

9th Meeting of the Informal Working Group on Hydrogen and Fuel Cell Vehicles

Global Technical Regulation No. 13 (Phase 2)

2021 March 23, 25, 26 – Online

	Agenda Items	Presenters	Documents
1	Opening Remarks The Chair and Vice Chair welcomed the participants and thanked the meeting organizers	M. Koubek Y. Sakamoto	--
2	Agenda approved	M. Koubek	GTR13-9-02
3	Approval of the meeting minutes of the 8th meeting	Secretary	GTR13-8-16
	a. Meeting minutes from 8 th IWG approved (GTR13-8-16). b. The Secretary reviewed the status of the current discussion. A final technical draft approved by GRSP in May 2022 is expected, and the Chair reminded the IWG that active participation and contribution is essential for this work. Chair informed IWG that the report given to the November (182 nd) Session of WP.29 can be found on page 29, Chapter XXI, Section M. https://unece.org/fileadmin/DAM/trans/doc/2020/wp29/ECE-TRANS-WP29-1155e.pdf , but no formal report was given to the 183 rd Session in March 2021, since the IWG had not met.		
4	Review of Issues List Taskforce #1 (Heavy Duty Vehicles) Update	Secretary K. Hwang (KATRI)	GTR13-9-03 GTR13-9-08
	a. Secretary presented status of various topics (detailed below) b. TF1 update – While there has been no TF1 meeting, Korea summarized current issues. c. Sled Test (TF1) <ol style="list-style-type: none"> i. Currently, EU, JP, KR and CHN supported inclusion of the sled test into the GTR regulatory section (Part II), while the US will wait for the proposal from the EC. ii. The EC noted that this work is ongoing and requested to include the sled test as the separate agenda item for the next meeting. The EC will provide the proposal in April to TF1 for further discussion. iii. The EC showed the report (over 200 pages) submitted by TRL. It covers appropriateness of all EU regulations using sled test, including R134, R67 and R110. The report may be released once confirmed by the EC and to be shared from GTR13 website. The EC will propose the increase of the acceleration for M2/N2 to be the same as M1/N1 and for M3/N3 to 8g for both directions. d. Permeation criteria (TF1) <ol style="list-style-type: none"> i. Consensus has been obtained among the co-sponsors. The opinions from DE and UK are still to be confirmed. e. TPRD direction (TF1) <ol style="list-style-type: none"> i. OICA proposed to reinsert language from original GTR13 draft to exclude TPRD venting direction towards the front of the vehicle, as this is the safety zone for first responders. The US appreciated to bringing back this language. ii. OICA also proposed to avoid venting to emergency exits as a requirement for category 1-2 vehicles. iii. Korea questioned if emergency exits include regular doors and JAMA responded that the key is to restrict to category 1-2 vehicles (i.e., buses). iv. The Chair requested the TF1 to refine the text on this and requested a TF1 meeting to be held. KR committed to schedule a meeting this spring (3rd week of April). v. CHN requested to have explanatory figures as an example. The US also supported to have such clarifications. vi. The US commented that in case of emergency, the occupants tend to escape from its normal doors if available. The US prefers "toward any exit(s)" and not specifically call out emergency exits. 		

	<ul style="list-style-type: none"> vii. OICA showed a picture of a city bus with emergency exits identified for several windows. f. Extension of container life (TF1) <ul style="list-style-type: none"> ii. OICA introduced the proposal for extending the service life for 25 years by increasing the number of cycles based on the market data available. iii. The Chair asked if the extension of the cycle lifetime also applied to conformable containers. OICA confirmed and noted the GTR does not differentiate between the type of containers. iv. The US wondered how the service life is connected to the number of cycles, as service life is found first and the relevant mileage (and number of cycles) are calculated. v. It was noted that the entry for 25 years for HDV has a clerical error (4,200,000 divided by 320 does not make 10,400). vi. Hexagon questioned if resins are sufficiently screened to ensure 25 years. [Note: The glass transition temperature test and resin shear strength test are not in GTR13, but EU406] vii. BAM noted that there could be a wide distribution of fill cycles in actual use, but Nikola pointed out that the current number of cycles (5,500) for 15 years is very conservative, based on a 3x factor of six sigma. viii. Another issue is that while most vehicles won't survive for 25 years, containers in taxi's and commercial vehicles can be reused, so 25 years is realistic. ix. Hexagon commented that the test procedure for CHSS closures (e.g., valves) assume 15 years of service life and should be reviewed and the group agreed. x. This topic should be further discussed at TF1. OICA is requested to update the proposal. 		
5	Taskforce #2: Receptacle	Secretary	--
	<p>Secretary reviewed current CP positions:</p> <ul style="list-style-type: none"> a. CAN confirmed to use ISO17268:2020 and include in Part 1. b. The US reserved to use ISO17268:2020. c. KR has the same opinion as EU, JP (ISO 17268:2020 is referred to in Part 2) d. The Chair asked if all CPs could agree to refer to future revisions of ISO Part 1. This was agreed by all CPs. 		
6	Taskforce #3: Test Procedures	L. Gambone (Nikola)	GTR13-9-12
	<p>TF3 leader presented a progress report on open items:</p> <ul style="list-style-type: none"> a. The outcomes of the TF3 are being integrated into the document of TF0. b. The Chair invited participants to carefully review the TF0 document and provide feedback, if any. c. The US asked if the number of cycles and service life is to be included in the presentation of TF3. TF leader indicated it will be when finalized in TF1. Also noted that removal of container attachment without causing damage is subjective which should be avoided to the extent possible. <p>Change of design table</p> <ul style="list-style-type: none"> d. The US also asked other CPs if the inclusion of change of design table is needed in the GTR. Secretary recalled the position table developed so far among the co-sponsor's meeting. e. The EC commented that it would include the change of design table in Part 1, since the concept does not apply to all CP. f. OICA pointed out that the EU regulation containing the change of design table will be repealed with mandatory implementation of UNR134. Therefore, OICA wished to include this table into R134 as soon as possible. g. KR considers that change of design table can be included in Part 2 h. JP noted that change of design table concept exists in Japanese regulation and support inclusion into Part 2. i. CHN and the US see no need for inclusion of design table in the GTR. j. CAN agreed to include the change of design table into Part 1 but considers it difficult to include in Part 2 for self-certification countries. However, CAN believes that even under the self-certification process, the COD table is valuable for manufacturers to allow them to reference as an industry standard. k. DE commented that a change of design table is used in their territory but questioned the necessity in the GTR. 		

	<p>Conformable tanks</p> <ol style="list-style-type: none"> l. OICA asked if CPs are eager to include conformable tank in the Phase 2 in current schedule. The Chair noted that he is amazed with the progress in matters related conformable tank so far, which has been shared at GRSP meetings. He mentioned that he highlighted this positive development during his report to the March WP.29. m. OICA commented that change of design table and conformable tank are the important interests of the industry and the 18 months extension of the mandate will allow inclusion of conformable tank issues. n. The EC considers the material compatibility and conformable tanks the priority issues for Phase 2, as these are important to promote de-carbonization of automobiles. Harmonization of materials requirement will contribute to minimizing trade barriers. o. All CP agree that conformable tanks should be included in Phase 2 outcome. 		
7	Taskforce #4: Fire Test	G. Scheffler (SAE)	GTR13-9-10
	<ol style="list-style-type: none"> a. TF4 leader (G. Scheffler, US) reported their progress with GTR13-9-10. The changes developed by TF4 have been incorporated into TF0 documents. TF4 invited participation into round-robin testing that will be discussed at the next TF4 meeting in April 13. b. CHN showed its interest in participating the round robin tests. c. KR presented GTR13-9-09 proposing to add heat flux measurement to improve repeatability and reproducibility. d. TF4 leader commented that the heat flux had been discussed during earlier TF4 discussions and the measurement of heat flux can be included for round robin test for gathering more data. TF4 leader stated that the heat available for heat transfer round the cylinder has been set according to JARI vehicle fire test, which is the condition that is being replicated. However, measurement of heat flux can be investigated in the fire test of an actual CHSS during the round robin test. 		
8	Initial Burst Pressure for Carbon Fibre Containers	Secretary	--
	<ol style="list-style-type: none"> a. Secretary showed the status of the CP's view on this issue where only CHN does not agree to use 200% NWP for 35 MPa system. Secretary recalled that the same discussion has been repeated and a possible compromise is to make this a CP option for the moment. b. CHN confirmed that has not changed its position. c. CP agreed to make 225% NWP initial burst pressure for 35 MPa carbon fibre containers a CP option. 		
9	Material Compatibility	C. San Marchi (Sandia NL)	GTR13-9-13
	<ol style="list-style-type: none"> a. Secretary noted the current positions of CPs where the positions are divided: (a) EC, JPN to include in Part 2, (b) CHN: No need, (c) US, CAN, KOR: Reserve. b. Sandia National Lab (C. San Marchi) presented the activities among experts on material compatibility. c. Sandia noted the change in the fatigue life test, where the test temperature is raised 233K to 293K to allow the test to be more practical. SAE also noted that it is impossible to make a "proven" materials list using Table B2 because the material specification standards are missing, which are important as it specifies not only the composition but the nature of the material. However, in the next revision of SAE J2579, it is possible to add a catalog of test results from materials that have already been tested. d. The EC requested the input for the list of laboratories that can conduct the test. SNL confirmed that the list shown is a partial list of labs with this type of capability. e. JRC appreciated that the test procedure is going to be simplified. JRC also questioned about the progress of ISO in this area. ISO 19881 convener (L. Gambone) stated that materials tests are not included the document (for containers). f. OICA commented that the material compatibility requirement to be transposed into UNR will be quite important for manufacturers, and a list of proven materials will help the practice of the type approval process. The same applies to the countries not the parties to 1958 Agreement but applying type approval. g. SAE (G. Scheffler) noted that the SAE J2579 Table B.2 shown in the presentation is a result of 5-10 years of discussion and the materials have been used in the hydrogen industry for many years. However, given the test methods, if a table/catalog of materials that have been evaluated through these methods are provided, it will be of great help for manufacturers. h. The US maintains a reservation on this issue as this is beyond the minimum standards and questions how it will fit for the 1998 Agreement CPs. i. CHN stated that their institute has finished their material testing and will send results to SNL. 		

	<p>j. EC stated that not having the material requirement in GTR is a risk that would create a trade barrier and there are CPs only to the 98 Agreements.</p> <p>k. CAN thinks it is not necessary for self-certification but admitted the need to include in GTR for type approval in Part 1 or referenced as an annex.</p> <p>l. KR commented their position is reserve, or Part 2 or CP option.</p> <p>m. DE will adhere to the position of the EC.</p> <p>n. Secretary will set a meeting for CPs to get consensus on how it should be incorporated in GTR13.</p>			
10	Humid Gas Stress Corrosion Cracking (HG-SCC)	H. Tamura (JARI) M. Schwarz (MPA Stuttgart)	GTR13-9-09 GTR13-9-11	
	<p>a. JP introduced the progress of this test procedure (GTR13-9-09). JP will prepare the proposal and rationale for the next meeting.</p> <p>b. TesTneT Engineering (C. Webster) questioned why JP considers this test is necessary. JP referred to previous report where alloys like AL6351 cylinders caused problems in humid environment and therefore it is necessary to prevent similar materials from being used in the future.</p> <p>c. Hexagon (J. Eihusen) asked if the cylinder level tests are met, then the material tests are really necessary or not.</p> <p>d. MPA Stuttgart (M. Schwarz) presented GTR13-9-11 to assess the practicability of the test procedure proposed by JPN.</p> <p>e. The Chair invited participants to study two presentations for the next meeting, as this topic will be discussed under material compatibility.</p>			
11	Taskforce #0: Drafting Team	I. MacIntire (NHTSA)	GTR13-9-14 GTR13-9-15 GTR13-9-16 GTR13-9-17	
	<p>a. TF0 leader updated the progress of the drafting GTR documents by TF0 with GTR13-9-14.</p> <p>b. TF0 invite participants to review Phase 2 draft (GTR13-9-15, 16) and submit comments by April 14 with the GTR13-9-17 form document.</p>			
12	Other Issues	J. In (KATRI)	GTR13-9-05	
	<p>a. KR presented proposal for procedure on hydrogen bus roll-over test, which is the same as that of UNR66.</p>			
13	Summary of the meeting	Secretary	GTR13-9-03	
	<p>a. The secretary briefed the summary of the meeting and action items toward the next meeting.</p> <p>b. Next IWG meeting: End of June – Beginning of July</p>			
14	APPENDIX: Attendees List			
	<p>AIST Japan BAM Germany Beijing Nowogen Co., Ltd Bosch GmbH Canada/Transport Canada CEA France China/CATARC Emcara Gas Development European Commission GWS Solutions of Tolland Hexagon Composites Hexagon Purus GmbH Iijin Composites Japan/JARI</p>	<p>Japan/JASIC Japan/KHK Japan/METI Japan/MLIT Kiwa Netherlands Korea/KATRI Korea/Gas Safety Corporation Korea/KRISS KPIT Technologies Linamar MAXIMATOR GmbH MPA Stuttgart Nikola Motors NPROXX</p>	<p>OICA/Audi OICA/BMW OICA/ Daimler AG OICA/Ford OICA/GM OICA/ Honda R&D OICA/Hyundai Motor OICA/Mercedes Benz AG OICA/Renault OICA/Stellantis OICA/Toyota OICA/Volvo Powertech Labs Quantum Fuel Systems</p>	<p>Refire RISE Sweden Sandia National Laboratories Shell TesTneT Tokyo University Tongji University Ulster University USA/Dept of Energy USA/NHTSA VDA Westport Fuel Systems Worthington Industries Xiangyang Daan Automobile Test Center Zhejiang University</p>