PROCESS INDUSTRY PRACTICES

TECHNICAL REVISION
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Electrical

PIP ELSAP11
Design and Fabrication of Flooded-Cell Lead-Acid Batteries

PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

This Practice has been prepared by harmonizing technical requirements from existing standards of major industrial operators, contractors, and standards development organizations. While this Practice is intended to incorporate the majority of requirements, individual applications may have requirements which take precedence over this Practice. Determinations concerning fitness for purpose or application of this Practice to specific project or engineering situations should not be made solely on information contained in this Practice. All Practices are intended to be consistent with applicable laws and regulations. Should this Practice conflict with applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by this Practice.

Use of trade names should not be viewed as an expression of preference. Other brands having the same specifications are equally correct and may be substituted for those named.

This Practice is subject to revision at any time. For more information refer to PIP ADG001, *Specification for Developing Practices*.

Process Industry Practices
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Austin, Texas 78759

PUBLISHING HISTORY

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1. Scope

This Practice provides the requirements for design and fabrication of vented, flooded-cell lead-acid batteries and accessories. It further describes the design, inspection, testing, shipment, and documentation for these type batteries for application in electrical stations or uninterruptible power supplies (UPS) in indoor, nonclassified areas.

2. References

Applicable parts of the following Practices and industry codes and standards shall be considered an integral part of this Practice. The edition in effect on the date of contract award shall be used, except as otherwise noted. Short titles will be used herein where appropriate.

2.1 Process Industry Practices (PIP)

– PIP ELSAP11-D - *Data Sheet for Flooded-Cell Lead-Acid Batteries*

2.2 Industry Codes and Standards

- American Society of Civil Engineers (ASCE)
  – ASCE/SEI 7 - *Minimum Design Loads for Building and Other Structures*
- Institute of Electrical and Electronics Engineers (IEEE)
  – IEEE 450 - *Recommended Practice for Maintenance, Testing, and Replacements of Vented Lead-Acid Batteries for Stationary Applications*
  – IEEE 485 - *Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications*
  – IEEE 1184 - *Guide for the Selection and Sizing of Batteries for Uninterruptible Power Systems*
- National Electrical Manufacturer Association (NEMA)
  – NEMA PE 5 - *Utility Type Battery Chargers*
- National Fire Protection Association (NFPA)
  – NFPA 70 - *National Electrical Code*
- Underwriters Laboratories (UL)
  – UL 94 - *Test for Flammability of Plastic Materials for Parts in Devices and Appliances*

3. Definitions

acceptance test: Capacity test made on a new battery to determine whether it meets specifications or manufacturer's ratings

aging factor: Additional battery capacity used to account for normal degradation over the battery's service life