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IEEE Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations



IEEE Std 485-1983



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IEEE
Std 485-1983
(Revision of
ANSI/IEEE
Std 485-1978)

IEEE Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations

Sponsor

**Power Generation Committee of the
IEEE Power Engineering Society**

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Foreword

(This Foreword is not a part of IEEE Std 485-1983, IEEE Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations.)

Although the storage battery is of primary importance in ensuring the satisfactory operation of generating stations and substations, no single up-to-date guide exists to aid engineers in sizing the battery for a particular installation. This recommended practice is based on commonly accepted methods used to define the load and to ensure adequate battery capacity. The method described is applicable to all installations and battery sizes.

The installations considered herein are designed for *full float* operation with a battery charger serving to maintain the battery in a charged condition as well as to supply the normal dc load.

This recommended practice was prepared by the Working Group on Batteries of the Station Design Subcommittee of the IEEE Power Generation Committee. It may be used separately, but, when combined with ANSI/IEEE Std 450-1980, IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations, and IEEE Std 484-1981, IEEE Recommended Practice for Installation Design and Installation of Large Lead Storage Batteries for Generating Stations and Substations, it will provide the user with a general guide to designing, placing in service, and maintaining a large storage battery installation. At the time this standard was approved the members of the Working Group on Batteries of the Station Design Subcommittee were:

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IEEE Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations

1. Scope

This recommended practice describes methods for defining the dc load in a generating station or a substation and for sizing a lead storage battery to supply that load. Some factors relating to cell selection are provided for consideration. Installation, maintenance, qualification, testing procedures, and consideration of battery types other than lead storage are beyond the scope of this recommended practice. Design of the dc system and sizing of the battery charger(s) are also beyond the scope of this recommended practice.

2. Definitions

The following definitions apply specifically to this recommended practice. For other definitions, see ANSI/IEEE Std 100-1977, Dictionary of Electrical and Electronics Terms.

battery duty cycle. The load currents a battery is expected to supply for specified time periods.

cell size. The rated capacity of a lead storage cell or the number of plates in the cell.

full float operation. Operation of a dc system with the battery, battery charger, and load all connected in parallel and with the battery charger supplying the normal dc load plus any self-discharge or charging current, or both, required by the battery. (The battery will deliver current only when the load exceeds the charger output.)

period. An interval of time in the battery duty cycle during which the current is assumed to be constant for purposes of cell sizing calculations.

rated capacity. The ampere-hour capacity assigned to a lead storage cell by its manufacturer for a given discharge time, at a specified electrolyte temperature and specific gravity, to a given end-of-discharge voltage.

3. References

- [1] ANSI/IEEE Std 100-1977, IEEE Standard Dictionary of Electrical and Electronics Terms.
- [2] ANSI/IEEE Std 450-1980, IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations.
- [3] ANSI/IEEE Std 535-1979, IEEE Standard for Qualifications of Class 1E Lead Storage Batteries for Nuclear Power Generating Stations.
- [4] IEEE Std 323-1983, IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations.
- [5] IEEE Std 484-1981, IEEE Recommended Practice for Installation Design and Installation of Large Lead Storage Batteries for Generating Stations and Substations.
- [6] IEEE Std 627-1980, IEEE Standard for Design Qualification of Safety Systems Equipment Used in Nuclear Power Generating Stations.
- [7] HOXIE, E. A. Some Discharge Characteristics of Lead-Acid Batteries. *AIEE Transactions (Applications and Industry)*, vol 73, pp 17–22, 1954.