Status of Korean EVS Regulation

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Korea Automobile Testing & Research Institute (KATRI)

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## 1. Research on the development of safety-Assessment Procedures for HEV

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<th>Objective</th>
<th>Revision of the Safety standard for HEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>KATRI, SK Innovation, KESCO, MANDO</td>
</tr>
</tbody>
</table>

### Task
- Safety standards were developed according to performance test procedures for HEV to identify problems and solutions
- Revision of the safety standards for HEV
- Power performance, Braking ability, Accelerator control system
- Defrost and demist, EMC, Crashworthiness, High voltage system and Traction battery

### Result
- Revision of KMVSS (8 Articles) : Jan.23,2009
  - Revision : Article 2(Definitions), 11(Motor and Transmission System), 15(Brake System), 91(Fuel System), 111(Motor Power), 111-2(EMC)
  - Newly inserted : Article 18-2(High voltage electric device), 18-3(Traction Battery)
- Revision of KMVSS Test Procedure (7 Items) : Feb.19,2009

## 2. Research on the development of safety-Assessment Procedures for HFCV

<table>
<thead>
<tr>
<th>Objective</th>
<th>To amend safety standards for HFCV and consequently reflect research results to vehicle management policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>KATRI, HMC, SNU, SKKU, KESCO, YURA CO. etc.</td>
</tr>
</tbody>
</table>

### Task
- Development of a technique for safety assessment of HFCV
  - Regulation system and policy
  - Research for safety of hydrogen storage and supply system
  - Assessment of compliance with safety standards of HFCV
  - Research for electric safety of high-voltage and fuel cell system
  - International harmonization of safety standards for HFCV
- Development of safety standards for hydrogen storage, supply system and fail safety

### Result
- Revision of KMVSS (10 Articles) : in 2012
  - Article 17(Fuel System), 18-2(High voltage electric device), 37(Muffler), 87(Accelerator Control System), 90(Brake System), 91(Fuel System), 102(Occupant Protection), 109(Defrost and demist), 111(Motor Power), 111-2(EMC)
- Revision of KMVSS Test Procedures (15 Items) : in 2012
### 3. Monitoring Program of Electric Vehicles

<table>
<thead>
<tr>
<th>Objective</th>
<th>Identify problems regarding safety and develop the plan of improvement during real world monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>KATRI</td>
</tr>
</tbody>
</table>

**Task**

- Monitoring of EV during real world driving
  - Monitoring Vehicle: NEV(10), EV(7), EV Bus(1)
  - Monitoring region(8)
    - Traffic environment: big city, towns, rural, sea-side village, mountain village
    - Climate condition (term): consider annual temperature variations, etc.

- Activation and Ensure the safety of EV
  - Identify field problems and solutions

- Revision of Motor vehicle safety standards for EV
  - In-use (Charging): EMC and Safety of High voltage electric device
  - Fuel Economy test procedure for Heavy Duty Vehicle (including EV)
  - Test Procedure of Traction Battery Safety

**Result**

- Revision of KMVSS Test Procedure (3 Items): 2012~2013

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### Status of Korean EVS Regulations

**KMVSS** (Regulation on Korea Motor Vehicle Safety Standard)

- **Promulgation**: Jan. 23, 2009  
  - Result of Research on HEV Safety

**Article 2 Definition**

52. “High voltage electric device” refers to an electric system whose actuating power exceeds DC 60 V or AC 25 V, as in a drive motor or an electric power converter.

53. “Traction Battery” refers to a battery that stores electric energy for driving the vehicle or other electric energy storage medium with a similar function.

**Article 18-2 High voltage electric device**

1. Electric wires between high voltage electric devices shall be orange in color.
2. Electric wiring shall have protective equipment.
3. Electric wiring shall be free from any exposed live part conductors or joints in between.
4. The polarity of connector is not true for a structure where the polarity cannot easily be changed.
5. High voltage electric devices shall have warning marks against electric shock which conform to each of the following requirements.
Traction batteries in a vehicle shall meet each of the following requirements.

1. Traction batteries shall be isolated from the wall or guard plate.
2. They shall be equipped with functions to prevent an overcharge or over-current exceeding the range specified in the design.
3. Traction batteries shall be free of the possibility for fire or explosion that can take place in physical, chemical, electrical, and thermal shock conditions as notified by the Minister of Land, Transport and Maritime Affairs.

(4) Hybrid vehicles (including only passenger cars and vans whose gross weights are 4.5t or below) and Electric vehicles (including only passenger cars and vans whose gross weights are 4.5t or below) shall satisfy the standards on a high voltage electric device collision test in Table 11-3.

### Table 11-3: Safety Standard on a high voltage electric device collision test

<table>
<thead>
<tr>
<th>Condition</th>
<th>Acceptance criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Frontal barrier crash: 48.3km/h</td>
<td>1. Not fire and explosion</td>
</tr>
<tr>
<td>2. Rear moving barrier impact: 48.3km/h</td>
<td>2. Electrolyte spillage from Traction Batteries: not more than 5 liters, until 30 min.</td>
</tr>
<tr>
<td>3. Side moving deformable barrier impact: 32.3km/h</td>
<td>3. No visible trace of electrolyte shall spill into the passenger compartment.</td>
</tr>
<tr>
<td>4. Post-impact test static rollover: 90 degrees, 4 times, each 5 min.</td>
<td>4. No part of any battery system component that is located outside the passenger compartment shall enter the passenger compartment.</td>
</tr>
<tr>
<td></td>
<td>5. Isolation resistance between Live part and electrical Chassis: Not less than 100Ω/V[DC], 500Ω/V[AC]</td>
</tr>
</tbody>
</table>

- **Plan to revise in 2012**
  - **Result of Research on HFCV Safety**
  - **Base on SGS GTR**
    - Article 18-2 High voltage electric device
    - Article 91 Fuel System
Status of Korean EVS Regulations

KMVSS Test Procedure

- Promulgation: Feb. 19, 2009 ☞ Result of Research on HEV Safety

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annex 1 - Part 47 Test Procedures of High voltage electric device</td>
<td>- Application: Liquid Fuel HEV, CNG HEV, LPG HEV, EV  - Test Procedure: - Frontal barrier crash - Rear moving barrier impact - Side moving deformable barrier impact - Post-impact test static rollover - Calculate the electrical isolation</td>
<td>Similar to FMVSS 571-305</td>
</tr>
</tbody>
</table>

- Plan to revise in 2012 ☞ Result of Research on HFCV Safety
  - Base on SGS GTR
  - Test Procedures of High voltage electric device for HFCV

Status of Korean EVS Regulations

KMVSS Test Procedure

- Promulgation: Feb. 19, 2009 ☞ Result of Research on HEV Safety

<table>
<thead>
<tr>
<th>Article</th>
<th>Test Item</th>
<th>Condition</th>
<th>Acceptance criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annex 1 - Part 48 Test Procedures of Traction Battery Safety</td>
<td>Drop</td>
<td>Drop from 4.9 m high</td>
<td>Fire/ Explosion</td>
</tr>
<tr>
<td></td>
<td>Immersion</td>
<td>Immerse completely in the sea water</td>
<td>Fire/ Explosion</td>
</tr>
<tr>
<td></td>
<td>Over-charge</td>
<td>Charge up to 150% SOC</td>
<td>Fire/ Explosion</td>
</tr>
<tr>
<td></td>
<td>Over-discharge</td>
<td>Discharge with 1C rate</td>
<td>Fire/ Explosion</td>
</tr>
<tr>
<td></td>
<td>External Short Circuit</td>
<td>Closed circuit with total resistance of 50 mΩ or less for 1 hour</td>
<td>Fire/ Explosion</td>
</tr>
<tr>
<td></td>
<td>Heat Exposure</td>
<td>Exposed to 80 °C heat for 4 hour</td>
<td>Fire/ Explosion</td>
</tr>
<tr>
<td></td>
<td>Fire Resistance</td>
<td>Exposed to flame of 890 to 900 °C for 2 min</td>
<td>Explosion</td>
</tr>
</tbody>
</table>

- Plan to revise in 2012 ☞ Result of EV Monitoring Program
  - Same Test Item
  - Test conditions and Procedures
Thank you!