

# 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





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## Upstream Segment

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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.

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## CONTENTS

	Page
1 SCOPE .....	1
1.1 Coverage .....	1
1.2 Section Coverage .....	1
2 REFERENCES .....	1
3 DEFINITIONS .....	1
4 PROPERTIES OF DRILL PIPE AND TOOL JOINTS .....	3
5 PROPERTIES OF DRILL COLLARS .....	33
6 PROPERTIES OF KELLYS .....	33
7 DESIGN CALCULATIONS .....	46
7.1 Design Parameters .....	46
7.2 Special Design Parameters .....	46
7.3 Supplemental Drill Stem Members .....	46
7.4 Tension Loading .....	46
7.5 Collapse Due to External Fluid Pressure .....	50
7.6 Internal Pressure .....	51
7.7 Torsional Strength .....	51
7.8 Example Calculation of a Typical Drill String Design—Based on Margin of Overpull .....	51
7.9 Drill Pipe Bending Resulting From Tonging Operations .....	52
8 LIMITATIONS RELATED TO HOLE DEVIATION .....	53
8.1 Fatigue Damage .....	53
8.2 Remedial Action to Reduce Fatigue .....	54
8.3 Estimation of Cumulative Fatigue Damage .....	58
8.4 Identification of Fatigued Joints .....	58
8.5 Wear of Tool Joints and Drill Pipe .....	58
8.6 Heat Checking of Tool Joints .....	59
9 LIMITATIONS RELATED TO FLOATING VESSELS .....	59
10 DRILL STEM CORROSION AND SULFIDE STRESS CRACKING .....	61
10.1 Corrosion .....	61
10.2 Sulfide Stress Cracking .....	64
10.3 Drilling Fluids Containing Oil .....	65
11 COMPRESSIVE SERVICE LIMITS FOR DRILL PIPE .....	67
11.1 Compressive Service Applications .....	67
11.2 Drill Pipe Buckling in Straight, Inclined Well Bores .....	67
11.3 Critical Buckling Force for Curved Boreholes .....	78
11.4 Bending Stresses on Compressively Loaded Drill Pipe in Curved Boreholes .....	79
11.5 Fatigue Limits for API Drill Pipe .....	96
11.6 Estimating Cumulative Fatigue Damage .....	98
11.7 Bending Stresses on Buckled Drill Pipe .....	101
12 SPECIAL SERVICE PROBLEMS .....	101
12.1 Severe Downhole Vibration .....	101
12.2 Transition from Drill Pipe to Drill Collars .....	108

	Page	
12.3	Pulling on Stuck Pipe . . . . .	108   09
12.4	Jarring . . . . .	109
12.5	Torque in Washover Operations . . . . .	109
12.6	Allowable Hookload and Torque Combinations . . . . .	109
12.7	Biaxial Loading of Drill Pipe . . . . .	110
12.8	Formulas and Physical Constants . . . . .	110
12.9	Transition from Elastic to Plastic Collapse . . . . .	110
12.10	Effect of Tensile Load on Collapse Resistance . . . . .	110
12.11	Example Calculation of Biaxial Loading . . . . .	110
13	IDENTIFICATION, INSPECTION AND CLASSIFICATION OF DRILL STEM COMPONENTS . . . . .	112
13.1	Drill String Marking and Identification . . . . .	112
13.2	Inspection Standards—Drill Pipe and Tubing Work Strings . . . . .	112
13.3	Tool Joints . . . . .	122
13.4	Drill Collar Inspection Procedure . . . . .	124   09
13.5	Drill Collar Handling Systems . . . . .	124
13.6	Kellys . . . . .	125
13.7	Recut Connections . . . . .	126
13.8	Pin Stress Relief Grooves for Rental Tools and Other Short Term Usage Tools . . . . .	126
14	SPECIAL PROCESSES . . . . .	127
14.1	Drill Stem Special Processes . . . . .	127   03
14.2	Connection Break-In . . . . .	127
15	DYNAMIC LOADING OF DRILL PIPE . . . . .	127
16	CLASSIFICATION SIZE AND MAKE-UP TORQUE FOR ROCK BITS . . . . .	128
APPENDIX A	STRENGTH AND DESIGN FORMULAS . . . . .	133   03
APPENDIX B	ARTICLES AND TECHNICAL PAPERS . . . . .	151

Figures

1–25	Torsional Strength and Recommended Make-up Torque Curves . . . . .	20–32
26	Drill Collar Bending Strength Ratios, 1½ and 1¾ Inch ID . . . . .	39
27	Drill Collar Bending Strength Ratios, 2 and 2¼ Inch ID . . . . .	40
28	Drill Collar Bending Strength Ratios, 2½ Inch ID . . . . .	41
29	Drill Collar Bending Strength Ratios, 2 <sup>13</sup> / <sub>16</sub> Inch ID . . . . .	42
30	Drill Collar Bending Strength Ratios, 3 Inch ID . . . . .	44
31	Drill Collar Bending Strength Ratios, 3¼ Inch ID . . . . .	45
32	Drill Collar Bending Strength Ratios, 3½ Inch ID . . . . .	46
33	New Kelly-New Drive Assembly . . . . .	48
34	New Kelly-New Drive Assembly . . . . .	48
35	Maximum Height of Tool Joint Above Slips to Prevent Bending During TONGING . . . . .	53
36	Dogleg Severity Limits for Fatigue of Grade E75 Drill Pipe . . . . .	55
37	Dogleg Severity Limits for Fatigue of S-135 Drill Pipe . . . . .	56
38	Lateral Force on Tool Joint . . . . .	57
39	Fatigue Damage in Gradual Doglegs (Noncorrosive Environment) . . . . .	58
40	Fatigue Damage in Gradual Doglegs (In Extremely Corrosive Environment) . . . . .	58



41	Lateral Forces on Tool Joints and Range 2 Drill Pipe 3½ Inch, 13.3 Pounds per Foot, Range 2 Drill Pipe, 4¾ Inch Tool Joints . . . . .	60
42	Lateral Forces on Tool Joints and Range 2 Drill Pipe 4½ Inch, 16.6 Pounds per Foot, Range 2 Drill Pipe, 6¼ Inch Tool Joints . . . . .	60
43	Lateral Forces on Tool Joints and Range 2 Drill Pipe 5 Inch, 19.5 Pounds per Foot, Range 2 Drill Pipe, 6⅜ Inch Tool Joints . . . . .	62
44	Lateral Forces on Tool Joints and Range 3 Drill Pipe 5 Inch, 19.5 Pounds per Foot, Range 3 Drill Pipe, 6⅜ Inch Tool Joints . . . . .	62
45	Delayed-Failure Characteristics of Unnotched Specimens of an SAE 4340 Steel During Cathodic Charging with Hydrogen Under Standardized Conditions . . . .	66
46–66	Approximate Axial Compressive Loads at which Sinusoidal Buckling is Expected to Occur . . . . .	68–78
67a–74a	Bending Stress and Fatigue Limits . . . . .	80–94
67b–74b	Lateral Contact Forces and Length . . . . .	81–95
75	Hole Curvature Adjustment Factor To Allow for Differences in Tooljoint OD's	97
76	Median Failure Limits for API Drillpipe Noncorrosive Service . . . . .	99
77	Minimum Failure Limits for API Drillpipe Noncorrosive Service . . . . .	100
78a	Bending Stress for High Curvatures . . . . .	102
78b	Lateral Contact Forces and Length . . . . .	103
79a	Bending Stress for High Curvatures . . . . .	104
79b	Lateral Contact Forces and Length . . . . .	105
80a	Bending Stress for High Curvatures . . . . .	106
80b	Lateral Contact Forces and Length . . . . .	107
81	Ellipse of Biaxial Yield Stress or Maximum Shear-Strain Energy Diagram After Holmquist and Nadai, Collapse of Deep Well Casing, API Drilling and Production Practice (1939) . . . . .	111
82	Marking on Tool Joints for Identification of Drill String Components . . . . .	113
83	Recommended Practice for Mill Slot and Groove Method of Drill String Identification . . . . .	114
84	Identification of Lengths Covered by Inspection Standards . . . . .	116
85	Drill Pipe and Tool Joint Color Code Identification . . . . .	122
86	Tong Space and Bench Mark Position . . . . .	123
87	Drill Collar Elevator . . . . .	124
88	Drill Collar Grooves for Elevators and Slips . . . . .	125
89	Drill Collar Wear . . . . .	125
90	Modified Pin Stress-Relief Groove . . . . .	126
A-1	Eccentric Hollow Section of Drill Pipe . . . . .	133
A-2	Rotary Shouldered Connection . . . . .	135
A-3a	Make-up Torque Then Tension . . . . .	137
A-3b	Tension Then Torque . . . . .	137
A-3c	Make-up Torque Then Tension . . . . .	139
A-3d	Tension Then Torque . . . . .	139
A-4	Rotary Shouldered Connection Location of Dimensions for Bending Strength Ratio Calculations . . . . .	141
A-5	Buckling Force vs Hole Curvature . . . . .	143
A-6	Buckling Force vs Hole Curvature . . . . .	144
A-7	Buckling Force vs Hole Curvature . . . . .	145

## Tables

1	New Drill Pipe Dimensional Data . . . . .	4
2	New Drill Pipe Torsional and Tensile Data . . . . .	5
3	New Drill Pipe Collapse and Internal Pressure Data . . . . .	6

	Page	
4	Used Drill Pipe Torsional and Tensile Data API Premium Class . . . . .	7
5	Used Drill Pipe Collapse and Internal Pressure Data API Premium Class . . . . .	8
6	Used Drill Pipe Torsional and Tensile Data API Class 2 . . . . .	9
7	Used Drill Pipe Collapse and Internal Pressure Data API Class 2 . . . . .	10
8	Mechanical Properties of New Tool Joints and New Grade E75 Drill Pipe . . . . .	11
9	Mechanical Properties of New Tool Joints and New High Strength Drill Pipe . .	13
10	Recommended Minimum OD and Make-up Torque of Weld-on Type Tool Joints Based on Torsional Strength of Box and Drill Pipe. . . . .	15
11	Buoyancy Factors . . . . .	18
12	Rotary Shouldered Connection Interchange List . . . . .	19
13	Drill Collar Weight (Steel) (pounds per foot). . . . .	34
14	Recommended Make-up Torque <sup>1</sup> for Rotary Shouldered Drill Collar Connections . . . . .	35
15	Strength of Kellys . . . . .	47
16	Contact Angle Between Kelly and Bushing for Development of Maximum Width Wear Pattern . . . . .	48
17	Strength of Remachined Kellys . . . . .	49
18	Section Modulus Values . . . . .	53
19	Effect of Drilling Fluid Type on Coefficient of Friction . . . . .	67
20	Hole Curvatures that Prevent Buckling . . . . .	79
21	Youngstown Steel Test Results . . . . .	96
22	Fatigue Endurance Limits Compressively Loaded Drill Pipe . . . . .	98
23	Values Used in Preparing Figure 77 . . . . .	98
24	Classification of Used Drill Pipe . . . . .	115
25	Classification of Used Tubing Work Strings . . . . .	117
26	Hook-Load at Minimum Yield Strength for New, Premium Class (Used), and Class 2 (Used) Drill Pipe. . . . .	118
27	Hook-Load at Minimum Yield Strength for New, Premium Class (Used), and Class 2 (Used) Tubing Work Strings . . . . .	120
28	Drill Collar Groove and Elevator Bore Dimensions . . . . .	125
29	Maximum Stress at Root of Last Engaged Thread for the Pin of an NC50 Axisymmetric Model . . . . .	126
30	IADC Roller Bit Classification Chart . . . . .	129
31	IADC Bit Classification Codes Fourth Position. . . . .	130
32	Recommended Make-up Torque Ranges for Roller Cone Drill Bits. . . . .	130
33	Recommended Minimum Make-up Torques for Diamond Drill Bits . . . . .	131
34	Common Roller Bit Sizes . . . . .	131
35	Common Fixed Cutter Bit Sizes . . . . .	131
A-1	Rotary Shouldered Connection Thread Element Information . . . . .	148

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# 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

- 98 | 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*  
98 | 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<sup>1</sup>

- D3370 *Standard Practices for Sampling Water*

### NACE<sup>2</sup>

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

<sup>1</sup>American Society for Testing Materials, 100 Barr Harbor Drive, West Conshocken, Pennsylvania 19428.

<sup>2</sup>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. 98

**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. 98

**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. 98

**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. 98

**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.