

API Specification

# 7-1

ISO 10424-1:2004 (Modified), Petroleum and natural gas industries—Rotary drilling equipment—Part 1: Rotary drill stem elements

First Edition, March 2006 –

Includes Addendums 1, 2 and 3

Specification for Rotary Drill Stem Elements

## 5.3 Connections

### 5.3.1 Size and type

All valves covered by this part of ISO 10424, shall be furnished by the manufacturer with end connections for pressure test verification. The preferred end connections on all valves are of the size and style indicated below for the valve type.

Connections stated on the purchase order that are not listed in the tables defined below for each valve type shall be considered as non-preferred (NPC) connections for these applications.

Non-preferred connections are not a part of this specification.

Preferred connections on upper kelly valves shall be of the size and type shown in Clause 6, Column 3 of Table 5 (Table A.5) and Table 7 (Table A.7) of this part of ISO 10424.

Preferred upper connections on lower kelly valves shall be of the size and type shown in Clause 6, Column 7 of Table 5 (Table A.5) and Table 7 (Table A.7) of this part of ISO 10424.

Preferred lower connections on lower kelly valves shall be of the size and type of any connection shown in Table 5 (Table A.5), Table 7 (Table A.7), Table 14 (Table A.14) and Table 23 (Table A.23) of this part of ISO 10424 and including the NC 40 and 6 5/8 FH.

Preferred connections on other drill stem safety valves connections shall be of the size and type of any connection shown in Table 5 (Table A.5), Table 7 (Table A.7), Table 14 (Table A.14) and Table 23 (Table A.23) of this part of ISO 10424 and including the NC 40 and 6 5/8 FH.

When connections are machined, the corresponding bevel diameters specified for the connection on the joining product shall be used.

Galling of rotary shouldered connections and sealing shoulders occurs frequently in field usage. Treating the shoulders and threads with a coating of zinc or manganese phosphate has proven to be beneficial in lessening this problem. Therefore a treatment of zinc or manganese phosphate shall be applied to the threads and the sealing shoulders of all end connections of kelly valves and other drill stem safety valves manufactured from standard steels. Application of the treatment shall be after completion of all gauging. The treatment type shall be at the discretion of the manufacturer.

Gall-resistant treatments are not readily available for non-magnetic materials, therefore are not required.

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Cold working of threads is optional. But purchaser should consider specifying cold working of threads after thread gauging. See 8.1.7.3 for further details.

Consult manufacturer for recommended make-up torques and combined load rating of end connections and any service connections supplied. (See API RP7G Appendix A for combined load rating calculations for API connections.)

### 5.3.2.2 Connections from standard steel

Connections manufactured from standard steel shall be examined by the wet magnetic-particle method. The examination shall be performed according to a written procedure developed by the manufacturer. The procedure shall be in accordance with ISO 9934-1 or ASTM E 709 and shall be made available to the purchaser on request.

### 5.3.2.3 Connections from non-magnetic material

Connections manufactured from non-magnetic steel shall be examined by liquid penetrant, using the visible or fluorescent solvent-removable or water-washable method. The examination shall be performed according to a written procedure developed by the manufacturer. The procedure shall be in accordance with ISO 3452 or ASTM E 1209, ASTM E 1219, ASTM E 1220 and ASTM E 1418 and shall be made available to the purchaser on request.

### 5.4.5 Design verification test for sealing temperature range

This applies to Class 2 type valves only and is only required for design verification purposes. Standard non-metallic seal systems are typically valid over the range  $-10\text{ }^{\circ}\text{C}$  ( $14\text{ }^{\circ}\text{F}$ ) to  $90\text{ }^{\circ}\text{C}$  ( $194\text{ }^{\circ}\text{F}$ ), so design verification testing shall be conducted with the valve and the test fluid at these temperature extremes, unless the purchaser specifies otherwise. Pressure testing shall be performed in accordance with 5.4.3 and 5.4.4 at both low and high temperatures, using suitable testing fluids for extreme temperature conditions.

### 5.5 Documentation and retention of records

The manufacturer shall maintain, and provide on request to the purchaser, documentation of inspection (dimensional, visual and non-destructive) and hydrostatic testing for each valve supplied. The manufacturer shall maintain documentation of performance verification testing for a period not less than 7 years after the last model is sold.

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## 5.7 Supplementary requirements

### 5.7.1 General

The following supplementary requirements for kelly valves and other types of drill-string safety valves shall apply by agreement between the purchaser and the manufacturer and when specified on the purchase order.

### 5.7.2 Supplemental requirement for gas-tight sealing

Kelly valves and other types of drill-stem safety valves have not historically been designed with gas-tight sealing mechanisms. Valves that are designed to operate under these conditions are known as gas-tight valves. See 5.7.3 for optional performance verification testing that may be requested as a supplemental requirement by purchaser to verify gas-tight sealing design and for routine acceptance testing for each gastight valve supplied.

### 5.7.3 Performance verification testing of gas-tight sealing

Supplemental performance verification testing of drill-stem safety valves designed and manufactured in accordance with this part of ISO 10424 shall be carried out and/or certified by a quality organization independent of the design function. Since leak-testing at high pressure is potentially more hazardous with gas than with fluids of low compressibility, gas testing at high pressure shall be restricted to performance verification testing. Nitrogen or other suitable non-flammable gas should be used at ambient-temperature conditions. Otherwise, testing at low and high pressures shall be conducted in accordance with 5.4.3. No gas bubbles shall be observed in a 5 min test period.

For each valve manufactured to the same specifications as a valve that has been designed and verified as being capable of gas-tight sealing, a gas test at low pressure to 0,62 MPa (90 psi), using ambient-temperature air, shall be performed in accordance with appropriate subclauses in 5.4.3. No gas bubbles shall be observed in a 5 min test period.

### 5.7.4 Supplemental requirements for H<sub>2</sub>S trim

If valve trim materials conform to the requirements of ISO 15156-2 and/or ISO 15156-3 for H<sub>2</sub>S service, at conditions specified by the manufacturer, then the valve shall be designated “H<sub>2</sub>S trim”. H<sub>2</sub>S trim may be requested as a supplemental requirement by the purchaser.

### 5.7.5 Supplemental marking

Supplemental performance verification testing information shall be applied in a separate milled recess.

Designations shall be used to indicate verified performance as follows:

a) successful gas-tight sealing supplemental testing: “Gas-tight”;

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b) H2S trim supplemental requirement: “H2S trim”.

## 9.1 Roller bits and blade drag bits

### 9.1.1 Size

Roller bits shall be furnished with sizes as specified on the purchase order. Blade drag bits shall be furnished in the sizes specified on the purchase order.

## 10 Heavy Weight Drill Pipe (HWDP)

### 10.1 General

This standard covers the manufacturing specifications of heavy weight drill pipe that is most commonly utilized in bottom-hole assemblies. This product should not be confused with heavy wall (or heavy weight) drill pipe manufactured to meet API Spec 5D. It should be understood that the materials specified herein are generally not regarded as suitable for sour service or other highly corrosive drilling conditions, and the User is advised to take this into account when initiating purchase agreements for heavy weight drill pipe if such drilling conditions are anticipated.

#### 10.1.7.2 Connection stress relief features

Stress relief features are optional. When specified in the purchase agreement, stress relief features complying with the dimensions specified in API Spec 7 shall be provided.

#### 10.1.7.3 Cold working of thread roots

When specified in the purchase agreement, cold working of thread roots shall be provided. Method of cold working is optional with the manufacturer.

## 11.3 Surface defects

### 11.3.1 Outside-surface-breaking defects

The outside surface of each standard steel bar or tube shall be inspected for defects. The preferred methods are either the ultrasonic (UT) or magnetic particle (MT) methods. As an option, other methods (such as eddy current) may be used, providing it can be demonstrated that the system and procedures are capable of detecting indications described in Table 16.

Inspection of the outside surface of non-magnetic bars and tubes is not required if the outside surface has been machined. However, by agreement between the manufacturer and purchaser it may be performed. If it is deemed desirable to inspect the outside surface of non-magnetic

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bars, the surface shall be inspected by either the ultrasonic (UT) or liquid-penetrant (PT) method.

The method used for outside-surface inspection shall be at the discretion of the manufacturer.

## 12.5 Abrasion protection

The crown surface of the stabilizer shall be provided with protection against abrasion. The protection method is optional to the manufacturer unless specified by the purchaser and is outside the scope of this standard. However, a documented procedure for applying this protection shall exist (WPS for welded hard-facing), and welders or welding machines shall have documented qualification (WQR) to this procedure.

### 12.6.5 Blade spiral

The spiral shall be as defined on the purchase order, and interpreted according to Table 36. Unless otherwise specified, the spiral shall be right-hand.

## 12.8 Customer information

### 12.8.1 Required information from customer

- a) Stabilizer type: String or near-bit
- b) Integral or welded
- c) Stabilizer (blade) diameter
- d) Wrap: Tight Spiral, Full Spiral, Open Spiral or Straight
- e) Neck size and connections

### 12.8.2 Optional requirements

- a) Connection Stress Relief features, per ISO 10424-2 (API Spec 7-2)
- b) Connection cold working
- c) Connection surface treatment (optional for non-magnetic only)
- d) Non-magnetic
- e) Abrasion protection type
- f) Left hand spiral
- g) Float valve recess on near-bit stabilizer