

# Uninterruptible Power system - Continuous Current for Industrial Use

## Procedure

This Standard replaces and cancels its previous revision.

The CONTEC - Authoring Subcommittee provides guidance on the interpretation of this Standard when questions arise regarding its contents. The Department of PETROBRAS that uses this Standard is responsible for adopting and applying the sections, subsections and enumerates thereof.

**Technical Requirement:** A provision established as the most adequate and which shall be used strictly in accordance with this Standard. If a decision is taken not to follow the requirement ("non-conformity" to this Standard) it shall be based on well-founded economic and management reasons, and be approved and registered by the Department of PETROBRAS that uses this Standard. It is characterized by imperative nature.

**Recommended Practice:** A provision that may be adopted under the conditions of this Standard, but which admits (and draws attention to) the possibility of there being a more adequate alternative (not written in this Standard) to the particular application. The alternative adopted shall be approved and registered by the Department of PETROBRAS that uses this Standard. It is characterized by verbs of a nonmandatory nature. It is indicated by the expression: **[Recommended Practice]**.

Copies of the registered "non-conformities" to this Standard that may contribute to the improvement thereof shall be submitted to the CONTEC - Authoring Subcommittee.

Proposed revisions to this Standard shall be submitted to the CONTEC - Authoring Subcommittee, indicating the alphanumeric identification and revision of the Standard, the section, subsection and enumerate to be revised, the proposed text, and technical/economic justification for revision. The proposals are evaluated during the work for alteration of this Standard.

***"This Standard is exclusive property of Petróleo Brasileiro S. A. - PETROBRAS, internal application and PETROBRAS Subsidiaries and shall be used by its suppliers of goods and services under contracts or similar under the conditions established in Bidding, Contract, Agreement or similar.***

***The use of this Standard by other companies / organizations / government agencies and individuals is the sole responsibility of the users.."***

## CONTEC

Comissão de Normalização  
Técnica

## SC - 06

Electricity

## Introduction

*PETROBRAS Technical Standards are prepared by Working Groups - WG (consisting specialized of Technical Collaborators from Company and its Subsidiaries), are commented by Company Units and its Subsidiaries, are approved by the Authoring Subcommittees - SCs (consisting of technicians from the same specialty, representing the various Company Units and its Subsidiaries), and ratified by the Executive Nucleus (consisting of representatives of the Company Units and its Subsidiaries). A PETROBRAS Technical Standard is subject to revision at any time by its Authoring Subcommittee and shall be reviewed every 5 years to be revalidated, revised or cancelled. PETROBRAS Technical Standards are prepared in accordance with PETROBRAS Technical Standard N-1. For complete information about PETROBRAS Technical Standards see PETROBRAS Technical Standards Catalog.*

## Foreword

This Standard is the English version (issued in 09/2013) of PETROBRAS N-332 REV. E 12/2012. In case of doubt, the Portuguese version, which is the valid document for all intents and purposes, shall be used.

## 1 Scope

1.1 This Standard specifies the conditions required for the purchase of Uninterrupted Power System CC (UPS-CC) for industrial facilities belonging to PETROBRAS.

1.2 This Standard does not apply to UPS-CC used in telecommunication facilities and in cathodic protection systems of onshore and offshore facilities.

1.3 The scope of this standard does not include storage batteries, which shall be specified and testes according to the requirements of PETROBRAS [N-329](#).

1.4 This Standard applies to procedures started as of their date of issuance.

1.5 This Standard contains only Technical Requirements.

## 2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document applies.

PETROBRAS [N-329](#) - Storage Battery;

PETROBRAS [N-898](#) - Graphical Symbols and Designations for Electrical Diagrams;

PETROBRAS [N-2760](#) - Sistema Ininterrupto de Energia para Uso Industrial;

PETROBRAS [N-2841](#) - Qualificação e Aplicação de Revestimentos Anticorrosivos, à Base de Tintas em Pó;

ABNT [NBR IEC 60529](#) - Graus de Proteção para Invólucros de Equipamentos Elétricos (Código IP);

ISO [7779](#) - Acoustics - Measurement of Airborne Noise Emitted by Information Technology and Telecommunications Equipment;

IEC [60068-2-6](#) - Environmental Testing - Part 2-6: Tests - Test FC: Vibration (Sinusoidal);

IEC [60068-2-27](#) - Environmental Testing - Part 2-27: Tests - Test Ea and Guidance: Shock;

IEC [60146-1-1](#) - Semiconductor Converters - General Requirements and Line Commutated Converters - Part 1-1: Specifications of Basic Requirements;

IEC [61000-2-2](#) - Electromagnetic Compatibility (EMC) Part 2-2: Environment - Compatibility Levels for Low-Frequency Conducted Disturbances and Signaling in Public Low-Voltage Power Supply Systems;

IEC [62040-1](#) - Uninterruptible Power Systems (UPS) - Part 1: General and Safety Requirements for UPS;

IEC [62040-2](#) - Uninterruptible Power Systems (UPS) - Part 2: Electromagnetic Compatibility (EMC) Requirements;

IEC 62040-3 - Uninterruptible Power Systems (UPS) - Part 3: Method of Specifying the Performance and Test Requirements;

IEC CISPR 16-1-1 - Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Part 1-1: Radio Disturbance and Immunity Measuring Apparatus - Measuring Apparatus;

IEC CISPR 16-1-2 - Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Part 1-2: Radio Disturbance and Immunity Measuring Apparatus - Ancillary Equipment - Conducted Disturbances;

NOTE For documents referred in this Standard and for which only the Portuguese version is available, the PETROBRAS department that uses this Standard should be consulted for any information required for the specific application.

### 3 Terms and Definitions

For the purposes of this document, the following terms and definitions are applicable.

#### 3.1

##### **UPS-CC (Uninterruptible Power system - Continuous Current)**

Uninterruptible Power System in Continuous Current, with AC inlet and DC outlet, also known as battery charger

#### 3.2

##### **automatic recharge**

automatic operation initiated by the UPS-CC when the need for recharging is detected due to the current drained by the battery. The UPS-CC returns to float charge mode after recharging the battery

#### 3.3

##### **manual recharge**

manual operation initiated by the user when the need for recharging is detected, since the automatic recharge option is not enabled or operational

#### 3.4

##### **ripple**

component of alternating voltage superimposed on continuous voltage

#### 3.5

##### **charge current**

current supplied to the accumulator in the charging process

#### 3.6

##### **ambient temperature**

temperature of the location where the UPS-CC is installed

#### 3.7

##### **fluctuation voltage**

voltage above the open-circuit voltage established for the charged cell plus that needed to make up for self-discharge losses by keeping the cell charged

**3.8****overload**

value of current exceeding the rated current of equipment

**3.9****modu code**

english acronym that means “code for the construction and equipment of mobile offshore drilling units”. It refers to a set of requirements intended to ensure minimum operational safety standards compatible with the characteristics of drilling platforms

**3.10****general current limit**

maximum current to be provided by the UPS-CC

**3.11****battery current limit**

maximum current provided by the UPS-CC to the battery

**3.12****LED**

Light Emitting Diode

**3.13****MMI**

Man-Machine Interface

**3.14****MTBF**

Mean Time Between Failures

**3.15****MTTR**

Mean Time To Repair

**3.16****TAC**

Field Acceptance Test

**3.17****TAF**

Factory Acceptance Test

**3.18****DCS**

Direct Current Switchboard

**3.19****RMS**

Root Mean Square of voltage and current parameters

**3.20****SPDT**

Single Pole Double Throw

**3.21****Industrial UPS-CC**

UPS-CC intended to feed safety, protection and automation systems of critical industrial processes

**3.22****operating mode of stored energy or battery in operation**

operating mode of UPS-CC when fed under the conditions below:

- a) main power supply disconnected or out of tolerance limits;
- b) energy storage system CC is discharging;
- c) the load is within the established limits of UPS-CC;
- d) the output voltage is within the established limits of UPS-CC.

**3.23****normal operating mode**

stable operating mode which the UPS-CC reaches when fed under the conditions below:

- a) main power supply connected and within tolerance limits;
- b) storage battery is charged or recharging within the power recovery time;
- c) the operation is continuous or may be continuous;
- d) the load is within the established limits of UPS-CC;
- e) the output voltage is within the established limits of UPS-CC.

**4 General Conditions**

4.1 The equipment shall meet the regulating standards and government ordinances in force during its date of purchase.

4.2 Any discrepancy or alternative presented by the bidder in relation to the conditions originally specified by PETROBRAS shall be clearly indicated in its bid in an item entitled "deviations from and alternatives to specifications".

4.3 When "deviations or alternatives" occur the bid shall include matching references to the numbers of the corresponding paragraphs of this Standard, Data Sheet or Material Requisition (RM).

4.4 If "deviations or alternatives" are not mentioned, the manufacturer's supply will be considered to be fully in accordance with the specifications.

4.5 Any item not sufficiently covered by this Standard shall comply with the IEC standards and be subjected to approval by PETROBRAS during the bid submission phase.

4.6 Whenever there are discrepancies between the Data Sheet of Annex B and this Standard, the information contained in the former shall prevail.

4.7 The UPS-CC shall be designed to be a stationary, fixed, and integrated equipment to be installed in an area that may only be accessed by qualified personnel.

4.8 The UPS-CC shall be able to supply the load without storage battery or with storage battery on float charge or recharge.

4.9 The specific characteristics of the UPS-CC are those indicated on the Data Sheet of Annex B.

4.10 The Data Sheet of UPS-CC shall be followed by the Data Sheet of Storage Battery, as specified in PETROBRAS [N-329](#).

4.11 The supplier shall complete all blank items on the Data Sheet of Annex B (technical data, list of standards used in the design, manufacturing, and testing as well as the list of tests) and return the Data Sheet to PETROBRAS duly authenticated.

4.12 The specific characteristics of each UPS-CC are indicated on its respective Data Sheets, which are numbered according to each design. The (blank) form of these Data Sheets is standardized as per Data Sheet of Annex B.

4.13 When the UPS-CC is installed on offshore production units it shall follow the recommendations of the classification societies. In the case of a floating type offshore unit, the inclination requirements specified in IMO and in the modu code shall also be observed.

4.14 The UPS-CC shall be designed to provide a mean time between failures (MTBF) of over 180 000 hours and a mean time to repair (MTTR) not exceeding 4 hours.

4.15 Provision shall be made for a DCS for the UPS-CC or UPS-CC set, as per Petrobras' design. The DCS shall be supplied by the UPS-CC manufacturer if requested in Data Sheet of Annex B.

4.16 The degree of protection of the DCS shall be the same as that of the UPS-CC, as indicated on the Data Sheet of Annex B and in accordance with ABNT [NBR IEC 60529](#).

4.17 When indicated on the Data Sheet of Annex B, the DCS shall have an insulation monitoring system capable of identifying the branch of the charge with low insulation.

4.18 According to definitions of IEC [62040-2](#), the UPS-CC listed in this document are Category C2 or C3 and belong to the Second Ambient.

## **5 Service Conditions**

5.1 The equipment shall operate in a sheltered location and in a non-hazardous area.

5.2 The ambient temperature range is -10 °C to 40 °C, with 100 % of load up to 1 000 m, or as defined on the Data Sheet of Annex B.

5.3 The relative air humidity ranges from 30 % to 95 %, without condensation, at 25 °C.

5.4 The maximum altitude is 1 000 m, unless otherwise indicated on the Data Sheet of Annex B.

## 6 Constructive Characteristics

6.1 The equipment painting shall comply with the recommendations of PETROBRAS [N-2841](#).

6.2 It shall be possible to intervene in the UPS-CC even with the battery discharging to the consumer.

6.3 All UPS-CC settings shall be accessible to the user. In case the adjustments are made through software, there shall be no obstructions requiring PETROBRAS to pay for the assignment of the license for using the software. The software shall be supplied with the equipment, be active at the time of supply and its license shall be valid for an indefinite period of time. The circuits shall have means to avoid accidental contact to energized parts.

6.4 The UPS-CC shall comply with IEC [62040-2](#) with respect to electromagnetic compatibility requirements, e the circuits shall have means to avoid accidental contact to energized parts.

6.4.1 When indicated on the Data Sheet of Annex B the need for cooling with forced ventilation, it shall be monitored redundant with failure alarm indication.

6.4.2 Forced ventilation shall be accessible so as to allow replacement of the fans with the equipment in operation, without jeopardizing the safety of people and equipment.

6.5 The UPS-CC shall present the degree of protection indicated on the Data Sheet of Annex B, according to ABNT [NBR IEC 60529](#).

6.6 The UPS-CC shall be resistant to corrosion caused by the characteristic atmosphere of the facility environment, as indicated on the Data Sheet of Annex B.

6.7 The final finish color shall be as indicated in Data Sheet of Annex B.

6.8 The metal parts comprising the UPS-CC, which are not intended to carry current, shall have electrical continuity and be connected to the grounding busbar of the UPS-CC. The doors shall have electrical continuity with the metallic structure of the UPS-CC through flexible copper braid.

6.9 The ground busbar of the UPS-CC shall be run along its entire length and have a compression connector, suitable for the connection of a stranded bare copper ground cable with the nominal cross-sectional area indicated on the Data Sheet of Annex B.

6.10 The UPS-CC identification plate shall be attached to the outside of the UPS-CC and shall be made of series AISI 300 stainless steel. This plate shall contain at least the following data:

- a) manufacturer's name or brand name;
- b) supply voltage, number of phases, and rated frequency;
- c) rated power supply current;
- d) rated power in kVA and rated power factor;
- e) rated output voltage;
- f) rated output current;
- g) degree of protection;
- h) weight;
- o) serial number;

p) model.

6.11 The switchgear shall be provided with a supplementary identification plate made of series AISI 300 stainless steel containing at least the following data:

- a) Petróleo Brasileiro S.A. - PETROBRAS;
- b) name of PETROBRAS department;
- c) project name;
- d) UPS-CC identification;
- e) RM number;
- f) Purchase and Service Order number (PCS);
- g) as an alternative to f), the contract number, in case the acquisition is made under a Turn Key, Lump Sum, and other similar types of contracts.

## **7 Electrical Characteristics**

7.1 The UPS-CC shall be of the industrial type and operate with vented or valve-regulated lead acid alkaline batteries.

7.2 It shall be possible to select the rating of the UPS-CC through the command located on the front panel of the equipment, with the functions:

- a) float;
- b) manual recharge;
- c) automatic.

**NOTE** When the need for automatic recharge is indicated on the Data Sheet of Annex B, there shall also be the command for controlling MANUAL RECHARGE and AUTOMATIC RECHARGE situations.

7.2.1 Manual recharging shall be started manually and ended automatically for a specified period of time, adjusted by the user, or ended manually at any time.

7.2.2 Automatic recharging shall be ended in all cases due to idle current of the battery, returning automatically to the float regime.

7.3 Static regulation of the output voltage shall be  $\pm 1$  %, as per test conditions.

7.4 The dynamic regulation shall be less than 10 %, with time less than 100 ms, as per test conditions.

7.5 The current limiting device of the UPS-CC shall operate both in the float regime and in the recharge regime, allowing adjustment from 50 % to 100 % of the rated current of the UPS-CC.

7.6 The current limiting device for the battery shall operate both in the float regime and in the recharge regime and allow adjustment of the battery charging current to a maximum value, numerically equal to 0.25 times, for the acid battery, or 0.4 times, for the alkaline battery, the value of the rated capacity, in Ampere-hour (Ah), of the battery.

7.7 The maximum ripple shall be 2 % RMS rated output voltage without battery, or as requested on the Data Sheet of Annex B.