

Recommended Practice on Remotely Operated Tool (ROT) Intervention Systems

ANSI/API RECOMMENDED PRACTICE 17M
FIRST EDITION, APRIL 2004

REAFFIRMED: JANUARY 2009

ISO 13628-9:2000 (Identical), Petroleum and natural gas industries—Design and operation of subsea production systems—Part 9: Remotely Operated Tool (ROT) intervention systems



Special Notes

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

API is not undertaking to meet the duties of employers, manufacturers, or suppliers to warn and properly train and equip their employees, and others exposed, concerning health and safety risks and precautions, nor undertaking their obligations under local, state, or federal laws.

Information concerning safety and health risks and proper precautions with respect to particular materials and conditions should be obtained from the employer, the manufacturer or supplier of that material, or the material safety data sheet.

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. Sometimes a one-time extension of up to two years will be added to this review cycle. This publication will no longer be in effect five years after its publication date as an operative API standard or, where an extension has been granted, upon republication. Status of the publication can be ascertained from the API Standards department telephone (202) 682-8000. A catalog of API publications, programs and services is published annually and updated biannually by API, and available through Global Engineering Documents, 15 Inverness Way East, M/S C303B, Englewood, CO 80112-5776.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this standard or comments and questions concerning the procedures under which this standard was developed should be directed in writing to the Director of the Standards department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005. Requests for permission to reproduce or translate all or any part of the material published herein should be addressed to the Director, Business Services.

API standards are published to facilitate the broad availability of proven, sound engineering and operating practices. These standards are not intended to obviate the need for applying sound engineering judgment regarding when and where these standards should be utilized. The formulation and publication of API standards is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

These materials are subject to copyright claims of ISO, ANSI and API.

All rights reserved. No part of this work may be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Contact the Publisher, API Publishing Services, 1220 L Street, N.W., Washington, D.C. 20005.

Copyright © 2004 American Petroleum Institute

API Foreword

This standard shall become effective on the date printed on the cover but may be used voluntarily from the date of distribution.

Standards referenced herein may be replaced by other international or national standards that can be shown to meet or exceed the requirements of the referenced standard.

This American National Standard is under the jurisdiction of the API Subcommittee on Subsea Production systems. This standard is considered identical to the English version of ISO 13628-9:2000. ISO 13628-9:2000 was prepared by Technical Committee ISO/TC 67 Materials, equipment and offshore structures for the petroleum and natural gas industries, SC 4 Drilling and production equipment.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any federal, state, or municipal regulation with which this publication may conflict.

Suggested revisions are invited and should be submitted to API, Standards department, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

Contents

	Page
API Foreword	ii
Foreword	iv
Introduction.....	v
1 Scope	1
2 Terms, definitions and abbreviated terms	1
2.1 Terms and definitions.....	1
2.2 Abbreviated terms	2
3 System selection.....	3
3.1 General.....	3
3.2 Deck handling equipment	5
3.3 Intervention control system (ICS)	5
3.4 Deployment/landing equipment	7
3.5 Tools for primary intervention tasks	7
4 Functional requirements and recommendations	8
4.1 General.....	8
4.2 Deployment and landing requirements and recommendations	9
4.3 Surface equipment.....	10
4.4 Control system requirements and recommendations	12
4.5 Tie-in operations	15
4.6 Module replacement	18
5 Test requirements and recommendations	19
6 Interfaces	19
Bibliography.....	24

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.

Attention is drawn to the possibility that some of the elements of this part of ISO 13628 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13628-9 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*

Introduction

This part of ISO 13628 is considered to be closely related to ISO 13628-1 and ISO 13628-8. ISO 13628-1 provides general requirements and overall recommendations for development of complete subsea production systems for the petroleum and natural gas industries, from design to decommissioning, and gives a description of how the ROT intervention systems relate to the total subsea production system.

The objective of subsea intervention systems, including vessel and deck handling equipment, is to facilitate safe and efficient intervention on subsea installations.

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

Part 9: Remotely Operated Tool (ROT) intervention systems

1 Scope

This part of ISO 13628 provides functional requirements and recommendations for ROT intervention systems and interfacing equipment on subsea production systems for the petroleum and natural gas industries.

This part of ISO 13628 does not cover manned intervention and ROV-based intervention systems (e.g. for tie-in of sealines and module replacement). Vertical wellbore intervention, internal flowline inspection, tree running and tree running equipment are also excluded from this part of ISO 13628.

2 Terms, definitions and abbreviated terms

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

2.1 Terms and definitions

2.1.1

subsea intervention

all work carried out subsea

2.1.2

primary intervention

all work carried out during the scheduled intervention task

2.1.3

ROT system

dedicated, unmanned, subsea tools used for remote installation or module replacement tasks that require lift capacity beyond that of free-swimming ROV systems

NOTE The ROT system comprises wire-suspended tools with control system and support-handling system for performing dedicated subsea intervention tasks. They are usually deployed on liftwires or a combined liftwire/umbilical. Lateral guidance may be via guidewires, dedicated thrusters or ROV assistance.

2.1.4

deployment system

all equipment involved in the launch and recovery of the ROT system

2.1.5

heave-compensated system

system that limits the effect of vertical vessel motion on the deployed ROT system

2.1.6**skid system**

storage, transportation, lifting and testing frames to facilitate movement of the ROT systems and the modules and components to be replaced or installed

NOTE Skids are used in combination with a skidding system.

2.1.7**sealines**

all pipelines, flowlines, umbilicals and cables installed on the seabed

2.1.8**termination head**

part of the PICS interfacing with the end of the sealine

2.1.9**pull-in head**

part of the pull-in system acting as attachment point for the end of the pull-in wire

2.2 Abbreviated terms

CB	centre of buoyancy
CF	connection function
CG	centre of gravity
CT	connection tool
FAT	factory acceptance test
HPU	hydraulic power unit
ICS	intervention control system
ID	internal diameter
IP	ingress protection
LCC	life cycle cost
MQC	multi quick connector
NAS	National Aerospace Standard Institute
PGB	permanent guide base
PICS	pull-in and connection system
PIF	pull-in function
PIT	pull-in tool
ROT	remotely operated tool
ROV	remotely operated vehicle
SPS	subsea production system

SWL	safe working load
WOCS	workover control system

3 System selection

3.1 General

The design, configuration and operation of the ROT intervention system impacts directly on the LCC for the entire SPS. In order to obtain an SPS design providing safe and cost-effective intervention operations, it is important to obtain a closed loop between SPS design and intervention system design. See Figure 1.

An ROT intervention system typically comprises the following:

- a) ROTs for dedicated intervention tasks,
- b) deck handling equipment,
- c) ICS,
- d) deployment/landing equipment,
- e) ROV spread interfaced with ROT systems.

An illustration of the main features of an ROT intervention system and associated equipment is shown in Figure 2.

The breakdown of the ROT intervention system into sub-elements and components as presented in this part of ISO 13628 should not pose limitations on the selection of new intervention concepts whose functionality and reliability can be documented.

Configurational options for the ROT intervention system and interfacing equipment, such as intervention vessel and ROV systems when used, are shown in Figure 3.

ROT intervention systems shall be evaluated for all phases of an intervention operation, which typically are:

- mobilization (specific issues at the location in question),
- deck handling and preparation,
- launch, descent and landing,
- intervention task,
- testing,
- complementary tasks,
- retrieval,
- demobilization,
- contingency.

During the evaluation, consideration shall be given to reasonably foreseeable misuse of the ROT intervention system.