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Guidance on Industry Standard for D.C. Power Supplies

GIS 12-357

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) GIS 12-357. This Guidance on Practice (GP) is based on the following heritage documents from merged BP companies:

Amoco (ACES)

A EL-DC-BC-P Electrical—DC Equipment—Battery Chargers—Supply Specification

ARCO APCES

ES 317 91F Instrument Power Supply Systems.

BP (RPSE)

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

GS 112-10 Guidance for Specification GS 112-10 - Secure Static A.C. power Supplies for Control Systems

GS 112-11 Guidance for Specification GS 112-11 - D.C. Power Supplies

BP Chemical US.

CP 17-9-1 Station Batteries and Battery Chargers

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1. Scope

This GIS provides guidance for design, manufacture and testing of d.c. power supplies.

2. Normative references

The following normative documents contain requirements that, through reference in this text, 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 12-051	Guidance on Industry Standard for Transformers (IEC)
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)

National Electrical Manufacturers Association (NEMA)

NEMA AB 1	Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures
NEMA FU 1	Low Voltage Cartridge Fuses
NEMA PE 5	Utility Type Battery Chargers
NEMA ICS 2	Industrial Control Systems Controllers, Contactors and Overload Relays Rated 600 Volts
NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code
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International Electrotechnical Commission (IEC)

IEC 60146-1-1	Semiconductor convertors: General requirements and line commutated convertors – Part 1-1: Specifications of basic requirements
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 60529	Classification of degrees of protection provided by enclosures
IEC 60947-2	Specification for low-voltage switchgear and controlgear — Part 2: Circuit breakers
IEC 60947-3	Specification for low-voltage switchgear and controlgear — Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units
IEC 60947-4-1	Specification for Low-voltage switchgear and controlgear — Part 4-1: Contactors and motor starters - Electromechanical contactors and motor-starters



IEC 62040

Uninterruptible power systems (UPS) – All Parts

3. General requirements

3.1. Governing standards

D.C. power supplies shall be in compliance with the relevant parts of IEC 60146, IEC 62040, or NEMA PE 5.

Reference should also be made to the guidance in GIS 12-356.

3.2. Service Conditions

D.C. power supplies will be located indoors and shall be suitable for continuous duty under the service conditions specified in clause 4 of IEC 62040-3 or section 7 of NEMA PE 5 and any more onerous conditions as specified in the enquiry documents.

3.3. Reliability, service life, and operation

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

Batteries supplied as part of the d.c. power supply may be designed with a much shorter life expectation than 20 years. Planté and nickel cadmium pocket plate batteries should have a 20 years life expectation but tubular lead acid and VRLA (valve regulated lead acid) types could have a 10 year life expectation or less.

- c. D.C. power supplies 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 m (3 ft) from the d.c. power supply surface shall not exceed 60 dB(A) or a more onerous condition if specified in the enquiry documents.

4. System Design

4.1. General

- a. D.C. power supplies shall consist of the following components:
 1. Input transformer
 2. A.C. to D.C. rectifier/battery charger
 3. Storage battery bank
 4. Blocking diodes and counter EMF diodes (if required)
 5. Controls and instrumentation
 6. Metering alarms, and indicators
 7. D.C. distribution board
- b. Active components shall be solid state.
- c. Semiconductor devices and relays shall be sealed.

