

Standards to promote hydrogen mobility

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EMPIR project • November 8th, 2018

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International and European structures of interest

ISO/TC 197
“Hydrogen technologies”

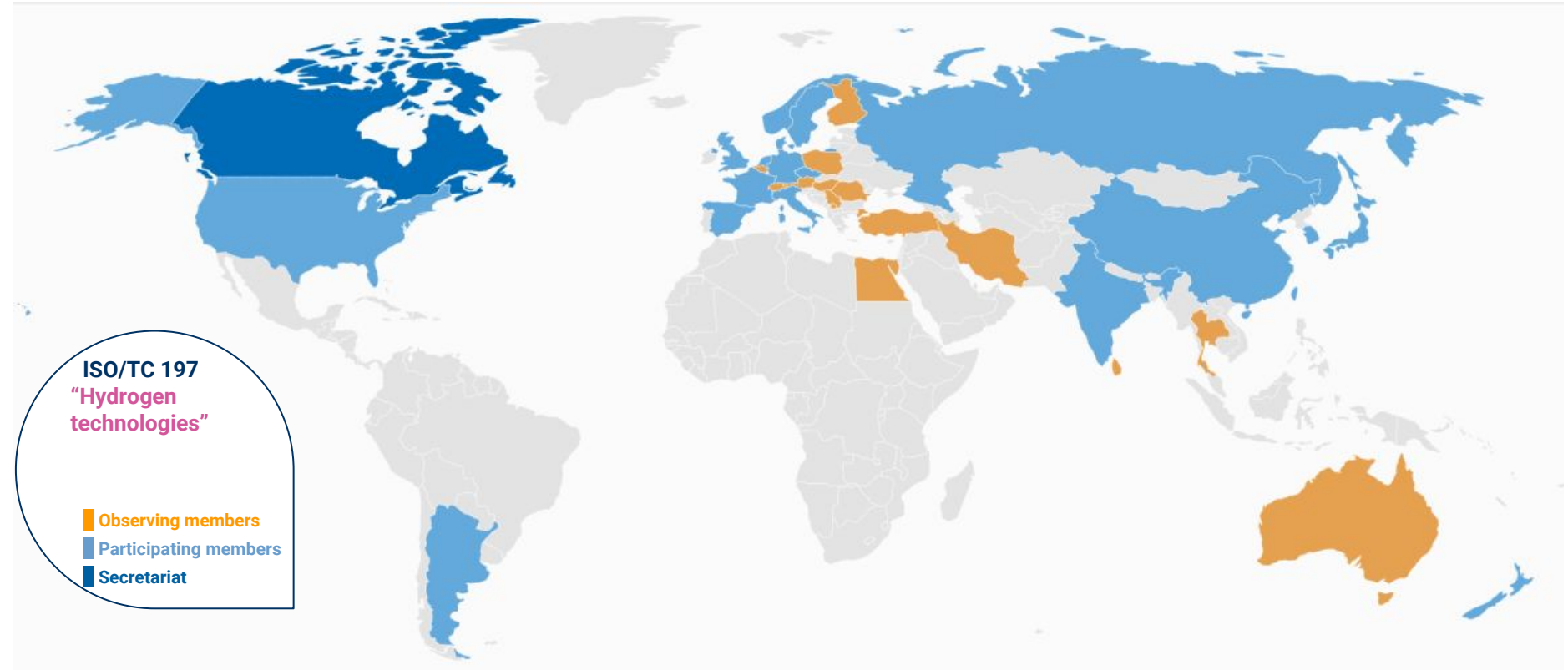
CEN/TC 268/
WG 5
“Specific H2 technologies
applications”

CEN/TC 23/
WG 16
“Fully wrapped composite
cylinders”

CEN-CLC TC 6
“Hydrogen”

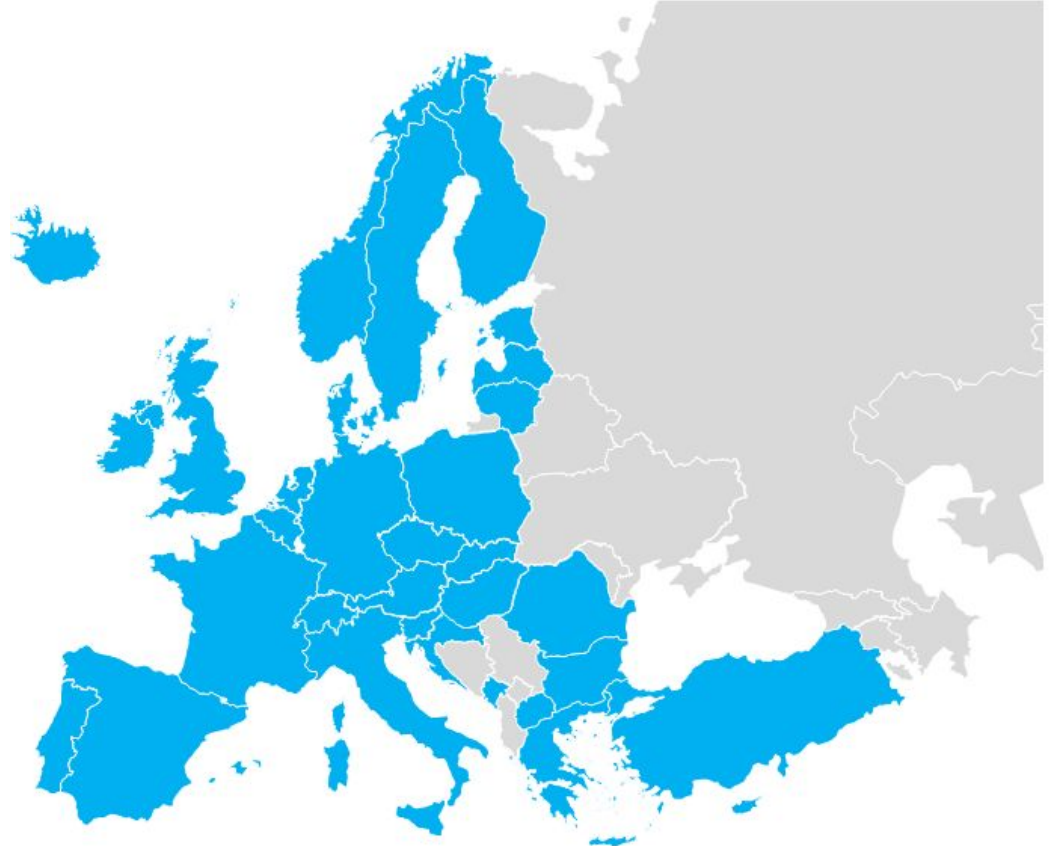
IEC-TC 105
“Fuel cell
technologies”

Participation at ISO/TC 197



Participation at CEN/TC 268 and CEN/TC 23

34
Participating
members



Link between the committees


INTERNATIONAL

ISO/TC 197


 Chairman: Andrei Tchouvelev
Secretary: Jonathan Lafontaine (BNQ)

EUROPEAN

CEN/TC 268/WG 5

 Convenor: Hervé Barthélémy
Secretary: Laurie Jardel (AFNOR)

CEN/TC 23/WG 16

 Convenor: Hervé Barthélémy
Secretary: Laurie Jardel (AFNOR)

NATIONAL

E29D

Chairman: Pierre Serre-Combe
Secretary: Frédéric Solbes (AFNOR)
HB member

E29E

Chairman: Hervé Barthélémy
Secretary: Laurie Jardel (AFNOR)

Focus on ISO/TC 197 “Hydrogen technologies”



Scope of the ISO/TC 197

- Standardization in the field of systems and devices for the production, storage, transport, measurement and use of hydrogen.

**19 PUBLISHED
STANDARDS**

**10 STANDARDS UNDER
DEVELOPMENT**

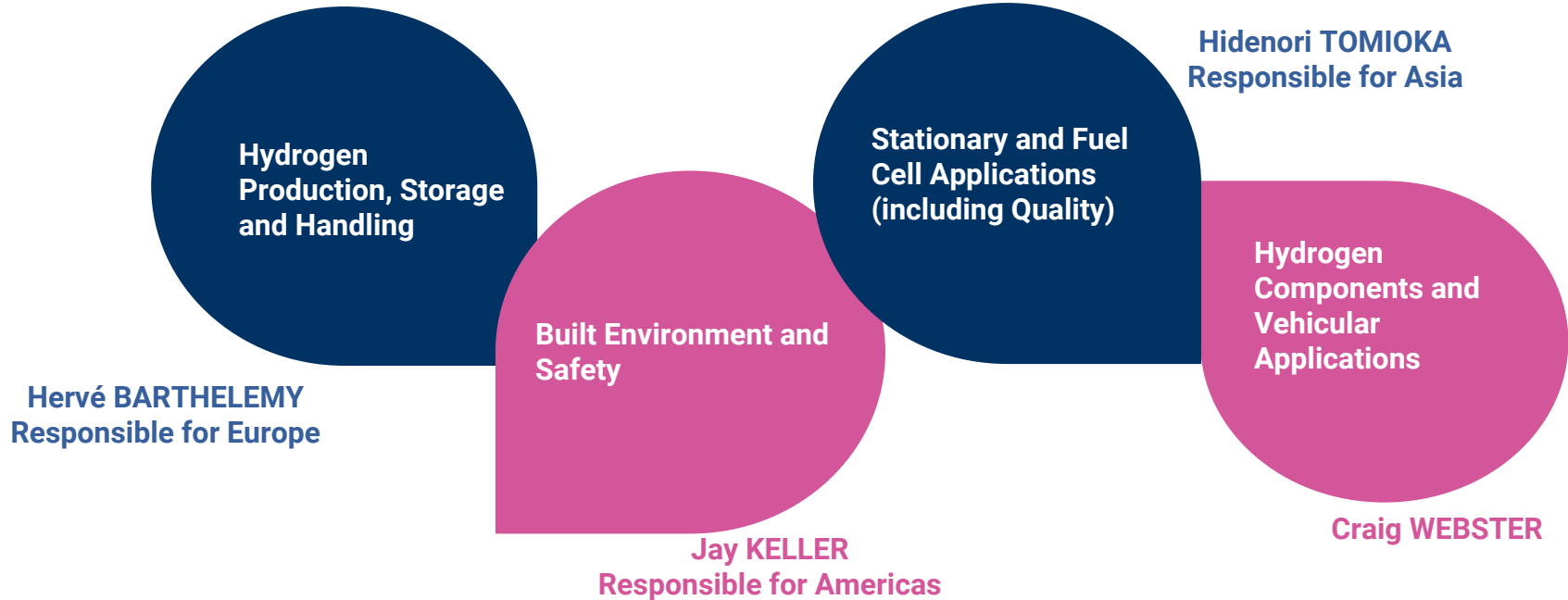
19 P-MEMBERS

15 O-MEMBERS

ISO/TC 197 has a **Technical Advisory Board (TAB)** made up of **recognized experts in four key subject areas, from different regions**, to act as Technical Program Directors (TPDs) helping to coordinate the liaisons and TC work in their areas of expertise and the work in their regions

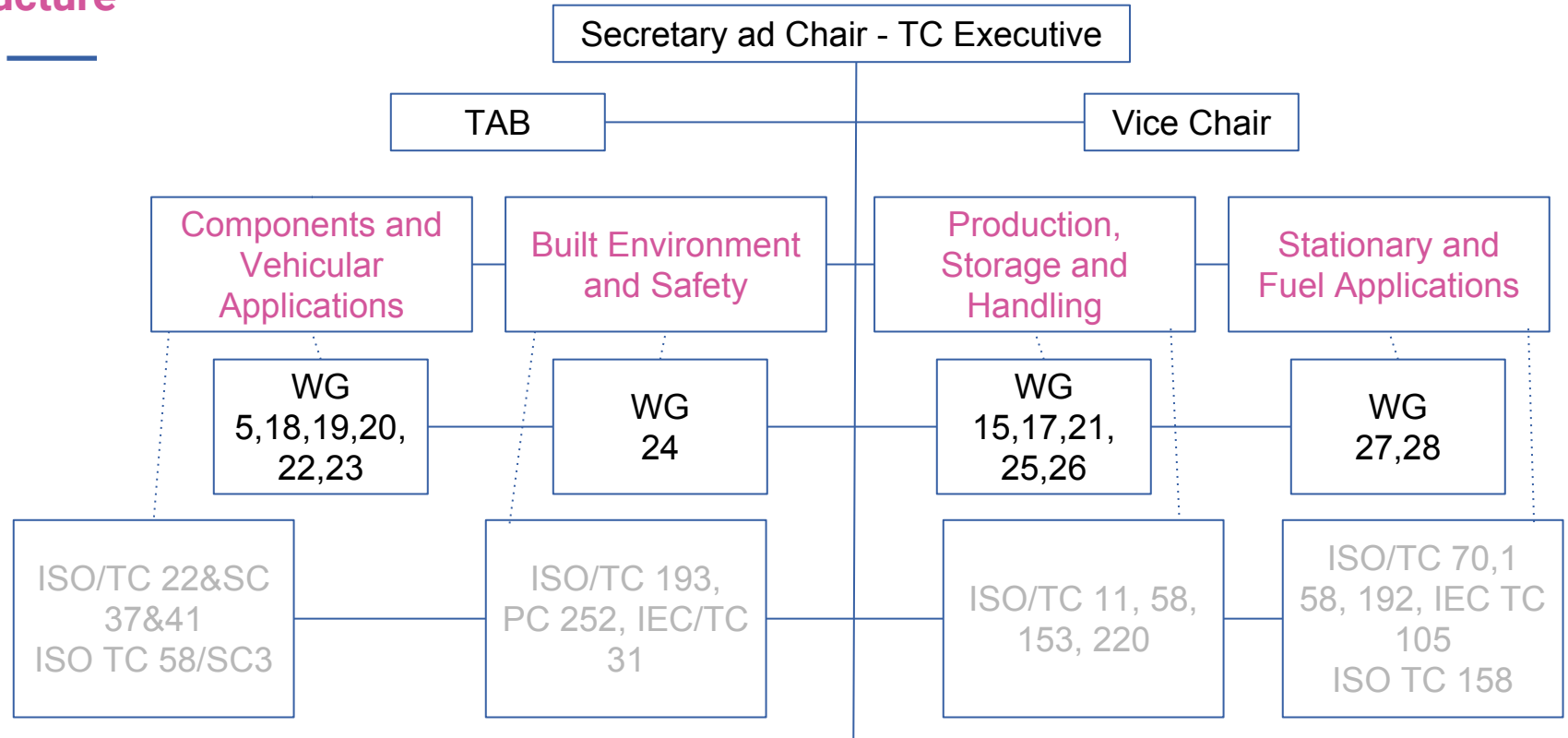
Focus on ISO/TC 197 “Hydrogen technologies”

Technical Advisory Board (TAB)



Focus on ISO/TC 197 “Hydrogen technologies”

Structure



Focus on ISO/TC 197 “Hydrogen technologies”

Published standards

- ISO 13984 “Liquid hydrogen - Land vehicle fuelling system interface”
- ISO 13985 “Liquid hydrogen - Land vehicle fuel tanks”
- ISO 14687-1 “Hydrogen fuel - Product specification - Part 1: All applications except PEM fuel cell for road vehicles”
- ISO 14687-2 “Hydrogen fuel - Product specification - Part 2: PEM fuel cell applications for road vehicles”
- ISO 14687-3 “Hydrogen fuel - Product specification - Part 2: PEM fuel cell applications for stationary appliances”
- ISO/TS 15869 “Gaseous hydrogen and hydrogen blends - Land vehicle fuel tanks”
- ISO/TR 15916 “Basic considerations for the safety of hydrogen systems”
- ISO 16110-1 “Hydrogen generators using fuel processing technologies - Part 1: Safety”
- ISO 16110-2 “Hydrogen generators using fuel processing technologies - Part 2: Test methods for performance”
- ISO 16111 “Transportable gas storage devices - Hydrogen absorbed in reversible metal hydride”

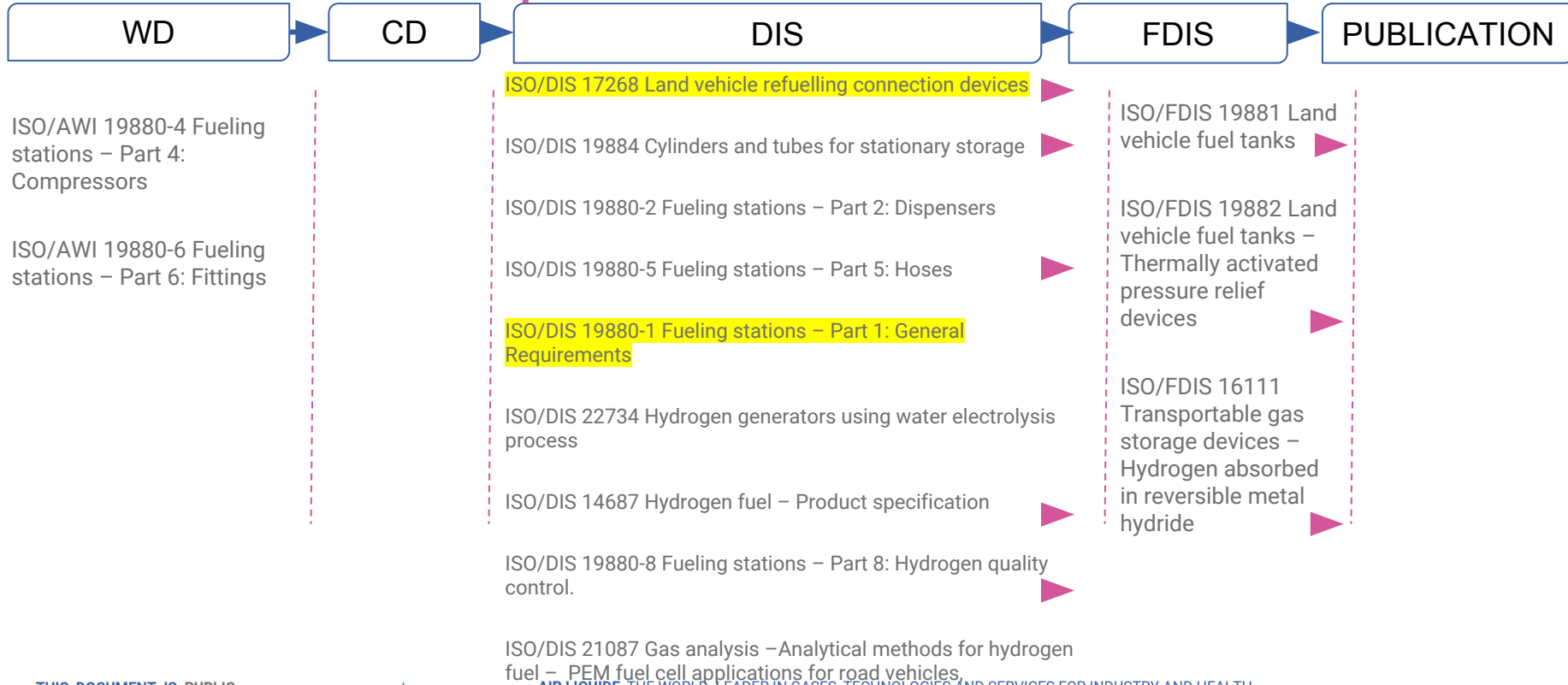
Focus on ISO/TC 197 “Hydrogen technologies”

Published standards

- ISO 17268 “Gaseous hydrogen land vehicle refuelling connection devices”
- **ISO/TS 19880-1 “Gaseous hydrogen - Fuelling stations - Part 1: General requirements”**
- ISO 19880-3 “Gaseous hydrogen - Fuelling stations - Part 3: Valves”
- ISO/TS 19883 “Safety of pressure swing adsorption systems for hydrogen separation and purification”
- ISO 22734-1 “Hydrogen generators using water electrolysis process - Part 1: Industrial and commercial applications”
- ISO 22734-2 “Hydrogen generators using water electrolysis process - Part 2: Residential applications”
- ISO 26142 “Hydrogen detection apparatus - Stationary applications”

Focus on ISO/TC 197 “Hydrogen technologies”

Standards under development



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CEN/TC 268/WG 5 - "Specific H2 technologies applications"

Scope of the CEN/TC 268/WG 5

Development of 3 standards to comply with the AFI mandate

Convenor:
Hervé BARTHELEMY



STATIONS & FUELLING PROTOCOLS

HYDROGEN QUALITY

prEN 17124 "Hydrogen fuel. Product specification and quality assurance. Proton exchange membrane (PEM) fuel cell applications for road vehicles"

prEN 17127 "Outdoor hydrogen refuelling points dispensing gaseous hydrogen and incorporating filling protocols"
(INTEROPERABILITY)

CONNECTORS

EN ISO 17268 "Gaseous hydrogen land vehicle refuelling connection devices"

Date of availability : 2018-10-10

2018-11-07

Already available and in revision

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November 8th, 2018

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EMPIR project

Standards to promote hydrogen mobility

prEN 17124 “Hydrogen fuel. Product specification and quality assurance. Proton exchange membrane (PEM) fuel cell applications for road vehicles“

This European standard specifies:

- the quality characteristics of hydrogen fuel
- the corresponding quality assurance in order to ensure uniformity of the hydrogen product as dispensed for utilization in proton exchange membrane (PEM) fuel cell road vehicle systems.
- Aligned with ISO 14687 (new) and ISO 19880-8

Constituent	Characteristics
Hydrogen fuel index (minimum mole fraction) ^a	99,97 %
Total non-hydrogen gases	300 $\mu\text{mol/mol}$
Maximum concentration of individual contaminants	
Water (H ₂ O)	5 $\mu\text{mol/mol}$
Total hydrocarbons ^b (Excluding Methane)	2 $\mu\text{mol/mol}$
Methane (CH ₄)	100 $\mu\text{mol/mol}$
Oxygen (O ₂)	5 $\mu\text{mol/mol}$
Helium (He)	300 $\mu\text{mol/mol}$
Nitrogen (N ₂)	300 $\mu\text{mol/mol}$ ←
Argon (Ar)	300 $\mu\text{mol/mol}$ ←
Carbon dioxide (CO ₂)	2 $\mu\text{mol/mol}$
Carbon monoxide (CO) ^c	0,2 $\mu\text{mol/mol}$
Total sulfur compounds (H ₂ S basis)	0,004 $\mu\text{mol/mol}$
Formaldehyde (HCHO) ^c	0,2 $\mu\text{mol/mol}$ ←
Formic acid (HCOOH) ^c	0,2 $\mu\text{mol/mol}$
Ammonia (NH ₃)	0,1 $\mu\text{mol/mol}$
Total halogenated compounds ^d (Halogenate ion basis)	0,05 $\mu\text{mol/mol}$
Maximum particulates concentration	1 mg/kg
For the constituents that are additive, such as total hydrocarbons and total sulfur compounds, the sum of the constituents are to be less than or equal to the acceptable limit.	
^a The hydrogen fuel index is determined by subtracting the “total non-hydrogen gases” in this table, expressed in mole percent, from 100 mole percent.	
^b Total hydrocarbons include oxygenated organic species. Total hydrocarbons shall be measured on a carbon basis ($\mu\text{molC/mol}$).	
^c Total of CO, HCHO, HCOOH shall not exceed 0,2 $\mu\text{mol/mol}$ ←	
^d Total halogenated compounds include, for example, hydrogen chloride (HCl), and organic halides (R-X). Species will be checked according Quality Assurance	

CEN/TC 23/WG 16 - “Fully wrapped composite cylinders”

Convenor: Hervé BARTHELEMY



BUFFERS FOR STATIONS

prEN ISO 19884
“Gaseous hydrogen –
Cylinders and tubes for
stationary storage”



CYLINDERS AND TUBES FOR TRAILERS

prEN 17339
“Transportable gas
cylinders – Fully wrapped
carbon composite
cylinders and tubes for
hydrogen use”

Conclusion

- **Several International and European committees involved into the development of standards to promote hydrogen mobility**
- **The 3 standards supporting AFI directive are under publication**
- **Support from pre-normative research projects is needed to help development of standards**

End of
presentation

