
**Petroleum and natural gas industries —
Progressing cavity pump systems for
artificial lift —**

**Part 1:
Pumps**

*Industries du pétrole et du gaz naturel — Pompes de fond à cavités
progressantes pour activation des puits —*

Partie 1: Pompes



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Abbreviated terms and symbols	8
5 Functional specification	10
5.1 General	10
5.2 PCP type description	10
5.3 Functional requirements	10
5.4 Design validation	14
5.5 Product functional evaluation	15
5.6 Quality control grades	15
5.7 Additional documentation	15
5.8 Additional requirements	15
6 Technical specification	15
6.1 General	15
6.2 Technical characteristics	16
6.3 Design criteria	16
6.4 Dimensional information	17
6.5 Performance ratings	18
6.6 Design verification	19
6.7 Design validation	19
6.8 Functional evaluation requirements	19
6.9 Allowable design changes	19
6.10 Scaling of design validation	20
7 Supplier/manufacturer requirements	20
7.1 General	20
7.2 Documentation and data control	20
7.3 Product identification	22
7.4 Quality	23
7.5 Raw materials certification	25
7.6 Additional processes applied to components	25
7.7 Traceability	25
7.8 Calibration systems	26
7.9 Examination and inspection	26
7.10 Manufacturing non-conformance	31
7.11 User/purchaser complaint returns	31
7.12 Product functional testing	31
8 Repair	31
9 Shipping, handling and storage	31
9.1 General	31
9.2 Preparation for shipment	31
9.3 Handling	32
9.4 Storage	32
Annex A (normative) Requirements for progressing cavity pump elastomers	34

Annex B (normative) Design validation	38
Annex C (normative) Functional evaluation	42
Annex D (informative) Optional information for PCP elastomer testing and selection	48
Annex E (informative) Installation guidelines	59
Annex F (informative) Operational guidelines.....	62
Annex G (informative) Supplemental information for PCP performance characteristics.....	70
Annex H (informative) Example user/purchaser PCP functional specification form	76
Annex I (informative) Analysis after use	79
Annex J (informative) Selection and use of drive-string equipment in PCP applications.....	93
Annex K (informative) Repair and reconditioning	100
Annex L (informative) Auxiliary equipment	103
Bibliography	108

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 15136-1 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 4, *Drilling and production equipment*.

This second edition cancels and replaces the first edition (ISO 15136-1:2001), which has been technically revised.

ISO 15136 consists of the following parts, under the general title *Petroleum and natural gas industries — Progressing cavity pump systems for artificial lift*:

- *Part 1: Pumps*
- *Part 2: Surface-drive systems*

Introduction

This part of ISO 15136 has been developed by users/purchasers and suppliers/manufacturers of progressing cavity pumps and is intended for use in the petroleum and natural gas industry worldwide. This part of ISO 15136 provides requirements and information to both parties in the selection, manufacturing, testing, and using progressing cavity pumps as defined in the scope. Further, this part of ISO 15136 addresses supplier requirements, which set the minimum parameters with which it is necessary that suppliers comply to claim conformity with this part of ISO 15136.

This part of ISO 15136 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 three grades of design validation and quality control, and two grades of functional testing. Design validation grade V3 is restricted to legacy products, the basic grade is V2 and the highest grade is V1. Quality control grade 3 is the standard grade and grades 2 and 1 provide additional requirements. Functional evaluation grade F1 requires a hydraulic test of the PCP and grade F2 does not. The user/purchaser has the option of specifying requirements supplemental to these grades.

It is necessary that the users of this part of ISO 15136 be aware that requirements above those outlined in this part of ISO 15136 can be needed for individual applications. This part of ISO 15136 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. Where an alternative is offered, it is the responsibility of the supplier/manufacturer to clearly and completely identify any variations from the requirements of this part of ISO 15136.

Petroleum and natural gas industries — Progressing cavity pump systems for artificial lift —

Part 1: Pumps

IMPORTANT — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

1 Scope

This part of ISO 15136 provides requirements for the design, design verification and validation, manufacturing and data control, performance ratings, functional evaluation, repair, handling and storage of progressing cavity pumps for use in the petroleum and natural gas industry. This part of ISO 15136 is applicable to those products meeting the definition of progressing cavity pumps (PCP) included herein. Connections to the drive string and tubulars are not covered by this part of ISO 15136.

This part of ISO 15136 includes normative annexes that establish requirements for characterization and testing of stator elastomer material, design validation and functional evaluation. Additionally, informative annexes provide information for PCP elastomer selection and testing, installation, start-up and operation guidelines, equipment selection and application guidelines, functional specification form, used pump evaluation, drive string selection and use, repair and reconditioning procedures and auxiliary equipment.

Equipment not covered by the requirements of this part of ISO 15136 includes bottom-drive systems except for the PCP components, drive-string components and auxiliary equipment such as tag bars, gas separators and torque anchors. These items might or might not be covered by other International Standards. Surface-drive systems are covered in ISO 15136-2.

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 (including any amendments) applies.

ISO 34-1, *Rubber, vulcanized or thermoplastic — Determination of tear strength — Part 1: Trouser, angle and crescent test pieces*

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 815-1:2008, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

ISO 2977, *Petroleum products and hydrocarbon solvents — Determination of aniline point and mixed aniline point*

ISO 4662, *Rubber, vulcanized or thermoplastic — Determination of rebound resilience*

ISO 4666 (all parts), *Rubber, vulcanized — Determination of temperature rise and resistance to fatigue in flexometer testing*

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

ISO 7743, *Rubber, vulcanized or thermoplastic — Determination of compression stress-strain properties*

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

ISO 11960, *Petroleum and natural gas industries — Steel pipes for use as tubing or casing for wells*

ISO 15136-2, *Petroleum and natural gas industries — Progressing cavity pump systems for artificial lift — Part 2: Surface-drive systems*

ISO 15156 (all parts), *Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production*

API Spec 11B, *Specification for Sucker Rods*¹⁾

ASTM D412-06ae2, *Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers — Tension*²⁾

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

ASTM D429-08, *Standard Test Methods for Rubber Property — Adhesion to Rigid Substrates*

ASTM D575, *Standard Test Methods for Rubber Properties in Compression*

ASTM D611-07, *Standard Test Methods for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents*

ASTM D623, *Standard Test Methods for Rubber Property — Heat Generation and Flexing Fatigue in Compression*

ASTM D624, *Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers*

ASTM D2240-05, *Standard Test Method for Rubber Property — Durometer Hardness*

3 Terms and definitions

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

NOTE For quality system related terms used in this document and not defined below, reference can be made to ISO 9000.

3.1

actual capacity per rpm

volumetric capability determined through functional testing for a specific product

NOTE “rpm” has been retained in this term on the basis that it is part of an established industry terminology. However, it is deprecated by ISO as a unit, in which case it is rendered as the accepted form “r/min.”

1) American Petroleum Institute, 1220 L Street North West, Washington, DC 20005, USA.

2) American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA.