SLOVENSKI STANDARD
SIST EN ISO 13628-8:2007

01-maj-2007

Industrija za predelavo nafte in zemeljskega plina - Naļ rtovanje in delovanje podvodnih proizvodnih sistemov - 8. del: Vmesniki daljinsko vodenih vozil (ROV) za uporabo v podvodnih proizvodnih sistemih (ISO 13628-8:2002)

Petroleum and natural gas industries - Design and operation of subsea production systems - Part 8: Remotely Operated Vehicle (ROV) interfaces on subsea production systems (ISO 13628-8:2002)

Erdöl- und Erdgasindustrie - Konstruktion und Betrieb von Unterwasser-Produktionssystemen - Teil 8: Schnittstellen ferngelenkter Fahrzeuge (ROV) mit Unterwasser-Produktionssystemen (ISO 13628-8:2002)

Industries du pétrole et du gaz naturel - Conception et exploitation des systemes de production immergés - Partie 8: Véhicules commandés a distance pour l'interface avec les matériels immergés (ISO 13628-8:2002)

Ta slovenski standard je istoveten z: **EN ISO 13628-8:2006**

ICS:

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment

SIST EN ISO 13628-8:2007 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 13628-8

December 2006

ICS 75.180.10

English Version

Petroleum and natural gas industries - Design and operation of subsea production systems - Part 8: Remotely Operated Vehicle (ROV) interfaces on subsea production systems (ISO 13628-8:2002)

Industries du pétrole et du gaz naturel - Conception et exploitation des systèmes de production immergés - Partie 8: Véhicules commandés à distance pour l'interface avec les matériels immergés (ISO 13628-8:2002)

Erdöl- und Erdgasindustrie - Konstruktion und Betrieb von Unterwasser-Produktionssystemen - Teil 8: Schnittstellen ferngelenkter Fahrzeuge (ROV) mit Unterwasser-Produktionssystemen (ISO 13628-8:2002)

This European Standard was approved by CEN on 13 November 2006.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN ISO 13628-8:2006: E

Foreword

The text of ISO 13628-8:2002 has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum and natural gas industries" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 13628-8:2006 by 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.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 13628-8:2002 has been approved by CEN as EN ISO 13628-8:2006 without any modifications.

INTERNATIONAL STANDARD

ISO 13628-8

First edition
2002-12-15

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

Part 8: Remotely Operated Vehicle (ROV) interfaces on subsea production systems

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

Partie 8: Véhicules commandés à distance pour l'interface avec les matériels immergés

Reference number
ISO 13628-8:2002(E)

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

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 13628-8 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*.

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 umbilicals*

— *Part 6: Subsea production control systems*

— *Part 7: Completion/workover 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 a revision, major amendment and expansion of Annex C of API[1)] 17D[1].

The recommended practices for the selection and use of ROV interfaces have generally selected one interface for a specific application. The inclusion of a particular approach or recommendation does not imply that it is the only approach or the only interface to be used for that application.

In determining the suitability of standardization of ROV intervention interfaces for installation, maintenance or inspection tasks on subsea equipment, it is necessary to adopt a general philosophy regarding subsea intervention. This intervention philosophy is more fully described within this part of ISO 13628, as are the associated evaluation criteria used in selecting the interfaces incorporated into these recommendations.

This part of ISO 13628 is not intended to obviate the need for sound engineering judgement as to when and where its provisions are to be utilized, and users need to be aware that additional or differing details may be required to meet a particular service or local legislation.

With this part of ISO 13628, it is not wished to deter the development of new technology. The intention is to facilitate and complement the decision processes, and the responsible engineer is encouraged to review standard interfaces and re-use intervention tooling in the interests of minimizing life-cycle costs and increasing the use of proven interfaces.

This part of ISO 13628 does not cover intervention by remote operated tools (ROTs), which are dedicated tools deployed on drill pipe or guidelines. Instead, it focuses upon defining the requirements of ROV interfaces with subsea production systems, with further reference to ROT interfaces only being made where deemed appropriate. The interfaces on the subsea production system can apply equally to ROTs and ROVs.

1) American Petroleum Institute, 1220 L Street NW, Washington D.C. 20005, USA.

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

Part 8: Remotely Operated Vehicle (ROV) interfaces on subsea production systems

1 Scope

This part of ISO 13628 gives functional requirements and guidelines for ROV interfaces on subsea production systems for the petroleum and natural gas industries. It is applicable to both the selection and use of ROV interfaces on subsea production equipment, and provides guidance on design as well as the operational requirements for maximising the potential of standard equipment and design principles. The auditable information for subsea systems it offers will allow interfacing and actuation by ROV-operated systems, while the issues it identifies are those that have to be considered when designing interfaces on subsea production systems. The framework and detailed specifications set out will enable the user to select the correct interface for a specific application.

2 Normative references

The following referenced document is 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 10423, *Petroleum and natural gas industries — Drilling and production equipment — Wellhead and christmas tree equipment*

3 Terms, definitions and abbreviated terms

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

3.1 Terms and definitions

3.1.1
functional requirement
minimum criterion which shall be satisfied in order to meet a stated objective or objectives

NOTE Functional requirements are performance oriented and are applicable to a wide range of development concepts.

3.1.2
guideline
recommendation of recognized practice to be considered in conjunction with applicable statutory requirements, industry standards, standard practices and philosophies

3.1.3
manufacturer
company responsible for the manufacture of the interface

3.1.4
operator
company which physically operates the ROV (delivery system)

3.1.5
remotely operated tool
ROT
dedicated tool that is normally deployed on lift wires or drill string

NOTE Lateral guidance can be by guide wires, dedicated thrusters or ROV assistance.

3.1.6
remotely operated vehicle
ROV
free-swimming submersible craft used to perform tasks such as valve operations, hydraulic functions and other general tasks

NOTE ROVs can also carry tooling packages for undertaking specific tasks such as pull-in and connection of flexible flowlines and umbilicals, and component replacement.

3.2 Abbreviated terms

CCO Component change-out

FAT Factory acceptance test

FMECA Failure mode effect and criticality analysis

HIPPS High integrity pipeline protection system

MQC Multi quick connect

MTBF Mean time between failures

ROV Remotely operated vehicle

ROT Remotely operated tool

SCM Satellite control module

TDU Tool deployment unit

4 Intervention philosophy and functional requirements

4.1 General

When designing interfaces for use on subsea production systems an intervention philosophy needs to be established. The intervention philosophy should address the activities to be carried out, the method of intervention for each task, the type of tool, the method of stabilization of the ROV by docking or positioning for the effective performance of its intervention tasks, and access requirements. The intervention philosophy should take into account the various intervention tasks, rationalizing them so that a consistent method is adopted, as a number of tasks may be performed consecutively.

Once the tasks to be carried out have been identified the ROV intervention method should be established.

Figures 1 to 34 show a variety of ROV systems and interfaces.

4.2 Intervention by ROV

ROVs are free-swimming submersible craft that can be used to perform tasks such as valve operations, hydraulic functions, and other general tasks. ROVs can also carry tooling packages in order to undertake specific tasks such as tie-in and connection functions for flowlines, umbilicals and rigid pipeline spools, and component replacement. ROVs are essentially configured for carrying out intervention tasks in five ways:

— with manipulators for direct operation of the interface;

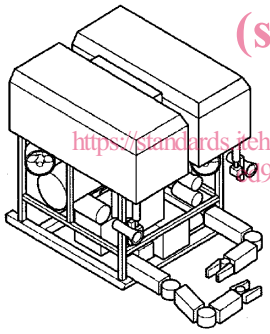
— with a manipulator-held tool;

— with TDUs;

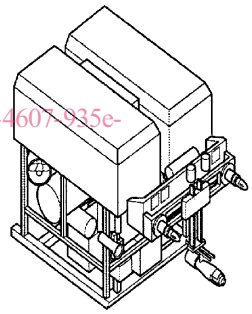
— dual down line method (with ROTs);

— with tool skids or frames.

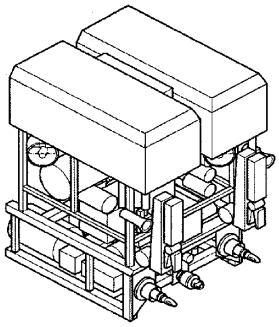
Interface tooling, so far as possible, should be designed to operate with a range of ROVs and not be limited in application to one design only, thus allowing the use of ROVs and intervention vessels of opportunity. Figure 1 shows typical ROVs.



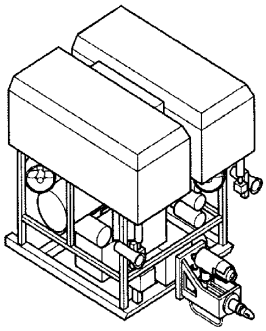
a) ROV with manipulators



b) Twin-point docking tool delivery system



c) Underslung tool skid



d) Single-point docking tool delivery system

Figure 1 — Typical work class ROV operationally configured

Figure 2 shows ROV and interfaces on a typical tree.

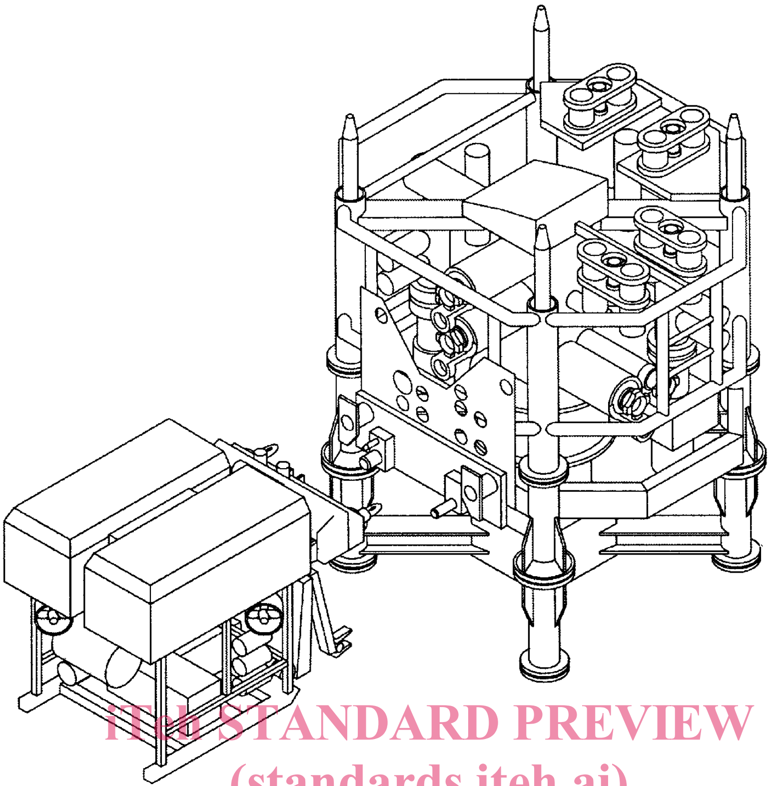


Figure 2 — Interfaces on typical tree

4.3 ROV intervention task configurations

4.3.1 ROV intervention with manipulators

A manipulator is a mechanical arm complete with joints allowing degrees of freedom (see Figure 1). The arm or arms are connected to the ROV vehicle frame. The more joints that the arm has, the more degrees of freedom and consequently the more versatile the arm.

At the end of the arm there is a gripper, usually consisting of two or three fingers that allow handles, objects and structural members to be grasped for the purpose of carrying out an activity or to stabilize the ROV.

Where a ROV is engaged in performing tasks, it can have two manipulator arms, one used for stabilising the ROV itself and the second for carrying out the function or task.

Manipulator systems operated by ROV vary considerably in their functionality and controllability. For tasks to be performed on a subsea production system using ROV manipulators or manipulator-held tooling, the following number of issues require special consideration:

— location of the interface such that it is within the manipulator capability in terms of reach, i.e. the working envelope (see Annex C for details of typical manipulator envelopes);

— pliancy between the tool body and the handle by which the manipulator holds the tool, to provide dexterity during insertion or pull-out of the tool, such that the manipulator's wrist angle does not have to move precisely in tandem with the insertion or pull movement of the rest of the arm (see Figure 19 for an example of design pliancy in the wire rope extension between a hot stab body and the manipulator handle);

— weight of any removable components such that they are within the manipulator capability in terms of the arm's lift and handling capacity;

— precision, accuracy and repeatability in determining the difficulty of the task;

— sufficient access and space to allow tools to be inserted into the interface and allowable clearance away from adjacent operations such as hot stabs, etc.;

— ability of the subsea equipment and component to resist the loads and torque reactions applied by the manipulator, tool and/or ROV;

— protection for equipment against impact from the ROV.

Consideration of environmental conditions, which may affect successful intervention and the completion of specific tasks identified above, will lead to the selection of one of the following stabilization methods:

— a flat horizontal platform area for the ROV to park, thrusting against the platform, adjacent to the interface, allowing vertical or horizontal access;

— a horizontal or vertical bar, to allow the ROV grabber (limited degree of freedom manipulator arm) to take hold (see Figure 6);

— ROV docking/receiver points (see Figures 7, 15, 16, 18 and 22);

— relatively flat, smooth surfaces for attaching suction cups.

Docking and interface points should be a minimum of 1,5 m (4,92 ft) above the clear local seabed level for unhindered operations.

ROV platforms should be avoided where they need to be removed, opened or closed in order that other intervention tasks can be performed.

The designer should take into account the various intervention tasks and rationalize these to adopt a consistent means of ROV docking on the subsea facility, as the ROV could be required to perform a number of tasks during the same dive.

In certain geographic locations, care needs to be taken in establishing the seabed level owing to soft mud and the effect of ROV thruster wash on the seabed.

See Figure 8 for specific details related to local tool loads.

4.3.2 ROV intervention with a tool deployment unit (TDU)

4.3.2.1 General

A TDU is a specifically designed work package that is attached to the front or rear of the ROV frame to accurately orient and position the tool by use of a Cartesian carriage arrangement (see Figure 3). The number of degrees of freedom are one, two or three axis, depending upon the complexity of the task and the position of the TDU's docking position relative to the tooling interface. The TDU can replace or be complementary to the manipulator arm or arms.

4.3.2.2 Twin-point docking system

The TDU is used in combination with two docking probes that latch onto and attach the Cartesian carriage and ROV to the subsea production equipment. The twin docked carriage system can access one or more intervention interfaces from the same docked position and is particularly suitable when grouping interface missions into panels. Figure 3 shows a typical twin-point TDU.