



European Commission

• **SGS 3 - 3**

Enterprise and Industry Directorate General

Update on EU Regulation on type-approval of hydrogen vehicles

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State-of-play

- European Commission adopted the proposal on 10 October 2007
- COM(2007) 593 final
- Full text available at:
<http://ec.europa.eu/enterprise/automotive/directives/proposals.htm>
- Split-level approach: co-decision regulation, comitology regulation
- Co-decision process ongoing
- First reading agreement likely
- Co-decision regulation likely to be adopted by end 2008
- Comitology regulation is under development – planned for first semester 2009

Content of the co-decision Regulation

- Establishes technical requirements for type-approval of:
 - vehicles with regard to hydrogen propulsion
 - hydrogen components (containers and components other than containers)
 - hydrogen systems
- Requirements for installation of such components or systems
- Similar structure to current UNECE Regulations 67 (LPG) and 110 (CNG)
- Based on results of EIHP project



Scope

The Regulation applies to:

- (a) hydrogen powered vehicles of categories M and N;**
- (b) hydrogen components designed for motor vehicles of categories M and N;**
- (c) hydrogen systems designed for motor vehicles of categories M and N.**

Test requirements

The proposal specifies test requirements for:

1. Hydrogen containers designed to use liquid hydrogen
2. Other components designed to use liquid hydrogen
3. Hydrogen containers designed to use compressed (gaseous) hydrogen
4. Other components designed to use compressed (gaseous) hydrogen

Content of the Regulation

General requirements (ex.):

- The hydrogen system and the hydrogen components shall function in a correct and safe way.
- They shall reliably withstand the electrical, mechanical, thermal and chemical operating conditions without leaking or visibly deforming.
- Materials of the hydrogen system and components which are in contact with hydrogen shall be compatible with it.
- They shall withstand expected temperatures and pressures.

List of components subject to type approval

components designed to use liquid hydrogen:

- container;
- automatic shut-off valve;
- check valve or non-return valve (if safety device);
- flexible fuel line (if upstream of first automatic shut off valve or other safety devices);
- heat exchanger;
- manual or automatic valve;
- pressure regulator;
- pressure relief valve;
- pressure, temperature and flow sensor (if safety device);
- refuelling connection or receptacle.

List of components subject to type approval

components designed to use compressed
(gaseous) hydrogen with a nominal
system pressure of over 3.0 MPa:

- container;
- automatic shut-off valve;
- container assembly;
- fittings;
- flexible fuel line;
- heat exchanger;
- hydrogen filter;
- manual or automatic valve;

List of components subject to type approval

Continued:

- non-return valve;
- pressure regulator;
- pressure relief device;
- pressure relief valve;
- refuelling connection or receptacle;
- removable storage system connector;
- sensors (pressure or temperature or hydrogen or flow sensors) if used as a safety device;
- hydrogen leakage detection sensors.

Applicable tests for hydrogen containers (LH₂)

- **Burst test**
- **Bonfire test**
- **Maximum filling level test**
- **Pressure test**
- **Leak test**

Applicable tests for hydrogen components other than containers (LH₂)

HYDROGEN COMPONENT	TYPE OF TEST										
	Pressure test	External leakage test	Endurance test	Operational test	Corrosion resistance test	Resistance to dry-heat test	Ozone ageing	Temperature cycle test	Pressure cycle test	Hydrogen compatibility test	Seat leakage test
Pressure relief devices	✓	✓		✓	✓			✓		✓	
Valves	✓	✓	✓		✓	✓	✓	✓		✓	✓
Heat exchangers	✓	✓			✓	✓	✓	✓		✓	
Refuelling connections	✓	✓	✓		✓	✓	✓	✓		✓	✓
Pressure regulators	✓	✓	✓		✓	✓	✓	✓		✓	✓
Sensors	✓	✓			✓	✓	✓	✓		✓	
Flexible fuel lines	✓	✓			✓	✓	✓	✓	✓	✓	

Types of hydrogen containers (CGH₂)

Classification of containers designed for the use of compressed (gaseous) hydrogen:

- Type 1 Seamless metallic container
- Type 2 Hoop wrapped container with a seamless metallic liner
- Type 3 Fully wrapped container with a seamless or welded metallic liner
- Type 4 Fully wrapped container with a non-metallic liner.

Applicable tests for hydrogen containers (CGH₂)

Test	Applicable To <i>Container Type</i>			
	1	2	3	4
Burst Test	✓	✓	✓	✓
Ambient Temperature Pressure Cycling Test	✓	✓	✓	✓
LBB Performance Test	✓	✓	✓	✓
Bonfire Test	✓	✓	✓	✓
Penetration Test	✓	✓	✓	✓
Chemical Exposure Test		✓	✓	✓
Composite Flaw Tolerance Test		✓	✓	✓
Accelerated Stress Rupture Test		✓	✓	✓
Extreme Temperature Pressure Cycling Test		✓	✓	✓
Impact Damage Test			✓	✓
Leak Test				✓
Permeation Test				✓
Boss Torque Test				✓
Hydrogen Gas Cycling Test				✓

Applicable tests for hydrogen components other than containers (CGH₂)

SPECIFIC COMPONENT	TYPE OF TEST					
	Material tests	Corrosion resistance test	Endurance test	Hydraulic pressure cycle test	Internal leakage test	External leakage test
Automatic valves	✓	✓	✓	✓	✓	✓
Fittings	✓	✓	✓	✓		✓
Flexible fuel lines	✓	✓	✓	✓		✓
Heat exchangers	✓	✓		✓		✓
Hydrogen filters	✓	✓		✓		✓
Manual valves	✓	✓	✓	✓	✓	✓
Non-return valves	✓	✓	✓	✓	✓	✓
Pressure regulators	✓	✓	✓	✓	✓	✓
Pressure relief devices	✓	✓	✓	✓	✓	✓
Pressure relief valves	✓	✓	✓	✓	✓	✓
Receptacles	✓	✓	✓	✓	✓	✓
Removable storage system connectors	✓	✓	✓	✓		✓
Sensors for hydrogen systems	✓	✓	✓	✓		✓

Content of the comitology Regulation

- **The comitology Regulation will contain i.a.:**
 - **administrative provisions for the EC type-approval of vehicles with regard to the hydrogen propulsion, and of hydrogen components and systems;**
 - **information to be provided by manufacturers for the purposes of type-approval and periodic inspection;**
 - **the detailed rules for the test procedures;**
 - **the detailed rules for the installation of hydrogen components and systems;**



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THANK YOU
for your attention

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