



SURFACE VEHICLE RECOMMENDED PRACTICE

J2981™

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(R) Starter Battery Identification and Classification

RATIONALE

SAE J2981 is the result of a Five-Year Review and update of the specification.

1. SCOPE

This document provides recommendations to identify battery group sizes and dimensions for 6 V, 8 V, 12 V, and 24 V lead acid batteries.

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: 1-877-606-7323 (U.S. and Canada only) or 1-724-776-4970 (outside U.S. and Canada), www.sae.org.

SAE J537 Storage Batteries

2.1.2 BCI Publications

Available from Battery Council International, 330 North Wabash Avenue, Suite 2000, Chicago, IL 60611, Tel: 312-245-1074, www.batterycouncil.org.

BCIS-04 BCI Battery Technical Manual - BCI Recommended Storage Battery Specifications Starting, Lighting and Ignition Types

The Battery Council International's Method and The Data Book Committee's Informal Guidelines for the Assignment of Group and Assembly Numbers

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Documents

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2.1.3 BSI Publications

Copies of these documents are available online at www.bsigroup.com.

EN 50342-1 Lead-Acid Starter Batteries, Part 1: General Requirements and Methods of Test

EN 50342-2 Lead-Acid Starter Batteries, Part 2: Dimensions of Batteries and Dimensions and Marking of Terminals

2.1.4 IEC Publications

Available from IEC Secretariat, 3 rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41 22 919 0211, www.iec.ch.

IEC 60095-1 Lead-Acid Starter Batteries, Part 1: General Requirements and Methods of Test

IEC 60095-2 Lead-Acid Starter Batteries, Part 2: Dimensions of Batteries and Dimensions and Marking of Terminals

2.1.5 JSA Publications

Available from Japanese Standards Association, 3-13-12 Mita, Minato-Ku 108-0073, Tokyo, Japan, Tel: +81-50-1741-7520, <https://webdesk.jsa.or.jp/>.

JIS D5301 Lead-Acid Starter Batteries

3. DEFINITIONS

3.1 CCA

Cold Cranking Ampere at -18 °C (0 °F) as defined in SAE J537 and Battery Council International (BCI) (BCIS-04).

3.2 RC

Reserve capacity in minutes at 27 °C (80 °F) as defined in SAE 537 and Battery Council International (BCI) (BCIS-04).

3.3 PROCEDURE

Assignment of Group Numbers and Inclusion of Batteries in this Standard.

NOTE: The term "Group Number" implies the particular assembly number that is assigned to a particular battery with attributes listed in Table 4.

3.4 GROUP NUMBERS - PURPOSE

Group Numbers are assigned to assist the industry in the orderly presentation of battery attributes for classification.

A battery group number may not be changed once it becomes official unless it is determined that there is an error in the definition or assignment of the battery number.

3.5 STRUCTURE OF NEW GROUP NUMBERS

A new Group Number will contain not more than three numerical digits, without prefix. The only suffix permitted is the letter "R" in designs which the positive terminal is located on the right front corner of the battery when the battery terminals are facing the reader.

Letters "D": 4D, 6D, 8D; "H": 24H; "L": 19L, "T": 31T; "A": 31A; and more! (4DLT, 24NF, etc.)

Suggested verbiage: A new Group Number will contain not more than four characters as a combination of numbers and letters.

NOTE: A letter will be added to Group 31 to designate the terminal: "T" for "Threaded Stud" and "A" for "SAE Automotive Post."

If the positive terminal is located on the left front, a group number will be assigned consisting of numbers only (no letters).

If the positive terminal is located on the right front, a group number will be assigned consisting of numbers and may include the letter suffix "R" or "F." The letter suffix "R" and "F" is used to designate right hand positive and also reverse polarity as generally accepted in the industry.

Group sizes excluded from this rule are group 47, 48, 49, 90, 91, 92, and 93, which are established numbers and as such exempt from the R and F designation rule.

The lowest vacant number is normally used; however, a new Group Number may be selected from a block of numbers reserved for batteries of similar characteristics and intended for similar applications.

In absence of a SAE/BCI Group Size Number, the BCI Data Book Committee or SAE Battery Standards Committee may choose to recognize an existing number from another industry standard.

3.6 SIGNIFICANCE OF A GROUP NUMBER

A Group Number will represent:

- a. Maximum Overall Dimensions
- b. Assembly Number

3.7 DIMENSIONING

3.7.1 Dimensions will be expressed in millimeters and inches.

Criteria for introducing a new Group Number:

- a. If battery dimensions vary more than ± 2 mm from the listed Maximum Overall Dimensions of any current Group size mentioned in Table 1, OR
- b. If a battery has features that may interfere with fitment or function of a current group size with compatible overall dimensions (less than ± 2 mm variance in respective dimensions).

A review should be triggered and supported by the BCI Data Book Committee or the SAE Battery Standards Committee to determine whether introduction of a new Group Number is needed.

Exceptions to the new Group size requirement may be made for battery types that are controlled and published under another recognized standard such as EN or JIS. In these cases, the dimensions and tolerances will be ruled by the associated standards documentation.

Group Numbers are not intended to indicate the electrical performance characteristics or the applications of the batteries listed.

Dimensions for new batteries will be based on millimeters to the nearest whole number.

3.7.2 Definition of Maximum Overall Dimensions

Maximum Overall Dimensions shall include hold-downs, lifting ledges, posts, studs, vent caps, or any other protrusion that may affect battery fit and aftermarket interchangeability.

3.8 PRESENCE OF SPECIAL FEATURES

The presence of such special features that do not affect battery fit and interchangeability may be indicated by a letter suffix to the Assembly Number, and/or by a footnote.

3.9 BATTERIES WITH SPECIAL FEATURES

Battery types with special features (protruding ledges, hold downs, etc.) that do not affect aftermarket fit and interchangeability will take the Group Number for a similar battery without a feature. Such features may be indicated by a letter suffix to the Assembly Number and/or footnote.

3.10 SIGNIFICANCE OF AN ASSEMBLY NUMBER

Assembly Numbers will indicate:

- a. Cell layout
- b. Terminal design and general location
- c. Special features that may affect battery fit and interchangeability

3.11 SIGNIFICANCE OF ASSEMBLY NUMBERS

When special features not identified in an Assembly Number affect aftermarket fit or interchangeability, a new Group Number and associated new Assembly Number with or without suffix is required.

3.12 SIZE OF NEW ASSEMBLY NUMBERS

Assembly Numbers will have not more than two numerical digits without prefix continuing with the next consecutive number.

3.13 ASSEMBLY NUMBERS MAY HAVE SUFFIXES TO ASSEMBLY NUMBERS

Assembly Numbers may have suffixes to indicate special features.

3.14 SUFFIXES

Suffixes to Assembly Numbers may be used to indicate such special features as flange hold-downs, recesses, lifting ledges, special terminals, etc.

3.15 ASSEMBLY NUMBER MAY DEFINE SEVERAL GROUP NUMBERS

An Assembly Number may be assigned to more than one Group Number; but no Group Number may have more than one Assembly Number.

An existing Assembly Number may be assigned to any Group Number having the configuration indicated by a particular layout.

When considering assignment of an existing Assembly Number for a new Group Number, suffixes can be ignored, unless they apply to the new Group Number.

3.16 THE RULE OF REASON

In order to minimize the quantity of Group Numbers, the “Rule of Reason” shall be applied to all borderline situations.

EXAMPLE: When various terminal designs all accomplish the same purpose, they will be assigned the same Assembly Number.

3.17 WHEN A NEW GROUP NUMBER IS “OFFICIAL”

The Assignment of a Group Number for a new battery size and/or configuration will become official only upon recommendation by the SAE/BCI Committee.

3.18 APPLICATIONS FOR NEW GROUP NUMBERS

Any manufacturer or individual seeking the assignment of a new Group Number must petition the SAE or BCI Committee, giving all details of the physical characteristics of the battery (assembly drawing), and the applications for which it is intended.

Based on the information supplied, the BCI/SAE Committee will determine whether a battery should be classified in an established Group, assigned a new Group Number, or not listed at all.

3.19 DIRECTION OF COMMUNICATIONS

Communications should be in writing, directed to the appropriate SAE committee.

3.20 RECOGNITION OF JIS, EN, IEC BATTERY GROUP NUMBERS

When a new battery size originates through either Japanese or European battery specifications and vehicle registrations in North America are in significant quantities, then SAE J2981 may recognize and list the original battery identification number (either JIS, EN, or IEC specification). SAE/BCI numbering protocol should be used whenever possible.

3.21 NON-SAE/BCI GROUP SIZE RECOGNITION

Use of Japanese and European Community generated battery group numbers is permitted. This is in recognition of the increasing number of vehicles that contain batteries that are described by Japanese and European specifications. When approved by committee action, the appropriate JIS, EN, and IEC battery number will be listed in the SAE J2981 standard.

4. EXCEPTIONS

4.1 Guideline A

4.1.1 Delisting of Group Numbers

Group Numbers are delisted from Tables 3 and 4 as necessary to avoid complexity.

4.2 Guideline B

4.2.1 Reassignment of Group Numbers

A Group Number can be delisted from the SAE Identification table as deemed necessary by the committee. A group number may only be reassigned after it is clear that reassignment will not cause confusion as to the identity of the reassigned number.

4.3 Guideline C

4.3.1 Approximate Performance Ranges

The “Approximate Performance Ranges” in the table will reflect the lowest and highest ratings for the OE batteries in a Group.

5. GENERAL REQUIREMENTS

5.1 General

The following specifications are common to all vehicle batteries not limited to this standard.

5.2 Marking

5.2.1 Safety Labeling

The batteries shall bear the safety symbols in accordance with the BCI “Recommended Practices Battery Labeling Manual.”

5.2.2 Marking of the Polarity of Terminals

5.2.2.1 General

The batteries shall carry the marking of polarity, at least that of the positive terminal.

5.2.2.2 Marking of Positive Terminals

This marking shall take the form of the symbol “+” either on the upper surface of the positive terminal or on the lid adjacent to the positive terminal.

5.2.2.3 Marking of Negative Terminals

This marking shall take the form of the symbol “-” either on the upper surface of the negative terminal or on the lid adjacent to the negative terminal.

5.2.2.4 Design and Dimensions of Marking of Terminals

The symbols used for marking the terminals shall be in accordance with the IEC 60417, symbol 5005 for the positive and symbol 5006 for the negative polarity.

The dimensions of the marking in Figure 1 (shown as an example) follow IEC 60417.



Figure 1 - Marking of polarity (millimeters)

The polarity symbols may be either indented or embossed by $(0,4 \pm 0,1)$ mm.

As an alternative, the wordings "POS" and "NEG" are permitted for the North American market only.

5.3 Dimensions and Designs

All dimensions given in this document correspond to a temperature of 20 °C of the polypropylene polyethylene copolymer.

Details of the design that are not indicated in the generic drawings need to be chosen appropriately.

The generic drawings in this document are possible examples only. Especially the design of the lid, handles, ribs, ledges, and vent caps are not mandatory.

5.3.1 SAE/BCI Group Sizes Assembly and Dimensions

Table 1 illustrates the dimensions of common SAE/BCI automotive battery group sizes and the reference to assembly figures shown in Figure 2.

Table 1 - BCI battery classifications, dimensional specifications, and ratings

BCI Group Number	Maximum Overall Dimensions						Post/ Terminal	Assembly Figure No.	O.E. Performance Ranges (for Reference Only)	
	Millimeters			Inches					Cold Cranking Performance Amps. @ 0°F (-18°C)	Amp-Hour (Ah)
	L	W	H	L	W	H				
Passenger Car and Light Commercial Batteries 12-Volt (6 Cells)										
21	208	173	222	8 3/16	6 13/16	8 3/4	A,A2	10	305-420	---
21R	208	173	222	8 3/16	6 13/16	8 3/4	A,A2	11	310-490	---
22F	241	175	211	9 1/2	6 15/16	8 5/16	A	11F	220-500	---
22HF	241	175	229	9 1/2	6 15/16	9	A	11F	290	---
22NF	240	140	227	9 7/16	5 1/2	8 15/16	A,A2	11F	165-550	---
24	260	173	225	10 1/4	6 13/16	8 7/8	A,A2	10	200-1000	70
24F	273	173	229	10 3/4	6 13/16	9	A,A2	11F	250-900	65-70
24H	260	173	238	10 1/4	6 13/16	9 3/8	A	10	315-410	---
24R	260	173	229	10 1/4	6 13/16	9	A,A2	11	585	---
24T	260	173	248	10 1/4	6 13/16	9 3/4	A	10	370-900	---
25	230	175	225	9 1/16	6 15/16	8 7/8	A,A2	10	260-660	---
26	208	173	197	8 3/16	6 13/16	7 3/4	A,A2	10	245-800	---
26R	208	173	197	8 3/16	6 13/16	7 3/4	A	11	235-675	---
27	306	173	225	12 1/16	6 13/16	8 7/8	A,A2	10	240-810	---
27F	318	173	227	12 1/2	6 13/16	8 15/16	A,A2	11F	315-780	80
27H	298	173	235	11 3/4	6 13/16	9 1/4	A	10	420-440	---
27R	306	173	225	12 1/16	6 13/16	8 7/8	A,A2	11	270-700	---
29NF	330	140	227	13	5 1/2	8 15/16	A	11F	280-430	---
33	338	173	238	13 5/16	6 13/16	9 3/8	A	11F	1050	---
34	260	173	200	10 1/4	6 13/16	7 7/8	A	10	235-1000	70
34R	260	173	200	10 1/4	6 13/16	7 7/8	A	11	450-850	100
35	230	175	225	9 1/16	6 15/16	8 7/8	A,A2	11	300-640	48-113
36R	263	183	206	10 3/8	7 3/16	8 1/8	A	19	540-650	---
40R	278	175	175	11	6 15/16	6 15/16	A,A1	15	550-650	---
41	293	175	175	11 9/16	6 15/16	6 15/16	A,A1	15	300-720	---
42	242	175	175	9 9/16	6 15/16	6 15/16	A,A1	15	210-500	---
43	334	175	205	13 1/8	6 15/16	8 1/16	A,A1	15	495	---
45	240	140	227	9 7/16	5 1/2	8 15/16	A,A2	10F	235-500	---
46	273	173	229	10 3/4	6 13/16	9	A,A1	10F	315-450	---
47	242	175	190	9 9/16	6 15/16	7 1/2	A,A1,F	24	290-680	45-64
48	278	175	190	11	6 15/16	7 1/2	A,A1,A2	24	315-850	60-80
49	353	175	190	13 15/16	6 15/16	7 1/2	A,A1,A2	24	470-950	72-100
50	343	127	254	13 1/2	5	10	A	10	500-600	---
51	238	129	223	9 3/8	5 1/16	8 3/4	A,A2	10	270-500	---
51R	238	129	223	9 3/8	5 1/16	8 3/4	A,A2	11	295-500	---
52	186	147	210	7 5/16	5 13/16	8 1/4	A	10	405	---
53	330	119	210	13	4 11/16	8 1/4	A	14	210-350	---
54	186	154	212	7 5/16	6 1/16	8 3/8	A	19	305-330	---
55	218	154	212	8 9/16	6 1/16	8 3/8	A	19	370-580	---
56	254	154	212	10	6 1/16	8 3/8	A	19	350-550	---
57	205	183	177	8 1/16	7 3/16	6 15/16	A	22	310	---
58	255	183	177	10 1/16	7 3/16	6 15/16	A	26	245-550	---
58R	255	183	177	10 1/16	7 3/16	6 15/16	A	19	540-580	---

BCI Group Number	Maximum Overall Dimensions						Post/ Terminal	Assembly Figure No.	O.E. Performance Ranges (for Reference Only)	
	Millimeters			Inches					Cold Cranking Performance Amps. @ 0°F (-18°C)	Amp-Hour (Ah)
	L	W	H	L	W	H				
Passenger Car and Light Commercial Batteries 12-Volt (6 Cells) Continued										
59	255	193	196	10 1/16	7 11/16	7 3/4	A	21	540	---
60	332	160	225	13 1/16	6 5/16	8 7/8	A	12	260-950	---
61	192	162	225	7 9/16	6 3/8	8 7/8	A	20	310	---
62	225	162	225	8 7/8	6 3/8	8 7/8	A	20	310-535	---
63	258	162	225	10 3/16	6 3/8	8 7/8	A	20	450	---
64	296	162	225	11 5/8	6 3/8	8 7/8	A	20	380-535	---
65	306	192	192	12 1/16	7 9/16	7 9/16	A	21	540-880	70
66	306	192	194	12 1/16	7 9/16	7 11/16	A	13	650-750	---
67R	231	175	176	9 1/8	6 15/16	6 15/16	A	39	390	---
70	208	180	186	8 3/16	7 1/16	7 5/16	S	17	250-675	---
71	208	179	216	8 3/16	7 1/16	8 1/2	S	17	275-650	---
72	230	179	210	9 1/16	7 1/16	8 1/4	S	17	265-465	---
73	230	179	216	9 1/16	7 1/16	8 1/2	S	17	425-500	---
74	260	184	222	10 1/4	7 1/4	8 3/4	S	17	265-650	---
75	230	180	186Ⓢ	9 1/16	7 1/16	7 5/16Ⓢ	S	17	425-690	---
76	334	179	216	13 1/8	7 1/16	8 1/2	S	17	750-1075	---
77	306	184	222	12 1/16	7 1/4	8 3/4	A	17	350-465	---
78	260	180	186	10 1/4	7 1/16	7 5/16	S	17	465-875	63
79	307	179	188	12 1/16	7 1/16	7 3/8	S	35	800-840	---
85	230	173	203	9 1/16	6 13/16	8	A	11	430-630	---
86	230	173	203	9 1/16	6 13/16	8	A	10	430-640	---
90	242	175	175	9 9/16	6 15/16	6 15/16	A1,A2	24	450-600	---
91	278	175	175	11	6 15/16	6 15/16	A1,A2	24	590-700	---
92	315	175	175	12 7/16	6 15/16	6 15/16	A1,A2	24	575-720	80
93	353	175	175	13 15/16	6 15/16	6 15/16	A1,A2	24	600-800	90
94R	315	175	190	12 7/16	6 15/16	7 1/2	A1,A2	24	440-900	61-100
95R	394	175	190	15 9/16	6 15/16	7 1/2	A1,A2	24	800-950	105-115
96R	242	175	175	9 1/2	6 15/16	6 15/16	A,A1	15	400-590	60
97R	252	175	190	9 15/16	6 15/16	7 1/2	A1,A2	15	575	---
98R	283	175	190	11 1/8	6 15/16	7 1/2	A1,A2	15	620-760	---
99	207	175	175	8 1/8	6 15/16	6 15/16	A1	34	470	---
99R	207	175	175	8 1/8	6 15/16	6 15/16	A1	24	390-470	44
100	260	179	188	10 1/4	7 1/16	7 3/8	S	35	770	---
101	260	179	170	10 1/4	7 1/16	6 11/16	S	17	540	---
102R	207	175	139	8 1/8	6 15/16	5 1/2	A	24	---	35
121R	208	177	215	8 1/4	7	8 1/2	A	11H	410-600	---
124	265	175	214	10 7/16	6 15/16	8 7/16	A	40	600	---
124R	262	177	218	10 3/8	7	8 5/8	A	11H	500-740	68-80
140R	207	175	190	8 1/8	6 15/16	7 1/2	A	24	285-570	44-51
148	278	175	190	11	6 15/16	7 1/2	A1,A2	34	595-600	70
151R	188	125	225	7 7/16	4 15/16	8 7/8	A	28	340-370	---
400	150	88	143	5 7/8	3 7/16	5 5/8	Aux	41	200	12-14
401	150	88	130	5 7/8	3 7/16	5 1/8	Aux	41	170-180	10
402R	198	132	188	7 13/16	5 3/16	7 3/8	A	28	---	30-33