Australian Standard®

Secondary batteries for use with stand-alone power systems

Part 1: General requirements

[Defence Title allocated by Codification and Standardisation Authority:
BATTERIES RECHARGEABLE
NATO Supply Classification 6140]

This Australian Standard was prepared by Committee EL/5, Secondary Batteries. It was approved on behalf of the Council of Standards Australia on 2 October 1992 and published on 15 March 1993.

The following interests are represented on Committee EL/5:

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

Department of Defence

Electricity Supply Association of Australia

Federal Chamber of Automotive Industries

Institution of Engineers, Australia

Telecom Australia

Additional interests participating in preparation of Standard:

Civil Aviation Authority

Department of Administrative Services — Australian Construction Services

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This Standard was issued in draft form for comment as DR 91137.

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First published as AS 4086.1—1993.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140
ISBN 0 7262 7900 5

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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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.