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| <b>Document No.</b>  | GIS 12-351       |
| <b>Applicability</b> | Group            |
| <b>Date</b>          | 19 December 2003 |

# **Guidance on Industry Standard for Uninterruptible Power Systems, UPS (IEC)**

**GIS 12-351**

**BP GROUP  
ENGINEERING TECHNICAL PRACTICES**

## Foreword

This is the first issue of Engineering Technical Practice (ETP) GIS 12-351. This Guidance on Industry Standard (GIS) is based on parts of heritage documents from the merged BP companies:

**Amoco (ACES)**

A EL-UPS-00-P Electrical Uninterruptible Power 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)**

RP 12-5 Electrical Systems and Installations – Power Supplies for Control Systems

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 supplies

## 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 12-354 | Guidance on Industry Standard for Station batteries (IEEE) |
| GIS 12-356 | Guidance on Industry Standard for Battery chargers         |

### International Electrotechnical Committee (IEC)

|               |                                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------|
| IEC 60146-1-3 | Semiconductor convertors: General requirements and line commutated convertors – Part 1-3: Transformers and reactors                      |
| IEC 60269-1   | Low voltage fuses – Part 1: General requirements                                                                                         |
| IEC 60269-2   | Low voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (Fuses mainly for industrial application) |
| IEC 60417     | Graphical symbols for use on equipment – Part 1: Overview and application                                                                |
| IEC 60529     | Classification of degrees of protection provided by enclosures                                                                           |
| IEC 62040     | Uninterruptible power systems (UPS) – All Parts                                                                                          |

## 3. General requirements

### 3.1. Governing standards

UPS systems shall be in compliance with relevant parts of IEC 62040.

### 3.2. Ambient conditions

UPS systems will be located indoors and shall be suitable for continuous duty under the ambient conditions specified in IEC 62040-3 and any more onerous conditions as specified in the enquiry documents.

### 3.3. Reliability, service life, and operation

- The manufacturer shall provide information on MTBF (mean time between failure) and MTTR (mean time to repair) data for the UPS system. The means of deriving this data shall also be provided.
- Components used in UPS systems, excluding batteries, shall have a 20-year life under specified operating conditions.

*Batteries supplied as part of the UPS system may be designed with a much shorter life expectation than 20 years. Planté and nickel cadmium pocket plate batteries should have a*



*20-year life expectation but tubular lead acid and VRLA (valve regulated lead acid) types could have a 10-year life expectation or less.*

- c. UPS systems and component parts, with the exception of batteries and ventilation air filters, shall be designed to operate continuously maintenance free for at least 104 weeks.

### 3.4. Acoustic noise

- a. The maximum sound pressure level at or beyond 1 metre from the UPS system surface shall not exceed 60 dB(A) or a more onerous condition if specified in the enquiry documents.
- b. The manufacturer shall provide an octave-band spectrum for the UPS system at 1 m over the range 31.5 Hz to 8 kHz

*Noise measurement requirements can be found in EEMUA Standard 140. ISO 3740-3746 also contains advice on precision methods for determination of sound power levels for broad-band sources in reverberation rooms.*

## 4. System design

### 4.1. General

- a. UPS systems shall consist of the following components:
  1. A.C. to D.C. rectifier/battery charger
  2. Storage battery bank
  3. D.C. to A.C. inverter
  4. Static transfer switch (if required)
  5. Maintenance bypass switch (if required)
  6. Isolation transformer(s) (as required)
  7. Controls and instrumentation
  8. Metering alarms and indicators
- b. Standby circuits shall have a static switching device to transfer a.c. output loads. This circuit shall be fully rated for both continuous and short circuit duties.
- c. 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.
- d. Active components shall be solid state.
- e. Inverter standard design shall use pulse width modulated (PWM) technology.
- f. Semiconductor devices and relays shall be sealed.
- g. Power semiconductors shall operate at:
  1. 60% maximum of manufacturer's current rating at full load
  2. 80% maximum of manufacturer's temperature rating at full load

### 4.2. Incoming power supplies

- a. Incoming a.c. main and by-pass supplies will be three-phase or single-phase as specified in the enquiry documents and, unless otherwise specified will have a solidly earthed neutral.
- b. Equipment shall be suitable for continuous operation at rated load within the following supply tolerances:

