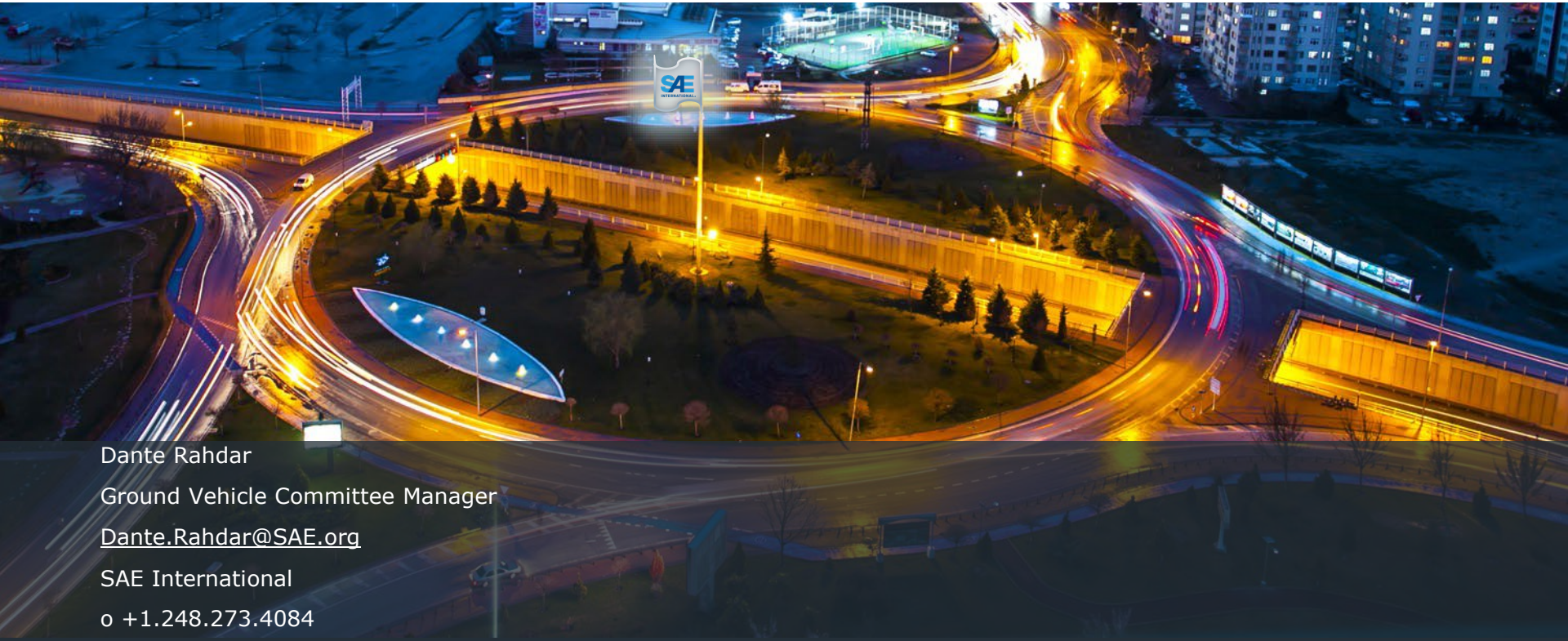
Ground Vehicle Fuel Cell Standards Overview 2026



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SAE ITC
An SAE International Affiliate

2003

Year founded

Not-for-profit

Aerospace, Land-based, Multi-sector Vehicle, and Data-intensive

Industries Industry conferences, consortia program administration.

SAE INTERNATIONAL®

1905

Year founded

Not-for-profit

Land-based and Aerospace Multi Mobility Sectors (Vehicle/Commercial/Micro)

Develop the highest quality technical standards and drive innovation through products, people, and processes.

PRI
PERFORMANCE REVIEW INSTITUTE

1990

Year founded

Not-for-profit

Aerospace, and Medical Device Industries

Management system auditing and certification

MISSION: *To advance mobility knowledge and solutions for the* ***benefit of humanity***

NEUTRAL FORUMS

Address society's mobility needs

RESOURCES

Engineering resources to advance mobility

EDUCATION

STEM programs and professional courses, building the workforce

COMMUNITY

Global community pulling from each other's collective wisdom

STANDARDS

Consensus-based standards that advance quality, safety and innovation

ROLES IN INDUSTRY: Professional Association, SDO, Publisher, STEM Educator, Professional Workforce Development, Knowledge & Networking Resource

Why SAE?

SAE International is the world's leading authority in mobility standards development.

SAE standards enable industry to advance technology to meet ambitious environmental targets.

SAE develops voluntary consensus standards, which are standards developed or adopted by voluntary consensus standards bodies, domestic (national), regional, and international.

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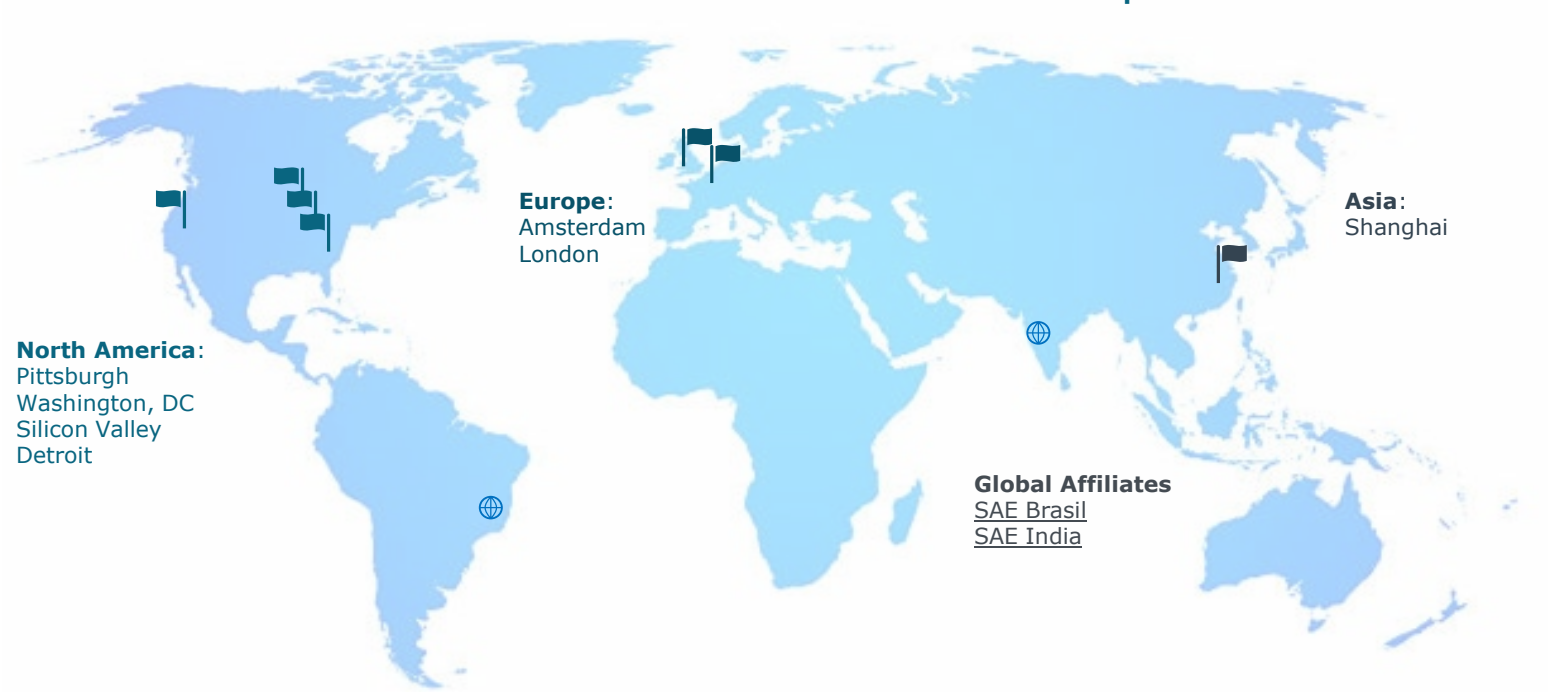
121 Years of Advancing Mobility Internationally

Mobility, Advanced℠

SAEI 200,000+ members & volunteers

90 Countries
42 Sections
115 Student Chapters



North America:
Pittsburgh
Washington, DC
Silicon Valley
Detroit

Europe:
Amsterdam
London

Asia:
Shanghai

Global Affiliates
SAE Brasil
SAE India

Role of Standards Today

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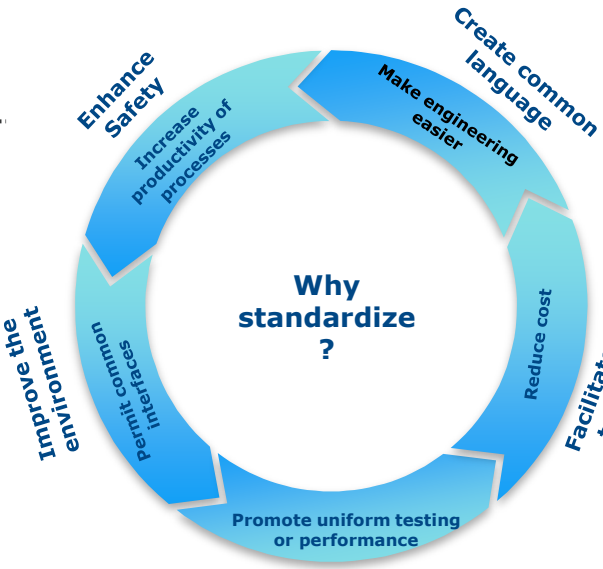
Consistent product quality

Regulatory compliance foundation

Consistent and clear expectations for product performance



Compatibility and interoperability

More efficient procurement

- Lowers trade barriers
- Lowers purchasing costs
- Decreases design time
- Increases new technology speed to market
- Promotes innovation and fosters competition
- Advances the collective technology of industry

https://www.sae.org/

Standards Development Process Timeline

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Need Established
Industry/Authority

Technical Development
Committee Expertise
Ballot 28/14 Days

Governance
Council Oversight
Ballot 28 Days

1,000+ SAE Standards currently cited in international regulations

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NHTSA

232
SAE Standards

EPA

87
SAE Standards

U.S. Department of Labor
MSHA
Mine Safety & Health Administration

42
SAE Standards

OSHA

40
SAE Standards

FMCSA

21
SAE Standards

United States Coast Guard

24
SAE Standards

Technical Committee Participant Classifications

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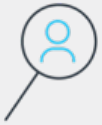
Voting Member

Access to all Work Area files and drafts

Responsibility to participate in meetings and balloting process

Liaison

Liaisons coordinate with parallel activities occurring in the government, other associations, and related SAE International technical committees



Mailing List Recipient

Mailing List Recipients receive information on technical committee meetings.

They do not receive information related to technical reports or ballots.

Consultant

Consultants are under contract to SAE International and serve in an advisory capacity on specific projects.

Global Ground Vehicle Standards Structure

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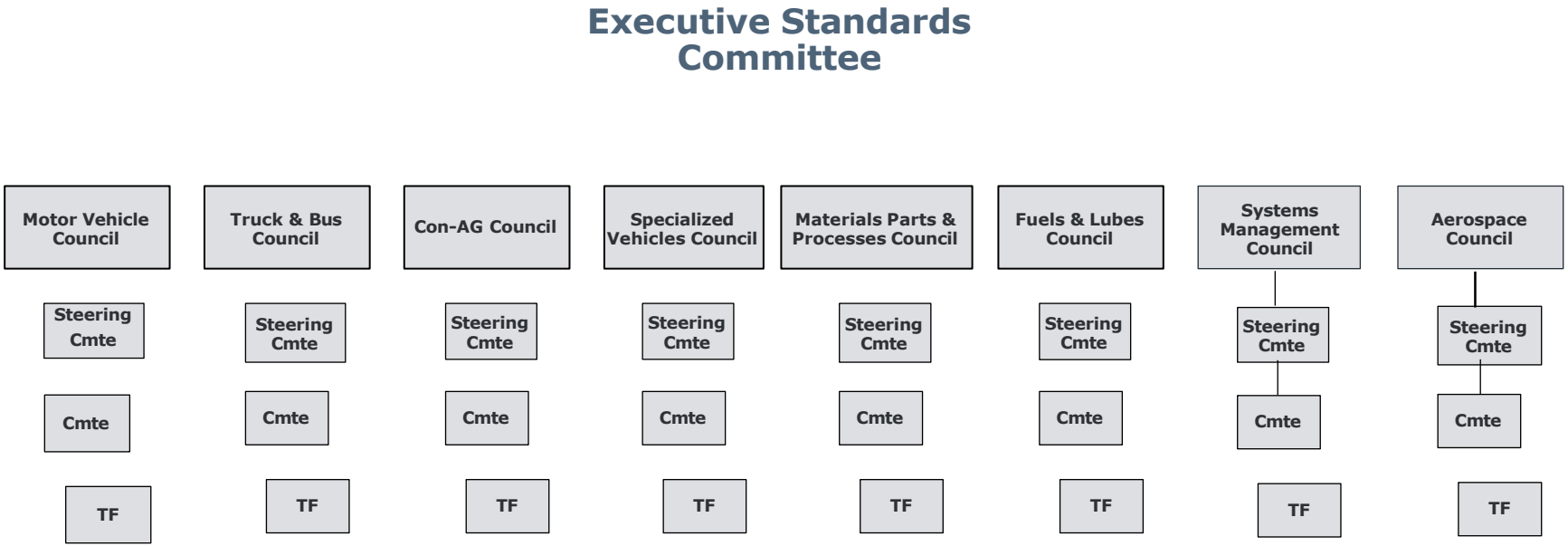

Ballot Process Flow Chart

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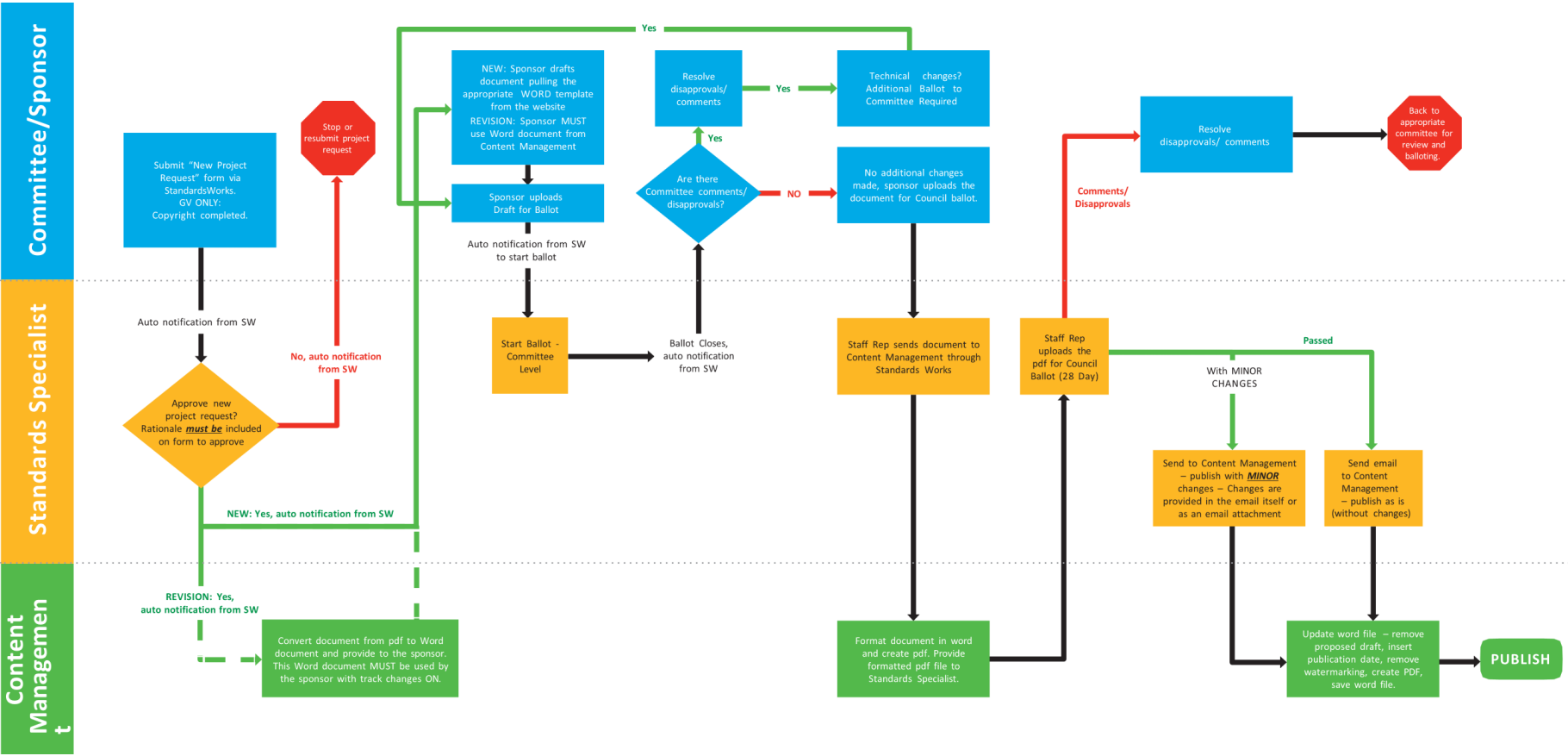

105 SAE EV, Hybrid, and Fuel Cell Vehicle Published Documents

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Fuel Cell Fueling: J2600, J2601, J2601/2, J2601/3, J2601/4, J2601/5, J2719, J2719/1, J2799, J1766, J2578, J2579,

Fuel Cell Testing: J2615, J2616, J2617, J3219

Fuel Cell Systems: J2579, J2594, J3089

EV Battery Recycling/Secondary Use: J2984, J2974, J3071, J2997

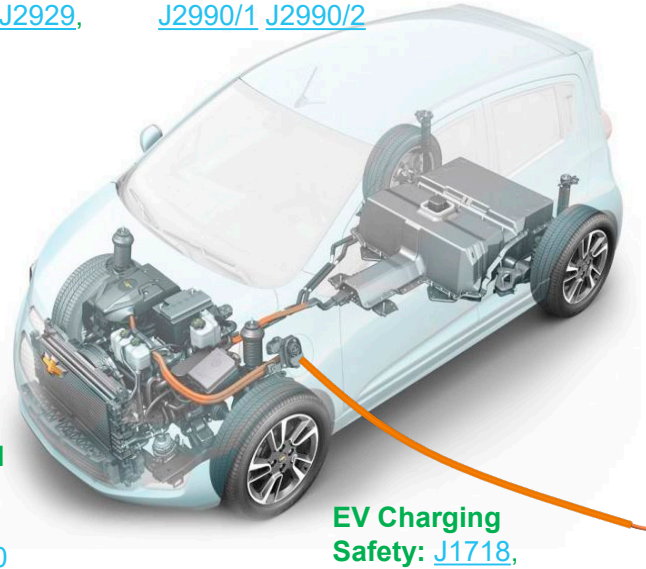
Energy Transfer Systems: J2293/2, J2293/1, J3072

EV, Hybrid, Fuel Cell Vehicle Safety: J1766, J2344, J2910, J2578, J3108, J3108/1, J3235, J2950, J3325, J2929, J2464, J3303

Battery Testing: J1798, J1798/1, 1798/2, J2288, J2289, J2380, J2758, J3220, J3277, J3277/1 J3335, J3337

EV, Hybrid, Fuel Cell Vehicle Terminology: J1715, J1715/2 J2574, J2760

EV, Hybrid, Fuel Cell Vehicle Crash Safety: J3040, J1766, J2990, J2990/1 J2990/2



EV Charging Safety: J1718, J2953/1,J2953/2 J2953/3

EV, Hybrid, Fuel Cell Vehicle Economy, Range / Power: J1798, J2758, J2572, J2907, J2908, J1634, J1711, J2711, J3311

EV Charging & Grid Communications: J1772, J1773, J2293, J2836, J2841, J2847/2, J2894/1, J2931/1, J2954, J3068, J3105, J3105/1, J3105/2, J3105/3, J2799, J3271, J3400, J3400/1 J3400/2

https://standardsworks.sae.org/standards-committees/hybrid-ev-committee
https://standardsworks.sae.org/standards-committees/fuel-cell-standards-committee
ttps://standardsworks.sae.org/standards-committees/vehicle-battery-standards-steering-committee

SAE EV, Hybrid, Fuel Cell Vehicle Std's on Vehicle Safety

J2990 & J2990/1:

- Emergency Response Guides (Immobilize, Disable, Warnings)
- Vehicle Type Identification (Badging)
- High Voltage Shutdown (Disconnects, Battery & Converter Cables
- Tow & Inspection Guides (Recovery, Isolation, Inspection, Diagnostics)
- Hazard Communication

- **J2990** - Hybrid and EV First and Second Responder Recommended Practice
- **J2990/1** - Gaseous Hydrogen and Fuel Cell Vehicle First and Second Responder Recommended Practice
- **J3108** - EV Labels to Assist First and Second Responders, and Others (high voltage safety info.)
- **J3108/1** - Standard Four-Letter Coding as an Identification Method for Alternative Fuel Vehicles
- **J2344** - Guidelines for Electric Vehicle Safety (EV, HEV, PHEV and FCV high voltage systems)
- **J2578** - Recommended Practice for General Fuel Cell Vehicle Safety (fuel cell system, storage & high voltage)
- **J1766** - Recommended Practice for Electric, Fuel Cell and Hybrid Electric Vehicle Crash Integrity Testing
- **J2910** - Recommended Practice for Design & Testing Hybrid Electric/Electric Trucks/Buses for Electrical Safety
- **J2929** - Safety Standard for Electric and Hybrid Vehicle Propulsion Battery Systems Utilizing Lithium-based Rechargeable Cells
- **J2464** - Electric and Hybrid Electric Vehicle Rechargeable Energy Storage System (RESS) Safety and Abuse Testing
- **J3354** Electric Heavy-Duty Vehicle (E-HDV) Response Guidance

Fuel Cell Standards Committee

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The Fuel Cell Standards Committee is responsible for establishing standards for hydrogen and fuel cell vehicles. Standards will cover the safety aspects of hydrogen, fuel cell, and electrical systems in the vehicle, test procedures to establish the performance of the vehicle, system/components, and interface requirements.
https://standardsworks.sae.org/standards-committees/fuel-cell-standards-committee

Sub-Task Forces of interest include:

- Fuel Cell Interface Task Force
- Fuel Cell Safety Task Force

22 Published Documents

6 Active WIPs

Fuel Cell Interface Task Force

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The Fuel Cell Standards Committee is responsible for establishing standards for hydrogen and fuel cell vehicles. Standards will cover the safety aspects of hydrogen, fuel cell, and electrical systems in the vehicle, test procedures to establish the performance of the vehicle, system/components, and interface requirements.
https://standardsworks.sae.org/standards-committees/fuel-cell-interface-task-force

Currently working on open WIP revisions for J2601 Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles

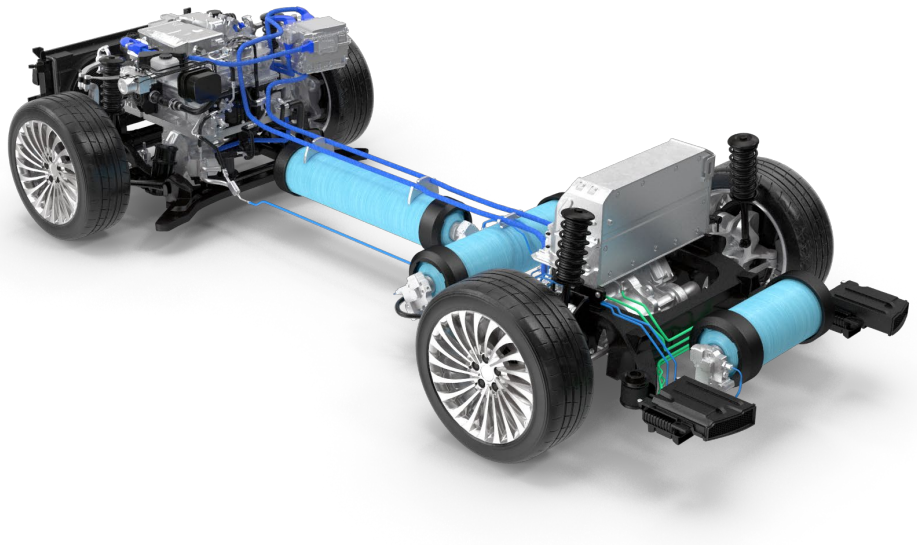
Fuel Cell Safety Task Force

Mobility, Advanced™

The Fuel Cell Standards Committee is responsible for establishing standards for hydrogen and fuel cell vehicles. Standards will cover the safety aspects of hydrogen, fuel cell, and electrical systems in the vehicle, test procedures to establish the performance of the vehicle, system/components, and interface requirements.
https://standardsworks.sae.org/standards-committees/fuel-cell-safety-task-force

Harmonizing standards with ISO and GTR13 regarding safety concerns. Specifically J2578 and J2579

Currently working on revisions for J2579/1 ·Cryo-compressed Hydrogen Storage Systems for Hydrogen Land Vehicles and J2990/1 ·Gaseous Hydrogen and Fuel Cell Vehicle First and Second Responder Recommended Practice



Fuel Cell Standards Committee Document Development

Mobility, Advanced™

J2601/5_202502 - High-Flow Prescriptive Fueling Protocols for Gaseous Hydrogen Powered Medium and Heavy-Duty Vehicles – Published in February of 2025

https://www.sae.org/standards/j26015_202502-high-flow-prescriptive-fueling-protocols-gaseous-hydrogen-powered-medium-heavy-duty-vehicles

This TIR establishes high-flow fueling protocols, including their process limits for fueling of compressed gaseous hydrogen vehicles at peak flow rates from 60 to 300 g/s with compressed hydrogen storage system (CHSS) volume capacities between 248.6 and 7500 L which have been qualified to UN GTR #13. This document is initially being published as a TIR due to limited field testing of the fueling protocols. Once the fueling protocols have been field tested, the SAE Fuel Cell Standards Committee Interface Task Force intends to publish a revision to this document as an SAE Standard.

This TIR is being revised to add H35 FM60 (60 g/s maximum flow rate) fueling protocols. Previously, this TIR only included an H35 FM120 (120 g/s maximum flow rate) fueling protocol.

Fuel Cell Standards Committee Document Development

Mobility, Advanced™

J2799 Hydrogen Surface Vehicle to Station Communications Hardware and Software – Newest revision published March 10th, 2026

https://www.sae.org/standards/j2799_202603-hydrogen-surface-vehicle-station-communications-hardware-software

This standard specifies the communications hardware and software requirements for fueling hydrogen surface vehicles (HSV), such as fuel cell vehicles, but may also be used where appropriate with heavy-duty vehicles (e.g., buses) and industrial trucks (e.g., forklifts) with compressed hydrogen storage. It contains a description of the communications hardware and communications protocol that may be used to refuel the HSV. The intent of this standard is to enable harmonized development and implementation of the hydrogen fueling interfaces. This standard is intended to be used in conjunction with the hydrogen fueling protocols in SAE J2601 and nozzles and receptacles conforming with SAE J2600 and ISO 17628. It may also be used with future hydrogen fueling protocols at the discretion of those fueling protocols.

Version 02.10 clarifies requirements concerning the OD field and expands on the data integrity checks for the OD field. Several standard OD data blocks are defined and appendices with examples supplied. Transparency examples are expanded to cover all cases.

Fuel Cell Standards Committee Document Development

Mobility, Advanced™

J2579/1 Cryo-compressed Hydrogen Storage Systems for Hydrogen Land Vehicles – Open WIP and in development within the Fuel Cell Safety Task Force, estimated to publish in 2026. This is a brand-new document.

This document contains requirements for materials, design, manufacture, and performance-based testing of refillable Cryo-compressed Hydrogen Storage Systems (CCHSS) intended for the storage of cryo-compressed hydrogen (CcH2) onboard land vehicles. The CCHSS: A) Is an assembly of the container(s), container attachments, and closure and safety devices, B) Are permanently attached to a land vehicle, C) Have a container water capacity of up to 1,000 L, D) Have a nominal working pressure of 35 MPa, E) Stores cryogenic compressed hydrogen of quality according to ISO 14687 or SAE J2719 With appropriate due diligence, this document may be used as guidance for CcH2 components, systems, or applications that are otherwise not in scope.

Fuel Cell Standards Committee Document Development

Mobility, Advanced™

J2719 Hydrogen Fuel Quality for Fuel Cell Vehicles – Open WIP and currently balloting within the Motor Vehicle Council, estimated to publish by the end of May 2026 (Harmonized with ISO14687)

This standard provides background information and a hydrogen fuel quality standard for commercial proton exchange membrane (PEM) fuel cell vehicles. This report also provides background information on how this standard was developed by the Hydrogen Quality Task Force (HQTF) of the Interface Working Group (IWG) of the SAE Fuel Cell Standards Committee.

Previously published version: https://www.sae.org/standards/j2719_202003-hydrogen-fuel-quality-fuel-cell-vehicles

Fuel Cell Standards Committee Document Development

Mobility, Advanced™

J2601 Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles – Open WIP, development ongoing within the Fuel Cell Interface Task Force

SAE J2601 establishes the protocol and process limits for hydrogen fueling of vehicles with total volume capacities greater than or equal to 49.7 L. These process limits (including the fuel delivery temperature, the maximum fuel flow rate, the rate of pressure increase, and the ending pressure) are affected by factors such as ambient temperature, fuel delivery temperature, and initial pressure in the vehicle's compressed hydrogen storage system.

SAE J2601 establishes standard fueling protocols based on either a look-up table approach utilizing a fixed pressure ramp rate, or a formula-based approach utilizing a dynamic pressure ramp rate continuously calculated throughout the fill. Both protocols allow for fueling with communications or without communications.

The table-based protocol provides a fixed end-of-fill pressure target, whereas the formula-based protocol calculates the end-of-fill pressure target continuously. For fueling with communications, this standard is to be used in conjunction with SAE J2799.

Fuel Cell Standards Committee Document Development

J2601 Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles – Open WIP, development ongoing within the Fuel Cell Interface Task Force

- In process to harmonize with ISO19885/3
- Anticipated to publish the revision in Q2 2027.

Coordinates with document from CSA/ANSI HGV4.3 which is validated fueling parameters, which tailored to J2601. This is the type of industry collaboration that ensures harmonization across organizations for the betterment of industry.
https://www.csagroup.org/store/product/2426672/?srsltid=AfmBOooocLejJabsmJrJ_TB1NQ-UA2ffK_o0UOIePqaVw-Npfb78KfHD

J2601 is also called out in NFPA Chapter 10 to mandate J2601 to be used to ensure fire code compliance.

Electrification New Volunteer Information

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Please feel free to scan this QR code or click on the link below which takes you to the volunteer packet for all prospective members of our Electrification Committees

https://standardsworks.sae.org/standards-committees/battery-standards-discussion-forum#resources&publicResource=1eaa1960-50b4-40ad-b150-6b0393112ce9

Thank you for your time and attention. Please contact me if you'd like to get involved regarding SAE's standards development process.

Dante Rahdar

Ground Vehicle Committee Manager

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