

[DRAFT Meeting Notes]

5th Meeting of the Informal Working Group on Hydrogen and Fuel Cell Vehicles

Global Technical Regulation No. 13 (Phase 2)

5-7 March, 2019 – Surrey, BC Canada

	Agenda Items	Presenters	Documents
0	Welcome and practical arrangements	N. Nguyen, P. Horacek	--
1	Approval of the agenda <ul style="list-style-type: none"> Agenda approved Reminding presentations and documents to be submitted to Secretary at least 10 working days before the meeting so IWG members can review; 	N. Nguyen	GTR13-5-01
2	Approval of the meeting minutes of the 4th meeting <ul style="list-style-type: none"> Meeting minutes approved without modifications 	N. Nguyen	GTR13-4-25
3	Schedule of the project <ul style="list-style-type: none"> Mandate to submit informal draft to GRSP by Dec 2020, formal document to WP.29 for a vote during November 2021 session. 	Y. Fujimoto	GTR13-5-08
4	Update on ongoing and planned research and rulemaking activities	Contracting Parties	--
	<ul style="list-style-type: none"> a. <u>Canada</u> (Hendershot) – Testing planned for 2 Toyota Mirai this year, dates TBD. b. <u>China</u> (He) – No new updates. c. <u>EC</u> (Acosta) – Currently developing GSR, as EC79 will be repealed, will refer to UNR134. EU will add material provisions on national level. d. <u>France</u> (Villalonga) – French efforts to promote hydrogen part of larger renewable energy goal. Minister proposes to set 10% share of hydrogen to be renewable by 2023. e. <u>Japan</u> (Ito) – No presentation. f. <u>Korea</u> (Kwon) – Korea developing safety standards for HDV. Progress to be informed at future IWG meetings. g. <u>USA</u> (Kuppa) – NHTSA performed tests per GTR13 at Powertech, CSA. Based on results, made recommendations to TF3. Also working with NREL to develop performance standards for CNG heavy duty vehicles. 		GTR13-5-17 GTR13-5-03
5	ISO TC197 Update	A. Tchouvelev	GTR13-5-09
	a. Plenary held in December (Vancouver). Most items have been published or in FDIS status.		
6	SAE Update	G. Scheffler (SAE)	--
	a. Supporting TF1 (leak, permeation) and TF4 (fire test).		
7	CSA Update	M. Veenstra	GTR13-5-16
	<ul style="list-style-type: none"> a. CHMC2 (Material Compatibility Test Methods – Polymers): Ballot in April, plan to be released in July. b. NGV2 (CNG Vehicle Fuel Containers): 2019 version to include localized fire test and test methods for conformable tanks. 		

Draft Notes - GTR13 Informal Working Group Meeting (March, 2019)

8	Taskforce #1 (Heavy Duty Vehicle) Update	S. Kwon (KATRI)	GTR13-5-15
	<p>a. Update of current discussion status. TF to continue to meet monthly and have in-person meeting before IWG.</p> <p>b. The TF agreed:</p> <ol style="list-style-type: none"> 1. Scope: <3,500 kg = LDV; 3500kg<GVM<4536kg = CP decides; >4536kg = HD. 2. Each CP maintains its existing national crash tests. 3. Rollover/side impact test: TF agreed these tests will be excluded from this GTR. 4. Sled test: Main purpose is to evaluate the fuel tank restraint system. Hydrogen leakage check after sled test is not practical for sled test. Need further discussion on the test procedures. 5. Side impact test: Korea will introduce regulation after 2020; no proposals for Phase 2. 6. Geometric installation requirements: No additional benefit for crash safety and can be design restrictive. 7. TPRD direction: Current requirements are agreeable but minor modification may be necessary. 8. Permeation test requirements: Current criteria can be applied for HDV. SAE will draft a rationale/justification. 9. Test cycles: Under discussions. 10. Hydrogen leakage: Under discussions on in-use requirements. 		
9	Taskforce #2 (Receptacle)	L. Gambone (Nikola)	GTR13-5-19
	<p>a. Presented proposed language that refers to ISO 17268:2018 drawings.</p> <p>b. TF was recommended to add language about the safety aspect in the rationale section (i.e., why geometry was chosen as most critical element to avoid over pressuring)</p>		
10	Taskforce #4 (Fire Test) Update	G. Scheffler (SAE)	GTR13-5-10
	<p>a. Reviewed JARI's proposal for improving fire test reproducibility by defining fire profile (height of flame relative to the diameter of the tank). These would be confirmed by measuring temperatures at the top of the tank and at end boss (middle of tank). JARI to conduct round-robin test mid-2019 through Q1 2020.</p> <p>b. TF to discuss mitigating the effects of wind if test is conducted outdoors.</p>		
11	Localized and engulfing fire	V. Molkov (Ulster)	GTR13-5-20
	<p>a. Presented results of modeling of fire test with blanket burner and pipe burner.</p>		
12	Taskforce #3 (Test procedures)	L. Gambone (Nikola)	GTR13-5-23
	<p>a. Presented progress of TF in working through comments.</p> <p>b. Air Liquide/Shell made presentation at TF meeting regarding results of modeling that show temperature excursions above 85°C if there is refueling error. As this problem is not well-understood by the TF, Air Liquide to organize a workshop to provide more information.</p> <p>c. TF leader asked to highlight important changes in tracking document.</p> <p>d. The TF will continue to discuss remainder of the table of comments.</p> <p>e. In person meeting will be held the same week of the next IWG meeting.</p>		
13	Material Compatibility (including Humid Gas Stress Corrosion Cracking for Aluminum)	C. San Marchi (Sandia Nat. Lab)	GTR13-5-25
	<p>a. Material compatibility for metals: No substantial changes on proposal since last June. Document is nearly finished, and rationale will be distributed soon. Technical issue remaining: elongation requirement during SSRT.</p> <p>b. HG-SCC: Material experts continue to develop test methodology. Sandia National Labs and MPA Stuttgart will also conduct validation tests. Japan commented this topic should be continue discussed in this IWG.</p>		
14	Material Compatibility (Contracting Party Feedback)		
	<p>a. IWG Chair: Material compatibility information to be included as an appendix to GTR13 so CP can choose whether or not they would adopt (per '98 Agreement)</p> <p>b. US/NHTSA: Don't know how/if it will be included in FMVSS.</p> <p>c. Canada: No material requirements will be included in regulation.</p> <p>d. China: Accept proposed test methods.</p> <p>e. Korea: Accept proposed test methods.</p> <p>f. Japan: Important to continue discussion on HG-SCC testing/data.</p>		

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15	Initial Burst Pressure Requirement	S. Villalonga (CEA)	GTR13-5-22
	<ul style="list-style-type: none"> a. Analysis shows that reducing burst ratio for 2.25 to 2.0 NWP means HYCOMP safety factor is reduced from 1.8 to 1.6 (which is margin of intrinsic safety factor) b. Can consider ISO 19881 where the specification of Tg (glass transition temp) has been added. c. Industry experts pointed out that GTR13 has both initial burst pressure and end of life requirement (residual burst pressure must be within 80% of initial burst) d. Industry also pointed out that 2.0 NWP is a minimum design requirement. Manufacturers must add safety margins that consider their production processes. So in reality, the initial burst pressure should be greater than 2.0 NWP. e. CN: 200NWP is acceptable for Type 3 or Type 4 tanks for 70MPa only. Not for 35 MPa due to the absolute differences in pressure between initial and 200% NWP. f. US, EU, JPN: OK with 200%NWP for 35MPa and 70MPa g. KOR/CAN: Need time to review 		
16	Taskforce #5 (ISO TC197) Update	A. Tchouvelev	GTR13-5-11
	<ul style="list-style-type: none"> a. Presented proposed text and diagram to GTR13 preamble that includes critical interoperability considerations. Includes safety considerations, fueling protocol, vehicle to station communication. b. Members are asked to review the documents and provide feedback. 		
17	Stress Rupture	G. Scheffler (SAE)	--
	<ul style="list-style-type: none"> a. Presented follow-up to proposed change to high temperature static pressure test (increase to 1.5NWP for 105 hrs) b. Purpose of test is to provide ability to verify a new fiber, new wrap and see if stress ratios have been violated. c. Work continues on creating models to perform the FEA for both Type 3 and Type 4 cylinders. d. Plan to complete model in about 6 months. 		
18	Action Items	A. Ryan	
	<ul style="list-style-type: none"> • See last page. 		
19	Review of Schedule	Y. Fujimoto	GTR13-5-08
	<ul style="list-style-type: none"> • Review of schedule based on discussions in the past 3 days 		
20	Next IWG meetings		
	<ul style="list-style-type: none"> 2019 June 18-20: China (CATARC/Tianjin) 2019 Nov 5-7: EU (Amsterdam or Brussels) 		
21	APPENDIX: Attendees List		
	Air Liquide	ILJIN Composites	Nikola Motors
	CATARC	ITM Power	OICA/Audi
	CEA	ISO TC197	OICA/BMW
	DOE (US)	JASIC	OICA/Ford
	Bosch	JARI Japan	OICA/GM
	European Commission	KATRI	OICA/ Honda R&D
	Hexagon Purus	KHK/Japan	OICA/Hyundai Europe
	Hexagon Lincoln	Kiwa Nederland	OICA/Hyundai R&D Korea
	Hexagon Composites	METI/ Japan	OICA/Toyota
			Powertech Labs
			Quantum
			SAE
			Transport Canada
			Tongji University
			Ulster University
			US/NHTSA
			Westport Power

Action Items 5th IWG Meeting

	Topic	Discussion at 5 th IWG Meeting	Action item	Responsible Person	Due Date
1	Vehicle Class (TF#1)	<ul style="list-style-type: none"> • TF leader provided update of project on 9 topics • Monthly web meetings will continue. Another in-person meeting to be scheduled before June IWG meeting • Review proposed scope revisions • CC: Co-sponsors 	<ul style="list-style-type: none"> • TF leader to provide update at next IWG • Continue to meet via Webex and in-person • Update project schedule with status/complete dates 	TF1 leader	Next IWG (JUN)
2	Receptacle (TF#2)	<ul style="list-style-type: none"> • TF leader provided current language 	<ul style="list-style-type: none"> • Final draft review to be approved by TF2 	TF2 leader	Next IWG (JUN)
3	Recommendations for test procedures (TF#3)	<ul style="list-style-type: none"> • TF leader reviewed progress of submitted comments. Majority are dispensed. • Discussion of refueling overtemp issue 	<ul style="list-style-type: none"> • Highlight significant changes to tracking document • EIGA to host workshop to discuss problem 	TF3 leader Air Liquide to inform	Next IWG (JUN) TBD
4	Fire test reproducibility (TF#4)	<ul style="list-style-type: none"> • TF leader provided update from last meeting at Feb SAE • JARI presentation on current thinking and test plan schedule 	<ul style="list-style-type: none"> • TF to continue discussion with JARI test data • Next steps: Meeting at next SAE mtg Jun 4-6 (Torrance, CA) 	TF4 leader	Next IWG (JUN)
5	Recommendations from ISO TC 197 (TF#5)	<ul style="list-style-type: none"> • TF5 leader provided updated draft text to rationale 	<ul style="list-style-type: none"> • IWG to review and provide feedback to TF leader • TF leader to update as necessary 	IWG TF5 leader	Next IWG (JUN)
6	Initial burst pressure (2.25 → 2.0 NWP) for carbon fiber	<ul style="list-style-type: none"> • CEA presented results of HYCOMP project • US: Regulations should be minimum safety standard, expect mfr to exceed them • EC, JPN agree to 200% NWP • China: 200% NWP is OK for 70MPa but not 35 MPa • KOR/CAN: Need time to review 	<ul style="list-style-type: none"> • Formalize positions at next IWG 	Korea, US, Canada	Next IWG (JUN)

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7	Material compatibility	<ul style="list-style-type: none"> • Proposal nearly final • CN, KOR participating in round-robin testing • CN, KOR do not have issues with proposed test methods 	<ul style="list-style-type: none"> • Complete proposal and rationale text to be presented at next IWG 	C. San Marchi / SAE	Next IWG (JUN)
8	HG-SCC (Aluminum)	<ul style="list-style-type: none"> • JARI provided update on plan to test in humid H2 conditions 	<ul style="list-style-type: none"> • Provide updates on verification of test method and data • JPN believes HG-SCC is important phenomenon and should continue to be discussed 	JARI	Next IWG (JUN)
9	Long-term stress rupture	<ul style="list-style-type: none"> • Update on the analysis needed for verification on Type 3 vessels 	<ul style="list-style-type: none"> • Next steps: analysis and tests 	SAE	Next IWG (JUN)
10	Material compatibility (polymers)	<ul style="list-style-type: none"> • Update regarding progress of CHMC2 • Balloting planned for Apr 	<ul style="list-style-type: none"> • None 	N/A	N/A
11	Static roll-over test	<ul style="list-style-type: none"> • TF1 proposed to exclude 	<ul style="list-style-type: none"> • See TF1 → 	→	→
12	Post-crash safety	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A 	TBD	TBD
13	High voltage safety	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A 	TBD	TBD
14	Liquid hydrogen	<ul style="list-style-type: none"> • Not discussed 	<ul style="list-style-type: none"> • N/A 	N/A	N/A
15	Editorial improvement	<ul style="list-style-type: none"> • Not discussed 	<ul style="list-style-type: none"> • N/A 	N/A	N/A
16	International standards and regulations	<ul style="list-style-type: none"> • Not discussed 	<ul style="list-style-type: none"> • All members to review and update 	All CP	As necessary
17	Research Items	<ul style="list-style-type: none"> • Not discussed 	<ul style="list-style-type: none"> • N/A 	N/A	N/A