
**Petroleum and natural gas industries —
Design and operation of subsea production
systems —**

**Part 1:
General requirements and recommendations**

*Industries du pétrole et du gaz naturel — Conception et exploitation des
systèmes de production immergés —*

Partie 1: Exigences générales et recommandations



Contents

1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviations	2
3.1 Terms and definitions	2
3.2 Abbreviations	2
4 Systems and interface descriptions	4
4.1 General	4
4.2 Overall system description	6
4.3 Subsea wellhead system	7
4.4 Subsea tree system and tubing hanger	8
4.5 Completion/workover riser systems	9
4.6 Mudline casing suspension system description	10
4.7 Production control system	10
4.8 Sealine systems	11
4.9 Subsea template and manifold systems	12
4.10 Production risers	13
4.11 Intervention systems	13
5 Design	14
5.1 General	14
5.2 Design criteria	14
5.3 Field development	17
5.4 Design loads	18
5.5 System design	18

© ISO 1999

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 the publisher.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

6 Materials and corrosion protection	39
6.1 Material evaluation	39
6.2 Metallic materials.....	40
6.3 Non-metallic materials	41
6.4 Bolting materials for subsea applications	42
6.5 External corrosion protection	42
6.6 Design limitations for materials	43
7 Manufacturing and testing	45
7.1 Manufacturing and testing.....	45
7.2 Test procedures.....	45
7.3 Integration testing	46
8 Operations	47
8.1 Transportation and handling.....	47
8.2 Installation.....	48
8.3 Drilling and completion.....	49
8.4 Hook-up and commissioning	50
8.5 Well intervention.....	55
8.6 Maintenance	56
8.7 Decommissioning.....	57
9 Documentation	59
9.1 General	59
9.2 Engineering and manufacturing	59
9.3 Operating and maintenance	59
9.4 As-built/as-installed documentation.....	59
Annex A (informative) Description of subsea production system	60
Annex B (informative) Marking colours	107
Annex C (informative) Integration testing of subsea production equipment	109
Annex D (informative) Typical procedures for commissioning	114
Annex E (informative) Documentation for operation	117
Annex F (informative) Data sheets	122
Bibliography	128

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 3.

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.

International Standard ISO 13628-1 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum and natural gas industries*, Subcommittee SC 4, *Drilling and production equipment*.

ISO 13628 consists of the following parts, under the general title *Petroleum and natural gas industries — Design and operation of subsea production systems*:

- *Part 1: General requirements and recommendations*
- *Part 2: Flexible pipe systems for subsea and marine applications*
- *Part 3: Through flowline (TFL) systems*
- *Part 4: Subsea wellhead and tree equipment*
- *Part 5: Subsea control umbilicals*
- *Part 6: Subsea production control systems*
- *Part 7: Workover/completion riser systems*
- *Part 8: Remotely Operated Vehicle (ROV) interfaces on subsea production systems*
- *Part 9: Remotely Operated Tool (ROT) intervention systems*

Annexes A, B, C, D, E and F of this part of ISO 13628 are for information only.

Introduction

This part of ISO 13628 has been prepared to provide general requirements, recommendations and overall guidance for the user to the various areas requiring consideration during development of a subsea production system for the petroleum and natural gas industries. The functional requirements defined in this part of ISO 13628 will allow alternatives in order to suit specific field requirements. The intention is to facilitate and complement the decision process rather than replace individual engineering judgement and, where requirements are non-mandatory, provide positive guidance for the selection of an optimum solution.

This part of ISO 13628 constitutes the overall subsea production system standard, with the intention that the more detailed requirements for the subsystems are retained in the complementary parts of ISO 13628. However, in some areas (e.g. structures, manifolds, marking) detailed requirements are included herein, as these subjects are not covered in a subsystem standard.

This part of ISO 13628 was developed on the basis of API RP 17A, *Design and Operation of Subsea Production Systems*, and other relevant documents on subsea production systems.

Petroleum and natural gas industries — Design and operation of subsea production systems —

Part 1: General requirements and recommendations

1 Scope

This part of ISO 13628 provides general requirements and overall recommendations for development of complete subsea production systems from the design phase to decommissioning. This part of ISO 13628 forms a top-level document to govern other standards dealing with subsystems typically forming a part of a subsea production system.

The complete subsea production system comprises several subsystems necessary to produce hydrocarbons from one or more subsea wells to a given processing facility located offshore (fixed, floating or subsea) or onshore, or to inject water/gas through subsea wells. This part of ISO 13628 and the subsystem standards apply as far as the interface limits described in clause 4.

Specialized equipment, such as split trees and trees and manifolds in atmospheric chambers, are not specifically discussed because of their limited use. However, the information presented is applicable to those types of equipment.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 13628. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 13628 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs.*

ISO 898-2, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 2: Nuts with specified proof load value.*

ISO 10423, *Petroleum and natural gas industries — Drilling and production equipment — Wellhead and christmas tree equipment.*

ISO 13628-3, *Petroleum and natural gas industries — Design and operation of subsea production systems — Part 3: Through flowline (TFL) systems.*

ISO 13628-4:—¹⁾, *Petroleum and natural gas industries — Design and operation of subsea production systems — Part 4: Subsea wellhead and tree equipment.*

¹⁾ To be published.

ISO 13628-6, *Petroleum and natural gas industries — Design and operation of subsea production systems — Part 6: Subsea production control systems.*

ISO 13819-1, *Petroleum and natural gas industries — Offshore structures — Part 1: General requirements.*

ISO 13819-2, *Petroleum and natural gas industries — Offshore structures — Part 2: Fixed steel structures.*

ANSI/ASME B31.8, *Gas Transmission and Distribution Piping Systems.*

API RP 17C²⁾, *TFL (Trough Flowline) Systems.*

API RP 17G³⁾, *Design and Operation of Completion/Workover Riser Systems.*

ASTM A 193, *Specification for Alloy — Steel and Stainless Steel Bolting Materials for High Temperature Service.*

ASTM A 320, *Specification for Alloy Steel Bolting Materials for Low-Temperature Service.*

3 Terms, definitions and abbreviations

For the purposes of this part of ISO 13628, the following terms, definitions and abbreviations apply.

3.1 Terms and definitions

3.1.1

sealine

flowline, service line, cable, umbilical or pipeline

NOTE For description of pressure and temperature ratings, the definition given in the applicable subsystem standard and other relevant standards and design codes is used.

3.2 Abbreviations

ADS	atmospheric diving suit
API	American Petroleum Institute
BOP	blow-out preventer
BS&W	basic sediment and water
CRA	corrosion-resistant alloy
DCV	directional control valve
DFI	design, fabrication, installation
DFO	documentation for operation
EDP	emergency disconnect package
EFC	European Federation of Corrosion
ESD	emergency shutdown

²⁾ For the purposes of this part of ISO 13628, API RP 17C will be replaced by ISO 13628-3 when the latter becomes publicly available.

³⁾ For the purposes of this part of ISO 13628, API RP 17G will be replaced by ISO 13628-7 when the latter becomes publicly available.