

Suggestion on Swappable Battery

GRPE(93th)
15th-17th October 2025
Expert from Japan

Reminder (Reference:GRPE-92-15-Rev.1)

- **GRPE Workshop on Sustainable Battery Regulations**
(17 October 2024 : 9.30 – 12.30 @The UN, Geneva)

- "sustainable" in aspect of the environment
 - (1) Utilization of on-board and removed battery as buffer for renewable energy would be required. e.g. RED III Art.20a in EU
- "sustainable" in aspect of the customer acceptability / vehicle life.
 - (2) Battery cost accounts for a large proportion of the vehicle price, and it prevent the penetration of electrified vehicle. In several business models, battery is sold, leased or subscribed separately from vehicle.
 - (3) Vehicle has longer life span than that of battery. Service exchange of battery is therefore expected within the middle of vehicle life, especially for commercial vehicles.
 - (4) Battery would be swapped with next generation one, due to the rapid evolution of battery technology.
- Next Steps

To discuss how we can layout "sustainable" battery under the framework of WP.29, respecting environment protection and safety.

One Option: Swappable Battery

Reminder(Reference:GRPE-92-15-Rev.1)

Challenges of adopting in-vehicle battery EV



- Operating rate deteriorates because of long charging time.
- In “last one-mile delivery”, carriers often leave and return all at once. Power peak and electricity cost will rise significantly due to fast charging at the same time.
- High installation and construction costs ex.) Quick charger is required for each vehicle.



- High introduction costs (vehicle price) making it difficult to recover the investment.

*From interviews with delivery companies

Benefits of replacing to swappable battery EV

- ✓ It is possible to replace the full-charge battery at any time in short time.
- ✓ By separating car body and battery, the delivery company can purchase only the car body.
- ✓ Users can charge swappable batteries when power demand is low.
- ✓ Battery station can be used as an emergency power in the event of a disaster.

Swappable Battery



Battery Station

Manufactures have started to demonstrate Swappable Battery EVs.



Source: JAMA

(Tentative) Issues for “swappable battery” under the framework of WP.29

- Possible items to be discussed as Functionality/requirements

	Approval for vehicle <u>installing swappable battery</u>	Approval for vehicle and battery <u>separately</u>
Approval	How to approve series of vehicles installing <u>different number of battery packs</u> ?(As one type vs as different types?)	How to approval swappable battery <u>separately</u> ?
Safety	Needs for requirements: - To deal with swapping in aspect of safety?(<u>Measures to prevent electric shock and vehicle movement during swapping etc.</u>) - To ensure <u>functionality of attachment</u> (such as strength against mechanical shocks etc.)	Needs for requirements: - To deal with swapping in aspect of safety?(<u>Measures to prevent electric shock and vehicle movement during swapping etc.</u>) - To ensure <u>functionality of attachment</u> (such as strength against mechanical shocks etc.) <u>Performance requirements against water and dusts</u>
Durability of swappable battery	<u>Durability requirements for individual batteries</u>? - How to trace the history of use of battery?	<u>Durability requirements for individual batteries</u>? - How to trace the history of use of battery?
Cyber security		<u>Protection from cyber attacks</u>
Allert of battery failure		<u>Storing and transferring information regarding battery failed</u>
Software update of battery management system		How to check compatibility between <u>battery and vehicle combinations</u>
Lifetime of swappable battery	Needs for specified <u>definition of lifetime</u> , durability as vehicle including swappable battery	Needs for specified <u>definition of lifetime</u> , durability as vehicle including swappable battery

Suggested Work Plan(Updated)

- Preparation (~ Dec. 2025)

GRPE summarizes the following items then asks for a guidance from WP.29.

- To identify issues (continuously)
- To summarize the items to be taken as “Swappable Battery” related issues based on the above identification
- To assess the views of wider range of stakeholders under the WP.29 on “Swappable Battery”

=> The results were mentioned in the reported from the vice-chair.

- Setting a new body under the WP.29 framework(~March 2026)
 - To determine the work structure
 - To draft ToR

Suggestion based on Feedback from GRSP leading team

GRPE could consider...

- Establishment of a new Task Force under GRPE
- This Task Force will share relevant tasks with existing other groups such as,
 - ✓ EV Fast and Smart Charging Cluster(Infrastructure relevant)
 - ✓ Retrofit EV(Type approval relevant)
 - ✓ ☐ EVE-IWG(Battery durability? relevant) ☐
- To plan two step approach as
 - Step One: Identify work items
 - Step Two: Draft/Modify Terms of Reference

Based on Vice-chair's report (GRPE-93-06)...

Retrofit EV relevant ☐
(and replace battery's issue?)

F&SC relevant ☐

New group
of GRPE

	Subjects	Issues regarding vehicle + SWB combination	Issues regarding SWB as a single unit	Issues regarding infrastructure	Other issues
IWVTA	Type approval	•How to approve series of vehicles installing <u>different number of battery packs?</u> (As one type vs as different types?)	•How to approval swappable battery separately?		
GRSP	Safety	•Needs for requirements: • To deal with swapping in aspect of safety?(<u>Measures to prevent electric shock and vehicle movement during swapping etc.</u>) • To ensure <u>functionality of attachment</u> (such as strength against mechanical shocks etc.)	Needs for requirements: • To deal with swapping in aspect of safety?(<u>Measures to prevent electric shock and vehicle movement during swapping etc.</u>) • To ensure <u>functionality of attachment</u> (such as strength against mechanical shocks etc.) • <u>Performance requirements against water and dusts</u>		
GRVA	Cyber security		•comprehensive approach for cyber resiliency		
	Software update		•How to check compatibility between <u>battery and vehicle combinations</u>	•Off vehicle SW update of battery	
GRPE	Durability	• <u>Durability requirements for individual batteries?</u> • How to trace the history of use of battery? •Compatibility on testing between LDV and HDV	• <u>Durability requirements for individual batteries?</u> • How to trace the history of use of battery?	•Alert for degraded batteries	
	Lifetime of swappable battery	•Needs for specified <u>definition of lifetime</u> , durability as vehicle including swappable battery	•Needs for specified <u>definition of lifetime</u> , durability as vehicle including swappable battery		
	Others				LCA, Reuse, Recycle
GRX	Allert of battery failure		• <u>Storing and transferring information regarding battery failed</u>	•Means to detect failure	

EVE-IWG relevant ☐

Suggested Timeline(tentative)

GRPE Calendar



SWB Calendar

Step One:
Identify work items

Step Two:
Draft/Modify Terms of Reference

Agreement on ToR ☐ if needed ☐

Proceed discussions to address identified items

- In 2026 March, mainly determine the work structure and take feedback from GRPE (and WP.29)
- By 2026 June(or October), draft ToR completely (including existing other group's ToRs)

Thank you!

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