

Australian Standard[®]

Secondary batteries for use with stand-alone power systems

Part 1: General requirements

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Australian Automobile Association
Australian Automotive Aftermarket Association
Australian Chamber of Commerce and Industry
Australian Electrical and Electronic Manufacturers Association
Australian Federation of Consumer Organizations
Australian Lead Development Association
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PREFACE

This Standard was prepared by the Standards Australia Committee on Secondary Batteries.

A distinguishing feature of stand-alone power systems is the unpredictability of and limitation on the amount of charging power available and hence on the charge-discharge cycles imposed on the battery. Batteries for use in stand-alone power systems have different requirements to those designed for use in other applications, in particular low self-discharge, long life under the charging cycle associated with stand-alone systems, and the ability to operate over a wide temperature range.

Batteries in stand-alone power systems are often supplied with power from a number of sources, such as photovoltaic arrays, wind generators, water generators and diesels, combined to form a hybrid system.

This Standard is the first part of a two-part Standard on stand-alone batteries, the two parts of which are—

- (a) this Standard; and
- (b) a proposed second part covering the installation and maintenance of stand-alone batteries.

In the preparation of this Standard reference was made to a draft Standard, Rechargeable batteries for photovoltaic solar energy systems, prepared by IEC Committee 21, Secondary Cells and Batteries.

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CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE	4
1.2 REFERENCED DOCUMENTS	4
1.3 DEFINITIONS	4
1.4 INFORMATION TO BE PROVIDED BY THE MANUFACTURER	5
1.5 MARKING	5
SECTION 2 FUNCTIONAL CHARACTERISTICS AND REQUIREMENTS	
2.1 CAPACITY	7
2.2 CYCLE LIFE	7
2.3 RESISTANCE TO OVERCHARGE	7
2.4 CHARGE RETENTION	7
2.5 CHARGE-DISCHARGE EFFICIENCY	7
2.6 CAPACITY RECOVERY FOLLOWING OVER-DISCHARGE	7
2.7 MECHANICAL ENDURANCE	8
2.8 INTERNAL RESISTANCE	8
2.9 ELECTROLYTE LEVEL INDICATION	8
SECTION 3 TEST CONDITIONS	
3.1 ACCURACY OF MEASURING INSTRUMENTS	9
3.2 PREPARATION OF TEST BATTERIES	9
3.3 TEST SEQUENCE	9
APPENDICES	
A CAPACITY TEST METHOD (120 HOUR DISCHARGE RATE)	10
B CAPACITY TEST METHOD (10 HOUR DISCHARGE RATE)	11
C CYCLE LIFE TEST METHOD	12
D OVERCHARGE RESISTANCE TEST METHOD	13
E CHARGE RETENTION TEST METHOD	14
F CHARGE-DISCHARGE EFFICIENCY TEST METHOD	15
G CAPACITY RECOVERY TEST METHOD	17
H MECHANICAL ENDURANCE TEST METHODS	18
I INTERNAL RESISTANCE TEST METHOD	19

STANDARDS AUSTRALIA

Australian Standard

Secondary batteries for use with stand-alone power systems

Part 1: General requirements

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies requirements for secondary batteries for use with stand-alone power systems.

Stand-alone power systems are those that are not connected to the power distribution system of an electricity supply authority. Stand-alone systems are supplied with power from one or a combination of the following sources: a photovoltaic array, a wind generator, a water generator or a diesel generator.

This Standard specifies requirements for all types of batteries including lead-acid and nickel-cadmium and covers both vented and sealed cells.

The Standard includes tests designed to verify the capacity, efficiency and life of batteries (see Appendices A to I).

1.2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS	
1042	Direct-acting indicating electrical measuring instruments and their accessories
1099	Basic environmental testing procedures for electrotechnology
1099.2.6	Method 2.6: Test F_c —Vibration (sinusoidal)
1099.2.29	Method 2.29: Test E_b —Bump and guidance
1099.2.31	Method 2.31: Test E_c —Drop and topple, primarily for equipment
1104	Informative symbols for use on electrical and electronic equipment
2700	Colour standards for general purposes

1.3 DEFINITIONS For the purpose of this Standard, the definitions below apply.

1.3.1 Battery—a unit consisting of one or more cells connected in a series, parallel, or series-parallel arrangement to supply the voltage and current requirements of a connected load.

1.3.2 Capacity (C)—the quantity of electricity in ampere hours (A.h) which a fully charged battery can deliver under specified conditions.

The capacity of a cell or battery is denoted by the symbol C . As the capacity varies with rate of discharge, the symbol C is followed by a numerical suffix giving the rate of discharge. Thus C_{120} is the capacity in ampere hours (A.h) at the 120 hour rate of discharge. The specified temperature is usually 25°C. The final voltage depends on battery type and conditions of service.

Capacity is specified as follows:

- (a) *Actual capacity*—the quantity of electricity in ampere hours (A.h) that can be withdrawn from a cell or battery for a specific set of operating conditions including discharge rate, temperature, initial state of charge, age, and final voltage.
- (b) *Rated capacity*—the quantity of electricity in ampere hours (A.h), declared by the manufacturer which a battery can deliver after a full charge under specified conditions.

NOTE: The specified conditions are rate of discharge final voltage and temperature.

1.3.3 Cell—the basic electrochemical unit used to store electrical energy.

1.3.4 Charge-discharge rate—the current at which a battery is charged or discharged. This can be expressed in amperes or as a multiple of the battery's rated capacity. For example, if a battery is rated at 500 A.h at the 10 hour rate of discharge and is being discharged at 50 A, its discharge rate can be expressed as 0.1 C_{10} .

1.3.5 Charging—conversion of electrical energy into chemical potential energy within a cell by the passage of a direct current in the direction opposite to that of discharge.

1.3.6 Cycle—one discharge-charge sequence to a specified depth of discharge.

1.3.7 Cycle life—the number of cycles to a specified depth of discharge at a fixed temperature that a cell or battery can undergo before failing to meet its efficiency performance criteria.

1.3.8 Depth of discharge (DOD)—the ampere hours removed from a fully charged battery at a specified discharge rate. Depth of discharge is expressed as a percentage of the battery's rated capacity. For example, the removal of 25 A.h from a 100 A.h battery results in a 25% depth of discharge.