



ATIS-0600330.2018 (R2023)

Valve Regulated Lead-Acid Batteries Used  
in the Telecommunications Environment

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**ATIS-0600330.2018(R2023)**

(Revision of ATIS-0600330.2013)

American National Standard for Telecommunications

# Valve Regulated Lead-Acid Batteries Used in the Telecommunications Environment

Alliance for Telecommunications Industry Solutions

Approved January 2018

American National Standards Institute, Inc.

## Abstract

This standard covers valve-regulated lead-acid (immobilized electrolyte) batteries, hereinafter referred to as VRLA cells (or modules), used as a reserve energy source that supports dc-powered telecommunications load equipment.

## Foreword

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The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

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Suggestions for improvement of this document are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, STEP, 1200 G Street NW, Suite 500, Washington, DC 20005.

At the time of consensus on this document, STEP, which was responsible for its development, had the following leadership:

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American National Standard for Telecommunications –

# Valve Regulated Lead-Acid Batteries Used in the Telecommunications Environment

## 1 Scope, Purpose, & Application

### 1.1 Scope

This standard covers valve-regulated lead-acid (immobilized electrolyte) batteries, hereinafter referred to as VRLA cells (or modules), used as a reserve energy source that supports dc-powered telecommunications local equipment.

### 1.2 Purpose

The purpose of this standard is to aid in developing a common understanding between suppliers and users by defining proper operational use, storage conditions, and test criteria – both initial and lifetime – for VRLA cells (or modules).

### 1.3 Application

This standard is intended to be used to establish: (a) initial physical and performance characteristics of VRLA cells (or modules); (b) performance expectations for these cells (or modules) throughout their lifetime; (c) operating conditions for the appropriate use of these cells (or modules); and (d) guidance for the designers of these cells (or modules).

### 1.4 Theory of Operation

The VRLA cell is designed to minimize gaseous emissions and eliminate electrolyte maintenance throughout the life of the cell. This is accomplished by recombination of internally generated oxygen gas and suppression of hydrogen gas evolution to conserve water in the electrolyte, since water is not expected to be replaced. A resealable valve is included to vent gases not recombined. It is for this reason that these cells (or modules) are called "valve-regulated".

The charge-discharge reactions and products of the VRLA cell are the same as those of the flooded lead-acid cell (see Annex C). However, the VRLA cell has one fundamental difference: it is in the rate at which oxygen, evolved from the positive plates, diffuses to the negative plates, ultimately forming water. This diffusion process can occur at rates up to several orders of magnitude faster than in flooded cells. The oxygen recombination rate translates to a reduction in the volume of water lost by electrolysis. Water loss from evaporation is minimized by operation in a benign ambient, using appropriate materials and properly designed seals.

The electrolyte in a VRLA cell (or module) is "immobilized". The two most common methods of immobilizing the electrolyte are discussed here, although other methods are possible. The first method uses highly porous fibrous mats which hold the electrolyte while separating and electrically insulating the plates. The second method uses a gelling agent to thicken the electrolyte that is distributed between and around the cell plates and separators. With both methods, the intent is to immobilize the electrolyte and create voids that increase the rate of oxygen diffusion and recombination.