Transmitted by the three Co-Sponsors
Germany, Japan and United States of America

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agenda item 16.7.)

Status Report of Hydrogen/Fuel Cell Vehicles (HFCV)-Subgroup on Safety (SGS)

1. OBJECTIVE

The SGS goals are to develop and establish a global technical regulation (gtr) for Hydrogen-/ Fuel Cell Vehicles (HFCV) that:

(1) Attains equivalent levels of safety as those for conventional gasoline powered vehicles,

(2) Is performance-based to the extent possible and avoids provisions that are not justified,

(3) Does not restrict future technologies.

2. GTR DEVELOPMENT PROCESS

In order to develop the gtr in the context of an evolving hydrogen technology, SGS proposes to develop the gtr in two phases:

(a) Phase 1 (gtr for hydrogen-powered vehicles):

Establish a gtr by 2010 for hydrogen-powered vehicles based on a component level, subsystems, and whole vehicle crash test approach. For the crash testing, the gtr would specify that each contracting party will use its existing national crash tests but develop and agree on maximum allowable level of hydrogen leakage. The Japanese regulation, and any available research and test data will be used as a basis for the development of this first phase of the gtr.

(b) Phase 2 (Assess future technologies and harmonize crash tests):

Amend the gtr to maintain its relevance with new findings based on new research and the state of the technology beyond 2010. Discuss how to harmonize crash test requirements for HFCV regarding whole vehicle crash testing for fuel system integrity.

3. TIMETABLE

Action	Date	Duration	Location	Purpose
1st HFCV-SGS meeting	September 2007	2 days	Bonn	Agreement of principles
2nd HFCV-SGS meeting	January 2008	3 days	Geneva	Review of work
3rd HFCV-SGS meeting	May 2008	3 days	Washington DC	Agreement of gtr structure
4th HFCV-SGS meeting	September 2008	3 days	Tokyo	Starting of drafting gtr
5th HFCV-SGS meeting	January 2009	3 days	Budapest	Discussion on draft gtr
Drafting Task Force group meeting for fuel system	April 2009	3 days	Frankfurt	Refine gtr contents
6th HFCV-SGS meeting	May 2009	3.5 days	Beijing	Discussion on draft gtr (Fuel system)
Drafting Task Force group meeting for storage system	July 2009	3 days	Frankfurt (Scheduled)	Refine gtr contents
7th HFCV-SGS meeting	September 2009	3 days	Ottawa (Scheduled)	Discussion on draft gtr (Fuel storage, Electric Safety)
8th HFCV-SGS meeting	January 2010	3 days	Geneva (Planned)	Finalization of draft gtr for Phase 1
9th HFCV-SGS meeting	May 2010			Finalization of draft gtr for Phase 1
10th HFCV-SGS meeting				if necessary

As for Phase 1, co-sponsors agreed following time table tentatively.

4. CURRENT STATUS

- Work of the SGS is progressing according to the Action Plan (ECE/TRANS/WP.29/2007/41).
- At the moment, SGS is still on schedule, as outlined by the Action Plan, for having gtr in 2010 (Phase 1) as a result of the good progress in the meetings that took place by now.
- The gtr will cover fuel cell (FC) and internal combustion engine (ICE), compressed gaseous hydrogen (CGH2) and liquid hydrogen (LH2) in the phase 1 gtr. However, requirements for

liquid hydrogen (LH2) will be completed after the establishment of compressed gaseous hydrogen (CGH2) requirements.

- The application of the gtr is for passenger vehicles only with the understanding that in the coming years, it will appropriate to extend the application of the regulation and/or establish new requirements for additional classes of vehicles, specifically, motor coaches, trucks, and two-/three-wheel motorcycles.
- SGS has started the development of the gtr by collecting information on existing regulations and standards. Three main areas outlined in the Action Plan have been discussed: fuel system, electrical safety, and hydrogen storage system.
- The draft contents of gtr text are attached to this document as an appendix 1.
- Based on maturity of each subject, SGS started drafting after the 4th meeting first with requirements for the fuel system/leakage provisions. TUV/Germany, Japan, US and OICA have all proposed items on this subject for inclusion in the gtr.
- To advance the discussion for effectiveness, a Drafting Task Force (DTF) meeting for the fuel system was organized. The DTF group was able to refine key discussion items consistent with the Action plan, that is, avoid provisions that lack technical justifications and design specific requirements, to the extent possible.
- One example of an open issue concerning requirements in the gtr is to prevent overpressure downstream of the pressure regulator. SGS discussed this issue again at its 6th meeting in Beijing without reaching an agreement. On one hand, the necessity of such a requirement was not seen. On the other hand, this kind of safety level is already required (in Japanese legislation and on EU level), and the lack of such a downstream pressure limit in the gtr would not be accepted by a part of the group. SGS will try to address this issue at the Co-sponsors+ Task Force meeting for hydrogen storage system that has been tentatively scheduled for July. If these positions are not reconciled within SGS, the Subgroup would look to WP.29/AC.3 for guidance.
- Regarding the hydrogen storage system, discussion was started in 6th meeting using the OICA document as a starting point of discussion. At this meeting, ISO also submitted a proposal for the fuel container. OICA and ISO were requested to work on the technical differences with a view to possibly develop a unified proposal.
- The Co-sponsors+ Task Force meeting for hydrogen storage system has been proposed and is tentatively scheduled for July.

- The electrical safety portion has been developed under the Electric Safety Subgroup (ELSA), in parallel on amending ECE R.100.
- The ELSA group intends to finalize the draft of electric safety requirements for both in-use and post-crash, based on proposal from OICA, at their next meeting.
- SGS continues to benefit from increased and very active participation and cooperation among Contracting Parties, industry and standard-setting organizations, namely ISO and SAE. In particular, OICA has been working actively with the US delegate on the drafting of the gtr.
- Documents are available on the HFCV – SGS website.

Appendix 1------contents of draft gtr

Global technical regulation No. xx

HYDROGEN POWERED VEHICLE
(Established in the Global Registry on [DATE])

TABLE OF CONTENTS

B. TEXT OF THE REGULATION

1. Purpose: This regulation specifies performance requirements for hydrogen powered vehicles. The purpose of this regulation is to minimize human harms that may occur as a result of fires or explosions related to the vehicle fuel system and/or from electric shock caused by the vehicle's high voltage system.

2. Application / Scope: This regulation applies to all vehicles of Category 1-1 and 1-2, with a gross vehicle mass (GVM) of 4,536 kilograms or less(under discussion)

3. Definitions

4. General requirements:

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7. Annexes