

**GRPE Ad-hoc Working Group - Hydrogen Vehicle Storage Systems  
4th Meeting**

**Koln, Germany – 14 & 15 November 2002**

**PROPOSALS FOR  
COMPRESSED GASEOUS HYDROGEN REGULATIONS**

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Summary of CGH<sub>2</sub> activities since the last meeting

Meetings of GRPE/ISO CGH<sub>2</sub> Experts

Major changes between Revisions 9 & 10

Outstanding issues

## SUMMARY OF CGH<sub>2</sub> ACTIVITIES SINCE THE LAST MEETING OF THE GRPE AD-HOC WORKING GROUP

Last meeting of the GRPE Ad-hoc Working Group: 4-5 June 2002

1<sup>st</sup> meeting of GRPE/ISO CGH<sub>2</sub> Experts: Munich, 30 July 2002

Restructuring of Annex 8 (old Annexes 8 & 9) by EIHP2 & Powertech:  
August-October 2002

New Annex 8 distributed for comments on 16 October 2002

As requested at the 1<sup>st</sup> meeting, discussions were held between Powertech, Raufoss & Volvo to develop proposals to resolve comments before the 2<sup>nd</sup> meeting: August-October 2002

2<sup>nd</sup> meeting of GRPE/ISO CGH<sub>2</sub> Experts: Vancouver, 24-25 October 2002

CGH<sub>2</sub> Revision 10 distributed on 6 November 2002

## MEETINGS OF GRPE/ISO CGH<sub>2</sub> EXPERTS

Excellent co-operation between all parties

1<sup>st</sup> meeting of GRPE/ISO CGH<sub>2</sub> Experts: Munich, 30 July 2002

- Attended by 29 people from 9 countries inc. North America & Japan
- Majority of the differences identified in the ISO comparative report were harmonised
- Outstanding issues: Stress analysis report & impact damage test
- "Other comments" relating to CGH<sub>2</sub> Revision 9 were not addressed
- Results contained in GRPE/ISO Docs. N08 & 09

2<sup>nd</sup> meeting of GRPE/ISO CGH<sub>2</sub> Experts: Vancouver, 24-25 October 2002

- Attended by 20 people from 9 countries inc. North America & Japan
- Remaining differences identified in the ISO comparative report were harmonised, i.e. stress analysis report & impact damage test
- A major new harmonisation issue was identified during the meeting: ISO 15869 now refers exclusively to ISO7866/9809 for Type 1 (all metal) containers – unresolved
- "Other comments" relating to CGH<sub>2</sub> Revision 9 with an impact on harmonisation were addressed
- Results contained in GRPE/ISO Doc. N26, 27 & 28

# MAJOR CHANGES BETWEEN REVISIONS 9 & 10 OF THE CGH<sub>2</sub> PROPOSALS (1 of 3)

Annexes 8 & 9 (based on ECE R110) have been replaced by a totally restructured Annex 8 developed by EIHP2 & Powertech, including:

Similar changes to the work undertaken for Annex 7:

- Removal of design related requirements and restrictions, e.g. flexible fuel lines
- Took account of comments received on Annexes 8 & 9, see docs N08 & N09
- Took account of recent practical experience of EIHP2 partners with Rev. 9 and the similar ECE R110 (CNG)

Reviewed and restructured approval test procedures for components

- Implemented "duty cycle" (engine ignition cycle) philosophy for endurance tests, where "filling cycles" are not appropriate
- Introduced component related approval test procedures, formerly pressure class related
- Clearer test sequence

Simplified and shortened document text, e.g. use of new definitions

## **MAJOR CHANGES BETWEEN REVISIONS 9 & 10 OF THE CGH<sub>2</sub> PROPOSALS (2 of 3)**

The "container assembly" concept was clarified by introducing a new definition and related changes

"Filling cycles" redefined to take account of "top ups" of the container

Section 2.4.6 "Filling cycles" redrafted to clarify the implementation of the new philosophy

Section 6.1.11 added to clarify that requirements in the regulation take precedence in the event of a conflict with other documents referenced

Material tests are not necessary for every component if the material has already been approved (Section 6.1.3)

Alternative component test methods may be used if equivalence with the stated test method is demonstrated (Section 6.1.4)

# MAJOR CHANGES BETWEEN REVISIONS 9 & 10 OF THE CGH<sub>2</sub> PROPOSALS (3 of 3)

Annex 7 tests:

- For containers, material requirements for aluminium alloys and steels are now based on ISO7866/9809 (Annex 7: A3.2)
- Tensile test now applies to plastic liners only
- Charpy impact, corrosion, sustained load cracking and high temperature creep tests deleted
- Impact damage test revised

Annex 10 (PSV "H<sub>2</sub> GAS" labels) added

Many editorial improvements and changes

## OUTSTANDING ISSUES TO BE RESOLVED BY THE AD-HOC WORKING GROUP (1 of 2)

ISO15869 now refers exclusively to ISO7866/9809 for Type 1 (all metal ) containers, Rev.10 refers to ISO7866/9809 for material tests only

Component marking:

- Unlike the ECE R110, all *Specific Components* shall have a space large enough to accommodate an approval mark. Is this practical for the fittings, etc.?
- For flexible fuel lines approval is gained for any length. Is a marking necessary on every individual length of flexible fuel line used on a vehicle?
- Should all *Specific Components* be marked with an ECE approval mark (Sect. 4)?

Japanese proposal to reduce the need for approval of components to the container, pressure relief device, automatic shut-off valve and non-return valve

PSA proposal for removable containers

## OUTSTANDING ISSUES TO BE RESOLVED BY THE AD-HOC WORKING GROUP (2 of 2)

### Annex 10: Public Service Vehicle Labels



- The green label follows existing ECE practice for CNG.
- A blue triangle is used to identify hydrogen in the USA.
- ISO 7225:1994 *Gas cylinders - Precautionary labels* and the UN regulations for the transport of dangerous goods use a red sign to identify hydrogen  
Note: OEMs do want a red label
- Is a label needed? Should it be left to local authorities? If so, what colour/shape?



## **OUTSTANDING ISSUES TO BE RESOLVED BY THE GRPE/ISO EXPERTS (1 of 1)**

Comments from ISO Secretariat: issues identified during a check of a draft version of Rev.10, but too complex to resolve in the time available (if harmonisation is an issue)

Any general comments received if harmonisation is an issue

## OUTSTANDING ISSUES TO BE RESOLVED BY EIHP2 (1 of 1)

Flexible fuel lines - Section B5.2.3 "Endurance Test" new proposals for a combined flexing-impulse test

Proposal by UTC Fuel Cells to change definition of *Working Pressure* downstream of a pressure regulator to "Maximum Allowable Working Pressure"

Consider component test pressure relative to set pressure of *Pressure Relief Valves*

Comments from ISO Secretariat: issues identified during a check of a draft version of Rev.10, but too complex to resolve in the time available (if harmonisation is not an issue)

Propose that Japanese Rev.9 comments received on 22 October 2002 are reviewed by JASIC with respect to Rev.10

Any general comments received if harmonisation is not an issue

# APPROVAL PROCEDURES & TEST REQUIREMENTS FOR TYPE 1 (ALL METAL) CONTAINERS

## 4 FEASIBLE SOLUTIONS

