

Supplementary Specification to IEC 61800-2 Low-voltage AC Drives

Revision history

VERSION	DATE	PURPOSE
1.0	September 2021	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 2020).

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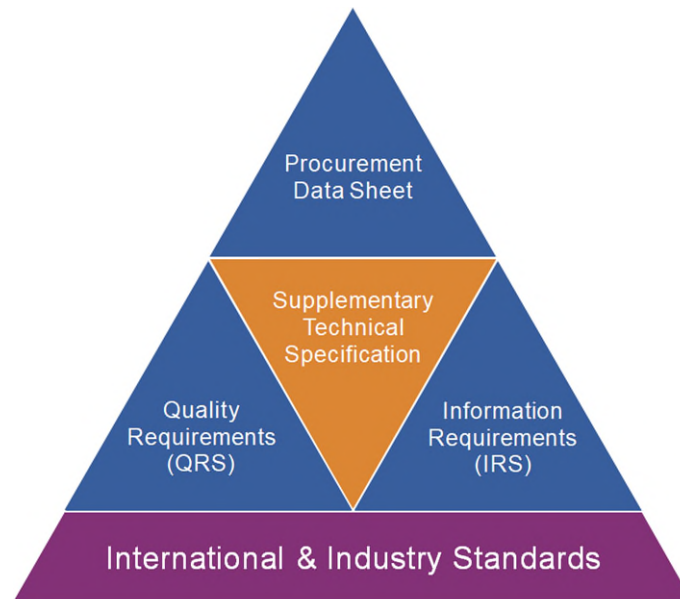
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Introduction

The purpose of this specification is to define a minimum common set of requirements for the procurement of low-voltage AC drives in accordance with IEC 61800-2, Edition 3, Adjustable speed electrical power drive systems – Part 2: General requirements – Rating specifications for adjustable speed AC power drive systems, 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 Supplementary Technical Specification

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

IOGP S-736: Supplementary Specification to IEC 61800-2 Low-voltage AC Drives

This specification defines the technical requirements for the supply of the equipment and is written as an overlay to IEC 61800-2, following the IEC 61800-2 clause structure. Clauses from IEC 61800-2 not amended by this specification apply as written to the extent applicable to the scope of supply.

Modifications to IEC 61800-2 defined in this specification are identified as *Add* (add to clause or add new clause), *Replace* (part of or entire clause) or *Delete*.

IOGP S-736D: Procurement Data Sheet for Low-voltage AC Drives (IEC)

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

IOGP S-736L: Information Requirements for Low-voltage AC Drives (IEC)

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

IOGP S-736Q: Quality Requirements for Low-voltage AC Drives (IEC)

The QRS defines quality management system requirements and the proposed extent of customer conformity assessment activities for the scope of supply. Customer 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 customer in the data sheet or in the purchase order.

The terminology used within this specification and the supporting procurement data sheet, IRS and QRS follows that of IEC 61800-2 and is in accordance with ISO/IEC Directives, Part 2 as appropriate.

The procurement data sheet and IRS are published as editable documents for the customer to specify application specific requirements. The supplementary 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) customer defined requirements (procurement data sheet, IRS, QRS);
- d) this specification;
- e) IEC 61800-2.

1 Scope

Replace second paragraph with

This specification amends and supplements IEC 61800-2 and associated parts of IEC 61800 referenced in IEC 61800-2 for the design, manufacture and testing of:

- AC drive systems connected to 50 Hz or 60 Hz input voltages;
- AC drive systems with only low-voltage basic drive modules (BDMs) with input and output line-to-line voltages up to and including 1 kV AC;
- AC drive systems with a low-voltage BDM provided with an input step-down transformer and/or an output step-up transformer integrated into a complete drive module (CDM) in accordance with Table 5.

Delete NOTE

Replace third paragraph with

This specification defines BDM/CDM criteria and properties with a focus on the following items:

- principal parts topology and classification of the BDM/CDM;
- ratings, performance and functionality;
- specifications for the environment in which the BDM/CDM is intended to be installed and operated;
- other specifications which might be applicable when specifying a complete BDM/CDM.

In fifth paragraph, replace "BDM/CDM/PDS" with

BDM/CDM

In sixth paragraph, replace "PDS" with

BDM/CDM

In seventh paragraph, add new list items

- explosion protection safety requirements covered by the IEC 60079 series related to BDM/CDMs feeding motors located in potentially explosive atmospheres;
- AC electrical machines used in power drive systems (PDSs) – application guide is covered in IEC TS 60034-25.

Add to subclause

This specification applies to BDMs operating with low voltage at input and output terminals.

Add new subclause

1.1 Low-voltage AC drives included in scope

This specification covers air-cooled BDMs/CDMs located, either offshore or onshore, in the following areas:

- in a non-hazardous area feeding motors located in a non-hazardous area;

- in a non-hazardous area feeding motors located in a hazardous area;
- indoors, either wall mounted or free standing;
- indoors, for integration in a switchgear/control gear assembly by others;
- indoors, for integration in a switchgear/control gear assembly by the BDM/CDM supplier;
- outdoors, within a weatherproof enclosure.

Add new subclause

1.2 Low-voltage AC drives excluded from scope

The following PDSs are excluded from the scope of this specification:

- AC PDSs with BDM input/output voltage above 1 000 V AC;
- low-voltage adjustable speed DC PDSs;
- BDMs/CDMs installed in a potentially explosive atmosphere.

The following components of the PDS which are not part of the BDM/CDM are outside the scope of this specification:

- low-voltage switchgear (the upstream switching device protection and bypass);
- high-voltage switchgear;
- supply transformer;
- low-voltage AC motor;
- high-voltage AC motor;
- oil-cooled BDMs/CDMs.

Add new subclause

1.3 Extended use of this specification

This specification can be used for the procurement of low-voltage AC drives which are not detailed in this specification, such as:

- drives with DC input voltage up to 1.5 kV;
- drives with current source converters;
- drives with water cooling;
- drives with input and output transformers which are external to an integrated CDM.

NOTE Supplementary specifications are required for extended use of this specification to cover the applications listed above.

2 Normative references

Add to clause

IEC 61378 (all parts), *Converter transformers*

3 Terms and definitions

Table 1 – List of general terms

Add to Table 1

3.98	cabinet
------	---------

Table 5 – Basic classification of PDS by voltage

Replace Table 5 with

CDM voltage ratings				Classification of PDS by voltage
Input U_{LN}	BDM voltage ratings		Output U_{AN1}	
	Input U_{VN}	Output U_{aN1}		
low-voltage	low-voltage	low-voltage	low-voltage	low-voltage
low-voltage	low-voltage	low-voltage	high-voltage	high-voltage
high-voltage	low-voltage	low-voltage	low-voltage	high-voltage
high-voltage	low-voltage	low-voltage	high-voltage	high-voltage

Add new term

3.98 cabinet

free-standing and self-supporting enclosure for housing electronic and/or electrical equipment, usually fitted with doors and/or side panels which may or may not be removable

[SOURCE: IEC 60917-1:2019, 3.15, modified - Figure 4 has been deleted.]

4 Guidance for specification of BDM/CDM/PDS and methodologies for compliance

4.3 Applicable standards

Add new list item

- Explosion protection safety requirements covered by IEC 60079 series related to BDM/CDMs feeding motors located in potentially explosive atmospheres.

Add new list item

- AC electrical machines used in PDSs (power drive systems) – application guide is covered in IEC TS 60034-25.

5 Performance and functionality criteria

5.3 Ratings

5.3.2 Input ratings

5.3.2.2 Input voltage and input frequency

Replace first paragraph with

Selection of a BDM/CDM/PDS shall be verified based on the specified ratings of the BDM/CDM/PDS input voltage and input frequency.

Add to subclause

BDMs/CDMs shall be rated for continuous operation for the specified input voltage and input frequency in accordance with IEC 61800-3.

5.3.2.3 Input current

In first paragraph, replace "should" with

shall

5.3.2.4 Short-circuit protective devices (SCPD)

Replace first paragraph with

Short-circuit protection of BDMs/CDMs output shall be in accordance with IEC 61800-5-1.

5.3.3 Output ratings

5.3.3.1 BDM/CDM continuous operation

Replace first paragraph with

BDMs/CDMs shall be continuously rated at the specified site conditions to supply the specified motor duty in terms of:

- fundamental AC voltage (U_{aN1}/U_{AN1});
- rated output current (I_{aN}/I_{AN});
- output frequency range;
- rated maximum apparent output power (S_{aN}/S_{AN}) [kVA] or maximum output active power (P_{aN}/P_{AN}) [kW].

5.3.3.2 PDS continuous output

In first paragraph, replace "should" with

shall

5.3.4 Operating quadrants

5.3.4.1 General

In first sentence, replace "should" with

shall

5.3.6 Special ratings related to BDM/CDM/PDS or motor

5.3.6.2 Transformers and reactors

5.3.6.2.1 General

Replace fifth paragraph with

Transformers shall comply with IEC 60076 (all parts) and IEC 61378 (all parts).

5.4 Performance

5.4.1 Operational

5.4.1.4 Dynamic braking

5.4.1.4.1 Resistive braking

5.4.1.4.1.3 Resistive braking (slowdown)

In subclause a), replace "should" with

shall

In subclause b), replace "should" with

shall

In subclause c), replace "should" with

shall

5.4.2 Fault supervision

5.4.2.1 General

Replace "should" with

shall

Replace "may" with

shall

5.4.2.2 BDM/CDM/PDS protection interface

Add to subclause

BDMs/CDMs shall detect an internal earth fault in the DC link and provide means of isolating the earth fault.

Add to subclause

BDMs/CDMs shall have overload, overcurrent/short-circuit at output, motor stall/jam, phase loss and earth fault motor protections features.

5.4.3 Minimum status indication required

Replace "should" with

shall

5.4.4 I/O devices

5.4.4.1 General

In first paragraph, replace "should" with

shall

5.5 General safety

Replace subclause with

BDM/CDM general safety requirements shall be in accordance with IEC 61800-5-1.

5.6 Functional safety

Replace fourth paragraph with

BDM/CDM functional safety requirements shall be in accordance with IEC 61800-5-2.

5.9 Environmental condition for service, transport and storage

5.9.1 General

In first sentence of first paragraph, replace "should" with

shall

In second paragraph, replace "should" with

shall

5.9.2 Operation

5.9.2.1 Climatic conditions

5.9.2.1.1 General

Replace first paragraph with

BDMs/CDMs shall be rated for the specified environmental conditions in accordance with Table 12.

In second paragraph, replace "should" with

shall

Replace third paragraph with

With doors and/or covers open, the BDM/CDM ingress protection shall be IP2X in accordance with IEC 60529.

5.9.4 Mechanical conditions

Add to subclause

Components or assemblies with a weight greater than 25 kg shall have lifting eyes/handles.

5.15 Earthing requirements

Add to subclause

Where the main supply has an IT earthing system, EMC filters with a connection to earth on the line side of the BDM/CDM shall not be provided.

Add new subclause

5.16 Cabinet access

Cabinet doors shall be secured to prevent access without the use of keys or special tools.

6 Test

6.6 Test specifications

6.6.3 Static performance and rating test

6.6.3.7 Additional tests for special rating

6.6.3.7.7 Checking properties under unusual service conditions

In first sentence of first paragraph, replace "may" with

shall

In second paragraph, replace "might" with

shall

7 Information and marking requirements

7.2 Marking on product

In first paragraph, replace "should" with

shall

In second paragraph, replace "should" with

shall

In third paragraph, replace "should" with

shall

7.3 Information to be supplied with the PDS or BDM/CDM

In first paragraph, replace "should" with

shall

In second paragraph, replace "should" with

shall

In third paragraph, replace "should" with

shall

7.4 Information to be supplied or made available

In first paragraph, replace "should" with

shall

In second paragraph, replace "should" with

shall

7.5 Safety and warning

7.5.1 Safety and warning labels

Replace "should" with

shall

7.5.2 Additional safety considerations of a PDS

In third paragraph, replace "should" with

shall

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