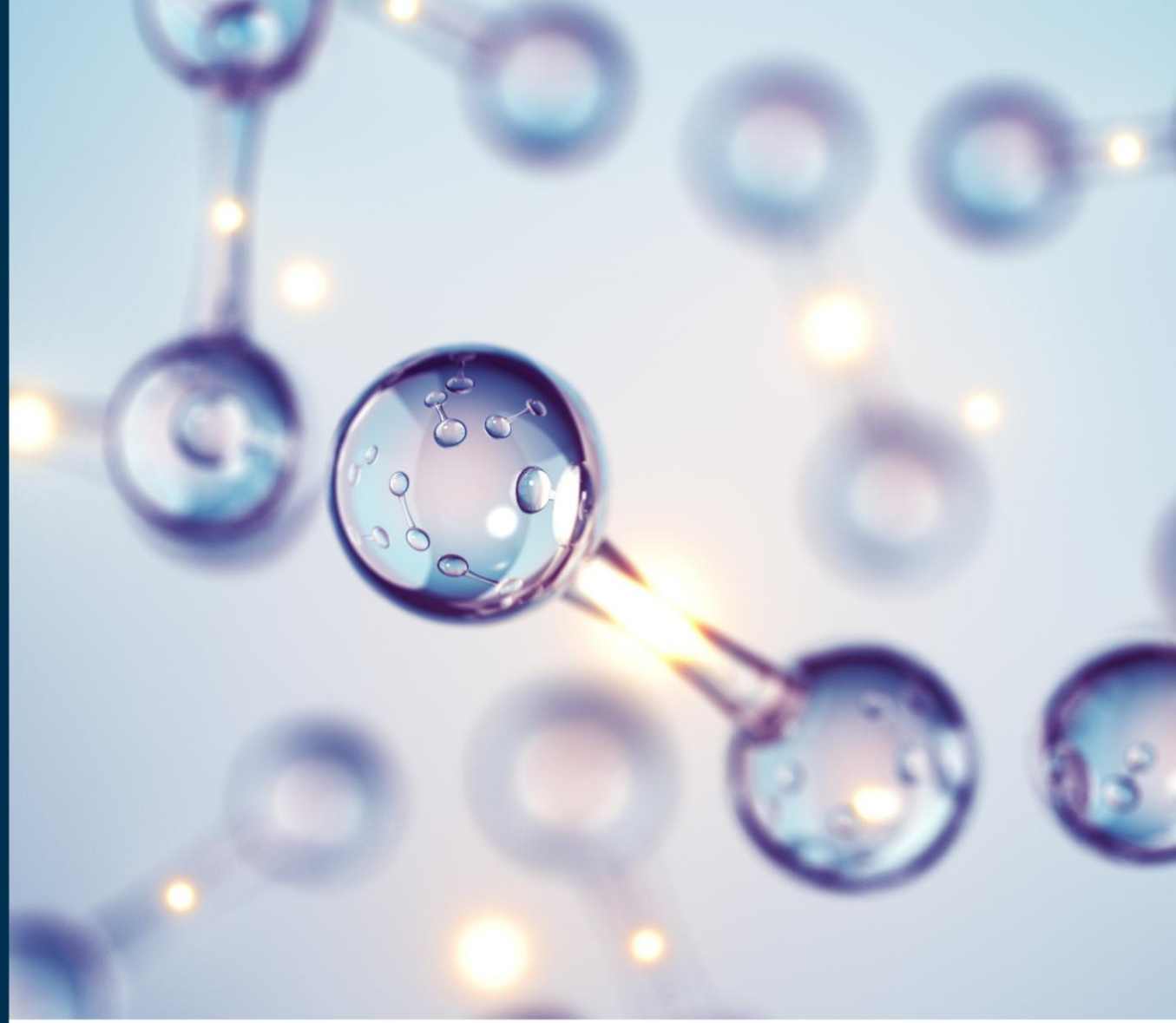
ISO/TC 197 and SC 1 Activities

Jennifer Hamilton

Hydrogen Fuel Cell Partnership

ISO/TC 197 U.S. TAG Chair



ANSI

ASTM INTERNATIONAL

CGA Compressed Gas Association The Standard For Safety Since 1913

CSA GROUP™

ISO Technical Committee (TC) 197 Hydrogen Technologies

- Creation date: 1990
- Secretariat: SCC (Canada)
- Committee Manager: Siasia Morel, Bureau de la normalization du Québec (BNQ)
- Chair: Tetsufumi Ikeda, The Association of Hydrogen Supply and Utilization Technology (HySUT)

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

ISO/TC 197

- 33 Plenary meetings
- 4 SC1 Plenaries

- 25 Standards published (including under SC1)

Participating members : 44 (5 new members)

Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Cyprus, Czech Republic, Denmark, **Egypt**, Finland, France, Germany, Hungary, India, Islamic Republic of Iran, Ireland, Italy, Japan, Republic of Korea, **Kuwait**, **Luxembourg**, **Malaysia**, Morocco, Netherlands, New Zealand, Norway, Peru, **Poland**, Romania, Russian Federation, Saudia Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Tunisia, Ukraine, United Arab Emirates, United Kingdom and the United States of America

Observing members : 15

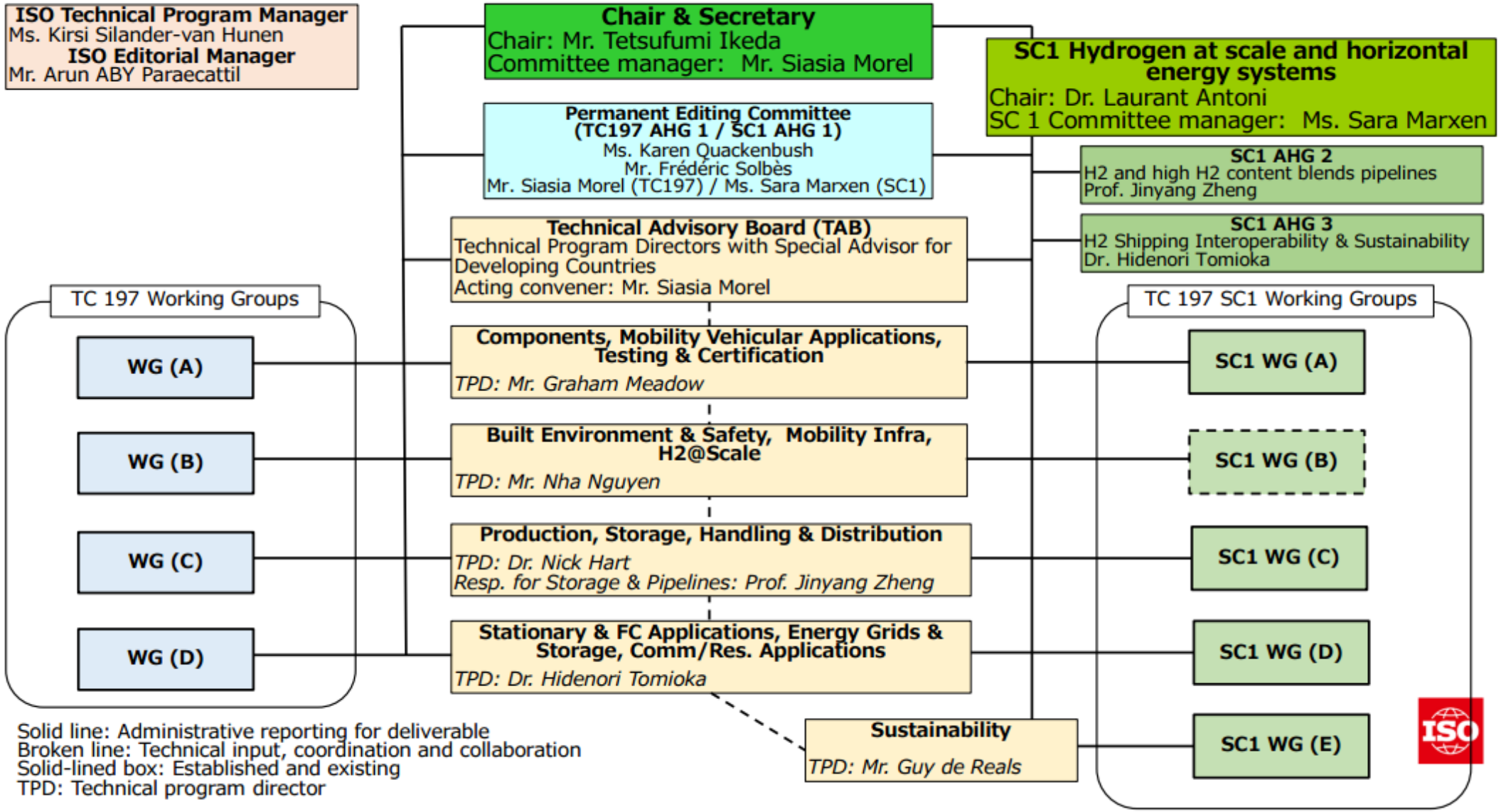
Plurinational State of Bolivia, Bulgaria, Colombia, Estonia, Hong Kong Special Administrative Region of China, Israel, Kazakhstan, Oman, Portugal, Serbia, Slovakia, Sri Lanka, Thailand, Türkiye and Uzbekistan

ISO/TC 197 Subcommittee (SC) 1
Hydrogen at scale and horizontal energy systems

- Creation date: 2022
- Secretariat: SCC
- Committee Manager: Sara Marxen, CSA Group
- Chair: Dr. Laurent Antoni, International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE)

- SCOPE: Standardization of large-scale hydrogen energy systems and applications including aspects of testing, certification, sustainability and placement, and coordination with other relevant standardization bodies and stakeholders.

ISO/TC 197 Hydrogen Technologies



ISO/TC 197 Working Groups

WG (A)
Components, Mobility Vehicular Applications, Testing & Certification

- **WG1 Liquid hydrogen -Land vehicles fuel tanks**
  Convener: Mr. Richard Trott
- **WG5 Gaseous hyrogen land vehicle refueling connection devices**
  Convener: Mr. Livio Gambone
- **WG18 Gaseous hydrogen land vehicle fuel tanks and TPRDs**
  Convener: Mr. Livio Gambone
- **WG19 Gaseous hydrogen fueling station dispensers**
  Convener: Dr. Shogo Watanabe
- **WG22 Gaseous hydrogen fueling station hoses**
  Convener: Ms. Karen Quackenbush
- **WG23 Gaseous hydrogen fueling station fittings**
  Convener: Ms. Karen Quackenbush
- **WG31 Rubber O-rings**
  Convener: Dr. Shin Nishimura
- **WG36 Gaseous hydrogen land vehicle refueling connection devices-Cryo-compressed H2 gas**
  Convener: Mr. Michael Stodt
- **JWG30 with TC22/SC41 Gaseous hydrogen land vehicle fuel system components**
  Convener: Mr. Graham Meadows

WG (B)
Built Environment & Safety, Mobility Infra, H2@Scale

- **WG24 Gaseous hydrogen fueling protocols for – hydrogen fuelled vehicles**
  Convener: Mr. Steve Mathison
- **WG29 Basic considerations for the safety of hydrogen system**
  Convener: Dr. Jay Keller
- **WG35 Liquid hydrogen land vehicle fueling protocol**
  Convener: Mr. Baptiste Ravinel
- **WG37 Gaseous hydrogen - Fuelling stations - Mobile fueling stations**
  Convener: Dr. Hansang Kim
- **WG38 Gaseous hydrogen - Fuelling protocols for hydrogen fuelled vehicles: communications between the vehicle and dispenser control systems**
  Convener: Mrs. Victoria Carette
- **WG39 Hydrogen technologies - Interoperability - Interface between gaseous hydrogen trailer and hydrogen fuelling station**
  Convener: Mrs. Elena Vyazmina

WG 42 Gaseous hydrogen - Fuelling stations - General requirements
Convenor: Mr. Carlos Damas

WG (C)
Production, Storage, Handling & Distribution

- **WG15 Cylinders and tubes for stationary storage**
  Convener: Mr. John Eihusen
- **WG21 Gaseous hydrogen fueling station compressors**
  Convener: Ms. Karen Quackenbush
- **WG34 Hydrogen generators using water electrolysis test protocols and safety requirements**
  Convener: Dr. Nick Hart

WG (D)
Stationary & FC Applications, Energy Grids & Storage, Comm/Res. Applications

- **WG27 Hydrogen fuel quality**
  Convener: Mr. Osamu Tajima
- **WG28 Hydrogen quality control**
  Convener: Dr. Hidenori Tomioka
- **WG33 Sampling for fuel quality analysis**
  Convener: Dr. Thor Anders Aarhaug
- **WG40 Hydrogen generators using fuel processing technologies - Part 2: Test methods for performance**
  Convener: Mr. Rob Early

ISO/TC 197 SC1 Working Groups

SC1 WG (A)
Components, Mobility Vehicular Applications, Testing & Certification

SC1 JWG3 Fuel system components for hydrogen-fuelled vehicles - Part 2: Rail vehicles
Convener, Mr. Enrico Morelli

SC1 WG (C)
Production, Storage, Handling & Distribution

SC1 WG2 Aerial vehicle liquid hydrogen fuel storage system
Convener, Dr. Yon Nam Choi

SC1 WG (D)
Stationary & FC Applications, Energy Grids & Storage, Comm/Res. Applications

SC1 WG4 Hydrogen generators using water electrolysis - Part 2: Testing guidance for performing electricity grid service
Convener: Mr. Kevin Vincent Schalk

SC1 WG (E)
Sustainability

SC1 WG1 Methodology for Determining the Greenhouse Gas Emissions Associated with the Production, Conditioning and Transport of Hydrogen to Consumption Gate
Convener, Dr. Laurent Antoni

SC1 WG5 Methodology for Determining the Greenhouse Gas Emissions Associated with the Conditioning and Transport of Liquid Hydrogen up to Consumption Gate
Convener, Dr. Yuki Kudoh

SC1 WG6 Methodology for Determining the Greenhouse Gas Emissions Associated with the Conversion and Transport of Ammonia up to Consumption Gate
Convener, Mr. Trevor Brown

SC1 WG7 Methodology for Determining the Greenhouse Gas Emissions Associated with the Conversion and Transport of Liquid Organic Hydrogen Carrier up to Consumption Gate
Convener, Mr. Alexander Pilz-Lansley

Standards published in 2025

- ISO 24078:2025 - Hydrogen in energy systems — Vocabulary (CEN lead)
- ISO 22734-1:2025 - Hydrogen generators using water electrolysis — Part 1: Safety (WG 34)
- ISO 19882:2025 - Gaseous hydrogen — Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers (WG 18)
- ISO 19881:2025 - Gaseous hydrogen — Land vehicle fuel containers (WG 18)
- ISO 19880-2:2025 - Gaseous hydrogen — Fuelling stations — Part 2: Dispensers and dispensing systems (WG 19)
- ISO 19880-5:2025 - Gaseous hydrogen — Fuelling stations — Part 5: Dispenser hoses and hose assemblies (WG 22)
- ISO 19880-7:2025 - Gaseous hydrogen — Fuelling stations — Part 7: Rubber O-rings (WG 31)
- ISO 17268-1:2025 - Gaseous hydrogen land vehicle refuelling connection devices — Part 1: Flow capacities up to and including 120 g/s (WG 5)
- ISO 14687:2025 - Hydrogen fuel quality — Product specification (WG 27)

Standards published in 2026

- ISO/TS 15916: Hydrogen technologies — Basic considerations for the safety of hydrogen systems (WG 29)
- ISO 13984: Liquid hydrogen — Land vehicle fueling protocol (WG 35)

Reference	Document title	Working Group
ISO/DIS 13985	*Liquid hydrogen — Land vehicle fuel storage system*	ISO/TC 197/WG 1
ISO/AWI 16110-2	*Hydrogen generators using fuel processing technologies — Part 2: Test methods for performance*	ISO/TC 197/WG 40
ISO/DIS 17268-2	*Gaseous hydrogen land vehicle refuelling connection devices — Part 2: Part 2: Flow capacities greater than 120 g/s*	ISO/TC 197/WG 5
ISO/AWI 19880-1	*Gaseous hydrogen — Fuelling stations — Part 1: General requirements*	ISO/TC 197/WG 42
ISO/PWI 19880-4	*Gaseous hydrogen – Fueling stations — Part 4: Compressors*	ISO/TC 197/WG 21
ISO/CD TS 19880-10	*Gaseous hydrogen — Fuelling stations — Part 10: Mobile fueling stations*	ISO/TC 197/WG 37
ISO/AWI 19880-11	*Gaseous hydrogen — Fuelling stations — Part 11: Part 11: High pressure Liquid Hydrogen Pumps*	ISO/TC 197/WG 41
ISO/DIS 19884-1	*Gaseous Hydrogen - Pressure vessels for stationary storage — Part 1: Part 1: general requirements*	ISO/TC 197/WG 15
ISO/DTR 19884-2	*Gaseous Hydrogen - Pressure vessels for stationary storage — Part 2: Material test data of class A materials (steels and aluminum alloys) compatible to hydrogen service*	ISO/TC 197/WG 15
ISO/AWI TR 19884-3	*Gaseous Hydrogen - Pressure vessels for stationary storage — Part 3: Pressure cycle test data to demonstrate shallow pressure cycle estimation methods*	ISO/TC 197/WG 15
ISO/CD 19885-2	*Gaseous hydrogen — Fuelling protocols for hydrogen-fuelled vehicles — Part 2: Definition of communications between the vehicle and dispenser control systems*	ISO/TC 197/WG 38
ISO/CD 19885-3	*Gaseous hydrogen — Fuelling protocols for hydrogen-fuelled vehicles — Part 3: High flow hydrogen fuelling protocols for heavy duty road vehicles*	ISO/TC 197/WG 24
ISO/AWI 19885-4	*Gaseous hydrogen — Fuelling protocols for hydrogen fuelled vehicles — Part 4: Part 4: Validation of Hydrogen Fuelling Protocols Applied in a Dispenser*	ISO/TC 197/WG 24
ISO/AWI 19886	*Hydrogen technologies — General hydrogen station requirements*	ISO/TC 197/WG 42
ISO/AWI 19888-1	*Hydrogen Technologies — Aerial Vehicles — Part 1: Liquid Hydrogen Fuel Storage System*	ISO/TC 197/WG 2
ISO/CD TS 19889-1	*Hydrogen technologies — Interoperability — Part 1: Part 1: Interface between gaseous hydrogen trailer and hydrogen fuelling station*	ISO/TC 197/WG 39
ISO/WD 24925	*Cryo-compressed hydrogen refuelling protocol*	ISO/TC 197/WG 36
ISO/AWI 25578	*Liquid hydrogen — Land vehicle refuelling connection devices*	ISO/TC 197/WG 35
ISO/WD 26018	*Liquid hydrogen — Fuel system components for hydrogen fuelled vehicles*	ISO/TC 197/WG 1

SC-1: documents in development

- Published: ISO/TS 19870:2023 Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the production, conditioning and transport of hydrogen to consumption gate
- Currently being separated into four parts:
  - ISO/FDIS 19870-1 Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 1: Emissions associated with the production of hydrogen up to the production gate (WG 1)
  - ISO/DIS 19870-2 Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 2: Emissions associated with the conditioning and transport of gaseous and liquid hydrogen up to consumption gate (WG 5)

SC-1: documents in development

- ISO/DIS 19870-3 hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 3: Emissions associated with the production, storage and transport of ammonia up to delivery gate and the conversion of ammonia into hydrogen (WG 6)
- ISO/DIS 19870-4 Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 4: Emissions associated with the storage and transport of hydrogen via LOHC (WG 7)
  - From the 2025 Plenary: it was noted that for the 19870 Series, we need participation at the European level from 5 countries for the Vienna Agreement* with CEN/CENELEC
  - *The 1991 agreement between ISO and CEN ensures that standards developed by ISO/TC 197 are often adopted as European Standards (EN ISO), minimizing duplicate work and conflict*

SC-1: documents in development

- ISO/CD 19887-2 Gaseous Hydrogen — Fuel system components for hydrogen-fuelled vehicles — Part 2: Rail vehicles (JWG 3 with IEC/TC 9)
- ISO/AWI 19888-1 Hydrogen Technologies — Aerial Vehicles — Part 1: Liquid Hydrogen Fuel Storage System (WG 2)
- ISO/WD TS 22734-2 Hydrogen generators using water electrolysis — Part 2: Testing guidance for performing electricity grid service (WG 4) -requesting additional expert participants
  - The U.S. is looking to submit a New Work Item Proposal with Germany for Performance Requirements related to water electrolyzers in electricity grid services

Liaisons to the TC 197 and SC-1

- TC 197

IEC/TC 9	Electrical equipment and systems for railways
IEC/TC 31	Equipment for explosive atmospheres
ISO/TC 11	Boilers and pressure vessels
ISO/TC 22	Road vehicles
ISO/TC 22/SC 37	Electrically propelled vehicles
ISO/TC 22/SC 41	Specific aspects for gaseous fuels
ISO/TC 45/SC 1	Rubber and plastics hoses and hose assemblies
ISO/TC 58	Gas cylinders
ISO/TC 58/SC 3	Cylinder design
ISO/TC 158	Analysis of gases
ISO/TC 192	Gas turbines
ISO/TC 220	Cryogenic vessels
ISO/TC 291	Domestic gas cooking appliances

- SC-1
  - IEC/SC 31J, Classification of hazardous areas and installation requirements
  - IEC/TC 9, Electrical equipment and systems for railways
  - ISO/TC 8/SC 2, Marine environment protection
  - ISO/TC 67, Oil and gas industries including lower carbon energy
  - ISO/TC 67/SC 2, Pipeline transportation
  - ISO/TC 67/SC 9, Production, transport and storage facilities for cryogenic liquified gases
  - ISO/TC 109, Oil and gas burners
  - ISO/TC 161, Controls and protective devices for gaseous and liquid fuels
  - ISO/TC 207, Environmental Management
  - ISO/TC 207/SC 7, Greenhouse gas and climate change management and related activities
  - ISO/TC 220, Cryogenic vessels
  - ISO/TC 244, Industrial furnaces and associated processing equipment
  - ISO/TC 269, Railway applications

Looking forward

- TC 197
  - Potentially more work around electrolyzers (efficiencies and performance testing)
  - Tube trailer components- potential overlap with existing work in TC 58/SC 2
  - Revision of the Strategic Business Plan; ad hoc group (AHG 3) being formed
- SC 1
  - A new work item proposal for hydrogen-based energy storage is being reviewed by the TAB
  - Meeting between the TC 197 and SC 1 leadership to discuss potential overlap on proposals around electrolyzers

1954 - 2025

Remembering

Dr. Andrei V. Tchouvelev

Over 41 years of experience in the field of hydrogen energy and technology.

Career in ISO activities
2012-2021 Chair, ISO/TC197
2017- ISO TMB Task Force on Climate Change Coordination (now CCCC)
2022- Chair, ISO/TC197/SC1

Thank you