Requestor	Ref. Clause No./ Annex	Text (existing draft Jan. 2010)	Proposed change by the Requestor	Comment (justification for change)
Germany	**B 5.1. Action Item TF1 in document SGS 9.02**	The hydrogen storage system will be qualified to the performance test requirements specified in this Section B.5.1. All new hydrogen storage systems produced for on-road vehicle service must be capable of satisfying requirements of B.5.1. Qualification requirements for on-road service include: B.5.1.1 Verification Tests for Baseline Metrics B.5.1.2 Verification Test for Performance Durability B.5.1.3 Verification Test for Expected On-Road Performance B.5.1.4 Verification Test for Service Terminating Performance	**Insert:** ...this Section B.5.1. All new hydrogen storage systems produced for on-road vehicle service must be capable of satisfying requirements of B.5.1. **"If subsystems or components are changed the function, strength and material compatibility must be proved in dependence of the type of change.** **e.g. change of the TPRD, its position of installation and/or venting lines** Qualification requirements for on-road service include: B.5.1.1 Verification Tests for Baseline Metrics B.5.1.2 Verification Test for Performance Durability B.5.1.3 Verification Test for Expected On-Road Performance B.5.1.4 Verification Test for Service Terminating Performance	From our point of view: if components are changed the relevant performance tests of the system must be repeated for the qualification test and if applicable for the approval because component tests are not part of the GTR. Example: If the Eutecticum or pressure bearing parts of a TPRD are changed the bonfire test is not sufficient for evaluation, because also the strength and durability for in use must be proved . There were several accidents in Europe (e.g. bus fire in Rendsburg) caused by TPRDs that did not stand the in use conditions (high temperature creeping)

Germany	**B 5.1. Action Item TF3 in document SGS 9.02**	new paragraph	**insert in B5.1** The hydrogen storage system will be qualified to the performance test requirements specified in this Section B.5.1. **If the system as defined above cannot be tested as a whole system with all components as shown in figure B5.1.1 the components must be tested individually and adequately.**	Requirements under B5.1.2ff only consider the hydrogen storage system. Not all tests might be practicable with valves and equipment. Thus an alternative must be given, e.g. hydraulic pressure cycling.
JASIC	**B4** **Action Item 3 from Doc. SGS 9.02**		Insert a new paragraph: "**B4.3 The Nominal working pressure(NWP) shall be 70MPa or less. The Maximum working pressure(125%NWP) shall be 87.5MPa or less."**	Europe requires a worldwide standardisation of fuel connections for filling. This is only possible in case of defined pressure levels. Germany therefore supports the proposal of JASIC
Germany	B3. Definitions		**include definitions for** Nominal working pressure(NWP) Maximum working pressure	to be done!

Germany	A5.1.2.8 new ***Action Item 7:*** "Draft text for Part A to address recommendation for monitoring residual life of cylinders"		Add the following paragraph behind A 5.1.2.7 (Position in the draft could have to be discussed) "A 5.1.2.8 Verification Tests for pressure vessel durability estimation The Performance Durability Test in B5.1.2 provides a reasonable proof that the service life of the pressure vessels is within expectation. However the time lapse characteristics of the test generate unavoidable uncertainties. Therefore the manufacturer is advised to verify that vessels taken from service after several years show that the degradation is not higher than expected. The manufacturer should carry out these verification tests after each five years of service, respectively."	The estimative character of the durability testing of the vessels should not be neglected due to safety concerns. The equivalence of the severity of the test procedure compared to real service life must be assessed by the manufacturer. Therefore after half of the service life pressure vessels to be taken out of service still would have to be able to endure a durability test (B5.1.2) with a test duration equivalent to 50% of the initial test. Five years should be a reasonable period to verify that residual life is still within the limits of the initial prediction of service durability.

Germany	***Action Item 10:*** "Rationale for or against limiting the GTR to current tank types"		Tank types should be limited to tank types that are used currently or in the near future: Vessels with load bearing structure made of metal or fibre composite with load-bearing, with polymeric (non-load-bearing) or without liner. Other tank types can not be covered by current testing programme	Justification • Future technologies are explicitly excluded from this phase of the action plan They are scheduled for Phase 2 of the project (For reference, see A2.3 a) and b)) and do not have to be assessed here. • Not all possible aspects of future technologies can be reasonably covered by a current state-of-the-art test programme. Example 1: Chemical stability of the system would not be covered for a high-pressure hydrogen storage system with chemical storage compounds Example 2: Free-form vessels could become an integral part of the vehicle structure. Crash protection would not be assured (e.g. no rear crash procedure in Europe). • GTR has to be adopted in many several countries. Safety concerns could be minimized by employing restrictions that are on a very low level, allowing for the very most of possible designs. • It should be noted that in the (unlikely) case of a real break-through technology advance, GTR could be amended to cover this new technology.

Germany	***Action Item 13:*** "Data to support higher number of cycles for Performance Durability testing"		given by Japan	Germany supports Japanese proposal
	Action item 13. Parties are asked to provide data to support higher number of cycles for Performance Durability tank testing (the taxi issue)		Number of filling cycles If the vehicle manufacturer cannot guarantee that the maximum filling cycles acc. B 5.1.2 and B 5.1.3 and will not be exceeded during use (professional use e.g. taxis), the manufacturer shall specify the number of filling cycles for hydrogen system and install a monitoring and control system which prevents further refilling of the vehicle when the maximum filling cycles are reached. The safety concept of the usage monitoring and control system shall be approved concerning functionality and prevention of manipulation.	Since the driving range, the density of refuelling stations and others influences the refuelling behaviour of the users; it will be not possible, to design a storage system to the maximum filling cycles of hydrogen vehicles reliable. Therefore and for avoiding and too conservative design it is proposed, to design for a more limited number of refuelling and to take care for avoiding a higher number of refuelling.

Germany	***Action Item 18:*** *"To provide rationale for the ECE R110 two-tank requirement for bonfire test (one at reduced pressure) and relevance given current TPRD"*		•	• Testing at two pressure levels seems to be dispensable with current technology (e.g. glass bulb designs). Yet using current technology is design-restrictive and cannot be assured. Thus fusible plugs which are no longer state-of-the-art could be used. These exhibit the risk of malfunction at lower internal pressure levels.
			•	•
	Action Item 23 Overpressurisation in low pressure system	B 5.3.1	add new paragraph in B5.3.1 before B5.3.1.3 "The hydrogen system downstream of a pressure regulator shall be protected against overpressure due to the possible failure of the pressure regulator. If an overpressure protection device is used, the set pressure of such a device shall be lower than or equal to the MAWP for the appropriate section of the hydrogen system."	79/2009EC, annex IV, part 1, 1.8

	A3.5.4		Change “such that the power is between 300 and 600 VDC” into “such that the **voltage** is between 300 and 600 VDC”	Electrical power has the unit Watt
	A5.1.1.5 d		“methanol in gasoline” “methanol **and** gasoline”	it is unclear what that might be used for
	A5.1.1.5 e		Delete Subparagraph iv, v, vi and vii maximum range of vehicles (potential lifetime of the drivetrain) should be known by the manufacturer; Estimated range per full will is known by the manufacturer and could be less than the minimal range in the draft.	Rationale is taken from field data with considerably different technology. It has not been shown that hydrogen vehicles show a comparable filling range, total range or service life compared to common ICE engines now or in the near future, so there is no justification to make estimations from one to the other technological field. That would be the same as to estimate user data of passenger vehicles from cargo trucks.
	A5.1.1.5 h - i.		“and 1000 **hours of** static full pressure exposure”	editorial
	B5.1		Allowed designs for tanks should be restricted in accordance with the rationale provided above	
	B5.1.2		Verification test for performance durability: This test should be done on two samples	One test result does not provide enough evidence that the storage system is suitable.
	B5.1.3.5		Residual Burst pressure test	Burst pressure test shows critical degradation only for some types of pressure vessels. For containers with metal–liner most effects can not be shown.

	B5.1.2.6		Substitute +50℃ by +85℃	The used temperature of +50℃ is much lower than the experienced temperature peaks during filling. Therefore a temperature of at least 85℃ should be used. See former draft of ECE regulation and current EC regulation for Hydrogen
	B5.1.3		The total number of cycling during pre-conditioning should be representative and the same for both tests (5.1.2 and 5.1.3).	Such tests should simulate as pre-conditioning the performance of real use, while the residual strength should be tested to failure as second step. The 500 cycles of gas cycling does not correspond with 5.500 cycles of hydraulic cycling. There is no procedure described which allows to compare degradation by hydraulic cycles with degradation by gas cycles.
	B5.1.2.8 and B5.1.3.5		If no differentiation between different cylinder types will be implemented: a) each test has to be performed with deducting the residual burst pressure and on a parallel set on specimen the number of residual load cycles. or b) exclude containers others than those with CFRP and without load sharing metal liners from this GTR.	The residual burst test may be a reliable method for the quantification of degradation of composite fibres. As soon as the strength is influenced by matrix creeping or other influences on internal stresses the burst pressure is not appropriate as indicator. In theses cases it shows a significant reduction not before the degradation becomes critical.