



ATA'S TECHNOLOGY & MAINTENANCE COUNCIL

**ANNUAL MEETING**  
& Transportation Technology Exhibition

MARCH 4-7, 2024 | NEW ORLEANS, LA  
ERNEST N. MORIAL CONVENTION CENTER

# Quality Spec'ing for Optimal Performance

The bottom of the image features three horizontal stripes: a white stripe, a red stripe, and a gold stripe, set against a solid blue background.



- 
- Technology & Maintenance Council

*... Turning Experience Into Practice*



# **Electric Vehicle Test Procedure Discussion**

**Brian Wilson- Sr. Research Technologist  
Southwest Research Institute**

**3/4/2024**

# ATTENTION PLEASE

- In accordance with TMC Board Policy, all personal phones without a silent feature must be turned off during business sessions.
- If you must use your phone —please leave the room!



# ATTENTION PLEASE

- This is an open meeting of the Technology & Maintenance Council, held in accordance with ATA Antitrust Guidelines which are listed in your meeting packet.
- Audio or video recordings are not permitted at this session. However, photography is permissible.
- The opinions expressed in this meeting are those of the individual and not necessarily the opinion of his/her company nor of TMC unless stated otherwise.

# ANTITRUST/PATENT DISCLOSURE

- To minimize the possibility of antitrust problems, the guidelines detailed in your registration packet should be followed at all TMC meetings, task force and study group sessions.
- All participants in any group involved in the development of standards or recommended practices shall disclose, as stated in the antitrust/patent disclosure guidelines in your registration packet, all patents or patent applications that are owned, controlled or licensed by the Participant or Participant's employer when the Participant reasonably believes such patent or patent application may become material to the standard or RP development process.

# Constructive Comments Are Always Appreciated!

- TMC welcomes your comments, but please make certain that they are constructive and appropriate before you turn in your evaluation sheet!
- *Thank You for Your Cooperation!*

# Study Group Agenda

- General Discussion
- New Procedure- Not an Update to Existing RP
- Call for **Volunteers**
- Test Procedure for EV Specifics
- Charging Options and Considerations
- How do we Compare to Gas/Diesel
- **Safety**
- Closing



# S.11 EV Test Procedure

- Existing procedures to draw from
- SAE J1711 for Hybrid EVs
- Dyno test measuring Fuel Economy / Emissions



## S.11 EV Test Procedure

- Existing procedures
- SAE J1634 for Battery EVs
- EPA follows procedure to measure energy consumption and range testing (MPG equivalency)



Figure 1. Chassis dyno with EV under test.

# S.11 EV Test Procedure

- **Measurement**

- Battery Ampere-Hour Capacity
- Discharge Energy
- DC Discharge Amp-Hours
- Power Outlet Voltage
- AC Recharge Energy
- DC Recharge Amp-Hours

- **Unit**

DC Amp Hours  
DC Watt Hours  
DC Amp Hours  
AC Volts (RMS)  
AC Watts Hours  
DC Amp Hours

- Electrical measurements made for EV MPG equivalency by US EPA

# S.11 EV Test Procedure

- Topics for Consideration
- How to measure battery regen from;
- Braking
- Solar roof panels
- Coasting downhill with speed control

# S.11 EV Test Procedure

- Topics for Consideration
- Accessory motors must be operated the same for both vehicles
- A/C motor
- Power Steering motor (driver affects)
- Water pump load
- Electric heater load
- Battery heater load

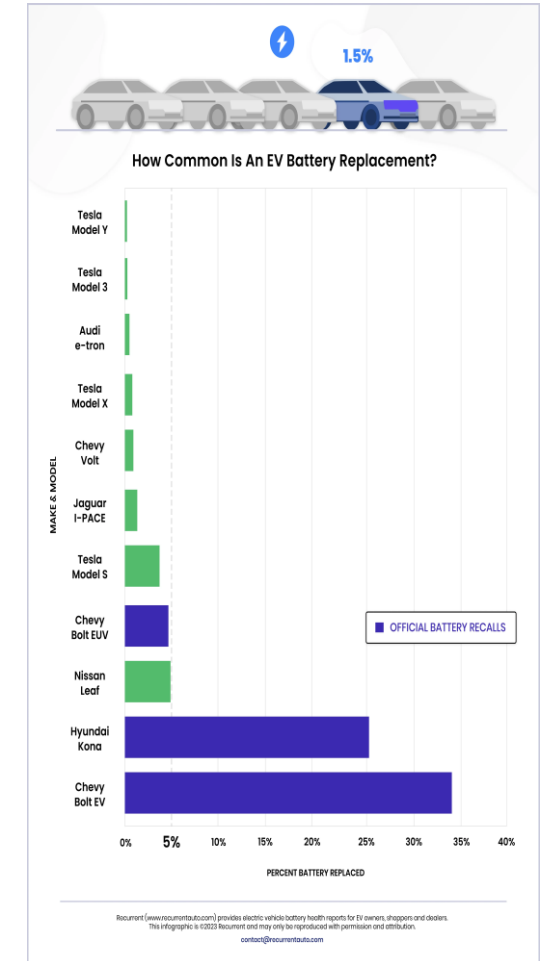


## S.11 EV Test Procedure

- Topics for Consideration
- Battery charge level at SOT, how to measure, when to measure
- Test route- Brake application affects re-gen
- Re-Gen capability on one vehicle may be much more efficient than another vehicle.

# S.11 EV Test Procedure

- Topics for Consideration
- Battery condition throughout test.
- Degradation begins at first charge
- Degradation is affected by use / abuse
- Degradation is affected by time/hours
- Degradation is affected by temperature
- Is there a “Break-In” period for motors
- Battery degradation over time.



# S.11 EV Test Procedure

- Topics for Consideration
- What portions of previous fuel economy procedures apply equally to EVs and Hybrids
- Tires
- **Weather**
- Drive cycle
- Driver skill



# S.11 EV Test Procedure

- Topics for Consideration
- Are battery design differences enough to show one vehicle is more efficient?
- Same with drive motors?
- The GRID...?

# S.11 EV Test Procedure

- Topics for Consideration
- **Safety**
- Unpredictable combustion
- "thermal runaway."
- "It's a chemical reaction where the heat from one cell of the battery ignites the next cell," said Andrew Klock, senior manager of training and education at the National Fire Protection Association. "If you think about it, it's like a bunch of matchsticks and if you light one and they're all touching each other, the next one will ignite."

# S.11 EV Test Procedure

- Topics for Consideration
- **Safety**
- Lithium-ion batteries burn **hotter** and can last much **longer** than gasoline, which tends to burn out quickly. Lithium-ion battery fires can take thousands of gallons of water to extinguish.

# S.11 EV Test Procedure

- Topics for Consideration
- **Safety for Staff**
- Testing procedure must include recommendations for emergency preparation to address electrical fire suppression.
- Hi-Voltage training should be expected for any staff working with/on EVs.  
(ORANGE=Danger)



# S.11 EV Test Procedure

- Topics for Consideration
- **Safety for Staff**
- Hi-Voltage training should be expected for any staff working with/on EVs.  
(ORANGE=Danger)
- Hi-Voltage training should be expected for any staff working around EVs.



# S.11 EV Test Procedure

- We are at phase 1 of this new and exciting S.11 procedure
- Please sign up to be a part of the development



## S.11 EV Test Procedure

- Open discussion on this RP Development

Questions? Comments?

# S.11 EV Test Procedure

- Closing Comments

## Thank you!!!!

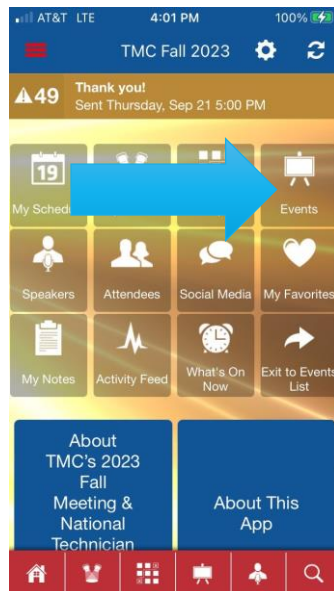
- Please sign **volunteer sheet for this update.** These are **your** procedures, and **your** participation is always welcome!
- Email- Brian.Wilson@SwRI.org



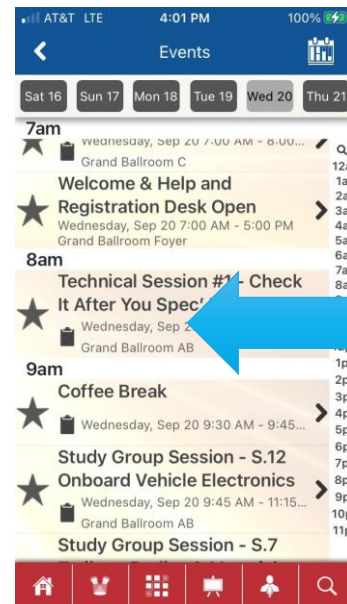
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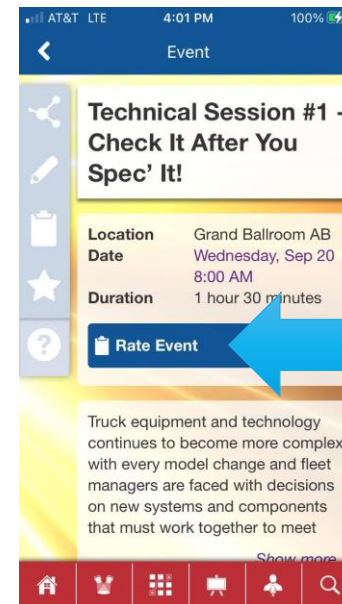
Step 1



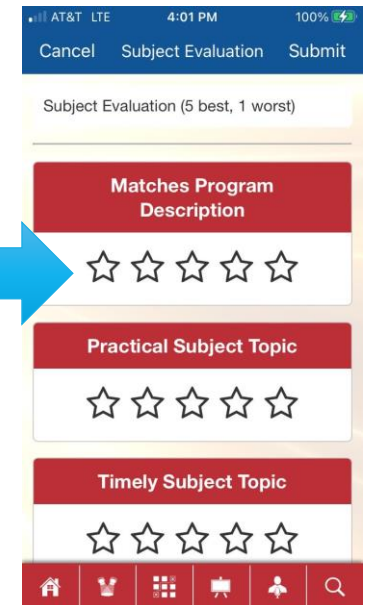
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# S.11 EV Test Procedure

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*save the date!*