

# Supplementary Specification to PIP ELSAP04 for AC Uninterruptible Power Supply (UPS) System and Associated Batteries

**NOTE** This version (S-734J) of the specification document provides the justification statements for each technical requirement, but is otherwise identical in content to S-734.

## Revision history

VERSION	DATE	PURPOSE
2.0	March 2024	Second Edition
1.0	November 2020	First Edition

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## Acknowledgements

This IOGP Specification was prepared by a Joint Industry Programme 33 Standardization of Equipment Specifications for Procurement organized by IOGP with support by the World Economic Forum (WEF).

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## Foreword

This specification was prepared under Joint Industry Programme 33 (JIP33) "Standardization of Equipment Specifications for Procurement" organized by the International Oil & Gas Producers Association (IOGP) with the support from the World Economic Forum (WEF). Companies from the IOGP membership participated in developing this specification to leverage and improve industry level standardization globally in the oil and gas sector. The work has developed a minimized set of supplementary requirements for procurement, with life cycle cost in mind, resulting in a common and jointly agreed specification, building on recognized industry and international standards.

Recent trends in oil and gas projects have demonstrated substantial budget and schedule overruns. The Oil and Gas Community within the World Economic Forum (WEF) has implemented a Capital Project Complexity (CPC) initiative which seeks to drive a structural reduction in upstream project costs with a focus on industry-wide, non-competitive collaboration and standardization. The CPC vision is to standardize specifications for global procurement for equipment and packages. JIP33 provides the oil and gas sector with the opportunity to move from internally to externally focused standardization initiatives and provide step change benefits in the sector's capital projects performance.

This specification has been developed in consultation with a broad user and supplier base to realize benefits from standardization and achieve significant project and schedule cost reductions.

The JIP33 work groups performed their activities in accordance with IOGP's Competition Law Guidelines (November 2020).

This second edition cancels and replaces the first edition published in November 2020.

Due to technical writing requirements leading to extensive changes, this second edition should be treated as a new document.

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## Introduction

The purpose of the IOGP S-734 specification documents is to define a minimum common set of requirements for procurement of uninterruptible power supply (UPS) systems and associated batteries for North American projects in accordance with PIP ELSAP04, Complete Revision September 2020, Technical Correction September 2021, Uninterruptible Power Supply (UPS) System Specification, for application in the petroleum and natural gas industries.

The IOGP S-734 specification documents follow a common structure (as shown below) comprising a specification, also known as a technical requirements specification (TRS), a procurement data sheet (PDS), an information requirements specification (IRS) and a quality requirements specification (QRS). These four specification documents, together with the purchase order, define the overall technical specification for procurement.



### **JIP33 Specification for Procurement Documents Supplementary Technical Requirements Specification (TRS)**

This specification is to be applied in conjunction with the supporting PDS, IRS and QRS as follows.

#### **IOGP S-734: Supplementary Specification to PIP ELSAP04 for AC Uninterruptible Power Supply (UPS) System and Associated Batteries**

This specification defines technical requirements for the supply of the equipment and is written as an overlay to PIP ELSAP04, following the PIP ELSAP04 clause structure. Clauses from PIP ELSAP04 not amended by this specification apply as written. Modifications to PIP ELSAP04 defined in this specification are introduced by a description that includes the type of modification (i.e. Add, Replace or Delete) and the position of the modification within the clause.

**NOTE** Lists, notes, tables, figures, equations, examples and warnings are not counted as paragraphs.

### **IOGP S-734D: Procurement Data Sheet for AC Uninterruptible Power Supply (UPS) System and Associated Batteries (PIP)**

The PDS defines application-specific requirements. The PDS is applied during the procurement cycle only and does not replace the equipment data sheet. The PDS may also include fields for supplier-provided information required as part of the purchaser's technical evaluation. Additional purchaser-supplied documents may also be incorporated or referenced in the PDS to define scope and technical requirements for enquiry and purchase of the equipment.

### **IOGP S-734L: Information Requirements for AC Uninterruptible Power Supply (UPS) System and Associated Batteries (PIP)**

The IRS defines information requirements for the scope of supply. The IRS includes information content, format, timing and purpose to be provided by the supplier, and may also define specific conditions that invoke the information requirements.

### **IOGP S-734Q: Quality Requirements for AC Uninterruptible Power Supply (UPS) System and Associated Batteries (PIP)**

The QRS defines quality management system requirements and the proposed extent of purchaser conformity assessment activities for the scope of supply. Purchaser conformity assessment activities are defined through the selection of one of four generic conformity assessment system (CAS) levels on the basis of evaluation of the associated service and supply chain risks. The applicable CAS level is specified by the purchaser in the PDS or in the purchase order.

The specification documents follow the editorial format of PIP ELSAP04 and, where appropriate, the drafting principles and rules of ISO/IEC Directives Part 2.

The PDS and IRS are published as editable documents for the purchaser to specify application-specific requirements. The TRS and QRS are fixed documents.

The order of precedence of documents applicable to the supply of the equipment, with the highest authority listed first, shall be as follows:

- a) regulatory requirements;
- b) contract documentation (e.g. purchase order);
- c) purchaser-defined requirements (e.g. PDS, IRS and QRS);
- d) this specification;
- e) PIP ELSAP04.

## 1 Scope

Replace all instances of "PIP ELSAP04-D Data Sheet" with

IOGP S-734D

### **Justification**

*The PIP ELSAP04-D Data Sheet has been replaced because it does not provide sufficient details for the scope of supply and default selections are not indicated in most instances. It is also not considered essential minimum.*

## 2 References

Add to first paragraph

The following publications are referred to in this document, the PDS (IOGP S-734D) or the IRS (IOGP S-734L) in such a way that some or all of their content constitutes requirements of this specification.

### 2.1 Process Industry Practices (PIP)

Delete from section

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

PIP ELSAP12, *Design and Fabrication of Valve-Regulated Lead-Acid Batteries*

### 2.2 Industry Codes and Standards

Add to section

46 CFR 111, *Title 46—Shipping, Chapter I—Department of Coast Guard, Subchapter J—Electrical Engineering, Part 111—Electrical Systems—General Requirements.*

ABS MODU, *Publication Number 6 Part 4*

API Recommended Practice 500, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2*

API Recommended Practice 505, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2*

ASCE/SEI 7-16, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*

CSA C22.1, *Canadian Electrical Code, Part I, Safety Standard for Electrical Installations*

CSA C22.2 No. 29, *Panelboards and enclosed panelboards*

CSA C22.2 No. 107.3, *Uninterruptible power systems*

ANSI/IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60623, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Vented nickel-cadmium prismatic rechargeable single cells*



IEC 60896-11, *Stationary lead-acid batteries – Part 11: Vented types – General requirements and methods of tests*

IEC 60896-22, *Stationary lead-acid batteries – Part 22: Valve regulated types – Requirements*

IEC 61439-1, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*

IEC 62040-2, *Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements*

IEC 62259, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Nickel-cadmium prismatic secondary single cells with partial gas recombination*

IEC 62620, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for use in industrial applications*

IEEE 519, *IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems*

IEEE 1184, *IEEE Guide for Batteries for Uninterruptible Power Supply Systems*

NFPA 70, *National Electrical Code*

Replace Section 3 title with

### **3 Definitions and Abbreviated Terms**

Add new section heading 3.1 before first definition

#### **3.1 Definitions**

Add new definition

*touch safe (finger safe)*: Protected from inadvertent contact by a finger using covers, recessing of terminals or the size of openings.

Note: "Touch-safe" and similar terms, such as "finger safe", are widely used to describe products but are not defined by industry standards. "Touch safe" is generally equivalent to IP 2X or IPXXB as per ANSI/IEC 60529 and IEC 61439-1.

Add new definition

*electrical control and management system (ECMS)*: A system that automatically controls the power system through instrumentation and control devices.

Add new definition

*emergency shutdown (ESD)*: An automatic protection system that acts to shut down the plant if it enters a potentially dangerous state.

Add new definition

*fire and gas system (FGS)*: A system that monitors for fire, gas, smoke and heat, and initiates actions to suppress and isolate the detected threats while simultaneously generating audio and visual alarms.

Add new definition

*process control system (PCS)*: An overall site-integrated process automation, control and/or monitoring system.

Add new definition

*safety instrumented system (SIS)*: A system that is an independent protection layer that shuts down a system or a part of it if a hazardous condition is detected.

Add new section

### **3.2 Abbreviated Terms**

For the purposes of this document, the abbreviated terms given in PIP ELSAP04 and the following apply.

ABS	American Bureau of Shipping
ACO	accredited certification organization
BMS	battery management system
ECMS	electrical control and management system
ESD	emergency shutdown
FGS	fire and gas system
IRS	information requirements specification
MBS	internal manual bypass switch
NRTL	nationally recognized testing laboratory
PCS	process control system
PDS	procurement data sheet
PWM	pulse-width modulated
QRS	quality requirements specification
RMBS	remote maintenance bypass switch
SIS	safety instrumented system
THDv	total harmonic distortion of the voltage
TRS	technical requirements specification
UPS	uninterruptable power system
USCG	United States Coast Guard

## 4 Requirements

### 4.1 General

#### 4.1.3

Replace section with

The UPS shall be listed or certified by a nationally recognized testing laboratory (NRTL) for the United States or an accredited certification organization (ACO) for Canada.

Note: Applications for this equipment in other countries may have additional requirements for certification.

#### *Justification*

*This replacement is to focus on the requirement of certification laboratories or bodies. The specifics are handled by a PDS selection for the certifying body.*

#### 4.1.4

Add new section

##### 4.1.4.1

The operational life of the UPS and its components at the rated load shall be in accordance with Table 3.

#### *Justification*

*PIP ELSAP04 does not address the operational life. Table 3 aligns with IOGP S-701.*

Add new Table 3

**Table 3. Operational Life of the UPS and its Components**

Components	Minimum Operational Life (Years)
Rectifier unit, inverter unit and static switch unit	20
Cooling fans	5
AC and DC capacitors	7
Input and output isolation transformer	20
Bypass transformer	20

#### *Justification*

*Reliable performance is key to the UPS and this requirement ensures that serviceable parts or components supplied for the AC UPS have a defined life expectancy.*

Add new section

##### 4.1.4.2

The UPS shall have a minimum UPS efficiency in accordance with the overall weighted efficiency as per IEC 62040-3:2021, I.3.

### **Justification**

*Efficiency as per PIP ELSAP04 is not essential minimum. The efficiency is based on an overall weighted average calculation.*

### **Add new section**

#### **4.1.4.3**

An obsolescence management plan in accordance with an industry-recognized system (e.g., IEC 62402) shall be provided for AC UPS assembly components.

### **Justification**

*An obsolescence management plan helps ensure the availability of components or spares in the market for main equipment during its service life. Unforeseen obsolescence could involve higher costs by means of engaging alternate resources to resolve the crisis. This situation could place reliability and operation of critical systems at risk. Hence, having an obsolescence management plan in place reduces the risk of obsolescence issues and/or reduces the impact when an item becomes obsolete.*

#### **4.1.5**

*In first sentence, add after "Figure 1"*

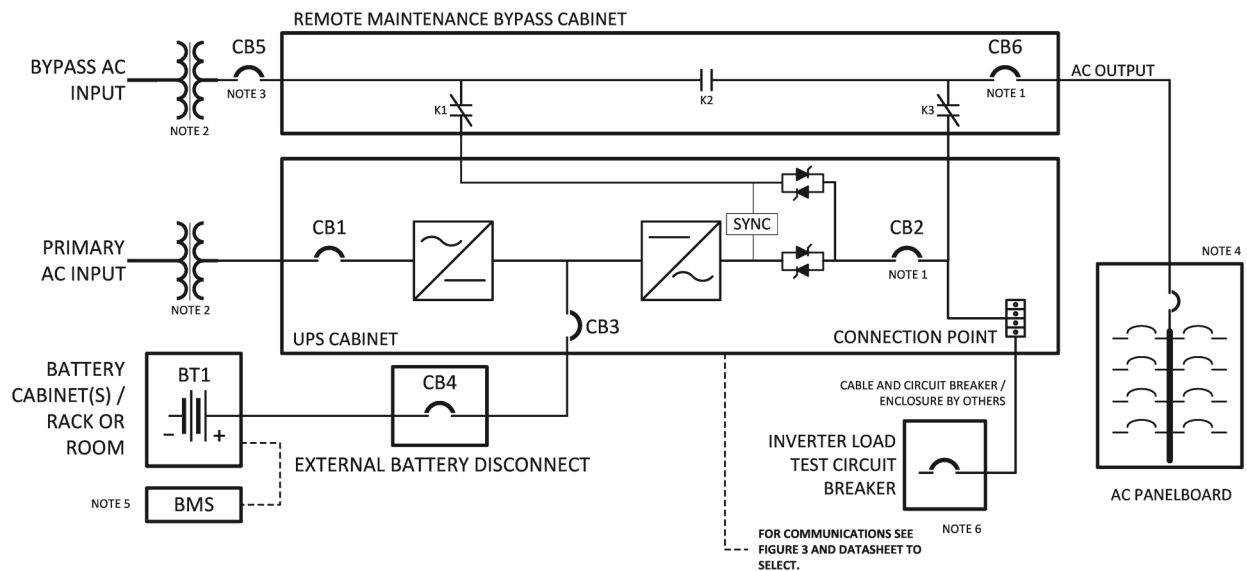
and Figure 2

### **Justification**

*Figure 2 has been added because PIP ELSAP04 does not include a figure depicting duplicate and paralleled UPS systems.*

#### 4.1.7

Replace Figure 1 with



NOTE This figure is used to assist with the specification of the UPS and associated equipment. Refer to the manufacturer's documentation for specific components and configuration.

NOTE 1 Circuit breaker located in the UPS (CB2) and/or the bypass cabinet (CB6).

NOTE 2 Optional isolation transformer(s) located external or internal to the associated cabinet.

NOTE 3 CB5 located external or internal to the bypass cabinet.

NOTE 4 The AC panelboard, inverter load test CB and external battery disconnect (CB4) are optional items (see the PDS).

NOTE 5 See Figure 3 for BMS details.

NOTE 6 Test CB is supplied and installed by others and is external to the UPS. Terminals to land test cable(s) are provided by the supplier and located in the UPS cabinet.

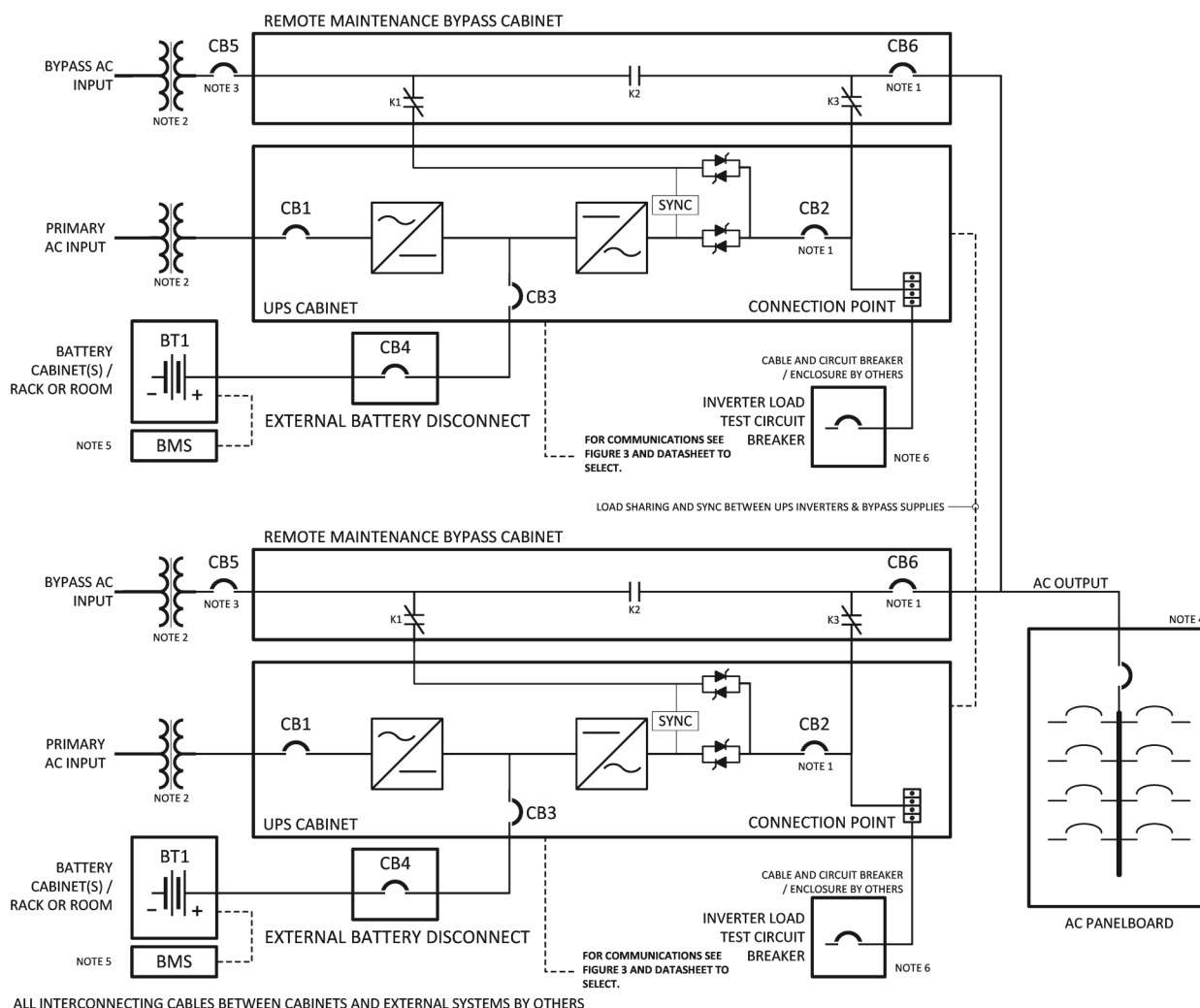
Replace Figure 1 title with

**Figure 1. Single UPS**

#### Justification

*This figure has been replaced to more closely align with industrial UPS systems.*

Add new Figure 2



NOTE This figure is used to assist with the specification of the UPS and associated equipment. Refer to the manufacturer's literature for specific components and configuration.

NOTE 1 Circuit breaker located in the UPS (CB2) and/or the bypass cabinet (CB6).

NOTE 2 Optional isolation transformer(s) located external or internal to the associated cabinet.

NOTE 3 CB5 located external or internal to the bypass cabinet.

NOTE 4 The AC panelboard, inverter load test CB and external battery disconnect (CB4) are optional items (see the PDS).

NOTE 5 See Figure 3 for BMS details.

NOTE 6 Test CB is located and supplied by others and external to the UPS. Terminals to land test cable(s) are provided by the supplier and located in the UPS cabinet.

NOTE 7 Generally, AC input supplies for remote bypass units are considered from the same source of supply. However, separate AC input supplies for the bypass can be used subject to compatibility requirements including synchronization, if any, to be discussed with the supplier.

**Figure 2. Duplicate (Paralleled) UPS**

### **Justification**

*This figure has been added to provide details on duplicate and paralleled UPS systems topology that is not covered by PIP ELSAP04.*

#### **4.1.20**

Delete "Unless otherwise specified on the purchaser's PIP ELSAP04-D Data Sheet, tin plated copper" from first sentence

### **Justification**

*Proper grounding is typically provided in each cabinet. Grounding is provided to conform to electrical safety requirements as defined by the referenced standards. The ground bus material selection is included in the PDS.*

Add new section

#### **4.1.24**

If an AC panelboard is specified, the UPS and panelboard protective devices shall be selectively coordinated with the UPS inverter and bypass sources.

### **Justification**

*A properly coordinated system minimizes the impact of a load-side fault on the AC panelboard when the AC panelboard is supplied by either the UPS inverter or bypass sources.*

Add new section

#### **4.1.25**

Equipment and wiring methods that form part of the AC UPS package scope of supply and that are located external to the AC UPS enclosure shall be in accordance with the applicable installation codes and regulations.

### **Justification**

*This requirement clarifies that equipment, wiring and installation methods external to the UPS are not covered by the NEMA, UL and IEC standards associated with the UPS but by applicable codes and standards as specified.*

Add new section

#### **4.1.26**

If specified, UPS assemblies on floating offshore installations in United States Coast Guard (USCG) and American Bureau of Shipping (ABS) jurisdictions shall comply with 46 CFR 111 and ABS MODU Publication Number 6 Part 4, respectively.

Note: Additional guidance and information on USCG and ABS requirements for UPS installed on floating facilities in US territorial waters can be found in API RP 14F / API RP 14FZ.

### **Justification**

*Floating marine/offshore installations can require additional measures to ensure compliance with ABS/USCG regulatory requirements.*

## 4.2 Site Conditions

### 4.2.5

Replace section with

The UPS shall be suitable for electrically unclassified (i.e., non-hazardous) areas.

#### **Justification**

*The option to design the UPS for "classified" areas has been removed as it is not essential minimum. Also, "unclassified" is equivalent to "non-hazardous" meaning an area in which an explosive atmosphere is not expected to be present.*

Add new section

### 4.2.6

If a seismic design is specified, the UPS shall comply with ASCE/SEI 7-16.

#### **Justification**

*This seismic requirement is not covered by PIP ELSAP04 and is needed for critical equipment such as UPS systems.*

## 4.3 Electrical Characteristics

**Table 1. Electrical Characteristics**

Add row 6. to section A.

	Ferroresonant	Pulse-Width Modulated (PWM)
<b>A. Input</b>		
6. AC input supply voltage total harmonic distortion (THDv)	≤ 8% as per IEEE 519	≤ 8% as per IEEE 519

#### **Justification**

*Input harmonic limits are not specifically included or referenced in PIP ELSAP04 and are used to establish the maximum total harmonic voltage distortion limit that the UPS feeds back into the connected input.*



In section D, replace rows 9. and 10. with

	Ferroresonant	Pulse-Width Modulated (PWM)
<b>D. Output</b>		
9. Overload (inverter only, without transfer to bypass)	a. 100% continuously b. 125% for 10 minutes c. 150% for 1 minute d. 200% for 100 milliseconds	a. 100% continuously b. 125% for 10 minutes c. 150% for 1 minute d. 200% for 100 milliseconds
10. Overload/fault-clearing current capability on bypass source, including static transfer switch	a. 100% continuously b. 125% for 10 minutes c. 150% for 1 minute d. 200% for 100 milliseconds e. 1000% for 50 milliseconds	a. 100% continuously b. 125% for 10 minutes c. 150% for 1 minute d. 200% for 100 milliseconds e. 1000% for 50 milliseconds

#### Justification

*These alternate values better align with IOGP S-701, the essential minimum and the supplier's standard offerings.*

## 4.5 Input Isolation and Bypass Isolation Transformers

### 4.5.6

Delete section 4.5.6

#### Justification

*Manufacturers typically design integral input transformers with harmonics taken into account. This requirement has been transferred to the PDS as it is understood by those competent to fill out the PDS.*

## 4.6 Rectifier/Charger

### 4.6.1 General

In first sentence of list section 4., replace "absolute short circuit continuously" with

overload capability of 125% for 10 minutes

#### Justification

*The requirement has been modified to reflect an overload operating condition as opposed to operating into an absolute short circuit condition.*

In list section 4., replace second sentence with

The overload current limit setting shall be:

#### Justification

*The current limit has been changed to overload current limit setting to establish the overload operating range.*

Replace list section 12. with

12. The AC UPS shall conform to the electromagnetic emission and immunity levels set out in IEC 62040-2 for category C3.

#### **Justification**

*Electromagnetic compatibility (emission and immunity) levels are important. This replacement specifies the EMC levels necessary to prevent UPS electromagnetic interference to other equipment (emission) and UPS immunity to external electromagnetic interference for industrial applications.*

### **4.9 Internal Manual Bypass Switch (MBS)**

Delete section 4.9

#### **Justification**

*These requirements for the internal maintenance bypass switch have been deleted for safety purposes to ensure that there are no internal power sources inside UPS cabinets during maintenance.*

### **4.10 Remote Maintenance Bypass Switch (RMBS)**

#### **4.10.1**

Replace first sentence with

The UPS shall be provided with a remote maintenance bypass switch.

#### **Justification**

*The maintenance bypass switch for supply isolation ensures safety for maintenance personnel during UPS maintenance.*

Add new section

#### **4.10.5**

The RMBS shall have a three-position switch to select between normal, test and bypass modes.

#### **Justification**

*The RBMS allows for the complete isolation of the UPS system or inverter in order to perform routine or emergency maintenance on the equipment.*

Add new section

#### **4.10.6**

The RMBS three-position switch shall have the capability to be locked in the bypass position.

#### **Justification**

*A three-position switch with the capability to be locked in the bypass position provides isolation for the safety of personnel performing maintenance on the UPS.*

## 4.11 Inverter Test Load Connection

### 4.11.1

Replace section with

If test load terminals are specified, they shall be rated for the full load rating of the UPS and readily accessible for user connection at the inverter output.

#### *Justification*

*Customer load test terminals are provided to allow safe isolation of the inverter output for test purposes. This can include readily accessible customer terminals provided by the supplier and cabling to an external standalone circuit breaker or disconnect. The cabling, circuit breaker or disconnect is provided by entities other than the UPS supplier. The terminals are sized to permit full load testing of the UPS.*

### 4.11.2

Delete section 4.11.2

#### *Justification*

*The circuit breaker is external to the UPS and supplied by entities other than the UPS supplier.*

### 4.11.3

Delete section 4.11.3

#### *Justification*

*The circuit breaker is external to the UPS and supplied by entities other than the UPS supplier.*

### 4.11.4

Replace section with

Terminals used for the test load connection shall be clearly identified inside the UPS enclosure.

#### *Justification*

*Test load terminals need to be clearly marked to prevent incorrect wiring to the test load disconnection means.*

Replace section 4.12 title with

## 4.12 Internal Battery Disconnect

Add new section

### 4.12.4

If battery under-voltage protection is provided in the external battery disconnect, the auxiliary supply for the external battery disconnect (CB4) control element shall be derived from CB4 terminals connected to AC UPS.

### **Justification**

*Deriving supply for the external battery disconnect control element from the terminal connected to the AC UPS side ensures supply availability. When the external battery disconnect is tripped due to battery undervoltage, the supply at the battery side may not have adequate voltage to energize the coil after undervoltage reset, hence deriving supply from the AC UPS side is proposed.*

## **4.13 Batteries**

### **4.13.1**

Delete section 4.13.1

### **Justification**

*These references have been deleted as the PDS now provides information to completely specify the batteries.*

### **4.13.2**

Delete section 4.13.2

### **Justification**

*This requirement has been deleted as the PDS now provides information to completely specify the batteries.*

Add new section

### **4.13.3**

#### **4.13.3.1**

If batteries are specified, hardware and accessories applicable to the battery technology selected shall be provided (e.g., insulated inter-cell connectors, flame arrestor type vent plugs with dust caps and racks with provisions for grounding).

### **Justification**

*This requirement clarifies the scope to include battery hardware, connectors and accessories when batteries are provided as PIP ELSAP04 does not address these items directly but through battery standards now deleted from sections 2.1 and 4.13.1.*

#### **4.13.3.2**

Battery terminal connectors and interconnecting straps shall be covered for protection against inadvertent contact with energized components.

### **Justification**

*This requirement is added for personnel safety.*

Add new section

### **4.13.4**

Battery racks shall be electrically bonded and provided with provisions for grounding.

### **Justification**

*This requirement is included for purposes of electrical safety.*

## **4.14 Enclosures**

### **4.14.3**

Delete section 4.14.3

### **Justification**

*Lifting base provisions are covered by the PDS.*

### **4.14.12**

Replace "to less than 2% by volume in accordance with IEEE 484" with

to less than 1% in accordance with API RP 500 and API RP 505

### **Justification**

*The hydrogen concentration of 2% in IEEE 484 conflicts with that of 1% in API RP 500 and API RP 505. The purchaser has to determine the H<sub>2</sub> concentration using the appropriate standard/practice.*

## **4.15 Circuit Breakers and Switches**

### **4.15.1**

In first sentence, replace "the one-line diagram" with

Figure 1, Figure 2 or the purchaser's diagram

### **Justification**

*Figure 1, Figure 2 and the purchaser's diagram provide details on circuit breakers for the charger input and inverter/UPS output.*

## **4.16 Fuses**

### **4.16.1**

Replace "finger safe, with an open fuse indication light" with

touch safe (finger safe)

### **Justification**

*This requirement provides increased electrical safety for personnel troubleshooting inside the UPS enclosure. An indicator light is not considered essential minimum.*

#### 4.16.3

Replace section with

Exposed energized terminals of low-voltage components (e.g., fuse holders and fuse blocks) with a line-to-ground voltage greater than or equal to 50 V shall be provided as touch safe (finger safe) or covered by an insulating barrier.

#### **Justification**

*This requirement provides increased electrical safety for personnel troubleshooting inside the UPS enclosure and protection from inadvertent contact.*

### 4.17 Wiring and Terminals

#### 4.17.1

Replace section with

Exposed energized terminals of low-voltage components (e.g., relays, power terminal blocks and alarm terminal blocks) with a line-to-ground voltage greater than or equal to 50 V shall be provided as touch safe (finger safe) or covered by an insulating barrier.

#### **Justification**

*This requirement provides increased electrical safety for personnel troubleshooting inside the UPS enclosure to provide protection from inadvertent contact.*

### 4.18 UPS Controls, Monitoring, and Communications

#### 4.18.3 Measurement

##### 4.18.3.3

Delete list item c.

#### **Justification**

*The display of frequency is not considered essential minimum because issues with power system frequency indicate global issues with the power system.*

Delete list item e.

#### **Justification**

*The display of bypass AC current for each phase is not considered essential minimum because it adds significant complexity to the bypass cabinet with the addition of current transformers and associated wiring with additional inputs and programming for the UPS displays.*

Delete list item f.

#### **Justification**

*The display of bypass frequency is not considered essential minimum as system frequency is typically measured and monitored upstream.*

Replace list item g. with

g. DC bus voltage

**Justification**

*The DC bus voltage is the same as the battery voltage when the battery isolator is closed.*

**4.18.4 Protection and Alarms**

**4.18.4.6**

Delete list item 3. from list section j.

**Justification**

*The display of input frequency out of tolerance is not considered essential minimum as system frequency is typically measured and monitored upstream.*

**4.18.4.7**

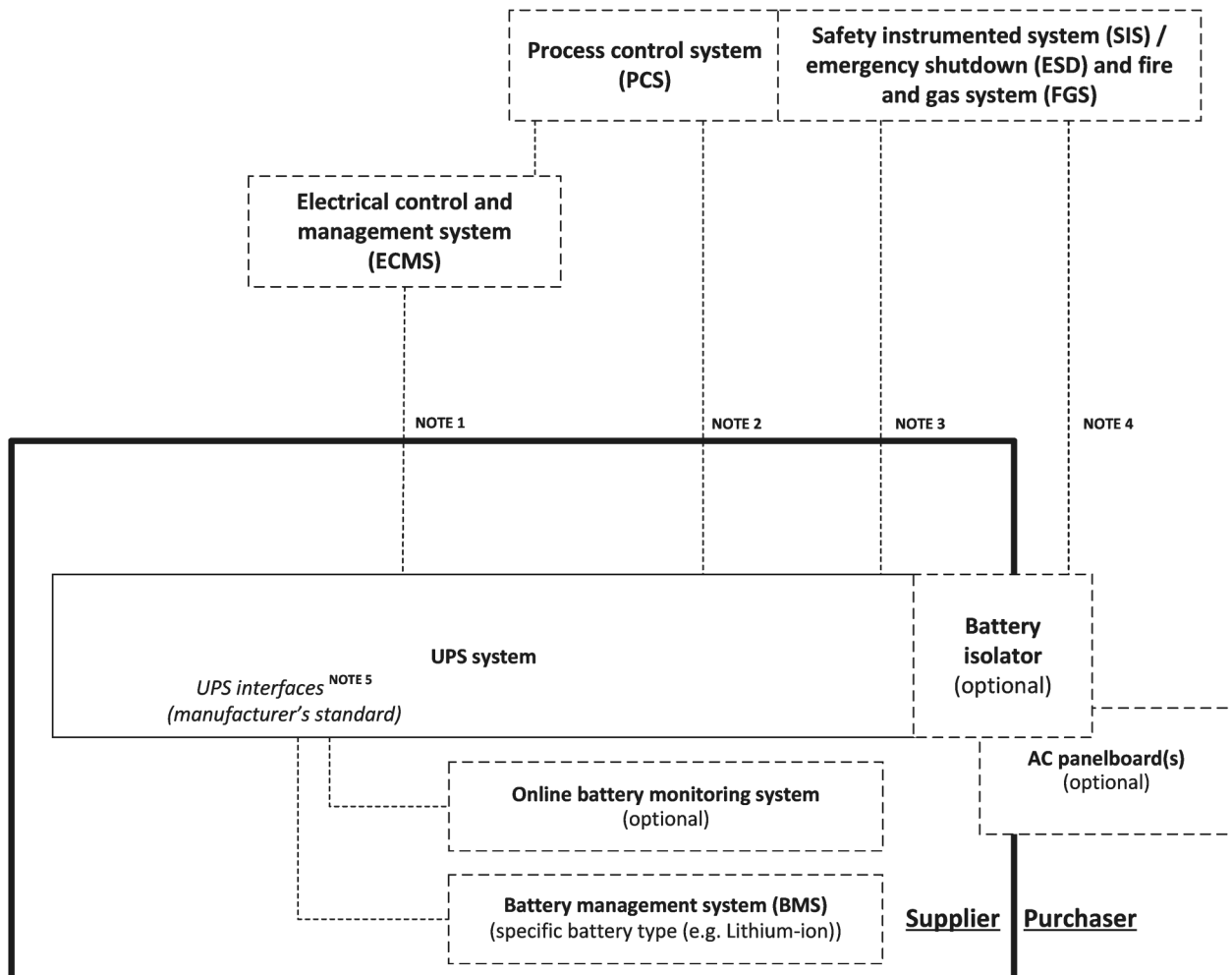
Delete section 4.18.4.7

**Justification**

*The provision of an audible alarm is not considered essential minimum. Items to be alarmed are implemented through communications and hardwired interfaces as specified in the PDS.*

#### 4.18.7 Communications

Add new Figure 3



NOTE 1 Network connectivity interface for time synchronization, remote access and configuration.

NOTE 2 Direct interface for critical / safety critical status and alarms to PCS where ECMS is not present. Independent to ESD system trip.

NOTE 3 Direct interface for ESD trip and FGS function (e.g., boost charge inhibit) / trip.

NOTE 4 Direct interface for ESD and FGS trips.

NOTE 5 Supplier's standard interface for synchronization and load sharing between UPSs (applicable for parallel systems), UPS battery monitoring system and battery management system where applicable.

**Figure 3. Typical Communications Block Diagram**

#### **Justification**

*This figure provides further details of the communication and interconnection options selectable in the PDS.*



#### 4.18.7.2

Replace section with

UPS interfaces and interconnections shall be in accordance with Figure 3.

#### **Justification**

*Figure 3 provides clarity on the UPS interface and communications options.*

#### 4.18.7.3

Delete section 4.20.7.3

#### **Justification**

*This information has been transferred to the PDS.*

### 4.19 Tagging and Nameplates

#### 4.19.3

##### 4.19.3.4

Delete section 4.19.3.4

#### **Justification**

*Input short circuit rating is not useful information to be included on the AC UPS nameplate.*

##### 4.19.3.7

Delete section 4.19.3.7

#### **Justification**

*This option is not considered essential minimum. The kVA rating of the UPS is already part of the nameplate requirements.*

Add new section

#### 4.19.8

Compartments with an external voltage source shall have a caution label fitted on the doors.

#### **Justification**

*This requirement provides increased electrical safety by notifying personnel of the location of external sources of power.*

## 4.20 Inspection and Testing

### 4.20.2

Delete section 4.20.2

#### **Justification**

*This is covered in the IRS, FAT records and type test certificates.*

### 4.20.3

Replace section with

Type testing shall be performed in accordance with IEC 62040-3:2021, Table 5.

#### **Justification**

*Type testing is covered in IEC 62040-3:2021.*

### 4.20.4

Delete section 4.20.4

#### **Justification**

*All testing requirements are now addressed in new sections 4.20.9, 4.20.10, 4.20.11 and 4.20.12.*

### 4.20.5

Delete section 4.20.5

#### **Justification**

*All testing requirements are now addressed in new sections 4.20.9, 4.20.10, 4.20.11 and 4.20.12.*

### 4.20.6

Delete section 4.20.6

#### **Justification**

*IEC 62040-3:2021, Section 6 covers the AC UPS testing requirements.*

### 4.20.7

Delete section 4.20.7

#### **Justification**

*IEC 62040-3:2021, Section 6 covers the AC UPS testing requirements.*

### 4.20.8

Delete section 4.20.8

### **Justification**

*All testing requirements are now addressed in new sections 4.20.9, 4.20.10, 4.20.11 and 4.20.12.*

#### Add new section

#### **4.20.9**

Routine testing shall be performed in accordance with IEC 62040-3:2021, Table 5.

### **Justification**

*Routine testing in IEC 62040-3:2021 covers testing required for the AC UPS system and associated equipment.*

#### Add new section

#### **4.20.10**

Where a burn-in test is specified, the test shall be a continuous operation at full rated capacity.

### **Justification**

*This requirement ensures proper operation of critical UPS equipment and identifies heat-related failure modes.*

#### Add new section

#### **4.20.11**

Communication interfaces shall be tested to verify physical hardware media and associated software protocols.

### **Justification**

*This requirement verifies the UPS communication interface prior to shipment.*

#### Add new section

#### **4.20.12**

For duplicate (paralleled) UPS systems, equal load sharing shall be verified in accordance with IEC 62040 3:2021, 6.4.2.6.

### **Justification**

*IEC 62040-3:2021 refers to the ability of paralleled UPSs to load share as a type test. This requirement provides evidence of equal load sharing between each duplicate (paralleled) UPS unit.*

## **4.22 Documentation**

### **4.22.3**

#### Delete section 4.22.3

### **Justification**

*The requirements for documentation are defined in the IRS.*

#### 4.22.4

Delete section 4.22.4

##### **Justification**

*The requirements for documentation are defined in the IRS.*

#### 4.22.5

Delete section 4.22.5

##### **Justification**

*The requirements for documentation are defined in the IRS.*

#### 4.22.6

Delete Section 4.22.6

##### **Justification**

*The requirements for documentation are defined in the IRS.*

#### 4.22.7

Delete section 4.22.7

##### **Justification**

*The requirements for documentation are defined in the IRS.*

### **Table 2. Documentation Requirements**

Delete Table 2

##### **Justification**

*The requirements for documentation are defined in the IRS.*

## **4.23 Conflict Resolution**

Delete section 4.23

##### **Justification**

*Conflict resolution (order of precedence) is covered in the introduction of this specification.*

Add Bibliography

## Bibliography

The following documents are informatively cited in the text of this document, PIP ELSAP04, the PDS (IOGP S-734D) or the IRS (IOGP S-734L).

- [1] API Recommended Practice 14F, *Recommended Practice for Design, Installation, and Maintenance of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Division 1, and Division 2 Locations*
- [2] API Recommended Practice 14FZ, *Recommended Practice for Design, Installation and Maintenance of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Zone 0, Zone 1, and Zone 2 Locations*
- [3] IEC 62402, *Obsolescence management*
- [4] IEEE 485, *IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications*
- [5] IEEE 1115, *IEEE Recommended Practice for Sizing Nickel-Cadmium Batteries for Stationary Applications*
- [6] IOGP S-701, *Supplementary Specification to IEC 62040-3 for AC Uninterruptible Power Systems (UPS)*
- [7] ISO/IEC 17000, *Conformity assessment — Vocabulary and general principles*

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