

Ground Vehicle Standards Newsletter

Volume II, Issue 4
November 2011

SAE International

Creating harmonized standards solutions. Moving the on- and off-road vehicle industry forward.

SAE International standards among first chosen for Smart Grid Catalog of Standards

Three SAE International electric vehicle standards are among the first standards added by The Smart Grid Interoperability Panel (SGIP) into its Catalog of Standards. The SGIP, a consensus-based group of more than 675 public and private organizations was created by the National Institute of Standards and Technology (NIST) to coordinate the development of US Smart Grid standards.

SAE International is a leading standards development organization identified by NIST for "Interoperability Standards to Support Plug-In Electric Vehicles." The standards, which gained approval by over 90 percent of SGIP members, reflect the high-priority national standards needed to convey the modern and energy-efficient power grid with seamlessly interoperable components.

The SAE International standards included in SGIP's Catalog of Standards are:

J1772: SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler – This standard describes the physical connector used to plug in an electric vehicle (EV), and it specifies such details as the dimensions, functions, and configurations of the vehicle inlet and mating conductor. Standardization of the connector allows EV operators to use the same charging equipment, reducing consumer costs and increasing consumer convenience and acceptance. This standard applies to charging from AC power sources, such as that presently available at a typical home or office building. This standard is currently being revised to encompass a new quick-charge DC connector which will reduce the charge time for electric vehicles from hours to minutes.

J2836/1: Use Cases for Communication Between Plug-in Vehicles and the Utility Grid – This standard describes the electronic information the vehicle will exchange with the grid during the charging process by establishing use cases for communication between plug-in electric vehicles and the electric power grid, for energy transfer and other applications. With the information made available by the adoption of this standard, utilities will be able to develop programs that enable consumers to charge their vehicles at the lowest cost during off-peak hours.

J2847-1: Communication Between Plug-In Vehicles and the Utility Grid – This standard establishes requirements and specifications for communication between plug-in electric vehicles and the electric power grid, for energy transfer and other applications. Where relevant, the document notes, but does not formally specify, interactions between the vehicle and the vehicle operator.

The SGIP Catalog of Standards will eventually contain hundreds of consensus standards and be an important source of knowledge for the entire grid community including utilities, manufacturers, consumers, and regulators.

"Our stakeholders have a keen interest in the Smart Grid because it's the infrastructure needed to recharge hybrid and electric vehicles," said Jack Pokrzywa, Director of Global Ground Vehicle Standards with SAE International.



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SAE International Cooperative Research Program awarded government contract for rechargeable energy storage systems

The SAE International Cooperative Research Program has been awarded a contract from the U.S. Department of Transportation (DOT) and the National Highway Traffic Safety Administration (NHTSA) for development of repeatable safety performance test procedures for rechargeable energy storage systems (RESS).

The two-year cooperative effort to develop performance test procedures along with detailed, quantifiable measurement criteria to evaluate Li-ion based RESS performance will aid in the development of safer processes and practices by the industry in order to help mitigate safety risks from rechargeable energy storage systems.

SAE International, along with its project partners, will meet with NHTSA representatives in the near future to discuss project details.

The SAE International cooperative research partnership consists of the following partners: SAE International (Project Leader); General Motors Corporation; Daimler AG; Toyota Motor Corporation; Honda Motor Company Ltd.; and Nissan Motor Company.

"We very much appreciate the confidence that DOT and NHTSA have shown in SAE International's Cooperative Research Program and its knowledgeable committee members," Jack Pokrzywa, manager of Ground Vehicle Standards for SAE International, said. "We look forward to assisting DOT and NHTSA in creating the proper test methods and performance measurement criteria to reduce public risks from Li-Ion RESS powered HEV's, PHEV's and EV's."

SAE Cooperative Research Programs provide a neutral environment for joint venture projects where numerous organizations pool their resources to study areas of common technical interest where results are shared.

SAE International Ground Vehicle Standards Technical Committees are leading the vehicle transportation industry in the development of standards to provide safer processes and practices for effective implementation of hybrid/electric vehicles. A total of 24 SAE International Ground Vehicle electrification committees with more than 780 members have developed 46 standards and are currently working on more than 30 new standards.

SAE International hosts ISO TC22 meeting

SAE International hosted the 36th Plenary Meeting of the ISO TC22 (Road Vehicles) at its automotive headquarters facility October 26–28. The ISO plenary meetings are held every eighteen months and are hosted by one of the major motor vehicle manufacturing countries.

Thirty-one attended the meeting with representatives from US, France, Germany, Italy, Japan, Korea, China, and Malaysia, Sweden, including a representative from the ISO Central Secretariat.

SAE International represents the US at the direction of the ANSI.

Prior to the meeting, the Strategic Advisory Group gathered with the key principle member countries of TC22 (US, France, Germany, Italy, Japan, Korea, Malaysia, and Sweden) to align on critical discussion issues including the vision for TC22; the need for additional resources; the development of closer liaisons with WP29; the creation of an ISO TC22/IEC MOU advisory group to minimize duplication of efforts; and the use of ISO standards to prevent technical barriers to trade.



Representing Germany at the 36th Plenary Meeting of the ISO TC22 (Road Vehicles) were Dr. Horst Wunderlich (Daimler), Egbert Fritsche (VDA), and Dr. Juergen Braeuningner (Bosch), shown pictured left to right.

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The ISO creates international standards often used in international regulations, and has a structured process that each international standard must follow. New work items must be approved before a subcommittee can begin work toward an IS and insufficient progress along the way will cause the prospective standard to be dropped or restarted from the beginning. The plenary meeting reviews the progress of each of its standing working groups and subcommittees for progress and continued justification. The ISO also coordinates its work with the IEC and ITU in areas of electrical system and telecommunications system integration into motor vehicles.

On October 27, the ISO Plenary meeting toured the GM Poletown Assembly Plant in Detroit to view production of the plug-in hybrid Chevy Volt. SAE International and ISO TC22 thank GM for hosting the tour.

Standard for wireless charging in development

The **SAE Hybrid-EV Committee** is working on the development of a standard that will establish minimum performance and safety criteria for wireless charging of electric and plug-in hybrid vehicles. The J2954 Technical Information Report is scheduled to be released in early 2012.

This technical information report will define acceptable criteria for minimum performance, safety and testing for wireless charging of electric and plug-in electric vehicles.

A new standard will then be developed based on the report, with the formal publication of the standard tentatively targeted for 2014. Adoption of a standard for wireless power transfer based on charge level will enable selection of an appropriate charging based on vehicle requirements thus allowing for better vehicle packaging, reduced cost, and ease of customer use.

Wireless charging will enable electric and plug-in hybrid vehicles to be charged without having to physically connect. It will also facilitate smart grid programmability and wireless vehicle to grid communications.

J2954 is being developed with the input of a wide cross-section of wireless power transfer suppliers, infrastructure companies, automotive OEMs, Tier 1 suppliers, and governmental organizations.

SAE International

For On- and Off-Road Harmonized Standards Solutions, All Roads Lead to SAE

Since 1905, SAE International has been providing the common engineering requirements for new mobility products, advanced technologies, and applications. It is uniquely positioned to provide innovative standards solutions to the global on- and off-road industries and their engineering challenges.

For automotive vehicles, SAE plays the central role in developing essential North American emissions and safety standards to meet some of the most stringent regulations in the world. Through ISO, it plays a key role in bringing standards for and from the United States market to the global table. As the center of expertise on Commercial Vehicle/ConAgg standards development, many of its standards are adopted by ANSI and ISO.

SAE offers a full suite of standards capabilities—committee management, consensus-based standards development, consortium administration, cooperative research, and database development—providing industry, companies, and individuals with extensive opportunities to participate, influence, grow, and prosper.

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Kawasaki certifies horsepower for 32 small engines under SAE International standard

Kawasaki Motor Corporation has certified 32 of its family of small engines under SAE International's standard for gross horsepower rating – "J1995: Engine Power Test Code-Spark Ignition and Compression Ignition- Gross Power Rating."

J1995 is a companion document to SAE International's "J1349: Engine Power Test Code – Engine Power and Torque Certification," which certifies vehicle engines for net horsepower. In addition, testing criteria for both J1995 and J1349 are outlined through SAE International's "J2723: Engine Power Test Code - Engine Power and Torque Certification," document.

"SAE International's formal acknowledgment means that Kawasaki has met the required standards to use the SAE International reference in its advertising and promotional materials for specified engines. The certification entailed a battery of engine tests operated and witnessed by independent, experienced engineers familiar with the requirements of SAE J1995," said Gary Pollak, Program Manager, Ground Vehicle Standards, SAE International.

Engine certification is based on a series of self-certification tests conducted by the manufacturer that are witnessed and verified by an SAE-qualified observer. Certification under these SAE International standards assures consumers that the production engines they purchase will produce at least 98 percent of their rated values.

Kawasaki executives are in agreement that the very strict SAE J2723 standard is better suited to accommodate the company's advanced engine and manufacturing technologies.

New committee chairs and vice chairs

Sue Bai, Honda R & D Americas Inc. – Chair, DSRC Technical Committee

Noelle Baker, Ford Motor Co. – Chair, Light Vehicle Exterior Sound Level Committee

John Capp, General Motors – Chair, Active Safety Systems Committee

David Gonska, Meritor Inc. – Chair, Truck and Bus Wheel Committee

Oliver Gross, Chrysler LLC – Chair, Capacitive Energy Storage Committee

Joseph Jaklic, Osram Sylvania Products – Vice Chair, Lighting Coordinating Advisory Group

James Johnson, Valeo Sylvania LLC – Vice Chair, Lighting Materials Standards Committee

Paul Johnston – Chair, Truck and Bus Council

James Misener, Booz Allen Hamilton Inc. – Vice Chair, DSRC Technical Committee

Paul Perrone, Perrone Robotics Inc. – Chair, On-Road Autonomous Vehicle Committee

Daniel Stern, Driving Vision News – Chair, Heat Age Degradation of Optical Components

Dr. Bart Terburg, Osram Sylvania – Chair, Lighting Coordinating Advisory Group

Dennis Winn, Orscheln Products LLC – Chair, Truck and Bus Corrosion Committee

An economical pathway for joint venture research: the Cooperative Research Program of SAE

Cooperative research ventures serve to bring more minds to the challenges and issues faced by industry. The result is a more robust project than each participating organization could complete independently. The pooling of financial resources also affords each participant more efficient use of their research budgets and eliminates duplication of efforts. Whether moving forward on the development of fuel cell standards...researching alternative refrigerants to HFC 134a...or developing a database of human body measurements to foster ergonomic designs, SAE's Cooperative Research Program can assist your company in its collaborative research needs.

To learn more contact Gary Pollak, Program Manager +1-724-772-7196; gary@sae.org



SAE J2881 provides aerodynamic performance metric

SAE International's "J2881: Measurement of Aerodynamic Performance for Mass-Produced Cars and Light-Duty Trucks" is a recommended practice providing a comprehensive overview of successful, aerodynamic testing and measurement practices in a full-scale wind tunnel.

The recommended practice details procedures to measure the aerodynamic performance of passenger vehicles, such as mass-produced cars and light-duty trucks intended primarily for individual consumers.

Aerodynamic performance—primarily the aerodynamic drag coefficient (Cd)—relies significantly on vehicle content and loading, as well as the type, scale, and simulation qualities of the wind tunnel used to make the measurement. The recommended practice is critical to the automotive industry because publication of non-standard test results generates an incorrect perception of a vehicle's anticipated aerodynamic performance by government, academia, and the general public.



J2881 is used by manufacturers for measurement and documentation of aerodynamic performance for a particular vehicle. The intent is to promote uniform test protocols and traceable results.

J2881 is used by manufacturers for measurement and documentation for a particular vehicle. The intent is to promote uniform test protocols and traceable results of published aerodynamic performance.

"As fuel-economy standards become more stringent and fuel prices continue to increase, aerodynamic performance naturally becomes a more prominent part of the product development process," said **Dr. Joel Walter, sponsor of J2881 and Chairman of the Road Vehicle Aerodynamics Committee.** "We are combining the best practices of automotive wind tunnels around the world so that J2881 will provide a meaningful metric for both consumers and manufacturers. We anticipate seeing published or advertised aerodynamic performance as 'measured according to SAE J2881' just as we already do with J1349 for engine horsepower. Doing so will provide a better picture for the consumer and also enhance the reputation and credibility of the aerodynamics discipline."

Standards Consortium Administration

With over a century of experience providing the common engineering requirements for new mobility vehicles, SAE can be a key component in developing any consortium-based activity, providing the expertise and worldwide technological and human resources to help you turn your vision into a successful operating reality.

Each client maintains its desired degree of autonomy, flexibility, and control. Client/project-tailored services include:

- A legal framework
- Fiscal oversight
- Policy and procedure development
- Publishing and distribution services
- Marketing and public relations activities

SAE International: at the forefront of green technology

A sampling of activities and achievements in the field of green technology

SAE Standards in NIST Catalog of Smart Grid Standards

Three SAE International electric vehicle standards are included in The Smart Grid Interoperability Panel (SGIP) into its Catalog of Standards. The SGIP was created by the National Institute of Standards and Technology (NIST) to coordinate the development of US Smart Grid standards. SAE standards "J1772: SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler;" "J2836/1: Use Cases for Communication Between Plug-in Vehicles and the Utility Grid;" and "J2847-1: Communication Between Plug-In Vehicles and the Utility Grid" are included.

SAE Green Technology Systems Group

SAE's Green Technology Systems Group serves as a guiding body for consensus standards development for environmental sustainability issues in the automotive sector. The group has recently presented a "Green Chemistry" session at the SAE 2011 World Congress and a "Workshop to Characterize Biobased Materials in Vehicles" in Detroit in April 2011.

Standards Development

SAE's Standards Development Committees have developed, or are in the process of developing industry standards which support the automotive industry's green initiatives. SAE has issued standards covering these topics:

- Electric vehicle charging
- Electric vehicle safety
- Refrigerants for mobile air conditioning systems
- Hydrogen fuel cells
- Alternate fuels
- On-Board diagnostics
- Fuel economy
- Emission control and reduction
- Noise reduction

Partnerships

SAE works with other organizations to promote green practices. Recent examples include:

- Contract with the National Highway Traffic Safety Administration (NHTSA) to develop standards for safety testing of lithium-ion batteries
- Contract with the Department of Energy (DOE) to develop to ensure interoperability of electric vehicle supply equipment
- Partner in DOE's Green Racing Initiative
- Work with the U.S. Environmental Protection Agency (EPA) and the global automotive industry to research and select the next generation of environmentally-friendly refrigerants for mobile air conditioning systems
- Collaboration with the ZigBee Alliance on Smart Energy standards development
- Support of the Michigan Academy for Green Mobility Alliance through participation on committees, advisory groups, and the governing board

Outgoing Truck and Bus Wheel Committee chair saluted

John Hall, outgoing Chair of the SAE Truck and Bus Wheel Committee, received a Certificate of Appreciation on September 27. The members of the committee presented him with the certificate in recognition of his leadership of the committee since January 2000.



SAE International to support US DoT's ITS Standards Program

SAE International has recently been contracted by the Federal Highway Administration to support the US Department of Transportation's Intelligent Transportation Systems (ITS) Standards Program.

As the sole standards development organization awarded the contract, SAE International will plan and develop ITS standards with a primary focus on those "around the vehicle platform," specifically, any standards needed to provide connectivity between vehicles (V2V) and between vehicles and infrastructure (V2I) and, any other standards required to fully support the successful deployment of Research and Innovative Technology Administration's (RITA) Intelligent Transportation Systems Joint Program Office (ITS-JPO) research program technologies.

The USDOT ITS Standards Program is one of the critical research efforts over the next five years that will address the V2V and V2I technology platform encompassing the V2V and V2I system architecture as it may evolve.

New standard on hydraulic brake tube joints

SAE J2879, a new standard that specifies dimensions for all three components of a double inverted flare, high-pressure hydraulic brake tube joint, was issued by the **Hydraulic Brake Components Standards Committee** in July.

"J2879: Automotive Hydraulic Brake Tube Joints" applies to 90 degree double inverted flares used on common sizes of automotive hydraulic brake tubes, and their associated tube nuts and ports.

This standard is intended to replace the use of J512 and J533 for automotive hydraulic brake tube connections. Previously, a user needed to reference these separate standards, which resulted in the need to modify dimensions for each joint. Thus there are numerous unique joint designs within an OEM and across the industry.

The standard was developed based on state-of-the-industry considerations regarding function (sealing, hand-start, durability), manufacturability and minimal material cost. It includes dimensions for tubes of both metric and English sizes, so an OEM can now use one standard for all products worldwide.

SAE: A Global Partner in Standards Development

In addition to the maintenance and development of its family of technical standards, SAE International is also an active partner with other standards development organizations, government agencies, and regulatory bodies to support the newest, most robust, and comprehensive standards products for a changing global marketplace.

- US Department of Transportation
- Society of Automotive Engineers of Japan (JSAE)
- German Electrical and Electronic Manufacturers Association (ZVEI)
- US Federal Highway Administration
- China Automotive Technology & Research Center (CATARC)
- National Highway Traffic Safety Administration
- Korean Agency for Technology and Standards (KATS)
- US Department of Energy
- Japan Automobile Research Institute (JARI)
- US Environmental Protection Agency
- Brazilian National Standards Organization (ABNT)
- American National Standards Institute (ANSI)
- Automotive Electronics Council (AEC)
- International Organization for Standardization (ISO); US representative

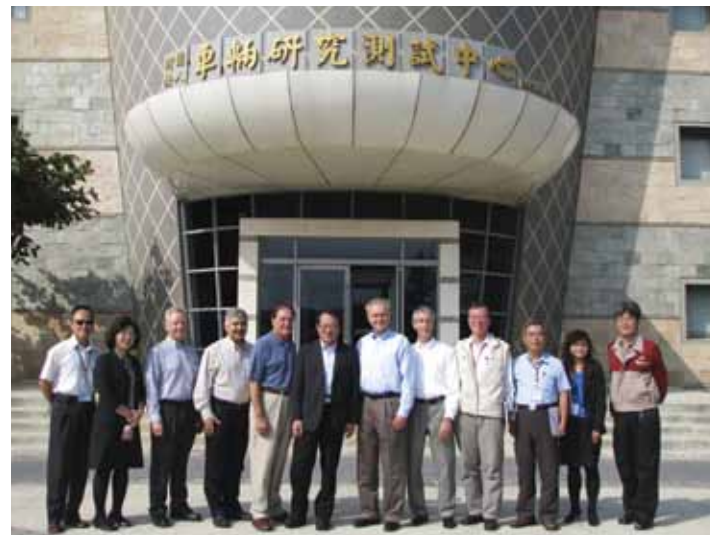


Technical experts from SAE battery committee visit Automotive Research and Testing Center in Taiwan

SAE International recently facilitated delivery of consulting services to Automotive Research and Testing Center (ARTC) engineers in Taiwan.

Last year, the Taiwan government approved a seven-year strategic development and action plan to develop their electric vehicle industry. The 2015 targets include production of 60,000 electric vehicles (15,000 units to be sold globally) and the establishment of Taiwan as a leading electric vehicle manufacturer. To accomplish, organizations such as ARTC are required to build the engineering skills and staff know-how.

Over the last several months, SAE International technical experts have provided clarification and interpretation of SAE standards being developed in the areas of battery safety. This past November, ARTC organized and held an EV testing and international standards conference. It included an update on SAE International electric vehicle standardization; presentations on EMC system engineering of electric vehicles; an analysis and comparative overview of SAE J1766, J2344, J2464, and J2929; and testing methodologies related to electric vehicle battery modules. Other presenting organizations included TUV Sued, JARI and UTAC.



During the two-day event held in Taipei, **SAE International battery committee members Dennis Davis, Daniel Doughty, and James Muccioli** presented an in-depth overview of the current status and future direction related to standardization and testing of battery safety. To determine capabilities for providing testing and verification services to Taiwan-based OEMs and suppliers in accordance with SAE-relevant standards, a visit to ARTC testing lab and test track in Taichung followed the event.

Cooperation between SAE International and ARTC will be extended into 2012 and beyond.

Call for nominees: Technical Standards Board Outstanding Contribution Award

Nomination Deadline: December 31

Administered by the SAE Technical Standards Board, this award recognizes individuals for outstanding service in the technical committee activities of the Society. This includes valuable contributions to the work of SAE technical committees, unusual leadership in the activities of an SAE technical committee, significant contributions as a representative of the Society to the accomplishments of technical committees of other organizations or of government agencies, and outstanding contributions to SAE technical committee work in the form of research, test methods and procedures, and/or development of standards.

Nomination forms can be found at this link: <http://www.sae.org/news/awards/list/tsb/nomination.pdf> or contact the SAE Awards staff at awards@sae.org, 1-877-606-7323 (U.S. and Canada only) or 1-724-776-4970 (outside U.S. and Canada).

Acknowledgement: 2011 corporate support

SAE International wishes to acknowledge those companies who contributed to the funding of this year's SAE Standards Development Program. Thank you for helping write the future of the ground vehicle industry.

Thank you.

AM General
Association of Equipment Manufacturers
Bendix Commercial Vehicle Systems
Borg Warner
Cequent Performance Products
Chrysler LLC
Cryotech Deicing Technology
Delphi Corporation

Denso International America
Ford Motor Company
General Motors
Honda of America Manufacturing
Navistar
Nissan Motor Company
SEW Eurodrive
TARDEC
Toyota Motor Corporation

SAE Ground Vehicle Standards "on the road"

A re-cap of recent events at which SAE International Standards participated

- At the SAE India Southern Section meeting on July 13, Jack Pokrzywa conducted a day-long workshop on standards.
- SAE Ground Vehicle Standards took part in the International Conference on Electromobility Standardization" organized by DIN, Germany's national standards body, on September 20. The conference focused on the need for harmonization among all global stakeholders, expanding the network concept, exploring potential synergies, and extending international cooperation, particularly in standardization. Jack Pokrzywa, SAE International Director of Ground Vehicle Standards, gave a presentation on "U.S. approach and perspective on electromobility and standardization."
- As a special highlight of World Standards Week 2011, The American National Standards Institute (ANSI) hosted a U.S.-European open conference on transatlantic partnerships on October 12 at the U.S. Chamber of Commerce. The first session of the day addressed electric vehicles as a priority area of focus from both the political and business perspectives. Jack Pokrzywa was a featured speaker.
- Robert Galyen, Chair of the SAE Battery Standardization Steering Committee**, chaired a panel discussion at The Battery Show on October 25-27 in Novi, Michigan.
- SAE Ground Vehicle Standards staff member Keith Wilson spoke at the Smart Cars Conference, October 24-26 in San Francisco, California.
- At the Smart EV 2011 Executive Leadership Forum, held November 7 in Washington, D.C., Jack Pokrzywa was a featured speaker at the "Leveraging Technology for Improved Communications Between Stakeholders and the Customer Experience" session.



Jack Pokrzywa, SAE International Director of Ground Vehicle Standards, addresses the International Conference on Electromobility Standardization on September 20.

SAE standards efforts spotlighted in two magazines

SAE International's standards development efforts on two critical issues were recently featured in articles the prominent magazines *Bloomberg Businessweek* and *Batteries International*.

SAE International was mentioned, and SAE staff members were quoted, in an article in the October 17th issue of *Bloomberg Businessweek* on the issue of computer hacking of automobiles. The article "Making Cars More Hacker-Proof," by Craig Trudell, covered the potential for hacking automotive computer systems in order to control a vehicle's brakes, engine, lights and locks.

In the article, Jack Pokrzywa, Director of Ground Vehicle Standards, noted that recent university research into this issue has "raised the alert" of the automotive industry, and that SAE has formed a committee to draft standards to provide greater security. Staff engineer Peter Byk was also quoted in the story.

Author Trudell was interviewed on the National Public Radio program "Here and Now" on October 14.

In a segment on the issue of automobile computer hacking, Trudell told host Robin Young that SAE is one organization that is looking into this issue and has formed a committee to establish standards and guidelines.

The work of the **SAE Battery Standards Committee** was featured in the Spring 2011 issue of *Batteries International* magazine. The issue featured a cover photo of **Bob Galyen, Chairman of the Battery Standards Committee**. Galyen was asked to write a regular column for the publication on the progress of the committee and its task forces.

"The future of battery electric vehicles depends primarily upon the cost and availability of batteries with high energy densities, power density, and long life," Galyen wrote in his column. "Standardization can make that happen."

The issue also featured summaries of the work of 14 committee task forces, including those focused on battery safety, battery transportation, hybrid battery testing, truck and bus batteries, battery materials testing, battery recycling, and more.



Engineering Aids from SAE

SAE provides products that support testing procedures set forth in SAE standards, Recommended Practices, Information Reports, and other SAE documents including the **OSCAR H-Point Machine**, which is used in the design of seating and interior packages and in conjunction with SAE J 826 (rev. 1995), FMVSS regulations, and ISO standards—making it the required design and auditing tool for current production.

Also available is the newly designed **HPM II H-Point Machine**, which includes enhancements over the OSCAR H-Point machine for use in advance design applications.

Available at <http://store.sae.org/ea/>



Volunteer recognition: document sponsors

(May-November 2011)

The SAE Standards Development Program thanks its Document Sponsors. These individuals have served not only as active committee members but have dedicated their time and talent in guiding the development of standards documents from the preparation of all drafts through balloting and publication.

Thank you.

Mohamed Abdelhamid, Robert Bosch LLC
 Carlos Agudelo, Link Testing Laboratories Inc
 Gregory Anderson, Scalia Safety Engineering
 Anthony Androsky, Consultant
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 Richard Batzer
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 Frank Wassilak
 Rick Weires, John Deere C&F
 Wayne Winch, PACCAR Parts
 Richard Wood, Solus-Solutions and Technologies
 Ryan Wood, Transport Research Laboratory Ltd
 Garold Yurko, TE Connectivity
 Mark Zachos, DG Technologies

SAE standard committees seeking volunteers

A new “Hybrid First and Second Responder Task Force” is seeking members. This task force will develop an SAE Recommended Practice, which defines a common set of standard guidelines and procedures for ensuring human and traction battery safety during vehicle emergency response. The document will describe the new hazards associated with electrified vehicles, and suggest common methods to safely handle and mitigate these hazards during the vehicle emergency response, recovery, tow, storage, and salvage. Significant work has been made in educating first responders to accident scenes, but further effort is needed to create consistent standards across vehicle platforms. If you are interested in joining, please contact Pat Ebejer; pebejer@sae.org or 248-273-4084.

The **SAE Odometer and Speedometer Standards Committee** is seeking engineers to assist in writing new standards regarding recommended practices for odometers and speedometers. Four standards are now stabilized, and the committee is working to update these standards to become consistent with current technology and practices.

The **SAE Acoustical Materials Committee** is also seeking OEM and supplier participants.

Finally, the **SAE Service Development Steering Committee** is seeking additional committee participants from industry. The committee is also seeking potential opportunities for collaboration with other SAE committees regarding serviceability. The Service Development Technical Committee involves service collision, towability, and graphics-based service information.

If you are interested in participating in these committees or any of the following standards technical committees noted below for which there is a heightened need for volunteers, please visit <http://www.sae.org/standardsdev/participateReq.htm>. Fuel Cells; Vehicle Safety Systems; Green Technology Systems; Materials, Processes and Parts; Powertrain Systems; Chassis Systems; Truck and Bus; Electrical Systems; and Vehicle Engineering Systems.

Upcoming Standards Technical Committee Meetings

A current schedule can be found on the SAE website. <http://www.sae.org/standards/>



New, revised & stabilized SAE standards (June – Nov 2011)

Committee	Doc	Title	Status	Pub Date
CONSTRUCTION, AGRICULTURAL & OFF-ROAD MACHINERY COUNCIL				
Common Tests Technical Steering Committee	J1422_201110	Fuel Warmer - Diesel Engines	STABILIZED	10/27/11
	J2079_201110	Location of Atomizer of Ether Systems for Diesel Engines	STABILIZED	10/27/11
Operator Accommodation	J1559_201109	Determination of Effect of Solar Heating	Revised	09/12/11
	J1017_201110	Nomenclature - Rollers and Compactors	Cancelled	10/27/11
Loaders, Crawlers, Scrapers and Mounted Attachments	J1197_201110	Rated Operating Load for Loaders Equipped with Log or Material Forks Without Vertical Mast	STABILIZED	10/27/11
	J1233_201110	Commercial Literature Specifications—Off-Road Work Machines	STABILIZED	10/25/11
Tire and Rim	J1303_201110	Cutting Edge - Cross Sections Loader Straight	STABILIZED	10/25/11
	J1304_201110	Cutting Edge - Cross Sections Loader Straight with Bolt Holes	STABILIZED	10/25/11
	J1580_201110	Metric Countersunk Holes for Cutting Edges and End Bits	STABILIZED	10/27/11
	J1581_201110	Cutting Edge - Optional Cross-Sections and Dimensions	STABILIZED	10/25/11
	J740_201110	Loader Straight	STABILIZED	10/25/11
	J764_201110	Countersunk Square Holes for Cutting Edges and End Bits	STABILIZED	10/27/11
	J873_201110	Loading Ability Test Procedure – Scrapers	STABILIZED	10/27/11
Lighting and Marking	J1337_201110	Drag Force Test Procedure for Construction, Forestry, and Industrial Machines	STABILIZED	10/27/11
	J1544_201110	Off-Road Rim Maintenance Procedures and Service Precautions Diameter Code 20 and Larger	Revised	10/27/11
	J572_201110	Revolutions Per Mile and Static Loaded Radius for Off-Road Tires	STABILIZED	10/25/11
		Requirements for Sealed Lighting Unit for Construction and Industrial Machines	STABILIZED	10/27/11
MATERIALS, PROCESSES, & PARTS COUNCIL				
Acoustical Materials Committee	J1325_201110	Test Method for Measuring the Relative Drapeability of Flexible Insulation Materials	STABILIZED	10/27/11
	J1389_201108	Corrosion Test for Insulation Materials	STABILIZED	08/31/11
Surface Enhancement Committee	J2629_201106	Standard Formats for Presenting Acoustical Data	Issued	06/08/11
	J391_201106	Definition for Particle Size	STABILIZED	06/01/11
	J448_201108	Surface Texture	STABILIZED	08/04/11
	J449_201108	Surface Texture Control	STABILIZED	08/04/11
	J932_201108	Definitions for Macrostrain and Microstrain	STABILIZED	08/04/11

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Fasteners Committee	J429_201109	Mechanical and Material Requirements for Externally Threaded Fasteners	Revised	09/08/11
Hydraulic Tube Fittings Committee	J1453/1_201108	Specification for O-Ring Face Seal Connectors: Part 1 - Tube Connection Details and Common Requirements for Performance and Tests	Revised	08/04/11
Hydraulic Hose and Hose Fittings Committee	J2631_201110 J516_201110	Defining Hydraulic Oil Compatibility With Hydraulic Hose Elastomers Hydraulic Hose Fittings	STABILIZED Revised	10/25/11 10/25/11
SPECIALIZED VEHICLE & EQUIPMENT COUNCIL				
Motorcycle Technical Steering Committee	J47_201108	Maximum Sound Level Potential for Motorcycles	Revised	08/04/11
Marine Technical Steering Committee	J34_201107	Exterior Sound Level Measurement Procedure for Recreational Motorboats	Revised	07/18/11
Marine Electrical Systems Committee	J1191_201110	High Tension Ignition Cable Assemblies – Marine	Revised	10/27/11
	J378_201110	Marine Propulsion System Wiring	Revised	10/27/11
TRUCK & BUS COUNCIL				
Truck and Bus Tire Pressure Management Systems Committee	J2848/2_201106	Tire Pressure Systems - Maintenance (ATIS) Type For Medium and Heavy Duty Highway Vehicles	Issued	06/30/11
Truck and Bus Foundation Brake Committee	J1462_201110	External Automatic Brake Adjuster Test Procedure - Truck and Bus	Revised	10/27/11
	J1505_201107 J2536_201111 J257_201108 J880_201110	Brake Force Distribution Test Procedure-Trucks and Buses Anti-Lock Brake System (ABS) Road Test Evaluation Brake Rating Power Requirements Truck and Bus Brake System Rating Test Code-Commercial Vehicles	Revised Revised	07/13/11 08/04/11 10/05/11
Control Components Committee	J2684_201111	FMVSS 105 Inertia Brake Dynamometer Test Procedure for vehicles above 4540 kg GVWR	Issued	11/10/11
Truck and Bus Hydraulic Brake Committee	J1516_201110	Accommodation Tool Reference Point for Class B Vehicles	Revised	10/27/11
	J1517_201110	Driver Selected Seat Position for Class B Vehicles - Seat Track Length and SgRP	Revised	10/27/11
Truck Crashworthiness Committee	J2956_201106	Occupant Restraint and Equipment Mounting Integrity - Side Impact System-Level Ambulance Patient Compartment	Issued	06/16/11
Truck and Bus Total Vehicle Steering Committee	J133_201107	Fifth Wheel Kingpin Performance—Commercial Trailers and Semitrailers	STABILIZED	07/13/11
	J2181_201109 J2228_201109 J336_201109 J366_201109 J691_201106 J693_201106 J695_201106 J697_201107 J699_201106	Steady-State Circular Test Procedure for Trucks and Buses Kingpin Wear Limits—Commercial Trailers and Semitrailers Sound Level for Truck Cab Interior Exterior Sound Level for Heavy Trucks and Buses Motor Truck CA Dimensions Truck Overall Widths Across Dual Tires Turning Ability and Off Tracking—Motor Vehicles Safety Chain of Full Trailers Or Converter Dollies Average Vehicle Dimensions for Use in Designing Docking Facilities for Motor Vehicles	STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED	09/12/11 09/12/11 09/12/11 09/12/11 06/13/11 06/13/11 06/13/11 07/13/11
	J700_201107	Upper Coupler Kingpin—Commercial Trailers and Semitrailers	STABILIZED	06/13/11
	J847_201107	Trailer Tow Bar Eye and Pintle Hook/Coupler Performance	STABILIZED	07/13/11
	J848_201109	Fifth Wheel Kingpin, Heavy-Duty—Commercial Trailers and Semitrailers	STABILIZED	09/12/11
	J875_201106	Trailer Axle Alignment	STABILIZED	06/13/11
Truck and Bus Aerodynamics and Alternative Fuels Committee	J1340_201109	Test Method for Measuring Power Consumption of Liquefied Natural Gas (LNG) Vehicle Fuel	Issued	07/08/11
	J2699_201107 J1922_201108	Powertrain Control Interface for Electronic Controls Used in Medium- and Heavy-Duty Diesel On-Highway Vehicle Applications	STABILIZED	08/12/11
Truck and Bus Low Speed Communication Network Committee	J2496_201106	Transport Area Network Cabling	STABILIZED	06/30/11
	J1939/13_201110	Off-Board Diagnostic Connector	Revised	10/05/11
Truck Bus Control and Communications Network Committee	J1939/14_201110	Physical Layer, 500 Kbps	Issued	10/05/11
	J1939/81_201106	Network Management	Revised	06/30/11
MOTOR VEHICLE COUNCIL				
Safety and Human Factors Steering Committee	J2889/1_201109	Measurement of Minimum Noise Emitted by Road Vehicles	Issued	09/21/11
	J1991_201108	Standard of Purity for Use in Mobile Air-Conditioning Systems	STABILIZED	08/12/11
Interior Climate Control Committee	J2197_201108	Hfc-134a (R-134a) Service Hose Fittings for Automotive Air-Conditioning Service Equipment	STABILIZED	08/12/11
	J2209_201108	CFC-12 (R-12) Refrigerant Recovery Equipment for Mobile Automotive Air-Conditioning Systems	STABILIZED	08/12/11
Interior Climate Control Service Committee	J2219_201108	Mobile Air Conditioning Industry Criteria and Guidelines	STABILIZED	08/12/11
	J2298_201108	Ultraviolet Leak Detection: Procedure for Use of Refrigerant Leak Detection Dyes for Service of Mobile Air-Conditioning Systems	STABILIZED	08/12/11
Interior Climate Control Service Committee	J1628_201108	Technician Procedures for Refrigerant Leak Detection in Service of Mobile Air Conditioning Systems	Revised	08/29/11
	J2845_201110	R-1234yf [HFO-1234yf] and R-744 Technician Training for Service and Containment of Refrigerants Used in Mobile A/C Systems	Revised	10/04/11
Interior Climate Control Vehicle OEM Committee	J2912_201110	Performance Requirements for R-134a and R-1234yf Refrigerant Diagnostic Identifiers for Use with Mobile Air Conditioning Systems	Revised	10/04/11
	J902_201108	Passenger Car Windshield Demisting and Defrosting Systems	Revised	08/04/11
Inflatable Restraints Committee	J1794_201108	SAE Restraint Systems Effluent Test Procedure	STABILIZED	08/29/11
Interior Climate Control Fluids Committee	J2844_201110	R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems	Revised	10/04/11

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Vehicle EE System Diagnostic Standards Committee	J1979DA_201110 J2901_201106	J1979-DA, Digital Annex of E/E Diagnostic Test Modes Misfire Generator Functional Requirements	Revised Issued	10/10/11 06/30/11
Electromagnetic Compatibility (EMC) Standards	J1113/13_201106 J1752/2_201106 J1752/3_201106	Electromagnetic Compatibility Measurement Procedure for Measurement of Radiated Emissions from Integrated Circuits— Surface Scan Method (Loop Probe Method) 10 MHz to 3 GHz Measurement of Radiated Emissions from Integrated Circuits — TEM/Wideband TEM (GTEM) Cell Method; TEM Cell (150 kHz to 1 GHz), Wideband TEM Cell (150 kHz to 8 GHz)	Revised	06/24/11
Ignition Standards Committee	J2031_201109	High Tension Ignition Cable	Revised	06/17/11
Engine Power Test Code	J1349_201109	Engine Power Test Code - Spark Ignition and Compression Ignition - As Installed Net Power Rating	Revised	09/13/11
Cooling Systems Standards Committee	J2914_201111	Exhaust Gas Recirculation (EGR) Cooler Nomenclature and Application	Revised	09/20/11
Fuel Cell Standards Committee	J2574_201109 J2594_201109 J2615_201110 J2616_201108 J2617_201108 J2719_201109 J2760_201106	Fuel Cell Vehicle Terminology Recommended Practice to Design for Recycling Proton Testing Performance of Fuel Cell Systems for Automotive Applications Testing Performance of the Fuel Processor Subsystem of an Automotive Fuel Cell System Recommended Practice for Testing Performance of PEM Fuel Cell Stack Sub-system for Automotive Applications Hydrogen Fuel Quality for Fuel Cell Vehicles Pressure Terminology Used in Fuel Cells and Other Hydrogen Vehicle Applications	Issued STABILIZED STABILIZED STABILIZED Revised	11/02/11 09/06/11 10/20/11 08/12/11 08/12/11 09/20/11
Fuel Systems Standards Committee	J1645_201110	Fuel Systems and Components - Electrostatic Charge Mitigation	Revised	06/01/11
Hydraulic Brake Components Standards Committee	J2879_201107	Automotive Hydraulic Brake Tube Joints	Revised	10/25/11
Controls and Displays Standards Committee	J1377_201107 J1399_201107 J195_201107	Transmission Mounted Vehicle Speed Signal Rotor Specification Electric Tachometer Specification Automatic Vehicle Speed Control-Motor Vehicles	Cancelled Cancelled Cancelled	07/19/11 07/11/11 07/11/11
Adaptive Devices Standards Committee	J2388_201110 J2836/2_201109 J2847/2_201110	Secondary Control Modifications Use Cases for Communication between Plug-in Vehicles and Off-Board DC Charger Communication Between Plug-in Vehicles and Off-Board DC Chargers	Revised Issued Issued	10/05/11 09/15/11 10/21/11
Heavy Duty Lighting Standards Committee	J1967_201106	Retroreflective Materials for Vehicle Conspicuity	Revised	06/01/11
Lighting Standard Practices Committee	J573_201106	Signal and Marking Light Sources	Revised	06/24/11
Road Illumination Devices Standards Committee	J583_201111 J1957_201108 J2087_201110 J586_201106 J588_201108	Front Fog Lamp Center High Mounted Stop Lamp Standard for Vehicles Less than 2032 mm Overall Width Daytime Running Light Stop Lamps for Use on Motor Vehicles Less than 2032 mm in Overall Width Turn Signal Lamps for Use on Motor Vehicles Less than 2032 mm in Overall Width	Revised Revised Revised	11/08/11 08/18/11 10/10/11 06/15/11
Emergency Warning Lights and Devices Standards Committee	J1133_201106 J2498_201108	School Bus Stop Arm Lamp Minimum Performance of the Warning Light System Used on Emergency Vehicles	Revised Revised	08/05/11 06/10/11
Odometer and Speedometer Standards	J887_201106 J1059_201108 J1226_201108 J678_201108 J862_201108	School Bus Warning Lamp Speedometer Test Procedure Electric Speedometer Specification—On Road Speedometers and Tachometers-Automotive Factors Affecting Accuracy of Mechanically Driven Automotive Speedometer - Odometers	Revised STABILIZED STABILIZED STABILIZED	08/05/11 08/05/11 08/05/11 08/05/11
Powertrain Steering Committee	J1094_201109 J1145_201109 J1151_201109 J1515_201109 J1618_201109 J1937_201109 J2132_201109 J2200_201109 J244_201106 J2453_201109 J2525_201109 J254_201106 J506_201106 J604_201108 J614_201106 J648_201106 J835_201106 J922_201106 J924_201106	Constant Volume Sampler System for Exhaust Emissions Measurement Emissions Terminology and Nomenclature Methane Measurement Using Gas Chromatography Impact of Alternative Fuels on Engine Test and Reporting Procedures Continuously Variable Transmission Test Code For Passenger Cars Engine Testing With Low-Temperature Charge Air-Cooler Systems in a Dynamometer Test Cell Manual Transmissions and Transaxle High-Speed Lubrication, Unbalance, and Seizure Evaluation Passenger Car and Light Truck Axles Measurement of Intake Air Or Exhaust Gas Flow of Diesel Engines Manual Transmission and Transaxle Efficiency and Parasitic Loss Measurement SAE Design Guideline: Metal Belt Drive Continuously Variable Ratio (CVT) Automatic Transmissions Instrumentation and Techniques for Exhaust Gas Emissions Measurement Sleeve Type Half Bearings	STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED STABILIZED	08/05/11 09/06/11 09/06/11 09/06/11 09/06/11 09/06/11 09/06/11 09/06/11 09/06/11 09/06/11 06/13/11 09/02/11 09/12/11 06/10/11 06/10/11 08/05/11 06/13/11 06/13/11 06/13/11 06/13/11 06/13/11 06/13/11
Impact and Rollover Test Proced Stds Comm	J2926_201108	Rollover Testing Methods	Issued	08/18/11
Dummy Testing and Equipment Committee	J2915_201108	H-III5F Spine Box Update to Eliminate Noise	Issued	08/05/11
Automatic Transmission Transaxle Committee	J1087_201108 J640_201107	One-Way Clutches--Nomenclature and Terminology Symbols for Hydrodynamic Drives	Revised STABILIZED	08/12/11 07/08/11

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Motor Vehicle Council		Truck & Bus Council	Materials, Processes & Parts Council	Construction, Agricultural & Off-Road Machinery Council
<p>Vehicle Engineering Systems</p> <p>Comfort & Convenience</p> <ul style="list-style-type: none"> Adaptive Devices Controls & Displays Cooling Systems Dedicated Short Range Communications Advanced Traveler Information Systems Human Accommodations and Design Devices Interior Climate Control Volatile Organic Compounds <p>Exterior and Performance</p> <ul style="list-style-type: none"> Dynamical Modeling and Simulation Glazing Materials Light Duty Vehicle Performance & Economy Measurements Light Vehicle Exterior Sound On-Road Autonomous Vehicle Standards Road Vehicle Aerodynamics Speedometer & Odometer Tow Vehicle Trailer Rating WIN/WMI Wiper Standards <p>Lighting Coordinating Advisory Group</p> <ul style="list-style-type: none"> Heavy Duty Lighting Standards Road Illumination Devices Standards Signaling and Marking Devices Standards Test Methods and Equipment Standards Emergency Warning Lights and Devices Lighting Materials Standards <p>International Lighting Advisory Group</p> <ul style="list-style-type: none"> Lighting Standard Practices International Cooperation 	<p>Chassis Systems Group</p> <ul style="list-style-type: none"> Brake Forum Steering Cmtc Brake Linings Standards Brake NVH Standards Highway Tire Forum Steering Cmtc Vehicle Dynamics Standards Wheel Standards Hydraulic Brake Actuating Forum Adv. Grp. Brake Fluids Standards Automotive Brake & Steering Hose Hydraulic Brake Components <p>Electrical Systems Group</p> <ul style="list-style-type: none"> Vehicle E/E Systems Diagnostic Electronic Design Automation Vehicle Arch. for Data Communications Vehicle Electric Power Supply Embedded Software Automotive Electronic Systems Reliability Vehicle Flat Panel Display Electromagnetic Compatibility (EMC) Electrical Distribution Systems Steering Cmtc. Connector Systems Cable Standards Harness Covering Circuit Protection & Switch Devices Functional Safety Automotive OEM EMC Event Data Recorder <p>IC Powertrain Groups</p> <ul style="list-style-type: none"> Powertrain Steering Committee Automatic Trans Transaxle Automatic Trans Friction Driveline Standards All Wheel Drive Emissions Engine Power Test Code Belt Drive Diesel Exhaust Aftertreatment Air Cleaner Test Code Piston and Ring Standards Filter Test Methods Gasoline Fuel Injection Ignition Fuel System Standards Spark Arrester 	<p>Work Truck Safety Committee</p> <p>Advanced & Hybrid Powertrain Steering Cmtc</p> <ul style="list-style-type: none"> Alternative Fuels Clutch, Transmission & Power Take-Off Hybrid Safety Hydraulic Hybrids Body & Occupant Environment Steering Cmtc Truck Crashworthiness Windshield Wipers & Climate Control Human Factors Electronic/Electronic Steering Cmtc Low Speed Communications Network Control and Communications Network Event Data Recorder Electrical Systems Brake and Stability Control Steering Cmtc Active Safety Systems Foundation Brake Brake Actuator Brake Systems Hydraulic Brake Wheel Stability Control Systems Air Brake Tubing & Tube Fittings <p>Total Vehicle Steering Cmtc</p> <ul style="list-style-type: none"> Tire Pressure Management Systems Corrosion Aerodynamics/Fuel Economy Tire <p>Fuels & Lubricants Council</p> <ul style="list-style-type: none"> TC 1 – Engine Lubrication TC 2 – Industrial Lubricants TC 3 – Driveline & Chassis Lubrication TC 7 - Fuels 	<p>Automotive Corrosion & Prevention</p> <ul style="list-style-type: none"> Acoustical Materials Fasteners <p>Metals Technical Executive Steering Cmtc</p> <ul style="list-style-type: none"> Carbon & Alloy Steels Metals Test Procedures Automotive Iron & Steel Castings Sheet & Strip Steel Elev Top Prop of Ferrous Metals Automotive Adhesives & Sealants Plastics Spline B92 <p>Spring Steering Cmtc</p> <ul style="list-style-type: none"> Coil Spring Leaf Spring Pneumatic Spring Torsion Bar Spring & Stabilizer Bars Textile & Flexible Plastics Vibration Control <p>Fluid Conductors Connectors Steering Cmtc</p> <ul style="list-style-type: none"> C1 Hydraulic Tube Fittings C2 Hydraulic Hose & Hose Fittings C5 Metallic Tubing Cmtc on Automotive Rubber Specs Non-Hydraulic Hose Hose/Clamp Performance & Compatibility <p>Fatigue Design & Eval Advisory Group</p> <ul style="list-style-type: none"> Surface Enhancement Material Properties Structural Analysis Fatigue Lifetime Predictions Road Load Data Acquisition Component Testing & Simulation Squeak and Icht Compatibility Task Force Ground Vehicle Reliability Terrain Modeling Task Force Software System Reliability SC Unmanned Ground Vehicle Reliability TF CBM (Condition Based Management) SC 	<p>Common Tests Technical Steering Cmtc</p> <ul style="list-style-type: none"> Hydraulics Electrical Components Cold Weather Operations <p>Human Factors Technical Adv. Grp</p> <ul style="list-style-type: none"> Machine Controls – Operator Machine Displays and Symbols Operator Seating and Ride Operator Accommodation <p>Machine Technical Steering Cmtc</p> <ul style="list-style-type: none"> Loaders, Crawlers, Scrapers & Attachments Sweeper, Cleaner & Machinery Industrial Equipment Forestry & Logging Equipment Excavators Roadbuilding Machinery Tire & Rim Trenching & Boring <p>Operator Protection Tech Adv. Grp</p> <ul style="list-style-type: none"> Personal Protection (General) Braking Lighting and Marking Protective Structures <p>Sound Level Technical Steering Cmtc</p> <ul style="list-style-type: none"> Earth Moving Machinery Sound Level Back-up and Forward Warning Alarms
<p>Vehicle Safety Systems</p> <ul style="list-style-type: none"> Active Safety Systems <p>Restraints System Standards Steering Cmtc</p> <ul style="list-style-type: none"> Child Restraints Seat Belt Systems Inflatable Restraints Safety Systems Components Advisory Group Human Biomechanics & Simulation Steering Cmtc Dummy Testing & Equip Dummy Dev Eval Advisory Group Impact & Rollover Test Procedures Safety Test Instrumentation Safety Test Instrumentation <p>Driver Vision</p> <ul style="list-style-type: none"> Safety & Human Factors Steering Cmtc Vehicle Sound for Pedestrians (VSP) <p>Keith Wilson – kwilson@sae.org Peter Byk – peterbyk@sae.org</p>	<p>Green Technology Systems Group</p> <ul style="list-style-type: none"> Green Bio-Materials Task Force Green Terminology Task Force <p>Service Development Steering Committee</p> <ul style="list-style-type: none"> Service Towability Collision Repair Graphics Based Service Info <p>Automotive Quality & Process Improvement Committee</p>	<p>Cooperative Research Projects</p> <ul style="list-style-type: none"> High Strain Rate Plastics IMAC ITS Projects CAESAR Ergonomics Otologic Trauma Plastics Suitable for use with H₂ <p>Standards Derivative Programs</p> <ul style="list-style-type: none"> Horsepower Certification J746 Software Assessment Repository On Board Diagnostics Database MAC Equipment Conformance <p>H-Point Machines WMI/VIN WMC/PIN Wheel Conformance</p>	<p>MAC Refrigerant Blends (MRB CRP)</p> <ul style="list-style-type: none"> Alternative Refrigerants CRP 1234y FAH Refrigerant Assessment CRP 150 Low GWP AII Refrigerants Assessment High Temperature Battery Study Emergency Vehicle Lighting Truck Cab Anthropometric Study Vehicle Sound Level for Pedestrians H₂ Fuel Cell Station Breakaways, Hoses, Fittings and Nozzles <p>MAC Refrigerant Blends (MRB CRP)</p> <ul style="list-style-type: none"> Alternative Refrigerants CRP 1234y FAH Refrigerant Assessment CRP 150 Low GWP AII Refrigerants Assessment High Temperature Battery Study Emergency Vehicle Lighting Truck Cab Anthropometric Study Vehicle Sound Level for Pedestrians H₂ Fuel Cell Station Breakaways, Hoses, Fittings and Nozzles <p>Standards Derivative Programs</p> <ul style="list-style-type: none"> Horsepower Certification J746 Software Assessment Repository On Board Diagnostics Database MAC Equipment Conformance 	
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