

Drill Stem Valves

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Introduction

This standard has been developed by users/purchasers and suppliers/manufacturers of drill string valve equipment intended for use in the petroleum and natural gas industry worldwide. It is intended to give requirements and information to both parties in the selection, manufacture, testing, and use of these valves. The standard addresses requirements that set the minimum parameters with which the supplier/manufacturer will need to comply to claim conformity to this standard.

Users of this standard should be aware that further or differing requirements might be needed for individual applications. This standard is not intended to inhibit a supplier/manufacturer from offering, or the user/purchaser from accepting, alternative equipment or engineering solutions. This may be particularly applicable where there is innovative or developing technology.

See [Figure 1](#) for a general example of a drill stem assembly.

Drill Stem Valves

1 Scope

This standard specifies the minimum design requirements for the following drill stem valves: drill pipe float valves, kelly valves, and inside blow out preventers (See [Figure 1](#)).

Qualification of items are intended to be independent for any of the components listed above. This standard does not cover maintenance and inspection once the valve has left the manufacturer and is in operation.

Kelly valve requirements, which were formerly covered in API Specification 7-1, are now superseded by the content in this document once published.

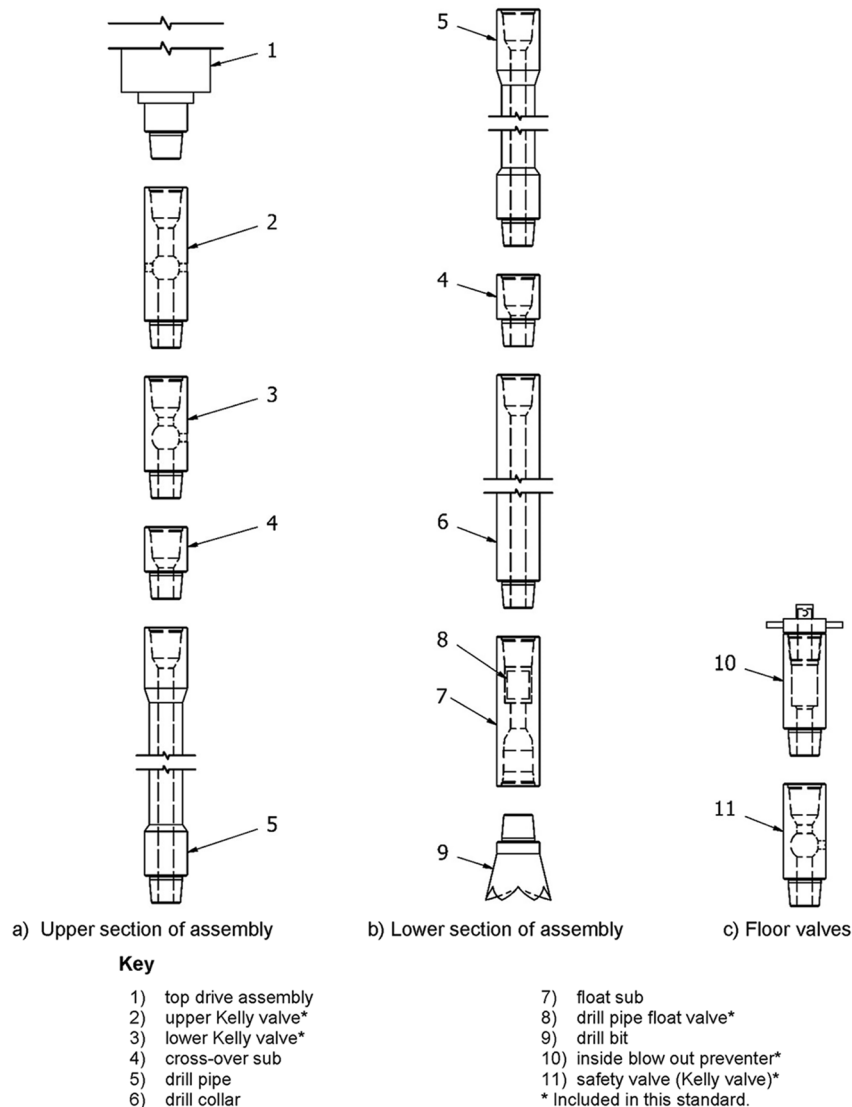


Figure 1—Drill Stem Assembly General Example

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 addenda) applies.

API Manual of Petroleum Measurement Standards (MPMS), Chapter 10.4, *Determination of Sediment and Water in Crude Oil by the Centrifuge Method (Field Procedure)*

API Recommended Practice 13B1, *Field Testing Water-Based Drilling Fluids*

API Specification 5B, *Threading, Gauging and Inspection of Casing and Tubing and Line Pipe Threads*

API Specification 7-1, *Drill Stem Elements*

API Specification 7-2, *Threading and Gauging of Rotary Shouldered Connections*

ASTM A370, *Standard test methods and definitions for mechanical testing of steel products*

ASTM E10, *Standard test method for Brinell hardness of metallic materials*

ASTM E18, *Standard test methods for Rockwell hardness and Rockwell superficial hardness of metallic materials*

ASTM E23, *Standard Test Methods for Notched Bar Impact Testing of Metallic Materials*

ASTM E709, *Standard Guide for Magnetic Particle Testing*

ASTM E1209, *Standard Practice for Fluorescent Liquid Penetrant Testing Using the Water-Washable Process*

ASTM E1219, *Standard Practice for Fluorescent Liquid Penetrant Testing Using the Solvent-Removable Process*

ASTM E1220, *Standard Practice for Visible Penetrant Testing Using Solvent-Removable Process*

ASTM E1418, *Standard Practice for Visible Penetrant Testing Using the Water-Washable Process*

ISO 17025, *General requirements for the competence of testing and calibration laboratories*

ASNT SNT TC-1A, *Personnel qualification and certification in non-destructive testing*

NACE MR0175/ISO 15156-1, *Petroleum and natural gas industries – Materials for use in H₂S-containing environments in oil and gas production*

3 Terms, Definitions, and Abbreviations

3.1 Terms and Definitions

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

3.1.1

batch lots

A group of items that are processed together with the same parameters and under the same conditions.

3.1.2

bit side

The side of DPFV intended to block pressure when the valve is closed.

NOTE Also known as “lower side”.

3.1.3

body

Structural component of the valve to which remaining components are attached directly or indirectly.

3.1.4

design acceptance criteria

Defined limits placed on characteristics of materials, products, or services established by the manufacturer to ensure conformance to the product design.

3.1.5

drill pipe float valve

DPFV

Downhole non-return safety valve that creates a barrier to prevent unwanted flow of fluids up the drill string.

NOTE Excludes sealing surfaces, i.e. float sub (not covered in this standard) in which the DPFV is installed.

3.1.6

flow velocity

Average rate of flow in the throat area.

3.1.7

heat lot

Pieces of steel with the same nominal dimensions and from a single heat which are subsequently heat treated as part of the same continuous operation or batch.

3.1.8

inside blowout preventer

IBOP

Device that can be installed in the drill string that acts as a check valve allowing drilling fluid to be circulated down the string but prevents back flow.

NOTE Also known as a gray valve.

3.1.9

job lot

A batch of items related to a specific manufacturing run.

3.1.10

kelly valve

Type of drill stem valve used to control flow out of the drill pipe.

NOTE Also referred to as a top drive valve or full-opening safety valve and are usually quarter-turn ball valves.

3.1.11

manufacturer

The principal entity in the design, fabrication, and furnishing of equipment who chooses to conform to this standard.

3.1.12

model

Equipment with unique internal parts and operating characteristics which differentiate it from other equipment of the same type.

3.1.13**multi-heat job lot**

A job lot that contains multiple heats.

3.1.14**production test**

Test performed to qualify an individual product after it has been manufactured.

NOTE Production tests are also known as functional tests.

3.1.15**service**

Environmental classification of where a valve is used.

3.1.16**shell test**

Outer pressure boundary test required for the valve.

3.1.17**type**

Valves with unique internal construction.

NOTE The flapper valve and plunger valve are examples of types.

3.1.18**throat**

The minimum cross-sectional area of flow normal to the central axis line of the float valve.

3.1.19**validation test**

Design test performed to qualify a size, type, seal material and model of valve for a specific class of service.

NOTE This does not pertain to production tests; see relevant section for specific requirements.

3.2 Abbreviations

API	American Petroleum Institute
DPFV	Drill pipe float valve
IBOP	Inside blow-out preventer
Min	Minimum
NDE	Nondestructive examination
OD	Outside diameter
REG	Regular

4 Drill Pipe Float Valve**4.1 General**

Valve sizes shall be divided into four groups as shown in [Table 1](#) and are further classified into three types as shown in [Figure 2](#). This is to allow for qualification of multiple sizes of the same type with a single test.

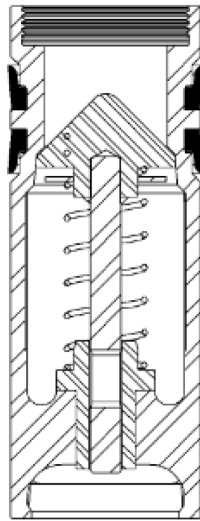
NOTE 1 Ported valves may be qualified by qualification of the same non-porting valve.

NOTE 2 All units in this document are only stated in U.S. customary units. If other units are used, it is the responsibility of the manufacturer to make appropriate conversions that conform to this standard.

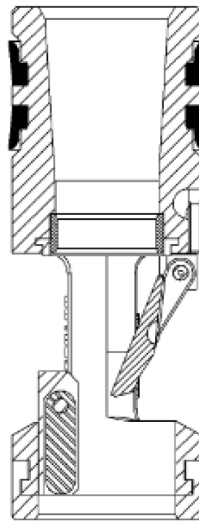
Table 1—DPFV Groups

Group	Min OD (in.)	Max OD (in.)	Valve Industry Label ^a
1	1.0	2.25	1R 1F-2R
2	> 2.25	3	2F-3R 3F
3	> 3	4.5	3- $\frac{1}{2}$ IF 4F 4R 5R
4	> 4.5	6.5	5F-6R 6F

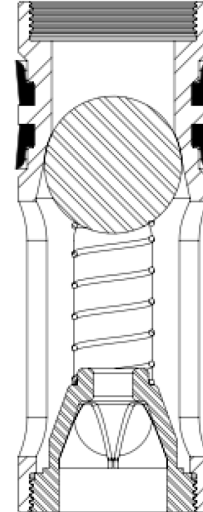
^a For information and use in ordering.



Type A: Dart/Plunger



Type B: Flapper



Type C: Ball

Figure 2—DPFV Types

4.2 Design Requirements

4.2.1 The documentation of designs shall include methods, assumptions, calculations, and design requirements.

Design requirements shall include, but not be limited to, those criteria for size, test and operating pressures, material, environmental, and other pertinent requirements upon which the design is based.

Design documentation shall be clear, legible, reproducible, and retrievable.

4.2.2 Requirement removed.

4.2.3 Changes to the design acceptance criteria that could affect validation test performance or interchangeability of DPFVs shall require requalification. Seals that have passed the applicable validation test requirements of [4.5](#) shall be treated interchangeably among the DPFVs of a manufacturer for a particular service and do not require requalification.