

DRAFT Minutes For the 9th Meeting of the Subgroup on Safety (SGS) of Hydrogen-/Hydrogen Fuel Cell Vehicles

15-18 June 2010
Seoul

Place: Meeting Room: Millennium Seoul Hilton
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Schedule: Tuesday, 15 June 09:30 – 18:00
Wednesday, 16 June 09:00 – 15:30
Thursday, 17 June 09:00 – 19:00
Friday, 18 June 09:00 – 11:30

Video equipment and wireless internet connection available

Tuesday, June 15:

1. Welcome and Introductions

Chairman Narusawa, Japan's National Transportation Safety and Environment Laboratory called the meeting to order, and thanked the Ministry of Land, Transport and Maritime Affairs (MLTM) and the Korea Transportation Safety Authority (hosts) and KICTEP (sponsor).

Tuesday: Mr. Sookon KIM, Director General, Motor Vehicles Policy Bureau, MLTM, welcomed the participants, the first UNECE WP.29-related meeting in Korea. Korea is contracting party to the 1998 and 1958 UNECE agreements. He welcomed the efforts of many countries, including Korea, to reduce GHG emissions. The Korean government has increased regulations on vehicles to address GHG and other pollution in Korea. Low-speed electric vehicles are already on roads now, and high-speed electric vehicles will be available shortly. Fuel cell vehicles are being accessed as possible alternatives to conventional vehicles. He noted Korean companies' increased vehicle production. Korea's rate of road crash-related fatalities, however, is double of other OECD countries. An active campaign with many facets is underway and some incremental improvements have been made already. As a result, road fatalities decreased by 4%, even with a 3.2% increase in vehicle population in Korea. He concluded with wishes for a productive meeting and a fine visit to Korea.

Representatives from Germany (BMVBS, BAM), Japan, JASIC (Nissan, Honda), JAMA, US (DOT and DOE, consultants, LANL), OICA (GM, Daimler), Volvo, Canada (Transport Canada), European Commission, Korea (KATRI, KAMA, KGS, KCR, Hyundai), China (Tsinghua University, Tongji University, and Zhejiang University)

2. Logistical Arrangements

2.1 Meeting arrangements

Luncheon will be provided (12:00 is normal lunchtime). Wednesday afternoon, there will be a small city tour on a Fuel Cell bus (leaves at 4:50pm). Dinner will be provided after the tour. Chairman proposes to extend the meeting time Tuesday and Thursday, and to start earlier the next two days. Friday will be kept open if needed. Time changes were adopted.

3. Approvals

3.1 Minutes/decisions of the 8th Meeting

Approved as posted.

3.2 Action Items from the 8th Meeting

Action Items from the Task Force Meeting

TF1. Storage system prequalification when component(s) are exchanged: Germany to review the level of safety and determine if it is equivalent (with the inclusion of the recommendations in Part A) to existing regulations (Germany and Japan should check). **Comments received from Germany (SGS-9-07) and Japan**

TF2. OICA will draft supplemental rationale for taxis to be considered as passenger vehicles (basically, that the 5,500 cycles are sufficient for taxis). **Completed see SGS-9-13**

TF3. Germany will verify if hydraulic testing is conducted on the cylinder or on the system. NOTE: This has been resolved - only the bonfire test needs to be conducted on the system. **Completed see SGS-9-07**

TF4. ISO will check on the equivalence safety between this new OICA proposal and the existing ISO proposal. **Completed**

TF5. US and OICA will propose modification to the language in section B.5.1.3.2 so that it is not a mix of procedure and requirement. **Completed see SGS-9-13**

TF6. ISO will check on the equivalence of this new proposal (section B.5.1.3.2) and the existing ISO procedure. **Completed**

SGS-8 Meeting: All action items are due no later than March 31, 2010.

1. Secretary will update section A.2.2 to include reference to ELSA **Completed**
2. Draft language will be proposed and inserted in Part B to address the issue of maximum NWP of 70MPa. **Completed**
3. Germany and Japan will provide sample language on pressure limits from existing regulations. **Completed see SGS-9-07 and SGS-9-05**
4. BMW and GS will work to develop a more correct (generic) Figure 4. **Completed see SGS-9-09**
5. Secretary will work to correct the reference to current Powertech report, or to revise the text of the Powertech report to include more information on this issue. **Completed**

6. Mr. Albus will obtain a legal opinion on the inclusion of the supplemental requirements for type approval in Part A. (this was discussed in the Task Force meeting) **Completed: the EC Legal Department recommend that requirements be in Part B. If they are optional, they may be included in Part A, but there must be a reference to them in Part B.**
7. Contracting parties will draft text for Part A to address the recommendation for monitoring/measuring residual life of cylinders **Open. Germany response: see SGS-9-07**
8. Contracting parties and other participants should provide the Secretary with the information that should be recommended for inclusion on the refueling port. **Completed**
9. Secretary and co-sponsors will work to improve the Purpose paragraph in Part B. **Completed**
10. Each contracting party will draft a rationale for or against limiting the GTR to current tank types. **Completed - see SGS-9-07**
11. OICA will provide justification for the changes to the LBB test to support the change from 150% to 125% and for the reduction in the number of cycles from 15,000 to 11,000. **Completed - to be discussed - see SGS-9-13.**
12. OICA will provide rationale for the removal of the boss torque test requirement, text to be included in Part A. **Completed see SGS-9-13**
13. Parties are asked to provide data to support higher number of cycles for Performance Durability tank testing (the taxi issue). **Completed see SGS-9-05 and SGS-9-07**
14. CS/OICA will provide documentation/rationale to support the modified Expected On-Road Performance test sequence is equivalent to previous sequence **Completed see SGS-9-13**
15. GS, CS, OICA, and Paul Adams (HySAFE) will draft text for Part A that explains how the equation of allowable permeation rate as a function of vehicle size and garage size. **Completed see SGS-9-13**
16. Japan will check permeation test results to confirm that the value is consistent with HySAFE value. **Completed see SGS-9-05, SGS-9-06, and SGS-9-11**
17. US will provide a proposal for the combined localized + bonfire test procedure. **Completed**
18. Germany to provide rationale for the ECE-R110 two-tank requirement for bonfire test (one tank at reduced pressure) and relevance given current TPRDs **see SGS-9-07**
19. BMW will provide a revised LH2 section, assuming the structure of the section on CH2 revised draft does not change (substantially). **Completed see SGS-9-10**
20. OICA will draft text for performance-based requirements for safe refueling. **Completed see SGS-9-13**
21. ISO will provide text of the DIS for refueling receptacle. SAE will provide similar. **Completed ISO, open SAE**
22. OICA, in collaboration with JASIC and Japan delegation, will prepare alternate text and test

procedure for air tightness. **Completed see SGS-9-13**

23. All contracting parties and interested participants are asked to review the proposed language on protection of the vehicle fuel system against burst. **Completed. Germany: see SGS-9-07**

24. Manufacturers will provide information on the telltales/warnings that are visible or provided in their demonstration vehicles **Completed see SGS-9-14**

25. Interested parties will submit written comments on the proposed text for fuel leakage limit (post crash). **Completed see SGS-9-05**

4. Reports of UN Activities

4.1 150th Session of WP.29 in March 2010

WP.29-150-24: status report. One year extension was proposed and accepted. Draft is supposed to be finalized at the SGS-10 meeting in September (TBD US). Draft GTR document is due in December 2010 to GRSP.

Q: ELSA is not making much progress on post-crash issues - will this delay the draft?

A: To be discussed later in the agenda

5. Reports of other activities

5.1 National/Regional

Canada:

Winter Olympics are completed, so there are no new government projects.

China:

Presentation (to be provided). 2010 Shanghai Expo (May 1 - Oct 31). Clean Energy Vehicles:1017 total: EV=321, HEV=500 FCV=196. In the Olympic Games in 2008, there were 601 clean vehicles, Biggest increase in HEV vehicles (by number) and FCV (by percentage). Already, 10,000 attendees have experienced a ride on a FCV at the Expo. Infrastructure: hydrogen is from an industrial process (byproduct hydrogen requiring purification to 99.99%. There are two stations and two mobile refueling stations. There are also three vehicle maintenance bases.

Q: Can you give us more information in the codes, standards, and regulations for the FCV, EV and the refueling stations?

A: There are 42 standards for EV and Hybrids, but there are very few in place for FCVs.

Q: What container types are used in the vehicles? Is the ban on type 4 containers still in effect?

A: In Shanghai, type 3 and 4 are used. The use of type 4 is an exception for the Expo. Some additional tests were carried out, but the type 4 tanks must be removed after the Expo. There is no consideration to change the ban.

ACTION: Electronic copy of China presentation to be provided to Secretary and posted on the SGS website.

EC:

April 28th, EC issued a strategy paper for energy efficient vehicles (is not limited to electric vehicles, but also covers fuel cell vehicles). Published implementing measures for hydrogen regulation - co-decision approach REG 406-2010 (copy is to be made available) - 4-wheeled vehicles can now be type approved in the EC.

Q: What was the date of publication of the regulation?

A: May 18, 2010 L122

ACTION: Electronic copy of EC Regulation 406-2010 to be provided to Secretary and posted on the SGS website.

Germany: no additional comments beyond the EC report

Q: There is a lot of activity in Germany - are there any updates?

A: There are no regulation activities on the national level (only at the EC level). The government does fund a great deal of research on the development of hydrogen and fuel cell technologies.

Japan:

Internal discussion with the METI. Two years ago, the discussion was focused on hydrogen storage. Agree that the storage part of the GTR will be implemented into the Japanese regulation, in principle - depending on the content of the GTR of course.

Korea:

Presentation (to be provided). Frontal and side impact tests. SUV tested using KMVSS 102 (helium used). Because there is no hydrogen on board, the fuel cell was not energized, so it was not possible to test electrical isolation. May test electrical isolation using lower pressure hydrogen in order to have an active fuel cell to test.

Q: Very nice work - can we see some additional details?

A: More details will be provided to specific questions to the proper experts.

C: Chair would like to hear the questions and have the answers provided to all members

C: EC has specific questions that may be too detailed for the group.

C: Nha will join the discussion and will report to the Chair.

Q: Excellent work. KMVSS 102 test is not the same as the one in the GTR

A: KMVSS 91 is the rear crash test. The other test(s) will also be reference.

Q: Are the test results published?

A: Test were conducted only in December 2009 and March 2010 - report is only in Korean at this time.

C: OICA has an idea on how to measure the isolation. ECE R94 and 95: experts agreed on measurement of electrical isolation resistance without active fuel on board. These reports are published and could be used by Korea.

ACTION: Electronic copy of Korea presentation to be provided to Secretary and posted on the SGS website.

US:

Progress report on SC&S [Safety, Codes and Standards] at NHTSA:: ready to perform crash test (CNG vehicles purchased - tanks will be replaced). Developing localized fire test (not finalized yet - presentation later in the agenda). FMVSS 305 was published yesterday - took 4 years (electronic version sent to participants - will be posted). Now ELSA meetings will be more productive (report later in the agenda)

Progress report on SC&S at DOE: Presentation (to be provided). Overview of the SC&S program at the DOE Fuel Cell Technologies Program. A large number of (small) fuel cells for portable, stationary, auxiliary power units, and forklifts have been installed (many more than installed in fuel cell vehicles). 2010 budget was \$174M for Fuel Cells Technologies Program; 2011 budget is \$137M (major reduction in funding of Storage Centers of Excellence, which finished in 2010).

ACTION: Electronic copy of FMVSS 305 and the presentation by DOE to be provided to Secretary and posted on the SGS website.

5.2 ISO/SAE

ISO: not present

SAE: no report

Q: Why is SAE J-2579 no longer available?

A: That must be a mistake. The document is only one year old. It is under revision, but the current version is still available. SAE will be asked to confirm.

6. Drafting GTR

Table of Contents from SGS-09-15 (in blue and times roman font): Comments inserted in appropriate section below. Note that not all changes are recorded here. Refer to latest draft of GTR for all changes.

A. STATEMENT OF TECHNICAL RATIONALE AND JUSTIFICATION

- 1. Introduction.....
- 2. GTR Action plan.....
- 3. Description Of ~~Compressed Hydrogen Fuel Cell~~ Vehicle.....

Change made to title of section 3 (removed “compressed” and “fuel cell”)

- 3.1 Vehicle Description.....
- 3.2 Hydrogen Fueling System.....
- 3.3 Hydrogen Storage Subsystem.....
 - 3.3.1 Compressed Hydrogen Storage System.....
 - 3.3.2 Liquefied Hydrogen Storage System.....

LH2 proposal rationale included. Requirements are in Part B.

Proposal was submitted only two weeks ago. A teleconference is needed to have a detailed discussion (information will be sent to interested parties). Overview given by GS (SAE): followed the format of the compressed hydrogen section. Main differences: the relief valves are pressure activated and are spring-loaded - can open and re-close (rather than thermal activated PRDs that one finds on a CH2 system). Burst disc is included to protect the vacuum jacket. There is a return valve on the fill receptacle to allow the return of gaseous hydrogen during refueling. Q: Does “typical” mean “example”? Otherwise, it implies a design-specific requirement.

A: It should say example (in both the compressed and the liquefied sections). Changes will be made by the Secretary for consistency.

Q: How do we do post crash requirements for an LH2 system?

A: A section can be developed for LH2 once the CH2 section is developed. The same requirements will be addressed (<4% in passenger compartment, and leakage rate). Not sure what fluid could be used.

C: The European directive name is not correct. Should be Pressure Equipment Directive.

ACTION: The Secretary will set up a conference call and send connection information to participants for a discussion of the LH2 proposal: **Proposal: July 8th at 7am EDT.**

- 3.4 Hydrogen Fuel Delivery Subsystem.....
- 3.5 Fuel Cell Subsystem
- 3.6 Electric Propulsion and Power Management Subsystem.....

4. Existing Regulations, Directives, and International Voluntary Standards.....
Additions and corrections made in text for each subsection

- 4.1 Vehicle Fuel System Integrity
 - 4.1.1 National Regulations
 - 4.1.2 International Industry Standards
- 4.2 Storage System
 - 4.2.1 National Regulations
 - 4.2.2 International Industry Standards
- 4.3 Electric Safety
 - 4.2.1 National Regulations
 - 4.2.2 International Industry Standards

5. Technical Rationale.....

5.1 Compressed Hydrogen Storage System Test Requirements and Safety Concerns

Q: What does “single produced system” mean?

A: This is a statement about re-qualification.

Q: Do we want to limit the regulation to new systems only?

A: The GTR is for new systems/vehicles only. The sentence should be removed (and was deleted).

5.1.1 Rationale for Hydrogen Storage System.....

Section A.5.1.1.5:

Canada report on high-usage vehicles (report was emailed - needs a number and to be posted on the SGS-9 page)

Assuming 15-year lifetime. There is no factor of safety in the estimates. The average usage is much less than the extreme situations, and the GTR does not address these cases. Once a lifetime of 15 years is used, there is an issue with the number of pressure cycles. Canada proposes to revert to 11,000 cycles.

C: Something unusual has to happen for the vehicle to last that many miles/kilometers. Extreme use usually means the engine is being changed out .

C: The issue is the number of times the cylinder has been pressure cycled.

C: And those cycles need to be from empty (approximately). It is not really the number of times it is refueled, only the number of times it was empty when it was refueled.

C: Safety says we must have the same regulation for private and commercial use of the vehicle. There must be control of the tank - only can be used for a certain number of fillings.

C: All the data say that a full fill is not the same as two half-fills. The stress only occurs during the full fill cycling. There would be a safety factor if we look at the mileage rather than fills.

Need to decide on these (or other options)

- 11,000 cycles
- 7,500 cycles (gives a reasonable safety factor for most vehicles)
- Re-qualification requirement

C: Japan: each country should set the limit. Each country can manage special use vehicles (taxis, vans, buses). Special tanks in these vehicles. See document SGS-9-05

C: Germany: we would have to reduce the scope of the GTR, but currently we have no possibility of restricting the way a vehicle is used.

C: EC: we could not make that distinction. What about driving school cars? There are other applications where the vehicle could be used more frequently than normal.

Q: Is the Canadian data presented the same in US, Europe, Japan, elsewhere?

A: In the US, we do not have a good data set. We do have data from New York taxis, and the use levels are far lower than those in the Canada study.

A: Canada taxis do see greater usage compared to US. Could let the Contracting Parties decide on the life of the cylinder or the number of fuelings.

C: Our preference is to have a uniform requirement. We could go back to the 11,000 cycle number (original OICA proposal).

C: 7,500 would also be a reasonable requirement (still gives a large number of fuelings). This gives a factor of safety of 4 or more.

Germany: does not want to reduce the safety factor, so want to keep it at the 11,000, which is lower than the ISO requirement and has been justified by the EIHP work.

Korea: What is the cost benefit of going from 11,000 to 5,500 (or going 5,500 to 11,000)

Canada: Data show that 5,500 is too low. Suggest 7,500 cycles would give an appropriate safety factor. 11,000 would cover the extreme.

China: Want a uniform requirement for all vehicles and 11,000 cycles is the suggested level.

Japan: 11,000 is not needed for passenger vehicle. If the contracting party can distinguish the vehicle usage type, then that country could reduce the number to 5,500 cycles.

OICA: The potential to get to those levels with current fuel cell vehicles is very low. The tank, however, could be used in more than one generation of fuel cell vehicle. There are some options: (1) specify the number of filling cycles (2) install a counter on the cylinder to determine the number of fillings, with the requirement to take the system out of service; (3) age of the vehicle - the vehicle has to somehow be under the control of the manufacturer. The manufacturer should be able to calculate the vehicle life (this is in the current EC regulation - checking on the number).

Germany: 15,000 cycles required in EC regulation (safety factor of 3). Also need 45,000 cycles before burst (another factor of 3 safety).

Japan: contracting parties can set the number of cycles to 5,500 for the limited-use vehicles. It is within the authority of each contracting party to do this. Want to introduce this number into the GTR for the limited-use vehicles.

US: need to have a uniform requirement.

Q: what is the advantage of changing the number?

A: Overbuilding a vehicle results in reduced efficiency and penalizes the consumer. Need to understand the benefit of going to higher cycle testing.

US: what is the factor of safety represented by the proposed number of cycles?

Canada: for extreme usage there is no factor of safety

Q: Could we include different requirements based on vehicle weight?

A: There has to be a way to control that vehicle or cylinder, such as the OICA proposal of use of a counter or other mechanism.

Chair: who can live with the 11,000 cycles requirement? Canada, Germany, Japan (with the option to reduce to 5,500 (or some other number) for domestic-only vehicles with restricted (normal) use), Korea (with cost-benefit analysis, also support Japan proposal), US, EC (thinking about the Japan proposal).

SEE FRIDAY DISCUSSION IN PART B.5.1.2

OICA: Has reservation. Still in favor of having a way to limit service life. The members would like to consider this and come back with a decision. Would like consideration of the European regulation and methods given above.

There is no need to have language in the text of Part A to cover a reduced safety level. Inclusion of language in Part A is not necessary, but can be added since it is non-binding. Section needs to be rewritten and could include a statement about the reduced number of cycles (do not specify).

A.5.1.1.8

Page 23-24: Letter of verification of this section received from Powertech: tanks that passed EIHP suite of tests (type 3) and ANSI/CGA/NGV2 modified for hydrogen suite of tests (type 4), failed the SAE J-2579 suite of tests.

Germany: the Powertech report is not enough justification - only a small number (4) of tanks were used. In addition, the test procedures have changed quite a bit from the draft. Therefore, the Powertech report cannot be used to justify the test procedures in the GTR. This is essentially what ISO was saying.

US: Powertech was asked to do validation of the SAE tests in the standard as it was being drafted (unusual to do this). Known failure modes for on-road usage (corrosion-induced damage, etc). Objectives of the testing: could the J-2579 suite of tests detect known failure modes (yes); tests could be done (yes); and systems that pass tests found in other standards also passed the SAE tests (this is where a difference was found - testing for failure modes that would be expected to occur in service)

US: The leak occurred under the circumstances included in the GTR draft, so the language in the GTR is still correct. The SAE draft standard has been changed, but the failure occurred well before the new cycle limits were met in either draft of the SAE standard.

ACTION: Letter from Powertech will be posted on the SGS website.

Page 24: Rationale for the permeation limit.

GS: The proposed language is consistent with the HySAFE project results.

HySAFE presentation by Paul Adams: Clarification of the text that scales properly with the vehicle size, and takes into account the smallest possible garage size. The changes result in language that is essentially equivalent to ISO proposal.

Germany: need to use SI units (seconds and degrees K), and you need to specify the kind of pressure cycles - add the word "pneumatic"

Japan presentation (SGS-9-06):

Proposal is made to set the permeation rate at 46 cc/L/hr (L = volume of the container)

US: this is consistent with the HySAFE work if the maximum capacity is 330 L instead of 360L.

ACTION: Japan and HySAFE will work to harmonize the permeation rate numbers.

ACTION: HySAFE presentation to be posted on the SGS website.

ACTION: Edit the entire GTR document to ensure that SI units are used throughout.

A.5.1.1.9

Page 26: Engulfing bonfire test versus localized fire test

GS: presentation. Localized fires can weaken the container before the PRD opens. Data indicate that about 1/3 of the fires are engulfing, so we do not want to ignore engulfing fires (but perhaps it is not necessary to do it as a separate test - hope for an industry decision by September 2010).

Q: is this a component test, or is it a vehicle-level test?

A: Certainly the vehicle structure can affect the localized test. The entire storage system should be included (i.e., the tank shielding would be part of the test). For example, the tank shielding could be incorporated into the unibody, so it becomes more complex to set the rules for doing this test.

Q: Could this work lead to new requirements for the storage system?

A: The intent is to have a performance-based fire test that results in all systems having a TPRD.

C: B.5.1 - the GTR already includes language that requires a TPRD on each tank.

Q: Was hydrogen in the tank during the Powertech tests? Is it necessary to do the test with hydrogen?

A: Yes, the localized fire tests used hydrogen. It may not be necessary to use hydrogen in the test procedure when it is finalized.

ACTION: Presentation on localized fire test to be posted on the SGS website.

ACTION: Chair requests that the next draft of the GTR be distributed in July.

5.1.2 Supplemental Test Requirements for Type-Approval.....

Supplemental requirements for type approval

C: New section should be created (Section 6)

Germany: the EC Legal opinion is confusing, since anything in Part B is a requirement. So reference to the supplemental requirements in Part B makes them requirements for all. Advice from WP.29 is required.

US: It is odd that this has not come up in any of the other GTRs. Do we believe that we will get an opinion? Is it possible to get an informal opinion, or information on how this was handled in other GTRs?

Q: If these requirements are moved to an Annex, could that solve the problem?

C: We need information and advice from WP.29

Wednesday, June 16:

Chairman-of Korea Transportation Safety Authority (KOTSA) Chung Sang-Ho welcomed the participants and discussed Government of Korea's goals related to vehicle safety, emissions and use. Chairman Chung also discussed Korea's commitment to addressing global warming issues and the research facility for green vehicle development, including hydrogen fuel cell vehicles and hybrid vehicles. He encouraged constructive discussion towards the development of a GTR for fuel cell vehicles in the meeting.

GTR-10 page 16 deals with the differences between type approval (Part B: section 7.4 - in-use testing) and self-certification (Part B: section 7.3 - laboratory testing) requirements. This GTR was sponsored and chaired by the US. To use this example in our situation, we will need to develop parallel sections that apply to only self certification CPs and to only type approval CPs. In GTR-10, the details are within Part B, but we could put the details in an Annex to keep the

text of the regulation more readable.

C: this is a possible “clean” way to deal with our situation. We can think about how to make this work for our GTR.

Q: Will the US require only system-level testing?

A: The self certification process requires the manufacturer to test at the whole vehicle level. The regulation does not have a component testing requirement. An example of an issue that is not regulated in the US is conformity of production. Still not sure that moving all of the Part A section 5.2 (or 6 if we renumber) into Part B will work, but it might. US would like it to be in an Annex.

Q: Are the OEMs required to keep test results?

A: DOT response - Not explicitly. During an investigation, the records must be provided.

C: In Canada, records must be provided within 30 days of a request by the government.

C: In the US, an investigation can be called at any time and the records must be produced.

US: The concern is that we will end up with two separate regulations.

EC: Without the inclusion of the type approval detail, the EC will not be able to use the GTR.

Chair: suggest that we table the discussion for now. The two options are that we refer to it in Part B and leave it in Part A; or to apply the process used in GTR-10. The co-sponsors and interested parties will continue this discussion, and perhaps this can be resolved with a policy decision.

Secretary: Either we put the details in an Annex or leave it in Part A.

Canada: it is not that simple. Not all of the text currently in Part A need to be there. What really needs to be in the GTR and how do we make them requirements in Part B for the type approval CP? We need advice from WP.29 (or AC.3).

Secretary: The text in this section was negotiated, so it is not likely that reduction in the text is possible (except for marking, perhaps).

C: we need some time to look closely at how this will become a regulation under type approval and under self certification, with the text in Part A or in an Annex. The cylinder labeling is one part that we will likely need in both processes, for example. We should focus on the technical content and leave the location of the sections to the co-sponsors, project manager Albus, WP.29 and others at UNECE.

OICA: When we did this in Mainz, we did not have the legal opinion of the EC. We need to reconsider our decision based on this new information.

ACTION: Co-sponsors will discuss with Task Manager Albus, WP.29, and AC.3 to determine the appropriate location of the type approval requirements so that all CPs can apply the GTR.

Secretary: We will move it to an Annex of Part B for the time being (editing will be done overnight in the interest of moving forward today). We still need to discuss the technical issues.

Conformity of Production should remain in Part A, as it cannot be in Part B according to type approval.

Changed the text of 5.1.2.2: “Contracting parties may elect to include...”

A.5.1.2.4 Qualification test for hydrogen-flow closures

OICA: Will the EC accept a reference to a CSA standard as an international standard reference? The ISO standard will not be available in time.

EC: The EC will write the details into the regulation, so it will be fine.

Japan: The Japanese test procedure exists, and should be included for the moment. Japan will check whether the CSA standard is equivalent.

ACTION: Japan will determine if the CSA test procedure on qualification test for hydrogen-flow closures (A.5.1.2.4) is substantially equivalent to the Japanese test procedure.

A.5.1.2.5 Markings

Japan, Germany, US, Canada, EC, and ISO proposals should be harmonized by the proposers and other interested parties.

Secretary created a table of the various labeling proposals, with a column for the proposed GTR requirement.

C: Concern that the use of words to describe each bit of information would result in a translation problem for EC and others. Can pictograms or symbols be used? Suggest a calendar to indicate the date, a factory for the manufacturer, etc.

Secretary will draft language for further discussion, based on the table with the required markings that was developed by the group.

A.5.1.2.6 Verification tests for conformity of units available for testing

Language needs to be fixed and it stays in Part A.

A.5.1.2.7 Verification test for conformity of production (COP)

Leave it in Part A as guidance on conformity of production (some editing is required, such as the removal of the word “must” in a number of places - “should” or “may” can be used).

A.5.1.2.8 Verification test for durability estimates

Leave it in Part A, but the text needs to be rewritten. “Manufacturers are advised to consider getting feedback on product performance” or similar.

OEMs already do this on the vehicles that they control (durability runners) so that they can understand the durability and performance issues of the vehicle.

Wording developed and changes made to the draft text.

5.2 Liquefied Hydrogen Storage System Requirements and Safety Concerns

Teleconference will be scheduled to discuss the BMW proposal. Tentative date for the call is July 8th at 7am NA Eastern Time.

5.3 Vehicle Fuel System Requirements and Safety Concerns

5.3.1 In-use Requirements.....

OICA: No consensus on receptacle design, so no standard receptacle exists. Consensus is beginning to emerge.

Germany: Receptacle is out of scope of the GTR.

China: Data communication between the vehicle and the fueling station should be required.

OICA: The interface platform is discussed by both the infrastructure group and the vehicle group. Harmonization is very important.

EC: Need something - if the GTR is silent on the issue, how would the EC regulation be written? Would the vehicle owner need to have converter kits for any number of standards in every country?

OICA: the regulation cannot contain receptacle design, only that the interface be safe.

Chair: according to the Action Plan, we are focused on the vehicle. We do not have refueling specialists in this group, nor do we have communication specialists in this group.

Proposed required information was developed. Basic information was set.

June 17, Thursday:

The participants discussed labeling - does the GTR contain only harmonized requirements (which seems to mean that the maximum amount of information would be in the GTR, with the CP having the option to require LESS information)? Or that each CP has the right to require additional information? If this is moved to Part B as proposed, it is a requirement.

The majority of the group thinks that the GTR will contain requirements for the minimum information included on the label. If CP needs to require more information that can do so as they introduce the GTR into their rulemaking process. The minimum labeling requirements will be developed and put into Part B.

The EC expressed its concern that the GTR should have maximum requirements, rather than minimum requirements.

Proposed language presented.

C: "permanently labeled" might not mean the same thing to all member countries in the EU.

C: "permanently affixed" is better, with the minimum data as listed.

Germany: cannot say that Germany agrees. A container producer cannot know where the tank will be sold, and therefore there is no free trade.

Q: can you have an additional label that covers the detailed requirements for each country?

A: seems like a reasonable solution. - edits made to the text "may specify additional labeling requirements"

Germany: will check to see if this language is acceptable.

C: if we specify the order, it would be consistent and obvious, and would promote free trade.

C: we will only say the order is required without specifying the order, CP regulations could require a specific order.

C: Labels are often a source of conflict (Canada and EC gave examples)

Co-Chair: the list of container label required information is agreed. This section will be put into Part B.

ACTION: Germany will get a legal opinion on whether the proposal is consistent with the regulation that the label is imbedded in the cylinder.

ACTION: Co-Chair will get an opinion from WP.15 on their work for harmonized labels.

A.5.3.1.1: recommended practices

Canada: need to remove "shall" if this is in Part A. Both sections (a) and (b) should be removed. Deleted in the draft.

Canada provided a proposal for consideration on Thursday. Suggestion is to move it to the Annex. Accepted, and the language needs to be made consistent with a requirement.

5.3.2 Post-Crash Requirements.....

Additions and corrections made in text of the draft.

5.3.3 Supplemental Test Requirements for Type-Approval.....

Additions and corrections made in text of the draft.

5.4 Electrical Safety Requirements and Safety Concerns

5.4.1 In-use Requirements.....

5.4.2 Post-Crash Requirements.....

6. Discussion of Key Issues

7. Benefits and Costs.....

B. TEXT OF THE REGULATION

1. Purpose.....

Canada: is this purpose correct? Does it belong in the regulation section?
 Chairman: this format is established in the GTR document.
 C: Concern that it will be used in the North American legal system in an unintended way, as written.

2. Application/Scope.....

Germany: we have to exclude the interface between the receptacle and the nozzle
 C: what about all the other things not included?
 Germany: because other European regulations cover this, it must be excluded
 OICA: we cannot exclude the interface. Surely we cannot establish requirements for the fueling station, but the system may not leak, and therefore must be included.
 Co-chair: propose the inclusion of the sentence: "This GTR does not address the fueling station interface requirements."
 Q: should this be in Part A instead?
 A: agreed to move the sentence to Part A and to provide rationale.

3. Definitions.....

Germany: why do we have two definitions of high voltage? We need to make sure we have a complete set of definitions, now that we have a more complete Part A.
 Secretary: there is no agreement in ELSA on the high level - once agreement is reached, the text will be finalized. This working group will focus on the hydrogen definitions and leave the electrical ones to ELSA.

ACTION: A small group should focus on the definitions section to ensure the language is consistent and correct.

4. General Requirements.....

See text

Friday, June 18:

Discussion on Annex and how it is to be used for type approval

Proposed language:

B.4.3: contracting parties that have type approval systems shall use the requirements specified in Annex A.

C: need to check on how this is handled in existing GTRs

C: there could be a paragraph at the beginning of the Annex that describes the contents and their use.

Canada: Until the next draft of the GTR is distributed and we see what is left in Part A and what

is moved to Annex.

EC: there is a definition of type approval in the 1958 agreement

ACTION: EC will provide a sample definition of type approval

ACTION: Each CP to provide comments on the proposed language for the use of Annex A

5. Performance Requirements.....

Consideration of the proposal to specify the covered tank types to the current tank types - submitted by Germany (SGS-9-07)

Secretary: this was decided in a previous meeting that we would not specify types (the GTR is to remain silent on this issue).

Germany: wants it noted that they continue to have concerns about the safety of the system if allowed tank type is left open/unspecified.

5.1 Compressed Hydrogen Storage System.....

5.1.1 Verification Tests for Baseline Metrics.....

B.5.1.1.2: Baseline Initial Pressure Cycle Life

The OICA-proposed text needs to be moved: the parts that are specific to type approval should be moved the Annex and the parts of this section that are related to cylinder production batch should remain in this section. Notes were made in the draft.

5.1.2 Verification Tests for Performance Durability.....

Japan would like to see two limits for cycle testing (11,000 generally, but 5,500 cycles for passenger vehicles in normal use). The Japanese regulation already contains the lower requirement.

US: Using the Canada data presented earlier, we propose to reduce the number of cycles to 7,500 (rather than 11,000 as is currently in the GTR)

Canada: will accept 7,500. Suggest that the three co-sponsors make a decision.

US: the co-sponsors have already agreed to 5,500

Canada: think this is not the agreement

Germany: EU regulation has 15,000 cycles for 20 years, and therefore accepts 11,000 for 15 years.

OICA: this is not really true, as the EU regulation allows for reduction based on certain data or calculations. Appropriate wording was submitted that is consistent with the European regulation.

Germany: refilling twice a day is the worst case scenario, but there is no factor of safety.

Japan: prefer 11,000 for the GTR, with the option to reduce it to 5,500 and/or to have a counter.

OICA: only a full fill is critical, so that results in 5.5 million km. There are no vehicles that meet this, so there is a safety factor even for the extreme use case.

Korea: 5,500 is sufficient, but also support the Japanese proposal of 11,000 with the option for the use of 5,500.

US: Wants a single requirement with the option to reduce by each CP (and wants this option to be explicitly included)

EC: 11,000 is fine, but perhaps not enough. We are not thinking outside of the box. For example, if the tank is really small and the vehicle is used in an Expo-like application, it would be easy to get to a lot of refueling. Number can be reduced if there is a counter system.

China: wants one number (do not have an opinion of which number to use)

Germany: have to take existing safety levels that exist in the European regulations. Reducing the number of cycles is acceptable if there is a counter installed.

Co-Chair: it looks like there is agreement on 11,000 with the option to reduce by each CP (if a counter is included)

US: wants 7,500 cycles with no allowance for a reduced number if a counter is included. There is no way to do a compliance test on this counter, and then we need a test procedure.

China: wants 5,500 cycles

Proposal: set it to 11,000 with the allowance that CP can lower it and may require additional measures such as a counter.

Q: is there a lowest allowable number to be stated?

A: not in the GTR

Japan agrees with the proposal

US: no mention of a counter is to be allowed

C: It is not necessary to include a statement that indicates that CP can do whatever they want. Because the GTR process allows this anyway.

Canada: a rationale will be provided for the 11,000 number.

Germany: if the number is lower than 11,000 than the safety is not assured and therefore a counter will be required.

China: not acceptable - GTR is the minimum requirement and therefore they prefer 5,500.

OICA: current text has the justification for 5,500 cycles.

Korea: 5,500 is the minimum, and the CP can require higher.

US: 7,500 is acceptable

Canada: will not accept 5,500 but 7,500 will be ok

C: the 7,500 requirement will exclude Type 3 tanks; can only withstand ~6,000 cycles.

Chairman proposes that this issue be discussed tomorrow morning, when people are fresh

Chairman: GTR must be the most stringent of existing regulations (which is counter to what was discussed earlier about the labeling issue)

Minimum requirement is to be set, but the manufacturers want to know what the maximum number of cycles.

Proposed language: the number of cycles required cannot be greater than 11,000 but it could be set by the CP at a lower number, but not lower than 5,500 cycles for 15 years service life.

Agreement!!! This goes in Part B.

5.1.3 Verification Tests for Expected On-road Performance.....

Germany does not think that the test procedure illustrated in Figure B.5.1.3 is as strict as the EC test procedure.

Co-chair: this issue has been discussed at length in the past. Suggest that we move on after removing the comment.

Changes made to the permeation section to make it acceptable to Japan (consistent with the discussion in Part A)

5.1.4 Verification Tests for Service Terminating Conditions.....

Comment on the fire test: needs to be discussed with the localized fire test.

5.2 Liquefied Hydrogen Storage System.....

Note: a teleconference will be set up to discuss this section (already in the action item list).

5.2.1 Verification for Baseline Metrics
 5.2.2 Verification for Material Compatibility
 5.2.3 Verification for Expected On-Road Performance.....
 5.2.4 Verification Test for Service Terminating Conditions.....

5.3 Vehicle Fuel System.....
 5.3.1 In-Use Requirements.....

Future discussion will need to be focused on the receptacle/fueling interface.

ACTION: EC will propose text for section B.5.3.1.1 on fueling interface

B.5.3.1.5: Discussion of leak and leak detection. Text proposed.

5.3.2 Post-Crash Requirements.....

B.5.3.2.1: Video of hydrogen leak into trunk of small vehicle (NHTSA).

ACTION: NHSTA will provide the report on the vehicle trunk explosion.

5.4 Electrical Safety.....
 5.4.1 In-Use Requirements
 5.4.2 Post-Crash Requirements

6. Test Conditions and Test Procedures.....

6.1 Compliance Tests for Fuel System Integrity.....
 6.1.1 Crash Test for Fuel System Integrity
 6.1.2 Compliance Test for Single Failure Conditions.....

B.6.1.2: Alternative test procedure (not validated)

Q: Will Japan accept the alternative procedure for inclusion?

A: Acceptable, but Japanese procedure should be made the main procedure.

ACTION: OICA will submit a test report to validate the alternative test procedure in B.6.1.2.

6.1.3 Compliance Test for Fuel Cell Vehicle Exhaust System.....

Should it be for all vehicle operating conditions? Japan uses a warmed fuel cell system. OICA members do this test at a range of conditions (cold start is one), so do not need the first test step.

Japan: test results were presented during a SGS-6 meeting (Beijing) but are not posted because it is a confidential report (the web site is open so the document cannot be posted).

Japan: the test was designed to match the in-use condition.

Conclusion: use the Japan procedure as is unless some other procedure (accompanied by test data) is developed or presented for consideration.

6.1.4 Compliance Test for Gas Tightness of Fuel Lines.....

6.2 Test Procedures for Compressed Hydrogen Storage.....

6.2.1 Material Qualifications.....

China would like an additional steel material to be added to the list of compatible steels

C: This material needs to be vetted by the material scientists, just as the others listed have been vetted.

ACTION: China will provide material data for consideration by material scientists for inclusion in the list of compatible materials.

- 6.2.2 Test Procedures for Performance Durability.....
- 6.2.3 Test Procedures for On-Road Performance.....
- 6.2.4 Test Procedures for Service-Terminating Conditions.....

7. Annexes.....

7. Electric Safety

7.1 Update on ELSA activities

7.2 Discussion

8. Miscellaneous Administrative Items

8.1 Approval of Decisions and Action Items of the 9th Meeting

Action Item list was reviewed and updated.

Action items should be provided ASAP, especially the documentation ones.

Comments on the clean draft (which will be distributed by the 3rd week in July) must be provided no later than August 16th

8.2 Next (10th) Meeting

Meeting will be in California (either San Francisco/Sacramento or LA area).

September 7-10th: start in the afternoon of the 7th, finish by noon on the 10th

Group will be notified by the end of June.

8.3 Other Issues

None