International Association of Oil & Gas Producers

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S-740

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Specification for Batteries (IEC)

JIP33
JOINT INDUSTRY PROGRAMME

Revision history

VERSION	DATE	PURPOSE
1.0	December 2020	Issued for Use

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 2014).

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Introduction

The purpose of this specification is to define a minimum common set of requirements for the procurement of batteries for application in the petroleum and natural gas industries.

This specification follows a common document structure comprising the four documents as shown below, which together with the purchase order define the overall technical specification for procurement.

JIP33 Specification for Procurement Documents
Technical Specification

This specification is to be applied in conjunction with the supporting data sheet, quality requirements specification (QRS) and information requirements specification (IRS) as follows.

IOGP S-740: Specification for Batteries (IEC)

This specification defines the technical requirements for the supply of the equipment.

IOGP S-740D: Data Sheet for Batteries (IEC)

The data sheet defines application specific requirements, attributes and options specified by the purchaser for the supply of equipment to the technical specification. The data sheet may also include fields for supplier provided information attributes subject to purchaser's technical evaluation. Additional purchaser supplied documents may also be incorporated or referenced in the data sheet to define scope and technical requirements for enquiry and purchase of the equipment.

IOGP S-740Q: Quality Requirements for Batteries (IEC)

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 data sheet or in the purchase order.

IOGP S-740L: Information Requirements for Batteries (IEC)

The IRS defines the information requirements, including contents, format, timing and purpose to be provided by the supplier. It may also define specific conditions which invoke information requirements.

The terminology used within this specification and the supporting data sheet, QRS and IRS is in accordance with ISO/IEC Directives, Part 2.

The data sheet and IRS are published as editable documents for the purchaser to specify application specific requirements. The specification and QRS are fixed documents.

The order of precedence (highest authority listed first) of the documents shall be:

a) regulatory requirements;

b) contract documentation (e.g. purchase order);

c) purchaser defined requirements (data sheet, QRS, IRS);

d) this specification.

1 Scope

This document specifies the minimum requirements for batteries and battery installations. In general, the requirements and definitions are specified for lead-acid and nickel-cadmium batteries.

This specification covers most of the applications for which batteries are purchased in the oil, gas and petrochemical industries, namely:

— AC and DC uninterruptible power systems (UPS);

— rotating machinery auxiliaries;

— navigational aids;

— solar photovoltaics (PV);

— diesel and gas engines (controls, run-down systems and engine start and cranking applications).

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the references document (including any amendments) applies.

IEC 60092 (all parts), *Electrical installations in ships*

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

IEC 60622, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Sealed nickel-cadmium prismatic rechargeable single cells*

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 60896-21, *Stationary lead-acid batteries – Part 21: Valve regulated types – Methods of test*

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

IEC 61427-1, *Secondary cells and batteries for renewable energy storage – General requirements and methods of test – Part 1: Photovoltaic off-grid application*

IEC 61892 (all parts), *Mobile and fixed offshore units – Electrical installations*

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

IEC 62485-1, *Safety requirements for secondary batteries and battery installations – Part 1: General safety information*

IEC 62485-2, *Safety requirements for secondary batteries and battery installations – Part 2: Stationary batteries*

IEEE 485, *IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications*

IEEE 1115, *IEEE Recommended Practice for Sizing Nickel-Cadmium Batteries for Stationary Applications*

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

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Environment and safety

4.1

The safety requirements for batteries shall be in accordance with IEC 62485-1 and IEC 62485-2.

4.2

When multiple cells are supplied with connection links, they shall be a fully insulated design or provided with IP2X insulated covers for protection against direct contact in accordance with IEC 60529.

4.3

The recommended ventilation flow rate in m^3/hr shall be specified for each battery.

4.4

Caution, danger and warning labels shall display information on the rack or cabinet of the battery bank in English, and an additional specified language if applicable.

5 Design and performance

5.1

Batteries shall have capacity to supply power within the defined voltage tolerance in accordance with the specified load profile for the specified autonomy time.

5.2

The battery technology shall be in accordance with Table 1.

5.3

The battery performance shall meet the requirement of number of repeated cycles of charging and discharging for its service life.

5.4

The battery performance shall meet the requirements of continuous float-charge operation until the end of its service life.

Table 1 — Battery technology

Battery technology	In accordance with IEC standard
sealed nickel-cadmium	IEC 60622
vented nickel-cadmium	IEC 60623
nickel-cadmium partial gas recombination	IEC 62259
valve-regulated lead-acid	IEC 60896-22
vented lead-acid	IEC 60896-11

5.5

Single blocks with multiple cells having inter-cell connections outside the container shall be in accordance with the configurations defined in Table 2.

Table 2 — Multiple cell configuration

Battery technology	Configuration
nickel-cadmium	maximum 10 cells per block
lead acid	maximum 6 cells per block

5.6

The maximum permissible ripple current from the charger equipment, causing no reduction in the battery life or the number of complete discharge cycles, shall be specified.

5.7

For photovoltaic off-grid applications, batteries shall be in accordance with IEC 61427-1.

6 Battery construction

6.1 Cell container

6.1.1

Cell containers shall be made of flame-retardant, heat-resistant, shock-resistant plastic.

6.1.2

The container and the cover shall be leak-proof.

6.1.3

The electrolyte level in containers of vented, flooded cells shall be visible through the material of the container.

6.1.4

The containers of vented, flooded cells shall have minimum and maximum level markings on the front (visible) side of container.

6.1.5

Valve and vent plugs shall include spray-proof and flame-arresting features.

6.2 Cell terminals

Cell terminals shall have current carrying capacity to meet or exceed the Ah rating of the battery.

7 Battery sizing

The battery sizing calculations shall be performed in accordance with IEEE 1184, IEEE 485 and IEEE 1115.

8 Battery testing

The battery testing shall be in accordance with the IEC standards specified in Table 3.

Table 3 — Battery testing requirements

Battery technology	IEC standard (clauses related to testing)
nickel-cadmium partial gas recombination	IEC 62259:2003 (clauses 7 to 10)
sealed nickel-cadmium	IEC 60622:2002 (clauses 4 to 7)
vented nickel-cadmium	IEC 60623:2017 (clauses 7 to 10)
valve regulated lead-acid – AGM	IEC 60896-21:2004 (clauses 5 and 6)
valve regulated lead-acid – Gel	IEC 60896-21:2004 (clauses 5 and 6)
vented lead-acid	IEC 60896-11:2002 (clauses 13 to 20)

9 Battery accessories

9.1 Interconnecting links and covers

9.1.1

The batteries shall be supplied with insulated inter-cell connectors made of tin or lead-plated copper bus bars or cables using stainless steel 316 hardware for fixing.

9.1.2

Connectors shall be sized for carrying fault currents and the continuous rated current.

9.1.3

Connectors and terminals shall be insulated and have provision to measure voltage, with a test lead pin, without removing the terminal insulation.

9.1.4

The terminal cells shall be supplied with connectors (terminal plates and terminal compression type lugs) for termination of cables as specified.

9.2 Tools and tackles

9.2.1

The following tools and instruments suitable for the battery technology and battery voltages shall be supplied if specified:

— an insulated spanner or wrench for tightening the connection hardware of the cells;

— a digital voltmeter for measuring the cell voltage at the terminals;

— a chemical resistant face shield;

— a chemical resistant apron;

— electrically insulated and chemical resistant gloves.

9.2.2

For flooded electrolyte battery types, the following tools and instruments shall be supplied if specified:

— a densimeter or hydrometer for the electrolyte of lead-acid batteries only;

— a vent plug thermometer for the electrolyte;

— a jug and a funnel for pouring the electrolyte;

— a rubber bulb electrolyte dropper.

9.2.3

A battery terminal protector coat spray or gel shall be supplied to prevent the terminals from corroding.

9.2.4

When the individual cell weight exceeds 25 kg, a battery lift or removal tool shall be supplied if specified.

10 Battery installation

10.1 Battery rack design

10.1.1

The arrangement of the cells on the rack shall not cause damage to adjacent equipment, components or cells due to leakage of electrolyte or emission of gaseous products.

10.1.2

The rack design shall provide space around the battery cells on the rack to have an even temperature distribution and ease of replacement.

10.1.3

The minimum vertical spacing between two tiers of the batteries on the rack shall be as specified.

10.1.4

The rack design shall ensure that the height from the top of battery on the top tier to the floor does not exceed the value specified.

10.1.5

Battery racks with a depth greater than 1 000 mm shall have access from front and rear.

10.1.6

For racks designed for flooded batteries, a chemical resistant spill containment system sized to contain the electrolyte volume from a cell shall be provided at the base of the rack if specified.

10.1.7

Non-insulated galvanized steel racks shall be provided with earthing lugs on the sides of the rack.

10.2 Cabinets and enclosures

10.2.1

Materials used for the construction of cabinets and enclosures shall be corrosion resistant with respect to the type of electrolyte used.

10.2.2

The cabinet or enclosure design shall prevent accumulation of a flammable atmosphere inside the cabinet or enclosure.

10.2.3

Cabinets shall have natural or forced ventilation as specified.

10.2.4

The ventilation fans shall be installed with a redundant (N+1) configuration.

10.2.5

Within the cabinet or enclosure, batteries shall be accessible to permit inspection and maintenance of cells without any safety risk to personnel.

10.2.6

The cabinet or enclosure design shall permit withdrawal of the cells.

10.2.7

For cabinets designed for flooded batteries, a chemical resistant spill containment system sized to contain the electrolyte volume from a cell shall be provided at the base of the cabinet if specified.

10.2.8

Moving metal parts of the cabinet shall be securely connected to the main earth bus bar within the cabinet by flexible copper connections.

10.2.9

For cabinets, a main earth bus bar shall be provided with a facility for external earthing connection.

10.2.10

For metallic enclosures, an external earthing boss shall be provided.

10.3 Additional requirements for electrical batteries installed on ships

In addition to the general requirements of the applicable IEC rules, the battery banks and associated components to be installed on ships shall be designed, tested and certified to the relevant requirements in the IEC 60092 series of rules for electrical installation in ships.

10.4 Additional requirements for electrical batteries installed on fixed and mobile offshore units

In addition to the general requirements of the applicable IEC rules, the battery banks and associated components to be installed on mobile and fixed offshore units (FPSO and FSO platforms) shall be designed, tested and certified to the relevant requirements in the IEC 61892 series of rules for electrical installation on mobile and fixed offshore units.

10.5 Markings

10.5.1

The rack, cabinet or enclosure of the battery shall be provided with a corrosion resistant, permanent name and rating plate.

10.5.2

The following information shall be inscribed on the name and rating plate:

— equipment tag number;

— purchase order number;

— year of manufacture;

— name of manufacturer;

— type of battery;

— battery voltage;

— number of cells;

— nominal Ah capacity with its discharge rate.

10.5.3

Labels with the sequential cell numbers shall be fixed on the rack or cabinet shelf and the cells.

10.6 Documentation

10.6.1

The test results as per the factory acceptance procedure shall be submitted as part of the manufacturing record book.

10.6.2

The following shall be provided with the equipment:

— installation manual;

— maintenance manual;

— operational manual; and

— manufacturing record book.

11 Battery handling, packing transportation and storage

11.1

An instruction label on the outer wrapping shall state the storage conditions and the date beyond which the product cannot be stored without remedial actions.

11.2

The cell shall be shipped according to the charge state as specified.

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