



ISO/TC 197  
Hydrogen technologies

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Secretariat: SCC (Canada)

**ISO CD 14687.2 - Collated Comments 2017-10**

Document type: Other committee document

Date of document: 2017-10-16

Expected action: INFO

Background: Here are the comments that were received with the CD2 14687  
Ballot that closed on 2017-10-14.

See document N 890 for the ballot results.

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

## Template for comments and secretariat observations

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MB/ NC <sup>1</sup>	Line number	Clause/ Subclause	Paragraph/ Figure/Table	Type of comment <sup>2</sup>	Comments	Proposed change	Observations of the secretariat
CA 001				ge/te	As discussed in the previous meeting, it is understood that 0.2 ppm CO is a compromised value for Type D hydrogen due to unacceptably high production cost if the standard is set to below 0.2 ppm. However, the general consensus from OEMs and system integrators is that 0.2 ppm CO is not low enough to not lead to adverse effect.  Is there any chance or way we can add a statement somewhere in the document highlighting this so that users of this standard are aware of the risk and not just blindly follow the standard naively thinking that it is risk-free?		
CN 002		02		ge	According to “www.iso.org”, ISO 21087 is under development. Analysis limit is closely related to maximum concentration of individual contaminants. Please provide some way that we can purchase this important standard.		
US 003		03.01		ed	Please delete second comma	form, purified	
AR 004		03.04		Te	Customer is defined as: “party responsible for sourcing hydrogen fuel in order to operate the fuel cell power system” However, the definition should include the customer for other applications different than PEM fuel cell road vehicles and stationary applications. In certain cases it is necessary to define the lot and the number of samples per lot when hydrogen is used as a propellant or burning fuel by agreement between supplier and customer	Make the definition broader as follows: “party responsible for sourcing hydrogen fuel in order to operate the hydrogen system” An alternative text could be the following: “party responsible for sourcing hydrogen fuel in order to operate the fuel cell power system or any other hydrogen system”	
FR 005		03.09		ed	Note 1 to entry does not add to the document	Delete Note 1	

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DIN / DE 006	Pg. 8	03.09		Ed	Comma and free sign too much: ...form, , purified to...	...form, purified to...	
DIN / DE 007	Pg. 8	03.09		Ge	What is the intention to define a minimum mole fraction of 98%? The relationship between concentration/mole fraction and aggregate state is not clear. Value is in contradiction to table 2.	Please delete the mole fraction and provide better definition of gaseous hydrogen.	
AR 008		03.09		Ed	In the definition the comma is duplicated	Eliminate double comma	
CN 009		03.09		ed	Extra comma should be deleted in the sentence “hydrogen under gaseous form, , purified to a minimum mole fraction of 98%”	“hydrogen under gaseous form, purified to a minimum mole fraction of 98%”	
US 010		03.10	03.10	te	Specify percentage.	Use a common description: mole fraction or hydrogen fuel index.	
FR 011		03.11		ed	“fraction or percentage of a fuel mixture that is hydrogen.” Hydrogen already defined as a mixture... in 3.9 and 3.10	fraction or percentage of a fuel mixture that is pure hydrogen	
US 012		03.11	03.11	te	Clarify “fraction or percentage”	Mole fraction of a fuel mixture that is hydrogen	
FR 013		03.14		ed	Note 1 does not add to the doc	delete note 1	
NO 014		03.14	Note 1 to entry	te	It is not possible to liquefy hydrogen by compression only. The liquification process has to be carried out in combination of compression with other physical processes.	Liquefaction may be carried out by a combination of compression, refrigeration and expansion or other means such as the magnetocaloric effect.	
US 015		03.15	03.15	te	Caption should refer to production	Fuel supply with on-site production	

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US 016		03.16	03.16	te	Caption should refer to production	Fuel supply with off-site production	
FR 017		04.02		ed	The following information as shown in Table 1 characterizes representative applications of each type and grade of hydrogen fuel. <u>It is noted that suppliers shall take measures not to contaminate the each grade of hydrogen with the other grade(s) of hydrogen.</u> Underscored part does not add to the document	Delete underscored part	
DIN / DE 018	Pg. 10	04.02		Ed	It is noted that suppliers shall take measures not to contaminate <b>the</b> each grade of hydrogen with the other grade(s) of hydrogen.	It is noted that suppliers shall take measures not to contaminate each grade of hydrogen with the other grade(s) of hydrogen.	
US 019		04.02	04.2	ed	Revise wording	...measures not to contaminate one with the other grade of hydrogen	
GB 020		04.02	1 <sup>st</sup> paragraph	Ed	Incorrect grammar	"It is noted that suppliers shall take measures not to contaminate <b>the</b> each grade of hydrogen with the other..."	
CA 021		04.02	Paragraph 1	ed		"It is noted that suppliers shall take measures not to contaminate the each grade of hydrogen with the other grade(s) of hydrogen." should be changed to "It is noted that suppliers shall take measures not to contaminate each grade of hydrogen with the other grade(s) of hydrogen."	
CN 022		04.02	Table 1	ed	Title of Table 1 should be bold.		

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FR 023		05.01		ed	The quality of hydrogen at dispenser nozzle for PEM fuel cell road vehicles shall meet the requirements of Table 2.	The quality of hydrogen at dispenser nozzle for type D hydrogen (see table 1) shall meet the requirements of Table 2.	
DIN / DE 024	Pg. 12	05.01	Table 2	Te	Please provide rationale why chlorine Cl <sub>2</sub> and hydrogen bromide HBr have been deleted from footnote e.	Please for clarification. Harmonization with ISO 19880-8 Annex A12.	
JP 1 025 infra- 1		05.01	Table 2 Footnote c	te	JPN infrastructure member understand that the constituent which is less than the lower detection limit is not included in the summation for the specification directed in the footnote c. If it is not the case, the cost of the analysis may increase because the higher precision of the analysis is needed.	Would like to confirm the interpretation. It is not needed to change the language.	
GB 026		05.01	Table 2, note b	Te	Avoid ambiguity	<b>“Total hydrocarbons except methane only include compounds that are in the gaseous phase.”</b> Total hydrocarbons except methane include oxygenated...”	
GB 027		05.01	Table 2, note e	Te	Avoid ambiguity	“Halogenated compounds include, for example, hydrogen chloride (HCl) and <b>key</b> organic halides (R-X).”	
GB 028		05.01	Table 2, note g	Te	Remove note g	Liquid particulates is already mentioned in note f and will be included in the analysis of particulate concentrations, note g does not add anything	
CN 029		05.02		ed	The comma in sentence “The analytical methods for measuring constituents in hydrogen for PEM fuel cell road vehicle applications as listed in Table 2, are specified in ISO 21087.” is suggested to be deleted.	“The analytical methods for measuring constituents in hydrogen for PEM fuel cell road vehicle applications as listed in Table 2 are specified in ISO 21087.”	
JP 2 030		05.03		ge	ISO 19880-8 specify the quality control procedure for gaseous hydrogen. It does not include liquid	Add <b>“for gaseous hydrogen”</b> as listed below. Quality verification requirements for the qualification	

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infra- 2					hydrogen.	tests for gaseous hydrogen shall be ...	
JP 3 031 infra- 3		05.04		ge	ISO 19880-1 provides the sampling procedures and hardware for gaseous hydrogen. It does not include liquid hydrogen.	Add "gaseous " as listed below. The guidance on hydrogen sampling method for gaseous hydrogen fuelling stations is ...	
FR 032		05.05		ed	The protocol for ensuring the quality of the gaseous hydrogen at distribution bases and hydrogen fuelling stations is given in ISO 19880-8 to comply with hydrogen quality required by this standard.	The Quality assurance methodologies to define the Quality Assurance plan for assuring the quality of the gaseous hydrogen as required by this standard at the fuelling stations is given in ISO 19880-8.	
DIN / DE 033	Pg. 13	06.01		Ge	Is appliances the correct word or should it be applications?	Please check with native speaker and correct complete document if necessary.	
US 034		06.01	Table 3	ed	Harmonize spaces after footnotes		
DIN / DE 035	Pg. 14/15	06.01	Table 3	Ed	Formatting of footnotes should be uniform. Table and footnotes should fit on one page.	Please correct.	
JP 4 036 TG2 01		06.01	Table 3	ed	The title of Table 3 - Hydrogen, and hydrogen based fuels, quality requirements for PEM fuel cell stationary applications — is different from other tables'.  Table 2 – Fuel quality specification for PEM fuel cell road vehicle application Table 4 – Fuel quality specification for applications except PEM fuel cells	To modify a title of Table 3 in reference to a title of Table 2 and Table 4.  Table 3 – Fuel quality specification for PEM fuel cell stationary applications	
GB		06.01	Table 3,	Te	Avoid ambiguity	"Total hydrocarbons except methane only	

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037			note d			include compounds that are in the gaseous phase. Total hydrocarbons except methane include oxygenated..."	
GB 038		06.01	Table 3, note e	Ed	Grammar	"Sum of CO, HCHO and HCOOH shall..."	
GB 039		06.01	Table 3, note g	Te	Avoid ambiguity	"Halogenated compounds include, for example, hydrogen chloride (HCl) and key organic halides (R-X)."	
US 040		06.03.1		ge	Revise wording	The analytical methods listed in ISO 21087 shall be used for this application.	
US 041		06.03.1		ge	Revise wording	The selection of relevant fuel contaminants for analysis (Table 3) should be carried out based on the hydrogen production method.	
US 042		06.03.2	NOTE	ed	Annex B of this ISO_CD 14687 provides the rational for the selection of the impurities specified in Table 2	Annex B of ISO14687 provides the rationale for the selection of the impurities specified in Table 2.	
JP 6 043 TG2 03		07		ed	The agreement about the correction of the title of Table 4 in WG27 Seoul meeting hasn't been reflected, yet.	To modify a title of Table 4 to match it with Chapter 7.	
GB 044		07.01	Table 3	Ed	Use same method to say this as Table 6	"Non-condensing at all ambient conditions" and remove note	
US 045		07.02.1		ge	Revise wording	As for the analysis methods for these applications, ISO 21087, Hydrogen fuel — Analytical methods — Proton exchange membrane (PEM) fuel cell applications for road vehicles, should be applied.	

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CN 046		07.02.1		ed	To keep consistent, name of ISO 21087 is suggested to deleted in the sentence "As for the analysis methods for these applications, ISO 21087, Hydrogen fuel — Analytical methods — Proton exchange membrane (PEM) fuel cell applications for road vehicles, may be applied."	"As for the analysis methods for these applications, ISO 21087 may be applied."	
US 047		07.02.2.2		ge	Revise wording and clarify statement		
US 048		07.02.3.2		ge	Lots are not specified/constricted – all lots seem to be possible. <b>Include ISO 19880 reference?</b>	Lot acceptance tests should be carried out on a level agreed upon between the supplier and a customer.	
GB 049		5 - 7	All	Ed	These sections are not ordered in the same way as Table 1	Correct the ordering of the sections so it follows A to E as listed in Table 1.	
DIN / DE 050	Pg. 20	A.2		Ed	<ul style="list-style-type: none"> <li>Liquid hydrogen storage, cryogenics pumps and vaporizers</li> </ul>	<ul style="list-style-type: none"> <li>Liquid hydrogen storage, cryogenic pumps and vaporizers</li> </ul>	
JP 5 051 TG2 02		All		ed	It is better to unify the expression of the words "Hydrogen fuel", "Fuel" and "Hydrogen" because it seems to have insufficient thought to use these terms properly.	Unify those terms	
GB 052		All	All	Ge	The UK notes the efforts that have gone into addressing the issues raised with the previous version of the CD, and appreciate the changes made to address them.	No change needed.	
US 053		Annex B		te	A high CO2 content in hydrogen fuel will result in the formation of CO via a reverse water gas shift reaction which, depending on the material selection and/or system design and operation, could	Please modify sentence as follows: Furthermore, very high concentrations of CO2, several orders of magnitude higher than the value specified in the standard, can be catalytically converted via a reverse water gas shift reaction into	

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					further impact fuel cell performance.	CO, which in consequence poisons the catalyst. However, under normal operating conditions such high levels of CO <sub>2</sub> are highly unlikely to be present in the anode	
US 054		B.4		ed	N <sub>2</sub> The number of individual atoms is indicated by an index.	N <sub>2</sub>	
US 055		B.7		ge	Revise wording	It is recommended that total sulfur concentration is monitored.	
CA 056		B.9		ed		"NH <sup>4++</sup> " should be changed to "NH <sub>4</sub> <sup>+</sup> "	
US 057		C.1		ge	Revise wording	For SMR-PSA production and purification, CO can serve as an indicator for the presence of other impurities listed in Table 3 because it has the highest probability of presence in a fuel produced by the given process.	
CA 058		Introduction		ed	Typo, semicolon should be changed to colon.	"Therefore, ISO 14687 has been mainly revised based on the research and development of PEM fuel cells focusing on the following items;" should be changed to "Therefore, ISO 14687 has been mainly revised based on the research and development of PEM fuel cells focusing on the following items:"	

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