



SURFACE VEHICLE RECOMMENDED PRACTICE

J2936™

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(R) SAE Electrical Energy Storage Device Labeling Recommended Practice

RATIONALE

This recommended practice was developed several years ago and needed to be reviewed and revised for accuracy. It also lacked information on the actual performance properties required by the label and/or tape that will be applied to the EVBs. The focus of this committee was to determine the requirements and include them in the overall standard.

FOREWORD

This document provides labeling guidelines for any energy storage device, including cell, battery, and pack level products used in mobility, stationary, and secondary use applications. Every attempt is made to cover information useful during the entire life spectrum of the product from manufacturing, shipping and transportation, usage, re-usage, and emergency information up to and including the point of recycling or reclamation. It is intended to provide labeling guidance for anyone working in the field of energy storage devices.

1. SCOPE

This SAE Recommended Practice outlines labeling guidelines and performance requirements for printed information and warning labels used on components, subsystems, and systems. It covers content, placement, and durability requirements throughout the product life cycle, from initial production to recycling or disposal.

1.1 Purpose

This document provides recommendations suggested by a group of professionals skilled in the field of energy storage and includes important information for labeling, including governmental regulations specific to energy storage devices. This information is provided to be part of the labeling program but does not specify exactly how and where and in what format that information is communicated to those persons or entities that interface with the subsystem(s) and systems(s).

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https://www.sae.org/standards/content/J2936_202505/

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 J537	Storage Batteries
SAE J1115	Guidelines for Developing and Revising SAE Nomenclature and Definitions
SAE J1715	Hybrid Electric Vehicle (HEV) and Electric Vehicle (EV) Terminology
SAE J1797	Recommended Practice for Packaging of Electric Vehicle Battery Modules
SAE J1798/1	Recommended Practice for Performance Rating of Lead Acid and Nickel Metal Hydride Electric Vehicle Battery Modules
SAE J1798/2	Performance Rating of Lithium-Ion Battery Module
SAE J2289	Electric-Drive Battery Pack System: Functional Guidelines
SAE J2344	Guidelines for Electric Vehicle Safety
SAE J2464	Electric and Hybrid Electric Vehicle Rechargeable Energy Storage System (RESS) Safety and Abuse Testing
SAE J2929	Safety Standard for Electric and Hybrid Vehicle Propulsion Battery Systems Utilizing Lithium-based Rechargeable Cells
SAE J2950	Recommended Practices for Shipping Transport and Handling of Automotive-Type Battery System - Lithium Ion
SAE J2984	Chemical Identification of Transportation Batteries for Recycling
SAE TSB 001	SAE Technical Standards Board Rules And Regulations
SAE TSB 002	Preparation of SAE Technical Reports
SAE TSB 003	Rules for SAE Use of SI (Metric) Units
SAE Report	Format Guidelines for Electronic Capture of SAE Documents

2.1.2 Other Publications

Globally Harmonized System of Classification and Labeling of Chemicals (GHS) (refer to the latest edition), UN publication

(Current) Edition of the Dangerous Goods Regulation (refer to the latest edition), International Air Transport Association (IATA)

Battery Council International Data Book (refer to the latest edition), BCI, 401 North Michigan Avenue, Chicago, IL 60611

International Maritime Dangerous Goods Regulations (IMDG) (refer to the latest edition), International Marine Organization (IMO), 4, Albert Embankment, London SE1 7SR, United Kingdom, Fax: +44 20 7587 3210

Technical Instructions for the Safe Transport of Dangerous Goods by Air (refer to the latest edition), International Civil Aviation Organization (ICAO), 999 University Street, Montréal, Quebec H3C 5H7, Canada, Tel: +1 514-954-8219, Fax: +1 514-954-6077, SITATEX: YULCAYA, Internet email: icaohq@icao.int

Poison Prevention Packaging Act (PPPA) (15 U.S.C.1471-1477)

ECE/TRANS/352, Vol. I and II, (Amended, ADR 2011) (European Agreement Concerning the International Carriage of Dangerous Goods by Road), United Nations Commission on Europe, New York, NY

IEC 60095-1 (Lead Acid Starter Batteries), International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland (International Symbols)

IEC 62281 (Safety of Primary and Secondary Lithium Cells and Batteries During Transport), International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211, Geneva 20, Switzerland

IEC 60417 (Graphical Symbols for Use on Equipment), 2002, International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211, Geneva 20, Switzerland

IEC 80416-1 (Basic Principles for Graphical Symbols for Use on Equipment - Part 1: Creation of Graphical Symbols for Registration), International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211, Geneva 20, Switzerland

BS EN 50342-1:2006 (Lead-Acid Starter Batteries; General Requirements and Methods of Test), BSI, 389 Chiswick High Road, London, W4 4AL United Kingdom

Lithium Battery Guide for Shippers: A Compliance Tool for All Modes of Transportation, PHH50-0217-102, Pipeline and Hazardous Materials Safety Administration Outreach, Engagement, and Grants Division East Building, 2nd Floor, 1200 New Jersey Avenue, SE, Washington, DC 20590

DIN 16507-2 (Typesetting Standardization), Deutsches Institut für Normung (German Institute for Standardization), Burggrafenstrasse 6, DE-10787 Berlin, Tel: +49 30 26 01-0, Fax: +49 30 26 01 12 31, Email: director.international@din.de, Web: www.din.de

EU Batteries Directive 2006/66/EC, EU Waste Electrical and Electronic Equipment Rules Regarding Capacity Labeling, Council of the European Union, Brussels, Belgium

EPA530-K-97-009 (Implementation of the Mercury-Containing and Rechargeable Battery Management Act), U.S. EPA, 401 M Street, SW, Washington, DC 20460

SJ/T 11363 (NOV) (Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products), Ministry of Industry and Information Technology of the People's Republic of China, Beijing, China

SJ/T 11364-2014 (Marking for the Control of Pollution Caused by Electronic Information Products), Ministry of Industry and Information Technology of the People's Republic of China, Beijing, China

SJ/T 11365-2006 (Testing Methods for Regulated Substances in Electronic Information Products), Ministry of Industry and Information Technology of the People's Republic of China, Beijing, China

GB 18455-2022 (Packaging Recycle Mark), Ministry of Industry and Information Technology of the People's Republic of China, Beijing, China

IEC 61960-3:2017 (Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 3: Prismatic and cylindrical lithium secondary cells and batteries made from them), International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211, Geneva 20, Switzerland

IEC 61960-4 (Commented Version) (Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 4: Coin secondary lithium cells, and batteries made from them), International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211, Geneva 20, Switzerland

IEC 61960 (Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes-Secondary Lithium Cells and Batteries for Portable Applications), International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211, Geneva 20, Switzerland

Hazardous Materials Markings, Labeling and Placarding Guide, U.S. Department of Transportation, PHMSA DOT Chart 17, U.S. Department of Transportation 1200 New Jersey Avenue, SE, Washington, DC 20590

Recommendations on the Transport of Dangerous Goods, UNECE Transport Division, Palais des Nations, CH-1211, Geneva 10, Switzerland

ISO 7000:2019, (Graphical symbols for use on equipment), International Organization for Standardization, ISO Central Secretariat 1, ch. de la Voie-Creuse, CP 56, CH-1211, Geneva 20, Switzerland

2.2 Governmental Resources

U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), East Building, 2nd Floor, 1200 New Jersey Avenue, SE, Washington, DC 20590, Tel: 202-366-4433, Fax: 202-366-3666

U.S. Department of Commerce, 1401 Constitution Avenue, NW, Washington, DC 20230, Tel: 202-482-2000, Email: TheSec@doc.gov

EU Commission of the European Communities, Brussels, Belgium

Ministry of Industry and Information Technology of the People's Republic of China, Beijing, China

UN Economic Commission for Europe, Information Service, Palais des Nations, CH-1211 Geneva 10, Switzerland, Tel: +41 (0) 22 917 44 44, Fax: +41 (0) 22 917 05 05, Email: info.ece@unece.org

Occupational Safety and Health Administration, 200 Constitutional Avenue, NW, Washington, DC 20210

United States Environmental Protection Administration, 401 M Street, SW, Washington, DC 20460

(California) DTSC's Perchlorate Best Management Practices (BMPs), Department of Toxic Substances Control, Hazardous Waste Management Program, Regulatory and Program Development Division, P.O. Box 806, Sacramento, CA 95812-0806

Code of Federal Regulations (CFR Title 16, 1500.121), Federal Trade Commission, Labeling Requirements; Prominence, Placement and Conspicuousness, Washington, DC

Code of Federal Regulations (CFR Title 49, 100 to 185), U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Washington, DC

2.3 Standards Organizations

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

American National Standards Institute (ANSI), 25 West 43rd Street, 4th Floor, New York, NY 10036, Tel: +1 212-642-4980, www.ansi.org

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

Portable Rechargeable Battery Association (PRBA), 1776 K Street, 4th Floor, Washington, DC 20006, Tel: 202-719-4978, Email: PRBAAtt@gmail.com

Deutsches Institut für Normung (German Institute for Standardization), Burggrafenstrasse 6, DE-10787 Berlin, Tel: +49 30 26 01-0, Fax: +49 30 26 01 12 31, Email: director@din.de, Web: www.din.de

The Japanese Standards Association (JSA) Mita Avanti, 3-11-28 Mita, Minato-ku, Tokyo, 108-0073, Japan, www.jsa.or.jp

JEDEC, 310 North 10th Street, Suite 240-S, Arlington, VA 22201-2107, www.jedec.org

International Electrotechnical Commission (IEC), 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland, www.iec.ch

Underwriter's Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096, Tel: 847-272-8800, www.ul.com

2.4 Other Organizations and Committees

Council on Safe Transportation of Hazardous Articles, Inc. (COSTHA), 7803 Hill House Court, Fairfax Station, VA 22039, Tel: 703-451-4031, Fax: 703-451- 4207, Email: mail@costha.com

International Air Transport Association (IATA), Publications Assistant, 800 Place Victoria, P.O. Box 113, Montreal, Quebec H4Z 1M1, Canada, Tel: 1-514-874-0202, www.iata.org

Battery Council International (BCI), 330 North Wabash Avenue, Suite 2000, Chicago, IL 60611, Tel: 312-644-6610, www.batterycouncil.org

International Maritime Organization (IMO), 4, Albert Embankment, London SE1 7SR, United Kingdom, Fax: +44 20 7587 3210, www.imo.org

International Civil Aviation Organization (ICAO), 999 University Street, Montreal, Quebec H3C 5H7, Canada, Tel: +1 514-954-8219, www.icao.int

United States Council for Automotive Research, LLC, 1000 Town Center Drive, Suite 300, Southfield, MI 48075, Tel: 248-223-9000, <https://uscar.org/>

U.S. Advanced Battery Consortium (Part of USCAR), 1000 Town Center Drive, Suite 300, Southfield, MI 48075, Tel: 248-223-9000, <https://uscar.org/usabc/>

UN Economic Commission for Europe, Transport Division, Palais des Nations, CH-1211, Geneva 10, Switzerland, <https://unece.org/>

3. DEFINITIONS

All definitions used in this document can be found in one of the following documents:

- Surface Vehicle Information Report SAE J1715.
- Symbols and electrochemical nomenclature were created and documented in SAE J1715_MAY2021.

4. COMPONENT (BATTERY CELL), SUBSYSTEM (BATTERY MODULE), AND SYSTEM (BATTERY PACK AND BATTERY SYSTEM) LABELING RECOMMENDATIONS

The information regarding content of labeling the component (battery cell), subsystem (battery module), and system (battery pack and battery system) is divided into the following sections: Manufacturer's Information, Product Information, Product Alerts, Regional Specific Information, Application Designation, Process Related Information, Electrostatic Discharge, Government and Industry Association Recommendations, and Recycling. Some of the information noted as "required" or "recommended" is based on governmental regulations and/or professional associations' recommendations. It is important for the user to review government regulations and professional associations' issued practices on a regular basis.

a. Manufacturer's Information

1. Name of Manufacturer (including "doing-business-as" designations): Shall be displayed on the largest "panel" or "side" of the product, excluding the bottom of the product.
2. Product Origin: Address (manufacturing or corporate address) city; legal region such as state, province, or territory; postal code; and any other local designations shall be displayed on the largest "panel" or "side" of the product (excluding the bottom of the product) for traceability.
3. Contact Information: Telephone, telex, web address, email addresses, and/or an industry registry number or code (if applicable and/or established) shall be displayed on the largest "panel" or "side" of the product (excluding the bottom of the product) for traceability and first responder use.

b. Product Information

1. Content Disclosure
 - i. Content chemistry type(s) shall be identified.
2. Traceability
 - i. Production dates, shift designations, lines, manufacture lots, etc., and related traceability information are recommended to be included in your labeling scheme.
3. Date of Manufacture
 - i. Date of manufacture is recommended. In some countries and jurisdictions, date of manufacture is a requirement.
4. Voltage
 - i. Voltage shall be shown in nominal volts. (Refer to SAE J1715.)
5. Polarity
 - i. Polarity shall be clearly marked on the energy source component(s) as positive (+) and negative (-).

6. Performance/Capacity (see Appendix L)

i. Product performance shall be identified by using one or a combination of the following:

- a) Ampere-Hours (Ah)
- b) Cold Cranking Amperes (CCA or A)
- c) Kilowatt Hours (kWh) or Watt hours (Wh)
- d) Labeling as follows:
 - 1) The capacity of automotive starting batteries shall be expressed in Ampere-hours (Ah) and/or Cold Cranking Amperes (A).
 - 2) Transportation regulations require that batteries must be marked with the Watt-hour rating on the outside of the battery case.
 - 3) The label shall be located on the battery itself, on one of the sides of the battery excluding the bottom side.

c. Product Alert Statements: Information, Caution, Warning, Danger, and Symbols Labeling

- 1. Information shall be conveyed describing potential issues through the use of "Information," "Caution," "Warning," and "Danger" statements with the use of specific colors, symbols, and label formats. (These formats are not required for marketing or manufacturing information.)
- 2. The label information provided on a particular energy source component shall be focused and directed to the "audience" who will be interacting with the component, subsystem, and system through the use of "Product Alert Statements" for consumer use, first responder contact, secondary use, end-of-life reclamation, and some internal processes. There are four types of "Alert Labeling":
 - i. Information Statement is used to provide useful information to the user of the component, subsystem, or system.
 - ii. Caution Statement is used to inform the user of a possible hazard which may result in serious damage to the component, subsystem, or system.
 - iii. Warning Statement is used to inform the user of a possible severe hazard, which has the potential to become dangerous, resulting in personal injury to the user.
 - iv. Danger Statement is used to inform the user of a danger which may result in serious bodily injury or death.
- 3. The alert statement shall be present on an overall white or contrasting background color, incorporating the following format components:
 - i. Signal Word Panel (see Appendix E)
 - a) Background Color is based on the Signal Word hazard severity
 - 1) Information Labeling: PMS Black
 - 2) Caution Labeling: PMS 116C
 - 3) Warning Labeling: PMS151C
 - 4) Danger Labeling: 186C

- b) Copy using one of the following single words identifying type of alert:
 - 1) "Information"
 - 2) "Caution"
 - 3) "Warning"
 - 4) "Danger"
 - c) Font color: PMS Black
 - d) Font Size
 - 1) See Section 6.b.3. (sizing).
 - 2) Reference: Title 16 CFR-1500.121 (c) for further clarification.
- ii. Hazard Identification (see Appendix E)
- a) Copy identifies the hazard
 - b) Font color: PMS Black (or dark contrasting color)
 - c) Font Size
 - 1) See Section 6.b.3. (sizing).
 - 2) Reference: Title 16 CFR-1500.121 (c).
- iii. Consequences of not avoiding the hazard (see Appendix E)
- a) Copy describes the consequences of not avoiding the hazard
 - b) Color is PMS Black or dark contrasting color
 - c) Font Size
 - 1) See Section 6.b.3. (sizing).
 - 2) Reference: Title 16 CFR-1500.121 (c).
- iv. How to avoid the hazard (see Appendix E)
- a) Copy describes how the user may avoid the hazard
 - b) Color is PMS Black or dark contrasting color
 - c) Font Size
 - 1) See Section 6.b.3. (sizing).
 - 2) Reference: Title 16 CFR-1500.121 (c).

v. Safety (or Warning) Symbol (see Appendix E)

- a) Consult ANSI Z535.4 for the proper symbol application and choice.
- b) Placement on left portion of the label.
- c) Symbol to be on white background.

d. Regional Specific Labeling

1. USA, California

i. Proposition 65 Warning

- a) Specific notification is required if a battery product is marketed in California and the battery product exposes residents to lead, lead compounds, lead acetate, lead phosphate, and/or lead subacetate residing in the battery or battery accessories (battery terminals, posts, cables, cable clamps, etc.).
- b) Location of the warning can be on any “side” of the battery, except the bottom panel, provided the size of the warning language is the same type size and style and is conspicuous as the other instructional and warning text which is printed on the battery wrappings, packaging, and shipping containers.
- c) Copy Illustration
 - 1) “WARNING: Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.”
- d) Recommended Font Size
 - 1) This warning shall be printed in a type size and style that is at least as conspicuous as, but not necessarily any more prominent than, other text printed.

ii. Best Management Practices for Perchlorate Materials

- a) Special handling instructions may apply if the energy storage device chemistry, such as lithium manganese dioxide chemistry, for example, contains a perchlorate substance in order to be in compliance with the code.
- b) Reference: State of California: Best Management Practices for Perchlorate Materials, California Code of Regulations, Title 22, Division 4.5, Chapter 33.

2. People’s Republic of China (PRC): Restriction of Hazardous Substances - China Mark I or China Mark II (see Appendix J)

- i. The PRC’s Restriction of Hazardous Substances or “RoHS” are measures for the administration of the control of pollution caused by Electronic Information Products (EIP). The China RoHS is different from the European counterpart in a few significant ways. Products (as well as the product’s packaging) imported into China must be marked unless:
 - a) The products are imported into China for export or manufactured in China for export.
 - b) The products are components sold to an OEM to be used in their own products.

- ii. The four types of “markings” or “labeling” are as follows:
 - a) The “Mark I” (Green “e”) symbol can be used if there are no RoHS substances in any of the homogeneous materials above the maximum permitted values within the EIP.
 - b) The “Mark II” (Environment Friendly Use Period) symbol is used to denote the toxic or hazardous substance(s), which are present in the product. Included in the symbol is a numeric representation period (number of years) in which the toxic and/or hazardous substance(s) or element(s) contained in the EIP will not leak or mutate under normal operating conditions, known as the “environment friendly safe use period.” This period starts at the date of manufacture. Also, the hazardous substance(s) and location must be printed in any accompanying manuals. (Note: If a “Mark II” label is used, a date of manufacture must be clearly marked on the product.)
 - c) A table, either presented in the manual, on packaging, or in documentation of the product, must show the hazardous materials present in the product and which of the components in the product contains the hazardous materials.
 - d) The packaging material “type” used shall also be described on the outside of the packaging.
- iii. The hazardous substances requiring identification are:
 - a) Lead (Pb)

NOTE: Lead-Acid Batteries are exempted from “China Mark” logo.
 - b) Cadmium (Cd)
 - c) Mercury (Hg)
 - d) Hexavalent Chromium (Cr)(VI)
 - e) Polybrominated Biphenyls (PBB)
 - f) Polybrominated Diphenyl Ethers (PBDE)
- iv. Reference: PRC, Ministry of Information Industry (MII) Order 39, Standard SJ/T 11364-2006, Marking for Control of Pollution Caused by Electronic Information Products (EIP).

e. Application Designation

- 1. It is recommended applications or uses of any component, subsystem, or system be designated on the product.
 - i. Copy example: “This (component, subsystem, system) is designed for use in (product) and should not be used in any other application.”
- f. Process Related Information - Process Related Information is recommended information necessary for the safe and proper assembly, consumer interaction, dealer servicing, emergency response, damaged vehicle disposition, secondary use, and end-of-life (reclamation) of the component, subsystem, and system:
 - 1. Cell
 - i. Component (Battery Cell) Assembly
 - a) Critical assembly labeling shall include:
 - 1) Potential assembly hazard notifications.
 - 2) Handling and storage instructions and warnings.

ii. Component (Battery Cell) Servicing

- a) Warnings concerning the servicing of the component shall be listed.
- b) “Only to be serviced by qualified technician” declaration shall be included if applicable.
- c) Discharging procedures and equipment required to perform discharging shall be listed.
- d) Field servicing, required equipment for servicing, and safety procedures information shall be included, if applicable.

iii. Component (Battery Cell) Secondary Use

- a) Secondary use restrictions
 - 1) Secondary prohibitions and/or limitations of secondary use shall be listed if applicable.
 - 2) Secondary use limitations shall be listed if applicable.
 - 3) Potential dangers of product contact or contact with other equipment shall be listed.
 - 4) Spill or leakage potentials with appropriate clean-up information shall be listed.
- b) Component (Battery Cell) information or “access-of-information” sources such as phone number(s), registries, or website(s) shall be included to provide secondary use information (or restrictions) on secondary cell use.
- c) Charging procedures (including proper equipment for charging) and restrictions shall be clearly stated.

iv. Component (Battery Cell) End of Life or Reclamation

- a) Bill-of-material or related information deemed appropriate for use in the “end-of-life” reclamation of the component shall be accessible and sourced by providing phone numbers, registries, or website(s) where applicable.
- b) Warnings regarding the opening or exposing of the cell chemistry/chemistries shall be clearly stated as well as those warnings to unqualified recyclers.

2. Module

i. Subsystem (Battery Module) Assembly

- a) Critical assembly labeling shall include:
 - 1) Potential assembly hazard notifications.
 - 2) Handling and storage instructions and warnings.
 - 3) Module handlings including any “lift” point notifications.
 - 4) State-of-charge and charging restrictions prior to installation.