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Guidance on Industry Standard for Uninterruptible Power Systems (NEMA)

GIS 12-352

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) GIS 12-352. This Guidance on Industry Standard (GIS) is based on parts of heritage documents from the merged BP companies:

Amoco (ACES)

EL-UPS-00-P Electrical—Uninterruptible Power Supply—Supply Specification

ARCO APCES

ES 317 91F Instrument Power Supply Systems.

BP GOMDW

EL-SP-4050 Uninterruptible Power Supplies

BP Chemicals

CP 17-17-1 Uninterruptible Power Supply

BP (RPSE)

GS 112-10 Secure Static AC Power Supplies for Control Systems

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1. Scope

This GIS document provides guidance on industry standard for the design, materials, fabrication, inspection, testing, documentation, and preparation for shipment of uninterruptible power supply systems.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

BP Engineering Technical Practices (ETP)

GIS 12-052	Guidance on Industry Standard for Transformers (ANSI)
GIS 12-354	Guidance on Industry Standard for Station Batteries (IEEE)
GIS 12-356	Guidance on Industry Standard for Battery Chargers (NEMA)

Institute of Electrical and Electronic Engineers (IEEE)

IEEE 446	Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications
IEEE 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment (Emerald Book)

National Electrical Manufacturers Association (NEMA)

NEMA PE 1	Uninterruptible Power Systems
NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code
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Underwriters Laboratories (UL)

UL 1778	Standard for Uninterruptible Power Supply Equipment
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3. System design

3.1. General

- a. UPS standard design shall use pulse width modulated (PWM) technology.
- b. UPS systems shall be in compliance with IEEE 446, UL 1778, NFPA 70 and NEMA PE-1.
- c. Electrical equipment for UPS systems shall be certified (UL, FM, ETL, or other nationally recognized testing laboratory) for its intended function. Components not available with such label or listing shall be built in accordance with the latest published standards and shall not affect overall listing of UPS as an assembly.
- d. UPS systems shall be UL listed as an assembly.



- e. Standby circuits shall have a static switching device to transfer ac output loads. This circuit shall be fully rated for both continuous and short circuit duties.
- f. Equipment and components shall be arranged so discrete parts of system can be isolated and made safe for maintenance to be performed without disrupting service of other apparatus.
- g. Equipment shall be suitable for continuous operation at rated load within the following supply tolerances:
 - 1. Voltage $\pm 10\%$
 - 2. Frequency $\pm 5\%$
- h. Equipment shall be capable of uninterrupted operation if delivering maximum continuous RMS rated current with the following harmonic content:
 - 1. 3rd harmonic 40% of fundamental.
 - 2. 5th harmonic 30% of fundamental.
 - 3. 7th and higher 7% of fundamental.
 - 4. Odd harmonics.
- i. UPS and MBS enclosures shall have a 1/4 in x 2 in copper ground bus bar the width of the unit.
- j. Ground bars shall be as follows:
 - 1. Marked green/yellow.
 - 2. Extend the length of the suite of UPS enclosures.
 - 3. Have joints between each transport section.
 - 4. M12 brass terminal at each end with compression lug suitable for a 2/0 AWG) external bonding conductor.
- k. The following noncurrent carrying metallic parts of UPS shall be bonded to the ground bus bar:
 - 1. Metalwork.
 - 2. Cable gland plates.
 - 3. Component or subassembly chassis.
- l. UPS shall have a 1/4 in x 1 in x 6 in copper neutral bus bar.

3.2. Major components

- a. UPS systems shall consist of the following components:
 - 1. Ac to dc rectifier/battery charger.
 - 2. Storage battery bank.
 - 3. Dc to ac inverter.
 - 4. Static transfer switch.
 - 5. Maintenance bypass switch.
 - 6. Isolation transformer(s).
 - 7. Controls and instrumentation.
 - 8. Metering alarms and indicators
- b. Active components shall be solid state.

