




KOREA AUTOMOBILE TESTING & RESEARCH INSTITUTE

GTR 13 Phase 2 9th IWG meeting-TF1

TS Korea Automobile
Test and Research Institute



ITEM	STATUS	Contents	
Vehicle Class	Reached to Agreement	LDV/HDV : 3.5t(or 4.5t) less /	
Installation requirement of container	Reached to Agreement	No need	
Hydrogen Leakage Criteria(in-use)	Reached to Agreement	After Crash, 118NL/min/1hr	
Permeation Criteria	Reached to Agreement	(LDV, HDV) 55°C, After 30hrs Less 46mL/h/L	
Sled Test	Expect Proposal from EC		
TPRD Direction	Review OICA Proposal		
Life Cycles(Tank)	Review OICA Proposal		

01 Sled Test

Suggestion (From OICA)

4.3. In case a contracting party under the UN 1998 Agreement requires a crash impact simulation (Sled Test) the procedure set out in paragraph Z shall apply and the provisions in paragraph 5.2.2.3. shall ne used for compliance

Post Crash provisions in GTR13 – (3/3)

...

Z: Crash simulation test

~~In case that one or both of the vehicle crash tests specified above are not applicable to the vehicle, the vehicle fuel system shall, instead, be subject to the relevant alternative accelerations specified below and the hydrogen storage system shall be installed in a position satisfying the requirements in paragraph The accelerations shall be measured at the location where the hydrogen storage system is installed. The vehicle fuel system shall be mounted and fixed on the representative part of the vehicle. The mass used shall be representative for a fully equipped and filled container or container assembly.~~

Accelerations for vehicles of categories M₁ and N₁:

- (a) 20 g in the direction of travel (forward and rearward direction);
- (b) 8 g horizontally perpendicular to the direction of travel (to left and right).

Accelerations for vehicles of categories M₂ and N₂:

- (a) 10 g in the direction of travel (forward and rearward direction);
- (b) 5 g horizontally perpendicular to the direction of travel (to left and right).

Accelerations for vehicles of categories M₃ and N₃:

- (a) 6.6 g in the direction of travel (forward and rearward direction);
- (b) 5 g horizontally perpendicular to the direction of travel (to left and right).

A calculation method can be used instead of practical testing if its equivalence can be demonstrated by the applicant for approval to the satisfaction of the Technical Service.

Copy from UN Regulation 134
Copy from UN Regulation 110
Copy from UN Regulation 134&110

TF1 Webmeeting (27th, Aug.)

■ NHTSA/US

Acceleration values doesn't seem appropriate. There have been a couple of impact test. It show that Acceleration value is higher than Paragraph Z in HDV. Need more Study

■ Result

Not enough well-founded proof of Acceleration, wait for EC Study of Acceleration values.

TF1 Leader is going to Request EC for Result or Schedule of Acceleration values Study

Co-sponsor meeting (29th, Sept.)

■ EC

Study for acceleration, Fuel leakage limit and Calculation method is going on. Expected to be done by end of 2020.



02 TPRD Direction

Proposal

- Upwards within 20°, downwards within 45°
- Delete ambiguous expressions such as “forward, horizontally, back, side”
- Additional prohibited directions.
 - REESS, exits

Storage system TPRDs. With the vehicle on a level surface, the hydrogen gas discharge from TPRD(s) of the storage system shall be directed upwards within 20° of vertical relative to the level surface or downwards within 45° of vertical relative to the level surface. Additionally, the hydrogen gas discharge from TPRD(s) of the storage system shall not be directed:

- (i) Into enclosed or semi-enclosed spaces;
- (ii) Into or towards any vehicle wheel housing;
- (iii) Towards hydrogen gas containers;
- (iv) ~~Forward from the vehicle, or horizontally (parallel to road) from the back or sides of the vehicle.~~
- (iv) Towards the vehicle’s REESS
- (v) Towards any exit(s)

TF1 Webmeeting (27th, Aug.)

■ Result

No any opinion.

Review Proposal in 8th IWG

Proposal from OICA

Storage system TPRDs. With the vehicle on a level surface, the hydrogen gas discharge from TPRD(s) of the storage system shall be directed upwards within 20° of vertical relative to the level surface or downwards within 45° of vertical relative to the level surface. Additionally, the hydrogen gas discharge from TPRD(s) of the storage system shall not be directed:




- | | | |
|-------|--|---------|
| (i) | Into enclosed or semi-enclosed spaces; | LDV+HDV |
| (ii) | Into or towards any vehicle wheel housing; | |
| (iii) | Towards hydrogen gas containers; | |
| (iv) | Forward from the vehicle, or horizontally (parallel to road) from the back or sides of the vehicle. | |
| (v) | Towards the vehicle’s REESS | |
| (vi) | Towards any [emergency] exit(s) (for Category 1-2) | HDV |

[Drafted language]

- The hydrogen gas discharge from TPRD(s) of the storage system shall not be directed towards any exit(s).

[Our discussion in last OICA meeting]

- Proposal to separate requirement for LDV vs HDV (towards emergency exits would apply for HDV only).

Category 1-1 (LDV)	Category 1-2 (HDV)	Category 2 (LDV/HDV)
		
<ul style="list-style-type: none"> • Small # of passenger(s) • No emergency exit 	<ul style="list-style-type: none"> • Large # of passenger(s) • Having emergency exit(s) 	<ul style="list-style-type: none"> • Small # of passenger(2) • No emergency exit • Doors configuration is similar to Category 1-1
<p>Not apply</p>	<p>Apply</p>	<p>Not apply</p>



JAMA suggests the language of “towards emergency exits” would apply for **Category 1-2 only**.

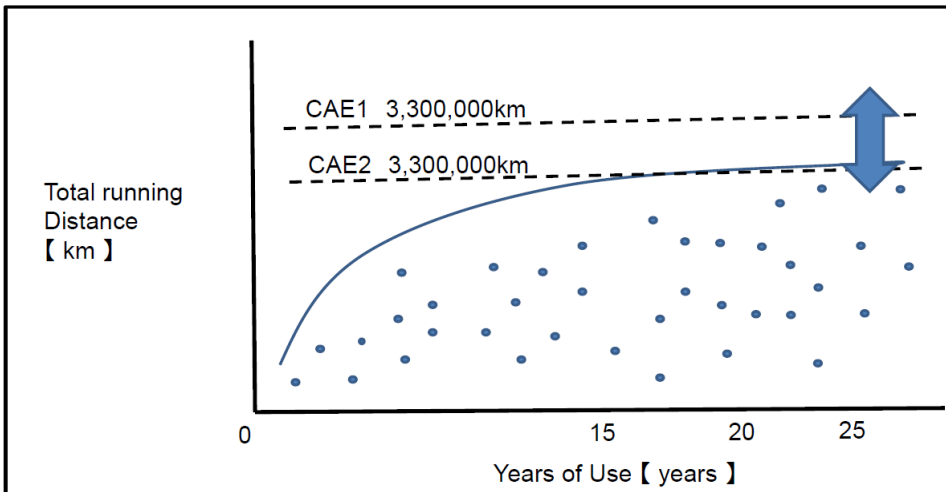
03 Pressure cycle test (Container)

6th IWG Meeting

- Agreement
 - 11,000 test cycles and 15yrs service life in HDV
 - * $350(\text{working day}) \times 2(\text{refueling/day}) \times 15\text{yrs} = 10,500$
 - Since Generally used more than 15yrs in HDV, Need additional Discussion for Extension of Service Life

7th IWG Meeting

- JAMA
 - HDV (more than 25yrs) Mileage is less than 3,300,000km .
 - 11,000 test cycle can guarantee 25yrs Service Life



- Result
 - Not enough mileage data in HDV. Discussion is needed over the long-term

Proposal from OICA

5.1. Compressed hydrogen storage system

(omit)

All new compressed hydrogen storage systems produced for on-road vehicle service shall have a NWP of 70 MPa or less and a service life of ~~45-25~~ years or less, and be capable of satisfying the requirements of paragraph 5.1.

5.1.1.2. Baseline initial pressure cycle life

Three (3) new containers randomly selected from the design qualification batch are hydraulically pressure cycled at $20(\pm 5)^{\circ}C$ to 125 per cent NWP without rupture for specified number of test cycles or until a leak occurs (para. 6.2.2.2. test procedure). Leakage shall not occur within a number of Cycles, where the number of Cycles is set individually by each Contracting Party ~~at 5,500, 7,500 or 11,000 cycles for a 15-year service life.~~ **Table xxx shows the number of cycles and test cycles for corresponding vehicle type.**

Table xxx The number of cycles and Test cycles

Vehicle type	The number of cycles	Test cycles
LDV	5,500/7,500/11,000	22,000
HDV	9,000/14,000/17,000	34,000

3. Proposal (Continued)

“Rupture” means to come apart suddenly and violently, break open or fly into pieces due to the force of internal pressure

- Example of draft is following.

5.1. Compressed hydrogen storage system

(omit)

All new compressed hydrogen storage systems produced for on-road vehicle service shall have a NWP of 70 MPa or less and a service life of ~~15-25~~ years or less, and be capable of satisfying the requirements of paragraph 5.1.

5.1.1.2. Baseline initial pressure cycle life

Three (3) new containers randomly selected from the design qualification batch are hydraulically pressure cycled at 20(±5)° C to 125 per cent NWP without rupture for specified number of test cycles or until a leak occurs (para. 6.2.2.2. test procedure). Leakage shall not occur within a number of Cycles, where the number of Cycles is set individually by each Contracting Party ~~at 5,500, 7,500 or 11,000 cycles for a 15-year service life.~~ **Table xxx shows the number of cycles and test cycles for corresponding vehicle type.**

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