Evolution in electric vehicle safety legislation and global harmonisation activities

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Bad press
The role of legislation

- Reduce risks to users
- Maintain public confidence
- Establish uniform technical requirements
- Harmonisation reduces burden to industry
Harmonisation of vehicle regulations

• World Forum for Harmonisation of Vehicle Regulations (WP.29)
  – United Nations Economic Commission for Europe

• Harmonised requirements and tests
  – UN Regulations
  – UN Global Technical Regulations
UN Regulations

- Type-approval and mutual recognition
- “1958 Agreement”
- Systems and components
  - Whole vehicle approval mechanism under development
- Not compatible with self-certification
UN Global Technical Regulations (GTRs)

- Not a legal document
  - Requirements are transposed into local legislation
- “1998 Global Agreement”
- Compatible with type-approval and self-certification
  - Data-driven
  - Performance based
UN GTR No. 13 on hydrogen-fuelled vehicles

- Proposal to develop GTR adopted 2007
  - Co-sponsors: Germany; Japan; United States
- Phase 1 of GTR adopted in June 2013
  - Developed by subgroup on safety
- Phase 2 expected to start in 2014
  - To take account of latest research
  - Harmonise crash test specifications
Main elements

• Compressed hydrogen storage system

• Vehicle fuel system
  – In use
  – Post crash

• Electrical safety
  – In use
  – Post-crash
Compressed hydrogen storage system

- Verification test for performance durability

Structural resistance to rupture:

Sequential hydraulic cycling (fluid is liquid)
Compressed hydrogen storage system

- Verification test for on-road performance

**Expected worst-case conditions (including fuel):**

**Sequential pneumatic cycling** (fluid is H\(_2\) gas)

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a. Fuel/defuel cycles @-40°C with initial system equilibration @ -40°C, 5 cycles with -20°C fuel; 5 cycles with <-35°C fuel
b. Fuel/defuel cycles @+50°C with initial system equilibration @+50°C, 5 cycles with <-35°C fuel
c. Fuel/defuel cycles @15-25°C with service (maintenance) defuel rate, 50 cycles
UN GTR No. XX on electric vehicles

• Proposal to establish two new informal groups adopted 2012
  – Co-sponsors: China; EU, Japan; United States

• Work started on safety GTR
  – Four meetings to date
  – Completion 2014
Main elements

• Electrical safety in-use
• Electrical safety post-crash
• Safety of rechargeable energy storage system

• First draft draws from UN Regulation 100
Rechargeable energy storage system

- Vibration
- Thermal shock and cycling
- Mechanical shock
- Mechanical integrity
- Fire resistance
- External short circuit
- Overcharge
- Over-discharge
- Over-temperature
Rechargeable energy storage system

- Vibration
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No evidence of: electrolyte leakage, rupture, fire, explosion
Conclusions

• High levels of cooperation achieved

• Political challenges
  – Political will to transpose requirements
  – Time-consuming

• Technical challenges
  – Technology is evolving
Expect the unexpected...