ISO/TC 197
Hydrogen technologies

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Background: Here is the compilation and treatment of the comments receivd with the CD Ballot from 2016. The CD Ballot results were sent out as N 793.

Committee URL: http://isotc.iso.org/livelink/livelink/open/tc197

Line number	MB/ NC[1]	Clause/ Subclause	Paragraph/ Figure/Table	Type of comment[2]	Comments	Proposed change	Observations of the secretariat
1	CA1	3.0		ge	Spelling error	Change “Contaminate” to “Contaminant”	Agree
2	CA2	3.2		ge	Spelling error	Change “Operatio3.Xnal” to “Operational”	Agree
3	JP1 (KK)	4		ED	Chemical formulas are neither symbols nor abbreviations. Chemical formulas are well-known.	Delete chemical formulas from the Table.	Agree for chemical formulas, but not for abbreviations such as total sulfur (TS)
91	CA	4		ge	NH3 and CH4 should be added to the table as the body of the document calls out NH3 and CH4		Disagree, See Comment 3
94	CA	4		ge	NH3 and CH4 should be added to the table as the body of the document calls out NH3 and CH4		Disagree, See Comment 3
4	JP2 (KK)	6		ED	To put languages directly under the chapter (or clause) is prohibited by ISO documentation rules, if that chapter (or clause) accompanies the clauses (sub-clauses).	Put the title “6.1 General” under “6 Quality control approaches. Check similar mistakes in this document and correct them.	Agree to follow ISO procedures XXX
5	US	6		Ed	Amend	There are two primary methods of quality control at a HRS: Spot Sampling and Continuous Monitoring, e.g. by sensors or process controls. These methods can be used individual or together to ensure hydrogen quality levels.	Agree XXX
6	FR 1	6.	Paragraph 1	te	“There are two primary methods of quality control at a HRS: Sampling and Monitoring” the term primary is not appropriate here. There is other signification in metrology	There are two methods to control the quality of H2 at a HRS: by sampling or by monitoring.	Agree with modification Will replace “primary” with “common” XXX
7	US	6.1	‘pp 1	Ed	Amend	Spot sampling at a HRS involves capturing a measured amount for chemical analysis. Sampling is used to perform an accurate and comprehensive analysis of impurities which is done externally. Since the sampling process involves	Agree for spot. Will follow ISO procedures for references XXX

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						drawing a sample of gas, it is typically done on a periodic basis and requires specialized sampling equipment and personnel to operate it. Sampling procedures shall follow the requirements in ISO ~~TC/197~~ 19880-1.	
8	US	6.1	‘pp new	Ed	Add	The advantage of spot sampling is that a more detailed laboratory analysis can be conducted on the sample.	Agree XXX
9	US	6.1	‘pp new	Ed	Add	The disadvantage of spot sampling is that it is not continuous and results in a detail analysis of a single point in time.	Agree XXX
10	US	6.2	‘pp new	Ed	Add	Continuous monitoring compliments spot sampling by offsetting the disadvantages.	Agree XXX
11	GE1	6.2	Para 1	te	Gas detection will measure the hydrogen leak, therefore installing a gas detection does not fit into the chapter “monitoring of hydrogen gas stream”	Please change Gas detection equipment is installed in-line with……. to A monitor is installed in-line with ……...	Agree with modification Monitoring equipment is ….
12	JP3 (KK)	7	Table 1 Table 2 Table 3 Table 4 Table 5	TE	It is not clear why and how the species which are potentially presented are chosen.	Clarify the rationale for the screening of potentially present species.	Withdrawn

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			Table 6				
13	US	7.1	P1	TE	The U.S. believes the WG intended that particulates be encompassed in a separate clause 7.4. An additional comment to insert new 7.4 has been submitted.	Add at end of Paragraph 1 "Only gaseous impurities are considered in each production method sub-section below. Particulates are considered separately in 7.4." Add notes to language introducing the tables to reference the new clause 7.4. Change title of left column in Tables 1-6 to "Gaseous" Impurities	Agree XXX
14	CA4	7.1.1	Paragraph 2	ge	Grammar error	Change "depending" to "dependent"	Agree
15	FR 2	7.1.1	Table 1	te	He can be potentially present depending of the natural gas used as raw material	Put He in potentially present	WG Agree
16	JP4 KN	7.1.1	Table 1	TE	HCHO should be listed in this table	List HCHO	WG Agree to add to very unlikely
17	NO1	7.1.1	Table 1	te	Is HCHO missing or deliberately left out?		See 17
92	US	7.1.1	Table 1	Te	Add as a note	If N_2 is in the feedstock, then NH_3 is exiting the reformer. The ratio is ~~about~~ approximately 1% N_2, which converts into 1 ppm NH_3.	WG disagrees. Information in annex
93	US	7.1.1	Table 1	Te	Add as a note	If incomplete reforming is occurring, the reformer could be generating aromatic compounds.	WG disagrees. Information in annex

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18	US	7.1.2	'pp 1	Te	Amend	Alkaline electrolysis has been used for more than a century to produce H_2 from H_2O using electricity. The hydrogen produced at the anode is usually purified from the remaining O_2 through a catalytic reactor and then dried through a Temperature Swing Adsorption (TSA). Table 2 investigates the potential sources of contaminations. Such contaminations are mainly coming from the H_2O, the electrolyte and the air.	Agree for entire doc XXX
19	CA5	7.1.2	Line 4 of Paragraph 1	ge	Spelling error	Change "contaminations" to "contaminants"	Agree
20	GB	7.1.2	Table 2	Te	Electrolysis doesn't generate air – the presence of air contaminants are a non-routine issue. Leave O_2, as this could be passed through the membrane – typically this varies with differential pressure across the membrane, as applicable. Leave H_2O	Remove N_2 and Ar from table for alkaline electrolysis	WG Agrees to move N2, Ar into "Very unlikely" EIGA/GB to provide Annex A table for electrolyzers (GdR, NH)
94	US	7.1.2	Table 2	Te	Add as a note	CO_2 concentration in the atmosphere is approximately 350 ppm. At PEM operating temperatures back shifting should be limited about 0.3 ppm and then further diluted by the ratio of the air concentration in the fuel.	May 3, 2016, TAG webconference TAG agreed to submit comment Need proposal from TAG
95	US	7.1.2	Table 2	Te	Add as note	Alkali metals used as the electrolyte can be carried over into the fuel as an ion in liquid water.	Disagree on adding note GB to review Annex A to ensure note is captured (NH)
21	CA6	7.1.3	Line 3 of Paragraph 1	ge	Spelling error	Change "contaminations" to "contaminants"	Agree
22	FR 3	7.1.3	Table 3	ed	Particulate are considered as potentially present at each	Delete "particulate" on line 2	Agree

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					step of the supply chain (see 7.4)		
23	GB	7.1.3	Table 3	Te	Electrolysis doesn't generate air – the presence of air contaminants are a non-routine issue. Leave O_2, as this could be passed through the membrane – typically this varies with differential pressure across the membrane, as applicable. Leave H_2O	Remove N_2 and Ar from table for PEM electrolysis	See 20
24	GB	7.1.3	Table 3	Te	7.4 addresses the fact that particulates can occur from any part of the system. The inclusion in Table 3 suggests that they are specific to PEM electrolysis.	Remove particulates from table for PEM electrolysis	Agree
25	US	7.2.1	'pp 1	Te	Amend	When transported in pipelines, H_2 is usually at relatively high pressure (>40 bar). ~~Contamination of any kind during normal operation is "very unlikely".~~ Contamination can be due to intentional and unintentional causes. An example of an intentional cause would be the "Odorization" of the fuel. An example of an unintentional cause would be condensate.	May 3, 2016, TAG webconference TAG agreed to submit modified comment Pending modified comment from US
26	US	7.2.1	'pp 3	Te	As written, this clause can be interpreted as allowing an inexpensive grade of hydrogen in which only oxygen is tested for. This is a means of contaminating a system. If you want to us a 98% nitrogen, what other impurities might be encountered? Will this grade of gas contaminate the storage and dispensing systems? How much particulate will be introduced into the system? Going on	This can be a major issue. Require a higher grade nitrogen for "purge" and gross leakage testing.	WG Disagree. Lower quality of purge gas will not affect final quality of hydrogen.

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					line, the closest I could find was medical nitrogen		
27	US	7.2.1	Para 2	TE	Only N_2 and H_2O identified as contaminants following a maintenance activity. The elevated presence of O_2 could prove to have consequences. This should be identified.	Add O_2 to first bullet: • O_2 or N_2 if insufficiently purged...	WG Disagree Pipelines are purged with inert gas to remove O2
28	US	7.2.1	Para 2	TE	Use of cutting oils during the maintenance process could potentially leave behind sulfur and hydrocarbon, halogenates, as well as particulate contaminants.	Add third bullet: • Use of cutting oils during the process could lead to contamination from sulfur, hydrocarbons, halogenates and/or particulates (construction debris if insufficiently cleaned after maintenance)	Agree but move to 7.4 XXX
29	CA7	7.2.1	Paragraph 2	ge	Grammar error	Change “source” to “sources”	Agree
30	CA8	7.2.1	Paragraph 3	ge	The explanation given is very confusing, possibly due to the sentence structure. A simple table capturing all the different thresholds may be beneficial.		WG Agrees with modifications (see document)
31	CA9	7.2.1	Table 4	ge	The comma after O2 should be removed.		Agree
96	US	7.2.1	Table 4	Te	Amend	Potentially present N_2, O_2, H_2O and odorant (TS)	WG Disagree. Odorants not used.
97	US	7.2.2	Table 5	Te	Amend	Potentially present N_2, He, O_2, H_2O, TS	WG Disagree. Odorants not used. He will not be added.
98	US	7.2.2	Table 5	Te	Amend	Very Unlikely CO_2, CO, CH_4, ~~He, TS~~, NH_3, THC, HCHO, HCOOH, Halogens	See 97

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32	US	7.2.2	'pp 2	Te	Only O_2, N_2 and H_2O identified as contaminants following a maintenance activity. Use of cutting oils during the maintenance process could potentially leave behind sulfur and hydrocarbon, halogenates, as well as particulate contaminants. These should be identified.	During maintenance, the potential sources of contamination are: • O_2, N_2, He if insufficiently purged after maintenance • H_2O if insufficiently dried after maintenance • Use of cutting oils during the process could lead to contamination from sulfur, hydrocarbons, halogenates and/or particulates (construction debris if insufficiently cleaned after maintenance)	WG disagree with adding He WG Agree with 3rd bullter Secretary to reword…."if cutting oils or cleaning agents are used.." XXX Particulates move to 7.4
33	US	7.2.2	Para 3	TE	Question regarding: "*Starting with a system containing N_2 with less than 2% O_2*, ..." If you want to use 98% nitrogen, what other impurities might be encountered? Will this grade of gas contaminate the storage and dispensing systems? How much particulate will be introduced into the system?	This can be a major issue. Require a higher grade nitrogen for "purge" and gross leakage testing.	WG Disagree See 26
34	US	7.2.2	Para 3	TE	As a minimum, should there be a filter on this supply of "non-reactive" gas? What size filter?	Specify filter for purge gases?	WG Disagree Filters not necessary during purging. High purity inert gas not necessary for purging
35	CA	7.2.2	Paragraph 2	ge	Grammar error	Change "source" to "sources"	Agree
36	US	7.3		te	Complete Table 6		WG Agrees Secretary will move all Prob level 2 from Table A3 into potentially present.
37	JP5 KN	7.3	2nd para.	TE	Water contamination from nozzle due to dew or rain should		KN, TN to provide specific proposal

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					be considered as potential risk. Ice may be formed inside of pre-cooler (-40 deg C-class) and it may contaminate fuel when it melts.		
38	US	7.3	Para 1	TE	Only N_2 and H_2O identified as contaminants following a maintenance activity. The elevated presence of O_2 could prove to have consequences. This should be identified.	Add O_2 to first bullet: • O_2 or N_2 if insufficiently purged...	WG Agree
39	US	7.3	Para 1	TE	Use of cutting oils during the maintenance process could potentially leave behind sulfur and hydrocarbon, halogenates, as well as particulate contaminants. These should be identified.	Add third bullet: • Use of cutting oils during the process could lead to contamination from sulfur, hydrocarbons, halogenates and/or particulates (construction debris if insufficiently cleaned after maintenance)	WG Agree with 3rd bullter Secretary to reword…."if cutting oils or cleaning agents are used.." XXX Particulates move to 7.4
40	CA	7.3	Paragraph 1	ge	Grammar error	Change "source" to "sources"	Agree
41	US	7.4	P1 End	Te	Add to end of P1 to ensure liquid particulates are considered. Consider adding more information to this section to properly account for a important and frequent impurity	Particulates is a term that covers a wide range of sizes: submicron to millimetres, and their source can be from soot and air pollution, construction debris, to desiccant pellets. Particulates can include solid or liquid materials, and can occur due to improper cleaning (metal burrs, cleaning fluid, etc.), abrasion, condensation, etc., especially in the HRS.	WG agrees to add 2nd paragraph XXX
42	US	8	P1 End	TE	This text is necessary to better describe the hydrogen quality plan.	The Quality Assurance plan shall include the following to ensure properly hydrogen quality is maintained:	WG Agrees with modifications The Quality Assurance plan for the HRS shall include the

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						-Potential Impurities -Methods to control and remove these impurities -Sampling -Monitoring of impurities or process controls -Liquid and solid particulate filters -Cleanliness procedures -Maintenance procedures	following to ensure hydrogen quality is properly maintained: -Potential Impurities -Methods to control and remove these impurities -Sampling -Monitoring of impurities or process controls -Liquid and solid particulate filters -Cleanliness and maintenance procedures
43	GE2	8	Para 1 and Para 3	ge	A quality assurance plan has a different meaning as than method	Please change A quality assurance plan …… to A quality assurance method ……..	Withdrawn
44	CA	8	Paragraph 1	ge	Grammar error	Change “developed” to “develop”	Agree
45	CA	8	Paragraph 1	ge	The comma after “vary” should be a period.		Agree
46	CA	8	Paragraph 3	ge	One of the commas after “approach” should be removed.		Agree
47	JP 13 KN	8.	1st Para	ED	There is no list of requirements in Clause 5.	A quality assurance plan for the entire supply chain shall be created to ensure that the hydrogen quality will meet the requirements listed in ~~Clause **Error! Reference source not found.**~~ ISO14687-2.	Withdrawn

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48	JP 14 KN	8. or 11.	-	TE	A quality assurance plan is created to ensure that the hydrogen quality will meet the requirements listed in ISO14687-2 in accordance with Clause 8. Quality assurance methodologies base on the QA plan should be revised and improved if contamination over a threshold of ISO14687-2 occurs actually.	Insert action to revise and improve relevant QA methodologies after contamination occurs over a threshold of ISO14687-2.	Withdrawn see new proposal for Clause 11
49	US	8.1	'pp new	Te	add	Prescriptive approach would be applied to a process where control of the sources of impurities is either not well known or not controlled. Examples might include non-dedicated deliver tube trailers and 3rd party owner/operator stations.	WG Disagree. Risk analysis approach also covers this scenario
51	US	8.2	'pp new	Te	add	Risk Assessment approach would be applied to a process where control of the sources of impurities are known and controlled. Examples can include dedicated deliver tube trailers and chain owner/operator stations (i.e. maintained by a major energy provider).	WG Disagree See 49
52	JP7 KN	8.2	2nd para	TE	Number of FCVs which are damaged by contaminated fuel should be considered in Occurrence (Table 7) or severity (Table 8)	1. What might go wrong: which event can cause the impurities to be above the threshold value? 2. What is the likelihood (probability of occurrence) that impurities can be above the threshold value? 3. What are the consequences (severity) for the fuel cell cars? NOTE : Number of cars which are damaged by contaminated fuel should be considered	WG Agrees to add following What is the likelihood (probability of occurrence expressed relative to number of refuelling events) that impurities can be above the threshold value?
53	JP8 KN	8.2	Table 7	TE	Table 7 is an example of definition of occurrence class.	Table 7 — An example of occurrence classes for an impurity	WG Disagrees. This table is a definition, not an example.

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New	F	8.2	Table 7	TE	Table 7 has not been updated		EIGA to provide revised table 7 (MC)
54	JP9 KN	8.2	Table 7	TE	Applicable condition of definition in Table 7 should be noted.	Insert text to describe applicable condition	EIGA to update text (MC)
55	US	8.2	Table 7	TE	Occurrence should take into account fuelings, rather than frequency of contamination	Change tables to account for frequency of contaminate above threshold per fueling	See 54
New	F	8.2	Table 7	TE	Table 8 has not been updated		EIGA to provide revised table 8 (MC)
56	CA15	8.2	Table 8	ge	For consistency, the periods after “operates” and “stops” should be removed.		Agree
57	CA	8.2	Table 8	te	What is considered as minor performance impact (e.g. % power loss)? Temporary power loss acceptable to a particular OEM might not be acceptable to another.		Table 8 being updated (Q)
58	JP 10 KN	8.2	Table 8	TE	Severity class should be as simple as possible	Merge class 3 and class 4 as serious impact	Withdrawal Table 8 being updated (Q)
59	JP 11 KN	8.2	Table 8	TE	Table 8 is an example of definition of severity classes	Table 8 – An example of severity levels for an impurity	WG Disagrees Table is definition
60	US	8.2	Table 8	TE	Temporary loss of power for a vehicle is a very sever issue. Any measureable loss of power should be at least a severity level of 4	Change “temporary loss of power” to “no discernible loss of power” in severity level 1, 2 and 3.	Table 8 being updated

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						Change “car stops” to “discernible loss of power” in Severity level 4 Add “car stops” to severity level 4. Change appropriate other columns	
61	US	8.2	Table 8	TE	Light or minor maintenance is a severe issue of 4 or above for the auto companies because it requires the user to return the vehicle for repair.	Delete “Requires specific procedure, light maintenance” in Severity Level 2 Change appropriate other columns	Table 8 being updated
62	US	8.2	Table 8	TE	Severity level 3 and 4 are very similar and require the same response.	Merge severity level 3 and 4	Table 8 being updated
63	US	8.2	Table 8/9	TE	Severity level 0 should be equal to the impurity levels in ISO 14687-2 because this is the point where no action is needed. Higher severity levels need to take into account amount of impurity	Add text Severity level 0 represents exceeding the impurity levels in Clause 5. Consider amount of impurity for Severity levels 1-4	Table 8/9 being updated
64	GE	8.2	Table 9	ge	The green area description repeats the same meaning, can be changed for better understanding	Please change Acceptable risk area. Existing controls acceptable to Acceptable risk area. Existing controls sufficient	Agree
65	JP 12 KN	8.2	Table 9	TE	Table 9 should be modified. Car stop is very serious	(To be commented by JPN-Car-OEMs in Munich on table 9 with revised definition of occurrence	Table 9 being updated

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					trouble. Light maintenance is also not acceptable if it occurs.	classes in Sacramento)	
66	US	8.2	Table 9	TE	Action is needed for lower severity and occurrence levels.	Change Table 9 colouring to suggestion at bottom of this table	Table 9 being updated
67	F	9	Ist paragraph	te	"Routine analysis is performed on a periodic basis once every specified time period or once for each lot or batch. Quality control based on the individual contaminants listed in ISO 14687-2 is presumed upon clearly identified production, purification and transportation methods of hydrogen" this description of routine analysis does not take into account the risk assessment done to define the impurities to follow	A routine analysis is performed on a periodic basis once every specified time period or once for each lot or batch. For assuring H2 quality control there are two options:follow the request from a prescriptive approach or adapt the analysis according to the risk assessment done at the station. Quality control based on the individual contaminants listed in ISO 14687-2 is presumed upon clearly identified production, purification and transportation methods of hydrogen, due to the risk assessment study.	WG Agree Secretary to work with GdR on final language XXX
68	GE	9	Para 1	ge	The quality assurance is ensured either by risk assessment approach or full list of impurities listed in ISO 14687-2	This should be repeated in chapter 9 and routine is performed to be changed routine analysis should be performed on a periodic basis …….. if the risk assessment approach is not be used	See 67
69	US	9.	'pp new	Te	Add as new second paragraph	The periodic time period shall reset after verification of quality after a major repair (e.g. cutting of pipe, compressor failure, heat exchanger failure), major maintenance (e.g. replacement of hardware prior to MTBF) and/or major process disruption (e.g. contaminated tube trailer, failed PSA unit). Testing for contaminants should be conducted prior to resumption of commercial activities.	WG Disagrees Covered in Clause 10
90	FR	9 and			Routine and non routine QC should be determined according to a QA methodology (Risk assessment or		See 67

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		10			prescriptive). Paragraph 9 and 10 should describe what is routine and non routine but not when or where to do it…		
70	FR	9.1		te	Statement does not reflect the reality of industrial H2 production. Quality control and on line monitoring must be assessed depending on the technology employed	Quality control and on line monitoring must be assessed depending on the technology employed	WG agrees in principle Secretary and GdR to work on language which includes accounting for magnitude XXX
71	US	9.1		Te	Amend	As a general rule, the product quality of a plant is consistent, as long as the input and the operating conditions are consistent. If there are no changes in the input and the operating conditions over a long period of time (i.e. the process is in control), only one quality analysis shall be needed per operation period. On the other hand, if there are changes in the input and the operating conditions (i.e. the control of the process is lost), quality analysis shall be needed for each condition.	Agree XXX
72	GE	9.1	Para 1	ge	in this chapter it's not clear, whether the production is onsite or outside A quality analysis per operation period is unclear. If this a offsite production, each gas provider will take care for the H2 quality, it should be not written here, how often an analysis shall be made	Definitions to clarify/change	WG agrees to change title to "Off site Production" On-site production and delivered H2 covered in 9.3. Edits for comment 70 will address frequency of analysis.
73	GE5 083	9.2.1	Para 1 and Para 2	ge	The contamination risk with H2 cylinder transport is again an issue of gas providers. The quality of feedstock, it's not necessary to write such general requirements in this chapter.	Definitions to clarify/change	WG requests specific proposal that still captures issue of contamination from "dirty" storage. (UC, AE)

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					A risk assessment approach will be used for such risks.		
74	FR	9.2.2		te		When hydrogen is produced in liquid state, any contaminant present in the gas before liquefaction will be trapped as solid deposit in the liquefaction process (except He).	WG Replace 9.2.2 with When hydrogen is produced in liquid state, any contaminant present in the gas before liquefaction will be trapped as solid deposit in the liquefaction process, and not appear in the product gas (except He).
75	US	9.2.3		Te	Delete existing text and replace with proposed text as there can always be a potential for contamination.	When hydrogen is transported via pipelines from a production facility, it is clear that, in general, there is no risk of contamination as demonstrated by the example of city gas transport. Therefore, in principle, no additional routine analyses are required within the pipelines. When hydrogen is transported via pipelines from a production facility, special attention may be required to assure quality. Additionally, if an odorant is mandated, a means will be required to remove the odorant prior to storage on the site where fuel is dispensed to the vehicles.	WG Disagrees Odorants are not used in H2
76	FR	9.3.1		ed		Hydrogen received from off-site hydrogen production is subject to a routine analysis for the chemical constituents that have not been covered by the centralized hydrogen production and distribution facility and for those that may infiltrate the gas after it is ~~accepted by~~ delivered to the HRS. . For individual contaminant species that may enter after delivery to	Agree

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						HRS ~~acceptance~~, the frequency of analysis may be reduced, provided that the possibility of infiltration is deemed eliminated by having a good operation and control program at the HRS, such as a purge procedure.	
77	US	9.3.1		Te	This section does not identify, or even acknowledge, what contaminants may enter the fuel stream simply due to routine processing operations onsite such as storage, compression and dispensing. Fuel quality, after hydrogen is delivered to the HRS, is then deemed acceptable "…by having a good operation and control program at the HRS, such as a purge procedure." This is inadequate.	Hydrogen received from off-site hydrogen production is subject to a routine analysis for the chemical constituents that have not been covered by the centralized hydrogen production and distribution facility and for those that may infiltrate the gas after it is accepted by the HRS. For individual contaminant species that may enter after HRS acceptance, the frequency of analysis may be reduced, provided that the possibility of infiltration is deemed eliminated by having a good operation and control program at the HRS~~, such as a purge procedure~~.	WG Agrees that section is missing section on quality control for HRS operation. Secretary to work with author for proposed text.
78	FR	9.3.2			Statement does not reflect the reality of industrial H2 production. Quality control and on line monitoring must be assessed depending on the H2 generation technology employed		See 82
79	NO	9.3.2		te	Once a day if all the hydrogen goes to same storage. If the produced hydrogen is stored in separate tanks, hydrogen for each of the tanks must be monitored.		See 82
80	NO	9.3.2		te	CO is probably working as canary species only above a certain limit, as you know…		Informative comment. Need specific proposal
81	US	9.3.2	'pp 2	Te	Amend	~~A canary species is a constituent with the highest~~	Agree XXX, except for last "in the

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						~~concentration level in a hydrogen production method. In other words, if~~ If it is confirmed that the concentration of the canary species of a given production method is less than its specified limit, other impurities are deemed to have met the standard requirements. For example, in the case of SMR and PSA production and purification, CO could serve as the canary species. In the case of an electrolyzer, water could serve.	case of an electrolyzer…"
82	GB	9.3.2	1	Te	Remove "shall do daily test" – turn around time is impossible. In such cases on-site quality control is required – not necessarily canary species	Change to: On-site generation will require on-site quality control, whether monitoring of specific analytes that can act as a canary species for those considered potential to be present based on the type of on-site generation, or by other process control methodologies, for instance the monitoring of differential pressure across an electrolyser membrane, or temperature of the hydrogen following a de-oxo catalyst system	WG Agrees Secretary and NH will work on improving language
83	GE	9.3.2	Para 1	ge	The requirement of an analysis per day for onsite H2 production is too specific. It not necessary to write here, how often an analysis shall be made	Definitions to clarify/change	See 82
84	CA	9.3.2	Paragraph 1	ge	One of the periods after "continuously" should be removed.		Agree
New	JPN	9.3.2	P1, S1/2	TE	Informative, not necessary, and also included in Annex B	Delete P1 S1/S2	WG Agree
85	JP (KK)	10		ED	The following language is confused. "A non-routine analysis is to be conducted for those constituents deemed necessary if: shall be required if any of the conditions listed below are encountered"	Change into the following language. A non-routine analysis is to be conducted ~~for those constituents deemed necessary if: shall be required~~ if any of the conditions listed below are encountered	Agree with modification to be proposed by secretary

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86	JP (KK)	10		ED	The sentence with bullets are quoted as10.(1)-(6) in B.5.2. Better to use numbering instead of bulletting	Change six dots into (1),(2),(3),(4),(5) and (6).	Agree XXX
87	US 097	10	‘pp 1	Te	What is this supposed to mean? A non-routine analysis is to be conducted for those constituents deemed necessary if: shall be required if any of the conditions listed below are encountered. The impurities to be analyzed shall be based upon the hydrogen quality plan listed in Clause 8.	WG should reword sentence	Agree with modification to be proposed by secretary
88	CA	10	Paragraph 1	ge		Change “A non-routine analysis is to be conducted for those constituents deemed necessary if: shall be required if any of the conditions listed below are encountered” to “A non-routine analysis is to be conducted for those constituents deemed necessary if any of the conditions listed below are encountered”	Agree with modification to be proposed by secretary
89	FR	11		ge	The Responsibility to report should be with HRS operator	If a HRS dispenses or has the potential of dispensing hydrogen which does not meet the requirements in Clause 5, the HRS operator shall immediately prevent any further dispensing until repaired and notify station owner/operator and authorities having jurisdiction as soon as possible.	Agree
50	JP6 (KK)	A.1 8.2	Table A.4	TE	It is necessary to take into consideration of the level of the impurities in risk assessment. Lower impurity level, for example a few ppm, may lead low severity but high probability of occurrence. On the contrary, higher impurity	Include the consideration on quantity for the risk assessment.	Withdrawn Severity based upon Level 1 contamination level.

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					level, for example 1000 ppm, may have high severity (such as lowering hydrogen concentration due to condensation) but low probability of occurrence. Table A.4 does not include this consideration..		
102	CA	A.1	Table A.1	ge	"," and "." Are used to denote decimal places in the table. For consistency, only "." Should be used.		Agree XXX
103	JP KN	A.1	Table A.4	TE	Severity class which is not agreed among global OEMs is used in Table A.4	Modify Table A.4 and its conclusion to avoid misunderstanding of severity classes and conclusion. (To be commented by JP-Car-OEMs in Munich if severity classes can be provided (e.g. Nitrogen 300ppm) for ISO/DIS19880-8)	Table A.4 will be revised
104	NO	A.1	Table A.4	te	Severity of > 5 ppm H2O is 4??? Why? Problems in cold conditions with H2 supply valves/reducers??? Dewpoint -40C corresponds 100 ppm H2O		Table A.4 will be revised
105	NO	A.1	Table A.4	te	Currently for TS the severity is 4. This may not be true, as S is desorbing slowly during operation. However, 4 is correct with the present knowledge. Must be studied more.		Table A.4 will be revised
106	NO	A.1	Table A.4	te	Currently for HCHO and HCOOH the severity is 2 (same as for CO). This may be true with the correct limits. The correct limits are not 0.01 (HCHO) and 0.2 (HCOOH) but 1-2 orders of magnitude larger.		Table A.4 will be revised
107	NO	A.1	Table A.4	te	Concerning Halogens, the stability of freons should be studied. If they are stable, then the severity goes from 4 to 0.		Table A.4 will be revised
108	US	A.1	Tables	ED	Tables contain poor grammar, slang, and French	Clean up tables in Annex A	Secretary requests EIGA help clean up (GdR)
109	US	A.1	Tables	TE	Severity levels have not been confirmed by automotive companies / Delete or gather Auto feedback on severity levels		Withdrawn

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					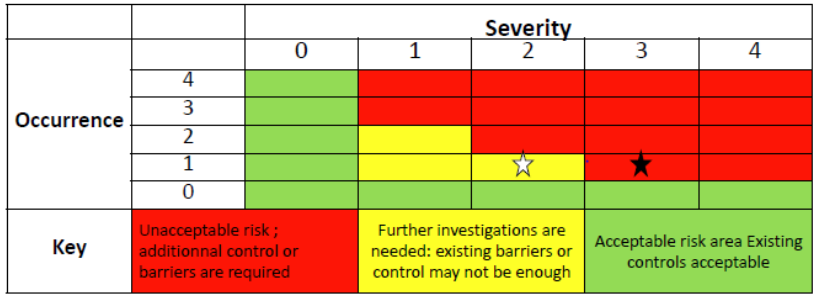 "Green" meets ISO14687-2		
110	GE7	B.4	Table B.3	ge	Reference to C9 does not exist	Definitions to clarify/change	Agree with secretary modification for accuracy
111	JP (KK)	B.7		ED		Correct the following: Table C7-1 →Table B.4 C3→B.3 C4→B.4 C5.1→B.5.1	Agree with secretary modification for accuracy
112	JP (KK)	B.8		ED		Correct the following: routine analysis →non-routine analysis Table C8-1 →Table B.5 C3→B.3 C4→B.4	Agree with secretary modification for accuracy

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						C5.2→B.5.2	
113	JP (SK)	B.9	Last paragraph	Te	As Japanese Guideline has been modified, Annex B should be changed.	See attached file	Agree Need attached file
114	JP (SK)	B.9	Table B4, Table B5	Te	As Japanese Guideline has been modified, Annex B should be changed.	See attached file	Agree Need attached file
99	JP (KK)	B.9	Table B.4	ED	The title of each column in the Table B.4 is better to be the same with the terms used in the main body.	Change as follows: QC point →Sampling /Monitoring point Parameter →Constituent Standard value → Threshold	Agree XXX with possible secretary modification to clarify
100	JP (KK)	B.9	Table B.4	ED	The following sentences are unclear in meaning: "Production of hydrogen from hydrocarbons utilizing steam reforming, catalytic reforming, partial oxidation or ATR, purification using refining equipment, and distribution"	Change into the following sentences: "Production of hydrogen from hydrocarbons utilizing steam reforming, catalytic reforming, or partial oxidation or ATR, followed by refinement".	Agree XXX with possible secretary modification to clarify
101	JP (KK)	B.9	Table B.4	ED	The following sentences are unclear in meaning: "Electrolysis of Nacl for hydrogen, purification, and distribution".	Change into the following sentences: "Hydrogen production using brine electrolysis, followed by purification".	Agree XXX with possible secretary modification to clarify
New	US JS	7.4	After P1	Ed		Reference 19880-1 for filter specification.	Pending Proposal
New	JP	11				The HRS owner/operator shall also review and update the quality assurance methodologies to prevent further	WG agrees in principle

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	KN					contamination	Secretary to work with AE on improving sentence XXX
New	NE AE	9.3.1			Analysis should be based upon QA Plan	Replace P1 with Quality control for delivered hydrogen will be carried out following a quality assurance plan developed specifically for the supply chain of the hydrogen Move P1S2 to new section based upon comment 77	WG Agrees

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