Recommended Practice for Drill Stem Design and Operating Limits

API RECOMMENDED PRACTICE 7G
SIXTEENTH EDITION, AUGUST 1998

EFFECTIVE DATE: DECEMBER 1, 1998

ERRATA: MAY 2000
ADDENDUM 1: NOVEMBER 2003
ADDENDUM 2: SEPTEMBER 2009

Recommended Practice for Drill Stem Design and Operating Limits

Upstream Segment

API RECOMMENDED PRACTICE 7G
SIXTEENTH EDITION, AUGUST 1998

EFFECTIVE DATE: DECEMBER 1, 1998

ERRATA: MAY 2000

ADDENDUM 1: NOVEMBER 2003
ADDENDUM 2: SEPTEMBER 2009

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Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years.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 Exploration and Production Department [telephone (202) 682-8000]. A catalog of API publications and materials is published annually and updated quarterly by API, 1220 L Street, N.W., Washington, D.C. 20005.

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 Exploration and Production 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 also be addressed to the director.

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.

FOREWORD

This recommended practice is under the jurisdiction of the API Subcommittee on Standardization of Drilling and Servicing Equipment.

The purpose of this recommended practice is to standardize techniques for the procedure of drill stem design and to define the operating limits of the drill stem.

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.

Changes from the previous edition are denoted with bars in the margins. The bars indicate new content or major editorial changes. Changes to section numbers due to reformatting or minor editorial changes are not denoted with bars.

98

Suggested revisions are invited and should be submitted to the director of the Exploration and Production Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

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

CONTENTS

Page

Figures

Page

Tables

Page

Recommended Practice for Drill Stem Design and Operating Limits

1 Scope

1.1 COVERAGE

This recommended practice involves not only the selection of drill string members, but also the consideration of hole angle control, drilling fluids, weight and rotary speed, and other operational procedures.

1.2 SECTION COVERAGE

Sections 4, 5, 6, and 7 provide procedures for use in the selection of drill string members. Sections 8, 9, 10, 11, 12, and 15 are related to operating limitations which may reduce the normal capability of the drill string. Section 13 contains a classification system for used drill pipe and used tubing work strings, and identification and inspection procedures for other drill string members. Section 14 contains statements regarding welding on down hole tools. Section 16 contains a classification system for rock bits.

2 References

(See also Appendix B.)

API

RP 5C1	*Care and Use of Casing and Tubing*
Bull 5C3	*Bulletin on Formulas and Calculations for Casing, Tubing, Drill Pipe, and Line Pipe Properties*
Spec 7	*Specification for Rotary Drill Stem Elements*
RP 7A1	*Recommended Practice for Testing of Thread Compounds for Rotary Shouldered Connections*
RP 13B-1	*Recommended Practice Standard Procedure for Field Testing Water-Based Drilling Fluids*
RP 13B-2	*Recommended Practice Standard Procedure for Field Testing Oil-Based Drilling Fluids*

ASTM[1]

D3370	*Standard Practices for Sampling Water*

NACE[2]

MR-01-75	*Sulfide Stress Cracking Resistant Metallic Material for Oil Field Equipment*

[1]American Society for Testing Materials, 100 Barr Harbor Drive, West Conshocken, Pennsylvania 19428.
[2]NACE International, P.O. Box 218340, Houston, Texas 77218-8340.

3 Definitions

3.1 bending strength ratio: The ratio of the section modulus of a rotary shouldered box at the point in the box where the pin ends when made up divided by the section modulus of the rotary shouldered pin at the last engaged thread.

3.2 bevel diameter: The outer diameter of the contact face of the rotary shouldered connection.

3.3 bit sub: A sub, usually with 2 box connections, that is used to connect the bit to the drill string.

3.4 box connection: A threaded connection on Oil Country Tubular Goods (OCTG) that has internal (female) threads.

3.5 calibration system: A documented system of gauge calibration and control.

3.6 Class 2: An API service classification for used drill pipe and tubing work strings.

3.7 cold working: Plastic deformation of metal at a temperature low enough to insure or cause permanent strain.

3.8 corrosion: The alteration and degradation of material by its environment.

3.9 critical rotary speed: A rotary speed at which harmonic vibrations occur. These vibrations may cause fatigue failures, excessive wear, or bending.

3.10 decarburization: The loss of carbon from the surface of a ferrous alloy as a result of heating in a medium that reacts with the carbon at the surface.

3.11 dedendum: The distance between the pitch line and root of thread.

3.12 dogleg: A term applied to a sharp change of direction in a wellbore or ditch. Applied also to the permanent bending of wire rope or pipe.

3.13 dogleg severity: A measure of the amount of change in the inclination and/or direction of a borehole, usually expressed in degrees per 100 feet of course length.

3.14 drift: A drift is a gauge used to check minimum ID of loops, flowlines, nipples, tubing, casing, drill pipe, and drill collars.

3.15 drill collar: Thick-walled pipe or tube designed to provide stiffness and concentration of weight at the bit.

3.16 drill pipe: A length of tube, usually steel, to which special threaded connections called tool joints are attached.