International Standard

ISO 23414

Oil and gas industries including lower carbon energy — Workover rigs for offshore fixed platforms

Industries du pétrole et du gaz, y compris les énergies à faible teneur en carbone — Appareils de reconditionnement pour plates-formes fixes en mer

First edition
2026-09

Reference number
ISO 23414:2026(en)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: 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.

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy*, Subcommittee SC 4, *Drilling, production and injection equipment*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document addresses the following aspects of workover rigs:

— design, including selection of equipment, calculation of key parameters, configuration of each system and system interfaces;

— fabrication, including rig construction, handling of workover equipment and onshore prefabrication of piping;

— commissioning, addressing commissioning preparation and requirements of each system;

— offshore installation, including loadout, transportation, hook up and offshore integrated commissioning;

— maintenance and inspection, defining maintenance requirements for each system and the requirements of different inspection types.

Annex A provides additional information and guidance on the clauses of this document and is intended to be read in conjunction with the main body of this document. The clause numbering in Annex A is the same as that in the normative text to facilitate cross-referencing.

Annex B provides a record of the piping pressure test.

Annex C provides a list of loadout and fixation design documents.

Annex D provides a commissioning outline for workover rigs and an integrated commissioning outline for workover rigs.

Annex E provides a typical in-service inspection plan for workover rigs.

Oil and gas industries including lower carbon energy — Workover rigs for offshore fixed platforms

1 Scope

This document gives requirements for the design, fabrication, installation, commissioning and integrity management of workover rigs on offshore fixed platforms.

This document is not applicable to workover equipment:

— installed on mobile or floating offshore units;

— intended for onshore use;

— coiled tubing unit or snubbing unit.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3320, *Fluid power systems and components — Cylinder bores and piston rod diameters and area ratios — Metric series*

ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 4414, *Pneumatic fluid power — General rules and safety requirements for systems and their components*

ISO 4395, *Fluid power systems and components — Cylinder piston rod end types and dimensions*

ISO 7240-14, *Fire detection and alarm systems — Part 14: Design, installation, commissioning and service of fire detection and fire alarm systems in and around buildings*

ISO 8501-1, *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings*

ISO 8503-1, *Preparation of steel substrates before application of paints and related products — Surface roughness characteristics of blast-cleaned steel substrates — Part 1: Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces*

ISO 8504, *Preparation of steel substrates before application of paints and related products — Surface preparation methods*

ISO 12944, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems*

ISO 13535, *Petroleum and natural gas industries — Drilling and production equipment — Hoisting equipment*

ISO 13626, *Petroleum and natural gas industries — Drilling and production equipment — Drilling and well-servicing structures*

ISO 13702, *Oil and gas industries — Control and mitigation of fires and explosions on offshore production installations — Requirements and guidelines*

ISO 13703, *Petroleum and natural gas industries — Design and installation of piping systems on offshore production platforms*

ISO 17635, *Non-destructive testing of welds — General rules for metallic materials*

ISO 18647, *Petroleum and natural gas industries — Modular drilling rigs for offshore fixed platforms*

ISO 19901-3, *Oil and gas industries including lower carbon energy — Specific requirements for offshore structures — Part 3: Topsides structure*

ISO 19902, *Petroleum and natural gas industries — Fixed steel offshore structures*

IEC 60034-11, *Rotating electrical machines — Part 11: Thermal protection*

IEC 60076-1, *Power transformers — Part 1: General*

IEC 60079-0, *Explosive atmospheres — Part 0: Equipment — General requirements*

IEC 60079-10-1, *Explosive atmospheres — Part 10-1: Classification of areas — Explosive gas atmospheres*

IEC 60079-14, *Explosive atmospheres — Part 14: Electrical installation design, selection and installation of equipment, including initial inspection*

IEC 60079-17, *Explosive atmospheres — Part 17: Electrical installations inspection and maintenance*

IEC 60085, *Electrical insulation — Thermal evaluation and designation*

IEC 60092-3, *Electrical installations in ships — Part 3: Cables (construction, testing and installations)*

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

IEC 61892-3, *Mobile and fixed offshore units — Electrical installations — Part 3: Equipment*

API Spec 4F, *Specification for Drilling and Well Servicing Structures*

API Spec 7K, *Drilling and Well Servicing Equipment*

API Spec 8C, *Drilling and Production Hoisting Equipment*

API Spec 16A, *Specification for Drill-through Equipment*

API Std 53, *Well Control Equipment Systems for Drilling Wells*

API Std 613, *Special-purpose Gears for Petroleum, Chemical, and Gas Industry Services*

API RP 4G, *Operation, Inspection, Maintenance, and Repair of Drilling and Well Servicing Structures*

API RP 9B, *Application, Care, and Use of Wire Rope for Oil Field Service*

API RP 500, *Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1, and Division 2*

API RP 505, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Zone 0, Zone 1, and Zone 2*

ASME B31.3, *Processing Piping*

AWS D1.1/D1.1M, *Structural Welding Code-Steel*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
number of effective travelling lines
number of effective lines
number of lines of drilling line strung over the sheaves of the travelling block that are load-bearing

Note 1 to entry: In a standard block-and-tackle system, this number is twice the number of sheaves on the travelling block.

Note 2 to entry: This number is used in conjunction with the dead line to calculate the total number of effective wire lines and the fast line pull.

3.2
workover depth
maximum depth achievable during workover operations using a workover rig and 88,9 mm (3,5 in) drill pipe, under the specified *number of effective travelling lines* (3.1) in the hoisting system

3.3
substructure clearance height
clearance height between the bottom surface of the drill floor and the upper deck of the topsides

3.4
maximum hook load
maximum load that the workover rig can lift using the hoisting system under the maximum number of lines

Note 1 to entry: The maximum load is determined by material strength and the specified safety factor.

Note 2 to entry: This load includes both static and dynamic forces.

3.5
piping and instrument diagram
schematic drawing that defines all mechanical and instrumentation components of a process flow, including but not limited to piping, valves, equipment, instruments, and their interrelationships

4 Abbreviated terms

AC	alternating current
BOP	blowout preventer
CCTV	closed circuit television
DC	direct current
HRC	Rockwell hardness test rating
MCC	motor control centre
NDT	non-destructive test
OEM	original equipment manufacturer
PA/GA	public address system/gas alarm system
PLC	programmable logic controller

PMS	planned maintenance system
UPS	uninterruptible power supply
VFD	variable-frequency drive
WOR	workover rig
WPQR	welding procedure qualification record
WPS	welding procedure specification

5 Overall considerations and rating selection

5.1 General

5.1.1 Workover rigs (WOR) can be classified according to the driving mode as follows:

— mechanical drive: the drawworks and rotary table are driven by diesel engines;

— electric drive: the drawworks and rotary table are driven by electric motors, which are divided into direct current (DC) driven and alternating current (AC) driven;

— hydraulic drive: the drawworks and rotary table are driven by hydraulic motors;

— composite drive: the drawworks and rotary table adopt a combination of mechanical drive, electric drive, and hydraulic drive.

5.1.2 The WOR should be able to perform workover operations safely, economically and reliably and should be according to ISO 12100, ISO 13849, IEC 60812 and IEC 61882.

5.1.3 The WOR should employ a modular design and construction to facilitate installation, connection and commissioning on the platform.

5.1.4 The WOR shall be verified to withstand the same operational, extreme and abnormal metocean and seismic design situations applicable to the fixed offshore steel platform on which the WOR will be operating.

5.1.5 The WOR should be equipped with advanced automated control systems and automated wellhead tools, such as automated elevators and automated slips, to reduce manual operations and enhance safety.

5.1.6 During WOR braking or drilling operations, an energy recovery system should be implemented to convert excess energy into electrical energy for storage or reuse, thereby reducing energy waste. The design and installation of the energy recovery system shall follow the OEM technical requirements.

5.1.7 Under the premise of ensuring the structural strength of the WOR, lightweight materials and designs should be adopted to reduce the equipment's self-weight and to achieve lower energy consumption.

5.2 Indicative parameters

The indicative parameters for WOR are shown in Table 1.

Table 1 — Indicative parameters for WOR

WOR rating			90	110[b]	135	160[b]	180	225
Workover depth m			2 500	3 500	4 500	5 500	6 500	7 500
Maximum hook load kN			900	1 100	1 350	1 600	1 800	2 250
Rating hook load [a] kN			600	800	1 000	1 200	1 500	1 800
Rated power of drawworks kW			260 to 330	280 to 400	330 to 450	400 to 500	450 to 600	550 to 746
Rated power of mud pumps kW(hp)			≥ 261 (≥ 350)	≥ 373 (≥ 500)	≥ 373 (≥ 500)	≥ 597 (≥ 800)	≥ 597 (≥ 800)	≥ 746 (≥ 1 000)
Height of the mast m			≥ 29		≥ 31		≥ 33	
Opening diameter of rotary table mm (in)			444,5 (17 1/2)		520,7 (20 1/2)		698,5 (27 1/2) to 952,5 (37 1/2)	
Substructure clearance height m			≥ 7,5					
Travelling system	Number of effective travelling lines		6 to 8		8 to 10		10	
	Drilling line diameter mm		26 to 29		29 to 32		32	
	Hoisting speed of the hook with no load m/s		≥1					
Wind bearing capacity	Each well position not in working condition and the mast is erected m/s (knot)	With full rated setback	36 (70)					
		With out setback	47,8 (93)					

[a] The data in this column (3 s gust wind speed at 10 m above sea level) should be determined from the metocean conditions of the offshore site where the work over rig is located, and is the minimum recommended value.

[b] Not suitable for use.

5.3 Configuration

The WOR shall include a power system, hoisting system, rotary system, circulation system, well control system, hydraulic system, electrical system, pneumatic system, instrumentation and communication system, safety system, skidding system. Other systems and facilities may exist as needed.

5.4 Hook load selection

5.4.1 The required hook load is the key parameter for WOR selection. The maximum value that can be encountered in various conditions during workover operations shall be considered when calculating the required hook load.

5.4.2 The maximum hook load of the selected WOR shall not be less than the hook load required for workover operations. Based on the hook load required for workover operations, select a WOR in accordance with Table 1, ensuring that the chosen rig's maximum hook load exceeds the required hook load.

NOTE A.5.4 gives recommended practice for calculating the hook load required for workover operations.

6 Design

6.1 General

6.1.1 The design of the WOR shall conform with the metocean design situation required for its operating site, with reference to ISO 19901-3.

6.1.2 The WOR shall be designed to be anti-corrosive, moisture-resistant and salt-mist-resistant.

6.1.3 The WOR shall be capable of moving horizontally in any direction within the wellhead area of the platform.

6.1.4 The center of the rotary table shall be able to align with any well slot.

6.1.5 The span of the skid rails shall be determined accounting for the platform configuration and well slot layout.

6.1.6 The location of the driller's cabin shall enable the driller to observe the monkey board, the derrick or mast gate and the rotary table area.

6.1.7 The driller's cabin shall include functions for controlling the drawworks, mud pump, rotary table and other equipment.

6.1.8 Dropped object and automated equipment hazardous events shall be identified.

6.1.9 The causes and consequences of such events shall be identified using methodologies such as FMECA (failure mode effects and criticality analysis) and HAZOP (hazard and operability).

6.1.10 Both the causes and the consequences shall be mitigated particularly with respect to life-safety.

6.2 Hoisting system

6.2.1 Derrick or mast

6.2.1.1 The derrick or mast design shall be in accordance with ISO 13626 and API Spec 4F.

6.2.1.2 The design parameters of the derrick or mast shall be in accordance with API Spec 4F.

6.2.1.3 The structural configuration of the derrick or mast should be telescopic or multi-section self-lifting.

6.2.1.4 Hydraulic or rack and pinion hoisting rigs may be used.

6.2.1.5 The basic parameters of the derrick or mast shall be in accordance with Table 1.

6.2.2 Substructure

6.2.2.1 The substructure is divided into an upper substructure (or drill floor) and a lower substructure. The substructure design shall be in accordance with ISO 13626.

6.2.2.2 The clearance height of the WOR substructure should accommodate the installation and operation of the wellhead and BOP stack.

6.2.2.3 The substructure shall be provided with a BOP hanging beam and sliding, positioning and locking devices.

6.2.2.4 The BOP hanging beam shall avoid the rat hole.

6.2.3 Drawworks

6.2.3.1 The design of the drawworks shall be in accordance with API Spec 7K.

6.2.3.2 The disc brake pads of the drawworks should undergo a running-in test to ensure even contact with the brake disc.

6.2.3.3 The contact area of the brake pads should be in accordance with the original equipment manufacturer's (OEM) technical requirements.

6.2.3.4 The hardness and dimensional characteristics of the gear teeth shall conform with API Std 613.

6.3 Rotary system

6.3.1 Rotary table

6.3.1.1 The rotary table shall be equipped with a brake.

6.3.1.2 The basic parameters of the rotary table shall be in accordance with API Spec 7K.

6.3.2 Swivel

The swivel shall be in accordance with API Spec 8C.

6.4 Circulation system

6.4.1 Mud pump

6.4.1.1 The mud pump shall have sufficient power to maintain wellbore cleaning by mud circulation during workover operations.

NOTE A.6.4 gives the recommended method of choosing mud pump power.

6.4.1.2 When the mud pump is operating at rated power and rated pressure, the noise level at a distance of 1 m from the pump shall not exceed 95 dB (A).

6.4.2 Charging pump

The charging pump shall be compatible with the mud pump.

6.4.3 Mud tanks volume

6.4.3.1 The effective volume of the WOR mud tanks shall not be less than the sum of the production well's wellbore volume and the circulation volume.

6.4.3.2 The circulation volume should be no less than 30 m^3.

6.4.3.3 The WOR should be equipped with no fewer than three mud tanks.