					
12:30					
12:45					
13:00	SAT session 4* 10 min talks, 4 breakout groups, closing panel	AUX session requirements & standards 4 short talks + 2 panels	10:30	Overview (90" pitches) PAM	
13:15			10:45	Overview (90" pitches) CSO	
13:30			11:00	PAM session 6* 5-8 min talks	CSO session 5* 8min talks
13:45			11:15	30' posters: 5 lobby, 1 webconf	3 breakout groups
14:00	CEL session 6* 5-8 min talks, test-cell walk	AUX session pulse discharge: sizing, modeling, monitoring 3* 6min intro talks, round-table discussion	11:30	20' closing panel	
14:15			11:45	lunch fingerfood in conference lobby	
14:30			12:00		
14:45			12:15		
15:00	coffee <i>between test cells</i>		12:30		
15:15	FUT: market trends and opportunities 7 plenary talks: OEM, regional battery industry, suppliers		12:45	report-out from Breakouts	
15:30			13:00		
15:45			13:15		
16:00			13:30		
16:15	FUTuring lead 12V - out of the box 7 breakout stations (2 per participant)		13:45	participant feedback	
16:30			14:00		
16:45			14:15		
17:00			14:30		
17:15	FUTuring lead 12V - action needs your votes & closing panel		14:45	coffee, ALBA departure	
17:30			15:00		
17:30	end of day		15:15		
			15:30		
			15:45		
			16:00		

Wednesday 10:00 Welcome Coffee

Wednesday 11:00

**Introduction to ALBA24**

Wednesday 11:30

17 elevator pitches: **Overview of sessions SAT, CEL, AUX**

Wednesday 12:00 Lunch

Wednesday 13:00 – 15:00

Parallel sessions

## SAT **AGM cell saturation: definition, measurement, effects on side reactions**

13:00 Short talks (4 · 8 min)

### **Requirements and standards for auxiliary & backup batteries**

Campbell Matthews, *ArcActive*

How does saturation affect battery performance?

Scott McCaskey, *EastPenn Manufacturing*

Saturation design and dynamic:

Procedure (determining maximum), overcharge experiments

John Wertz, *Hollingsworth & Vose*

Demonstrating a weight-based method for saturation measurement

Abderrezak Hammouche, *Clarios*

AGM single-plate test-cell investigation during overcharging

13:35 Breakout: 4 posters

### **Sharing experiences, discussing methods and hypotheses**

Campbell Matthews, Scott McCaskey, John Wertz, Abderrezak Hammouche

13:50 – 14:00 Closing discussion

### **Defining the challenge – next steps**

## CEL **Cell design and cell testing for auxiliary & backup batteries**

14:00 Short talks (6 · 5-7 min)

### **Requirements and standards for auxiliary & backup batteries**

Begüm Bozkaya, *CBI*

Session overview and CBI Best Practice Manual

Jochen Settelein, *Fraunhofer ISC*

High-temperature tests with test cells of different sizes

Q&A: High-temperature testing

Jack Scott, *EastPenn Manufacturing*

Miniaturizing the lead battery for in-situ analysis

Grant Spencer, *Univ. North Texas*

Mini test cell: computer tomography, first results

Q&A: Mini test cell

Jack Scott, *EastPenn Manufacturing*

Individual AUX cell testing for variable screening

Abderrezak Hammouche, *Clarios*

AGM single-plate test-cell update

Q&A: AUX-specific AGM laboratory cells

14:45 – 15:00 Breakout walk & discussion

### **Exhibits of various test cells and components**

This exhibition will be accessible for AUX session participants during the coffee break, too.

13:00 – 14:00 Short talks (4 · 8 min) and 2 discussions

### Requirements and standards for auxiliary & backup batteries

Aaron Bollinger, *EastPenn Manufacturing*

Market trends for 12V power supply and battery systems

Eckhard Karden, *CBI*

Mike Miao, *Leoch*

Gao Guoxing, *Camel Group*

Bernd Engwicht, *EastPenn Manufacturing*

Field experience with 12V batteries in BEV

Discussion: How will auxiliary and backup batteries fail in the field?

Luca Brisotto, *Exide*

Bernd Engwicht, *EastPenn Manufacturing*

Torsten Hildebrandt, *Clarios*

The new IEC 60095-8 standard: A template for OEM specifications?

Srihari V \*, *Amara Raja*

Evaluating the new IEC 60095-8 on a B20-sized AGM battery

Discussion: Finalizing the IEC a&b battery norm – will OEMs use it?

14:00 – 15:00 Short talks (3 · 8 min) and discussions

### Pulse-power characterization (PPC) as a tool for battery sizing, design and monitoring

José Otávio Peroba, *Moura*

Single-pulse PPC data allow performance prediction for complex SSOF power profiles (updates @ -30 °C)

Eckhard Karden, *CBI SSOF Working Group*

Linear I-U characteristics of AUX pulse discharge

Eckhard Karden, *IEC TC21X WG2*

Sizing non-starter batteries - proposal for a PPC-based CAE method

Discussion: Applications in ASIL-supporting battery monitoring systems

Wednesday 15:00 Electrolyte Refill.....with exhibits of participants' test cells

15:30 Plenary talks (7 · 6-8 min)

### Market trends and technology challenges

Egbert Lodowicks, *Audi*

Keeping 12 lead batteries competitive for future electrified vehicles

Aaron Bollinger, *EastPenn Manufacturing*

Market trends for 12V batteries – Western world

Mike Miao, *Leoch*

Market trends for 12V batteries – China

José Otávio Peroba, *Moura*

Market trends for 12V batteries – Brazil & Latin America

Renata Barros, *CBI*

OEM survey: 12V battery needs and Functional Safety impact

Paul Everill, *BlackDiamond*

OEM survey: A tier-2 perspective on battery trends

Sebastian Dacian Caragea, *Hella/Forvia*

OEM survey: A BMS supplier perspective

16:25 Breakout discussion (7 stations, 3·15 min per participant)

### FUTuring lead 12V – out of the box!

Cn ≤30Ah: standardization & cost options

Bernd Engwicht, Mike Miao

Design for reliable power at 9-10 V

José Otávio Peroba, Eckhard Karden, Luca Brisotto

Battery care in OEM processes

Egbert Lodowicks

Business model and OEM-supplier interaction

Aaron Bollinger

Chicken or egg? Enabling ASIL-compliant commodity BMS

Sebastian Dacian Caragea

OEM survey: first results and actions to be taken

Paul Everill

Technology marketing & communication strategy for 12V lead

Renata Barros

17:10 – 17:30 Closing discussion

### FUTuring lead 12V – opportunities, strategy, actions

Wednesday 18:15 Walk & train & city walk in Paris (Tuileries, Opéra Garnier)

Wednesday 19:30 Dinner (Grand Café Capucines, 4 Boulevard des Capucines, 75009 Paris)

Thursday 7:00 Breakfast

Thursday 8:30 – 10:15

Morning session

CR

## Ways to measure & improve charge recovery (CR)

8:30 Plenary talks (4 · 6-20 min)

### OEM needs and transient SOF recovery

- Christian Mondoloni, *Stellantis*      Avoiding lazy batteries: Which factors determine CR in vehicles?  
Eckhard Karden, *CBI*      Transient charge recovery: Battery power recovers much faster than SOC  
Eberhard Meissner      Understanding fast transient SOF recovery at the onset of battery recharge  
Jonathan Wirth, *BatterieIngenieure*      SOF transient recovery in simulated real-world driving

9:15 Elevator Pitches (10 · 90 sec)

### Recent experimental work to characterize recovery of SOC and SOF

- Jesus Perez, *C&D Trojan*      2V-cell (flooded vs AGM) charging experiment with different charging profiles  
Scott McCaskey, *EastPenn Manufacturing*      AGM: cold SOF recovery, alternate parameter trials for CR test  
Srihari V \*, *Amara Raja*      CR test validation with an AGM battery  
Mike Miao, Zhao Ke\*, *Leoch*      Acid density effects on charge recovery performance  
Gao Guoxing, *Camel Group*      CR test evaluation on 3 battery types with half-cell voltage analysis  
Grace Rocha, *ITEMM*      NAM additive effect on SOF and SOC recovery  
Pascual Garcia Perez, M. Duchi, D. Cericola, G. Fieni, *Imerys*      Conductive carbon materials for new auxiliary lead-acid batteries: negative plate carbon effect on charge-recovery tests  
Markus Föhlisch, *Moll Batterien*      Comparison of DCA and CR for various carbon/expander combinations  
Jochen Settelein, *Fraunhofer ISC*      CR screening of negative electrodes with variable specific surface  
Paul Everill, *Black Diamond*      PAM additives effect on IEC charge recovery

9:30 – 10:15 Breakout: 12 posters in 3 clusters

### Discussion of test methods, available data, and opportunities for better CR

- Background and application context, limiting mechanisms  
Eberhard Meissner, Jonathan Wirth, Jesus Perez  
Validation of IEC-draft CR procedure variants  
Scott McCaskey, Srihari V \*, Mike Miao, Gao Guoxing  
Material investigations with cell-level CR testing  
Grace Rocha, Pascual Garcia Perez, Markus Föhlisch, Jochen Settelein, Paul Everill

\* remote contribution

Thursday 10:15 Coffee break

Thursday 10:45

11 elevator pitches: **Overview of sessions PAM, CSO**

PAM		Improvements of positive plate and PAM recipes	
11:15 Short talks (6 · 5-8 min)			
<b>Investigations on PAM additives, compression and structure</b>			
Paul Everill, <i>BlackDiamond</i>		PAM additives affecting AUX-relevant performance	
Marco Robotti, <i>Hammond</i>	Enhancing PAM and 2V cells performance with GravityGuard(TM) additive		
Miguel Garcia, <i>Exide</i>	Additives for PAM improving formation and PSOC cycling properties		
Micha Kirchgessner, <i>Penox</i>	Red lead as a key PAM component for improved efficiency in the formation of automotive lead-acid batteries		
Eric Miller, Susmitha Appikatla*, <i>Daramic</i>	PAM performance improvement with composite separator design in VRLA batteries operating under high compression		
John Wertz, <i>Hollingsworth &amp; Vose</i>			
Jack Scott, <i>EastPenn</i> / Tim Fister*, <i>Argonne</i>	Evolution of PAM species during formation and cycling		
11:55 Breakout: 6 posters			
<b>Deep dive of 6 experimental studies</b>			
Paul Everill, Marco Robotti, Miguel Garcia, Micha Kirchgessner, Eric Miller / Susmitha Appikatla / John Wertz, Jack Scott			
12:25 – 12:45 Closing discussion			
<b>Areas and framework for continued pre-competitive exchange and collaboration</b>			

CSO		12V charging strategy and operation for BEV	
11:15 Short talks (5 · 6-8 min)			
<b>Opportunity charging in other applications – 12V operating strategies for BEV</b>			
Shawn Peng, <i>C&amp;D Trojan</i>		Charging Strategies for Flooded and AGM batteries	
Sally Sun*, <i>EAI</i>			
Jesus Perez, <i>C&amp;D Trojan</i>	Focus on Improving Opportunity Charging In Motive Power Applications		
Sebastian Mauer, <i>Moll Batterien</i>	Can slow voltage setpoint ramps optimize AUX charging efficiency?		
Jörg Tiburcy, <i>Clarios</i>	Gas flow investigation during various BEV charging strategies		
Eckhard Karden, <i>CBI</i>	Suggestion for a generic 12V-in-BEV operating strategy		
12:00 – 12:45 Breakout: 3 stations (3 · 15 min)			
<b>Technical discussion in small groups</b>			
Motive opportunity charge		Shawn Peng, Jesus Perez	
Slow ramps investigation		Sebastian Mauer, Jörg Tiburcy	
Control strategy recommendation		Eckhard Karden	

\* remote contribution

Thursday 12:45 Lunch

Thursday 13:45 – 14:30

**Closing discussion**

Thursday 14:30 Farewell coffee