



ISO/TC 197
Hydrogen technologies

Email of secretary: jonathan.lafontaine@bnq.qc.ca
Secretariat: SCC (Canada)

Presentation WG27-28 H2 Quality report 2019-12-12

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Background: Please find attached the presentation made by M. Tomioka as TPD during the Plenary meeting as item 7.5.

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



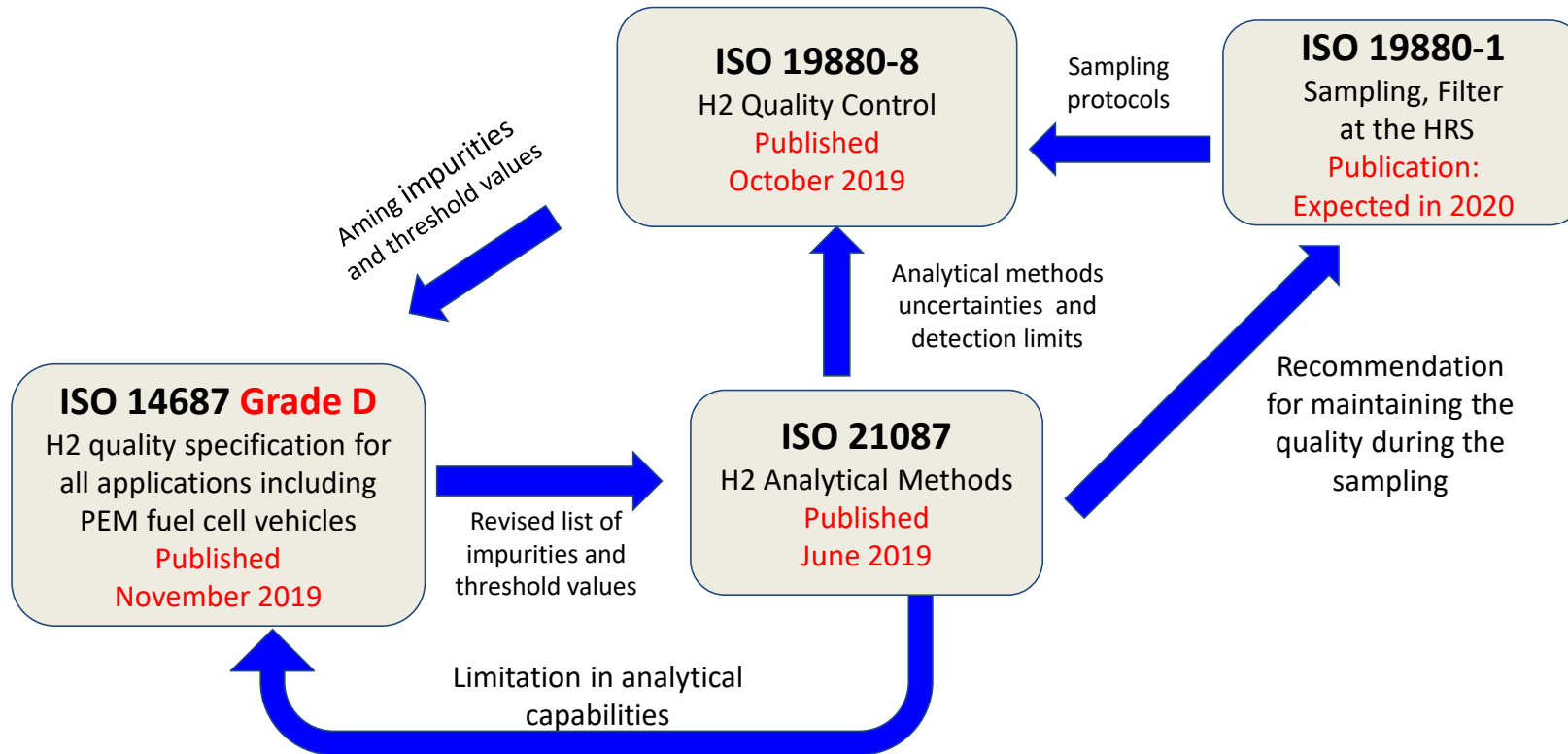
The Up-date for
ISO/TC197/WG27 and WG28
H₂ Quality: ISO14687 and
Quality Control: ISO19880-8
ISO/TC158/JWG7
H2 Gas analysis method: ISO21087

12 December, 2019

Hidenori Tomioka, JISC
ISO/TC197 Technical Program Director
WG27 Secretary
WG28 Convener



ISO H₂ Quality Standards





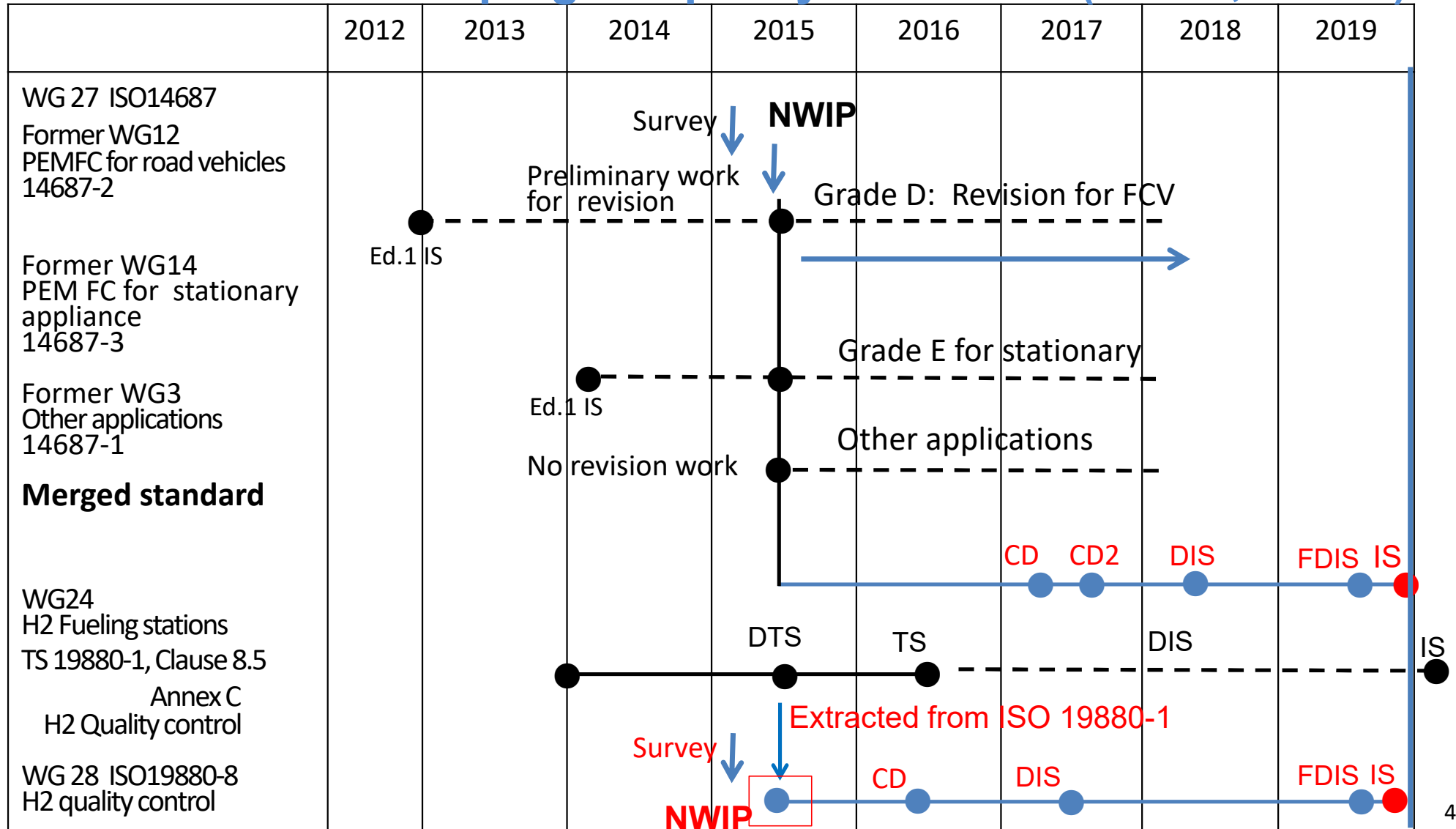
Clarification of WGs' responsibilities and progress

Trilateral structure of H2 Quality for FCV

- ✓ **WG 27: Threshold Specification, discussed in ISO14687 Grade D.**
FDIS ballot has started on 2019-08-28 and closed on 2019-10-23.
FDIS ballot was Approved without negative vote. It was published on 2019-11-27.
- ✓ **WG 28: Hydrogen Quality Control, discussed in ISO19880-8.**
FDIS ballot has been approved without negative vote.
It was published on 2019-10-22.
- ✓ **ISO/TC 158/JWG 7: Analytical methods for FCV.**
It has been published on 2019-06-26.



Schedule for developing H2 quality standards (WG27, WG28)





ISO TC 158,TC197 JWG 7
report of activity
(TC 197 plenary meeting December 2019)

Martine Carré, France
Convenor JWG 7

ISO TC 158 - JWG 7
(Nov 2019)



Objectives of JWG7

- This working group is in charge of the preparation of the standard (ISO 21087) for the validation of analytical methods to be used for assuring the quality of H₂ fuel used for PEM Fuel Cells according to the specifications defined in ISO 14687
- **Title of ISO 21087**
 - Gas analysis — Analytical methods for hydrogen fuel — Proton exchange membrane (PEM) fuel cell applications for road vehicles
- The work is done in collaboration of TC197 mainly with WG 28, WG 24 and WG 27 (following the revision of ISO 14687). A joined working group was created because experts from 158 were necessary to be able to write this document according to metrological rules.



Report for 2019 (1)



- A meeting of JWG 7 have been held on the **8th October 2018** in Saint Denis (France).
- The aim of this meeting was to treat the 106 DIS comments from Argentina, France, ISO, Japan, Netherlands, Ukraine and United Kingdom. The draft was under the DIS enquiry from 2018-05-10 until 2018-08-02. It received 100 % of approvals
- All comments were addressed and the draft was updated accordingly. Then, the draft was submitted to FDIS ballot from 2019-03-07 to 2019-05-02.
As for the preceding stage, it received 100 % of approvals. 72 editorial comments were received and considered directly by ISO/CS.

ISO 21087:2019 is published since 2019-06-26.



Report for 2019 (2)



Next steps:

- Considering there is no work item under preparation, ISO/TC 158 decided during its meeting held on 17th October 2019, to disband ISO/TC 158/JWG 7.



The Progress of ISO/TC197/WG27 H₂ Quality: ISO14687

Yasuo Takagi, JISC
Co Convener/WG27



The status of ISO/TC 197/WG 27

ISO/TC 197/WG 27: Hydrogen fuel quality

initiated on October 15, 2015

Conveners: Yasuo TAKAGI (TG1), Osamu TAJIMA (TG2): JISC (Japan)

Secretary: Hidenori TOMIOKA: JISC (Japan)

ISO 14687: (60:60) (2019-11-27) International Standard published

Hydrogen fuel quality — Product specification

Participation: CA, DE, FR, GB, JP, KR, NL, NO, US

The scope of ISO 14687:

This International Standard specifies the minimum quality characteristics of hydrogen fuel as distributed for utilization in vehicular and stationary applications.

It is applicable to hydrogen fuelling applications, which are listed in Table 1 of this International Standard.



A system for the next revision of ISO14687 (TBC)

ISO/TC 197/WG 27: Hydrogen fuel quality

Convener: : Osamu TAJIMA: JISC (JAPAN)

Secretary: Hidenori TOMIOKA: JISC (JAPAN)

- **Task 1 (Grade D: PEM FCV) Leader: Hidenori TOMIOKA: JISC (JAPAN)**
- **Task 2 (Grade E: PEM Stationary) Leader: Osamu TAJIMA: JISC (JAPAN)**
- **Task 3 (Grade A: Combustion, Boiler, Heat Appliances)
Leader: Arul Murugan: BSI (UK)**

This change would be resolved at the TC197 Plenary Meeting this year.



Task 1: The major change from ISO14687-2: 2012

Items for inert gases and CH₄.

- N₂ and Ar 100 to 300 ppm (Agreed upon among OEMs)
- CH₄ to be separated from the total hydrocarbons, the others are still C1 equivalent.

The summary of the consensus for CO, HCHO, HCOOH and halogens.

- The WG fully agreed to use those values EIGA proposed (CO: 0.2 ppm, HCHO: 0.2 ppm, HCOOH: 0.2 ppm, Sum of these three constituents: 0.2 ppm) in the ISO/DIS 14687 based on the data provided including JARI (JPN)'s data.
- **Delete "Total" from halogenated compounds**
Note: All halogenated compounds which could potentially be in the hydrogen gas (for example, hydrogen chloride (HCl), and organic chlorides (R-Cl)) should be determined by the hydrogen quality control plan discussed in ISO 19880-8.



The specification change for new ISO 14687 and ISO14687-2: 2012

For FCV

Constituents	Grade D, ISO14687 New	ISO 14687-2: 2012
Hydrogen fuel index	99,97 %	99,97 %
Total non-hydrogen gases	300 µmol/mol	300 µmol/mol
Maximum concentration of individual contaminants		
Water (H ₂ O)	5 µmol/mol	5 µmol/mol
Total hydrocarbons except methane (C1 equivalent)	2 µmol/mol	2 µmol/mol Including methane
Methane (CH ₄)	100 µmol/mol	
Oxygen (O ₂)	5 µmol/mol	5 µmol/mol
Helium (He)	300 µmol/mol	300 µmol/mol
Nitrogen (N ₂)	300 µmol/mol	The sum of N ₂ and Ar 100 µmol/mol
Argon (Ar)	300 µmol/mol	
Carbon dioxide (CO ₂)	2 µmol/mol	2 µmol/mol
Carbon monoxide (CO)	0,2 µmol/mol	0,2 µmol/mol
Total sulfur compounds (S1 equivalent)	0,004 µmol/mol	0,004 µmol/mol
Formaldehyde (HCHO)	0,2 µmol/mol	0,01 µmol/mol
Formic acid (HCOOH)	0,2 µmol/mol	0,2 µmol/mol
Ammonia (NH ₃)	0,1 µmol/mol	0,1 µmol/mol
Halogenated compounds (Halogen ion equivalent)	0,05 µmol/mol	0,05 µmol/mol
Maximum particulate concentration	1 mg/kg	1 mg/kg
Note: The sum of CO, HCHO and HCOOH shall not exceed 0,2 µmol/mol.		—



Further revision for ISO14687 Hydrogen Fuel Quality

- ✓ **H₂ quality standard needs to be mature enough to meet the large and mature hydrogen and FCV market. → Cost Issue**
- ✓ **It needs to be prepared for the “bad guy” provide cheap and poor quality H₂ in the market in the future.**
 - **WG27 has organized the collaborative workshop among European Stakeholders and TC197 in September, 2019 in conjunction with MetroHyVe/Hydraite workshop.**
 - **The preparation for the revision will be initiated soon as a preliminary work item.**



Discussion, action items and timeframe for WG27

✓ Task 1 Grade D;

- Send official request for feedback to member countries (H. Tomioka)
- Should there be a single voice from member countries regarding impurity levels? (Choi)

✓ Task 2 Grade E;

- Specification draft be done in 2 years.

✓ Task 3 Grade A;

- Task 3 does not include CNG/H2 blends (N. Hart)
- Will include Grade B
- Create proposal for scope (N. Hart, A. Murugan)
- Does Task 3 include power generation experts? (J. Keller)



The Progress Report of
ISO/TC 197/WG 28
Quality Control: ISO19880-8

Hidenori TOMIOKA, JISC
Convener/WG 28



The status of ISO/TC 197/WG 28

ISO/TC 197/WG 28: Hydrogen quality control

initiated on October 15, 2015

Convener: Hidenori TOMIOKA: JISC (Japan)

Secretary: Spencer Quong: ANSI (USA)

ISO 19880-8: (60:60) (2019-10-22) International Standard published

Gaseous hydrogen — Fueling stations — Part 8: Hydrogen quality control

Participation: CA, DE, FR, GB, JP, KR, NL, NO, US

The scope of ISO 19880-8:

This International standard specifies the protocol for ensuring the quality of the gaseous hydrogen quality at hydrogen distribution bases and hydrogen fuelling stations for PEM fuel cells for road vehicles.

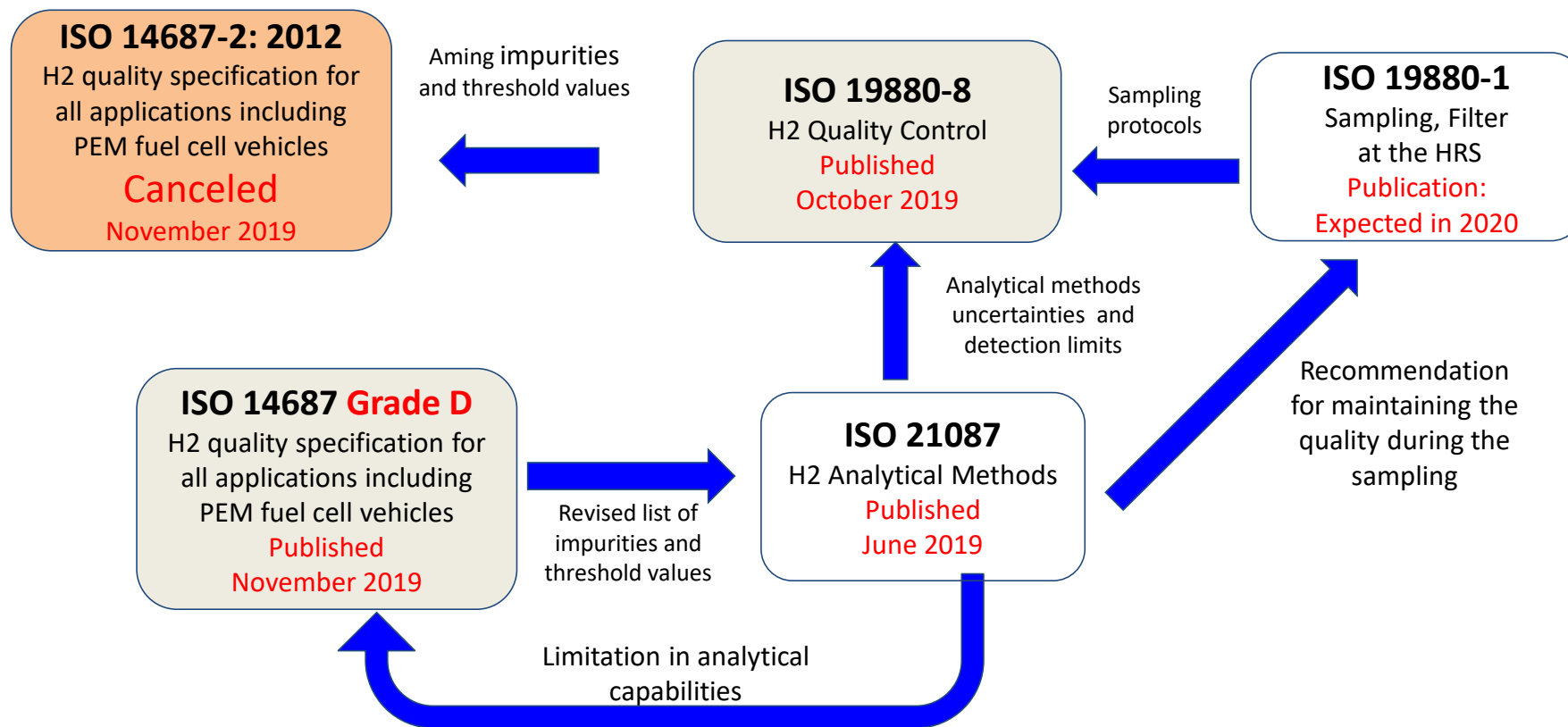


ISO19880-8: Gaseous Hydrogen Fueling Station - Hydrogen Quality Control

- **ISO19880-8 guides the ways of quality control for whole supply chain of the hydrogen for the FCV application.**
- **Two approaches for the quality control in ISO19880-8;**
 - **A prescriptive methodology to guide the quality control of the hydrogen production and supply of the established processes.**
 - **A risk assessment method to guide the appropriate quality control manner for the production and whole supply chain to meet the specifications.**

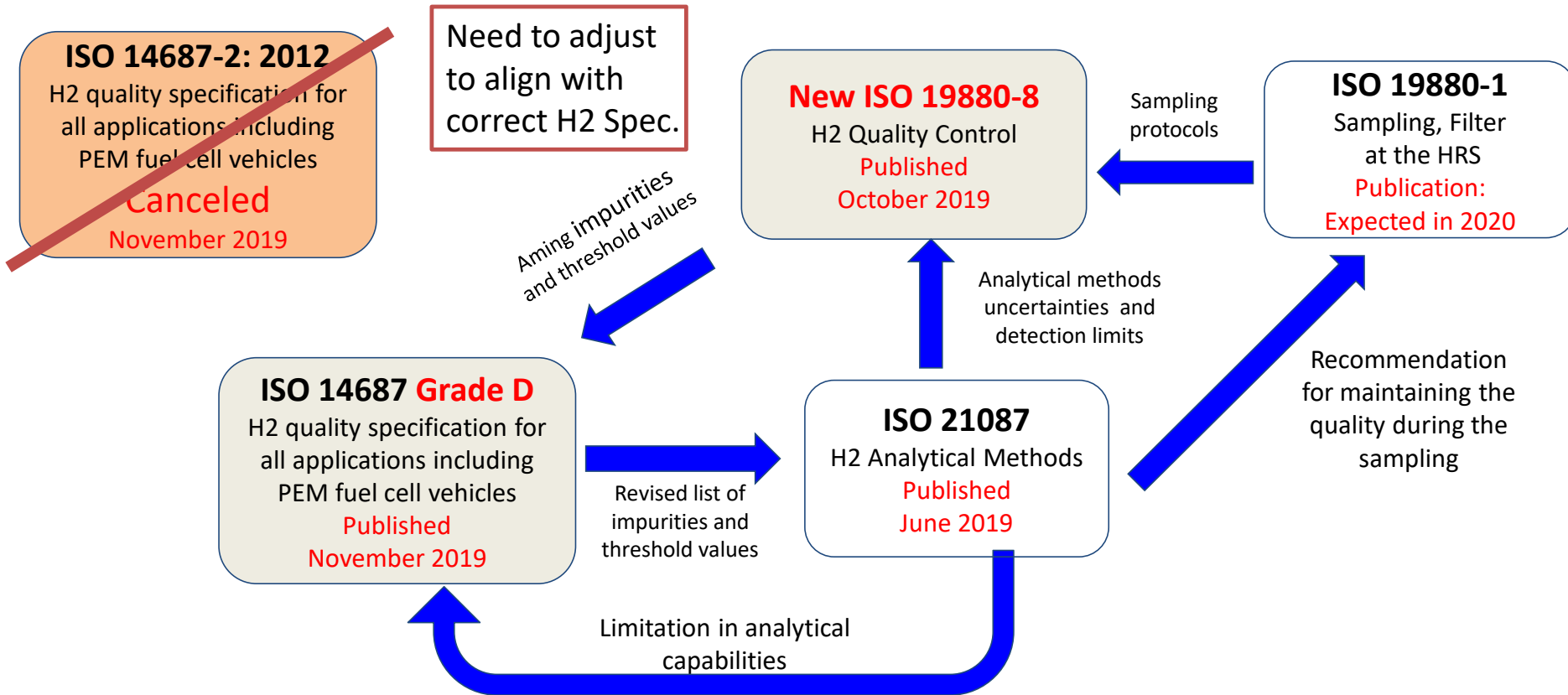


ISO H₂ Quality Standards at the moment





Urgent revision for ISO19880-8 is needed





After the WG 28 meetings at Minatec Grenoble, Dec. 9, 2019

✓ The path for revision of ISO19880-8

NP for a full revision or an Amendment;

- **WG28 agreed to revise ISO 198808 using an Amendment instead of full revision for whole standard.**
 - **Amendment can be processed quicker way. (need to be aligned ASPS)**
 - **Concentrate on the points need to be revised to catch up ISO14687.**

- **All technical discussions, including past FDIS comments, moved to next revision of 19880-8**
 - **Discussions will start after amendment is complete.**



Action Items for WG 28 for the next step

✓ The path for revision of ISO19880-8 Amendment

- Send out Amendment to 19880-8 with comment sheet before end of year (S. Quong, H. Tomioka)
- Agreement to propose amendment which will limit comments to align/correct 19880-8 with 2019 version of 14687
 - 18 month process
 - Proposal to skip CD (4 week CIB)
 - Agree to clarify Table 4 SC from value to N/A in order to address discrepancy of threshold vs. over threshold levels (similar to EN17124 H2O)



ISO TC197, H₂ Quality

Summary

Hidenori Tomioka, JISC
ISO/TC197 Technical Program Director



Items need to be resolved for the H₂ Quality Standards

WG 27: ISO14687

- ✓ The change of the convenorship.
- ✓ Registration of PWI for next revision.

WG28: ISO19880-8

- ✓ NP for an Amendment.
- ✓ To start with DIS (to skip CD)