SAE INTERNATIONAL

SURFACE VEHICLE RECOMMENDED PRACTICE

J3108™-1 MAR2024

Issued 2024-03

Standard Four-Letter Coding as an Identification Method for Alternative Fuel Vehicles

RATIONALE

The International community is in the process of adopting International Standards Organization (ISO) 17840, which provides first and second responders with a standardized format for emergency information. SAE has SAE J3108 for Electrified propulsion vehicle (xEV). While the ISO 17840 format in coloring and lettering can be adopted and should be encouraged when possible, this SAE J3108-1 Recommended Practice provides a means for responders to recognize fuel and vehicle type on North American license plates due to size constraints preventing use of ISO 17840 labels. The 110-mm (4.33-inch) width and 80-mm (3.15-inch) height of an ISO 17840 label is almost 3X wider than the available space in the corners of North American license plates, failing the ISO 9186-1 (6.2.8) requirement for legibility.

This document is planned as an alternative to ISO 17840 symbology on passenger vehicles only. This SAE Recommended Practice (RP) is not intended for use with larger vehicles, such as in commercial or public use, where ISO 17840 compliant marking can be accommodated.

This document provides a standardized means of providing a legible small four-letter code on a sticker or permanent symbol appropriately sized for license plates or any other designated location to convey fuel and hazard information to first responders. While encouraged to be adopted by vehicle manufacturers, this standard has been developed for the use of States and other Governmental organizations to be able to uniformly provide immediate information to responders.

1. SCOPE

SAE J3108 RP provides fuel and hazard guidance for first and second responders of incidents associated with alternative fueled vehicles. The intent of this SAE J3108-1 RP is to remain with the limited number of seven intuitive and colored letters contained in each of the first two letter positions (7^2=49). However, the use of four letters plus nine digits (to not use either 0 or o) permits up to 1185921 unique identifiers (33^4) for future expansion.

The RP is not intended to replace the standards for SAE J2990 format emergency response guide (ERG) created by automotive manufacturers for use at the scene of an emergency. Automotive OEMs are encouraged to reference this RP for industry design guidance when creating vehicle requirements and ERGs. This coding should be consistent with other vehicle badging with the goal of providing additional clarity.

This RP does not include detailed equipment and procedures such as tools, personal protective equipment, or other aspects required for addressing vehicles which have been involved in accidents or incidents. Other documents providing those aspects are listed in the list of references.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/J3108/1_202403/

This RP is independent of existing U.S. Department of Transportation (DOT) hazardous labeling and nomenclature provided by Code of Federal Regulations Part 49. The ten hazard symbols and four levels of severity rating are insufficient to identify the unique aspects of configurations which may be specific to various vehicles designs. Those symbols are typically not used on the passenger types of vehicles this RP is meant for. This document also does not supersede current DOT requirements, U.S. Federal Regulations, or other regional regulations for identifying vehicle fuel and critical first responder information.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J686	Motor Vehicle License Plates (stabilized July 2012; provides license plate dimensions and bolt holes)
SAE J1715	Hybrid Electric Vehicle (HEV) and Electric Vehicle (EV) Terminology
SAE J1715/2	Battery Terminology
SAE J1766	Recommended Practice for Electric, Full Cell and Hybrid Electric Vehicle Crash Integrity Testing
SAE J2344	Guidelines for Electric Vehicle Safety
SAE J2578	Recommended Practice for General Fuel Cell Vehicle Safety
SAE J2750	Assigned Identification Number Structure and Usage for North American Vehicles/Watercraft Other than Certified to Federal Regulations
SAE J2830	Process for Comprehension Testing of In-Vehicle Symbols
SAE J2936	SAE Electrical Energy Storage Device Labeling Recommended Practice
SAE J2950	Recommended Practices for Shipping Transport and Handling of Automotive-Type Battery System - Lithium Ion
SAE J2990	Hybrid and EV First and Second Responder Recommended Practice
SAE J3108	xEV Labels to Assist First and Second Responders, and Others

2.1.2 AAMVA Publications

Available from American Association of Motor Vehicle Administrators, 4401 Wilson Boulevard, Suite 700, Arlington, VA 22203, Tel: 703-522-4200, www.aamva.org.

American Association of Motor Vehicle Administrators. (2023). *License Plate Standard: Edition 3*. https://www.aamva.org/getmedia/7ffefe23-e5d7-4e7b-9393-744be0d25be2/License-Plate-Standard-Edition-3_final.pdf.

2.1.3 ISO Publications

Available from International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, Tel: +41 22 749 01 11, www.iso.org.

ISO 3779 Vehicle identification number (VIN) - Content and structure

ISO 9186-1 Graphical symbols - Test methods - Part 1: Methods for testing comprehensibility

ISO 17840 Road Vehicles - Information for First and Second Responders - Part 1: Rescue Sheet for Passenger Cars and Light Commercial Vehicles[1]

2.1.4 U.S. Government Publications

2.1.4.1 Code of Federal Regulations (CFR) Publications

Available from United States Government Printing Office, 732 North Capitol Street, NW, Washington, DC 20401, Tel: 202-512-1800, www.gpo.gov.

49 CFR Part 565 Vehicle Identification Number (Vin) Requirements

2.1.4.2 NHTSA Publications

Available from National Highway Traffic Safety Administration, 1200 New Jersey Avenue, SE, Washington, DC 20590, Tel: 1-888-327-4236, https://www.nhtsa.gov/.

FMVSS 305 Electric-Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection[2]

2.1.4.3 U.S. Department of Transportation Publications

Available from U.S. Department of Transportation, 1200 New Jersey Avenue, SE, Washington, DC 20590. Tel: 855-368-4200, www.transportation.gov.

DOT HS 811 574 Interim Guidance for Electric and Hybrid Electric Vehicles Equipped with High Voltage Batteries

GSA Federal Specification L-S-300 Sheeting and Tape, Reflective; Nonexposed Lens, Adhesive Backing

2.1.5 Other Publications

Available from U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) at http://phmsa.dot.gov/hazmat/library/erg and Council on Safe Transportation of Hazardous Articles (COSTHA), 7803 Hill House Court, Fairfax Station, VA 22039, Tel: (703) 451-4031, www.costha.com. In Canada, contact CANUTEC (613) 992-4624. In Mexico, call SCT at 52-5-684-1275.

U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration. (2016). *2020 Emergency Response Guidebook*. U.S. Department of Transportation.
https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg.[3]

[1] The full set of pictograms is provided in ISO 17840-3 and information related to propulsion energy identification is given in ISO 17840-4.

[2] A Federal Motor Vehicle Safety Standard (FMVSS) established under 49 CFR Part 571.305 which applies to MPVs, trucks, and buses with a GVWR of 10000 pounds (4536 kg) or less, that use more than 48 nominal volts of electricity as propulsion power and whose speed attainable in 1 mile (1.6 km) on a paved level surface is more than 25 mph (40 km/h). It specifies requirements for limitation of electrolyte spillage, retention of propulsion batteries during a crash, and electrical isolation of the chassis from the high voltage system.

[3] A guide intended for use by first responders during the initial phase of a transportation incident involving hazardous materials/dangerous goods.

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 NFPA Publications

Available from National Fire Protection Agency, 1 Batterymarch Park, Quincy, MA 02169-7471, Tel: 617-770-3000, www.nfpa.org.

NFPA 52	Vehicular Gaseous Fuel Systems Code (2010)
NFPA 57	Liquified Natural Gas (LNG) Vehicular Fuel Systems Code
NFPA 70	National Electric Code
NFPA 88A	Standard for Parking Structures
NFPA 704	Identification of Materials by Hazard Rating System
NFPA 1970	Standard on Protective Ensembles for Structural and Proximity Firefighting, Work Apparel and Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services, and Personal Alert Safety Systems (PASS)

3. DEFINITIONS

Except as noted below, all definitions are in accordance with SAE J1715.

3.1 BADGING

Describes a durable emblem, insignia, or label securely affixed on the exterior surface of the xEV.

3.2 EMERGENCY RESPONDER (ER)

Personnel responsible for mitigation activities in a medical, fire, or hazardous materials incident or a natural disaster.

3.3 EMERGENCY RESPONSE GUIDE (ERG)

A document and/or brief format rescue sheet providing a summary of steps to perform in emergency situations involving a vehicle or hazardous materials.

NOTE: This does not refer to the DOT document titled “A Guidebook for First Responders During Initial Phase of a Dangerous Goods/Hazardous Materials Transportation Incident.”

3.4 FIRST RESPONDERS

Include, but not limited to, fire department, rescue squads, emergency medical, law enforcement, and in some instances, military where the personnel are trained in assessing and treating injuries.

3.5 HAZARDOUS MATERIALS

Goods that can harm persons, property, or environment and specified by law for identification, packaging for transport, use, storage, and/or disposal (also known as hazmat or dangerous goods).

3.6 High Occupancy Vehicle (HOV) Lanes

A traffic lane reserved for buses or vehicles with more than one occupant, typically marked with large diamond shapes on the pavement and other signage. HOV Lanes in some locations may be accessed by low/alternative fuel vehicles.

3.7 HIGH VOLTAGE (HV)

FMVSS 305 requires use of the color orange to designate high voltage for applications of 30 VAC rms and 60 VDC in the electric power train or conductively connected to the electric power train. The term “rms” refers to root mean square as a working voltage for a voltage source greater than 30 VAC or 60 VDC. This may occur across its terminals or between its terminals and any conductive parts in open circuit conditions or under normal operating conditions.

3.8 HIGH VOLTAGE SYSTEM

A vehicle system inclusive of the battery system and high voltage components (e.g., inverter modules, high voltage cables, etc.) powered by the battery system.

3.9 LICENSE OR REGISTRATION PLATE

State-issued plates (typically metal or paper) which convey information about who owns the vehicle.

3.10 LICENSE PLATE READER (LPR)

Automated devices used to electronically read license plates on passing vehicles.

3.11 LI-ION

Lithium-ion battery or cell.

3.12 MARKER

Describes a durable emblem, insignia, or label securely affixed on an interior surface within the passenger compartment of the xEV.

3.13 MOBILE APPLICATION

Software that runs on a smart phone, mobile phone, tablet, or portable device. Also referred to as Mobile Apps.

3.14 NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA)

The National Highway Traffic Safety Administration is an operating administration of the United States Department of Transportation and is the federal agency responsible for improving motor vehicle safety on United States roadways. As part of its mission, NHTSA develops certain standards for motor vehicle safety and reporting. Under NHTSA’s regulations, each motor vehicle must contain a vehicle identification number, also known as a VIN, which is a 17-character number that encodes specific information about the particular vehicle.

3.15 NiMH

Nickel Metal Hydride battery or cell.

3.16 PERSONAL PROTECTIVE EQUIPMENT

Any of various safety equipment that workers wear or use to prevent injury when working around hazards, such as high voltage electrical energy, chemicals, and/or fire.

3.17 SECOND RESPONDERS

Include, but not limited to, tow/vehicle transport organizations and storage locations for recovered and salvage vehicles.

3.18 TERMINOLOGY

The following shall apply to the use of these words:

Shall: “Shall” is to be used wherever the criterion for conformance with the specific recommendation requires that there be no deviation. Its use shall not be avoided on the grounds that compliance with the SAE Technical Report is considered voluntary.

Should: “Should” is to be used wherever noncompliance with the specific recommendation is permissible. “Should” shall not be substituted for “shall” on the grounds that compliance with the SAE Technical Report is considered voluntary.

3.19 VEHICLE IDENTIFICATION NUMBER (VIN)

Under NHTSA’s regulations in 49 CFR Part 565, each motor vehicle must contain a vehicle identification number, also known as a VIN, which is a 17-character number that encodes specific information about the particular vehicle. These are encoded in SAE J2750 to show body/chassis style in letter positions six and seven with engine type in letter position number eight. This information is also contained in ISO 3779.

3.20 xEV

Any electrified propulsion vehicle with a high voltage system, including, but not limited to, HEV, PHEV, PEV, BEV, FCEV, and EV.

4. STANDARDIZED DEPICTIONS

Existing passenger vehicle license and registration plates are typically marked “Alternative Fuel” or “Electric Vehicle” which does not adequately define potential risks in sufficient detail for responders.

Existing passenger vehicle license and registration plates have insufficient space to be marked with standard ISO 17840 diamond symbols which meet the legibility criteria of ISO 9186-1.

This document provides a standardized means of providing a small letter coded sticker or permanent symbol appropriate to mark a vehicle or to affix to a license plate for the purpose of conveying fuel and hazard information to firefighters and other responders.

This marking system is intended for use on passenger vehicles. It is not intended for use on dealer license plates which are temporarily placed on numerous vehicles or for use on commercial, heavy duty, or publicly owned vehicles.

The colors and lettering are intended to be intuitive, such as use of the existing NHTSA requirement for orange to denote high voltage, followed by a “B” for Battery, “H” for Hybrid, etc.

The fuel and vehicle type may be determined from the sixth through eighth letter positions in the manufacturer VIN, per SAE J2950.

4.1 Letter Font, Letter Colors, Size, Placement

The font will be legible and readable, such as Abadi MT.

Coloring of letters shall be black or white and provide maximum contrast with the background color for the corresponding fuel.

The space provided for each letter shall be 19.05 mm tall x 10.2 mm wide (0.75 inch tall x 0.4 inch wide).

Each letter shall be at least 17.78 mm tall x 8.9 mm wide (0.7 inch tall x 0.35 inch wide).

The design of alternate fuel license plates varies by State. Many States require YEAR and MONTH of expiration to be placed in the upper left and right corners, while others leave the corner areas blank. Some provide unmarked space to the left, center, or right of lettering. (See examples in Figure 1.)

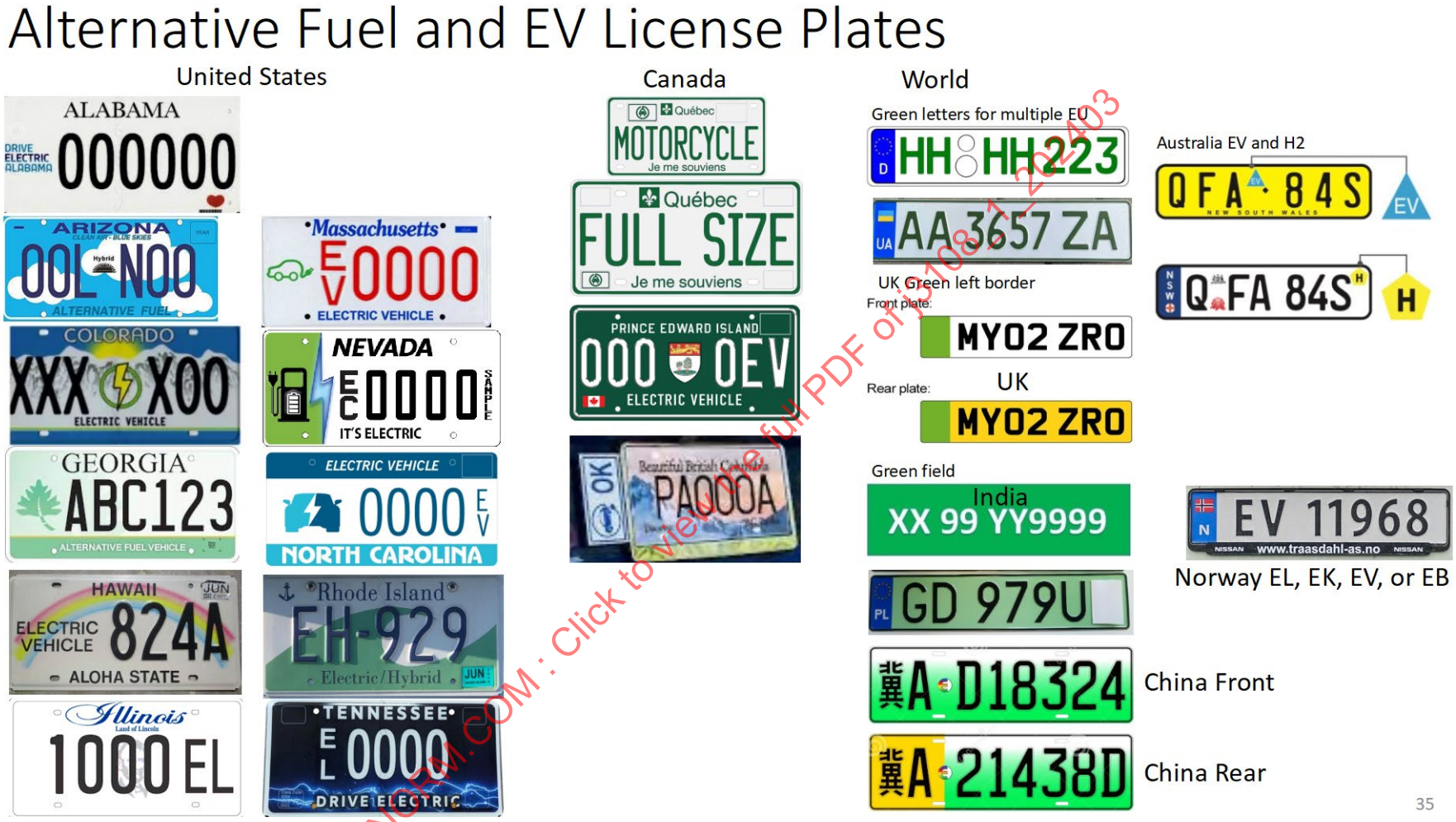

Figure 1 - Examples of existing license or registration plates for alternate fuel vehicles

Within the constraints of SAE J686 and the AAMVA License Plate Standard, the orientation of lettering in the horizontal or vertical plane is at the option of the State or other entity issuing the license plates. Vertical orientation also provides an option for international use. (See Figure 1.)

To fit horizontally between the width of a bolt or screw head retaining the license plate and the edge of the license plate, the minimum size shall be 4.064 x 1.905 cm (1.60 x 0.75 inches). (See Figure 2.)

Due to the minimum height of the four letters, vertical lettering requires the minimum size to be 73.15 mm tall x 10.2 mm wide (2.87 inches tall x 0.4 inch wide). (See Figure 2.)

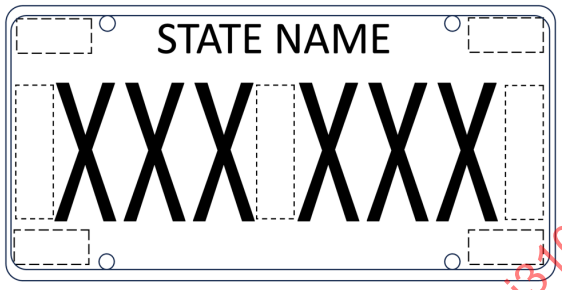

Figure 2 - Potential horizontal and vertical locations for application of lettering

4.2 Stickers Versus Permanent Symbology

Specific details regarding how to apply this standard is the option of the State of vehicle registration. Options include license plates with the symbology painted in place or the use of stickers. While painting the information in place assures consistency in location and permanence, this may not be uniformly desirable. For example, some States permit vehicle owners to keep and transfer license plate(s) to a different vehicle. If the second vehicle is powered by a different form of energy, then the painted symbology could become inappropriate.

Stickers could provide the following:

- Stickers allow separate States to specify where the stickers should be applied. States do not uniformly place registration expiration year and month in the same corners; some States do not require stickers, and some States place such information in other areas, such as on windshields.
    - Existing restrictions on license plate frames are that they cannot obscure required information, such as the expiration, and they may not have a cover the letters in a manner which obscures the plate from license plate reader (LPR) devices. While personalized frames may cover at least some of a sticker, in an emergency, they would provide minimal obstacle to being pulled or bent out of the way.
- Fastest implementation since many years may be required to replace all issued license plates.
- Since the majority of vehicles now have internal combustion engines (ICE), one State option would be to only issue stickers for alternative fuel vehicles.
- Flexibility of implementation in where and how distribution is carried out.
- Stickers could be used alone or to cover existing nomenclature for those plates with painted information.
- Stickers could be adopted by States using LPR technology as a means to permit HOV lane access, negating the need for separate HOV stickers.