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Petroleum and natural gas industries — Drilling and production equipment — Drilling and well-servicing structures

*Industries du pétrole et du gaz naturel — Équipement de forage et de
production — Structures de forage et d'entretien des puits*

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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 13626 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*.

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Introduction

This International Standard is based on API Spec 4F, second edition, June 1995.

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Petroleum and natural gas industries — Drilling and production equipment — Drilling and well-servicing structures

1 Scope

This International Standard specifies requirements and gives recommendations for suitable steel structures for drilling and well-servicing operations in the petroleum industry, provides a uniform method of rating the structures, and provides two product specification levels.

This International Standard is applicable to all new designs of all standard steel derricks, special steel derricks, portable masts and substructures.

Annex A provides a number of standard supplementary requirements which apply only if specified by the purchaser.

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 9712, *Non-destructive testing — Qualification and certification of personnel*
- ISO 13535, *Petroleum and natural gas industries — Drilling and production equipment — Hoisting equipment*
- ISO 10425, *Steel wire ropes for the petroleum and natural gas industries — Minimum requirements and terms of acceptance*
- AISC¹⁾ 335, 1989, *Specification for structural steel buildings, allowable stress design and plastic design*
- API²⁾ RP 2A-WSD, *Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms — Working Stress Design*
- API Spec 8A, *Specification for Drilling and Production Hoisting Equipment*
- API RP 9B, *Recommended Practice on Application, Care and Use of Wire Rope for Oilfield Service*
- ASTM³⁾ A 370, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*
- ASTM A 578/A 578M, *Standard Specification for Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications*
- AWS⁴⁾ D1.1/D1.1M:2002, *Structural Welding Code — Steel*

1) American Institute of Steel Construction, 1 East Wacker Drive, Suite 3100, Chicago, Illinois 60601.

2) American Petroleum Institute, 1220 L Street, Northwest, Washington, DC 20005-4070.

3) American Society for Testing and Materials, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania 19428-2959.

4) American Welding Society, Incorporated, 550 Northwest LeJeune Road, Box 351040, Miami, Florida 33135.

3 Terms and definitions

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

3.1

angle of roll
angle of pitch

angle of movement to one side from vertical

3.2

critical component

component which is necessary to maintain stability of a structure and which resides within the primary load paths of the structure when the structure is loaded under the design loadings of Clause 7

3.3

critical weld

weld which joins critical components

3.4

crown block assembly

stationary sheave or block assembly installed at the top of a derrick or mast

3.5

date of manufacture

date chosen by the manufacturer, occurring between the initiation of manufacture and the delivery to the purchaser

3.6

derrick

semipermanent structure, of square or rectangular cross-section, having members that are latticed or trussed on all four sides

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NOTE 1 This unit is assembled in the vertical or operation position, as it includes no erection mechanism.

NOTE 2 It may or may not be guyed.

3.7

design load

force or combination of forces which a structure is designed to withstand without exceeding the allowable stress in any member

3.8

dynamic loading

loading imposed upon a structure as a result of motion

3.9

erection load

load produced in the mast and its supporting structure during its raising and lowering, or in the substructure during its raising and lowering

3.10

guide track and dollies

equipment used to hold the travelling equipment in correct position relative to the derrick during various operations

NOTE A retractable dolly is used move the travelling equipment horizontally between the drilling position and the retracted position.

3.11**guy line**

wire rope with one end attached to the mast assembly and the other end attached to a suitable anchor to provide structural and/or lateral support for a mast under design loading conditions

3.12**guying pattern**

plan view showing the manufacturer's recommended locations for guy lines and their distance out to the anchors with respect to the centreline of the well

3.13**height of derrick and mast without guy lines**

minimum vertical distance from the top of the working floor to the bottom of the crown block support beams

3.14**height of mast with guy line**

minimum vertical distance from the ground to the bottom of the crown block support beams

3.15**impact loading**

loading resulting from near-instantaneous changes of forces

3.16**mast**

structural tower composed of one or more sections assembled in a horizontal position near the ground and then raised to the operating position

NOTE

If the unit contains two or more sections, it may be telescoped or unfolded during the erection procedure.

3.17**mast set-up distance**

distance from the centreline of the well to a designated point on the mast structure defined by a manufacturer to assist in the set-up of the rig

3.18**maximum rated static hook load**

load composed of the weight of the travelling equipment and a static load applied to the travelling equipment

NOTE

It is the largest load that can be applied to the structure within the guidelines imposed by this International Standard with a specified number of lines strung to the travelling block and in the absence of pipe setback, sucker rod or wind loading. A designated location of the deadline anchor and drawworks is assumed.

3.19**maximum rated wind velocity**

largest wind velocity the derrick or mast assembly is designed to resist for a specified design loading

NOTE

Maximum rated wind velocity is specified at 10 m above the ground or water surface.

3.20**nominal wire rope assembly strength**

nominal strength of the wire rope, multiplied by the efficiency of the end attachment in accordance with API RP 9B

3.21**period**

τ

(of roll, pitch or heave) time required for a complete cycle

3.22

pipe lean

angle between the vertical and a typical stand of pipe in the setback

3.23

product specification level

level of material and process controls placed upon the primary load-carrying components of the covered equipment

3.24

racking platform

platform located at a distance above the working floor for laterally supporting the upper end of racked pipe

3.25

rated static rotary load

maximum weight which can be supported by the rotary-table support beams

3.26

rated setback load

maximum weight of tubular goods which can be supported by the substructure in the setback area

3.27

rod board

rod hanger

platform located at a distance above the working floor for supporting rods

3.28

substructure

any structure through which hook load, rotary load and/or setback load are transmitted

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4 Product specification levels

This International Standard establishes requirements for two product specification levels (PSL) for drilling and well-servicing structures which define two levels of technical and quality requirements. These requirements reflect practices currently being implemented by a broad spectrum of the manufacturing industry. PSL 1 includes all the requirements of this International Standard unless specifically identified as PSL 2. PSL 2 includes all the requirements of PSL 1 plus additional requirements.

5 Marking and information

5.1 Nameplate

Drilling and well-servicing structures manufactured in accordance with this International Standard shall be identified by a nameplate bearing at least the information specified in 5.2 to 5.4, including the units of measurement where applicable. Markings shall be either raised or stamped. The nameplate shall be securely affixed to the structure in a conspicuous place.

5.2 Derrick and mast nameplate information

The following information shall be provided:

- a) manufacturer's name;
- b) manufacturer's address;
- c) date of manufacture, including month and year;

- d) serial number;
- e) height;
- f) maximum rated static hook load with guy lines, if applicable, for stated number of lines to travelling block;
- g) maximum rated wind velocity with guy lines, if applicable, with rated capacity of pipe racked;
- h) specification and edition of the specification under which the structure was designed and manufactured;

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- i) manufacturer's guying diagram, if applicable;
- j) the following text:

CAUTION — Acceleration, impact, setback and wind loads reduce the maximum rated static hook load capacity.

- k) manufacturer's load distribution diagram (may be placed in mast instructions);
- l) graph plotting maximum allowable static hook load versus wind velocity as defined in 6.2 f) and 6.4 e);
- m) mast set-up distance for mast with guy lines;
- n) PSL 2, if applicable;
- o) supplementary information as specified in the particular supplementary requirement (SR), if applicable (see Annex A).

5.3 Substructure nameplate information

The following information shall be provided:

- a) manufacturer's name;
- b) manufacturer's address;
- c) date of manufacture, including month and year;
- d) serial number;
- e) maximum rated static rotary capacity;
- f) maximum rated pipe setback capacity;
- g) maximum combined rated static rotary and rated setback capacity;
- h) specification and edition of the specification under which the structure was designed and manufactured;

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- i) PSL 2, if applicable;
- j) supplementary information as specified in the particular supplementary requirement (SR), if applicable (see Annex A).

5.4 Crown block assembly nameplate information (required only for crown block assemblies for use with derricks)

The following information shall be provided:

- a) manufacturer's name;
- b) manufacturer's address;
- c) date of manufacture, including month and year;
- d) serial number;
- e) maximum rated static hook load;
- f) specification and edition of the specification under which the structure was designed and manufactured;

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- g) PSL 2, if applicable;
- h) supplementary information as specified in the particular supplementary requirement (SR), if applicable (see Annex A).

6 Standard ratings

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6.1 General

Each structure shall be rated for the following applicable loading conditions. The structures shall be designed to meet or exceed these conditions in accordance with applicable specifications set herein. The following ratings do not include any allowance for impact. Acceleration, impact, setback and wind loads reduce the rated static hook load capacity.

6.2 Derrick (stationary base)

The following loading conditions are applicable to the derrick (stationary base):

- a) maximum rated static hook load for a specified number of lines strung to the travelling block;
- b) maximum rated wind velocity, in metres per second, without full pipe setback;
- c) maximum rated wind velocity, in metres per second, with full pipe setback;
- d) maximum number of stands and size of pipe in full setback;
- e) maximum rated gin pole capacity;
- f) rated static hook load for wind velocities varying from zero to maximum rated wind velocity, with full rated setback and with maximum number of lines to the travelling block.

6.3 Mast with guy lines

The following loading conditions are applicable to the mast with guy lines:

- a) maximum rated static hook load capacity for a specified number of lines strung to the travelling block and manufacturer's specified guying pattern;