SGS 2 - 5

GTR Requirements Working Table

Content of GTR	Japanese Regulation	GTR	Comments	Discussion
Scope	Compressed gas Fuel Cell Vehicle and ICE	Compressed gas, Liquid Hydrogen, fuel cell, and ICE	LH2, other storage systems Auxiliary power unit – excluded from scope - Hydrogen-fueled - Other types of fuel cells	- LH2 available, so should be included - Keep GTR open enough to include other storage systems as they are developed - The APU may need a substantial amount of hydrogen, so it should be covered by GTR - May be a high-temperature fuel cell (SOFC) with internal reforming, so many additional issues

Content of GTR	Japanese Regulation	GTR	Comments	Discussion
Application	Passenger vehicles, trucks, and buses (collision for passenger vehicles only)	Group suggests to proceed w/ development of category 1-1, as defined in SR1, first and continue the development for other vehicles categories later, similar to/based on the Japanese model	2- and 3-wheelers to be covered? - 3-wheelers are much more similar to 4-wheelers - 2-wheelers covered by motorcycle (or similar) regulations in most countries/regions inclusion of light trucks and/or buses will be considered	- In Europe, there are separate regulations and directives for 2- and 3-wheelers - Issues (vehicle safety-related) are different (expertise may not exist in this group) - India does not agree that the issues are different - Storage is probably similar, not sure about the rest of the system - Time scale is so tight for Phase 1, it might need to wait for Phase 2 - **ACTION**: contact IMMA (and other motorcycle associations), determine differences (presentation at next meeting?), take into account the tight GTR timing, then go to AC3 for a decision on whether or not to include 2- and/or 3-wheelers
Definition Section			Want this section added	- Need to make sure we are using the same terminology throughout the GTR, and that it is clear how the terms should be used (especially when in conflict with other standards and regulations such as ISO, EC Directives and SAE)
Each contracting party will maintain its existing national crash tests and use the following agreed set of requirements and limit values for compliance. (Exact regulatory text will be decided later)				

Content of GTR	Japanese Regulation	GTR	Comments	Discussion
Electrical Safety **1. In-use** **2. Post crash**			Action Plan includes effort to harmonize hybrid and electric vehicle electrical safety **Proposal**: Bring idea to have a meeting between experts to coordinate with GRSP to AC3/WP.29 (in Nov) and then to discuss informally (in Dec) with GRSP – coordination with the GRSP activity to organize a small group on Electric Safety Group (to amend R100) - Electrical isolation issues crosscut the various types of vehicles (electric shock) - R100 is being modified (Note: this is under the 1958 agreement – US is not a member) - *If there is consensus,* it could also be part of the GTR (this is the main conflict between 1958 and 1998 agreements) This GTR effort covers fuel cell hybrids, but not ICE hybrids (but what about hydrogen ICE hybrids?)	- Are there sufficient electrical safety experts in this group to effectively (technically) cover this in HFCV-SGS? - May need to include experts from the hybrid and EV GTR efforts - FMVSS 305 specifies electrical safety – has a consistent requirement for all high-voltage vehicles - There are existing documents that cover this subject, and they are well-aligned o ISO TC22/SC21 o SAE 1766 o EC R100 - **KEY**: Should this be separated from the hydrogen GTR? o Electric shock is the same for all these vehicles - Fuel cell vehicle has an additional issue that water is present (refrigerant electric safety)

Content of GTR	Japanese Regulation	GTR	Comments	Discussion
Hydrogen Leakage **1. In-use** **2. Post crash**	Leakage for in-use Sensors Purge gas measurement PRD discharge direction during fire Measurement Procedure for gas leakage after crash	[limits for rates of hydrogen leakage for in-use; measure to detect excess Hydrogen leakage in case of failure and set off appropriate countermeasure; need to set {maximum allowable limits} for leakage in post crash scenario definition of leakage Address the post-crash scenario Address the in-use and post-crash scenario Hydrogen related requirements for post crash scenario] Japan's comment re requirements for H veh – gas veh. Means for Hydrogen detection Concentration? Exhaust system	- Should the GTR have a requirement for component tests for low- and medium-pressure components? Current thinking in Europe: Components with pressure higher than 3Mpa would be subject to test requirements, per EIHP documents – NB: EC will discuss and decide later - Sensor failure and drift - Limit of hydrogen leakage for in-use and crash (for the entire system, regardless of the pressure) - Leakage requirement (amount, time, etc) - Requirement for sensors is a design-specific aspect – what is the performance issue that the sensor is addressing? - Should we have requirements for flexible fuel lines? Per EIHP – yes Japan: does not have; US: experience w/past GTRs – system level GTR first, secondary provisions developed as needed by individual CPs Japan: better to divide based on criteria: higher than 3Mpa and lower-pressure if <3Mpa GM: critical safety components In crash test limiting leakage is important; for normal use, high-pressure component such as see comment (1) container should be covered	- Leakage amount (on an energy-equivalent basis) is generally consistent throughout the various standards - Historical basis for comparative safety with conventional vehicles - In a regulation, we should not write that a sensor is to be used – we should only include what we want to achieve, and not the method of how to achieve - Leakage detection and appropriate reaction is the goal - Need some clear requirements to be able to show compliance (experts need to determine how this can be written down) o Sensor is only one option o Need to determine the criteria for safety (performance reqts) o What to do when the detection system fails

Content of GTR	Japanese Regulation	GTR	Comments	Discussion
Hydrogen Storage	35 MPa Bonfire test Material restriction	"critical requirements when thinking about CGH storage system" -As first step, complete a table, as prepared initially by Canada, identifying which applicable to high pressure; seeking input from Japan, EC, items identified in standard-setting organizations work, and any other items relevant to the SGS work on hydrogen storage system, incl., e.g., container Canada and ISO prepare a table;	- Higher pressure including 70 MPa - Localize fire - Fire protection (use PRD…) - Harmonization? - Material (embrittlement, permeability)? - Type of construction?	- Important differences in the various standards (ISO, SAE, EC) - ISO has a LH2 standard - ISO is expecting to publish the CH2 standard (DIS) soon o Discussion about whether or not it should be a technical specification rather than a DIS (the general consensus (not unanimous) of WG6 is that it should be a TS – not technically ready to go as a DIS) o Will have a full discussion at the next meeting from ISO TC197
Others			Comment/issues to think about: Hydrogen system: Over-pressurization High temp, shut-off in case of a crash (per Mr. Bindl) EC's Co-decision	Functional safety Risk analysis Single-failure assessment (i.e., FMEA) Safety Chain (i.e., detector – control unit – actuator – valve) Electronic control units (EC draft has an annex for this purpose, and it is specific to the hydrogen system) General Comment: - Want to keep the GTR as a performance-based regulation - Requirements for safety objectives, and leave the "how" to the discretion of the manufacturers, and for it to be open enough for technology development

(1) corrosion requirements for low pressure items would probably not be necessary; fuel line safety needs to be considered in the whole system context

(2) US suggests that there be a maximum allowable limit on post-crash leakage

(3) Per GM: differences in approach new vehicle vs. in-use vehicle; risk must be identified and addressed

Hydrogen detection

Re: “Sensors”

Formulate in terms of H detection rather than “sensors”

US supports OICA’s comment/approach

Germany agrees and wants to know Japan’s position – Japan agrees

Concentration should not exceed level (TBD) in the passenger compartment

(Japan, SAE, ISO, others?- will provide

Purge rate measurement

GM: what are we talking about? H purging through exhaust system

Japan regulation – occasional/regular purging of H from the FC

SAE – performance –based

Japan has no sensor requirement for purging only test method to detect the H concentration

GM: in ICE context, different

Need to avoid flames

EC: controlled vs. uncontrolled purging – emission vs. part of “maintenance”

ACTION ITEMS (work to be done in between the 2nd and 3rd meetings of the SGS

Christoph

talk to India and IMMA to clarify their position with regard to the inclusion of motorcycles and three-wheel vehicles in the GTR

pose to WP.29 in March – AC.3 to clarify in more detail the mandate of the Electric Safety group, with a purpose to specify the priority order for GTR and R.100

For the June session of WP.29, with input from co-sponsors will prepare a report on the activities and progress by SGS and SGE

EC

report on activities under IPHE

share information on Commontology document which is being finalized by the EC

US

provide document as promised from the 1st Meeting.

Provide new docket number

Correct the Minutes from the 1st Meeting of SGS in Bonn, per comments received.

ISO

Provide copy of the presentation, which will be posted by co-chair on the SGS website

ISO, EC and Japan will provide their latest container information to update the table. Canada will summarize and provide updated table about 1 month before the next meeting

Canada

continue to work on the table prepared for the 2nd Meeting – specifically by including information on requirements of Japan, EC,and any other CPs and other stakeholders, including ISO and SAE, - the table should be available to all participants at least 1 month in advance of the 3rd meeting - needs input from Japan, EC, and ISO

Japan, EC, ISO and SAE are requested to give a presentation to explain their respected requirements in detail

JAPAN

Japan and SAE will provide information of tests conducted to determine the combustible (flammability) level

OICA

provide a proposal for Measurement procedure for gas leakage post crash

Electric Safety Group

Develop TOR

US to include FMVSS 305, NPRM and when completed inform the group; Japan to make available on the website under the subgroup

US to host the 3rd Meeting of SGS, which is scheduled for May 13 (ELSA) -14-15-16 (to be confirmed with the Chair of the group)