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Petroleum and natural gas industries - Drilling and production equipment - Part 1: Electric submersible pump systems for artificial lift (ISO 15551-1:2015)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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**Petroleum and natural gas industries - Drilling and production
equipment - Part 1: Electric submersible pump systems for
artificial lift (ISO 15551-1:2015)**

Industries du pétrole et du gaz naturel - Équipement de
forage et de production - Partie 1: Systèmes électriques de
pompes submersibles pour l'ascension artificielle (ISO
15551-1:2015)

Erdöl- und Erdgasindustrie - Bohrloch-Ausrüstungen - Teil
1: Elektrische Tauchpumpen zur Förderung (ISO 15551-
1:2015)

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents	Page
Foreword.....	3

Foreword

This document (EN ISO 15551-1:2015) has been prepared by Technical Committee ISO/TC 67 “Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries” in collaboration with Technical Committee CEN/TC 12 “Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries” the secretariat of which is held by AFNOR.

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Endorsement notice

The text of ISO 15551-1:2015 has been approved by CEN as EN ISO 15551-1:2015 without any modification.

**Petroleum and natural gas industries —
Drilling and production equipment —**

**Part 1:
Electric submersible pump systems
for artificial lift**

*Industries du pétrole et du gaz naturel — Équipement de forage et
de production —*

*Partie 1: Systèmes électriques de pompes submersibles pour
l'ascension artificielle*





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Contents

Page

Foreword	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols and abbreviated terms	13
5 Functional specification	16
5.1 General	16
5.2 Component type	16
5.3 Functional requirements	16
5.3.1 General	16
5.3.2 Application parameters	16
5.3.3 Environmental compatibility	18
5.3.4 Compatibility with related well equipment and services	19
5.4 User/purchaser selections	20
5.4.1 General	20
5.4.2 Design validation	20
5.4.3 Component functional evaluation	20
5.4.4 Quality grades	20
5.4.5 Shipping, handling, and storage	21
5.4.6 Additional documentation or requirements	21
6 Technical specification	21
6.1 General	21
6.2 Design criteria	22
6.2.1 General	22
6.2.2 Design documentation	22
6.2.3 Materials	22
6.2.4 Dimensional information	25
6.2.5 Component and assembled system design verification	26
6.2.6 Component design validation	26
6.2.7 Component functional evaluation requirements	26
6.2.8 Assembled system functional evaluation	26
6.2.9 Design changes	26
6.3 Technical specification — All components	26
6.3.1 Technical characteristics	26
6.3.2 Performance rating	27
6.4 Technical specification — Bolt-on discharge	27
6.4.1 General	27
6.4.2 Technical characteristics for the discharge	27
6.4.3 Performance ratings	27
6.4.4 Scaling of design validation	27
6.5 Technical specification — Pump and gas handler	27
6.5.1 General	27
6.5.2 Technical characteristics for the pump and gas handler	27
6.5.3 Performance ratings	28
6.5.4 Scaling of design validation	28
6.6 Technical specification — Bolt-on intake	28
6.6.1 General	28
6.6.2 Technical characteristics for the intake	28
6.6.3 Performance ratings	28
6.6.4 Scaling of design validation	28
6.7 Technical specification — Mechanical gas separators	29

ISO 15551-1:2015(E)

6.7.1	General.....	29
6.7.2	Technical characteristics.....	29
6.7.3	Performance ratings.....	29
6.7.4	Scaling of design validation.....	29
6.8	Technical specification — Seal chamber sections.....	29
6.8.1	General.....	29
6.8.2	Technical characteristics.....	29
6.8.3	Performance ratings.....	29
6.8.4	Scaling of design validation.....	30
6.8.5	Horsepower requirement.....	30
6.9	Technical specification — Motors.....	30
6.9.1	General.....	30
6.9.2	Technical characteristics.....	30
6.9.3	Performance ratings.....	30
6.9.4	Scaling of design validation.....	31
6.10	Technical specifications — Power and motor lead extension cable.....	31
6.10.1	General.....	31
6.10.2	Technical characteristics.....	31
6.10.3	Performance ratings.....	31
6.10.4	Scaling of design validation.....	31
6.11	Technical specifications — Pothead.....	32
6.11.1	General.....	32
6.11.2	Technical characteristics.....	32
6.11.3	Performance ratings.....	32
6.11.4	Scaling of design validation.....	32
6.12	Assembled ESP system.....	32
6.12.1	General.....	32
6.12.2	Technical characteristics.....	33
6.12.3	System capabilities.....	33
7	Supplier/manufacturer requirements.....	34
7.1	General.....	34
7.2	Documentation and data control.....	34
7.2.1	General.....	34
7.2.2	Delivery documentation.....	34
7.2.3	Operator's manual.....	35
7.2.4	Certificate of compliance.....	35
7.2.5	Component data sheet.....	35
7.3	Component identification.....	38
7.3.1	Permanent identification.....	38
7.3.2	Semi-permanent identification.....	38
7.4	Quality.....	39
7.4.1	General.....	39
7.4.2	Quality grade requirements.....	39
7.5	Raw materials.....	40
7.6	Additional processes applied to components.....	41
7.6.1	Documentation.....	41
7.6.2	Coatings and surface treatments.....	41
7.6.3	Welding.....	41
7.6.4	Heat treating.....	41
7.7	Traceability.....	41
7.8	Calibration systems.....	42
7.9	Examination and inspection.....	42
7.9.1	General.....	42
7.9.2	Weld.....	42
7.9.3	Component and subcomponent dimensional inspection.....	43
7.9.4	Construction features.....	43
7.10	Manufacturing non-conformance.....	44
7.11	Component functional testing.....	44

8	Repair/redress	44
9	Shipping, handling, and storage	44
9.1	General	44
9.2	Storage	45
Annex A (normative)	Design validation performance rating requirements by component	46
Annex B (normative)	Requirements for determining performance ratings as an assembled system	74
Annex C (normative)	Functional evaluation: single component	77
Annex D (normative)	Cable reference information	85
Annex E (informative)	Functional evaluation guideline — Assembled ESP system	91
Annex F (informative)	Establishing recommended operating range (ROR) of ESP system	93
Annex G (informative)	Example user/purchaser ESP functional specification form	95
Annex H (informative)	Considerations for use of 3-phase low and medium voltage adjustable speed drives for ESP applications	99
Annex I (informative)	Analysis after ESP use	105
Annex J (informative)	Downhole monitoring of ESP assembly	117
Annex K (informative)	Information on permanent magnet motors for ESP applications	119
	Bibliography	121

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

The committee responsible for this document is ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 4, *Drilling and production equipment*.

Introduction

This part of ISO 15551 has been developed by users/purchasers and suppliers/manufacturers of electric submersible pumps and is intended for use in the petroleum and natural gas industry worldwide. This part of ISO 15551 provides requirements and information to both parties in the selection, manufacturing, testing, and use of electric submersible pumps as defined in the scope. Further, this part of ISO 15551 addresses supplier requirements, which set the minimum parameters for claiming conformity with this International Standard.

This part of ISO 15551 provides grades of requirements for design validation, quality control, and functional evaluations allowing the user/purchaser to select each for a specific application. There are two grades of design validation, three grades of quality control, and up to three grades of functional testing, depending on the component. Design validation grade V2 is restricted to legacy products, and the highest grade is V1. Quality control grade 3 is the standard grade and grades 2 and 1 provide additional requirements. Of the three functional evaluation grades, the lowest grade is the standard grade and higher grades provide additional requirements. The user/purchaser can specify requirements supplemental to these grades.

Users of this International Standard are informed that requirements above those outlined in this International Standard can be needed for individual applications. This International Standard is not intended to inhibit a supplier/manufacturer from offering, or the user/purchaser from accepting, alternative equipment or engineering solutions. This can be particularly applicable where there is innovative or developing technology.

Petroleum and natural gas industries — Drilling and production equipment —

Part 1: Electric submersible pump systems for artificial lift

1 Scope

This part of ISO 15551 provides requirements for the design, design verification and validation, manufacturing and data control, performance ratings, functional evaluations, handling, and storage of tubing-deployed electrical submersible pump (ESP) systems as defined herein. This part of ISO 15551 is applicable to those components meeting the definition of centrifugal pumps including gas handling devices, discharge heads, seal chamber sections, intake systems, mechanical gas separators, induction motors (herein motor), shaft couplings, motor lead extension, pothead, and power cables, as defined herein. Components supplied under the requirements of this part of ISO 15551 exclude previously used subcomponents. Additionally, this International Standard provides requirements for assembled ESP systems.

This part of ISO 15551 includes normative annexes addressing design validation performance rating requirements by component, requirements for determining ratings as an assembled system, functional evaluation: single component and cable reference information.

This part of ISO 15551 includes informative annexes addressing functional evaluation guidelines for assembled ESP systems, establishing recommended operating range (ROR) of the ESP system, example user/purchaser ESP functional specification form, considerations for the use of 3-phase low and medium voltage adjustable speed drives for ESP applications, analysis after ESP use, downhole monitoring of ESP assembly operation, and information on permanent magnet motors for ESP applications.

Equipment not covered by this part of ISO 15551 includes wireline and coiled tubing-deployed ESP systems, motor and pump shrouds, electric penetrators and feed-through systems, cable clamps and banding, centralizers, intake screens, passive gas separators, by-pass tools, check and bleeder valves, component adaptors, capillary lines, electric surface equipment, downhole permanent magnet motors, and non-conventionally configured ESP systems such as inverted systems. Repair and redress equipment requirements are not covered in this part of ISO 15551.

The terminologies used within this part of ISO 15551 are; “ESP assembly” for a system of products combined into an operational machine, “component” for individual products such as, pumps or seal chamber sections, and “subcomponent” for individual parts or subassemblies that are used in the construction of an individual component.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel*

ISO 29001, *Petroleum, petrochemical and natural gas industries — Sector-specific quality management systems — Requirements for product and service supply*

API RP 11S2, *Electric Submersible Pump Testing*

API RP 11S7, *Recommended Practice of Application and Testing of Electric Submersible Pump Seal Chamber Section*

API RP 11S8, *Practice on Electric Submersible Pump System Vibrations*

ASTM B3, *Standard Specification for Soft or Annealed Copper Wire*

ASTM B8, *Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft*

ASTM B33, *Standard Specification for Tin Coated Soft or Annealed Copper Wire for Electrical Purposes*

ASTM B189, *Standard Specification for Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes*

ASTM B193, *Standard Test Method for Resistivity of Electrical Conductor Materials*

ASTM B258, *Standard Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors*

ASTM B496, *Standard Specification for Compact-Round Concentric-Lay-Stranded Copper Conductors*

ASTM D471, *Rubber Property — Effect of Liquids, Test Method for*

ASTM E8, *Standard Test Methods for Tension Testing of Metallic Materials*

NEMA WC 53, *Standard Test Methods for Extruded Dielectric Power, Control, Instrumentation and Portable Cables for Test*

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